B 9

```
NNN         NNN  EEEEEEEEEEEEEEE  TTTTTTTTTTTTTTT     AAAAAAAAA        CCCCCCCCCCCC  PPPPPPPPPPPP
NNN         NNN  EEEEEEEEEEEEEEE  TTTTTTTTTTTTTTT     AAAAAAAAA        CCCCCCCCCCCC  PPPPPPPPPPPP
NNN         NNN  EEEEEEEEEEEEEEE  TTTTTTTTTTTTTTT     AAAAAAAAA        CCCCCCCCCCCC  PPPPPPPPPPPP
NNN         NNN  EEE                    TTT        AAA         AAA  CCC              PPP         PPP
NNN         NNN  EEE                    TTT        AAA         AAA  CCC              PPP         PPP
NNN         NNN  EEE                    TTT        AAA         AAA  CCC              PPP         PPP
NNNNNN      NNN  EEE                    TTT        AAA         AAA  CCC              PPP         PPP
NNNNNN      NNN  EEE                    TTT        AAA         AAA  CCC              PPP         PPP
NNNNNN      NNN  EEE                    TTT        AAA         AAA  CCC              PPP         PPP
NNN   NNN   NNN  EEEEEEEEEEEE           TTT        AAA         AAA  CCC              PPPPPPPPPPPP
NNN   NNN   NNN  EEEEEEEEEEEE           TTT        AAA         AAA  CCC              PPPPPPPPPPPP
NNN   NNN   NNN  EEEEEEEEEEEE           TTT        AAA         AAA  CCC              PPPPPPPPPPPP
NNN      NNNNNN  EEE                    TTT        AAAAAAAAAAAAAAA  CCC              PPP
NNN      NNNNNN  EEE                    TTT        AAAAAAAAAAAAAAA  CCC              PPP
NNN      NNNNNN  EEE                    TTT        AAAAAAAAAAAAAAA  CCC              PPP
NNN         NNN  EEE                    TTT        AAA         AAA  CCC              PPP
NNN         NNN  EEE                    TTT        AAA         AAA  CCC              PPP
NNN         NNN  EEE                    TTT        AAA         AAA  CCC              PPP
NNN         NNN  EEEEEEEEEEEEEEE        TTT        AAA         AAA     CCCCCCCCCCCC  PPP
NNN         NNN  EEEEEEEEEEEEEEE        TTT        AAA         AAA     CCCCCCCCCCCC  PPP
NNN         NNN  EEEEEEEEEEEEEEE        TTT        AAA         AAA     CCCCCCCCCCCC  PPP
```

```
                                             G 2
**FILE**ID**NETDLLTRN
```

```
NN      NN  EEEEEEEEEE  TTTTTTTTTT  DDDDDDDD    LL          LL          TTTTTTTTTT  RRRRRRRR    NN      NN
NN      NN  EEEEEEEEEE  TTTTTTTTTT  DDDDDDDD    LL          LL          TTTTTTTTTT  RRRRRRRR    NN      NN
NN      NN  EE              TT      DD      DD  LL          LL              TT      RR      RR  NN      NN
NN      NN  EE              TT      DD      DD  LL          LL              TT      RR      RR  NN      NN
NNNN    NN  EE              TT      DD      DD  LL          LL              TT      RR      RR  NNNN    NN
NNNN    NN  EE              TT      DD      DD  LL          LL              TT      RR      RR  NNNN    NN
NN  NN  NN  EEEEEEEE        TT      DD      DD  LL          LL              TT      RRRRRRRR    NN  NN  NN
NN  NN  NN  EEEEEEEE        TT      DD      DD  LL          LL              TT      RRRRRRRR    NN  NN  NN
NN    NNNN  EE              TT      DD      DD  LL          LL              TT      RR  RR      NN    NNNN
NN    NNNN  EE              TT      DD      DD  LL          LL              TT      RR  RR      NN    NNNN
NN      NN  EE              TT      DD      DD  LL          LL              TT      RR    RR    NN      NN      ....
NN      NN  EE              TT      DD      DD  LL          LL              TT      RR    RR    NN      NN      ....
NN      NN  EEEEEEEEEE      TT      DDDDDDDD    LLLLLLLLLL  LLLLLLLLLL      TT      RR      RR  NN      NN      ....
NN      NN  EEEEEEEEEE      TT      DDDDDDDD    LLLLLLLLLL  LLLLLLLLLL      TT      RR      RR  NN      NN      ....

LL            IIIIII      SSSSSSSS
LL            IIIIII      SSSSSSSS
LL              II      SS
LL              II      SS
LL              II      SS
LL              II      SS
LL              II        SSSSSS
LL              II        SSSSSS
LL              II              SS
LL              II              SS
LL              II              SS
LL              II              SS
LLLLLLLLLL    IIIIII    SSSSSSSS
LLLLLLLLLL    IIIIII    SSSSSSSS
```

Table of contents

```
0000          .TITLE  NETDLLTRN  - Routing & Datalink control layer
0000          .IDENT  'V04-000'
0000          .DEFAULT DISPLACEMENT,LONG
0000
0000  ;****************************************************************************
0000  ;*                                                                          *
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0000  ;*                                                                          *
0000  ;****************************************************************************
0000  ;
0000
0000
0000  ;++
0000  ; FACILITY:      NETWORK ACP
0000  ;
0000  ; ABSTRACT:
0000  ;
0000  ;
0000  ; ENVIRONMENT:
0000  ;
0000  ;       Kernel mode
0000  ;
0000  ; AUTHOR:        A.Eldridge, CREATION DATE: 11-APR-80
0000  ;
0000  ; MODIFIED BY:
0000  ;
0000  ;       V040    TMH0040         Tim Halvorsen   20-Jul-1984
0000  ;               Fix code which accidentally drops an area routing message
0000  ;               on a point-to-point circuit when it is received before the
0000  ;               circuit can be changed into the "run" state (this is a
0000  ;               race condition, and will occur whenever the remote node
0000  ;               is faster, and can send routing messages quickly after
0000  ;               node initialization; e.g. RSX).  The symptoms are that
0000  ;               the remote area is "unreachable" for up to 3 minutes,
0000  ;               even though the circuit has initialized.
0000  ;
0000  ;       V039    TMH0039         Tim Halvorsen   24-May-1984
0000  ;               Remove CANCEL on DLM circuits during shutdown (TMH0036)
0000  ;               which turned out to act like a DEACCESS, and removed all
0000  ;               X.25 level 3 knowledge of the outstanding reset status,
0000    ;               putting the circuit into a stuck state.
0000    ;               Only issue an PVC ACCESS once in the life of the circuit,
0000    ;               meaning that circuit re-initialization due to a remote RESET
0000    ;               will just issue a RESET-CONFIRM and transmit a "Start" msg.
0000    ;               Just issue a "reset confirm" when we get notification of an
0000    ;               incoming reset message - the failed receive IRP will be
0000    ;               sufficient mechanism for recycling the circuit.  (This
0000    ;               obsoletes ACT_RUN_RESET).
0000    ;               When exiting the run state for any reason (like either
0000    ;               software error or remote reset), issue a reset message to
0000    ;               the remote side to ensure that it recycles thru node init.
0000    ;               Minimize the computation of the Square Root Limit result with
0000    ;               the maximum allowed value of 127.
0000    ;
0000    ;       V038    TMH0038         Tim Halvorsen   22-Apr-1984
0000    ;               Wait a few seconds after circuit initialization before
0000    ;               declaring ourself the designated router.  This is so that
0000    ;               we give some time to receive Router Hello messages from
0000    ;               remote nodes which might have a higher priority than us.
0000    ;               When the decision algorithm can't decide between two paths
0000    ;               of equal cost, use the highest node address of the adjacent
0000    ;               nodes as the tiebreaker.
0000    ;
0000    ;       V037    RNG0037         Rod Gamache     7-Feb-1984
0000    ;               Fix problem where if 2 Level II routers where in different areas
0000    ;               and there are no other nodes in their respective areas, then
0000    ;               the remained "unreachable"! This has to do with the fact that
0000    ;               the RTG_CHG flag never got set, so the decision algorithm was
0000    ;               never run.
0000    ;
0000    ;       V036    TMH0036         Tim Halvorsen   15-Sep-1983
0000    ;               When a X.25 reset mailbox message is received while doing
0000    ;               PVC_START initialization, ignore it, since PVC_START always
0000    ;               does a "reset confirm" as the last thing it does.  This
0000    ;               prevents a duplicate Reset from being sent, and prevents
0000    ;               aborting the remote side's node initialization if it gets
0000    ;               it after starting node init.
0000    ;
0000    ;               When a X.25 reset mailbox message is received during node
0000    ;               init, restart the entire node init process, rather than
0000    ;               ignoring it, since it is possible that a node init message
0000    ;               got lost in the PVC reset.
0000    ;
0000    ;               Issue CANCEL on DLM circuits during shutdown to clean up
0000    ;               outstanding PSI requests, such as outstanding resets.
0000    ;
0000    ;               Fix code which accidentally drops a routing message on a
0000    ;               point-to-point circuit when it is received before the
0000    ;               circuit can be changed into the "run" state (this is a
0000    ;               race condition, and will occur whenever the remote node
0000    ;               is faster, and can send routing messages quickly after
0000    ;               node initialization; e.g. RSX).  The symptoms are that
0000    ;               the remote node is "unreachable" for up to 3 minutes,
0000    ;               even though the circuit has initialized.
0000    ;
0000    ;       V035    TMH0035         Tim Halvorsen   11-Jul-1983
0000    ;               Support alias local addresses (cluster addresses) by
```

```
0000   ;             zeroing the cost/hops entry for that address in routing
0000   ;             messages.
0000   ;
0000   ;     V034    TMH0034         Tim Halvorsen   06-Jun-1983
0000   ;             Detect null passwords from RSX Phase III nodes, which
0000   ;             are sent as 8 bytes of 0, rather than a 0 byte string.
0000   ;
0000   ;     V033    TMH0033         Tim Halvorsen   25-May-1983
0000   ;             Fix BC circuit rundown so that it calls DLE$BC_DOWN
0000   ;             even though we are an endnode.  Previously, if we were
0000   ;             an endnode, it was skipping the call and leaving the
0000   ;             channels assigned, preventing further service functions.
0000   ;             Use our own node type (in the LPD) to determine what kind
0000   ;             of message to send, rather than using the remote node's type
0000   ;             and jamming his type to support TRANSPORT TYPE.  This is
0000   ;             basically a cleanup of the logic, and should not change
0000   ;             the effective algorithm.
0000   ;             Fix bug in forced phase resynchronization which caused our
0000   ;             side to "act" as the same type as the remote node if we receive
0000   ;             his start msg before successfully initiating the transmission
0000   ;             of our start msg.
0000   ;
0000   ;     V032    TMH0032         Tim Halvorsen   17-May-1983
0000   ;             Fix bug in version checking in the error path which
0000   ;             crashes the system.
0000   ;
0000   ;     V031    TMH0031         Tim Halvorsen   06-May-1983
0000   ;             Fix bug in endnode decision algorithm which prevented
0000   ;             endnodes from talking to other endnodes over point-to-point
0000   ;             circuits.
0000   ;
0000   ;     V030    TMH0030         Tim Halvorsen   26-Apr-1983
0000   ;             Log "dropped by adjacent node" when we receive an
0000   ;             "I'm going away" RHEL from a remote node.
0000   ;             Require verification passwords from Phase III nodes
0000   ;             during point-to-point node init. to prevent accidental
0000   ;             "merging" of area address spaces via an intermediate
0000   ;             Phase III node between them.
0000   ;
0000   ;     V029    RNG0029         Rod Gamache     20-Apr-1983
0000   ;             Fix branch destinations out of range.
0000   ;
0000   ;     V028    TMH0028         Tim Halvorsen   06-Apr-1983
0000   ;             Fix code which attempts to ignore Transport data packets
0000   ;             when parsing messages from new adjacencies.
0000   ;             Allow no more than 20 outstanding transmits (of routing msgs)
0000   ;             on an NI circuit, to prevent queue pileup of a stuck datalink,
0000   ;             and to prevent too much storage from being tied up in such a
0000   ;             condition.
0000   ;             Remove some obsolete symbols.
0000   ;             If NBRA is exceeded when trying to add a new BRA, then eject
0000   ;             the lowest priority BRA (rather than simply ignoring the new
0000   ;             BRA).  This way, all BRAs eject the same node from the
0000   ;             "cluster" of BRAs.  Log "adjacency rejected" when a BRA is
0000   ;             thrown out due to the database being full.
0000   ;             Log "address change" reason when a remote adjacency is detected
0000   ;             to have recycled, rather than "listener timeout".
```

```
0000    ;
0000    ;       V027    TMH0027         Tim Halvorsen   02-Mar-1983
0000    ;               Completely rewrite DLE handling.
0000    ;               Fix bug which caused BUFFAIL conditions to leave an LPD
0000    ;               in the off-synchronizing state if the last message sent
0000    ;               to the ACP for the LPD was ignored.
0000    ;               Force the cost/hops to infinity when the area becomes
0000    ;               unreachable, to speed up process of an area going away.
0000    ;               Set flag in RCB if we are allowed to use level 2 routing
0000    ;               or not - set false if we detect ourselves to be an isolated
0000    ;               area router.
0000    ;               Do not allow transport type other than Phase IV on broadcast
0000    ;               circuits.
0000    ;               Adapt to Phase III endnodes properly by acting as a Phase
0000    ;               III router (rather than a Phase III endnode).
0000    ;               Change size of hello timer in Start, RHEL and EHEL messages
0000    ;               to be a word rather than a byte, and add temporary code to
0000    ;               continue to receive messages in the old format (1 byte hello).
0000    ;               Remove code to parse/save seed value from messages.  It is
0000    ;               never looked at.
0000    ;               Send "I'm going away" message (empty RHEL) when a BC circuit
0000    ;               is manually turned off.
0000    ;               Fix code which attempts to allow more than one area to coexist
0000    ;               on the NI by disallowing level2-level1 connections, by dropping
0000    ;               level 1 routing messages from other areas even if we're an area
0000    ;               router, and by discounting nodes in other areas while electing
0000    ;               a designated router.
0000    ;               Rather than sending out RHELs every second if there is at least
0000    ;               one 1-way connection, send out RHELs only if it has changed
0000    ;               since the last time we sent one.  This prevents RHELs every
0000    ;               second in the event that a connection is stuck in 1-way mode.
0000    ;               Remove incorrect check which required a remote Phase IV router
0000    ;               to have it's block size large enough to hold an entire routing
0000    ;               message - this check should only be done for Routing III nodes.
0000    ;               Remove obsolete XMT_RESTR mechanism - it assumed that incorrect
0000    ;               implementations of Phase III nodes could accept a Phase IV
0000    ;               start because it looked like a Phase III start.  This is not
0000    ;               the case - Phase IV node numbers make them unacceptable to any
0000    ;               Phase III node.
0000    ;               Dally for a few seconds before sending the initial start msg.
0000    ;               This gives us a chance to hear the remote node's start message,
0000    ;               and figure out what he is, before sending him a Phase IV msg
0000    ;               he may not like (some implementations can't handle Phase IV
0000    ;               messages, even to ignore them).
0000    ;               Remove code which "remembers" the remote node's type over a
0000    ;               circuit recycle.  This was the old method of phase resynch,
0000    ;               but was error prone when patching different systems of
0000    ;               different types into the same line.
0000    ;
0000    ;       V026    TMH0026         Tim Halvorsen   24-Jan-1983
0000    ;               Fix bug which prevented forced Phase III circuits to
0000    ;               endnodes from correctly detecting the remote node as
0000    ;               a Phase III endnode.
0000    ;               Allow LPD to be set as a Phase III endnode, so that
0000    ;               we can adapt to remote Phase III routers as an endnode.
0000    ;               This means changing all endnode checks to check for both
0000    ;               Phase III and Phase IV endnode node types.
```

```
0000  ;               Fix bug in code which tries to prevent sending of routing
0000  ;               messages for forced-endnode circuits - wasn't clearing
0000  ;               the work flag, and we went into an infinite loop.
0000  ;               Init cell in LPD which gives the datalink buffer size
0000  ;               and use it throughout, rather than the RCB value.  This
0000  ;               is so that datalink buffer sizes can be variable depending
0000  ;               on the datalink's route header.
0000  ;               Remove any maximum on a circuit's "input packet limiter".
0000  ;               Fix bug in computation of "nearest level 2 router" that
0000  ;               was causing it to be wiped out on partial decision
0000  ;               algorithms.
0000  ;               If the MAXIMUM WINDOW parameter is specified, then use it
0000  ;               as the input packet limiter for non-X.25 circuits.  This
0000  ;               essentially expands the usage of MAXIMUM WINDOW to both
0000  ;               X.25 and non-X.25 circuits.
0000  ;               Add endnode key support.
0000  ;               Prevent transport-type from being set to a router if
0000  ;               the executor is set to an endnode.
0000  ;               Add code to toggle a DMC line on listener timeouts.
0000  ;               Fix forced-phase III circuits to correctly ignore messages
0000  ;               with versions higher than phase III, so that node init
0000  ;               with higher version nodes works correctly.
0000  ;
0000  ;       V025    TMH0025         Tim Halvorsen   08-Jan-1983
0000  ;               Add Decision Update Vector which gets updated any time
0000  ;               a routing message is received which is different than
0000  ;               the last one we heard from the same place.  It is used
0000  ;               to limit the number of nodes which need to be looked
0000  ;               at in the Decision algorithm.
0000  ;               Fix loopback check for forced Phase II links to work
0000  ;               (it was broken by areas in the local address).
0000  ;               Journal new records at the start and finish of the
0000  ;               decision algorithm, so routing analysis can be done.
0000  ;               Journal all messages written directly to the datalink
0000  ;               via QIO from this routine.
0000  ;               Remove restriction that prevents a Phase II circuit
0000  ;               from initializing if the partner node is already
0000  ;               reachable in another part of the network.  This was
0000  ;               a restriction needed for the Phase II routing architecture,
0000  ;               and is no longer applicable for the current needs of
0000  ;               Phase II circuits.
0000  ;
0000  ;       V024    TMH0024         Tim Halvorsen   17-Dec-1982
0000  ;               Re-arrange received message dispatching to locate the
0000  ;               CNF, LPD and ADJ blocks before parsing the message.
0000  ;               Ignore all messages on NI from another area if we
0000  ;               are a level 2 router.
0000  ;               Fix circuit re-cycling, so that startup attempts wait
0000  ;               for NETDRIVER's IRPCNT in the LPD to go to zero before
0000  ;               recycling.  Prevents late breaking CRDs from interrupting
0000  ;               the next circuit startup attempt, resulting in TWO line
0000  ;               synchronization lost events.
0000  ;               Fix calculation of routing update loss for Phase IV
0000  ;               route messages, so that it correctly uses the highest
0000  ;               reachable node, rather than the highest unreachable
0000  ;               node.
0000  ;
```

```
0000  ;       V023    TMH0023         Tim Halvorsen   01-Dec-1982
0000  ;               Disable listen timer for Phase II links, since Phase
0000  ;               II didn't have any mandatory hello timer.
0000  ;               Make RECALL TIMER parameter work for all types of
0000  ;               circuits, to give control over Initialization retry
0000  ;               attempts.  Increase size of default interval from 3
0000  ;               seconds to 10 seconds to cut down on overhead when
0000  ;               a datalink goes down, especially if the datalink is
0000  ;               going up and down continuously.
0000  ;
0000  ;       V022    TMH0022         Tim Halvorsen   13-Oct-1982
0000  ;               Select incoming DLM circuits by DTE address,
0000  ;               if specified on the incoming circuits.
0000  ;               Fix so that a full routing message is sent
0000  ;               when a new BRA enters the run state (propagating
0000  ;               the database very quickly for the new node).  This
0000  ;               is done by the existing BRA, because the new BRA's
0000  ;               "request for routing info" (a routing msg) may have
0000  ;               been dropped by all routers while waiting for 2-way
0000  ;               communication to be established.
0000  ;               Add area routing support.
0000  ;               Fix bug which prevents values of MAX RECALLS greater
0000  ;               than 127 from working (sign bit was being tested).
0000  ;               Fix bug in outgoing calls which constructed an illegal
0000  ;               PSI NCB if either the WINDOW SIZE or MAXIMUM DATA were
0000  ;               specified.
0000  ;               Change order of "MOP detected" events, so that line synch.
0000  ;               lost comes out before remotely initiated state change.
0000  ;               Set the local cost/hops for endnodes to 0, since the
0000  ;               decision algorithm is never run (which does it normally).
0000  ;               Only reset partner node type every other startup attempt,
0000  ;               so that if a startup attempt fails due to wrong version,
0000  ;               then the next one will start with the right version.
0000  ;               Force the cost/hops to infinity when the node becomes
0000  ;               unreachable, to speed up process of node going away.
0000  ;
0000  ;       V021    TMH0021         Tim Halvorsen   26-Sep-1982
0000  ;               Do not allow BLOCKING parameter to be specified,
0000  ;               since we don't currently support X.25 blocking.
0000  ;               Add endnode support.
0000  ;               Fix bug in point-to-point initialization with
0000  ;               endnodes.
0000  ;
0000  ;       V020    TMH0020         Tim Halvorsen   20-Sep-1982
0000  ;               Fix "phase resynchronization", so that if we are the
0000  ;               higher phase, then process the start message received
0000  ;               from the other side (since the lower phase won't ever
0000  ;               retransmit it).
0000  ;               Allow "late arrival" of start and verification messages
0000  ;               to take care of phase resynchronization problems.
0000  ;               Fix bug in endnode handling which caused crash when
0000  ;               the endnode came up.
0000  ;
0000  ;       V019    TMH0019         Tim Halvorsen   30-Aug-1982
0000  ;               Fix DLE cancel, so that it correctly causes the XWB
0000  ;               to be aborted (prevents consistency bugcheck) by using
0000  ;               the full path ID, rather than the LPD index in all cases.
```

```
0000    ;               Fix transport resynchronization, so that the start message
0000    ;               is not reset if we receive a higher phase start, but only
0000    ;               if we "lower" our start phase (essentially entering
0000    ;               compatibility mode).
0000    ;               Fix so that Phase II nodes are not included in Phase IV
0000    ;               routing messages (and clean up the code a little by removing
0000    ;               Phase II "OL vector" and using the adjacency block instead).
0000    ;               Allow Phase II node init from a node address greater
0000    ;               than 241 (up to the phase III limit of 255) to allow
0000    ;               "forced phase II" gateways using "hidden nodes".
0000    ;
0000    ;       V018    TMH0018         Tim Halvorsen   02-Jul-1982
0000    ;               Don't ever modify the LPD$V_ACTIVE flag - that flag
0000    ;               is only to be modified by NETDRIVER, since it is used
0000    ;               as a flag to decide whether the IRP_DOWN signal needs
0000    ;               to be sent to the ACP or not.
0000    ;               Fix bug in code which toggles the line off and on when
0000    ;               a fatal controller error is detected by the circuit.
0000    ;               It was causing circuits to stay in the synchronizing
0000    ;               substate, rather than restarting themselves.
0000    ;               Change psect name on DLLTRN state table, so that it is
0000    ;               mapped after the main body of the ACP code and data.
0000    ;               Add support for broadcast circuits (UNA).
0000    ;               Change routines which reference local LPD and which scan
0000    ;               LPD vector to use new LPD vector, which is a vector of
0000    ;               longword pointers to the actual LPD blocks.  Change the
0000    ;               code which allocates LPD slots, to actually allocate an
0000    ;               LPD structure from non-paged pool, and insert it's address
0000    ;               into the LPD pointer vector.
0000    ;               Remove the cost/hops matrix, and instead, allocate a cost/
0000    ;               hops buffer for each LPD as it gets initialized, and store
0000    ;               the address of each cost/hops buffer into a new vector,
0000    ;               based on LPD index.
0000    ;               Remove DLL_COST vector, and instead, store and retreive
0000    ;               the circuit cost from the LPD block.
0000    ;               Add code to support adjacencies in conjunction with NETDRIVER.
0000    ;               Add check to ensure that NUMBER is specified with OUTGOING DLM
0000    ;               X.25 circuits.
0000    ;               Add missing code to pass the maximum window and maximum packet
0000    ;               size to PSI when making an outgoing DLM call.
0000    ;               Change calling interface to PROC_EVT and DLL_PRC_WQE so that
0000    ;               R1 doesn't have to be set to the event longword.
0000    ;
0000    ;       V017    TMH0017         Tim Halvorsen   28-Jun-1982
0000    ;               Enable use of X.25 datagrams by NETDRIVER.
0000    ;               Store PSI UCB address in LPD for DLM circuits.
0000    ;               Do not touch IOST2 field in X.25 IRP, but assume
0000    ;               that the datalink has gone down.
0000    ;
0000    ;       V016    TMH0016         Tim Halvorsen   25-Mar-1982
0000    ;               Fix bug in parsing of node address field for Phase II and
0000    ;               Phase III messages.
0000    ;               Heavily comment this module and add subtitles.
0000    ;               Fix psect naming conventions.
0000    ;               Remove all explicit displacement specifiers from operands
0000    ;               and make default displacement = word for the entire module.
0000    ;               Remove X state, which used to wait for a SHUTDOWN to complete,
0000  ;                      but the W state already does this.
0000  ;                      Remove transition which causes SHUTDOWN to be re-issued if
0000  ;                      a new access comes in.
0000  ;                      Get rid of CND_SHUT (action routine 7), change all references
0000  ;                      of CND_SHUT to a new redefined action routine 2 (CND_STRT),
0000  ;                      which issues a startup QIO if ASTCNT is zero.
0000  ;                      Remove IRP_EVT event, which was used to dispatch to IRP_DOWN
0000  ;                      or IRP_MM, based on the contents of the IRP.  Now, this
0000  ;                      dispatching is done upon immediately receiving the IRP.
0000  ;                      Remove obsolete CNF_CRI event - no longer referenced.
0000  ;                      Get rid of ACT_RCV_STRTIM (action routine 3), and cleanup
0000  ;                      the timer events to eliminate needless chaining.
0000  ;                      Cleanup I/O timer code.
0000  ;                      Add X.25 datalink support.
0000  ;                      Remove RCV_UNK event, since it didn't do anything.
0000  ;                      Log "packet format error" if we get an unrecognized message.
0000  ;                      Change ACT_ENT_MOP to log the event 5.0 or 5.1 (datalink
0000  ;                      state change) when we go into MOP mode.
0000  ;                      Log "aborted service request, line open error" if we are
0000  ;                      unable to create the detached NML process to handle remotely
0000  ;                      initiated service functions.
0000  ;-
```

```
                  0000    423         .SBTTL  Declarations
                  0000    424 ;
                  0000    425 ; INCLUDE FILES:
                  0000    426 ;
                  0000    427         $CCBDEF
                  0000    428         $CNFDEF
                  0000    429         $CXBDEF
                  0000    430         $NFBDEF
                  0000    431         $NMADEF
                  0000    432         $DDTDEF
                  0000    433         $DEVTRNDEF
                  0000    434         $DLLQIODEF
                  0000    435         $EVCDEF
                  0000    436         $IRPDEF
                  0000    437         $LPDDEF
                  0000    438         $ADJDEF
                  0000    439         $MSGDEF
                  0000    440         $NETMSGDEF
                  0000    441         $NETSYMDEF
                  0000    442         $NETUPDDEF
                  0000    443         $NSPMSGDEF                ; DNA architecture definitions
                  0000    444         $RCBDEF
                  0000    445         $UCBDEF
                  0000    446         $WQEDEF
                  0000    447         $XMDEF
                  0000    448         $PSIDEF                   ; PSI user definitions (for PSI NCB structure)
                  0000    449
                  0000    450 ;
                  0000    451 ;  EQUATED SYMBOLS
                  0000    452 ;
        00000000  0000    453 FDT_LEGAL  = 0                    ; FDT offset to legal functions
        00000008  0000    454 FDT_IOTYPE = 8                    ; FDT offset to function type (buffer/direct)
                  0000    455
        000000B4  0000    456 TR$C_TIM_DLLIO  = 3*60            ; ACP datalink I/O timeout period (sec)
        0000000A  0000    457 TR$C_TIM_RESTRT = 10              ; Transport Init retry interval (sec)
        00000002  0000    458 TR$C_TIM_DALLY  = 2               ; Dally for 2 seconds before sending start
                  0000    459                                   ; msg for resynch with dumb Phase III nodes
        00000005  0000    460 TR$C_TIM_DRDELAY = 5              ; Wait at least 5 seconds before declaring
                  0000    461                                   ; ourself "designated router" to give us time
                  0000    462                                   ; to hear from other routers on the NI.
                  0000    463
                  0000    464 ;
                  0000    465 ;  Define Phase IV Transport message symbols
                  0000    466 ;
        0000000B  0000    467 TR4C_MSG_RHEL   =   ^B00001011    ; Phase IV Router Hello message
        0000001B  0000    468 TR4C_RHEL_LNG   =           27    ; Length of fixed portion of message
        000000EC  0000    469 TR4C_MAX_RSLIST =          236    ; Maximum size of R/S list
        00000000  0000    470 TR4V_RS_PRIO    =            0    ; Start of router priority field in R/S LIST
        00000006  0000    471 TR4S_RS_PRIO    =            6    ; Length of field
        00000007  0000    472 TR4V_RS_TWOWAY  =            7    ; flag set if 2-way communication with  outer
                  0000    473
        0000000D  0000    474 TR4C_MSG_EHEL   =   ^B00001101    ; Phase IV Endnode Hello message
        00000020  0000    475 TR4C_EHEL_LNG   =           32    ; Length of fixed portion of message
                  0000    476
        00000001  0000    477 TR4C_MSG_STR    =   ^B00000001    ; Start message type code
        0000000C  0000    478 TR4C_STR_LNG    =           12    ; Fixed start message length
        00000000  0000    479 TR4V_REQ_NTY    =            0    ; Start of TLINFO field specifying node type
```

```
00000002  0000  TR4S_REQ_NTY    =            2   ; Length of the field
00000001  0000  TR4C_NTY_ARO    =            1   ; Field value for area routing nodes
00000002  0000  TR4C_NTY_ROU    =            2   ; Field value for routing nodes
00000003  0000  TR4C_NTY_NROU   =            3   ; Field value for non-routing nodes
00000002  0000  TR4V_REQ_VRF    =            2   ; TIINFO bit - set if verification is requested
          0000
00000003  0000  TR4C_MSG_VRF    =  ^B00000011    ; Verification message type code
00000004  0000  TR4C_VRF_LNG    =            4   ; Length of fixed portion of verfication msg
00000044  0000  TR4C_VRF_MXL    =           68   ; Verification message max length
00000040  0000  TR4C_MAX_PSW    =           64   ; Maximum password text length
          0000
00000009  0000  TR4C_MSG_ART    =  ^B00001001    ; Area routing message type code
00000006  0000  TR4C_ART_LNG    =            6   ; Length of fixed portion of routing message
          0000
00000007  0000  TR4C_MSG_RT     =  ^B00000111    ; Routing message type code
00000006  0000  TR4C_RT_LNG     =            6   ; Length of fixed portion of routing message
00000000  0000  TR4V_RT_COST    =            0   ; Begining of COST field
0000000A  0000  TR4S_RT_COST    =           10   ; Size of COST field
0000000A  0000  TR4V_RT_HOPS    =           10   ; Begining of HOPS field
00000005  0000  TR4S_RT_HOPS    =            5   ; Size of HOPS field
          0000
00000006  0000  TR4C_MSG_ENH    =  ^B00000110    ; Phase IV endnode data packet - always ignored here
          0000
00000002  0000  TR4C_TIVER      =    ^X000002    ; Phase IV version = 2.0.0
00000002  0000  TR4C_T3MULT     =            2   ; Hello/listen factor for non-broadcast circuits
00000003  0000  TR4C_BCT3MULT   =            3   ; Hello/listen factor for broadcast circuits
          0000
          0000  ;
          0000  ;  Define Phase III Transport message symbols
          0000  ;
00000001  0000  TR3C_MSG_STR    =  ^B00000001    ; Start message type code
0000000A  0000  TR3C_STR_LNG    =           10   ; Fixed start message length
00000009  0000  TR3C_STR_RSXL   =            9   ;!RSX work around
00000000  0000  TR3V_REQ_NTY    =            0   ; Start of TLINFO field specifying node type
00000002  0000  TR3S_REQ_NTY    =            2   ; Length of the field
00000002  0000  TR3C_NTY_PH3    =            2   ; Field value for routing nodes
00000003  0000  TR3C_NTY_PH3N   =            3   ; Field value for non-routing nodes
00000002  0000  TR3V_REQ_VRF    =            2   ; TLINFO bit - set if verification is requested
          0000
00000003  0000  TR3C_MSG_VRF    =  ^B000C0011    ; Verification message type code
00000004  0000  TR3C_VRF_LNG    =            4   ; Length of fixed portion of verfication msg
00000044  0000  TR3C_VRF_MXL    =           68   ; Verification message max length
00000040  0000  TR3C_MAX_PSW    =           64   ; Maximum password text length
          0000
00000007  0000  TR3C_MSG_RT     =  ^B00000111    ; Routing message type code
00000005  0000  TR3C_RT_LNG     =            5   ; Length of fixed portion of routing message
00000000  0000  TR3V_RT_COST    =            0   ; Begining of COST field
0000000A  0000  TR3S_RT_COST    =           10   ; Size of COST field
0000000A  0000  TR3V_RT_HOPS    =           10   ; Begining of HOPS field
00000005  0000  TR3S_RT_HOPS    =            5   ; Size of HOPS field
          0000
00000002  0000  TR3C_MSG_RTH    =  ^B00000010    ; Phase III/IV data packet - always ignored here
          0000
00000301  0000  TR3C_TIVER      =    ^X000301    ; Phase III version = 1.3.0
00000005  0000  TR3C_MSG_TST    =  ^B00C00101    ; Test (hello) message type code
          0000  ;!TR3C_TST_MAX  =          128   ; Maximum size of test data field
0000007F  0000  TR3C_TST_MAX    =          127   ;!RSX work-around
```

```
00000003  0000    537 TR3C_NUM_TST    =            3   ; Number of test messages to send during
          0000    538                                  ; acceptance testing.
          0000    539 ;
          0000    540 ;  Define Phase II Transport message symbols
          0000    541 ;
000000FF  0000    542 TR2C_MAX_PNA    =          255   ; Maximum Phase II partner node address
          0000    543
00000008  0000    544 TR2C_MSG_NOP    =  ^B00001000   ; NOP message type code
00000001  0000    545 TR2C_NOP_LNG    =            1   ; Mininum NOP message length
00000000  0000    546 TR2C_NUM_NOP    =            0   ; Number of NOP message to send to test the
          0000    547                                  ; circuit during initialization
          0000    548
00000058  0000    549 TR2C_MSG_INI    =  ^B01011000   ; Initialization message type code
          0000    550
00000001  0000    551 TR2C_INI_STR    =  ^B00000001   ; Initialization start sub-type code
0000000A  0000    552 TR2C_STR_LNG    =           10   ; Length of fixed portion of start message  ;!
00000050  0000    553 TR2C_STR_MXL    =           80   ; Max length of start message               ;!
00000000  0000    554 TR2C_STR_FCT    =  ^B00000000   ; Expected start message "function" field value
00000006  0000    555 TR2C_STR_REQ    =  ^B00000110   ; Expected start message "request" field value
00000000  0000    556 TR2V_REQ_VRF    =            0   ; "request" field modifier to request a
00000001  0000    557 TR2M_REQ_VRF    =       ^X<01>   ;   verification message
00000002  0000    558 TR2M_FCT_INT    =       ^X<02>   ; "function" field modifier to show that the
          0000    559                                  ; node does intercept functions
          0000    560
00000002  0000    561 TR2C_INI_VRF    =  ^B00000010   ; Initialization verification sub-type code
00000002  0000    562 TR2C_VRF_LNG    =            2   ; Length of verf msg minus password length
00000008  0000    563 TR2C_PSW_LNG    =            8   ; Length of verf msg password
          0000    564 ;
          0000    565 ;  Define common Routing constants
          0000    566 ;
00000044  0000    567 TR_C_VRF_LNG    = TR3C_VRF_MXL  ; Maximum verification msg size
00000040  0000    568 TR_C_MAX_PSW    = TR3C_MAX_PSW  ; Maximum size of verification password
```

```
                  0000        .SBTTL  Macros
                  0000
                  0000  ;
                  0000  ;  MACROS
                  0000  ;
                  0000  .MACRO  $LOG  code,qual1,qual2,reg              ; Setup logging info
                  0000
                  0000                          _$log = evc$c_'code'
                  0000          .IIF NB,qual1,  _$log = _$log + <<evc$c_'qual1'>@16>
                  0000          .IIF NB,qual2,  _$log = _$log + <<evc$c_'qual2'>@24>
                  0000
                  0000          MOVL    #_$log,WQE$W_EVL_CODE(reg)
                  0000  .ENDM   $LOG
                  0000
                  0000
                  0000  .MACRO  $DSP_TABLE  list                       ; Setup dispatch table
                  0000
                  0000          .MACRO  $dspent _$dspinx,_$dspact
                  0000
                  0000                  .IIF GT,  <_$dspinx-_$maxinx>,  _$maxinx = _$dspinx
                  0000                  .       = _$tmp + <4 * _$dspinx>
                  0000                  .address   _$dspact
                  0000          .ENDM   $dspent
                  0000
                  0000          _$tmp    = .
                  0000          _$maxinx = 0
                  0000          .IRP    a,<LIST>
                  0000          $dspent a
                  0000          .ENDR
                  0000
                  0000  . = _$tmp + <4 * _$maxinx> + 4
                  0000
                  0000  .ENDM   $DSP_TABLE
                  0000
                  0000
        00000010  0000  LEV$C_STATES   = 16                            ; Number of columns in the table
        FFFFFFFF  0000  LEV$C_MAX_EVT  = -1                            ; Init the number of rows
                  0000
                  0000  .MACRO  $LEV  event, s, w,y, m, a,b,c,d,j, r   ; Create state table entries
                  0000                                                 ; for the specified circuit event
                  0000
                  0000          LEV$C_MAX_EVT = LEV$C_MAX_EVT + 1      ; Bump max event value
                  0000          LEV$C_'event' == LEV$C_MAX_EVT         ; Define circuit event symbol
                  0000
                  0000                  $ENT    s,_s                   ; Create table entry
                  0000
                  0000                  $ENT    w,_w
                  0000                  $ENT    y,_y
                  0000
                  0000                  $ENT    m,_m
                  0000
                  0000                  $ENT    a,_a
                  0000                  $ENT    b,_b
                  0000                  $ENT    c,_c
                  0000                  $ENT    d,_d
                  0000                  $ENT    j,_j
                  0000
```

```
0000                      $ENT    r,_r
0000
0000                      $ENT    ?,_s                          ; Pad so that each row in the
0000                      $ENT    ?,_s                          ; table is a multiple of 16
0000                      $ENT    ?,_s                          ; so that the state table
0000                      $ENT    ?,_s                          ; journal file is easy to read
0000                      $ENT    ?,_s
0000                      $ENT    ?,_s
0000      .ENDM   $LEV
0000
0000
0000
0000      .MACRO  $SENT   entry,def_sta                         ; Create state table entry
0000
0000                       _$ent = %LENGTH(entry)-1
0000                      lev$c_sta_. = lev$c_sta'def_sta'; Define default next state
0000
0000              .IF IDN,entry,?                               ; ? => bug
0000                  .BYTE  lev$c_sta_.                        ; Use current state
0000                  .BYTE  4                                  ; Action is bug-check
0000              .IFF
0000                  .BYTE  lev$c_sta_%EXTRACT(0,1,entry); Setup next state
0000                  .BYTE  %EXTRACT(1,_$ent,entry)            ; Setup action routine index
0000
0000              .ENDC
0000      .ENDM   $SENT
```

```
0000            .SBTTL  Define circuit states
0000  ;
0000  ;  Circuit LPD States (LPD$B_STI values)
0000  ;
0000  $EQULST LEV$C_STA_,,0,1,<-;
0000
0000            <S>       -; Stopping: There is an active channel to the device but has
0000                      -;           either been stopped or has been given a command to
0000                      -;           stop. There may be timer or I/O ast's pending.
0000                      -;
0000                      -;
0000                      -;   DATA LINK LAYER INITIALIZATION OR RESTART
0000                      -;
0000            <W>       -; Shutting: A shutdown QIO was issued, and completion pending.
0000                      -;           The device has been given a command to shutdown so
0000                      -;           that it is in a known state prior to being started.
0000                      -;
0000            <Y>       -; Starting: A startup QIO was issued, and completion pending.
0000                      -;
0000                      -;
0000                      -;   NORMAL MAINTAINANCE MODE STATE (MOP MODE)
0000                      -;
0000            <M>       -; Maintenance: In use by another process for service functions
0000                      -;
0000                      -;
0000                      -;   TRANSPORT LAYER INITIALIZATION
0000                      -;
0000            <A>       -; Waiting for:  xmt idle, rcv verf, rcv init
0000            <B>       -; Waiting for:  xmt idle, rcv verf
0000            <C>       -; Waiting for:  xmt idle
0000            <D>       -; Waiting for:            rcv verf
0000                      -;
0000            <J>       -; Undergoing circuit acceptance testing
0000                      -;
0000                      -;
0000                      -;   NORMAL RUNNING STATES
0000                      -;
0000            <R>       -; Running:  Available for normal traffic.
0000  >
```

```
    0000            .SBTTL  Define circuit transition action routines
    0000
00000000            .PSECT  NET_PURE,NOWRT,NOEXE,LONG
    0000
    0000    LEV_AL_ACTTAB:
    0000
    0000        $DSP_TABLE  -
    0000        <-
    0000            < 0, ACT_NOP>           -; Nop action routine
    0000            <32, ACT_EXIT>          -; Exit state table processing
    0000            < 4, ACT_BUG>           -; Bugcheck
    0000            <11, ACT_NYI>           -; Not yet implemented
    0000            < 2, ACT_QIO_STRT>      -; If LPD$B_ASTCNT=0,
    0000                                    -; Issue startup QIO,  reset i/o timer
    0000            <34, ACT_X25_CALL>      -; Accept incoming X.25 call on circuit
    0000            <42, ACT_X25_RESET>     -; Respond to X.25 reset during initialization
    0000            <17, ACT_PVC_START>     -; Startup PVC in multiple steps
    0000            < 1, ACT_QIO_SHUT>      -; Issue shutdown QIO, reset i/o timer
    0000            < 6, ACT_RUN_SYNC>      -; Synchronization lost in run state
    0000            < 8, ACT_RUN_UXPK>      -; Unexpected packet rcv'd in run state
    0000            <16, ACT_RUN_SHUT>      -; Shut down from RUN state
    0000            <39, ACT_ADJ_DOWN>      -; Mark adjacency down
    0000                                    -;
    0000            <18, ACT_DLL_UP>        -; The datalink has initialized, begin next
    0000                                    -; phase (Transport or DLE) of activity
    0000            <10, ACT_ENT_RUN>       -; Enter RUN state
    0000            <22, ACT_ENT_MPR>       -; Circuit entered MOP mode while in RUN state
    0000            < 9, ACT_ENT_MOP>       -; Circuit entered MOP mode
    0000            <26, ACT_ENT_DLE>       -; The circuit has become available for use by
    0000                                    -; a server process for direct-line access
    0000            <37, ACT_BC_UP>         -; A broadcast circuit has initialized
    0000                                    -;
    0000            <19, ACT_XMT>           -; Send a message if possible
    0000            <30, ACT_RCV_2STR>      -; Respond to second rcvd "start" msg
    0000            <12, ACT_RCV_STR>       -; Respond to rcvd "start" msg
    0000            <13, ACT_RCV_VRF>       -; Respond to rcvd "verification" msg
    0000            <20, ACT_RCV_RT>        -; Respond to rcvd Routing msg
    0000            <29, ACT_RCV_RTA>       -; Receive Routing msg while acceptance testing
    0000            <35, ACT_RCV_ART>       -; Respond to rcvd area routing msg
    0000            <36, ACT_RCV_ARTA>      -; Receive area routing msg while testing
    0000            <40, ACT_RCV_RHEL>      -; Respond to rcvd "Router Hello" msg
    0000            <41, ACT_RCV_EHEL>      -; Respond to rcvd "Endnode Hello" msg
    0000                                    -;
    0000            <44, ACT_ELECT>         -; Elect 1st "designated router"
    0000                                    -;
    0000            <43, ACT_FAILED>        -; Mark a circuit "failed"
    0000            < 5, ACT_RUN_DOWN>      -; Cancel all timers, etc.
    0000            <31, ACT_SET_OPER>      -; Simulate a "set operators state" event
    0000            <15, ACT_EXI_SERV>      -; Exit service state if needed
    0000                                    -;
    0000            <21, ACT_TST_DL>        -; Run acceptance algorithm
    0000            <23, ACT_REQ_UPDATE>    -; Request routing database update
    0000                                    -;
    0000            <25, ACT_LOG_NFE>       -; Log event
    0000            <24, ACT_LOG_CDE>       -; Log event & shutdown circuit
    0000            <38, ACT_LOG_ADE>       -; Log event & shutdown adjacency
    0000                                    -;
```

```
             0000   751         <27, ACT_SYN_FAIL>      -; The circuit failed to synchronize
             0000   752         <28, ACT_INI_FAIL>      -; I/O failure during transport initialization
             0000   753     >
```

```
    00B4          .SBTTL  Define circuit state table
    00B4
    00B4          .SAVE_PSECT
00000000          .PSECT  TABLES_PURE,NOEXE,NOWRT,GBL      ; Separate psect for ease
    0000                                                   ; of journalling display
    0000
    0000  LEV$AW_STA_TAB:
    0000  ;
    0000  ;                       S   W   Y     M     A   B   C   D   J     ?
    0000  ;         -----------+---+---+-----+-----+---+---+---+---+-----+--
    0000  $LEV  NO_EVT         .5  .32 .32   .19   .19 .19 .19 .32 .21   .19
    0020  $LEV  EXIT           .   .   .     .     .   .   .   .   .     .
    0040  $LEV  BUG            ?   ?   ?     .     ?   ?   ?   ?   ?     ?
    0060
    0060  $LEV  UNJAM          .   W1  W1    W1    W1  W1  W1  W1  W1    W6
    0080  $LEV  REQ_SHUT       .1  W1  W1    W1    W1  W1  W1  W1  W1    W1
    00A0
    00A0  $LEV  OPR_OFF        .   S27 S27   S27   S1  S1  S1  S1  S1    W6
    00C0  $LEV  OPR_ON         W1  .15 .15   .15   .   .   .   .   .     .23
    00E0  $LEV  OPR_SRV        W1  .   .     .     W1  W1  W1  W1  W1    W6
    0100
    0100  $LEV  RCV_STR        .   .   .     .     B12 B30 B30 B30 B30   .8
    0120  $LEV  RCV_VRF        .   .   .     .     .   .13 W1  .13 W1    .8
    0140  $LEV  RCV_VVF        .   .   .     .     ?   C19 ?   J21 W1    ?
    0160  $LEV  RCV_RT         .   .   .     .     .   .   .   .   .29   .20
    0180  $LEV  RCV_ART        .   .   .     .     .   .   .   .   36    .35
    01A0  $LEV  RCV_RHEL       .   .   .     .     .   .   .   .   .     .40
    01C0  $LEV  RCV_EHEL       .   .   .     .     .   .   .   .   .     .41
    01E0
    01E0  $LEV  XMT_IDLE       .   .   .     .     ?   D   J21 .32 R10   .32
    0200
    0200  $LEV  LIN_UP         .   .   A18   .     ?   ?   ?   ?   R10   .
    0220  $LEV  LIN_DOWN       .   .   W27   W27   W1  W1  W1  W1  W1    W16
    0240  $LEV  ADJ_DOWN       .   .   W27   W27   W1  W1  W1  W1  W1    .39
    0260
    0260  $LEV  BC_UP          ?   ?   R37   ?     ?   ?   ?   ?   ?     ?
    0280
    0280  $LEV  IO_TIMOUT      .31 .27 W27   .     W27 W28 W28 W28 W28   W6
    02A0  $LEV  IO_FAIL        .   Y2  W27   W27   W27 W28 W28 W28 W28   W6
    02C0  $LEV  IO_SUCC        .   Y2  A18   .9    .   .   .   ?   .     .
    02E0
    02E0  $LEV  X25_CALL       .   Y34 ?     ?     ?   ?   ?   ?   ?     ?
    0300  $LEV  PVC_START      .   .   .17   ?     ?   ?   ?   ?   ?     ?
    0320  $LEV  X25_RESET      .   Y42 .     .     .42 .42 .42 .42 .42   .42
    0340
    0340  $LEV  STRT_TIM       .   Y2  .     .     .   .   .   .   .     .
    0360  $LEV  ELECT_TIM      .   .   .     .     .   .   .   .   .     .44
    0380
    0380  $LEV  FAILED         ?   S43 S43   ?     ?   ?   ?   ?   ?     ?
    03A0
    03A0  $LEV  ENT_DLE        ?   ?   M26   ?     ?   ?   ?   ?   ?     ?
    03C0  $LEV  DLE_ACC        W1  W1  W1    .26   W1  W1  W1  W1  W1    W16
    03E0
    03E0  $LEV  IRP_RESET      .   Y2  W27   W27   W27 W28 W28 W28 W28   W6
    0400  $LEV  IRP_DOWN       .   Y2  W27   W27   W27 W28 W28 W28 W28   W6
    0420  $LEV  IRP_MM         S9  S9  S9    W27   S9  S9  S9  S9  S9    W22
    0440
```

```
                    0440  $LEV  LOG_NFE    .25 .25 .25   .25   .25 .25 .25 .25 .25   .25
                    0460  $LEV  LOG_CDE    .24 .24 .24   .24   .24 .24 .24 .24 .24   .24
                    0480  $LEV  LOG_ADE    .38 .38 .38   .38   .38 .38 .38 .38 .38   .38
                    04A0
          00000025  04A0  LEV$C_EVENTS  = LEV$C_MAX_EVT+1
                    04A0
               000000B4          .RESTORE_PSECT
                    00B4
                    00B4  ;
                    00B4  ; NOTE: Action routines which are dispatched to upon the LEV$C_NO_EVT event
                    00B4  ;       must not exit with the LEV$C_NO_EVT; if no events are to be chained
                    00B4  ;       to then these routines must exit with LEV$C_EXIT.  Failure to adhere
                    00B4  ;       to this rule will result in an infinite loop in the state table.
                    00B4  ;
                    00B4  ;       If an action routine is never dispatched to upon the LEV$C_NO_EVT
                    00B4  ;       event then it must never exit with LEV$C_EXIT; if no events are to
                    00B4  ;       be chained to then these routines must exit with LEV$C_NO_EVT.
                    00B4  ;       Failure to adhere to this rule could result in failure to deallocate
                    00B4  ;       an LPD which is no longer needed.
                    00B4  ;
          00B4          .SBTTL  Define message mapping table
          00B4  ;
          00B4  ;  Define message mapping table
          00B4  ;
          00B4  .MACRO  MSGTAB    parser,min_siz,msg_typ
          00B4
          00B4          .ADDRESS  parser
          00B4          .WORD     min_siz
          00B4          .WORD     msg_typ
          00B4
          00B4  .ENDM   MSGTAB
          00B4  ;
          00B4  MSG_MAP_TABLE:
          00B4
          00B4      MSGTAB      RCV_STR2,  TR2C_STR_LNG,  <<TR2C_INI_STR@8>!TR2C_MSG_INI>
          00BC      MSGTAB      RCV_VRF2,  TR2C_VRF_LNG,  <<TR2C_INI_VRF@8>!TR2C_MSG_INI>
          00C4      MSGTAB      RCV_STR3,  TR3C_STR_RSXL,                  TR3C_MSG_STR
          00CC      MSGTAB      RCV_VRF3,  TR3C_VRF_LNG,                   TR3C_MSG_VRF
          00D4      MSGTAB      RCV_RT,    TR3C_RT_LNG,                    TR3C_MSG_RT
          00DC      MSGTAB      RCV_ART,   TR4C_ART_LNG,                   TR4C_MSG_ART
          00E4      MSGTAB      RCV_RHEL,  TR4C_RHEL_LNG,                  TR4C_MSG_RHEL
          00EC      MSGTAB      RCV_EHEL,  TR4C_EHEL_LNG,                  TR4C_MSG_EHEL
          00F4      MSGTAB      0,         0,             0
          00FC
          00FC
          00FC  ;
          00FC  ;  Setup mapping from CRI states to operator events
          00FC  ;
          00FC          ASSUME  NMA$C_STATE_ON  EQ 0
          00FC          ASSUME  NMA$C_STATE_OFF EQ 1
          00FC          ASSUME  NMA$C_STATE_SER EQ 2
          00FC
      06  00FC  OPR_EVT_MAP:    .BYTE   LEV$C_OPR_ON
      05  00FD                  .BYTE   LEV$C_OPR_OFF
      07  00FE                  .BYTE   LEV$C_OPR_SRV
      00  00FF                  .BYTE   0
          0100
          0100  ;
          0100  ; Define "destination NI addresses" for broadcast QIOs issued here
          0100  ;
          0100
          0100  NET$G_ALL_ROU:
030000AB  0100          .LONG   TR$C_NI_ALLROU1         ; Multicast = "all routers"
    0000  0104          .WORD   TR$C_NI_ALLROU2
          0106
          0106  ;
          0106  ; Define a CRC polyonomial table to compute CRC-16 checksums
          0106  ;
          0106
00000000  0106  CRC16:  .LONG   ^X00000000
0000CC01  010A          .LONG   ^X0000CC01
0000D801  010E          .LONG   ^X0000D801
00001400  0112          .LONG   ^X00001400
0000F001  0116          .LONG   ^X0000F001
00003C00  011A          .LONG   ^X00003C00
00002800  011E          .LONG   ^X00002800
0000E401  0122          .LONG   ^X0000E401
```

```
0000A001  0126    890          .LONG    ^X0000A001
00006C00  012A    891          .LONG    ^X00006C00
00007800  012E    892          .LONG    ^X00007800
0000B401  0132    893          .LONG    ^X0000B401
00005000  0136    894          .LONG    ^X00005000
00009C01  013A    895          .LONG    ^X00009C01
00008801  013E    896          .LONG    ^X00008801
00004400  0142    897          .LONG    ^X00004400
```

```
                              0146          .SBTTL  Storage definitions
                              0146
                          00000000          .PSECT  NET_IMPURE,WRT,NOEXE,LONG
                              0000  ;
                              0000  ;  Define miscellaneous storage
                              0000  ;
                 00000000     0000  NET$GL_INITVER::.LONG   0       ; For saving received Init Message version
        00000000 00000000     0004  LEV_Q_CRI:      .QUAD   0       ; For saving CRI CNF and CNR
                 00000000     000C  LEV_L_LPD:      .LONG   0       ; For saving LPD address
                 00000000     0010  LEV_L_ADJ:      .LONG   0       ; For saving ADJ address
                 00000000     0014  LEV_W_PNA:      .LONG   0       ; For saving partner's address
                 00000000     0018  LEV_W_BLKSIZE:  .LONG   0       ; Partner's receive block size
                 00000000     001C  LEV_B_PRIORITY: .LONG   0       ; Partner's router priority
                 00000000     0020  LEV_W_HELLO:    .LONG   0       ; Partner's hello timer
        00000000 00000000     0024  LEV_Q_PSWDESC:  .QUAD   0       ; For saving descriptor of rcvd password
                 00000000     002C  MAX_HOPS:       .LONG   0       ; Max total hops allowed
                 00000000     0030  MAX_COST:       .LONG   0       ; Max total path cost allowed
                 00000000     0034  XMTFLG:         .LONG   0       ; For LPD$B_XMTFLG image
                 00000000     0038  PTYPE:          .LONG   0       ; Type of partner node (routing, endnode, etc.)
                 00000000     003C  NULL:           .LONG   0       ; For dummy node name
                     0000     0040  RTGFLG:         .WORD   0       ; Routing flags
                 00000000     0042  RTG_V_RUS = 0                   ; Update supression timer is ticking
                 00000001     0042  RTG_V_UPD = 1                   ; Request was made to run "update"
                              0042
                          00000146          .PSECT  NET_PURE,NOWRT,NOEXE,LONG
                              0146
                              0146  ;
                              0146  ; Maximum value allowed for computed Square Root Limit (SRL).
                              0146  ;
                 0000007F     0146  MAX_SRL:        .LONG   127     ; Maximum signed byte value
                              014A
                              014A  ;
                              014A  ; Table to convert partner type codes into a "phase" designation
                              014A  ; (i.e. Phase II, Phase III, etc.) to be used in transport re-synchronization.
                              014A  ;
                              014A
                              014A          .MACRO  PHDEF   PTY,PHASE
                              014A          .SAVE_PSECT
                              014A          . = PTY_TO_PHASE + PTY
                              014A          .BYTE   PHASE
                              014A          .RESTORE_PSECT
                              014A          .ENDM
                              014A
                              014A  PTY_TO_PHASE:
                 00000154     014A          .BLKB   10                      ; Allocate table of 10 cells
                              0154                                          ; and fill them in with:
                              0154          PHDEF   ADJ$C_PTY_PH2,2
                              0154          PHDEF   ADJ$C_PTY_PH3,3
                              0154          PHDEF   ADJ$C_PTY_PH3N,3
                              0154          PHDEF   ADJ$C_PTY_PH4,4
                              0154          PHDEF   ADJ$C_PTY_PH4N,4
                              0154          PHDEF   ADJ$C_PTY_AREA,4
                              0154
                              0154
                              0154  ;
                              0154  ; Table to convert partner type codes into a version number to be used in
                              0154  ; message version checking.
```

```
          0154  ;
          0154
          0154          .MACRO  VERDEF  PTY,VERS
          0154          .SAVE_PSECT
          0154          . = PTY_TO_VERSION + <2*PTY>
          0154          .WORD   VERS
          0154          .RESTORE_PSECT
          0154          .ENDM
          0154
          0154  PTY_TO_VERSION:
00000168  0154          .BLKW   10                      ; Allocate table of 10 cells
          0168                                          ; and fill them in with:
          0168          VERDEF  ADJ$C_PTY_PH2,0
          0168          VERDEF  ADJ$C_PTY_PH3,TR3C_TIVER
          0168          VERDEF  ADJ$C_PTY_PH3N,TR3C_TIVER
          0168          VERDEF  ADJ$C_PTY_PH4,TR4C_TIVER
          0168          VERDEF  ADJ$C_PTY_PH4N,TR4C_TIVER
          0168          VERDEF  ADJ$C_PTY_AREA,TR4C_TIVER
          0168
          0168
      00000000          .PSECT  TABLES_IMPURE,NOEXE,WRT,GBL,LONG
          0000
00000400  0000  NUM_NODES = NET$C_MAX_NODES + 1         ; Use zero indexed structures
00000041  0000  NUM_CIRCS = NET$C_MAX_LINES + 1
00000040  0000  NUM_AREAS = NET$C_MAX_AREAS + 1
          0000
          0000
          0000  REACH_EVT:
00000080  0000          .BLKB   <NUM_NODES+7>/8         ; Bit vector used to monitor
          0080                                          ; node reachability changes
          0080
          0080  RTG_CHG:
00000100  0080          .BLKB   <NUM_NODES+7>/8         ; Bit vector used to monitor
00000080  0100  RTG_CHG_LEN = .-RTG_CHG                 ; node routing info changes
          0100
          0100          .ALIGN WORD
          0100
          0100  NET$AW_MIN_C_H::
00000900  0100          .BLKW   NUM_NODES               ; Minimum Cost/Hops vector
          0900
          0900  NET$AW_AREA_C_H::
00000980  0900          .BLKW   NUM_AREAS               ; Area Minimum Cost/Hops vector
          0980
          0980          .ALIGN LONG
          0980
          0980  NET$AL_CH_VEC::
00001A88  0980          .BLKL   1+NUM_CIRCS+NUM_NODES
          1A88                                          ; Vector of addresses of buffers
          1A88                                          ; which hold the last levl 1 routing message
          1A88                                          ; received from the circuit or BRA.
          1A88                                          ; NUM_NODES should be enough space for
          1A88                                          ; the maximum broadcast routers.
          1A88
          1A88  NET$AL_AREA_CH::
00002B90  1A88          .BLKL   1+NUM_CIRCS+NUM_NODES
          2B90                                          ; Vector of addresses of buffers
          2B90                                          ; which hold the last area routing message
```

```
    2B90  1013                                          ; received from the circuit or BRA.
    2B90  1014                                          ; NUM_NODES should be enough space for
    2B90  1015                                          ; the maximum broadcast routers.
    2B90  1016
00000000  1017          .PSECT  NET_CODE,NOWRT,EXE
```

```
                                   0000  1019          .SBTTL  NET$INIT_ROUTING - Initialize routing database
                                   0000  1020  ;+
                                   0000  1021  ; NET$INIT_ROUTING - Initialize routing database
                                   0000  1022  ;
                                   0000  1023  ; This routine is called when the ACP is starting up, to initialize
                                   0000  1024  ; any routing database that needs it.
                                   0000  1025  ;
                                   0000  1026  ; Inputs:
                                   0000  1027  ;
                                   0000  1028  ;       None
                                   0000  1029  ;
                                   0000  1030  ; Outputs:
                                   0000  1031  ;
                                   0000  1032  ;       R0 = Status code
                                   0000  1033  ;
                                   0000  1034  ;       All other registers are destroyed.
                                   0000  1035  ;-
                                   0000  1036 NET$INIT_ROUTING::
                                   0000  1037          ;
                                   0000  1038          ;   Initialize the minimum cost/hops vector
                                   0000  1039          ;
0080 8F    FF 8F   6E   00    2C   0000  1040          MOVC5   #0,(SP),#-1,#2*NUM_AREAS,NET$AW_AREA_C_H ; Min. area cost/hops
              00000900'EF          0008
0800 8F    FF 8F   6E   00    2C   000D  1041          MOVC5   #0,(SP),#-1,#2*NUM_NODES,NET$AW_MIN_C_H  ; Min. cost/hops vector
              00000100'EF          0015
                       000D   30   001A  1042          BSBW    FORCE_FULL_DECISION      ; Force full decision algorithm
                 50     00'   D0   001D  1043          MOVL    S^#SS$_NORMAL,R0         ; Success
                              05   0020  1044          RSB
                              0021          .SBTTL  NET$DLLUPDLNI - Process modified LNI parameters
                              0021    ;+
                              0021    ; NET$DLLUPDLNI - Process modified LNI parameters
                              0021    ;
                              0021    ; FUNCTIONAL DESCRIPTION:
                              0021    ;
                              0021    ; This routine is called from module NETACPTRN whenever the LNI data base has
                              0021    ; been updated.
                              0021    ;
                              0021    ; INPUTS:        None
                              0021    ;
                              0021    ; OUTPUTS:       R0      Status code
                              0021    ;
                              0021    ;
                              0021    ;                R1 is destroyed.
                              0021    ;-
                              0021            .SAVE_PSECT
                          00000000            .PSECT  NET_LOCK_CODE,NOWRT,EXE,GBL
                              0000
                              0000    NET$DLLUPDLNI::                         ; Update datalink control layer
                              0000    UPDATE_ALL:                             ; Update all routing databases
              0CFC 8F     BB  0000            PUSHR   #^M<R2,R3,R4,R5,R6,R7,R10,R11>; Save regs
  54     00000000'EF      D0  0004            MOVL    NET$GL_PTR_VCB,R4       ; Get RCB pointer
                              000B            ;
                              000B            ;  Calculate the maximum datalink queue length.  The formula
                              000B            ;  dictated by the Transport Archictecture is the number of
                              000B            ;  buffers divided by the square root of the number of circuits.
                              000B            ;
          50    5D A4     9A  000B            MOVZBL  RCB$B_MAX_SNK(R4),R0    ; Setup R0 in case no active circuits
          51    60 A4     9A  000F            MOVZBL  RCB$B_ACT_DLL(R4),R1    ; Get total number of active circuits
                   20     13  0013            BEQL    20$                     ; Done if EQL
        52    0082 C4     3C  0015            MOVZWL  RCB$W_MAX_PKT(R4),R2    ; Get the total number of buffers
              52   52     C4  001A            MULL    R2,R2                   ; Square it
              52   51     C6  001D            DIVL    R1,R2                   ; Divide by the number of circuits
              50   01     D0  0020            MOVL    #1,R0                   ; Establish tentative value
              51   01     D0  0023            MOVL    #1,R1                   ; Square of this value
              52   51     D1  0026    10$:    CMPL    R1,R2                   ; Compare square of value to
                              0029                                            ; (buffs**2)/circuits
                   0A     1E  0029            BGEQU   20$                     ; If GEQU then we're done
              51   50     C0  002B            ADDL    R0,R1                   ; Begin (n+1)**2 calculation
                   50     D6  002E            INCL    R0                      ;  n = n+1
              51   50     C0  0030            ADDL    R0,R1                   ; (n+1)**2 = n**2 + 2*n + 1
                   F1     11  0033            BRB     10$
                              0035    20$:    ;
                              0035            ;  Validate maximum allowed value for SRL (Square Root Limit)
                              0035            ;
  00000146'EF      50     D1  0035            CMPL    R0,MAX_SRL              ; Is value too large?
                   07     1B  003C            BLEQU   25$                     ; Br if no, okay
  50     00000146'EF      D0  003E            MOVL    MAX_SRL,R0              ; Else, set to maximum allowed
                              0045    25$:    ;
                              0045            ;  Update the maximum output queue lengths
                              0045            ;
          51    5D A4     9A  0045            MOVZBL  RCB$B_MAX_SNK(R4),R1    ; Get old max queue length
          5D A4    50     90  0049            MOVB    R0,RCB$B_MAX_SNK(R4)    ; Update it
              50   51     C2  004D            SUBL    R1,R0                   ; Get difference (could be negative)
          55    5C A4     9A  0050            MOVZBL  RCB$B_MAX_LPD(R4),R5    ; Get number of cells
                   21     13  0054            BEQL    50$                     ; If EQL then none
```

```
                              0056  1103          DSBINT  #NET$C_IPL                ; Synch with NETDRIVER
        56    28 B445    D0   005C  1104 30$:     MOVL    @RCB$L_PTR_LPD(R4)[R5],R6 ; Get LPD address
                   0E    18   0061  1105          BGEQ    40$                       ; Branch if none in this slot
                10 A6    D5   0063  1106          TSTL    LPD$L_UCB(R6)             ; Any datalink associated with this LPD?
                   09    13   0066  1107          BEQL    40$                       ; Branch if not (local LPD)
                   04    E1   0068  1108          BBC     #LPD$V_RUN,-              ;
             04 22 A6         006A  1109                   LPD$W_STS(R6),40$        ; Adjust only if in run state
           1E A6   50    80   006D  1110          ADDB    R0,LPD$B_XMT_SRL(R6)      ; Adjust square root limiter (could go
                              0071  1111                                            ; negative until some I/O completes!)
                E8 55    F5   0071  1112 40$:     SOBGTR  R5,30$                    ; Loop for each cell
                              0074  1113          ENBINT                            ; Restore IPL
                              0077  1114 50$:     ;
                              0077  1115          ;   On all routing circuits, force a routing message to
                              0077  1116          ;   be sent next time around.
                              0077  1117          ;
        55    5C A4      9A   0077  1118          MOVZBL  RCB$B_MAX_LPD(R4),R5      ; Get number of circuits
        56    28 B445    D0   007B  1119 60$:     MOVL    @RCB$L_PTR_LPD(R4)[R5],R6 ; Get LPD address
                   16    18   0080  1120          BGEQ    65$                       ; Branch if slot not valid
      11 22 A6    04     E1   0082  1121          BBC     #LPD$V_RUN,LPD$W_STS(R6),65$ ; Branch if circuit inactive
        57    2C B445    D0   0087  1122          MOVL    @RCB$L_PTR_ADJ(R4)[R5],R7 ; Get ADJ address
         08 67    02     E1   008C  1123          BBC     #ADJ$V_RTG,ADJ$B_STS(R7),65$ ; Branch if non-routing partner
                              0090  1124          ASSUME  LPD$C_SRM_SIZE EQ 32
         56 A6    01     CE   0090  1125          MNEGL   #1,LPD$G_SRM(R6)          ; Force rtginfo for all nodes to be sent
                              0094  1126          ASSUME  LPD$C_ASRM_SIZE EQ 1      ; && fix this
         5E A6    01     CE   0094  1127          MNEGL   #1,LPD$G_ASRM(R6)         ; Force area rtginfo to all level 2 nodes
                E0 55    F5   0098  1128 65$:     SOBGTR  R5,60$                    ; Loop through all circuits
                              009B  1129          ;
                              009B  1130          ;   Re-run the decision algorithm in 1 second, and send routing
                              009B  1131          ;   messages to our routing neighbors.
                              009B  1132          ;
        51     0202 8F   3C   009B  1133          MOVZWL  #<<WQE$C_QUAL_RTG>@8>!- ; Set timer ID
                              00A0  1134                  NET$C_TID_XRT,R1
      52    00000021'EF  9E   00A0  1135          MOVAB   UPDATE_TIMER,R2           ; Setup action routine address
53  00000000 00989680 8F 7D   00A7  1136          MOVQ    #10*1000*1000,R3          ; Timer = 1 second
                 FF4B'   30   00B2  1137          BSBW    WQE$RESET_TIM             ; Set the timer ticking
             50   01     D0   00B5  1138 90$:     MOVL    #1,R0                     ; Indicate success
              0CFC 8F    BA   00B8  1139 100$:    POPR    #^M<R2,R3,R4,R5,R6,R7,R10,R11>; Restore regs
                         05   00BC  1140          RSB
                              00BD  1141
                          00000021  1142          .RESTORE_PSECT
                              0021  1143
                              0021  1144 ;
                              0021  1145 ; This timer routine is called to run the decision algorithm.  It
                              0021  1146 ; is done on a timed basis, to avoid sending routing messages in
                              0021  1147 ; the above routine.
                              0021  1148 ;
                              0021  1149
                              0021  1150 UPDATE_TIMER:
                 0D64    30   0021  1151          BSBW    KILL_WQE                  ; Deallocate timer WQE
                   04    10   0024  1152          BSBB    FORCE_FULL_DECISION       ; Force full decision algorithm
                 1404    30   0026  1153          BSBW    REQUEST_UPDATE            ; Request decision
                         05   0029  1154          RSB
```

```
                                 002A  1156         .SBTTL  FORCE_FULL_DECISION - Force full decision algorithm
                                 002A  1157 ;+
                                 002A  1158 ; FORCE_FULL_DECISION - Force decision algorithm to be run on all nodes
                                 002A  1159 ;
                                 002A  1160 ; This routine is called whenever any routing related parameters have
                                 002A  1161 ; changes which might affect cost/hop calculations.
                                 002A  1162 ;
                                 002A  1163 ; Inputs:
                                 002A  1164 ;
                                 002A  1165 ;       None
                                 002A  1166 ;
                                 002A  1167 ; Outputs:
                                 002A  1168 ;
                                 002A  1169 ;       None
                                 002A  1170 ;
                                 002A  1171 ;       No registers are destroyed.
                                 002A  1172 ;-
                                 002A  1173 FORCE_FULL_DECISION:
                      3F    BB   002A  1174         PUSHR   #^M<R0,R1,R2,R3,R4,R5>  ; Save registers
       FF 8F     6E   00    2C   002C  1175         MOVC5   #0,(SP),#-1,-           ; Store 1's in bitvector
 00000080'EF   0080 8F           0031  1176                 #RTG_CHG_LEN,RTG_CHG
                      3F    BA   0039  1177         POPR    #^M<R0,R1,R2,R3,R4,R5>  ; Restore registers
                            05   003B  1178         RSB
```

```
                                003C          .SBTTL  NET$DLL_ALL_OFF - Turn off all circuits
                                003C    ;+
                                003C    ; NET$DLL_ALL_OFF - Turn off all circuits
                                003C    ;
                                003C    ; FUNCTIONAL DESCRIPTION:
                                003C    ;
                                003C    ; Each CRI entry is forced to the OFF state and an operator event is generated.
                                003C    ;
                                003C    ; INPUTS:        None
                                003C    ;
                                003C    ; OUTPUTS:       All registers are destroyed
                                003C    ;
                                003C    ;-
                                003C    NET$DLL_ALL_OFF::                                 ; Turn off all circuits
     54    00000000'EF      D0  003C            MOVL    NET$GL_PTR_VCB,R4         ; Get the RCB address
        55    5C A4         9A  0043            MOVZBL  RCB$B_MAX_LPD(R4),R5      ; Get number of cells
                 24         13  0047            BEQL    50$                       ; If EQL then none
           58    55         D0  0049    30$:    MOVL    R5,R8                     ; Get LPD i.d.
               2BF9         30  004C            BSBW    NET$GET_LPD_CRI           ; Get LPD and CRI blocks
              18 50         E9  004F            BLBC    R0,40$                    ; If LBC then not active
           58    01         D0  0052            MOVL    #NMA$C_STATE_OFF,R8       ; Setup new state value
                                0055            $PUTFLD cri,l,sta                 ; Stuff it into the CRI CNF
        50    00FC'C8       9A  0062            MOVZBL  OPR_EVT_MAP(R8),R0        ; Get corresponding event
               0CF1         30  0067            BSBW    SET_DLL_EVT               ; Queue the event - always succeeds
              DC 55         F5  006A    40$:    SOBGTR  R5,30$                    ; Loop for each cell
           50    00'        D0  006D    50$:    MOVL    S^#SS$_NORMAL,R0          ; Indicate success
                            05  0070            RSB
                            0071          .SBTTL  NET$DLL_OPR_SET - Process operator generated event
                            0071  ;+
                            0071  ; NET$DLL_OPR_SET - Setup operator generated event
                            0071  ;
                            0071  ; FUNCTIONAL DESCRIPTION:
                            007'  ;
                            0071  ; The CRI has been updated and is about to be inserted in the database.  Since
                            0071  ; the circuit "state" may have changed, schedule an event.
                            0071  ;
                            0071  ; INPUTS:        R11     CRI root block pointer
                            0071  ;                R10     CRI block pointer
                            0071  ;                R9      Scratch
                            0071  ;                R8      Value of <cri,l,sta> (operater state)
                            0071  ;                R7-R0   Scratch
                            0071  ;
                            0071  ; OUTPUTS:       R11,R10  are preserved
                            0071  ;                R0      Low bit set if successful
                            0071  ;                        VMS status code otherwise (R9 = Field ID in error)
                            0071  ;
                            0071  ;                All other registers are destroyed.
                            0071  ;
                            0071  ;-
                            0071  NET$DLL_OPR_SET::                               ; Setup operator generated event
                 58     DD  0071          PUSHL   R8                              ; Save state
        0000000C'EF     D4  0073          CLRL    LEV_L_LPD                       ; No LPD allocated yet
        00000000'EF     16  0079          JSB     NET$GET_VEC                     ; Prepare the line
              2F 50     E9  007F          BLBC    R0,2$                           ; If LBC then error
  54    00000000'EF     D0  0082          MOVL    NET$GL_PTR_VCB,R4               ; Get RCB address
     05    008A C4      91  0089          CMPB    RCB$B_ETY(R4),#ADJ$C_PTY_PH4N ; If endnode,
                 09     13  008E          BEQL    1$                              ; branch
        00000000'EF     16  0090          JSB     NET$GET_RTG                     ; Get routing info
              18 50     E9  0096          BLBC    R0,2$                           ; Branch if error
               2C00     30  0099  1$:     BSBW    NET$LOCATE_LPD                  ; Locate associated LPD
                            009C                                                  ; R6 = 0 on return if none
        00000000'EF     16  009C          JSB     NET$GET_VEC3                    ; Check the line state
              0C 50     E9  00A2          BLBC    R0,2$                           ; If LBC then error
          01     6E     91  00A5          CMPB    (SP),#NMA$C_STATE_OFF           ; Is the STATE OFF ?
                 0D     12  00A8          BNEQ    5$                              ; If NEQ then no
                 56     D5  00AA          TSTL    R6                              ; Is there an LPD
                 06     12  00AC          BNEQ    3$                              ; If NEQ yes, generate state table event
               009E     31  00AE          BRW     90$                             ; Else just return
               009E     31  00B1  2$:     BRW     100$                            ; Exit
               008A     31  00B4  3$:     BRW     80$                             ; Generate state table event
                            00B7  5$:     ;
                            00B7          ;    If STATE is ON, then ensure that all required parameters are set
                            00B7          ;
          00     6E     91  00B7          CMPB    (SP),#NMA$C_STATE_ON            ; Is new STATE ON ?
                 09     12  00BA          BNEQ    10$                             ; If no, then skip checks
               041F     30  00BC          BSBW    CHECK_REQ_PARAMS                ; Ensure required parameters are set
              03 50     E8  00BF          BLBS    R0,10$                          ; Branch if ok
               008D     31  00C2  109$:   BRW     100$                            ; Exit with error
                            00C5          ;
                            00C5          ;    Allocate an LPD, if one does not already exist for this circuit.
                            00C5          ;
                 56     D5  00C5  10$:    TSTL    R6                              ; Is there an LPD ?
                 0D     12  00C7          BNEQ    20$                             ; If NEQ then yes
               009C     30  00C9          BSBW    ALLOC_LPD                       ; Else allocate one
              F3 50   E9  00CC         BLBC    R0,109$                 ; If LBC then failed
   0000000C'EF   56   D0  00CF         MOVL    R6,LEV_L_LPD            ; Save new LPD pointer
                          00D6    20$: ;
                          00D6         ;   Validate circuit parameters with the datalink driver in
                          00D6         ;   order to return any simple errors immediately to the user.
                          00D6         ;   All errors after this point will simply leave the circuit
                          00D6         ;   in an ''on-synchronizing'' state.
                          00D6         ;
                          00D6         ;   This is not done for X.25 datalinks, since they don't have
                          00D6         ;   any concept of parameter validation without starting the circuit.
                          00D6         ;
        13 22 A6   07   E0  00D6         BBS     #LPD$V_X25,LPD$W_STS(R6),50$ ; Skip if X.25 datalink
                          00DB         $CNFFLD cri,s,chr,R9            ; Identify characteristics buffer
           52   14 A6   3C  00E2         MOVZWL  LPD$W_CHAN(R6),R2       ; Get I/O channel
                   51   D4  00E6         CLRL    R1                      ; Clear illegal I/O modifier mask
                FF15'   30  00E8         BSBW    NET$SET_QIOW            ; Get buffer and issue $QIOW
                64 50   E9  00EB         BLBC    R0,100$                 ; If LBC then failed
                          00EE    50$: ;
                          00EE         ;   Store cost associated with this circuit
                          00EE         ;
                          00EE         $GETFLD cri,l,cos               ; Get circuit cost
                          00FB                                         ; (must be specified at this point)
              29 A6   58   90  00FB         MOVB    R8,LPD$B_COST(R6)       ; Update circuit's cost
                          00FF         ;
                          00FF         ;   Store our NI router priority for this circuit
                          00FF         ;
                          00FF         $GETFLD cri,l,rpr               ; Get NI router priority
                          010C                                         ; (if not set, default it to zero)
              2A A6   58   90  010C         MOVB    R8,LPD$B_BCPRI(R6)      ; Store router priority
                          0110         ;
                          0110         ;   Save hello timer in LPD
                          0110         ;
                          0110         $GETFLD cri,l,het               ; Get the hello timer
                06 50   E8  011D         BLBS    R0,60$                  ; If LBS then it parameter was found
             58   0D   D0  0120         MOVL    #13,R8                  ; Else set the default
                FEDA'   30  0123         BSBW    CNF$PUT_FIELD           ; Store it in the CRI
              18 A6   58   B0  0126    60$: MOVW    R8,LPD$W_INT_TLK(R6)    ; Setup the talker interval
                          012A         ;
                          012A         ;   Store X.25 BLOCKING flag into LPD
                          012A         ;
                          012A         $GETFLD cri,l,blk               ; Get BLOCKING parameter
                07 50   E9  0137         BLBC    R0,80$                  ; If not specified, leave flag=off
                          013A    ;&&  BLBC    R8,80$                  ; Branch if parameter off
                          013A    ;&&  SETBIT  LPD$V_X25BLK,LPD$W_STS(R6) ; Set flag value into LPD
        50   0000'8F   3C  013A         MOVZWL  #SS$_BADPARAM,R0        ;&& We don't currently support this
                   11   11  013F         BRB     100$                    ; Exit with error
                          0141         ;
                          0141         ;   Force full decision algorithm to be run on all nodes, in case
                          0141         ;   the cost has changed for this circuit.
                          0141         ;
                 FEE6   30  0141    80$: BSBW    FORCE_FULL_DECISION     ; Force full decision algorithm
                          0144         ;
                          0144         ;   Generate an event to drive the circuit's state table
                          0144         ;
             58   6E   9A  0144         MOVZBL  (SP),R8                 ; Get new STATE value
        50   00FC'C8   9A  0147         MOVZBL  OPR_EVT_MAP(R8),R0      ; Get corresponding event
                 0C0C   30  014C         BSBW    SET_DLL_EVT             ; Queue the event - always succeeds
```

```
                        014F   1322
         50    00'  D0  014F   1323 90$:     MOVL    S^#SS$_NORMAL,R0        ; Indicate success
               8E   D5  0152   1324 100$:    TSTL    (SP)+                   ; Cleanup stack
            10 50   E8  0154   1325          BLBS    R0,110$                 ; Exit if success
        0000000C'EF D5  0157   1326          TSTL    LEV_L_LPD               ; Was LPD just allocated ?
               08   13  015D   1327          BEQL    110$                    ; If EQL then no
               50   DD  015F   1328          PUSHL   R0                      ; Remember status
             02E9   30  0161   1329          BSBW    DEAL_LPD                ; Deallocate the LPD
               50 8ED0  0164   1330          POPL    R0                      ; Restore status
                    05  0167   1331 110$:    RSB
```

```
                           0168  1333          .SBTTL  ALLOC_LPD - Allocate LPD
                           0168  1334 ;+
                           0168  1335 ; ALLOC_LPD      - Allocate and initialize an LPD cell
                           0168  1336 ;
                           0168  1337 ; FUNCTIONAL DESCRIPTION:
                           0168  1338 ;
                           0168  1339 ; A free LPD cell is allocated and initialized.  A channel is assigned to it.
                           0168  1340 ;
                           0168  1341 ;
                           0168  1342 ; INPUTS:        R11     CRI CNR address
                           0168  1343 ;                R10     CRI CNF address
                           0168  1344 ;                R9-R0   Scratch
                           0168  1345 ;
                           0168  1346 ; OUTPUTS:       R11,R10 Unchanged
                           0168  1347 ;                R8      Assigned path i.d.
                           0168  1348 ;                R6      Path's LPD address
                           0168  1349 ;                R0      Low bit set if path was found (or assigned)
                           0168  1350 ;                        Low bit clear otherwise (R9 = field ID in error)
                           0168  1351 ;-
                           0168  1352 ALLOC_LPD:                                    ; Allocate/init an LPD cell
    54  00000000'EF    D0  0168  1353          MOVL    NET$GL_PTR_VCB,R4             ; Get RCB address
                56     D4  016F  1354          CLRL    R6                            ; Mark no LPD allocated yet
                           0171  1355          ;
                           0171  1356          ;   Find a free LPD cell
                           0171  1357          ;
       55   5C A4      9A  0171  1358          MOVZBL  RCB$B_MAX_LPD(R4),R5          ; Get max path index
          58   01      D0  0175  1359          MOVL    #1,R8                         ; Start at beginning of vector
      53  28 B448      D0  0178  1360 110$:    MOVL    @RCB$L_PTR_LPD(R4)[R8],R3 ; Get LPD address for this index
                0D     18  017D  1361          BGEQ    130$                          ; Branch if index not in use
                58     D6  017F  1362          INCL    R8                            ; Advance to next slot
             F4 55     F5  0181  1363          SOBGTR  R5,110$                       ; Loop
      50   0000'8F     3C  0184  1364          MOVZWL  #SS$_INSFMEM,R0               ; Indicate failure
              0222     31  0189  1365 119$:    BRW     300$                          ; Take common exit
                           018C  1366          ;
                           018C  1367          ;   Allocate an LPD block from non-paged pool
                           018C  1368          ;
    51  0000006A 8F    D0  018C  1369 130$:    MOVL    #LPD$C_LENGTH,R1              ; Set length of LPD block
             FE6A'     30  0193  1370          BSBW    NET$ALONPGD_Z                 ; Allocate LPD block
             F0 50     E9  0196  1371          BLBC    R0,119$                       ; Branch if unable to allocate
          56   52      D0  0199  1372          MOVL    R2,R6                         ; Point to new LPD block
     28 B448   56      D0  019C  1373          MOVL    R6,@RCB$L_PTR_LPD(R4)[R8] ; Mark the slot in use
                           01A1  1374          ;
                           01A1  1375          ;   Allocate a buffer from ACP process space to hold the last
                           01A1  1376          ;   routing message received over this circuit.
                           01A1  1377          ;
                           01A1  1378          $DISPATCH RCB$B_ETY(R4),TYPE=B,<- ; If we are an endnode,
                           01A1  1379                  <ADJ$C_PTY_PH4N,135$>,- ; skip the following
                           01A1  1380                  <ADJ$C_PTY_PH3N,135$>>
              020D     30  01B1  1381          BSBW    ALLOC_COSTHOPS                ; Allocate cost/hops buffer
             D2 50     E9  01B4  1382          BLBC    R0,119$                       ; Branch if error detected
                           01B7  1383 135$:    ;
                           01B7  1384          ;   Initialize the LPD cell
                           01B7  1385          ;
 20 A6    53   0100 8F     A1  01B7  1386          ADDW3   #^X<0100>,R3,LPD$W_PTH(R6) ; Set the new path ID
                           01BE  1387                                                ; (increment sequence number)
       1F A6   01      90  01BE  1388          MOVB    #1,LPD$B_XMT_IPL(R6)          ; Setup input packet limiter
             5D A4     90  01C2  1389          MOVB    RCB$B_MAX_SNK(R4),-           ;
          1E A6          01C5  1390                    LPD$B_XMT_SRL(R6)          ; Setup square root limiter
                         01C7  1391          ASSUME  LPD$Q_REQ_WAIT EQ 0          ;
         66    56    D0  01C7  1392          MOVL    R6,(R6)                    ; Init the queue header
      04 A6    56    D0  01CA  1393          MOVL    R6,4(R6)                   ;
     00000000'GF     D0  01CE  1394          MOVL    G^EXE$GL_ABSTIM,-          ;
          36 A6          01D4  1395                  LPD$L_ABS_TIM(R6)          ; Time counters were zeroed
       004C 8F       A3  01D6  1396          SUBW3   #CXB$C_OVERHEAD,-          ; Default datalink buffer size
          7E A4          01DA  1397                  RCB$W_TOTBUFSIZ(R4),-      ; in case PLVEC doesn't exist
          50 A6          01DC  1398                  LPD$W_BUFSIZ(R6)
                         01DE  1399          ;
                         01DE  1400          ;    Determine if this is an X.25 datalink mapping circuit,
                         01DE  1401          ;    and if so, mark it as such.
                         01DE  1402          ;
                         01DE  1403          $GETFLD cri,l,typ                  ; Get TYPE parameter
          0A 50      E9  01EB  1404          BLBC    R0,140$                    ; Branch if not specified
      03     58      D1  01EE  1405          CMPL    R8,#NMA$C_CIRTY_X25        ; X.25 circuit?
             05      12  01F1  1406          BNEQ    140$                       ; Branch if not
                         01F3  1407          SETBIT  LPD$V_X25,LPD$W_STS(R6) ; Mark the circuit as X.25 datalink
                         01F8  1408 140$:    ;
                         01F8  1409          ;    Locate the line entry, by searching the line database
                         01F8  1410          ;    looking for a line with the same VMS initial device name.
                         01F8  1411          ;    In order to handle drivers which clone UCBs on each assign
                         01F8  1412          ;    (and so, we can't assign another channel for the circuit
                         01F8  1413          ;    without getting another UCB), we get the actual device name
                         01F8  1414          ;    used by the line (with the cloned unit number filled in)
                         01F8  1415          ;    and assigning a channel to that UCB for the circuit.
                         01F8  1416          ;
                         01F8  1417          ;    In addition, as long as we are looking for the associated
                         01F8  1418          ;    line, copy the line's datalink buffer size to the LPD for
                         01F8  1419          ;    easier access.  If it isn't found for some reason, the LPD
                         01F8  1420          ;    buffer size has been setup earlier with a default value.
                         01F8  1421          ;
      50    0000'8F  3C  01F8  1422          MOVZWL  #SS$_NOSUCHDEV,R0          ; Assume error if bad line name
                         01FD  1423          $GETFLD cri,s,vmsnam               ; Get device name descriptor
         03 50       E8  020A  1424          BLBS    R0,142$                    ; Br on success
           019E      31  020D  1425          BRW     300$                       ; Else, take common exit
    47 22 A6  07     E0  0210  1426 142$:    BBS     #LPD$V_X25,LPD$W_STS(R6),149$ ; No line for X25 circuits
        0C00 8F      BB  0215  1427          PUSHR   #^M<R10,R11>               ; Save CNR/CNF pointers
 5B   00000000'EF    D0  0219  1428          MOVL    NET$GL_CNR_PLI,R11         ; Point to line database
             5A      D4  0220  1429          CLRL    R10                        ; Start at beginning
                         0222  1430          $SEARCH eql,pli,s,vmsnam           ; Search for line with the same device
         21 50       E9  0231  1431          BLBC    R0,145$                    ; Error if no corresponding line
                         0234  1432          $GETFLD pli,l,bus                  ; Get datalink buffer size
         04 50       E9  0241  1433          BLBC    R0,144$                    ; Skip if not returned
      50 A6   58     B0  0244  1434          MOVW    R8,LPD$W_BUFSIZ(R6)        ; Save datalink buffer size
                         0248  1435 144$:    $GETFLD pli,s,devnam               ; Get actual device name for line
        0C00 8F      BA  0255  1436 145$:    POPR    #^M<R10,R11>               ; Restore registers
         59 50       E9  0259  1437          BLBC    R0,155$                    ; Branch if error detected
                         025C  1438 149$:    ;
                         025C  1439          ;    Assign a channel to the device.
                         025C  1440          ;
         7E   57     7D  025C  1441          MOVQ    R7,-(SP)                   ; Save name descriptor
         50   5E     D0  025F  1442          MOVL    SP,R0                      ; $ASSIGN_S modifies the SP
                         0262  1443          $ASSIGN_S  -                       ; Get a channel to the device
                         0262  1444                  DEVNAM = (R0),-
                         0262  1445                  CHAN   = LPD$W_CHAN(R6),-
                         0262  1446                  MBXNAM = NET$GQ_MBX_NAME  ; For PSI UCBs, get all mbx msgs
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                                0276                                           ; (For other UCBs, this does nothing)
                   8E     7C    0276          CLRQ    (SP)+                    ; Cleanup the stack
                3A 50     E9    0278          BLBC    R0,155$                  ; Br on error
                                027B          ;
                                027B          ;   Find associated LINE (PLVEC) with this device UCB and claim it
                                027B          ;
          50    14 A6     3C    027B          MOVZWL  LPD$W_CHAN(R6),R0        ; Get channel for call
           00000000'GF    16    027F          JSB     G^IOC$VERIFYCHAN         ; Get the CCB, ignore errors --
                                0285                                           ; CCB is returned anyway
             50     61    D0    0285          MOVL    CCB$L_UCB(R1),R0         ; Get the UCB pointer
          10 A6     50    D0    0288          MOVL    R0,LPD$L_UCB(R6)         ; Setup the UCB pointer
       78 22 A6     07    E0    028C          BBS     #LPD$V_X25,LPD$W_STS(R6),170$ ; X.25 datalink has no PLVEC
     58    00000000'EF    9A    0291          MOVZBL  PLVEC$GB_MAX,R8          ; Get max PLVEC index
  50     00000000'EF48    D1    0298 150$:    CMPL    PLVEC$AL_UCB[R8],R0      ; Is this it ?
                    16    13    02A0          BEQL    160$                     ; If EQL then yes
                 F3 58    F5    02A2          SOBGTR  R8,150$                  ; Else loop (index 0 is not used)
                                02A5          $DASSGN_S  CHAN = LPD$W_CHAN(R6); Deassign the channel
          50    0000'8F   3C    02B0          MOVZWL  #SS$_NOSUCHDEV,R0        ; Indicate error
                  00F6    31    02B5 155$:    BRW     300$                     ; Take common exit
         00000000'EF48    96    02B8 160$:    INCB    PLVEC$AB_REFC[R8]        ; Another PLVEC cell reference
          28 A6     58    90    02BF          MOVB    R8,LPD$B_PLVEC(R6)       ; Setup PLVEC index
                                02C3          ;
                                02C3          ;   For point-to-point pseudo UNA datalink, always use the same
                                02C3          ;   channel for both line and circuit, so that shared PID/CHAN
                                02C3          ;   matching works in the UNA driver.
                                02C3          ;
  0A     00000000'EF48    91    02C3          CMPB    PLVEC$AB_DEV[R8],-       ; Point-to-point pseudo UNA datalink?
                                02CB                  #DEVTRN$C_DEV_PPUNA
                    19    12    02CB          BNEQ    161$                     ; If so,
                    50    DD    02CD          PUSHL   R0                       ; Save datalink UCB address
                                02CF          $DASSGN_S CHAN = LPD$W_CHAN(R6) ; Deassign the channel done above
                    50  8ED0    02DA          POPL    R0                       ; Restore UCB address for later on
14 A6    00000000'EF48    B0    02DD          MOVW    PLVEC$AW_CHAN[R8],-      ; Use the line's channel
                                02E6                  LPD$W_CHAN(R6)           ; for the circuit as well
                                02E6 161$:    ;
                                02E6          ;   If the associated line is of PROTOCOL NI, then mark the LPD
                                02E6          ;   as a broadcast circuit and set a flag forcing all I/O to be
                                02E6          ;   word aligned.
                                02E6          ;
  09     00000000'EF48    91    02E6          CMPB    PLVEC$AB_DEV[R8],#DEVTRN$C_DEV_UNA      ; UNA?
                    0A    12    02EE          BNEQ    165$                     ; Branch if not
                                02F0          SETBIT  #LPD$V_BC,LPD$W_STS(R6) ; Mark as broadcast circuit
                                02F5          SETBIT  #LPD$V_ALIGNW,LPD$W_STS(R6) ; Always word-align UNA I/O
                                02FA 165$:    ;
                                02FA          ;   If the associated line is of PROTOCOL CI, then set a flag
                                02FA          ;   forcing all I/O to be quadword aligned.
                                02FA          ;
  04     00000000'EF48    91    02FA          CMPB    PLVEC$AB_DEV[R8],#DEVTRN$C_DEV_CI       ; CI?
                    05    12    0302          BNEQ    166$                     ; Branch if not
                                0304          SETBIT  #LPD$V_ALIGNQ,LPD$W_STS(R6) ; Always quadword-align the CI
                                0309 166$:    ;
                                0309          ;   Determine whether the datalink driver can support buffered
                                0309          ;   or direct I/O based on it's FDT table.
                                0309          ;
          50    0088 C0   D0    0309 170$:    MOVL    UCB$L_DDT(R0),R0         ; Get DDT address
           50    08 A0    D0    030E          MOVL    DDT$L_FDT(R0),R0         ; Get FDT
           00000000'8F    E1    0312          BBC     #IO$_READLBLK,-          ; If BC then direct I/O function
```

```
               05 08 A0        0318  1504               FDT_IOTYPE(R0),180$           ;
                               031B  1505          SETBIT   LPD$V_RBF,LPD$W_STS(R6) ; Mark for buffered receives
          00000000'8F    E1    0320  1506 180$:    BBC      #IO$_WRITELBLK,-          ; If BC then direct I/O function
               04 08 A0        0326  1507                   FDT_IOTYPE(R0),200$
                               0329  1508          SETBIT   LPD$V_XBF,LPD$W_STS(R6) ; Mark for buffered transmissions
                               032D  1509 200$:    ;
                               032D  1510          ;   If this is a broadcast circuit, then do not allow the circuit
                               032D  1511          ;   TRANSPORT TYPE to be any value other than Phase IV values.
                               032D  1512          ;
          24 22 A6    0A    E1 032D  1513          BBC      #LPD$V_BC,LPD$W_STS(R6),205$ ; If broadcast circuit,
                               0332  1514          $GETFLD cri,l,xpt             ; Get transport type parameter
                   14 50    E9 033F  1515          BLBC     R0,205$               ; Skip if not specified
                    1837    30 0342  1516          BSBW     XPT_TO_PTY            ; Translate XPT to node type
                               0345  1517          $DISPATCH R8,<-                ; Allow only if set to one of:
                               0345  1518                   <ADJ$C_PTY_PH4,205$>,- ; Phase IV routing
                               0345  1519                   <ADJ$C_PTY_PH4N,205$>,- ; Phase IV endnode
                               0345  1520                   <ADJ$C_PTY_AREA,205$>> ; Phase IV area routing
          50    0000'8F    3C 034F  1521          MOVZWL   #SS$_BADPARAM,R0       ; Else, illegal protocol
                      58    11 0354  1522          BRB      300$                  ; Exit with error
                               0356  1523 205$:    ;
                               0356  1524          ;   Allocate an ADJ control block, to maintain adjacency-related
                               0356  1525          ;   parameters.  The first MAX_LPD slots in the ADJ vector correspond
                               0356  1526          ;   exactly to the LPD of the same index, so allocation is easy.
                               0356  1527          ;
             57   20 A6    9A 0356  1528          MOVZBL   LPD$B_PTH_INX(R6),R7   ; Get LPD index
            57   2C B447   D0 035A  1529          MOVL     @RCB$L_PTR_ADJ(R4)[R7],R7 ; Get pointer to ADJ block
                      54    DD 035F  1530          PUSHL    R4                    ; Save registers
 67    0D    00    6E    00    2C 0361  1531          MOVC5    #0,(SP),#0,#ADJ$C_LENGTH,(R7) ; Zero ADJ cell
                   54 8ED0    0367  1532          POPL     R4                    ; Restore registers
          02 A7    20 A6    B0 036A  1533          MOVW     LPD$W_PTH(R6),ADJ$W_LPD(R7) ; Store associated LPD index in ADJ
          01 A7    FF 8F    90 036F  1534          MOVB     #ADJ$C_PTY_UNK,ADJ$B_PTYPE(R7) ; Mark partner type unknown
                               0374  1535          SETBIT   ADJ$V_INUSE,ADJ$B_STS(R7)   ; Mark cell in use
                               0377  1536          ;
                               0377  1537          ;   For broadcast circuits, initialize the "designated router"
                               0377  1538          ;   to be the NI itself.  For point-to-point circuits, initialize
                               0377  1539          ;   the "designated router" to be the remote partner node.
                               0377  1540          ;
                   20 A6    9B 0377  1541          MOVZBW   LPD$B_PTH_INX(R6),-     ; Preset ADJ index of "DRT" to that of
                   2C A6       037A  1542                   LPD$W_DRT(R6)          ; the circuit itself ("none")
                               037C  1543          ;
                               037C  1544          ;   If this is a broadcast circuit, then allocate a buffer to hold
                               037C  1545          ;   the current state of the "router election".
                               037C  1546          ;
                               037C  1547          $DISPATCH RCB$B_ETY(R4),TYPE=B,<- ; If we are an endnode,
                               037C  1548                   <ADJ$C_PTY_PH4N,210$>,- ; skip the following
                               037C  1549                   <ADJ$C_PTY_PH3N,210$>>
          12 22 A6    0A    E1 038C  1550          BBC      #LPD$V_BC,LPD$W_STS(R6),210$ ; Skip if non-broadcast circuit
   51    000000F9 8F    D0 03'1  1551          MOVL     #12+1+TR4$C_MAX_RSLIST,R1 ; Set size of buffer needed
                   FC65'    30 0398  1552          BSBW     NET$ALONPGD_Z          ; Allocate buffer from nonpaged pool
                   10 50    E9 039B  1553          BLBC     R0,300$               ; Branch if error detected
          2E A6    0C A2    9E 039E  1554          MOVAB    12(R2),LPD$L_RTR_LIST(R6) ; Store address of buffer
                               03A3  1555 210$:    ;
                               03A3  1556          ;   Link the new LPD to the CNF block
                               03A3  1557          ;
             58   20 A6    3C 03A3  1558          MOVZWL   LPD$W_PTH(R6),R8       ; Get path i.d.
             12 AA    58    B0 03A7  1559          MOVW     R8,CNF$W_ID(R10)       ; Link CNF to LPD
             50      00'    D0 03AB  1560          MOVL     S^#SS$_NORMAL,R0       ; Indicate success
```

```
     0F 50   E8  03AE   1561 300$:   BLBS    R0,390$              ; If error on exit,
        56   D5  03B1   1562         TSTL    R6                   ; Was an LPD allocated?
        0B   13  03B3   1563         BEQL    390$                 ; Branch if not
   0201 8F   BB  03B5   1564         PUSHR   #^M<R0,R9>           ; Save final status
      0091   30  03B9   1565         BSBW    DEAL_LPD             ; If so, cleanup LPD
   0201 8F   BA  03BC   1566         POPR    #^M<R0,R9>           ; Restore final status
             05  03C0   1567 390$:   RSB                          ; Return status in R0
```

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                                      03C1        .SBTTL  ALLOC_COSTHOPS - Allocate a cost/hops buffer
                                      03C1  ;+
                                      03C1  ; ALLOC_COSTHOPS - Allocate a cost/hops buffer for an adjacency
                                      03C1  ;
                                      03C1  ; This routine is called to allocate a buffer in ACP process space
                                      03C1  ; to hold the last routing message received from the circuit or
                                      03C1  ; broadcast router.  This is called when a circuit LPD is created,
                                      03C1  ; or when we hear from a new broadcast router.  The address of
                                      03C1  ; the buffer is stored in the NET$AL_CH_VE  pointer vector.
                                      03C1  ;
                                      03C1  ; Inputs:
                                      03C1  ;
                                      03C1  ;       R8 = ADJ index
                                      03C1  ;
                                      03C1  ; Outputs:
                                      03C1  ;
                                      03C1  ;       R0 = status code
                                      03C1  ;
                                      03C1  ;       R1-R2 is destroyed.
                                      03C1  ;-
                                      03C1 ALLOC_COSTHOPS:
                        38      BB    03C1         PUSHR   #^M<R3,R4,R5>              ; Save registers
                00000000'EF     16    03C3         JSB     NET$GET_RTG2               ; Get routing info
                      55 50     E9    03C9         BLBC    R0,90$                     ; Branch if error
         51     0000080C 8F     D0    03CC         MOVL    #12+<2*NUM_NODES>,R1       ; Set length of block
                      FC2A'     30    03D3         BSBW    NET$ALLOCATE               ; Allocate the buffer
                      48 50     E9    03D6         BLBC    R0,90$                     ; Branch if unable to allocate
                    52  0C      C0    03D9         ADDL    #12,R2                     ; Point to first available byte
                    51  0C      C2    03DC         SUBL    #12,R1
           00000980'EF48  52    D0    03DF         MOVL    R2,NET$AL_CH_VEC[R8]       ; Store address in vector
  62    51    FF 8F    6E  00   2C    03E7         MOVC5   #0,(SP),#-1,R1,(R2)        ; Initialize it to max cost/hops
                                      03EE         ;
                                      03EE         ;   If we are an area router, then allocate one for area
                                      03EE         ;   routing messages as well.
                                      03EE         ;
         51     00000000'EF     D0    03EE         MOVL    NET$GL_PTR_VCB,R1          ; Get RCB address
             03     008A C1     91    03F5         CMPB    RCB$B_ETY(R1),#ADJ$C_PTY_AREA ; Are we an area router?
                        22      12    03FA         BNEQ    80$                        ; If not, then exit
         51     0000008C 8F     D0    03FC         MOVL    #12+<2*NUM_AREAS>,R1       ; Set length of block
                      FBFA'     30    0403         BSBW    NET$ALLOCATE               ; Allocate the buffer
                      18 50     E9    0406         BLBC    R0,90$                     ; Branch if unable to allocate
                    52  0C      C0    0409         ADDL    #12,R2                     ; Point to first available byte
                    51  0C      C2    040C         SUBL    #12,R1
           00001A88'EF48  52    D0    040F         MOVL    R2,NET$AL_AREA_CH[R8]      ; Store address in vector
  62    51    FF 8F    6E  00   2C    0417         MOVC5   #0,(SP),#-1,R1,(R2)        ; Initialize it to max cost/hops
                    50  01      D0    041E 80$:    MOVL    #1,R0                      ; Success
                        38      BA    0421 90$:    POPR    #^M<R3,R4,R5>              ; Restore registers
                        05            0423         RSB
```

```
                             0424          .SBTTL  DEAL_LPD - Deallocate LPD
                             0424  ;++
                             0424  ; COND_DEAL_LPD - Conditionally deallocate LPD
                             0424  ; DEAL_LPD      - Unconditionally deallocate LPD
                             0424  ;
                             0424  ; The I/O channel is $DEASSGN'd, and the LPD block is deallocated.
                             0424  ; The LPD is unhooked from the CRI CNF.
                             0424  ;
                             0424  ; INPUTS:       R11     CRI CNR pointer
                             0424  ;               R10     CRI CNF pointer
                             0424  ;               R6      LPD pointer
                             0424  ;
                             0424  ; OUPUTS:       R6      Zero
                             0424  ;               R0      LBS if successful
                             0424  ;                       LBC otherwise
                             0424  ;
                             0424  ;               R1-R4,R7-R9 are destroyed
                             0424  ;--
                             0424  COND_DEAL_LPD:                          ; Conditionally deallocate LPD
                             0424          $GETFLD cri,l,sta               ; Get the operater state
                 07 50   E9  0431          BLBC    R0,10$                  ; If LBC then assume "off"
                    50   D4  0434          CLRL    R0                      ; Assume can't deallocate
              01    58   91  0436          CMPB    R8,#NMA$C_STATE_OFF     ; Is the state "off"
                    11   12  0439          BNEQ    20$                     ; If NEQ then can't deallocate
                 1B A6   95  043B  10$:    TSTB    LPD$B_ASTCNT(R6)        ; Has LPD run-down?
                    0C   12  043E          BNEQ    20$                     ; If NEQ no, return error
                 1C A6   95  0440          TSTB    LPD$B_IRPCNT(R6)        ; Does NETDRIVER still have references?
                    07   12  0443          BNEQ    20$                     ; If NEQ, then wait for NETDRIVER
                             0445                                          ; to wake us up with CRD event
                    03   E0  0445          BBS     #LPD$V_ACCESS,-         ; If accessed for "service" then
              02 22 A6       0447                    LPD$W_STS(R6),20$     ; cannot deallocate
                    01   10  044A          BSBB    DEAL_LPD                ; Deallocate LPD
                         05  044C  20$:    RSB                             ; Done
                             044D
                             044D  DEAL_LPD:                               ; Deallocate LPD
           50    28 A6   9A  044D          MOVZBL  LPD$B_PLVEC(R6),R0      ; Get PLVEC index
                    15   13  0451          BEQL    10$                     ; If EQL then none
                 28 A6   94  0453          CLRB    LPD$B_PLVEC(R6)         ; Init the PLVEC index
         00000000'EF40   97  0456          DECB    PLVEC$AB_REFC[R0]       ; No longer referencing it
 14 A6   00000000'EF40   B1  045D          CMPW    PLVEC$AW_CHAN[R0],-     ; Are the line and circuit channels
                             0466                  LPD$W_CHAN(R6)          ; the same?
                    0B   13  0466          BEQL    15$                     ; If so, let line-related code deassign it
                             0468  10$:    $DASSGN_S CHAN = LPD$W_CHAN(R6) ; De-assign channel
                 12 AA   B4  0473  15$:    CLRW    CNF$W_ID(R10)           ; Unbind LPD from CRI
           54    20 A6   3C  0476          MOVZWL  LPD$W_PTH(R6),R4        ; Get current path index & seq. no
              52    54   9A  047A          MOVZBL  R4,R2                   ; Get LPD index
   50    00000980'EF42   D0  047D          MOVL    NET$AL_CH_VEC[R2],R0    ; Get address of routing msg buffer
                    0D   13  0485          BEQL    20$                     ; Branch if none
              50    0C   C2  0487          SUBL    #12,R0                  ; Point to real start of block
                 FB73'   30  048A          BSBW    NET$DEALLOCATE          ; Deallocate routing message buffer
         00000980'EF42   D4  048D          CLRL    NET$AL_CH_VEC[R2]       ; Invalidate pointer
   50    00001A88'EF42   D0  0494  20$:    MOVL    NET$AL_AREA_CH[R2],R0   ; Get address of area routing buffer
                    0D   13  049C          BEQL    25$                     ; Branch if none
              50    0C   C2  049E          SUBL    #12,R0                  ; Point to real start of block
                 FB5C'   30  04A1          BSBW    NET$DEALLOCATE          ; Deallocate routing message buffer
         C0001A88'EF42   D4  04A4          CLRL    NET$AL_AREA_CH[R2]      ; Invalidate pointer
     51    00000000'EF   D0  04AB  25$:    MOVL    NET$GL_PTR_VCB,R1       ; Get RCB address
```

```
                   50    2C B142   D0  04B2            MOVL    @RCB$L_PTR_ADJ(R1)[R2],R0 ; Get address of ADJ block
                              16   BB  04B7            PUSHR   #^M<R1,R2,R4>             ; Save registers
        60    0D   00    6E   00   2C  04B9            MOVC5   #0,(SP),#0,#ADJ$C_LENGTH,(R0) ; Zero ADJ - including INUSE bit
                              16   BA  04BF            POPR    #^M<R1,R2,R4>             ; Restore registers
                     50    2E A6   D0  04C1            MOVL    LPD$L_RTR_LIST(R6),R0     ; Get address of RTR_LIST buffer
                              06   13  04C5            BEQL    30$                       ; Branch if none
                        50    0C   C2  04C7            SUBL    #12,R0                    ; Point to real start of block
                           FB33'   30  04CA            BSBW    NET$DEALLOCATE            ; Deallocate the buffer
                        50    56   D0  04CD      30$:  MOVL    R6,R0                     ; Point to LPD structure
                           FB2D'   30  04D0            BSBW    NET$DEALLOCATE            ; Deallocate LPD block
                              56   D4  04D3            CLRL    R6                        ; Invalidate LPD pointer
                   28 B142    54   D0  04D5            MOVL    R4,@RCB$L_PTR_LPD(R1)[R2] ; Invalidate LPD vector slot
                                       04DA                                              ; and store current index & seq. no
                                       04DA                                              ; instead of a pointer (bit 31 clear)
                        50    00'  D0  04DA            MOVL    S^#SS$_NORMAL,R0          ; Setup status
                                   05  04DD            RSB
                           04DE           .SBTTL  CHECK_REQ_PARAMS - Check that required parameters are set
                           04DE     ;+
                           04DE     ; CHECK_REQ_PARAMS - Check that required circuit parameters are specified
                           04DE     ;
                           04DE     ; This routine is called when a circuit is turned on, in order to ensure
                           04DE     ; that the proper parameters were specified, depending on the type of
                           04DE     ; circuit.  This is done here, so that immediate feedback can be given
                           04DE     ; to the requestor.
                           04DE     ;
                           04DE     ; Inputs:
                           04DE     ;
                           04DE     ;         R11 = CRI CNR address
                           04DE     ;         R10 = CRI CNF address
                           04DE     ;
                           04DE     ; Outputs:
                           04DE     ;
                           04DE     ;         R0 = status code
                           04DE     ;-
                           04DE     CHECK_REQ_PARAMS:
                           04DE           ;
                           04DE           ;   COST must be specified for all routing circuits.
                           04DE           ;
                           04DE           $GETFLD cri,l,cos               ; Get the COST value
            03 50    E8    04EB           BLBS    R0,10$                  ; Branch if okay
             0080    31    04EE           BRW     80$                     ; Else, error
                           04F1           ;
                           04F1           ;   If we are an endnode, do not allow TRANSPORT TYPE
                           04F1           ;   parameter to be set to a router.
                           04F1           ;
54      00000000'EF  D0    04F1     10$:  MOVL    NET$GL_PTR_VCB,R4       ; Get RCB address
                           04F8           $DISPATCH RCB$B_ETY(R4),TYPE=B,<- ; If we are an endnode,
                           04F8                   <ADJ$C_PTY_PH4N,15$>,-
                           04F8                   <ADJ$C_PTY_PH3N,15$>>
               28    11    0508           BRB     20$
                           050A     15$:  $GETFLD cri,l,xpt               ; Get TRANSPORT TYPE
            18 50    E9    0517           BLBC    R0,20$                  ; If specified,
             165F    30    051A           BSBW    XPT_TO_PTY              ; Translate XPT to node type
                           051D           $DISPATCH R8,<-                 ; These are the allowable values
                           051D                   <ADJ$C_PTY_PH4N,20$>,-
                           051D                   <ADJ$C_PTY_PH3N,20$>>
   50       0000'8F  3C    052B           MOVZWL  #SS$_BADPARAM,R0        ; Illegal parameter
               44    11    0530           BRB     90$
                           0532     20$:  ;
                           0532           ;   If X.25 circuit, then check additional parameters
                           0532           ;
                           0532           $GETFLD cri,l,typ               ; Get circuit type
            2A 50    E9    053F           BLBC    R0,50$                  ; Branch if not set
         03    58    D1    0542           CMPL    R8,#NMA$C_CIRTY_X25     ; X.25 circuit?
               25    12    0545           BNEQ    50$                     ; Branch if not
                           0547           ;
                           0547           ;   For X.25 circuits, USAGE must be specified, and for outgoing
                           0547           ;   DLM circuits, NUMBER must be specified.
                           0547           ;
                           0547           $GETFLD cri,l,use               ; Get USAGE
            1A 50    E9    0554           BLBC    R0,80$                  ; Error if not specified
         02    58    D1    0557           CMPL    R8,#NMA$C_CIRUS_OUT     ; Outgoing?
               10    12    055A           BNEQ    50$                     ; Branch if not
```

```
                           055C   1749           $GETFLD cri,l,num                ; Get NUMBER
          05 50       E9   0569   1750           BLBC    R0,80$                   ; Error if not specified
       50    00'      D0   056C   1751 50$:      MOVL    S^#SS$_NORMAL,R0         ; Successful
             05       11   056F   1752           BRB     90$
 50    0000'8F        3C   0571   1753 80$:      MOVZWL  #SS$_INSFARG,R0          ; COST value missing
                      05   0576   1754 90$:      RSB
```

```
                         0577           .SBTTL  NET$DLL_X25_CALL - Process incoming X.25 call
                         0577    ;+
                         0577    ; NET$DLL_X25_CALL - Process incoming X.25 call
                         0577    ;
                         0577    ; Attempt to associate the incoming call with a waiting X.25 DLM circuit
                         0577    ; which is marked "waiting for incoming call".  If a circuit is found,
                         0577    ; queue an event to the circuit.
                         0577    ;
                         0577    ; Inputs:
                         0577    ;
                         0577    ;       R9 = Unit number reported in mailbox message
                         0577    ;       R10/R11 = Descriptor of message data in mailbox message
                         0577    ;               (which is a byte-counted string containing incoming NCB)
                         0577    ;
                         0577    ; Outputs:
                         0577    ;
                         0577    ;       None
                         0577    ;-
                         0577   NET$DLL_X25_CALL::
            5A    8B  9A 0577           MOVZBL  (R11)+,R10              ; Construct descriptor of incoming NCB
            7E    5A  7D 057A           MOVQ    R10,-(SP)               ; Save NCB descriptor on stack
                  7E  7C 057D           CLRQ    -(SP)                   ; Preset descriptor of remote DTE
                         057F    ;
                         057F    ;  Locate the remote DTE address in the NCB
                         057F    ;
         01    02 AB  B1 057F   10$:    CMPW    2(R11),#PSI$C_NCB_REMDTE ; Have we found remote DTE entry?
                  09  12 0583           BNEQ    15$                     ; If not, continue looking
         6E    04 AB  9A 0585           MOVZBL  4(R11),(SP)             ; Save descriptor of remote DTE string
      04 AE    05 AB  9E 0589           MOVAB   5(R11),4(SP)
            50    6B  3C 058E   15$:    MOVZWL  (R11),R0                ; Get length of entry
            5B    50  C0 0591           ADDL    R0,R11                  ; Skip to next entry
            5A    50  C2 0594           SUBL    R0,R10                  ; Subtract from length of NCB left
                  E6  14 0597           BGTR    10$                     ; If more left, continue search
                         0599    ;
                         0599    ;  Search for an incoming circuit, waiting for a call,
                         0599    ;  and which matches the remote DTE address, if the
                         0599    ;  incoming circuit was restricted to a given remote DTE.
                         0599    ;
      5B  00000000'EF  D0 0599          MOVL    NET$GL_CNR_CRI,R11      ; Get address of CRI root
                  5A  D4 05A0           CLRL    R10                     ; Start at beginning of list
            58    01  D0 05A2   30$:    MOVL    #NMA$C_CIRUS_INC,R8     ; Set value of "incoming"
                         05A5           $SEARCH eql,cri,l,use           ; Search for USAGE INCOMING circuits
            4E 50     E9 05B4           BLBC    R0,50$                  ; Reject call if none found
             26E2     30 05B7           BSBW    NET$LOCATE_LPD          ; Locate LPD associated with circuit
            E5 50     E9 05BA           BLBC    R0,30$                  ; If none, ignore circuit
                         05BD           $GETFLD cri,s,num               ; Get specific remote DTE, if specified
            09 50     E9 05CA           BLBC    R0,35$                  ; If not specified, allow everybody
04 BE    6E    00    68    57  2D 05CD  CMPC5   R7,(R8),#0,(SP),@4(SP)  ; Does the remote DTE match?
                  CC  12 05D4           BNEQ    30$                     ; If not, skip this circuit
      C7 22 A6    09  E5 05D6   35$:    BBCC    #LPD$V_INCOMING,LPD$W_STS(R6),30$ ; Check if waiting for call
                         05DB                                           ; and mark it "no longer waiting"
                         05DB    ;
                         05DB    ; Circuit found - queue event to circuit with WQE containing
                         05DB    ; the actual X.25 NCB for the incoming call.
                         05DB    ;
            5E    08  C0 05DB           ADDL    #8,SP                   ; Pop remote DTE descriptor off stack
            5A    8E  7D 05DE           MOVQ    (SP)+,R10               ; Retreive NCB descriptor
```

```
                51    5A   D0  05E1   1813          MOVL    R10,R1                      ; Set size of extra WQE space
                50    01   D0  05E4   1814          MOVL    #WQE$C_SUB_ACP,R0           ; Set type of WQE
                    FA16'  30  05E7   1815          BSBW    WQE$ALLOCATE                ; Allocate a WQE
             10 A2    17   90  05EA   1816          MOVB    #LEV$C_X25_CALL,WQE$B_EVT(R2)    ; Set event code
          12 A2    20 A6   B0  05EE   1817          MOVW    LPD$W_PTH(R6),WQE$W_REQIDT(R2)  ; Set path ID
             14 A2    5A   D0  05F3   1818          MOVL    R10,WQE$L_PM2(R2)           ; Set size of NCB
                      52   DD  05F7   1819          PUSHL   R2                          ; Save WQE address
       24 A2    6B    5A   28  05F9   1820          MOVC    R10,(R11),WQE$C_LENGTH(R2) ; Copy incoming NCB into WQE
                      55 8ED0  05FE   1821          POPL    R5                          ; Restore WQE address into R5
                    077C   30  0601   1822          BSBW    NET$DLL_PRC_WQE             ; Process event and deallocate WQE
                           05  0604   1823          RSB
                               0605   1824
                               0605   1825 ;
                               0605   1826 ; No circuit could be found to handle the call.  Issue a QIO to reject it.
                               0605   1827 ;
                5E    08   C0  0605   1828 50$:     ADDL    #8,SP                       ; Pop remote DTE descriptor off stack
                50    5E   D0  0608   1829          MOVL    SP,R0                       ; Make pointer to NCB descriptor
                               060B   1830          $QIO_S  CHAN=NET$GW_X25_CHAN,-      ; Reject incoming call
                               060B   1831                  FUNC=#IO$_ACCESS!IO$M_ABORT,-
                               060B   1832                  P2=R0
                5E    08   C0  062C   1833          ADDL    #8,SP                       ; Pop NCB descriptor
                           05  062F   1834          RSB                                 ; and exit
```

```
                                0630  1836          .SBTTL  NET$DLL_X25_RESET - X.25 reset detected
                                0630  1837  ;+
                                0630  1838  ; NET$DLL_X25_RESET - X.25 circuit was reset by other side
                                0630  1839  ;
                                0630  1840  ; This routine is called when a mailbox message is received from PSI
                                0630  1841  ; indicating that the X.25 circuit has been reset.  Our action is to
                                0630  1842  ; issue a "reset confirmation", allowing the reset operation on the
                                0630  1843  ; other side to complete.  This is primarily needed during datalink
                                0630  1844  ; initialization, when there is no receive IRP available to detect
                                0630  1845  ; reset requests on the circuit.
                                0630  1846  ;
                                0630  1847  ; Inputs:
                                0630  1848  ;
                                0630  1849  ;       R9 = Unit number reported in mailbox message
                                0630  1850  ;       R10/R11 = Descriptor of message data in mailbox message
                                0630  1851  ;               (which is 3 bytes of: diagnostic, cause, reason)
                                0630  1852  ;
                                0630  1853  ; Outputs:
                                0630  1854  ;
                                0630  1855  ;       None
                                0630  1856  ;-
                                0630  1857  NET$DLL_X25_RESET::
                                0630  1858          ;
                                0630  1859          ;   Find the LPD whose channel corresponds to the unit
                                0630  1860          ;   number in the mailbox message.
                                0630  1861          ;
54   00000000'EF       D0       0630  1862          MOVL    NET$GL_PTR_VCB,R4          ; Get RCB address
     55    5C A4       9A       0637  1863          MOVZBL  RCB$B_MAX_LPD(R4),R5       ; Get number of LPDs
              1B       13       063B  1864          BEQL    30$                        ; If none, ignore message
    56    28 B445      D0       063D  1865  10$:    MOVL    @RCB$L_PTR_LPD(R4)[R5],R6 ; Get LPD address
              11       18       0642  1866          BGEQ    20$                        ; Branch if slot not valid
  0C 22 A6    07       E1       0644  1867          BBC     #LPD$V_X25,LPD$W_STS(R6),20$ ; Skip if not X.25 circuit
     50    10 A6       D0       0649  1868          MOVL    LPD$L_UCB(R6),R0           ; Get UCB address
              06       13       064D  1869          BEQL    20$                        ; Skip if no datalink
     54 A0    59       B1       064F  1870          CMPW    R9,UCB$W_UNIT(R0)          ; Does unit number match?
              04       13       0653  1871          BEQL    50$                        ; Exit loop if it matches
          E5 55        F5       0655  1872  20$:    SOBGTR  R5,10$                     ; Loop through all LPDs
                       05       0658  1873  30$:    RSB                                ; Ignore mailbox message
                                0659  1874          ;
                                0659  1875          ;   We have found the proper X.25 circuit.  Queue an event.
                                0659  1876          ;
              51       D4       0659  1877  50$:    CLRL    R1                         ; No extra WQE space needed
        50    01       D0       065B  1878          MOVL    #WQE$C_SUB_ACP,R0          ; Indicate type of WQE
           F99F'       30       065E  1879          BSBW    WQE$ALLOCATE               ; Allocate a work queue entry
        55    52       D0       0661  1880          MOVL    R2,R5                      ; Copy WQE address
     10 A5    19       90       0664  1881          MOVB    #LEV$C_X25_RESET,WQE$B_EVT(R5) ; Set event code
   12 A5    20 A6      B0       0668  1882          MOVW    LPD$W_PTH(R6),WQE$W_REQIDT(R5) ; Set path ID
            0710       30       066D  1883          BSBW    NET$DLL_PRC_WQE            ; Process event and deallocate WQE
                       05       0670  1884          RSB
```

```
0671          .SBTTL  NET$DLL_RCV - Process message received from driver
0671  ;+
0671  ; NET$DLL_RCV - Process block received from the Transport Layer
0671  ;
0671  ; FUNCTIONAL DESCRIPTION:
0671  ;
0671  ; Received messages are passed to the ACP from NETDRIVER by queuing the non-
0671  ; paged DYN$C_NET buffer directly to the ACP's AQB.  The WQE header and the
0671  ; body of the message are stored within the same buffer.  The message is
0671  ; scanned to determine its type, an event code is generated, and the event is
0671  ; dispatched.
0671  ;
0671  ; When a datalink is initialized, NETDRIVER allocates a single IRP for queuing
0671  ; receives to the datalink.  Post processing for this IRP takes place in
0671  ; NETDRIVER which detaches the received buffer and recycles the IRP by queuing
0671  ; it again to the same datalink.  However, prior to recycling the IRP, if the
0671  ; XM$B_STS_ACTIVE bit in IRP$L_IOST2 is clear then NETDRIVER realizes that the
0671  ; device has shutdown and passes the IRP to the ACP instead of the datalink.
0671  ; The ACP comes here to process this returned IRP.  The eventual action should
0671  ; be to read the entire IRP$L_IOST2 image to detect such things as device
0671  ; entering maintenance mode and to log this event.  For now, the IRP is assumed
0671  ; to be a signal that the device has shutdown.
0671  ;
0671  ; On return, the block is eventually deallocated.
0671  ;
0671  ; INPUTS:       R5      WQE ptr
0671  ;
0671  ;               All others are scratch.
0671  ;
0671  ; OUTPUTS:      All registers are clobbered.
0671  ;
0671  ;-
0671
0671  ;
0671  ;  The expected messages have the following format:
0671  ;
0671  ;
0671  ; Phase 2 init      <0101 1000><1K_1><EX2_add><I6_nam><1B_fct><1B_req>-
0671  ;                              <2B_blksiz><2B_nspsiz><2B_maxlnk5-
0671  ;                              <3b_rtver><3b_comver><I32_sysid>
0671  ; Phase 2 verf      <0101 1000><1K_25<8B_psw>
0671  ;
0671  ;                         <1B_fct>    ::== <1k_0>        no intercept functions
0671  ;                                          <1k_7>        intercept functions
0671  ;
0671  ;                         <1B_req>    ::== low bit = 0 => verf requested
0671  ;                                          low bit = 1 => no verf requested
0671  ;                                          ignore other requests
0671  ;
0671  ;                         <3B_rtver>  ::== <1K_3><1K_1><1K_0>
0671  ;                         <3B_comver> ::== <1K_3><1K_1><1K_0>
0671  ;
0671  ;
0671  ; Phase 3 init      <0000 0001><2B_srcnode><1B_tiinfo><2B_blksiz>-
0671  ;                              <3b_tiver><I64_seed>
0671  ; Phase 3/4 verf    <0000 0011><2B_srcnode5<I64_psw>
0671  ; Phase 3/4 test    <0000 0101><2B_srcnode><I128_data>
```

```
                              0671  ; Phase 3 rout      <0000 0111><2B_srcnode><rtginfo><checksum>
                              0671  ;
                              0671  ;                             <1B_tiinfo> ::== <0000bvnn>  nn = 00 reserved
                              0671  ;                                                             = 01 reserved
                              0671  ;                                                             = 10 routing
                              0671  ;                                                             = 11 nonrouting
                              0671  ;                                                           v =  0 no verf requested
                              0671  ;                                                             =  1 verf requested
                              0671  ;                                                           b =  0 no DLM blocking
                              0671  ;                                                             =  1 DLM block requested
                              0671  ;
                              0671  ;                             <3B_tiver>  ::== <1K_1><1K_3><1K_0>
                              0671  ;                             <64I_seed>  ::== <1K_0>
                              0671  ;
                              0671  ; Phase 4 init      <0000 0001><2B_srcnode><1B_tiinfo><2B_blksiz>-
                              0671  ;                                         <3b_tiver><2B_hello><I64_seed>
                              0671  ; Phase 4 rout      <0000 0111><2B_srcnode><1K_0><rtginfo><checksum>
                              0671  ; Phase 4 area rout <0000 1001><2B_srcnode><1K_0><rtginfo><checksum>
                              0671  ;
                              0671  ;                             <1B_tiinfo> ::== <0000bvnn>  nn = 00 reserved
                              0671  ;                                                             = 01 area routing
                              0671  ;                                                             = 10 routing
                              0671  ;                                                             = 11 nonrouting
                              0671  ;                                                           v =  0 no verf requested
                              0671  ;                                                             =  1 verf requested
                              0671  ;                                                           b =  0 no DLM blocking
                              0671  ;                                                             =  1 DLM block requested
                              0671  ;
                              0671  ;                             <3B_tiver>  ::== <1K_2><1K_0><1K_0>
                              0671  ;                             <64I_seed>  ::== <1K_0>
                              0671  ;
                              0671  ;
                              0671  NET$DLL_RCV::                                   ; Process rece ved message
                              0671          ;
                              0671          ;   Establish the context for the event
                              0671          ;
         00000034'EF     94   0671          CLRB    XMTFLG                          ; Clear all xmit flags
         00000038'EF     94   0677          CLRB    PTYPE                           ; Clear partner node type
         0000000C'EF     D4   067D          CLRL    LEV_L_LPD                       ; Clear the LPD pointer
         00000010'EF     D4   0683          CLRL    LEV_L_ADJ                       ; Clear the ADJ pointer
         00000004'EF     7C   0689          CLRQ    LEV_Q_CRI                       ; Clear the CRI CNF,CNR ptrs
         00000014'EF     B4   068F          CLRW    LEV_W_PNA                       ; Clear partner's node address
         00000018'EF     B4   0695          CLRW    LEV_W_BLKSIZE                   ; Clear partner's block size
         0000001C'EF     94   069B          CLRB    LEV_B_PRIORITY                  ; Clear router priority
         00000020'EF     B4   06A1          CLRW    LEV_W_HELLO                     ; Clear partner's hello timer
         00000024'EF     7C   06A7          CLRQ    LEV_Q_PSWDESC                   ; Clear init password descriptor
         00000000'EF     D4   06AD          CLRL    NET$GL_INITVER                  ; Clear recevied INIT message version
          51    14 A5    3C   06B3          MOVZWL  WQE$L_PM2(R5),R1                ; Get offset to message
             51    55    C0   06B7          ADDL    R5,R1                           ; Convert to pointer
          18 A5    51    D0   06BA          MOVL    R1,WQE$L_EVL_PKT(R5)            ; Store ptr in case packet header
                              06BE                                                  ; is logged
               0789      30   06BE          BSBW    FIND_WQE_CTX                    ; Locate CNF, LPD, ADJ blocks
              34 50      E9   06C1          BLBC    R0,20$                          ; If LPD no longer exists, skip event
  0000000C'EF    56      D0   06C4          MOVL    R6,LEV_L_LPD                    ; Save the LPD pointer in case
                              06CB                                                  ; DISPATCH fails (for code below)
 54     00000000'EF      D0   06CB          MOVL    NET$GL_PTR_VCB,R4               ; Get the RCB pointer
                 28      10   06D2          BSBB    DISPATCH                        ; Dispatch to determine the event
```

```
                03 50   E9 06D4  2000          BLBC    R0,10$                      ; If cannot determine, skip event
                 06B9   30 06D7  2001          BSBW    PROC_EVT                    ; Process the event
                           06DA  2002 10$:     ;
                           06DA  2003          ;   If LPD's receiver is suspended waiting for a buffer then pass this
                           06DA  2004          ;   this buffer back to NETDRIVER.  Else, deallocate it.
                           06DA  2005          ;
                FB'AF   9F 06DA  2006          PUSHAB  B^30$                       ; Setup return address
        56  0000000C'EF D0 06DD  2007          MOVL    LEV_L_LPD,R6                ; Get the LPD
                   12   13 06E4  2008          BEQL    20$                         ; If EQL then none
            50   32 A6  D0 06E6  2009          MOVL    LPD$L_RCV_IRP(R6),R0        ; Is there a waiting receive IRP?
                   0C   13 06EA  2010          BEQL    20$                         ; If EQL then none
            2C A0  55   D0 06EC  2011          MOVL    R5,IRP$L_SVAPTE(R0)         ; Attach buf'er to it
                   55   D4 06F0  2012          CLRL    R5                          ; ...and erase our pointer to it
               50  0C   D0 06F2  2013          MOVL    S^#NETUPD$_REACT_RCV,R0     ; Fct code is "reactivate receiver"
                 2634   31 06F5  2014          BRW     TELL_NETDRIVER              ; Give the buffer back to NETDRIVER
                 068D   30 06F8  2015 20$:     BSBW    KILL_WQE                    ; Else, deallocate the buffer
                        05 06FB  2016 30$:     RSB
                   06FC  2018          .SBTTL  Received message pre-processing routines
                   06FC  2019 ;+
                   06FC  2020 ; These routines are called after receiving a message to pre-process (parse)
                   06FC  2021 ; the message, and store common results in known cells.  This partially masks
                   06FC  2022 ; the difference between various versions which are supported.
                   06FC  2023 ;
                   06FC  2024 ; Inputs:
                   06FC  2025 ;
                   06FC  2026 ;        R11     CNR address
                   06FC  2027 ;        R10     CNF address
                   06FC  2028 ;        R7      ADJ address
                   06FC  2029 ;        R6      LPD address
                   06FC  2030 ;        R5      WQE address
                   06FC  2031 ;        R4      RCB address
                   06FC  2032 ;
                   06FC  2033 ; Outputs:
                   06FC  2034 ;
                   06FC  2035 ;        WQE$B_EVT = Event to be queued to state transition mechanism.
                   06FC  2036 ;
                   06FC  2037 ;        All input registers must be preserved by the parsing routines.
                   06FC  2038 ;-
                   06FC  2039 DISPATCH:
53    10 A5    9A  06FC  2040          MOVZBL  WQE$B_EVT(R5),R3        ; Get Transport layer event code
                   0700  2041          $DISPATCH R3,<-
                   0700  2042                  <NETMSG$C_IRP,   IRP>,- ; IRP event
                   0700  2043                  <NETMSG$C_UNK,   UNK>,- ; Possibly transport control message
                   0700  2044                  <NETMSG$C_APL,   APL>,- ; Aged packet
                   0700  2045                  <NETMSG$C_OPL,   OPL>,- ; Oversized packet loss
                   0700  2046                  <NETMSG$C_NOL,   NOL>,- ; Packet for out-of-range node
                   0700  2047                  <NETMSG$C_NUL,   NUL>,- ; Packet for unreachable node
                   0700  2048                  <NETMSG$C_PFE,   PFE>,- ; Packet with format error
                   0700  2049                  <NETMSG$C_LSN,   LSN>,- ; Listener timeout
                   0700  2050                  <NETMSG$C_CRD,   CRD>,- ; Circuit run down
                   0700  2051                  <NETMSG$C_ADJ,   ADJ>,- ; Adjacency up
                   0700  2052          >
                   071C  2053          BUG_CHECK  NETNOSTATE,FATAL     ; Bug if unknown
                   0720  2054
                   0720  2055 ;
                   0720  2056 ; The CRD message says that NETDRIVER has just completed it's last reference
                   0720  2057 ; to the LPD, so that it can be deallocated.  This is handled by queueing an
                   0720  2058 ; IRP_DOWN event, which causes the state table to eventually try and deallocate
                   0720  2059 ; the LPD again - which this time, will succeed.
                   0720  2060 ;
                   0720  2061 ; For the last IRP that NETDRIVER converts into a CRD message, the IRPCNT
                   0720  2062 ; in the LPD is not decremented until the message actually is processed by
                   0720  2063 ; NETACP.  This prevents any activity on the LPD until all relevant messages
                   0720  2064 ; have been handled.
                   0720  2065 ;
      1C A6    97  0720  2066 CRD:     DECB    LPD$B_IRPCNT(R6)        ; Indicate receipt of CRD message
                   0723  2067                                          ; (allow startup activity to continue)
       F8DA'   30  0723  2068          BSBW    NET$JNX_CO              ; Initialize journalling co-routine
      0D 50    E9  0726  2069          BLBC    R0,30$                  ; Branch if journalling not enabled
   81    33    90  0729  2070          MOVB    #^X33,(R1)+             ; Journal record type = Returned IRP
81    20 A6    90  072C  2071          MOVB    LPD$B_PTH_INX(R6),(R1)+ ; LPD index
         81    B4  0730  2072          CLRW    (R1)+                   ; Indicate no I/O function code
         81    7C  0732  2073          CLRQ    (R1)+                   ; Indicate no I/O completion status
         9E    16  0734  2074          JSB     @(SP)+                  ; Log the journalling record
```

```
          10 A5   20   90  0736  30$:    MOVB    #LEV$C_IRP_DOWN,WQE$B_EVT(R5) ; Device has shut down
             50   01   D0  073A          MOVL    #1,R0                      ; Process the event
                       05  073D          RSB                                ; Enter state transition
                           073E
                           073E
                           073E       ;
                           073E       ; IRP - ''FATAL DATALINK I/O ERROR''
                           073E       ;
                           073E       ; Inputs:
                           073E       ;
                           073E       ;       WQE$W_REQIDT = LPD index
                           073E       ;
                           073E       ; An IRP was just returned from the datalink layer.  Check to see if it
                           073E       ; applies to the local LPD, because if so, it is a signal that NETDRIVER
                           073E       ; is shutting down.
                           073E       ;
          01    12 A5   91  073E  IRP:    CMPB    WQE$W_REQIDT(R5),#LPD$C_LOC_INX ; Local LPD index?
                   06   12  0742          BNEQ    10$                        ; Branch if not
                F8B9'   30  0744          BSBW    NET$LOCLPD_DOWN            ; Report NETDRIVER shutting down
                   50   D4  0747          CLRL    R0                         ; Do not process any event
                        05  0749          RSB
                            074A       ;
                            074A       ; An IRP was just returned for a standard LPD.  This is either due
                            074A       ; to the line going down, or we just entered MOP mode.  Set the appropriate
                            074A       ; event so we can enter the state table.
                            074A       ;
                1B A6   97  074A  10$:    DECB    LPD$B_ASTCNT(R6)           ; Reduce NETACP's claim on the LPD
                            074D                                             ; (for it's receive IRP)
                F8B0'   30  074D          BSBW    NET$JNX_CO                 ; Initialize journalling co-routine
                11 50   E9  0750          BLBC    R0,30$                     ; Branch if journalling not enabled
          81       33   90  0753          MOVB    #^X33,(R1)+                ; Journal record type = Returned IRP
          81    20 A6   90  0756          MOVB    LPD$B_PTH_INX(R6),(R1)+    ; LPD index
          81    20 A5   B0  075A          MOVW    IRP$W_FUNC(R5),(R1)+       ; I/O function code
          81    38 A5   7D  075E          MOVQ    IRP$L_IOST1(R5),(R1)+      ; I/O completion status
                   9E   16  0762          JSB     @(SP)+                     ; Log the journalling record
          10 A5    1F   90  0764  30$:    MOVB    #LEV$C_IRP_RESET,WQE$B_EVT(R5) ; Assume X.25 circuit was reset
     0000'8F    38 A5   B1  0768          CMPW    IRP$L_IOST1(R5),#SS$_RESET ; Was X.25 circuit reset?
                   12   13  076E          BEQL    50$                        ; Branch if yes
          10 A5    20   90  0770          MOVB    #LEV$C_IRP_DOWN,WQE$B_EVT(R5) ; Assume device has shut down
       09 22 A6    07   E0  0774          BBS     #LPD$V_X25,LPD$W_STS(R6),50$ ; Don't check MOP if X.25
                   13   E1  0779          BBC     #XM$V_ERR_MAINT,-          ; Br if not MOP mode
           04 3C A5         077B                  IRP$L_IOST2(R5),50$        ;
          10 A5    21   90  077E          MOVB    #LEV$C_IRP_MM,WQE$B_EVT(R5) ; Device entered MOP mode
             50    01   D0  0782  50$:    MOVL    #1,R0                      ; Process the event
                        05  0785          RSB                                ; Enter state transition
                            0786
                            0786
                            0786       ;
                            0786       ; ADJ - ''ADJACENCY UP''
                            0786       ;
                            0786       ; Inputs:
                            0786       ;
                            0786       ;       WQE$W_REQIDT = LPD index
                            0786       ;       WQE$L_PM2 = Descriptor of message (word of length, word of offset)
                            0786       ;
                            0786       ; For adjacency up message, parse the message received by NETDRIVER,
                            0786       ; and if the message makes sense, then create an adjacency block
                           0786  ; for the new Router or Endnode.  The only messages that are allowed
                           0786  ; are: Start, Router Hello and Endnode Hello.  All other types of
                           0786  ; messages are ignored.
                           0786  ;
            0073    30     0786  ADJ:    BSBW    UNK                           ; Parse received message
           3F 50    E9     0789          BLBC    R0,40$                        ; If cannot parse, then ignore it
                           078C          $DISPATCH WQE$B_EVT(R5),TYPE=B,<-   ; Based on type of message,
                           078C                  <LEV$C_RCV_RHEL,10$>,-        ; Router Hello message
                           078C                  <LEV$C_RCV_EHEL,20$>,-        ; Endnode Hello message
                           078C                  <LEV$C_RCV_STR,50$>,-         ; Start message - process it
                           078C                  <LEV$C_LOG_NFE,50$>,-         ; If error detected, log event
                           078C                  <LEV$C_LOG_ADE,50$>,-         ;       ""
                           078C                  <LEV$C_LOG_CDE,50$>>          ;       ""
              2C    11     07CB  40$:    BRB     IGNORE_MSG                    ; Otherwise, ignore the message
                    05     07CD  50$:    RSB                                   ; Return to queue the event
                           07CE
                           07CE          ;
                           07CE          ;   Router Hello message - process new router adjacency
                           07CE          ;
              04    E1     07CE  10$:    BBC     #LPD$V_RUN,-                  ; Skip if circuit not in RUN state
        26 22 A6           07D0                  LPD$W_STS(R6),IGNORE_MSG
            1613    30     07D3          BSBW    BRA_UP                        ; Broadcast router is up
                           07D6                                                ; Reset R7 to point to new ADJ block
           20 50    E9     07D6          BLBC    R0,IGNORE_MSG                 ; If cannot allocate, then forget it
      20 A5    58   B0     07D9          MOVW    R8,WQE$W_ADJ_INX(R5)          ; Store new ADJ index
                    05     07DD          RSB                                   ; Queue event set by UNK
                           07DE          ;
                           07DE          ;   Endnode Hello message - process new endnode adjacency
                           07DE          ;
              04    E1     07DE  20$:    BBC     #LPD$V_RUN,-                  ; Skip if circuit not in RUN state
        16 22 A6           07E0                  LPD$W_STS(R6),IGNORE_MSG
            16FA    30     07E3          BSBW    BEA_UP                        ; Broadcast endnode is up
                           07E6                                                ; Reset R7 to point to new ADJ block
           10 50    E9     07E6          BLBC    R0,IGNORE_MSG                 ; If cannot allocate, then forget it
      20 A5    58   B0     07E9          MOVW    R8,WQE$W_ADJ_INX(R5)          ; Store new ADJ index
                           07ED          $LOG    TPL_AUP,,R5                   ; Set "adjacency up" event
           F808'    30     07F5          BSBW    NET$EVT_INTRAW                ; Log the event record
                    05     07F8          RSB                                   ; Queue event set by UNK
                           07F9
                           07F9  ;
                           07F9  ;   This routine is called when we have received a message which
                           07F9  ;   is valid when a adjacency is normally up, but which must be
                           07F9  ;   ignored when the adjacency is still undergoing initialization.
                           07F9  ;
                           07F9
                           07F9  IGNORE_MSG:
              50    D4     07F9          CLRL    R0                            ; Do not queue any event
                    05     07FB          RSB
                           07FC
                           07FC  ;
                           07FC  ;   Determine the type of message received, dispatch to parse it
                           07FC  ;
                           07FC
  02    61    02    00  ED 07FC  UNK:    CMPZV   #0,#2,(R1),#TR3C_MSG_RTH ; Phase III/IV Data Packet?
                    F6  13 0801          BEQL    IGNORE_MSG                    ; If so, drop message on the floor
  59    000000B4'EF     9E 0803          MOVAB   MSG_MAP_TABLE,R9              ; Setup the message mapping table ptr
              53    81  9A 080A          MOVZBL  (R1)+,R3                      ; Get the message type
```

```
         58 8F    53    91  080D          CMPB    R3,#TR2C_MSG_INI          ; Is this a Phase II init message?
                  05    12  0811          BNEQ    80$                       ; If not, branch
                  71    95  0813          TSTB    -(R1)                     ; Backup
            53    81    3C  0815          MOVZWL  (R1)+,R3                  ; Get the type and subtype
            50    89    D0  0818 80$:     MOVL    (R9)+,R0                  ; Get message parser routine address
                  32    13  081B          BEQL    PFE                       ; If at end of table, log error
            52    89    3C  081D          MOVZWL  (R9)+,R2                  ; Get minimum msg size
            89    53    B1  0820          CMPW    R3,(R9)+                  ; Is this it ?
                  F3    12  0823          BNEQ    80$                       ; If not, loop
         16 A5    52    A2  0825          SUBW    R2,WQE$L_PM2+2(R5)        ; Update bytes left
                  24    19  0829          BLSS    PFE                       ; If LSS then packet format error
                  60    16  082B          JSB     (R0)                      ; Parse the message
                        05  082D          RSB
                            082E
                            082E ;
                            082E ;    NETDRIVER messages which cause a DECnet event record to be written
                            082E ;    and the adjacency to be shutdown.
                            082E ;
                            082E
                            082E LSN:                                       ; Adjacncy listener timeout
                            082E ;
                            082E ;    If this is a DMC line, then we will toggle the line as well as the
                            082E ;    circuit to force any modem connections, to hang up. This is done
                            082E ;    here because the DMC driver cannot figure out on it's own when to
                            082E ;    hang up the modem.
                            082E ;
         50    28 A6    9A  082E          MOVZBL  LPD$B_PLVEC(R6),R0        ; Get PLVEC index
  01    00000000'EF40   91  0832          CMPB    PLVEC$AB_DEV[R0],-        ; Is this a DMC11?
                            083A                  #DEVTRN$C_DEV_DMC         ;
                  06    12  083A          BNEQ    10$                       ; Br if no
       1000 8F          A8  083C          BISW    #LPD$M_TOGGLE,-           ; Else, force a line toggle
         22 A6              0840                  LPD$W_STS(R6)             ;
         18 A5          D4  0842 10$:     CLRL    WQE$L_EVL_PKT(R5)         ; Indicate no packet for this event
                            0845          $LOG    TPL_LDS,TPL_PRSN_LTMO,,R5 ; Store logging info in WQE
                  13    11  084D          BRB     ADJ_DOWN_EVENT
                            084F PFE:                                       ; Packet format error
                            084F          BUMP    B,RCB$B_CNT_PFE(R4)       ; Increment packet format error count
                            085A          $LOG    TPL_PFM,,,R5              ; Store logging info in WQE
                            0862 ADJ_DOWN_EVENT:
         10 A5    24    90  0862          MOVB    #LEV$C_LOG_ADE,WQE$B_EVT(R5) ; Setup to log event
            50    01    D0  0866          MOVL    #1,R0                     ; Process event
                        05  0869          RSB                               ; Return true - process event
                            086A
                            086A ;
                            086A ;    NETDRIVER messages which simply cause a DECNET event record to be written.
                            086A ;
                            086A
                            086A OPL:                                       ; Oversized packet loss
                            086A          $LOG    TPL_OPL,,,R5              ; Store logging info into WQE
                  3D    11  0872          BRB     NON_FATAL                 ; Take common exit
                            0874 APL:                                       ; Aged packet loss
                            0874          BUMP    B,RCB$B_CNT_APL(R4)       ; Increment aged packet loss count
                            087F          $LOG    TPL_APL,,,R5              ; Store logging info in WQE
                  28    11  0887          BRB     NON_FATAL                 ; Take common exit
                            0889 NUL:                                       ; Node unreachable packet loss
                            0889          BUMP    W,RCB$W_CNT_NUL(R4)       ; Increment node unreachable loss count
                            0894          $LOG    TPL_UPL,,,R5              ; Store logging info in WQE
```

```
              13   11  089C   2246            BRB     NON_FATAL                       ; Take common exit
                       089E   2247  NOL:                                              ; Node out-of-range packet loss
                       089E   2248            BUMP    B,RCB$B_CNT_NOL(R4)             ; Increment node out of range loss count
                       08A9   2249            $LOG    TPL_RPL,,,R5                    ; Store logging info in WQE
                       08B1   2250  NON_FATAL:                                        ; Common non-fatal event exit
      10 A5   22   90  08B1   2251            MOVB    #LEV$C_LOG_NFE,WQE$B_EVT(R5) ; Setup for "log non-fatal event"
         50   01   D0  08B5   2252            MOVL    #1,R0                           ; Process event
                   05  08B8   2253            RSB                                     ; Return true - process event
                       08B9   2254
```

```
                        08B9          .SBTTL  RCV_STR2 - Received Phase II start message
                        08B9    ;+
                        08B9    ; RCV_STR2  - Process received Phase II Transport Initialization Start message
                        08B9    ;
                        08B9    ; FUNCTIONAL DESCRIPTION:
                        08B9    ;
                        08B9    ; The message is parsed to determine correctness, node address, and the
                        08B9    ; database is checked to determine whether a verification message needs to be
                        08B9    ; sent.
                        08B9    ;
                        08B9    ; The possible events returned in WQE$B_EVT are:
                        08B9    ;
                        08B9    ;               LEV$C_RCV_STR   - Rcv Transport Layer "start" msg
                        08B9    ;               LEV$C_LOG_FTE   - Fatal event
                        08B9    ;
                        08B9    ;
                        08B9    ; INPUTS:       R11     CNR address
                        08B9    ;               R10     CNF address
                        08B9    ;               R7      ADJ address
                        08B9    ;               R6      LPD address
                        08B9    ;               R5      WQE address
                        08B9    ;               R4      RCB address
                        08B9    ;               R1      Ptr to next byte in the message
                        08B9    ;
                        08B9    ;               All others are scratch
                        08B9    ;
                        08B9    ; OUTPUTS:      R5      Unchanged
                        08B9    ;               R0      True if event to be processed, false if not
                        08B9    ;
                        08B9    ;               All other regs may be clobbered.
                        08B9    ;
                        08B9    ;-
                        08B9   RCV_STR2:                                ; Process rcvd phase II Start msg
                        08B9            ;
                        08B9            ;  Parse the node address.
                        08B9            ;
         03CF     30    08B9            BSBW    PARSE_PH2_ADDR          ; Parse Phase II node address
       4F 50      E9    08BC            BLBC    R0,50$                  ; If LBC error, chain to event setup
                        08BF                                            ; by PARSE_PH2_ADDR
                        08BF            ;
                        08BF            ;  Process the nodename field.  The size is checked but the name text
                        08BF            ;  itself is ignored (this is consistent with not knowing the name of
                        08BF            ;  a Phase III node and allows the rules for Phase II and Phase III
                        08BF            ;  nodes to be the same with respect to whether or not there needs
                        08BF            ;  to be an NDI in the database for that node -- i.e., an NDI is
                        08BF            ;  needed only if "verification" is required for the circuit which
                        08BF            ;  connects to the node).
                        08BF            ;
     50     81    9A    08BF            MOVZBL  (R1)+,R0                ; Get bytes in node name
  16 A5     50    A2    08C2            SUBW    R0,WQE$L_PM2+2(R5)      ; Account for them
            4A    19    08C6            BLSS    100$                    ; If LSS then msg is too small
     51     50    C0    08C8            ADDL    R0,R1                   ; Advance past name
                        08CB            ;
                        08CB            ;  Ignore the FUNCTIONS field
                        08CB            ;
            81    95    08CB   20$:     TSTB    (R1)+                   ; If LSS then field is extended
            07    18    08CD            BGEQ    22$                     ; If GEQ then okay
```

```
        16 A5   B7  08CF              DECW    WQE$L_PM2+2(R5)           ; Account for next (optional) byte
           3E   19  08D2              BLSS    100$                      ; If LSS then format error
           F5   11  08D4              BRB     20$                       ; Loop
                    08D6       22$:   ;
                    08D6              ;       Process the REQUESTS field
                    08D6              ;
     07 61      00  E1  08D6          BBC     #TR2V_REQ_VRF,(R1),25$    ; If LBC verification not required
                    08DA              SETBIT  LPD$V_XMT_VRF,XMTFLG      ; Indicate verification required
           81   95  08E1       25$:   TSTB    (R1)+                     ; If LSS then field is extended
           07   18  08E3              BGEQ    27$                       ; If GEQ then okay
        16 A5   B7  08E5              DECW    WQE$L_PM2+2(R5)           ; Account for next (optional) byte
           28   19  08E8              BLSS    100$                      ; If LSS then format error
           F5   11  08EA              BRB     25$                       ; Loop
                    08EC       27$:   ;
                    08EC              ;       Get the partner's block size and version
                    08EC              ;
00000018'EF     81  B0  08EC          MOVW    (R1)+,LEV_W_BLKSIZE       ; Save partner's block size
                81  D5  08F3          TSTL    (R1)+                     ; Skip over partner's NSP block size
                    08F5                                                ; and his MAX LINKS specifier
00000038'EF     02  90  08F5          MOVB    #ADJ$C_PTY_PH2,PTYPE      ; Mark adjacent node as Phase II
00000000'EF     81  B0  08FC          MOVW    (R1)+,NET$GL_INITVER      ; Save INIT version (3 bytes)
00000002'EF     81  90  0903          MOVB    (R1)+,NET$GL_INITVER+2
      10 A5     08  90  090A          MOVB    #LEV$C_RCV_STR,WQE$B_EVT(R5) ; Event is 'rcvd start msg'
         50     01  D0  090E   50$:   MOVL    #1,R0                     ; Process event
                05      0911          RSB                               ; Return true - process event
                        0912
         FF3A   31      0912   100$:  BRW     PFE                       ; Packet format error
```

```
                          0915        .SBTTL  RCV_STR3 - Received Phase III start message
                          0915  ;+
                          0915  ; RCV_STR3  - Process received Phase II Transport Initialization Start message
                          0915  ;
                          0915  ; FUNCTIONAL DESCRIPTION:
                          0915  ;
                          0915  ; The message is parsed to determine correctness, node address, and the
                          0915  ; database is checked to determine whether a verification message needs to be
                          0915  ; sent.
                          0915  ;
                          0915  ; INPUTS:         R11     CNR address
                          0915  ;                 R10     CNF address
                          0915  ;                 R7      ADJ address
                          0915  ;                 R6      LPD address
                          0915  ;                 R5      WQE address
                          0915  ;                 R4      RCB address
                          0915  ;                 R1      Ptr to next byte in the message
                          0915  ;
                          0915  ;                 All others are scratch
                          0915  ;
                          0915  ; OUTPUTS:        R5      Unchanged
                          0915  ;                 R0      True if event to be processed, false if not
                          0915  ;
                          0915  ;                 All other regs may be clobbered.
                          0915  ;
                          0915  ;-
                          0915  RCV_STR3:                                     ; Process rcvd phase III/IV Start msg
                          0915          ;
                          0915          ;   Compare version numbers.  If we receive a start from a node
                          0915          ;   with a higher version number, then drop the message.  The
                          0915          ;   other node will detect that we are lower version and re-send
                          0915          ;   the correct start message.  If the version is lower than ours,
                          0915          ;   but we don't recognize or support it, then log "version skew".
                          0915          ;
            51       DD   0915          PUSHL   R1                            ; Save current pointer
      51    05 A1    9E   0917          MOVAB   5(R1),R1                      ; Point to version field
          03E6       30   091B          BSBW    PARSE_VERSION                 ; Parse version number field
            51     8ED0   091E          POPL    R1                            ; Restore current pointer
 0301 8F    05 A1    B1   0921          CMPW    5(R1),#TR3C_TIVER             ; Is it Phase III version?
            05       13   0927          BEQL    5$                            ; If so, override error - we can handle it
         41 50       E9   0929          BLBC    R0,30$                        ; If error, chain to new event
            43       11   092C          BRB     RCV_STR4                      ; If no error, then Phase IV
                          092E          ;
                          092E          ;   Parse the Phase III start message.
                          092E          ;
          0387       30   092E  5$:     BSBW    PARSE_PH3_ADDR                ; Parse phase III node address field
         39 50       E9   0931          BLBC    R0,30$                        ; Br on error with new event setup by
                          0934                                                ; PARSE_PH3_ADDR
   07 61    02       E1   0934          BBC     #TR3V_REQ_VRF,(R1),10$        ; Br unless verification is requested
                          0938          SETBIT  LPD$V_XMT_VRF,XMTFLG          ; Need to send verif. msg
            00       EF   093F  10$:    EXTZV   #TR3V_REQ_NTY,-               ; Get node type
 50    81   02            0941                  #TR3S_REQ_NTY,(R1)+,R0        ;
00000038'EF   00     90   0944          MOVB    #ADJ$C_PTY_PH3,PTYPE          ; Assume Phase III routing
       02     50     91   094B          CMPB    R0,#TR3C_NTY_PH3              ; Is it a routing node?
       0F     13          094E          BEQL    20$                           ; If EQL yes, continue
00000038'EF   01     90   0950          MOVB    #ADJ$C_PTY_PH3N,PTYPE         ; Assume Phase III non-routing
       03     50     91   0957          CMPB    R0,#TR3C_NTY_PH3N             ; Is it a non-routing node?
```

```
                  03   13  095A  2398          BEQL    20$                          ; If EQL yes, continue
                FEF0   31  095C  2399          BRW     PFE                          ; Else report "packet format error"
     00000018'EF   81   B0  095F  2400 20$:     MOVW    (R1)+,LEV_W_BLKSIZE          ; Store partner's block size
                  51   03   C0  0966  2401          ADDL    #3,R1                        ; Skip version field
               10 A5   08   90  0969  2402          MOVB    #LEV$C_RCV_STR,WQE$B_EVT(R5) ; Event is 'rcvd start msg'
                  50   01   D0  096D  2403 30$:     MOVL    #1,R0                        ; Process event
                       05  0970  2404          RSB                                  ; Return true - process event
```

```
                          0971  2406           .SBTTL  RCV_STR4 - Received Phase IV start message
                          0971  2407  ;+
                          0971  2408  ; RCV_STR4  - Process received Phase IV Transport Initialization Start message
                          0971  2409  ;
                          0971  2410  ; FUNCTIONAL DESCRIPTION:
                          0971  2411  ;
                          0971  2412  ; The message is parsed to determine correctness, node address, and the
                          0971  2413  ; database is checked to determine whether a verification message needs to be
                          0971  2414  ; sent.
                          0971  2415  ;
                          0971  2416  ; INPUTS:         R11     CNR address
                          0971  2417  ;                 R10     CNF address
                          0971  2418  ;                 R7      ADJ address
                          0971  2419  ;                 R6      LPD address
                          0971  2420  ;                 R5      WQE address
                          0971  2421  ;                 R4      RCB address
                          0971  2422  ;                 R1      Ptr to next byte in the message
                          0971  2423  ;
                          0971  2424  ;                 All others are scratch
                          0971  2425  ;
                          0971  2426  ; OUTPUTS:        R5      Unchanged
                          0971  2427  ;                 R0      True if event to be processed, false if not
                          0971  2428  ;
                          0971  2429  ;                 All other regs may be clobbered.
                          0971  2430  ;
                          0971  2431  ;-
                          0971  2432  RCV_STR4:                                       ; Process rcvd phase IV Start msg
             0344     30  0971  2433          BSBW    PARSE_PH4_ADDR                  ; Parse phase IV node address field
            54 50     E9  0974  2434          BLBC    R0,30$                          ; Br on error with new event setup by
                          0977  2435                                                  ; PARSE_PH4_ADDR
       07 61    02    E1  0977  2436          BBC     #TR4V_REQ_VRF,(R1),10$          ; Br unless verification is requested
                          097B  2437          SETBIT  LPD$V_XMT_VRF,XMTFLG            ; Need to send verif. msg
                00    EF  0982  2438 10$:     EXTZV   #TR3V_REQ_NTY,-                 ; Get node type
        50  81  02        0984  2439                  #TR3S_REQ_NTY,(R1)+,R0          ;
  00000038'EF   04    90  0987  2440          MOVB    #ADJ$C_PTY_PH4,PTYPE            ; Assume Phase IV routing
           02   50    91  098E  2441          CMPB    R0,#TR4C_NTY_ROU                ; Is it a routing node?
                1B    13  0991  2442          BEQL    20$                             ; Branch if so
  00000038'EF   05    90  0993  2443          MOVB    #ADJ$C_PTY_PH4N,PTYPE           ; Assume Phase IV non-routing
           03   50    91  099A  2444          CMPB    R0,#TR4C_NTY_NROU               ; Is it a non-routing node?
                0F    13  099D  2445          BEQL    20$                             ; If EQL yes, continue
  00000038'EF   03    90  099F  2446          MOVB    #ADJ$C_PTY_AREA,PTYPE           ; Assume Phase IV area routing
           01   50    91  09A6  2447          CMPB    R0,#TR4C_NTY_ARO                ; Is it area-router?
                03    13  09A9  2448          BEQL    20$                             ; Branch if so
         FEA1         31  09AB  2449          BRW     PFE                             ; Else report "packet format error"
  00000018'EF   81    B0  09AE  2450 20$:     MOVW    (R1)+,LEV_W_BLKSIZE             ; Store partner's block size
           51   03    C0  09B5  2451          ADDL    #3,R1                           ; Skip version field
        16 A5         B5  09B8  2452          TSTW    WQE$L_PM2+2(R5)                 ; && Was msg exactly 10 bytes?
                03    12  09BB  2453          BNEQ    25$                             ; && If so,
        01 A1         94  09BD  2454          CLRB    1(R1)                           ; && Clear high order byte for those
                          09C0  2455                                                  ; && impl. who onlyused 1 byte hello
  00000020'EF   81    B0  09C0  2456 25$:     MOVW    (R1)+,LEV_W_HELLO               ; Store partner's hello timer
        10 A5   08    90  09C7  2457          MOVB    #LEV$C_RCV_STR,WQE$B_EVT(R5) ; Event is 'rcvd start msg'
           50   01    D0  09CB  2458 30$:     MOVL    #1,R0                           ; Process event
                      05  09CE  2459          RSB                                     ; Return true - process event
```

```
                                  09CF   2461           .SBTTL  RCV_VRF - Received routing verification message
                                  09CF   2462 ;+
                                  09CF   2463 ; RCV_VRF2 - Process received Transport Phase II Verification message
                                  09CF   2464 ; RCV_VRF3 - Process received Transport Phase III Verification message
                                  09CF   2465 ; RCV_VRF4 - Process received Transport Phase IV Verification message
                                  09CF   2466 ;
                                  09CF   2467 ; FUNCTIONAL DESCRIPTION:
                                  09CF   2468 ;
                                  09CF   2469 ;
                                  09CF   2470 ; INPUTS:        R11     CNR address
                                  09CF   2471 ;                R10     CNF address
                                  09CF   2472 ;                R7      ADJ address
                                  09CF   2473 ;                R6      LPD address
                                  09CF   2474 ;                R5      WQE address
                                  09CF   2475 ;                R4      RCB pointer
                                  09CF   2476 ;                R1      Ptr to next byte in the message
                                  09CF   2477 ;
                                  09CF   2478 ;                All others are scratch
                                  09CF   2479 ;
                                  09CF   2480 ; OUTPUTS:       R5      Unchanged
                                  09CF   2481 ;                R0      True if event to be processed, false if not
                                  09CF   2482 ;
                                  09CF   2483 ;                All other registers may be clobbered.
                                  09CF   2484 ;
                                  09CF   2485 ;-
                                  09CF   2486           .ENABL  LSB
                                  09CF   2487
                                  09CF   2488 RCV_VRF2:                              ; Preprocess rcv'd Phase II Verf msg
     00000038'EF    02      90    09CF   2489           MOVB    #ADJ$C_PTY_PH2,PTYPE   ; Mark node is Phase II
                    08      B1    09D6   2490           CMPW    S^#TR2C_PSQ_LNG,-      ; Is the msg size correct?
                 16 A5            09D8   2491                   WQE$L_PM2+2(R5)        ;
                    18      13    09DA   2492           BEQL    5$                     ; If EQL yes, save password
                  FE70      31    09DC   2493           BRW     PFE                    ; Else report "packet format error"
                                  09DF   2494
                                  09DF   2495 RCV_VRF3:
                                  09DF   2496 RCV_VRF4:
                  02D6      30    09DF   2497           BSBW    PARSE_PH3_ADDR         ; Get partner's address
                 22 50      E9    09E2   2498           BLBC    R0,10$                 ; If LBC error, exit with event setup
                                  09E5   2499                                          ; by PARSE_PH3_ADDR
              50    81      9A    09E5   2500           MOVZBL  (R1)+,R0               ; Get count of password text
           16 A5    50      B1    09E8   2501           CMPW    R0,WQE$L_PM2+2(R5)     ; Does it match bytes left?
                    1D      12    09EC   2502           BNEQ    20$                    ; If not, illegal message
           40 8F    50      91    09EE   2503           CMPB    R0,#TR3C_MAX_PSW       ; Is it too large
                    17      1A    09F2   2504           BGTRU   20$                    ; If so, illegal message
                                  09F4   2505           ;
                                  09F4   2506           ;    Store the password descriptor
                                  09F4   2507           ;
           10 A5    09      90    09F4   2508 5$:       MOVB    #LEV$C_RCV_VRF,WQE$B_EVT(R5)    ; Setup event code
  00000024'EF    16 A5      9A    09F8   2509           MOVZBL  WQE$L_PM2+2(R5),LEV_Q_PSWDESC   ; Save password size
     00000028'EF    51      D0    0A00   2510           MOVL    R1,LEV_Q_PSWDESC+4              ; Save password pointer
              50    01      D0    0A07   2511 10$:      MOVL    #1,R0                  ; Process event
                            05    0A0A   2512           RSB                            ; Return true - process event
                                  0A0B   2513
                  FE41      31    0A0B   2514 20$:      BRW     PFE                    ; Report "packet format error"
                                  0A0E   2515
                                  0A0E   2516           .DSABL  LSB
```

```
                        0A0E          .SBTTL  RCV_RHEL - Received Phase IV Router Hello message
                        0A0E   ;+
                        0A0E   ; RCV_RHEL  - Process received Phase IV NI Router Hello message
                        0A0E   ;
                        0A0E   ; FUNCTIONAL DESCRIPTION:
                        0A0E   ;
                        0A0E   ; The message is parsed and validated, and an event is queued indicating
                        0A0E   ; that the message needs processing.
                        0A0E   ;
                        0A0E   ; INPUTS:         R11     CNR address
                        0A0E   ;                 R10     CNF address
                        0A0E   ;                 R7      ADJ address
                        0A0E   ;                 R6      LPD address
                        0A0E   ;                 R5      WQE address
                        0A0E   ;                 R4      RCB address
                        0A0E   ;                 R1      Ptr to next byte in the message
                        0A0E   ;
                        0A0E   ;                 All others are scratch
                        0A0E   ;
                        0A0E   ; OUTPUTS:        R5      Unchanged
                        0A0E   ;                 R0      True if event to be processed, false if not
                        0A0E   ;
                        0A0E   ;                 All other regs may be clobbered.
                        0A0E   ;-
                        0A0E   RCV_RHEL:                                       ; Process rcvd Phase IV Router Hello
                        0A0E           ;
                        0A0E           ;   Compare version numbers.  If we receive a message from a node
                        0A0E           ;   with a higher version number, then drop the message.  The
                        0A0E           ;   other node will detect that we are lower version and re-send
                        0A0E           ;   the correct message.  If the version is lower than ours,
                        0A0E           ;   but we don't recognize or support it, then log "version skew".
                        0A0E           ;
           02F3    30   0A0E           BSBW    PARSE_VERSION           ; Parse the version field
          76 50    E9   0A11           BLBC    R0,30$                  ; If error, chain to new event
                        0A14           ;
                        0A14           ;   Parse the remote node's address
                        0A14           ;
000400AA 8F   81   D1   0A14           CMPL    (R1)+,#TR$C_NI_PREFIX   ; Standard NI prefix?
             71    12   0A1B           BNEQ    70$                     ; Ignore msg if not
           0298    30   0A1D           BSBW    PARSE_PH4_ADDR          ; Parse phase IV node address field
          67 50    E9   0A20           BLBC    R0,30$                  ; Br on error with new event setup by
                        0A23                                           ; PARSE_PH4_ADDR
                        0A23           ;
                        0A23           ;   Parse the node type code
                        0A23           ;
             00    EF   0A23           EXTZV   #TR3V_REQ_NTY,-         ; Get node type
      50     81    02   0A25                   #TR3S_REQ_NTY,(R1)+,R0  ;
00000038'EF  04    90   0A28           MOVB    #ADJ$C_PTY_PH4,PTYPE    ; Assume Phase IV routing
         02  50    91   0A2F           CMPB    R0,#TR4C_NTY_ROU        ; Is it a routing node?
             0F    13   0A32           BEQL    20$                     ; Branch if so
00000038'EF  03    90   0A34           MOVB    #ADJ$C_PTY_AREA,PTYPE   ; Assume Phase IV area routing
         01  50    91   0A3B           CMPB    R0,#TR4C_NTY_ARO        ; Is it area-router?
             03    13   0A3E           BEQL    20$                     ; Branch if so
        FE0C       31   0A40           BRW     PFE                     ; Else report "packet format error"
                        0A43   20$:    ;
                        0A43           ;   If this is a message from a node in another area, then ignore
                        0A43           ;   it unless then node is also a level 2 router.  We assume that
                        0A43  2575            ;     the only way to get a message from another area past the address
                        0A43  2576            ;     parsing routine is for us to be a level 2 router.
                        0A43  2577            ;
                        0A43  2578            ;     This essentially allows level2-level2 connections, but
                        0A43  2579            ;     disallows level2-level1 connections over the NI.
                        0A43  2580            ;
                0A   EF 0A43  2581            EXTZV   #TR4$V_ADDR_AREA,-          ; Get area number of sending node
        50  58  06      0A45  2582                    #TR4$S_ADDR_AREA,R8,R0
      008B C4   50   91 0A48  2583            CMPB    R0,RCB$B_HOMEAREA(R4)       ; Our area?
                09   13 0A4D  2584            BEQL    22$                         ; If not, drop the message
03    00000038'EF   91  0A4F  2585            CMPB    PTYPE,#ADJ$C_PTY_AREA       ; Is the remote node a level 2 router?
                36   12 0A56  2586            BNEQ    70$                         ; If not, ignore the message
                        0A58  2587 22$:       ;
                        0A58  2588            ;     Parse remaining fields
                        0A58  2589            ;
00000018'EF     81   B0 0A58  2590            MOVW    (R1)+,LEV_W_BLKSIZE         ; Store partner's block size
0000001C'EF     81   90 0A5F  2591            MOVB    (R1)+,LEV_B_PRIORITY        ; Store router priority
                51   D6 0A66  2592            INCL    R1                          ; Skip AREA reserved field
00000020'EF     81   B0 0A68  2593            MOVW    (R1)+,LEV_W_HELLO           ; Store partner's hello timer
                07   12 0A6F  2594            BNEQ    25$                         ; && If not filled in, assume old impl.
00000020'EF     61   9B 0A71  2595            MOVZBW  (R1),LEV_W_HELLO            ; && who still used 1 byte hello
           51   09   C0 0A78  2596 25$:       ADDL    #1+1+7,R1                   ; Skip reserved, count byte, LOGICAL NAME
        16 A5   81   9B 0A7B  2597            MOVZBW  (R1)+,WQE$L_PM2+2(R5)       ; Store size of R/S LIST
           51   55   C2 0A7F  2598            SUBL    R5,R1                       ; Compute offset to R/S LIST
        14 A5   51   B0 0A82  2599            MOVW    R1,WQE$L_PM2(R5)            ; Store offset to list
        10 A5   0D   90 0A86  2600            MOVB    #LEV$C_RCV_RHEL,WQE$B_EVT(R5) ; Event is 'rcvd Router Hello'
           50   01   D0 0A8A  2601 30$:       MOVL    #1,R0                       ; Process event
                     05 0A8D  2602            RSB                                 ; Return true - process event
                        0A8E  2603
                        0A8E  2604 ;
                        0A8E  2605 ; Drop the message on the floor.
                        0A8E  2606 ;
                        0A8E  2607
                50   D4 0A8E  2608 70$:       CLRL    R0                          ; Return false - do not queue event
                     05 0A90  2609            RSB
```

```
                             0A91          .SBTTL  RCV_EHEL - Received Phase IV Endnode Hello message
                             0A91    ;+
                             0A91    ; RCV_EHEL  - Process received Phase IV NI Endnode Hello message
                             0A91    ;
                             0A91    ; FUNCTIONAL DESCRIPTION:
                             0A91    ;
                             0A91    ; The message is parsed and validated, and an event is queued indicating
                             0A91    ; that the message needs processing.
                             0A91    ;
                             0A91    ; INPUTS:         R11     CNR address
                             0A91    ;                 R10     CNF address
                             0A91    ;                 R7      ADJ address
                             0A91    ;                 R6      LPD address
                             0A91    ;                 R5      WQE address
                             0A91    ;                 R4      RCB address
                             0A91    ;                 R1      Ptr to next byte in the message
                             0A91    ;
                             0A91    ;                 All others are scratch
                             0A91    ;
                             0A91    ; OUTPUTS:        R5      Unchanged
                             0A91    ;                 R0      True if event to be processed, false if not
                             0A91    ;
                             0A91    ;                 All other regs may be clobbered.
                             0A91    ;-
                             0A91    RCV_EHEL:                                       ; Process rcvd Phase IV Endnode Hello
                             0A91            ;
                             0A91            ;   Compare version numbers.  If we receive a message from a node
                             0A91            ;   with a higher version number, then drop the message.  The
                             0A91            ;   other node will detect that we are lower version and re-send
                             0A91            ;   the correct message.  If the version is lower than ours,
                             0A91            ;   but we don't recognize or support it, then log "version skew".
                             0A91            ;
               0270     30   0A91            BSBW    PARSE_VERSION           ; Parse the version field
              4A 50     E9   0A94            BLBC    R0,30$                  ; If error, chain to new event
                             0A97            ;
                             0A97            ;   Parse the Endnode Hello message
                             0A97            ;
   000400AA 8F    81    D1   0A97            CMPL    (R1)+,#TR$C_NI_PREFIX   ; Standard NI prefix?
                  45    12   0A9E            BNEQ    70$                     ; Ignore msg if not
                0215    30   0AA0            BSBW    PARSE_PH4_ADDR          ; Parse phase IV node address field
              3B 50     E9   0AA3            BLBC    R0,30$                  ; Br on error with new event setup by
                             0AA6                                            ; PARSE_PH4_ADDR
                  0A    EF   0AA6            EXTZV   #TR4$V_ADDR_AREA,-      ; Get area number of sending node
         50    58   06       0AA8                    #TR4$S_ADDR_AREA,R8,R0
       008B C4    50    91   0AAB            CMPB    R0,RCB$B_HOMEAREA(R4)   ; Our area?
                  33    12   0AB0            BNEQ    70$                     ; If not, drop the message
                  00    ED   0AB2            CMPZV   #TR3V_REQ_NTY,-         ; Get node type
             81   02         0AB4                    #TR3S_REQ_NTY,(R1)+,-   ;
                  03         0AB6                    #TR4C_NTY_NROU          ; Is it a endnode?
                  03    13   0AB7            BEQL    20$                     ; Branch if so
                FD93    31   0AB9            BRW     PFE                     ; Else report "packet format error"
  00000038'EF     05    90   0ABC    20$:    MOVB    #ADJ$C_PTY_PH4N,PTYPE   ; Mark Phase IV endnode message
  00000018'EF     81    B0   0AC3            MOVW    (R1)+,LEV_W_BLKSIZE     ; Store partner's block size
           51     0F    C0   0ACA            ADDL    #1+8+6,R1               ; Skip AREA, SEED reserved fields
                             0ACD                                            ; Skip NEIGHBOR (designated router)
  00000020'EF     81    B0   0ACD            MOVW    (R1)+,LEV_W_HELLO       ; Store partner's hello timer
                  07    12   0AD4            BNEQ    25$                     ; && If not filled in, assume old impl.
```

```
        00000020'EF    61    9B  0AD6  2668          MOVZBW  (R1),LEV_W_HELLO             ; && who still used 1 byte hello
              10 A5    0E    90  0ADD  2669 25$:     MOVB    #LEV$C_RCV_EHEL,WQE$B_EVT(R5) ; Event is 'rcvd Endnode Hello'
                 50    01    D0  0AE1  2670 30$:     MOVL    #1,R0                         ; Process event
                             05  0AE4  2671          RSB                                   ; Return true - process event
                                 0AE5  2672
                                 0AE5  2673 ;
                                 0AE5  2674 ; Drop the message on the floor.
                                 0AE5  2675 ;
                                 0AE5  2676
                       50    D4  0AE5  2677 70$:     CLRL    R0                            ; Return false - do not queue event
                             05  0AE7  2678          RSB
```

```
                          0AE8                .SBTTL  RCV_RT3 - Received Phase III routing message
                          0AE8       ;+
                          0AE8       ; RCV_RT - Routing message received
                          0AE8       ;
                          0AE8       ; FUNCTIONAL DESCRIPTION:
                          0AE8       ;
                          0AE8       ;        Verify the routing message header and checksum and queue a
                          0AE8       ;        routing update event.
                          0AE8       ;
                          0AE8       ; INPUTS:         R11     CNR address
                          0AE8       ;                 R10     CNF address
                          0AE8       ;                 R7      ADJ address
                          0AE8       ;                 R6      LPD address
                          0AE8       ;                 R5      WQE address
                          0AE8       ;                 R4      RCB pointer
                          0AE8       ;                 R1      Ptr to next byte in the message
                          0AE8       ;
                          0AE8       ;                 All others are scratch
                          0AE8       ;
                          0AE8       ; OUTPUTS:        R5      Unchanged
                          0AE8       ;                 R0      True if event to be processed, false if not
                          0AE8       ;
                          0AE8       ;                 All other registers may be clobbered.
                          0AE8       ;
                          0AE8       ;-
                          0AE8       RCV_RT:                                          ; Process a routing message
        00   01 A7    91  0AE8               CMPB    ADJ$B_PTYPE(R7),#ADJ$C_PTY_PH3 ; Phase III or Phase IV?
                07    13  0AEC               BEQL    RCV_RT3                        ; Branch if Phase III
                01    A2  0AEE               SUBW    #TR4C_RT_LNG-TR3C_RT_LNG,- ; Adjust length of msg left
              16 A5       0AF0                       WQE$L_PM2+2(R5)                ; for Phase IV message
              0071    31  0AF2               BRW     RCV_RT4                        ; Process Phase IV routing message
                          0AF5
                          0AF5       RCV_RT3:
 00000038'EF    00    90  0AF5               MOVB    #ADJ$C_PTY_PH3,PTYPE           ; Indicate type of message
              01B9    30  0AFC               BSBW    PARSE_PH3_ADDR                 ; Parse the node address
             40 50    E9  0AFF               BLBC    R0,15$                         ; If LBC then error
   14 A5   51   55    A3  0B02               SUBW3   R5,R1,WQE$L_PM2(R5)            ; Save offset to current msg byte
       59   16 A5     3C  0B07               MOVZWL  WQE$L_PM2+2(R5),R9             ; Get msg bytes remaining
             29 59    E8  0B0B               BLBS    R9,13$                         ; Must be an even number
        59      02    C6  0B0E               DIVL    #2,R9                          ; Get number of words
                24    13  0B11               BEQL    13$                            ; Illegal msg if EQL
                          0B13               ;
                          0B13               ;    Calculate checksum  --  R9 does not include the checksum.
                          0B13               ;    The highest node address associated with a non-infinite cost/hops
                          0B13               ;    message cell is determined.  If that address is greater than
                          0B13               ;    our current "max address" then it is reported as an event.
                          0B13               ;
        50      01    D0  0B13               MOVL    #1,R0                          ; Setup loop counter
                52    7C  0B16               CLRQ    R2                             ; Init check sum (R2) and highest node
                          0B18                                                      ; (R3) reachable by partner
   7FFF 8F      61    B1  0B18       10$:    CMPW    (R1),#^X<7FFF>                 ; Compare to infinite "cost,hops"
                18    1A  0B1D               BGTRU   13$                            ; If GTRU then field is invalid
                03    13  0B1F               BEQL    11$                            ; If EQL then not reachable by partner
        53      50    D0  0B21               MOVL    R0,R3                          ; Save highest reachable address
        52      81    A0  0B24       11$:    ADDW    (R1)+,R2                       ; Calculate checksum via 1's complement
        52      00    D8  0B27               ADWC    #0,R2                          ;   add - needs "end around carry"
     EA 50      59    F3  0B2A               AOBLEQ  R9,R0,10$                      ; Loop until all segments processed
```

```
10 A5    0B   90  0B2E  2737          MOVB    #LEV$C_RCV_RT,WQE$B_EVT(R5) ; Set up event assuming valid checksum
   61    52   B1  0B32  2738          CMPW    R2,(R1)                     ; Check sum valid ?
         0B   13  0B35  2739          BEQL    15$                         ; If EQL then  valid
                  0B37  2740 13$:     $LOG    TPL_LDS,TPL_PRSN_RUCS,,R5 ; due to "routing update checksum"
       FD20   31  0B3F  2741          BRW     ADJ_DOWN_EVENT              ; Report fatal event
                  0B42  2742          ;
                  0B42  2743          ;   The message is okay.  Log "partial routing update loss" if needed.
                  0B42  2744          ;
5A A4    53   B1  0B42  2745 15$:     CMPW    R3,RCB$W_MAX_ADDR(R4)       ; Is partner's highest reachable node
                  0B46  2746                                              ; address within range?
         1A   1B  0B46  2747          BLEQU   50$                         ; If LEQU then yes
                  0B48  2748          BUMP    B,RCB$B_CNT_RUL(R4)         ; Inc count for this event
                  0B53  2749          $LOG    TPL_PRU,,,R5                ; Setup event logging code
1E A5    53   B0  0B5B  2750          MOVW    R3,@QE$B_EVL_DT1(R5)        ; Store partner's highest reachable node
      F49E'   30  0B5F  2751          BSBW    NET$EVT_INTRAW              ; Log the event
   50    01   D0  0B62  2752 50$:     MOVL    #1,R0                       ; Process event
              05  0B65  2753          RSB                                 ; Return true - process event
```

```
                          0B66               .SBTTL  RCV_RT4 - Received Phase IV routing message
                          0B66      ;+
                          0B66      ; RCV_RT4 - Phase IV routing message received
                          0B66      ;
                          0B66      ;        Verify the routing message header and checksum, and queue a
                          0B66      ;        routing update event.
                          0B66      ;
                          0B66      ; Inputs:
                          0B66      ;
                          0B66      ;        R11 = CNR address
                          0B66      ;        R10 = CNF address
                          0B66      ;        R7 = ADJ address
                          0B66      ;        R6 = LPD address
                          0B66      ;        R5 = WQE address
                          0B66      ;        R4 = RCB address
                          0B66      ;        R1 = Pointer to next byte in message
                          0B66      ;
                          0B66      ; Outputs:
                          0B66      ;
                          0B66      ;        R0 = True if event to be queued, false if not
                          0B66      ;-
                          0B66      RCV_RT4:
00000038'EF     04    90  0B66               MOVB    #ADJ$C_PTY_PH4,PTYPE      ; Indicate type of message
              0148    30  0B6D               BSBW    PARSE_PH4_ADDR            ; Parse Phase IV node address
             3E 50    E9  0B70               BLBC    R0,90$                    ; If error, do event setup by parse
                0A    EF  0B73               EXTZV   #TR4$V_ADDR_AREA,-        ; Get area number of sending node
   50    58     06        0B75                       #TR4$S_ADDR_AREA,R8,R0
  008B C4       50    91  0B78               CMPB    R0,RCB$B_HOMEAREA(R4)     ; Our area?
                36    12  0B7D               BNEQ    70$                       ; If not, drop the message
                51    D6  0B7F               INCL    R1                        ; Skip reserved byte
 14 A5    51    55    A3  0B81               SUBW3   R5,R1,WQE$L_PM2(R5)       ; Save offset to first segment
    53       16 A5    3C  0B86               MOVZWL  WQE$L_PM2+2(R5),R3        ; Get msg bytes remaining
             2B 53    E8  0B8A               BLBS    R3,80$                    ; If odd, packet format error
       53       02    C6  0B8D               DIVL    #2,R3                     ; Get number of words
                26    13  0B90               BEQL    80$                       ; Illegal msg if EQL
                          0B92               ;
                          0B92               ;   Calculate checksum and check it
                          0B92               ;
       52       01    D0  0B92               MOVL    #1,R2                     ; Init check sum
       52       81    A0  0B95      10$:     ADDW    (R1)+,R2                  ; Calculate checksum via 1's complement
       52       00    D8  0B98               ADWC    #0,R2                     ;   add - needs "end around carry"
             F7 53    F5  0B9B               SOBGTR  R3,10$                    ; Loop thru all segments
       61       52    B1  0B9E               CMPW    R2,(R1)                   ; Check sum valid ?
                15    12  0BA1               BNEQ    80$                       ; If NEQ, then checksum error
                          0BA3               ;
                          0BA3               ;   Check if any routing update loss, and if so, log an event.
                          0BA3               ;
   58         5A A4   3C  0BA3               MOVZWL  RCB$W_MAX_ADDR(R4),R8     ; Set upper limit for rtginfo
              0068    30  0BA7               BSBW    CHK_RUS4                  ; Check for routing update loss
             0B 50    E9  0BAA               BLBC    R0,80$                    ; Branch if packet format error
                          0BAD               ;
                          0BAD               ;   Accept the message as valid.  Set up event to process it.
                          0BAD               ;
   10 A5        0B    90  0BAD               MOVB    #LEV$C_RCV_RT,WQE$B_EVT(R5) ; Set up event
      50        01    D0  0BB1      90$:     MOVL    #1,R0                     ; Process event
                05        0BB4               RSB                               ; Return true - process event
                          0BB5
```

```
         50   D4  0BB5   2812 70$:     CLRL    R0                        ; Ignore message
              05  0BB7   2813          RSB
                  0BB8   2814
                  0BB8   2815 ;
                  0BB8   2816 ; Log a "routing checksum" event
                  0BB8   2817 ;
                  0BB8   2818 80$:     $LOG    TPL_LDS,TPL_PRSN_RUCS,,R5 ; due to "routing update checksum"
       FC9F   31  0BC0   2819          BRW     ADJ_DOWN_EVENT            ; Report fatal event
```

```
                                0BC3          .SBTTL  RCV_ART - Area Routing message received
                                0BC3   ;+
                                0BC3   ; RCV_ART - Area Routing message received
                                0BC3   ;
                                0BC3   ; FUNCTIONAL DESCRIPTION:
                                0BC3   ;
                                0BC3   ;       Verify the area routing message header and checksum and queue a
                                0BC3   ;       routing update event.
                                0BC3   ;
                                0BC3   ; INPUTS:               R11     CNR address
                                0BC3   ;                       R10     CNF address
                                0BC3   ;                       R7      ADJ address
                                0BC3   ;                       R6      LPD address
                                0BC3   ;                       R5      WQE address
                                0BC3   ;                       R4      RCB pointer
                                0BC3   ;                       R1      Ptr to next byte in the message
                                0BC3   ;
                                0BC3   ;                       All others are scratch
                                0BC3   ;
                                0BC3   ; OUTPUTS:              R5      Unchanged
                                0BC3   ;                       R0      True if event to be processed, false if not
                                0BC3   ;
                                0BC3   ;                       All other registers may be clobbered.
                                0BC3   ;
                                0BC3   ;-
                                0BC3   RCV_ART:                                        ; Process an area routing message
00000038'EF    03     90        0BC3           MOVB    #ADJ$C_PTY_AREA,PTYPE   ; Indicate type of message
        00EB    30              0BCA           BSBW    PARSE_PH4_ADDR          ; Parse Phase IV node address
      33 50     E9              0BCD           BLBC    R0,90$                  ; Branch if error detected
         51     D6              0BD0           INCL    R1                      ; Skip reserved byte
  14 A5  51    55     A3        0BD2           SUBW3   R5,R1,WQE$L_PM2(R5)     ; Save offset to first segment
     53    16 A5     3C         0BD7           MOVZWL  WQE$L_PM2+2(R5),R3      ; Get msg bytes remaining
      29 53     E8              0BDB           BLBS    R3,80$                  ; If odd, packet format error
      53   02   C6              0BDE           DIVL    #2,R3                   ; Get number of words
         24     13              0BE1           BEQL    80$                     ; Illegal msg if EQL
                                0BE3           ;
                                0BE3           ;   Calculate checksum and check it
                                0BE3           ;
      52   01   D0              0BE3           MOVL    #1,R2                   ; Init check sum
      52   81   A0              0BE6   10$:    ADDW    (R1)+,R2                ; Calculate checksum via 1's complement
      52   00   D8              0BE9           ADWC    #0,R2                   ;   add - needs "end around carry"
      F7 53     F5              0BEC           SOBGTR  R3,10$                  ; Loop thru all segments
      61   52   B1              0BEF           CMPW    R2,(R1)                 ; Check sum valid ?
         13     12              0BF2           BNEQ    80$                     ; If NEQ, then checksum error
                                0BF4           ;
                                0BF4           ;   Check if any routing update loss, and if so, log an event.
                                0BF4           ;
   58    008C C4    9A          0BF4           MOVZBL  RCB$B_MAX_AREA(R4),R8   ; Set upper limit for rtginfo
        0016    30              0BF9           BSBW    CHK_ROS4                ; Check for routing update loss
      08 50     E9              0BFC           BLBC    R0,80$                  ; Branch if packet format error
                                0BFF           ;
                                0BFF           ;   Accept the message as valid.  Set up event to process it.
                                0BFF           ;
    10 A5  0C   90              0BFF           MOVB    #LEV$C_RCV_ART,WQE$B_EVT(R5) ; Set up event
      50   01   D0              0C03   90$:    MOVL    #1,R0                   ; Process event
           05                   0C06           RSB                             ; Return true - process event
                                0C07
```

```
                        0C07   2878 ;
                        0C07   2879 ; Log a "routing checksum" event
                        0C07   2880 ;
                        0C07   2881 80$:    $LOG    TPL_LDS,TPL_PRSN_RUCS,,R5 ; due to "routing update checksum"
          FC50    31    0C0F   2882         BRW     ADJ_DOWN_EVENT          ; Report fatal event
```

```
                          0C12  2884          .SBTTL  Check for routing update loss
                          0C12  2885  ;+
                          0C12  2886  ; CHK_RUS4 - Check for routing update loss in Phase IV format messages
                          0C12  2887  ;
                          0C12  2888  ; Inputs:
                          0C12  2889  ;
                          0C12  2890  ;       R5 = WQE address
                          0C12  2891  ;       R4 = RCB address
                          0C12  2892  ;       R8 = Maximum allowed node/area number in message
                          0C12  2893  ;
                          0C12  2894  ; Outputs:
                          0C12  2895  ;
                          0C12  2896  ;       R0 = True if packet scanned successfully, False if format error
                          0C12  2897  ;       Event is logged, if necessary
                          0C12  2898  ;
                          0C12  2899  ;       R1-R3 are destroyed.
                          0C12  2900  ;-
                          0C12  2901  CHK_RUS4:
        03C0 8F     BB    0C12  2902          PUSHR   #^M<R6,R7,R8,R9>        ; Save registers
                          0C16  2903          ;
                          0C16  2904          ;   Compute the highest reachable node in this routing message
                          0C16  2905          ;   to be used to check for routing update loss.  Note that
                          0C16  2906          ;   only segments which contain info for nodes higher than
                          0C16  2907          ;   max address are even checked for the highest reachable
                          0C16  2908          ;   node, as an optimization.
                          0C16  2909          ;
              53    D4    0C16  2910          CLRL    R3                      ; Preset "highest reachable node"
     59    14 A5    3C    0C18  2911          MOVZWL  WQE$L_PM2(R5),R9        ; Get msg offset to routing info
        59    55    C0    0C1C  2912          ADDL    R5,R9                   ; Convert to pointer
     57    16 A5    3C    0C1F  2913          MOVZWL  WQE$L_PM2+2(R5),R7      ; Get number of bytes of rtginfo
        57    04    C2    0C23  2914  50$:    SUBL    #4,R7                   ; Account for COUNT & STARTID
              5F    15    0C26  2915          BLEQ    80$                     ; Branch if packet format error
        51    89    3C    0C28  2916          MOVZWL  (R9)+,R1                ; Get number of nodes in segment
        52    89    3C    0C2B  2917          MOVZWL  (R9)+,R2                ; Get starting node number
   56   51    01    78    0C2E  2918          ASHL    #1,R1,R6                ; Compute number of bytes of rtginfo
        57    56    C2    0C32  2919          SUBL    R6,R7                   ; Account for cost/hops info
              50    19    0C35  2920          BLSS    80$                     ; Branch if packet format error
   50    FF A142    9E    0C37  2921          MOVAB   -1(R1)[R2],R0           ; Compute highest node in segment
        58    50    D1    0C3C  2922          CMPL    R0,R8                   ; Within max address?
              05    1A    0C3F  2923          BGTRU   53$                     ; If within range, skip scanning segment
        59    56    C0    0C41  2924          ADDL    R6,R9                   ; Skip past entire segment
              16    11    0C44  2925          BRB     58$                     ; Continue with next segment
 7FFF 8F    89    B1    0C46  2926  53$:    CMPW    (R9)+,#^X<7FFF>         ; Compare with infinite cost/hops
              3A    1A    0C4B  2927          BGTRU   80$                     ; If GTR, then field is invalid
              08    13    0C4D  2928          BEQL    55$                     ; Branch if not reachable by partner
        53    52    D1    0C4F  2929          CMPL    R2,R3                   ; Is this the highest reachable node?
              03    1B    0C52  2930          BLEQU   55$                     ; Branch if not
        53    52    D0    0C54  2931          MOVL    R2,R3                   ; Else, save highest reachable node
              52    D6    0C57  2932  55$:    INCL    R2                      ; Skip to next node
           EA 51    F5    0C59  2933          SOBGTR  R1,53$                  ; Loop thru all nodes in segment
              57    D5    0C5C  2934  58$:    TSTL    R7                      ; Any more segments?
              C3    14    0C5E  2935          BGTR    50$                     ; If so, continue
                          0C60  2936          ;
                          0C60  2937          ;   If the highest reachable node is greater than our maximum
                          0C60  2938          ;   address, then log a non-fatal event.
                          0C60  2939          ;
        58    53    D1    0C60  2940          CMPL    R3,R8                   ; Greater than max address?
        1A   1B  0C63  2941           BLEQU   60$                     ; Branch if ok
                 0C65  2942           BUMP    B,RCB$B_CNT_RUL(R4)     ; Inc count for this event
                 0C70  2943           $LOG    TPL_PRU,,R5             ; Setup event logging code
1E A5   53   B0  0C78  2944           MOVW    R3,W^E$B_EVL_DT1(R5)    ; Store partner's highest reachable node
     F381'   30  0C7C  2945           BSBW    NET$EVT_INTRAW          ; Log the event
   50   01   D0  0C7F  2946 60$:      MOVL    #1,R0                   ; Packet format is ok
 03C0 8F     BA  0C82  2947 90$:      POPR    #^M<R6,R7,R8,R9>        ; Restore registers
             05  0C86  2948           RSB
                 0C87  2949
        50   D4  0C87  2950 80$:      CLRL    R0                      ; Indicate bad packet format
        F7   11  0C89  2951           BRB     90$                     ; exit
```

```
                          0C8B  2953          .SBTTL  Parse phase II/III/IV address
                          0C8B  2954 ;+
                          0C8B  2955 ; PARSE_PH2_ADDR          - Parse Phase II  address field
                          0C8B  2956 ; PARSE_PH3_ADDR          - Parse Phase III address field
                          0C8B  2957 ; PARSE_PH4_ADDR          - Parse Phase IV  address field
                          0C8B  2958 ;
                          0C8B  2959 ;
                          0C8B  2960 ; INPUTS:         R6      LPD address
                          0C8B  2961 ;                 R5      WQE address
                          0C8B  2962 ;                 R4      RCB address
                          0C8B  2963 ;                 R1      Pointer to next field in message (node address)
                          0C8B  2964 ;                 R0      Scratch
                          0C8B  2965 ;
                          0C8B  2966 ; OUTPUTS:        R8      Node address from message
                          0C8B  2967 ;                 R1      Advance passed node address field in message
                          0C8B  2968 ;                 R0      LBS if successful
                          0C8B  2969 ;                         LBC otherwise.  In this case an event code is setup
                          0C8B  2970 ;                         for the state table processing and the Event Logging
                          0C8B  2971 ;                         info are setup in the WQE.
                          0C8B  2972 ;
                          0C8B  2973 ;                 All other regs are unchanged
                          0C8B  2974 ;
                          0C8B  2975 ;-
                          0C8B  2976          .ENABL  LSB
                          0C8B  2977
                          0C8B  2978 PARSE_PH2_ADDR:                          ; Parse Phase II node address field
           58    81    98 0C8B  2979          CVTBL   (R1)+,R8                 ; Get partner's node address
                 15    18 0C8E  2980          BGEQ    10$                      ; Br unless field is extended
           50    81    9A 0C90  2981          MOVZBL  (R1)+,R0                 ; Get next (final) byte of field
  58    19    07    50 F0 0C93  2982          INSV    R0,#7,#25,R8             ; Merge with low order bits
                          0C98  2983          $LOG    TPL_PFM,,,R5             ; Assume fatal event is "format error"
              16 A5    B7 0CA0  2984          DECW    WQE$L_PM2+2(R5)          ; Account for extra byte
                 4A    19 0CA3  2985          BLSS    40$                      ; If LSS then msg is too small
                          0CA5  2986 10$:     $LOG    TPL_ISF,TPL_PRSN_ADJR,,R5 ; Assume address out of range
 000000FF 8F     58    D1 0CAD  2987          CMPL    R8,#TR2C_MAX_PNA         ; Less than max Phase II address ?
                 31    1A 0CB4  2988          BGTRU   30$                      ; Out of range if GTRU
                 1F    11 0CB6  2989          BRB     20$                      ; Continue in common
                          0CB8  2990
                          0CB8  2991 PARSE_PH3_ADDR:                          ; Parse Phase III node address field
                          0CB8  2992 PARSE_PH4_ADDR:                          ; Parse Phase IV node address field
           58    81    32 0CB8  2993          CVTWL   (R1)+,R8                 ; Get t e node address
      03   008A C4     91 0CBB  2994          CMPB    RCB$B_ETY(R4),#ADJ$C_PTY_AREA ; Are we a level 2 router?
                 15    13 0CC0  2995          BEQL    20$                      ; If so, skip the following check
                 0A    EF 0CC2  2996          EXTZV   #TR4$V_ADDR_AREA,-       ; Get the area number
      50    58   06       0CC4  2997                  #TR4$S_ADDR_AREA,R8,R0
                 0E    13 0CC7  2998          BEQL    20$                      ; If area = 0, allow it
       008B C4   50    91 0CC9  2999          CMPB    R0,RCB$B_HOMEAREA(R4)    ; Is it in our area?
                 07    13 0CCE  3000          BEQL    20$                      ; If so, then ok
     12 22 A6    0A    E1 0CD0  3001          BBC     #LPD$V_BC,LPD$W_STS(R6),30$ ; If non-BC circuit, then error
                 26    11 0CD5  3002          BRB     70$                      ; If NI, then simply ignore it so that
                          0CD7  3003                                           ; multiple areas can co-exist without
                          0CD7  3004                                           ; interference from other areas
                 00    EF 0CD7  3005 20$:     EXTZV   #TR4$V_ADDR_DEST,-       ; Extract the node address (from area)
      50    58   0A       0CD9  3006                  #TR4$S_ADDR_DEST,R8,R0
         5A A4   50    B1 0CDC  3007          CMPW    R0,RCB$W_MAX_ADDR(R4)    ; Within bounds?
                 05    1A 0CE0  3008          BGTRU   30$                      ; If not, report error
           50    01    D0 0CE2  3009          MOVL    #1,R0                    ; Success
```

```
                      0E    11  0CE5               BRB     50$
                                0CE7
                                0CE7      30$:     $LOG    TPL_LDO,-                 ; Line down due to "address out
                                0CE7                       TPL_PRSN_ADJR,,R5         ; of range"
           10 A5      24    90  0CEF      40$:     MOVB    #LEV$C_LOG_ADE,WQE$B_EVT(R5) ; Log event record & shutdown adjacency
                      50    94  0CF3               CLRB    R0                        ; Set error flag
                                0CF5
     00000014'EF      58    B0  0CF5      50$:     MOVW    R8,LEV_W_PNA              ; Save the node address
                            05  0CFC               RSB
                                0CFD
                                0CFD      ;
                                0CFD      ; Drop the message on the floor.
                                0CFD      ;
                                0CFD
           10 A5      00    90  0CFD      70$:     MOVB    #LEV$C_NO_EVT,WQE$B_EVT(R5) ; Do nothing - drop message
                      50    D4  0D01               CLRL    R0                        ; Signal error detected
                            05  0D03               RSB
                                0D04
                                0D04               .DSABL  LSB
                                0D04  3030          .SBTTL  PARSE_VERSION - Parse version number field
                                0D04  3031 ;+
                                0D04  3032 ; PARSE_VERSION - Parse the 3 byte version number field
                                0D04  3033 ;
                                0D04  3034 ; Inputs:
                                0D04  3035 ;
                                0D04  3036 ;       R6 = LPD address
                                0D04  3037 ;       R5 = WQE address
                                0D04  3038 ;       R4 = RCB address
                                0D04  3039 ;       R1 = Pointer to next byte in msg (version number)
                                0D04  3040 ;
                                0D04  3041 ; Outputs:
                                0D04  3042 ;
                                0D04  3043 ;       R0 = True if Phase IV, else WQE setup to chain to another event
                                0D04  3044 ;       R1 = Advanced past version number field
                                0D04  3045 ;       R8 = First 2 bytes of version number (Version & ECO level)
                                0D04  3046 ;
                                0D04  3047 ;       NET$GL_INITVER = Saved copy of version number (for event logging)
                                0D04  3048 ;
                                0D04  3049 ;       All other registers are preserved.
                                0D04  3050 ;-
                                0D04  3051 PARSE_VERSION:
                    7E     D4   0D04  3052          CLRL    -(SP)                   ; Allocate 4 bytes of scratch space
                                0D06  3053          ;
                                0D06  3054          ;   Get our version number.  This may be one of several values
                                0D06  3055          ;   depending on whether the circuit has been forced to operate
                                0D06  3056          ;   as a certain version type.
                                0D06  3057          ;
             50   1D A6    9A   0D06  3058          MOVZBL  LPD$B_ETY(R6),R0        ; Get our node type for this circuit
             FF 8F   50    91   0D0A  3059          CMPB    R0,#ADJ$C_PTY_UNK       ; Have we been assigned a node type?
                     43    13   0D0E  3060          BEQL    70$                     ; If not, drop msg on the floor
      6E   00000154'EF40   3C   0D10  3061          MOVZWL  PTY_TO_VERSION[R0],(SP) ; Get the 2 byte version number
                                0D18  3062          ;
                                0D18  3063          ;   Compare version numbers.  If we receive a message from a node
                                0D18  3064          ;   with a higher version number, then drop the message.  The
                                0D18  3065          ;   other node will detect that we are lower version and re-send
                                0D18  3066          ;   the correct message.  If the version is lower than ours,
                                0D18  3067          ;   but we don't recognize or support it, then log "version skew".
                                0D18  3068          ;
                6E   61    91   0D18  3069          CMPB    (R1),(SP)               ; Compare version numbers
                     36    1A   0D1B  3070          BGTRU   70$                     ; If higher than ours, ignore msg
                     07    1F   0D1D  3071          BLSSU   5$                      ; If equal, then
       01 AE    01   A1    91   0D1F  3072          CMPB    1(R1),1(SP)             ; Compare ECO numbers
                     2D    1A   0D24  3073          BGTRU   70$                     ; If higher than ours, ignore msg
                6E   61    B1   0D26  3074 5$:      CMPW    (R1),(SP)               ; Is it our version?
                     18    12   0D29  3075          BNEQ    60$                     ; If not, version skew
                58   61    3C   0D2B  3076          MOVZWL  (R1),R8                 ; Return version to caller
         00000000'EF 81    B0   0D2E  3077          MOVW    (R1)+,NET$GL_INITVER    ; Save INIT version (3 bytes)
         00000002'EF 81    90   0D35  3078          MOVB    (R1)+,NET$GL_INITVER+2
                50   01    D0   0D3C  3079          MOVL    #1,R0                   ; Success
                5E   04    C0   0D3F  3080 90$:     ADDL    #4,SP                   ; Pop scratch space
                           05   0D42  3081          RSB
                                0D43  3082
                                0D43  3083 ;
                                0D43  3084 ; Version number is lower than ours, but we can't handle it.  Log an event.
                                0D43  3085 ;
                                0D43  3086
                0D43  60$:    $LOG    TPL_LDS,TPL_PRSN_VRSK,,R5 ; Setup "version skew" event
10 A5   24  90  0D4B          MOVB    #LEV$C_LOG_ADE,WQE$B_EVT(R5) ; Signal "adjacency down event"
        50  D4  0D4F          CLRL    R0                        ; Signal error detected
        EC  11  0D51          BRB     90$
                0D53
                0D53  ;
                0D53  ; Version number is higher than ours.  Drop the message on the floor.
                0D53  ;
                0D53
10 A5   00  90  0D53  70$:    MOVB    #LEV$C_NO_EVT,WQE$B_EVT(R5) ; Do nothing - drop message
        50  D4  0D57          CLRL    R0                        ; Signal error detected
        E4  11  0D59          BRB     90$
```

```
                    0D5B  3100          .SBTTL  SET_DLL_EVT - Schedule event transition
                    0D5B  3101  ;+
                    0D5B  3102  ; SET_DLL_EVT - Schedule the processing of an event
                    0D5B  3103  ;
                    0D5B  3104  ; Inputs:       R0 = Event code
                    0D5B  3105  ;               R6 = LPD address
                    0D5B  3106  ;
                    0D5B  3107  ; Outputs:      R0 = Status
                    0D5B  3108  ;
                    0D5B  3109  ;-
                    0D5B  3110  SET_DLL_EVT::
          07    BB  0D5B  3111          PUSHR   #^M<R0,R1,R2>           ; Save regs
          51    D4  0D5D  3112          CLRL    R1                      ; Indicate no addition WQE space needed
     50   01    D0  0D5F  3113          MOVL    #WQE$C_SUB_ACP,R0       ; Indicate WQE subtype
       F29B'    30  0D62  3114          BSBW    WQE$ALLOCATE            ; Allocate WQE (always succeeds!)
     50   52    D0  0D65  3115          MOVL    R2,R0                   ; Transfer WQE address
  10 A0   8E    F6  0D68  3116          CVTLB   (SP)+,WQE$B_EVT(R0)     ; Enter event code
     51   8E    7D  0D6C  3117          MOVQ    (SP)+,R1                ; Recover R1,R2 and cleanup stack
       20 A6    B0  0D6F  3118          MOVW    LPD$W_PTH(R6),-         ; Enter LPD index
       12 A0        0D72  3119                  WQE$W_REQIDT(R0)        ;
      80'AF     9E  0D74  3120          MOVAB   B^NET$DLL_PRC_WQE,-     ; Enter action routine address
       0C A0        0D77  3121                  WQE$L_ACTION(R0)        ;
       F284'    30  0D79  3122          BSBW    WQE$INSQUE              ; Queue the WQE
     50   01    90  0D7C  3123  10$:    MOVB    #1,R0                   ; Indicate success
                05  0D7F  3124          RSB
```

```
                    0D80        .SBTTL  NET$DLL_PRC_WQE - Process work queue element
                    0D80  ;+
                    0D80  ; NET$DLL_PRC_WQE  - Process Work Queue Element
                    0D80  ;
                    0D80  ; FUNCTIONAL DESCRIPTION:
                    0D80  ;
                    0D80  ; This routine is called by the work queue dispatcher after the WQE is
                    0D80  ; dequeued from the work queue.  The WQE is deallocated below once it has
                    0D80  ; been processed.
                    0D80  ;
                    0D80  ; INPUTS:        R5      WQE address
                    0D80  ;
                    0D80  ;                All other registers are scratch.
                    0D80  ;
                    0D80  ; OUTPUTS:       All registers are clobbered.
                    0D80  ;
                    0D80  ;-
                    0D80  NET$DLL_PRC_WQE:                        ; Process DLL WQE event
       00C7   30    0D80          BSBW    FIND_WQE_CTX            ; Locate CNF, LPD, ADJ blocks
      02 50   E9    0D83          BLBC    R0,KILL_WQE             ; If LPD no longer exists, skip event
         0B   10    0D86          BSBB    PROC_EVT                ; Process the event
                    0D88  KILL_WQE:                               ; Deallocate WQE if its there
   50    55   D0    0D88          MOVL    R5,R0                   ; Get WQE for deallocation
         05   13    0D8B          BEQL    20$                     ; If EQL then none
         55   D4    0D8D          CLRL    R5                      ; Nullify normal pointer to it
      F26E'   30    0D8F          BSBW    WQE$DEALLOCATE          ; Deallocate the WQE
         05         0D92  20$:    RSB                             ; Done
```

```
                                 0D93  3154          .SBTTL  PROC_EVT - Process an event
                                 0D93  3155 ;+
                                 0D93  3156 ; PROC_EVT      - Process DLL event
                                 0D93  3157 ;
                                 0D93  3158 ; This routine processes all Data Link Layer events and is state table driven.
                                 0D93  3159 ; Action routines are called until the null event is detected.  Each action
                                 0D93  3160 ; routine generates a new event, which it returns in R1, and returns with the
                                 0D93  3161 ; low bit set in R0 only if the indicated state change is to be performed.
                                 0D93  3162 ;
                                 0D93  3163 ; Inputs:
                                 0D93  3164 ;
                                 0D93  3165 ;       R11 = CNR address
                                 0D93  3166 ;       R10 = CNF address
                                 0D93  3167 ;       R7 = ADJ address
                                 0D93  3168 ;       R6 = LPD address
                                 0D93  3169 ;       R5 = WQE address
                                 0D93  3170 ;
                                 0D93  3171 ; Outputs:
                                 0D93  3172 ;
                                 0D93  3173 ;       R5 = WQE address
                                 0D93  3174 ;
                                 0D93  3175 ;       All other registers are clobbered
                                 0D93  3176 ;-
                                 0D93  3177 PROC_EVT:                                 ; Process all DLL events
    0000000C'EF     56      D0   0D93  3178         MOVL    R6,LEV_L_LPD             ; Save the LPD pointer
    00000010'EF     57      D0   0D9A  3179         MOVL    R7,LEV_L_ADJ             ; Save the ADJ pointer
    00000004'EF     5A      7D   0DA1  3180         MOVQ    R10,LEV_Q_CRI            ; Save the CRI CNF and CNR ptrs
                                 0DA8  3181         ;
                                 0DA8  3182         ;    Find appropriate state table entry
                                 0DA8  3183         ;
         51    10 A5        9A   0DA8  3184         MOVZBL  WQE$B_EVT(R5),R1         ; Get the event code
         53    26 A6        9A   0DAC  3185 5$:     MOVZBL  LPD$B_STI(R6),R3         ; Get LPD internal state
              51    24      D1   0DB0  3186         CMPL    S^#LEV$C_MAX_EVT,R1      ; Is event within range ?
                    5C      1F   0DB3  3187         BLSSU   30$                      ; If LSSU then bug exists
        54    51    10      C5   0DB5  3188         MULL3   S^#LEV$C_STATES,R1,R4    ; Bias for current event
              54    53      C0   0DB9  3189         ADDL    R3,R4                    ; Add current state offset
   53    00000000'EF44      3E   0DBC  3190         MOVAW   LEV$AW_STA_TAB[R4],R3    ; Address state table entry
                 F239'      30   0DC4  3191         BSBW    NET$JNX_CO               ; Initialize journalling co-routine
                                 0DC7  3192                                          ; (Clobbers R0; stack has been changed)
              05 50         E9   0DC7  3193         BLBC    R0,14$                   ; If LBC journalling is inactive
                0048        30   0DCA  3194         BSBW    FILL_JNL                 ; Fill the record
                  9E        16   0DCD  3195         JSB     @(SP)+                   ; Store the journal record
              51    01      D1   0DCF  3196 14$:    CMPL    S^#LEV$C_EXIT,R1         ; Are we done ?
                    39      13   0DD2  3197         BEQL    18$                      ; If so, exit processing
                                 0DD4  3198         ;
                                 0DD4  3199         ;
                                 0DD4  3200         ;    Dispatch to the action routine with the following:
                                 0DD4  3201         ;
                                 0DD4  3202         ;    INPUTS:      R11     CRI CNR ptr
                                 0DD4  3203         ;                 R10     CRI CNF ptr
                                 0DD4  3204         ;                 R7      ADJ address
                                 0DD4  3205         ;                 R6      LPD address
                                 0DD4  3206         ;                 R5      WQE address
                                 0DD4  3207         ;                 R4      RCB address
                                 0DD4  3208         ;
                                 0DD4  3209         ;    ON RETURN:   R5      Unchanged
                                 0DD4  3210         ;                 R1      Next event to be processed
```

```
                               0DD4          ;               R0      Low bit set if state change is permitted,
                               0DD4          ;                       Low bit clear to avoid state change
                               0DD4          ;
                               0DD4          ;               All other regs may be clobbered
                               0DD4          ;
                  83     9F    0DD4          PUSHAB  (R3)+                      ; Save table address
               53  63    9A    0DD6          MOVZBL  (R3),R3                    ; Get action routine index
 50   00000000'EF43      D0    0DD9          MOVL    LEV_AL_ACTTAB[R3],R0       ; Get action routine address
   54  00000000'EF       D0    0DE1          MOVL    NET$GL_PTR_VCB,R4          ; Get RCB pointer
                  60     16    0DE8          JSB     (R0)                       ; Dispatch
                  53   8ED0    0DEA          POPL    R3                         ; Get next state, cleanup stack
   56  0000000C'EF       D0    0DED          MOVL    LEV_L_LPD,R6               ; Get LPD address
                  1A     13    0DF4          BEQL    20$                        ; If EQL then its been deallocated
               04 50     E9    0DF6          BLBC    R0,15$                     ; Avoid state change if LBC
          26 A6   63     90    0DF9  15$:    MOVB    (R3),LPD$B_STI(R6)         ; Change state
   57  00000010'EF       D0    0DFD          MOVL    LEV_L_ADJ,R7               ; Recover ADJ address
   5A  00000004'EF       7D    0E04          MOVQ    LEV_Q_CRI,R10              ; Recover CRI context
                  9F     11    0E0B          BRB     5$                         ; Process next event
                               0E0D
                F614     30    0E0D  18$:    BSBW    COND_DEAL_LPD              ; Clean-up if necessary
                         05    0E10  20$:    RSB
                               0E11
                               0E11  30$:    BUG_CHECK  NETNOSTATE,FATAL        ; Signal the bug
                               0E15
                               0E15
                               0E15  FILL_JNL:
          81   CC 8F     90    0E15          MOVB    #^X<CC>,(R1)+              ; Enter journal record type
          81   26 A6     90    0E19          MOVB    LPD$B_STI(R6),(R1)+        ; Current state
         00000000'EF     9F    0E1D          PUSHAB  LEV$AB_STA_TAB             ; Base of state table
       61   53    8E     C3    0E23          SUBL3   (SP)+,R3,(R1)              ; State table offset
            81    1F     CA    0E27          BICL    #^X1F,(R1)+                ; Display only base offset of event
            81    63     B0    0E2A          MOVW    (R3),(R1)+                 ; Enter table contents
          81   20 A6     B0    0E2D          MOVW    LPD$W_PTH(R6),(R1)+        ; Enter path ID
          81   22 A6     B0    0E31          MOVW    LPD$W_STS(R6),(R1)+        ; Enter current status
          81   24 A6     90    0E35          MOVB    LPD$B_XMTFLG(R6),(R1)+     ; Enter xmit flags
          81   1B A6     90    0E39          MOVB    LPD$B_ASTCNT(R6),(R1)+     ; Enter asynch activity count
          81   04 A7     B0    0E3D          MOVW    ADJ$W_PNA(R7),(R1)+        ; Enter the partner's address
          81   06 A7     B0    0E41          MOVW    ADJ$W_BUFSIZ(R7),(R1)+     ; Enter partner's block size
          81   25 A6     90    0E45          MOVB    LPD$B_PVCFLG(R6),(R1)+     ; Enter PVC startup flags
                         05    0E49          RSB
                         0E4A  3252          .SBTTL  FIND_WQE_CTX - Find context for a new WQE
                         0E4A  3253 ;+
                         0E4A  3254 ; FIND_WQE_CTX - Find CNF, LPD and ADJ for a new WQE to be processed
                         0E4A  3255 ;
                         0E4A  3256 ; This routine is called to locate the CNF, LPD and ADJ corresponding to a
                         0E4A  3257 ; WQE to be processed.
                         0E4A  3258 ;
                         0E4A  3259 ; Inputs:
                         0E4A  3260 ;
                         0E4A  3261 ;       R5 = WQE address
                         0E4A  3262 ;
                         0E4A  3263 ; Outputs:
                         0E4A  3264 ;
                         0E4A  3265 ;       R11 = CNR address
                         0E4A  3266 ;       R10 = CNF address
                         0E4A  3267 ;       R7 = ADJ address
                         0E4A  3268 ;       R6 = LPD address
                         0E4A  3269 ;       R5 = WQE address
                         0E4A  3270 ;       R0 = True if LPD found, else false
                         0E4A  3271 ;
                         0E4A  3272 ;       R8 is destroyed.
                         0E4A  3273 ;-
                         0E4A  3274 FIND_WQE_CTX:
           00     DD     0E4A  3275         PUSHL   #0                      ; Scratch for holding LPD address
  58    12 A5     3C     0E4C  3276         MOVZWL  WQE$W_REQIDT(R5),R8     ; Get LPD index
                         0E50  3277         ;
                         0E50  3278         ;    If this is the local LPD, then skip looking up the CNF block,
                         0E50  3279         ;    since there is none.
                         0E50  3280         ;
     01    58     91     0E50  3281         CMPB    R8,#LPD$C_LOC_INX       ; Local LPD index?
           2F     13     0E53  3282         BEQL    50$                     ; If so, handle it speciallv
                         0E55  3283         ;
                         0E55  3284         ;    Find the LPD and CRI
                         0E55  3285         ;
         1DF0     30     0E55  3286         BSBW    NET$GET_LPD_CRI         ; Find LPD and CRI for this index
        25 50     E9     0E58  3287         BLBC    R0,90$                  ; Branch if not found
     6E    56     D0     0E5B  3288         MOVL    R6,(SP)                 ; Save LPD address
                         0E5E  3289         ;
                         0E5E  3290         ;    Find the ADJ.  If the ADJ index in the WQE is zero, then use
                         0E5E  3291         ;    the LPD index so that the static ADJ block is used.
                         0E5E  3292         ;
  58    20 A5     3C     0E5E  3293         MOVZWL  WQE$W_ADJ_INX(R5),R8    ; Is ADJ index 0?
           08     13     0E62  3294         BEQL    10$                     ; Branch if so
         1E5F     30     0E64  3295         BSBW    NET$FIND_ADJ            ; Locate ADJ block
                         0E67  3296                                         ; and get LPD corresponding to ADJ
        16 50     E9     0E67  3297         BLBC    R0,90$                  ; If it went away, skip event
           0C     11     0E6A  3298         BRB     20$
20 A5   20 A6     9B     0E6C  3299 10$:    MOVZBW  LPD$B_PTH_INX(R6),WQE$W_ADJ_INX(R5) ; Set ADJ index
  58    20 A5     3C     0E71  3300         MOVZWL  WQE$W_ADJ_INX(R5),R8    ; Get ADJ index
         1E4E     30     0E75  3301         BSBW    NET$FIND_ADJ            ; Locate ADJ block (returns 0 if none)
                         0E78  3302                                         ; and get LPD corresponding to ADJ
     6E    56     D1     0E78  3303 20$:    CMPL    R6,(SP)                 ; Was ADJ$W_LPD different than WQE LPD?
           0D     12     0E7B  3304         BNEQ    30$                     ; If so, bugcheck
     50    01     D0     0E7D  3305         MOVL    #1,R0                   ; Success
     5E    04     C0     0E80  3306 90$:    ADDL    #4,SP                   ; Pop scratch storage
           05            0E83  3307         RSB
                         0E84  3308
```

```
                   0E84  3309 ;
                   0E84  3310 ; Special handing for local LPD
                   0E84  3311 ;
                   0E84  3312
    1E19   30      0E84  3313 50$:     BSBW    NET$FIND_LPD            ; Find the LPD via index in R8
  F6 50    E8      0E87  3314          BLBS    R0,90$                  ; Exit if ok
                   0E8A  3315                                          ; Else, bugcheck
                   0E8A  3316
                   0E8A  3317 30$:     BUG_CHECK  NETNOSTATE,FATAL     ; Signal the bug
```

```
                    0E8E  3319          .SBTTL  Simple transition routines
                    0E8E  3320 ;+
                    0E8E  3321 ; Various "simple" data link state transition action routines.
                    0E8E  3322 ;
                    0E8E  3323 ; ACT_BUG         - Bugcheck failure
                    0E8E  3324 ; ACT_NYI         - Not yet-implemented error
                    0E8E  3325 ; ACT_NOP         - No-operation
                    0E8E  3326 ; ACT_IRP_EVT     - I/O Request Packet returned to ACP
                    0E8E  3327 ; ACT_LOG_NFE     - Log event record
                    0E8E  3328 ; ACT_LOG_CDE     - Log event record & shutdown circuit
                    0E8E  3329 ; ACT_LOG_ADE     - Log event record & shutdown adjacency
                    0E8E  3330 ;
                    0E8E  3331 ;    INPUTS:      R11     CRI CNR ptr
                    0E8E  3332 ;                 R10     CRI CNF ptr
                    0E8E  3333 ;                 R6      LPD address
                    0E8E  3334 ;                 R5      WQE address
                    0E8E  3335 ;                 R4      RCB address
                    0E8E  3336 ;
                    0E8E  3337 ;    OUTPUTS:     R5      Unchanged
                    0E8E  3338 ;                 R1      Next event to be processed
                    0E8E  3339 ;                 R0      Low bit set if state change is permitted,
                    0E8E  3340 ;                         Low bit clear to avoid state change
                    0E8E  3341 ;
                    0E8E  3342 ;                 All other regs may be clobbered
                    0E8E  3343 ;
                    0E8E  3344 ACT_BUG:
                    0E8E  3345          BUG_CHECK  NETNOSTATE,FATAL     ; Signal the bug
                    0E92  3346 ACT_NYI:
                    0E92  3347          BUG_CHECK  NETNOSTATE,FATAL     ; Signal the bug
                    0E96  3348
                    0E96  3349 ACT_EXIT:                                ; Exit state table processing
 51     01     D0   0E96  3350          MOVL    #LEV$C_EXIT,R1          ; Signal last event
 50     01     90   0E99  3351          MOVB    #1,R0                   ; Allow state transition
               05   0E9C  3352          RSB
                    0E9D  3353
                    0E9D  3354 ACT_NOP:                                 ; Nop action routine
 51     00     D0   0E9D  3355          MOVL    #LEV$C_NO_EVT,R1        ; Signal last event
 50     01     90   0EA0  3356          MOVB    #1,R0                   ; Allow state transition
               05   0EA3  3357          RSB
                    0EA4  3358
                    0EA4  3359 ACT_LOG_CDE:                             ; Log event record & shutdown circuit
    F159'      30   0EA4  3360          BSBW    NET$EVT_INTRAW          ; Call internal raw event logger
 51     11     D0   0EA7  3361          MOVL    #LEV$C_[IN_DOWN,R1      ; Generate circuit down event
 50     01     90   0EAA  3362          MOVB    #1,R0                   ; Allow state change
               05   0EAD  3363          RSB
                    0EAE  3364
                    0EAE  3365 ACT_LOG_ADE:                             ; Log event record & shutdown adjacency
    F14F'      30   0EAE  3366          BSBW    NET$EVT_INTRAW          ; Call internal raw event logger
 51     12     D0   0EB1  3367          MOVL    #LEV$C_ADJ_DOWN,R1      ; Generate circuit down event
 50     01     90   0EB4  3368          MOVB    #1,R0                   ; Allow state change
               05   0EB7  3369          RSB
                    0EB8  3370
                    0EB8  3371 ACT_LOG_NFE:                             ; Log event record
    F145'      30   0EB8  3372          BSBW    NET$EVT_INTRAW          ; Call internal raw event logger
 51     00     D0   0EBB  3373          MOVL    #LEV$C_NO_EVT,R1        ; No new events
 50     01     90   0EBE  3374          MOVB    #1,R0                   ; Allow state change
               05   0EC1  3375          RSB
```

```
                            0EC2  3377          .SBTTL  ACT_RCV_STR - Received start message
                            0EC2  3378  ;+
                            0EC2  3379  ; ACT_RCV_2STR - Second start message received
                            0EC2  3380  ; ACT_RCV_STR - Start message received
                            0EC2  3381  ;
                            0EC2  3382  ; Inputs:       R11 = CRI CNR address
                            0EC2  3383  ;               R10 = CRI CNF address
                            0EC2  3384  ;               R7 = ADJ address
                            0EC2  3385  ;               R6 = LPD address
                            0EC2  3386  ;               R5 = WQE address
                            0EC2  3387  ;               R4 = RCB address
                            0EC2  3388  ;
                            0EC2  3389  ; Outputs:      R0 = True if state change requested
                            0EC2  3390  ;               R1 = Next event to be processed
                            0EC2  3391  ;
                            0EC2  3392  ;               R6 is the only register preserved.
                            0EC2  3393  ;-
                            0EC2  3394  ACT_RCV_2STR:                           ; Second start msg received
                       88   0EC2  3395          BISB    #LPD$M_XMT_STR!-        ; Retransmit everything
                            0EC3  3396                   LPD$M_XMT_VRF!-
                            0EC3  3397                   LPD$M_XMT_IDLE,-
        24 A6   0E          0EC3  3398                  LPD$B_XMTFLG(R6)
                            0EC6  3399
                            0EC6  3400  ACT_RCV_STR:
                            0EC6  3401          ;
                            0EC6  3402          ;   If the message we just received doesn't match the type
                            0EC6  3403          ;   that we sent, then we need to retransmit a start message
                            0EC6  3404          ;   again, only this time in the right Phase.
                            0EC6  3405          ;
   52   0000014A'EF    9E   0EC6  3406          MOVAB   PTY_TO_PHASE,R2         ; Get address of phase conversion table
     50      1D A6     9A   0ECD  3407          MOVZBL  LPD$B_ETY(R6),R0        ; Get our node type
   51   00000038'EF    9A   0ED1  3408          MOVZBL  PTYPE,R1                ; Get his node type (from msg)
        6240    6241   91   0ED8  3409          CMPB    (R2)[R1],(R2)[R0]       ; Does msg "phase" match ours?
                  25   13   0EDD  3410          BEQL    5$                      ; If same phase, process message
                  1E   14   0EDF  3411          BGTR    4$                      ; If higher phase, ignore msg.
                            0EE1  3412                                          ; Else, restart init. sequence by ...
                            0EE1  3413          SETBIT  LPD$V_XMT_STR,-         ; Retransmit start msg (the start
                            0EE1  3414                  LPD$B_XMTFLG(R6)        ; msg we already sent was wrong)
                            0EE5  3415          ;
                            0EE5  3416          ;   The message type we received doesn't match what we sent.
                            0EE5  3417          ;
                            0EE5  3418          ;   If this circuit has been forced into a certain type by
                            0EE5  3419          ;   the network manager, then ignore the message we just
                            0EE5  3420          ;   received because it doesn't match what we want.
                            0EE5  3421          ;   Otherwise, process the message (storing the correct type),
                            0EE5  3422          ;   and we will later send the correct start message because
                            0EE5  3423          ;   we were just marked for "start transmit" above.
                            0EE5  3424          ;
                  57   DD   0EE5  3425          PUSHL   R7                      ; Save ADJ address
                            0EE7  3426          $GETFLD cri,l,xpt               ; Were we forced into a specific type?
                  57 8FD0   0EF4  3427          POPL    R7                      ; Restore ADJ address
               05 50   E8   0EF7  3428          BLBS    R0,4$                   ; If so, then ignore the message
                0080   30   0EFA  3429          BSBW    ADAPT_TO_PARTNER        ; Adapt to partner's node type
                  05   11   0EFD  3430          BRB     5$                      ; Process the message now
                            0EFF  3431          ;
                            0EFF  3432          ;   Ignore the message
                            0EFF  3433          ;
```

```
                    50   94  0EFF  3434 4$:     CLRB    R0                      ; No state change
                  0096   31  0F01  3435         BRW     40$
                             0F04  3436         ;
                             0F04  3437         ;   Process message.  Dispatch on message type.
                             0F04  3438         ;
                             0F04  3439 5$:     $DISPATCH PTYPE,<-               ; Dispatch on message type
                             0F04  3440                 <ADJ$C_PTY_PH2,7$>,-     ; Phase II
                             0F04  3441                 <ADJ$C_PTY_PH3,8$>>      ; Phase III routing
                    19   11  0F12  3442         BRB     10$                     ; Else, no special processing here
                             0F14  3443         ;
                             0F14  3444         ;   Partner is a Phase II node.  Set the number of NOP messages to
                             0F14  3445         ;   send for circuit acceptance test.
                             0F14  3446         ;
                    00   90  0F14  3447 7$:     MOVB    #TR2C_NUM_NOP,-         ; Setup # of NOP msgs to send
                 1A A6       0F16  3448                 LPD$B_TSTCNT(R6)        ; to test the circuit
                    17   11  0F18  3449         BRB     20$
                             0F1A  3450         ;
                             0F1A  3451         ;   Partner is a Phase III routing node.  Determine if his receive
                             0F1A  3452         ;   buffer size is adequate to receive a maximum sized routing message.
                             0F1A  3453         ;
             50   5A A4  3C  0F1A  3454 8$:     MOVZWL  RCB$W_MAX_ADDR(R4),R0   ; Get max node address
                 50   02  C4  0F1E  3455         MULL    #NET$C_TRCTL_CEL,R0     ; Cell size for node in
                             0F21  3456                                         ; routing message
                 50   05  C0  0F21  3457         ADDL    #NET$C_TRCTL_OVR,R0     ; Routing message overhead
          50  00000018'EF  B1  0F24  3458         CMPW    LEV_W_BLKSIZE,R0        ; Can partner receive rtg msg?
                    71   1F  0F2B  3459         BLSSU   50$                     ; If LSSU buffer is too small
                             0F2D  3460         ;
                             0F2D  3461         ;   Setup number of test messages to send for c'rcuit acceptance test
                             0F2D  3462         ;   for all nodes except Phase II nodes.
                             0F2D  3463         ;
                    03   90  0F2D  3464 10$:    MOVB    #TR3C_NUM_TST,-         ; Setup number of test messages
                 1A A6       0F2F  3465                 LPD$B_TSTCNT(R6)
                             0F31  3466         ;
                             0F31  3467         ;   Store partner's block size, set flags to schedule initialization
                             0F31  3468         ;   message transmission.
                             0F31  3469         ;
  00C0 8F   00000018'EF  B1  0F31  3470 20$:    CMPW    LEV_W_BLKSIZE,#NET$C_MINBUFSIZ  ; At least as big as minimum?
                    62   1F  0F3A  3471         BLSSU   50$                             ; If LSSU then no
    06 A7   00000018'EF  B0  0F3C  3472         MOVW    LEV_W_BLKSIZE,ADJ$W_BUFSIZ(R7)  ; Setup partner's buff size
    04 A7   00000014'EF  B0  0F44  3473         MOVW    LEV_W_PNA,ADJ$W_PNA(R7)         ; Setup partner's node address
       50   00000020'EF  3C  0F4C  3474         MOVZWL  LEV_W_HELLO,R0                  ; Get partner's hello timer
                    04   12  0F53  3475         BNEQ    22$                             ; If not specified (Phase III),
             50   18 A6  3C  0F55  3476         MOVZWL  LPD$W_INT_TLK(R6),R0            ; then use our own hello timer
                 50   02  C4  0F59  3477 22$:    MULL    #TR4C_T3MULT,R0                 ; Multiply by hello/listen factor
              08 A7   50  B0  0F5C  3478         MOVW    R0,ADJ$W_INT_LSN(R7)            ; Set listen interval
              0A A7   50  B0  0F60  3479         MOVW    R0,ADJ$W_TIM_LSN(R7)            ; Start listen timer
    01 A7   00000038'EF  90  0F64  3480         MOVB    PTYPE,ADJ$B_PTYPE(R7)           ; Setup partner's node type
                             0F6C  3481         $DISPATCH PTYPE,<-
                             0F6C  3482                 <ADJ$C_PTY_PH3,25$>,-           ; If Phase III router,
                             0F6C  3483                 <ADJ$C_PTY_PH4,25$>,-           ; Or Phase IV level 1 router,
                             0F6C  3484                 <ADJ$C_PTY_AREA,25$>>           ; Or Phase IV level 2 router,
                    03   11  0F7E  3485         BRB     28$
                             0F80  3486 25$:    SETBIT  ADJ$V_RTG,ADJ$B_STS(R7)         ; then set RTG flag
    24 A6   00000034'EF  88  0F83  3487 28$:    BISB    XMTFLG,LPD$B_XMTFLG(R6)         ; Setup xmit flags
  04 00000034'EF     02  E0  0F8B  3488         BBS     #LPD$V_XMT_VRF,XMTFLG,30$       ; Br if verification msg needed
                             0F93  3489         CLRBIT  LPD$V_XMT_VRF,LPD$B_XMTFLG(R6)  ; Clear flag to send the msg
                 50   01  90  0F97  3490 30$:    MOVB    #1,R0                           ; Allow state change
                 0F9A  3491
  51   00   D0   0F9A  3492 40$:    MOVL    S^#LEV$C_NO_EVT,R1              ; No further events
            05   0F9D  3493         RSB
                 0F9E  3494
                 0F9E  3495 ;
                 0F9E  3496 ; Log "invalid partner block size" event
                 0F9E  3497 ;
                 0F9E  3498 50$:    $LOG    TPL_IOF,TPL_PRSN_ADJB,,R5       ; Buffer size too small
  51   23   D0   0FA6  3499         MOVL    #LEV$C_LOG_CDE,R1               ; Signal "circuit down event"
  50   01   D0   0FA9  3500         MOVL    #1,R0                           ; Make state change
            05   0FAC  3501         RSB
```

```
                                   0FAD          .SBTTL  ADAPT_TO_PARTNER - Adapt to partner's node type
                                   0FAD      ;+
                                   0FAD      ; ADAPT_TO_PARTNER - Adapt to partner's node type
                                   0FAD      ;
                                   0FAD      ; This routine is called when our partner is speaking a older Routing
                                   0FAD      ; version than we are.  The function is to figure out what version we want
                                   0FAD      ; to speak, based on his version, and store it in the LPD block so that
                                   0FAD      ; we only speak the older version from now on.
                                   0FAD      ;
                                   0FAD      ; Inputs:
                                   0FAD      ;
                                   0FAD      ;       R7 = ADJ address
                                   0FAD      ;       R6 = LPD address
                                   0FAD      ;       R4 = RCB address
                                   0FAD      ;       PTYPE = Partner node type (based on Start message)
                                   0FAD      ;       LPD$B_ETY = Our node type
                                   0FAD      ;
                                   0FAD      ; Outputs:
                                   0FAD      ;
                                   0FAD      ;       LPD$B_ETY = Our new adapted node type for this circuit
                                   0FAD      ;
                                   0FAD      ;       R0-R2 are destroyed.
                                   0FAD      ;-
                                   0FAD      ADAPT_TO_PARTNER:
   51    00000038'EF        9A     0FAD              MOVZBL  PTYPE,R1                 ; Get partner node type
      50    1D A6           9A     0FB4              MOVZBL  LPD$B_ETY(R6),R0         ; Get our node type
                                   0FB8              $DISPATCH R0,<-                  ; If we are an endnode,
                                   0FB8                      <ADJ$C_PTY_PH4N,20$>,-   ; then drop to his version only as
                                   0FB8                      <ADJ$C_PTY_PH3N,20$>>    ; an endnode
                                   0FC6              ;
                                   0FC6              ;   We are a router.  Make sure that we drop to his version,
                                   0FC6              ;   BUT as a router of that version, and not an endnode.
                                   0FC6              ;
  52   0000014A'EF41        9A     0FC6              MOVZBL  PTY_TO_PHASE[R1],R2      ; Get his "phase" (II, III or IV)
                                   0FCE              $DISPATCH R2,<-                  ; Dispatch on phase #
                                   0FCE                      <2,50$>,-                ; Drop to Phase II
                                   0FCE                      <3,13$>>                 ; Drop to Phase III router
                1F          11     0FD6              BRB     70$                      ; All other values illegal
                                   0FD8
         51     00          90     0FD8      13$:    MOVB    #ADJ$C_PTY_PH3,R1        ; Act as a Phase III router
                15          11     0FDB              BRB     50$
                                   0FDD
                                   0FDD              ;
                                   0FDD              ;   We are an endnode.  Make sure that we drop to his version,
                                   0FDD              ;   BUT as an endnode of that version, and not a router.
                                   0FDD              ;
  52   0000014A'EF41        9A     0FDD      20$:    MOVZBL  PTY_TO_PHASE[R1],R2      ; Get his "phase" (II, III or IV)
                                   0FE5              $DISPATCH R2,<-                  ; Dispatch on phase #
                                   0FE5                      <2,50$>,-                ; Phase II
                                   0FE5                      <3,23$>>                 ; Phase III endnode
                08          11     0FED              BRB     70$                      ; All other values illegal
                                   0FEF
         51     01          90     0FEF      23$:    MOVB    #ADJ$C_PTY_PH3N,R1       ; Act as a Phase III endnode
                                   0FF2
      1D A6     51          90     0FF2      50$:    MOVB    R1,LPD$B_ETY(R6)         ; Set our new node type
                            05     0FF6              RSB
                                   0FF7
```

```
0FF7  3560 ;
0FF7  3561 ; Cannot adapt to his version
0FF7  3562 ;
0FF7  3563
0FF7  3564 70$:    BUG_CHECK NETNOSTATE,FATAL
```

```
                            0FFB              .SBTTL  ACT_RCV_VRF - Received verification message
                            0FFB       ;+
                            0FFB       ; ACT_RCV_VRF - React to received verification message
                            0FFB       ;
                            0FFB       ; Inputs:        R11 = CRI CNR address
                            0FFB       ;                R10 = CRI CNF address
                            0FFB       ;                R7 = ADJ address
                            0FFB       ;                R6 = LPD address
                            0FFB       ;                R5 = WQE address
                            0FFB       ;
                            0FFB       ; Outputs:       R0 = True if state change requested
                            0FFB       ;                R1 = Next event to be processed
                            0FFB       ;
                            0FFB       ;                R6 is the only register preserved.
                            0FFB       ;-
                            0FFB       ACT_RCV_VRF:
                            0FFB              ;
                            0FFB              ;  Is phase of verification message the same as that of the Init msg?
                            0FFB              ;
         58     04 A7   3C  0FFB              MOVZWL   ADJ$W_PNA(R7),R8          ; Get partner's address
                            0FFF              $LOG     TPL_ISF,TPL_PRSN_UXPK,,R5 ; Assume phase change
                            1007
         02     01 A7   91  1007              CMPB     ADJ$B_PTYPE(R7),#ADJ$C_PTY_PH2 ; Phase II message expected?
                   0C   12  100B              BNEQ     5$                        ; Branch if not
   02    00000038'EF    91  100D              CMPB     PTYPE,#ADJ$C_PTY_PH2      ; Phase II message?
                   1D   13  1014              BEQL     10$                       ; Ok if so
                 00B9   31  1016       4$:    BRW      30$                       ; Else phase change - log it
   02    00000038'EF    91  1019       5$:    CMPB     PTYPE,#ADJ$C_PTY_PH2      ; Phase II message?
                   F4   13  1020              BEQL     4$                        ; If so, phase change - log it
                            1022              ;
                            1022              ;  Did the operator change the adjacent node's address?
                            1022              ;
                            1022              $LOG     TPL_IOF,TPL_PRSN_ADJC,,R5 ; Assume address change
 00000014'EF       58   B1  102A              CMPW     R8,CEV_W_PNA              ; Is the address the same as it was?
                   E3   12  1031              BNEQ     4$                        ; If not the same, log the event
                            1033              ;
                            1033              ;  If the remote node is a Phase III router, then REQUIRE that
                            1033              ;  a non-null password has been specified on the remote node,
                            1033              ;  and that it matches the receive password specified on this node.
                            1033              ;  This is intended to prevent accidental "cost/hops leakage"
                            1033              ;  (i.e. address merging) between two different areas if they
                            1033              ;  are accidentally connected between 1 or more Phase III routers.
                            1033              ;  The recommendation to customers is that they use passwords
                            1033              ;  containing the area number so that Phase III node can't be
                            1033              ;  accidentally connected to another area.
                            1033              ;
                            1033              ;  This check is only done if we are in a hierarchical network,
                            1033              ;  which is assumed if our homearea is not "1".
                            1033              ;
         0C80   8F      BB  1033       10$:   PUSHR    #^M<R7,R10,R11>           ; Save registers
                   53   D4  1037              CLRL     R3                        ; Preset "exact match" flag = false
    01   0088   C4      91  1039              CMPB     RCB$B_HOMEAREA(R4),#1     ; Is our area anything but "1"?
                   2A   13  103E              BEQL     11$                       ; Branch if not
           01   A7      91  1040              CMPB     ADJ$B_PTYPE(R7),-         ; Is adjacent node Phase III router?
                   00       1043                       #ADJ$C_PTY_PH3
                   24   12  1044              BNEQ     11$                       ; Branch if not
         53     01      D0  1046              MOVL     #1,R3                     ; Require exact password match
```

```
                08    BB  1049         PUSHR   #^M<R3>                  ; Save flag
      00   6E   00    2D  104B         CMPC5   #0,(SP),#0,-             ; Check if remote node gave
         00000024'EF      104F                 LEV_Q_PSWDESC,-          ; null password (RSX sends 8 bytes
         00000028'FF      1054                 @LEV_Q_PSWDESC+4         ; of 0, rather than 0 byte string)
                08    BA  1059         POPR    #^M<R3>                  ; Restore flag - use POPR, saving PSL
                1D    12  105B         BNEQ    12$                      ; If null password,
                          105D         $LOG    TPL_ISF,TPL_PRSN_VREQ,,R5 ; Log "verification req. from PH3 node"
             18 A5    D4  1065         CLRL    WQE$L_EVL_PKT(R5)        ; Don't print any packet header either
                64    11  1068         BRB     29$                      ; log event and bring down circuit
                          106A         ;
                          106A         ;   If the circuit has specified that verification is required
                          106A         ;   for all remote nodes over this circuit, then require verification.
                          106A         ;
                          106A    11$: $GETFLD cri,v,ver                ; Is verification required ?
                          1077         ASSUME  NMA$C_CIRVE_ENA  EQ  0
                          1077         ASSUME  NMA$C_CIRVE_DIS  EQ  1
             49 58    E8  1077         BLBS    R8,20$                   ; If disabled (or not set), skip it
                          107A                                          ; Require match only if RPA set
                          107A         ;
                          107A         ;   Verification is required.  Does the receive password match?
                          107A         ;   If no node database entry is found, or if the passwords don't
                          107A         ;   match, then reject the connection.
                          107A         ;
5B   00000000'EF      D0  107A    12$: MOVL    NET$GL_CNR_NDI,R11       ; Setup the root pointer
58   00000014'EF      3C  1081         MOVZWL  LEV_W_PNA,R8             ; Get node address
              EF75'   30  1088         BSBW    NET$NDI_BY_ADD           ; Find the matching NDI
             0A 50    E8  108B         BLBS    R0,15$                   ; If LBS then found
                          108E         $LOG    TPL_VFR,,,R5             ; due to "node not in database"
                36    11  1096         BRB     29$                      ; Log the event and bring line down
                          1098    15$: $GETFLD ndi,s,rpa                ; Get the receive password
             03 53    E8  10A5         BLBS    R3,18$                   ; If exact match not required,
             18 50    E9  10A8         BLBC    R0,20$                   ; and no password specified, skip check
                          10AB                                          ; (else, try match even with null RPA)
                          10AB    18$: $LOG    TPL_VFR,,,R5             ; Assume password mismatch
      00   68   57    2D  10B3         CMPC5   R7,(R8),#0,-             ;
         00000024'EF      10B7                 LEV_Q_PSWDESC,-          ; Does it match ?
         00000028'FF      10BC                 @LEV_Q_PSWDESC+4         ;
                0B    12  10C1         BNEQ    29$                      ; If NEQ no - verification failure
           0C80 8F    BA  10C3    20$: POPR    #^M<R7,R10,R11>          ; Restore registers
           51   0A    D0  10C7         MOVL    S^#LEV$C_RCV_VVF,R1      ; Indicate "valid verification"
           50   01    90  10CA         MOVB    #1,R0                    ; Allow state change
                      05  10CD         RSB
                          10CE
           0C80 8F    BA  10CE    29$: POPR    #^M<R7,R10,R11>          ; Restore registers
                          10D2                                          ; and log verification failure
                          10D2       ;
                          10D2       ; Log verification failure and bring the line down
                          10D2       ;
           51   23    D0  10D2    30$: MOVL    #LEV$C_LOG_CDE,R1        ; Switch to circuit down event
           50   01    D0  10D5         MOVL    #1,R0                    ; Make state change
                      05  10D8         RSB
```

```
                                 10D9           .SBTTL  ACT_RCV_RHEL - Received Router Hello message
                                 10D9      ;+
                                 10D9      ; ACT_RCV_RHEL - Router Hello message received
                                 10D9      ;
                                 10D9      ; Inputs:        R11 = CRI CNR address
                                 10D9      ;                R10 = CRI CNF address
                                 10D9      ;                R7 = ADJ address
                                 10D9      ;                R6 = LPD address
                                 10D9      ;                R5 = WQE address
                                 10D9      ;
                                 10D9      ; Outputs:       R0 = True if state change requested
                                 10D9      ;                R1 = Next event to be processed
                                 10D9      ;
                                 10D9      ;                R6 is the only register preserved.
                                 10D9      ;-
                                 10D9      ACT_RCV_RHEL:
                                 10D9              ;
                                 10D9              ;   Check that buffer size is reasonable
                                 10D9              ;
     00C0 8F   00000018'EF   B1  10D9              CMPW    LEV_W_BLKSIZE,#NET$C_MINBUFSIZ  ; At least as big as minimum?
                        0B   1E  10E2              BGEQU   10$                             ; If LSSU then no
                                 10E4              $LOG    TPL_IOF,TPL_PRSN_ADJB,,R5       ; Buffer size too small
                      00F5   31  10EC              BRW     70$                             ; Log the event, bring adj down
                                 10EF      10$:    ;
                                 10EF              ;   Check that partner's node type hasn't changed
                                 10EF              ;
        01 A7   00000038'EF   91  10EF              CMPB    PTYPE,ADJ$B_PTYPE(R7)           ; Node type changed?
                        0B   13  10F7              BEQL    20$                             ; Branch if ok
                                 10F9              $LOG    TPL_LDS,TPL_PRSN_UXPK,,R5       ; Unexpected message
                      00E0   31  1101              BRW     70$                             ; Log the event, bring adj down
                                 1104      20$:    ;
                                 1104              ;   Store partner's block size, router priority and listen timer
                                 1104              ;   parsed from message.
                                 1104              ;
        06 A7   00000018'EF   B0  1104              MOVW    LEV_W_BLKSIZE,ADJ$W_BUFSIZ(R7)  ; Setup partner's buff size
        0C A7   0000001C'EF   90  110C              MOVB    LEV_B_PRIORITY,ADJ$B_BCPRI(R7)  ; Set router priority
           50   00000020'EF   3C  1114              MOVZWL  LEV_W_HELLO,R0                  ; Get partner's hello timer
                  50     03   C4  111B              MULL    #TR4C_BCT3MULT,R0               ; Multiply by hello/listen factor
               08 A7     50   B0  111E              MOVW    R0,ADJ$W_INT_LSN(R7)            ; Set listen interval
               0A A7     50   B0  1122              MOVW    R0,ADJ$W_TIM_LSN(R7)            ; Start listen timer
                                 1126              ;
                                 1126              ;   If this router buffer size is less than the current "minimum",
                                 1126              ;   then we want to update the main ADJ$W_BUFSIZ for the BC, so that
                                 1126              ;   it always contains the minimum buffer size of all BRAs on the NI.
                                 1126              ;
                  50   20 A6  9A  1126              MOVZBL  LPD$B_PTH_INX(R6),R0            ; Get LPD index
                50   2C B440  D0  112A              MOVL    @RCB$L_PTR_ADJ(R4)[R0],R0       ; Get main ADJ for BC
             06 A0     06 A7  B1  112F              CMPW    ADJ$W_BUFSIZ(R7),ADJ$W_BUFSIZ(R0) ; Is bufsiz less than minimum?
                         05   1E  1134              BGEQU   25$                             ; Branch if not
             06 A0     06 A7  B0  1136              MOVW    ADJ$W_BUFSIZ(R7),ADJ$W_BUFSIZ(R0) ; If so, store the minimum
                                 113B      25$:    ;
                                 113B              ;   If we are an endncde, then simply remember this router as being
                                 113B              ;   our "designated router", and mark the BRA up.
                                 113B              ;
                                 113B              $DISPATCH LPD$B_ETY(R6),TYPE=B,<-       ; If we are an endnode,
                                 113B                      <ADJ$C_PTY_PH4N,27$>,-
                                 113B                      <ADJ$C_PTY_PH3N,27$>>
               1A   11  114A          BRB     29$
       0B 67   01   E2  114C   27$:   BBSS    #ADJ$V_RUN,ADJ$B_STS(R7),26$     ; Set into RUN state
                        1150          $LOG    TPL_AUP,,,R5                     ; Set "adjacency up" event
            EEA5'   30  1158          BSBW    NET$EVT_INTRAW                   ; Log the event record
  2C A6     20 A5   B0  115B   26$:   MOVW    WQE$W_ADJ_INX(R5),LPD$W_DRT(R6)  ; Store ADJ index of DRT
            EE9D'   30  1160          BSBW    UPDATE_ALL                       ; Update output path if changed
             0064   31  1163          BRW     90$                              ; Exit with success
                        1166   29$:   ;
                        1166          ;    See if two-way communication has been reached with the remote
                        1166          ;    partner by checking to see if our node address appears in his
                        1166          ;    election list.
                        1166          ;
       52   16 A5   3C  1166          MOVZWL  WQE$L_PM2+2(R5),R2               ; Get number of bytes in list
       53   14 A5   3C  116A          MOVZWL  WQE$L_PM2(R5),R3                 ; Get offset to list
          53   55   C0  116E          ADDL    R5,R3                            ; Get address of list
               16   11  1171          BRB     40$
 000400AA 8F   63   D1  1173   30$:   CMPL    (R3),#TR$C_NI_PREFIX             ; Standard Phase IV prefix?
               23   12  117A          BNEQ    69$                              ; If not, packet format error
     0E A4  04 A3   B1  117C          CMPW    4(R3),RCB$W_ADDR(R4)             ; Our address?
               1F   13  1181          BEQL    42$                              ; Branch if so
          52   07   C2  1183   35$:   SUBL    #7,R2                            ; Skip entry in list
          53   07   C0  1186          ADDL    #7,R3
               52   D5  1189   40$:   TSTL    R2                               ; Any bytes left?
               E6   14  118B          BGTR    30$
                        118D          ;
                        118D          ;    Our node address is not in his list.  If this adjacency
                        118D          ;    was already up, the bring it down (since it represents
                        118D          ;    a change in his status).  If we are waiting for 2-way
                        118D          ;    communication, then continue to wait.
                        118D          ;
               01   E1  118D          BBC     #ADJ$V_RUN,-              ; If not in RUN state,
            23 67       118F                  ADJ$B_STS(R7),45$         ; then keep waiting
                        1191          $LOG    TPL_LDS,TPL_PRSN_DROP,,R5 ; Log "dropped by adjacent node"
            18 A5   D4  1199          CLRL    WQE$L_EVL_PKT(R5)         ; Don't print any packet header either
             0045   31  119C          BRW     70$                       ; Bring down adjacency
                        119F
             002F   31  119F   69$:   BRW     60$                       ; Report packet format error
                        11A2          ;
                        11A2          ;    2-way communication has been established to the partner node.
                        11A2          ;    Mark the broadcast router adjacency in run state and log the
                        11A2          ;    adjacency up.
                        11A2          ;
               01   E2  11A2   42$:   BBSS    #ADJ$V_RUN,-              ; Set into RUN state
            0E 67       11A4                  ADJ$B_STS(R7),45$         ; Skip if already in run state
                        11A6          $LOG    TPL_AUP,,,R5              ; Set "adjacency up" event
            EE4F'   30  11AE          BSBW    NET$EVT_INTRAW            ; Log the event record
            EE4C'   30  11B1          BSBW    UPDATE_ALL                ; Force routing msgs to be sent
                        11B4   45$:   ;
                        11B4          ;    Build new NI router list for our Router Hello message
                        11B4          ;
                        11B4          ;    If there was at least one router in the election list which
                        11B4          ;    is still waiting for two-way communication to be established,
                        11B4          ;    then cause a Router Hello message to be sent in 1 second, so
                        11B4          ;    that elections are resolved quickly on the NI.
                        11B4          ;
             0FE6   30  11B4          BSBW    BUILD_RTR_LIST                   ; Re-build NI router list
            04 50   E8  11B7          BLBS    R0,48$                           ; Branch if election stabilized
 16 A6    01    B0  11BA  3789          MOVW    #1,LPD$W_TIM_TLK(R6)            ; Make talker fire in 1 sec.
                    11BE  3790 48$:     ;
                    11BE  3791          ;   If we have just initialized the circuit ("waiting for ballots"),
                    11BE  3792          ;   then wait to resolve the election after we've had time to hear
                    11BE  3793          ;   from everyone.  The election timer will eventually resolve the
                    11BE  3794          ;   election in this case.
                    11BE  3795          ;
          0F    E0  11BE  3796          BBS     #LPD$V_ELECT_TIM,-              ; If we are waiting for ballots,
  07 22 A6          11C0  3797                  LPD$W_STS(R6),90$               ; then wait for timer to fire
                    11C3  3798          ;
                    11C3  3799          ;   Store designated router address in LPD.  If we are the
                    11C3  3800          ;   designated router, then NETDRIVER will send our Router Hello
                    11C3  3801          ;   messages to "all endnodes" as well as "all routers".
                    11C3  3802          ;
        105A    30  11C3  3803          BSBW    ELECT_ROUTER                    ; Elect a designated router
 2C A6    51    B0  11C6  3804          MOVW    R1,LPD$W_DRT(R6)                ; Store designated router index
    51    00    D0  11CA  3805 90$:     MOVL    S^#LEV$C_NO_EVT,R1              ; No further events
    50    01    90  11CD  3806          MOVB    #1,R0                           ; Allow state change
                05  11D0  3807          RSB
                    11D1  3808
                    11D1  3809 ;
                    11D1  3810 ; Log "packet format error" & bring adjacency down
                    11D1  3811 ;
                    11D1  3812 60$:     BUMP    B,RCB$B_CNT_PFE(R4)             ; Bump packet format error count
                    11DC  3813          $LOG    TPL_PFM,,,R5                    ; Packet format error
                    11E4  3814
                    11E4  3815 ;
                    11E4  3816 ; Log event record & bring adjancency down
                    11E4  3817 ;
    51    24    D0  11E4  3818 70$:     MOVL    #LEV$C_LOG_ADE,R1               ; Signal "adjacency down event"
    50    01    D0  11E7  3819          MOVL    #1,R0                           ; Make state change
                05  11EA  3820          RSB
```

```
                         11EB          .SBTTL  ACT_ELECT - Resolve election after waiting for   llots
                         11EB   ;+
                         11EB   ; ACT_ELECT - Resolve election which is waiting for ballots
                         11EB   ;
                         11EB   ; This routine must only be called if we are a router (if an endnode
                         11EB   ; was to set its DRT to ourself, we would probably crash).
                         11EB   ;
                         11EB   ; Inputs:
                         11EB   ;
                         11EB   ;       R11 = CRI CNR address
                         11EB   ;       R10 = CRI CNF address
                         11EB   ;       R7 = ADJ address
                         11EB   ;       R6 = LPD address
                         11EB   ;       R5 = WQE address
                         11EB   ;       R4 = RCB address
                         11EB   ;
                         11EB   ; Outputs:
                         11EB   ;
                         11EB   ;       R0 = True if state change requested
                         11EB   ;       R1 = Next event to be processed
                         11EB   ;
                         11EB   ;       R6 is the only register preserved.
                         11EB   ;-
                         11EB   ACT_ELECT:
                         11EB           ;
                         11EB           ;   Clear the election suppression flag.  This means that after
                         11EB           ;   this point, the routine which receives the Router Hello messages
                         11EB           ;   will be free to run the election algorithm itself.
                         11EB           ;
                         11EB           CLRBIT  #LPD$V_ELECT_TIM,-              ; Clear election suppression
                         11EB                   LPD$W_STS(R6)
                         11F0           ;
                         11F0           ;   Store designated router address in LPD.  If we are the
                         11F0           ;   designated router, then NETDRIVER will send our Router Hello
                         11F0           ;   messages to "all endnodes" as well as "all routers".
                         11F0           ;
          102D     30    11F0           BSBW    ELECT_ROUTER                    ; Elect a designated router
   2C A6    51     B0    11F3           MOVW    R1,LPD$W_DRT(R6)                ; Store designated router index
                         11F7
      51    00     D0    11F7           MOVL    S^#LEV$C_NO_EVT,R1              ; No further events
      50    01     90    11FA           MOVB    #1,R0                           ; Allow state change
                   05    11FD           RSB
```

```
                               11FE              .SBTTL  ACT_RCV_EHEL - Received Endnode Hello message
                               11FE      ;+
                               11FE      ; ACT_RCV_EHEL - Endnode Hello message received
                               11FE      ;
                               11FE      ; Inputs:        R11 = CRI CNR address
                               11FE      ;                R10 = CRI CNF address
                               11FE      ;                R7 = ADJ address
                               11FE      ;                R6 = LPD address
                               11FE      ;                R5 = WQE address
                               11FE      ;                R4 = RCB address
                               11FE      ;
                               11FE      ; Outputs:       R0 = True if state change requested
                               11FE      ;                R1 = Next event to be processed
                               11FE      ;
                               11FE      ;                R6 is the only register preserved.
                               11FE      ;-
                               11FE      ACT_RCV_EHEL:
                               11FE              ;
                               11FE              ;   Check that buffer size is reasonable
                               11FE              ;
 00C0 8F    00000018'EF    B1  11FE              CMPW    LEV_W_BLKSIZE,#NET$C_MINBUFSIZ  ; At least as big as minimum?
                    0A     1E  1207              BGEQU   10$                             ; If LSSU then no
                               1209              $LOG    TPL_IOF,TPL_PRSN_ADJB,,R5       ; Buffer size too small
                    35     11  1211              BRB     70$                             ; Log the event, bring adj down
                               1213      10$:    ;
                               1213              ;   Check that partner's node type hasn't changed
                               1213              ;
   01 A7    00000038'EF    91  1213              CMPB    PTYPE,ADJ$B_PTYPE(R7)           ; Node type changed?
                    0A     13  121B              BEQL    20$                             ; Branch if ok
                               121D              $LOG    TPL_LDS,TPL_PRSN_UXPK,,R5       ; Unexpected message
                    21     11  1225              BRB     70$                             ; Log the event, bring adj down
                               1227      20$:    ;
                               1227              ;   Store partner's block size and listen timer parsed from message.
                               1227              ;
   06 A7    00000018'EF    B0  1227              MOVW    LEV_W_BLKSIZE,ADJ$W_BUFSIZ(R7)  ; Setup partner's buff size
   50       00000020'EF    3C  122F              MOVZWL  LEV_W_HELLO,R0                  ; Get partner's hello timer
               50   03     C4  1236              MULL    #TR4C_BCT3MULT,R0               ; Multiply by hello/listen factor
            08 A7   50     B0  1239              MOVW    R0,ADJ$W_INT_LSN(R7)            ; Set listen interval
            0A A7   50     B0  123D              MOVW    R0,ADJ$W_TIM_LSN(R7)            ; Start listen timer
               51   00     D0  1241              MOVL    S^#LEV$C_NO_EVT,R1              ; No further events
               50   01     90  1244              MOVB    #1,R0                           ; Allow state change
                           05  1247              RSB
                               1248
                               1248      ;
                               1248      ; Log event record & bring adjancency down
                               1248      ;
               51   24     D0  1248      70$:    MOVL    #LEV$C_LOG_ADE,R1               ; Signal "adjacency down event"
               50   01     D0  124B              MOVL    #1,R0                           ; Make state change
                           05  124E              RSB
```

```
                        124F          .SBTTL  ACT_RCV_RT - Receive routing message
                        124F   ;+
                        124F   ; ACT_RCV_RT - React to received routing message
                        124F   ; ACT_RCV_RTA - React to routing message received while in acceptance algorithm
                        124F   ;
                        124F   ; Inputs:        R11 = CRI CNR address
                        124F   ;                R10 = CRI CNF address
                        124F   ;                R7 = ADJ address
                        124F   ;                R6 = LPD address
                        124F   ;                R5 = WQE address
                        124F   ;
                        124F   ; Outputs:       R0 = True if state change requested
                        124F   ;                R1 = Next event to be processed
                        124F   ;
                        124F   ;                R6 is the only register preserved.
                        124F   ;-
                        124F   ACT_RCV_RT:                                   ; React to rcv'd routing message
             19    10   124F          BSBB    PROC_RT                        ; Do common processing
          09 50    E9   1251          BLBC    R0,10$                         ; If LBC then something's wrong
           01D6    30   1254          BSBW    REQUEST_UPDATE                 ; Request running of update algorithm
          51   00  D0   1257          MOVL    #LEV$C_NO_EVT,R1               ; No more events
          50   01  D0   125A          MOVL    #1,R0                          ; Allow state change
               05       125D   10$:   RSB                                    ; Return state table control in R0/R1
                        125E
                        125E   ACT_RCV_RTA:                                  ; Receive routing message while running
                        125E                                                 ; the acceptance algorithm
             0A    10   125E          BSBB    PROC_RT                        ; Do common processing
          06 50    E9   1260          BLBC    R0,10$                         ; If LBC then something's wrong
                        1263          ;
                        1263          ;   Terminate the acceptance testing and generate a "circuit up"
                        1263          ;   event.  This is necessary since we've just updated the matrix.
                        1263          ;
          1A A6    94   1263          CLRB    LPD$B_TSTCNT(R6)               ; Don't send any more test messages
          51   10  D0   1266          MOVL    #LEV$C_LIN_UP,R1               ; Signal "circuit up"
               05       1269   10$:   RSB                                    ; Return state table control in R0/R1
                        126A
                        126A   PROC_RT:                                      ; Common Routing message processing
                        126A          $DISPATCH LPD$B_ETY(R6),TYPE=B,<- ; If we are an endnode,
                        126A                  <ADJ$C_PTY_PH4N,5$>,-     ; never process rtg messages
                        126A                  <ADJ$C_PTY_PH3N,5$>>
                        1279          ;
                        1279          ;   Is the adjacency in the RUN state?  If not, ignore the routing
                        1279          ;   message, since it might have preceeded the necessary Router
                        1279          ;   Hello messages (for broadcast circuits ONLY).
                        1279          ;
    0A 22 A6   0A  E1   1279          BBC     #LPD$V_BC,LPD$W_STS(R6),10$ ; If broadcast circuit,
       06 67   01  E0   127E          BBS     #ADJ$V_RUN,ADJ$B_STS(R7),10$ ; and if not in "run" state,
          51   00  D0   1282   5$:    MOVL    #LEV$C_NO_EVT,R1               ; Drop message - No more events
               50  D4   1285          CLRL    R0                             ; Indicate nothing happened
               05       1287          RSB
                        1288   10$:   ;
                        1288          ;   Did the operator change the adjacent node's address?
                        1288          ;
 00000014'EF    04 A7  B1   1288      CMPW    ADJ$W_PNA(R7),LEV_W_PNA        ; Is the address the same as it was?
                6F     12   1290      BNEQ    80$                            ; If NEQ then not the same
                        1292          ;
                        1292          ;   Determine if this is a Phase III or Phase IV routing message.
```

```
                                    1292  3972           ;       Phase III routing messages are unsegmented, so we can copy
                                    1292  3973           ;       the entire routing portion into the cost/hops buffer.  Phase IV
                                    1292  3974           ;       routing messages are segmented  so we must run through each
                                    1292  3975           ;       segment, copying the information into the right place.
                                    1292  3976           ;
            50    20 A5        3C   1292  3977           MOVZWL  WQE$W_ADJ_INX(R5),R0        ; Get the ADJ index
     50   00000980'EF40        D0   1296  3978           MOVL    NET$AL_CH_VEC[R0],R0        ; Point to cost/hops buffer
                       57      13   129E  3979           BEQL    70$                         ; If none, then message error
            59    14 A5        3C   12A0  3980           MOVZWL  WQE$L_PM2(R5),R9            ; Get msg offset to routing info
               59    55        C0   12A4  3981           ADDL    R5,R9                       ; Convert to pointer
            58    16 A5        3C   12A7  3982           MOVZWL  WQE$L_PM2+2(R5),R8          ; Get number of bytes of rtginfo
     00    00000038'EF         91   12AB  3983           CMPB    PTYPE,#ADJ$C_PTY_PH3        ; Is it Phase III message?
                       0F      12   12B2  3984           BNEQ    50$                         ; If not, then Phase IV
                                    12B4  3985           ;
                                    12B4  3986           ;       If Phase III routing message, then copy the entire cost/hops
                                    12B4  3987           ;       portion into the cost/hops buffer for this circuit.
                                    12B4  3988           ;
                 53    59      D0   12B4  3989           MOVL    R9,R3                       ; Set address of rtginfo
        51    58    FF 8F      78   12B7  3990           ASHL    #-1,R8,R1                   ; Compute number of nodes
                 52    01      D0   12BC  3991           MOVL    #1,R2                       ; Set starting node number
                       4F      10   12BF  3992           BSBB    UPDATE_MATRIX               ; Update the routing matrix
                       2D      11   12C1  3993           BRB     90$
                                    12C3  3994           ;
                                    12C3  3995           ;       If Phase IV routing message, the run through the segments,
                                    12C3  3996           ;       copying each portion into the right place in the cost/hops buffer.
                                    12C3  3997           ;
                 58    04      C2   12C3  3998  50$:     SUBL    #4,R8                       ; Account for COUNT & STARTID
                       2F      15   12C6  3999           BLEQ    70$                         ; Branch if packet format error
                 51    89      3C   12C8  4000           MOVZWL  (R9)+,R1                    ; Get number of nodes in segment
                 52    89      3C   12CB  4001           MOVZWL  (R9)+,R2                    ; Get starting node number
                 53    59      D0   12CE  4002           MOVL    R9,R3                       ; Set address of rtginfo
            7E   52    51      C1   12D1  4003           ADDL3   R1,R2,-(SP)                 ; Compute ending+1 node number
       00000400 8F     8E      D1   12D5  4004           CMPL    (SP)+,#NUM_NODES            ; Larger than our buffer?
                       19      1A   12DC  4005           BGTRU   70$                         ; If so, error in routing message
            7E   51    01      78   12DE  4006           ASHL    #1,R1,-(SP)                 ; Compute number of bytes of rtginfo
                 59    6E      C0   12E2  4007           ADDL    (SP),R9                     ; Skip past rtginfo
                 58    8E      C2   12E5  4008           SUBL    (SP)+,R8                    ; Account for cost/hops info
                       0D      19   12E8  4009           BLSS    70$                         ; Branch if packet format error
                       24      10   12EA  4010           BSBB    UPDATE_MATRIX               ; Update the routing matrix
                       58      D5   12EC  4011           TSTL    R8                          ; Anything more?
                       D3      14   12EE  4012           BGTR    50$                         ; If so, continue
                 51    00      D0   12F0  4013  90$:     MOVL    #LEV$C_NO_EVT,R1            ; No more events
                 50    01      D0   12F3  4014           MOVL    #1,R0                       ; Allow state change
                               05   12F6  4015           RSB
                                    12F7  4016
                                    12F7  4017
                                    12F7  4018  ;
                                    12F7  4019  ; Routing message format error
                                    12F7  4020  ;
                                    12F7  4021  70$:     $LOG    TPL_LDF,TPL_PRSN_RUCS,,R5       ; Log "checksum error"
                       08      11   12FF  4022           BRB     85$                             ; Log the event record
                                    1301  4023  ;
                                    1301  4024  ; Adjacent node address has changed - log event and bring line down
                                    1301  4025  ;
                                    1301  4026  80$:     $LOG    TPL_LDO,TPL_PRSN_ADJC,,R5       ; Assume address change
                 51    24      D0   1309  4027  85$:     MOVL    #LEV$C_LOG_ADE,R1               ; Signal adjacency down event
                 50    01      D0   130C  4028           MOVL    #1,R0                           ; Make state change
```

```
 05  130F  4029         RSB
```

```
                             1310          .SBTTL  UPDATE_MATRIX - Update the routing matrix
                             1310    ;-
                             1310    ; UPDATE_MATRIX - Update the routing matrix
                             1310    ;
                             1310    ; Inputs:
                             1310    ;
                             1310    ;       R0 = Base address of node column in routing matrix for the adjacency
                             1310    ;       R1 = Number of nodes (non-zero)
                             1310    ;       R2 = Starting node number
                             1310    ;       R3 = Address of cost/hops routing information
                             1310    ;       (R6 = LPD address, for journalling of routing changes)
                             1310    ;       (R7 = ADJ address, for journalling of routing changes)
                             1310    ;
                             1310    ; Outputs:
                             1310    ;
                             1310    ;       None
                             1310    ;
                             1310    ;       The RTG_CHG vector is updated to reflect modifications
                             1310    ;       to the "node column" of the routing matrix.
                             1310    ;
                             1310    ;       All registers are preserved.
                             1310    ;-
                             1310    UPDATE_MATRIX:
                    1F   BB  1310           PUSHR   #^M<R0,R1,R2,R3,R4>       ; Save registers
            54    6042   3E  1312           MOVAW   (R0)[R2],R4               ; Address of 1st node in matrix
 50    00000000'EF       D0  1316           MOVL    NET$GL_PTR_VCB,R0         ; Get RCB address
                 18 A0   D5  131D           TSTL    RCB$L_PTR_JNX(R0)         ; Is journalling enabled?
                    19   12  1320           BNEQ    60$                       ; If so, use a slower loop
                             1322           ;
                             1322           ;   This loop is used when journalling is turned off, so that
                             1322           ;   journalling doesn't slow down this loop when disabled.
                             1322           ;
              84    83   B1  1322    10$:   CMPW    (R3)+,(R4)+               ; Same info as last message?
                    0D   13  1325           BEQL    20$                       ; If so, no need to do anything
        FE A4    FE A3   B0  1327           MOVW    -2(R3),-2(R4)             ; Store the changed cost/hops
                             132C           SETBIT  R2,RTG_CHG                ; Update "node changes" vector
                    52   D6  1334    20$:   INCL    R2                        ; Increment node number
                 E9 51   F5  1336           SOBGTR  R1,10$                    ; Loop until all nodes done
                    35   11  1339           BRB     90$
                             133B           ;
                             133B           ;   This loop is used when journalling is turned on.  The idea
                             133B           ;   is to log all changes in routing information, so that using
                             133B           ;   the journal, we can trace the routing activity of a node.
                             133B           ;
              84    83   B1  133B    60$:   CMPW    (R3)+,(R4)+               ; Same info as last message?
                    2B   13  133E           BEQL    70$                       ; If so, no need to do anything
                 ECBD'   30  1340           BSBW    NET$JNX_CO                ; Initialize journalling co-routine
                 18 50   E9  1343           BLBC    R0,65$                    ; Skip if not enabled for some reason
             81     04   90  1346           MOVB    #^X04,(R1)+               ; Record type = routing change
          81     20 A6   90  1349           MOVB    LPD$B_PTH_INX(R6),(R1)+   ; LPD index
          81     04 A7   B0  134D           MOVW    ADJ$W_PNA(R7),(R1)+       ; Neighbor node issuing rtg msg
             81     52   B0  1351           MOVW    R2,(R1)+                  ; Node number
          81     FE A4   B0  1354           MOVW    -2(R4),(R1)+              ; Old routing info
          81     FE A3   B0  1358           MOVW    -2(R3),(R1)+              ; New routing info
                    9E   16  135C           JSB     @(SP)+                    ; Log the journal record
        FE A4    FE A3   B0  135E    65$:   MOVW    -2(R3),-2(R4)             ; Store the changed cost/hops
                             1363           SETBIT  R2,RTG_CHG                ; Update "node changes" vector
```

```
       52  D6  136B  4088 70$:    INCL    R2                        ; Increment node number
    CB 51  F5  136D  4089         SOBGTR  R1,60$                    ; Loop until all nodes done
       1F  BA  1370  4090 90$:    POPR    #^M<R0,R1,R2,R3,R4>       ; Restore registers
           05  1372  4091         RSB
```

```
                       1373          .SBTTL  ACT_RCV_ART - Receive area routing message
                       1373  ;+
                       1373  ; ACT_RCV_ART - React to received area routing message
                       1373  ; ACT_RCV_ARTA - React to area routing message received while in acceptance algorith
                       1373  ;
                       1373  ; Inputs:        R11 = CRI CNR address
                       1373  ;                R10 = CRI CNF address
                       1373  ;                R7 = ADJ address
                       1373  ;                R6 = LPD address
                       1373  ;                R5 = WQE address
                       1373  ;
                       1373  ; Outputs:       R0 = True if state change requested
                       1373  ;                R1 = Next event to be processed
                       1373  ;
                       1373  ;                R6 is the only register preserved.
                       1373  ;-
                       1373  ACT_PCV_ART:                                    ; React to rcv'd area routing message
            19    10   1373          BSBB    PROC_ART                        ; Do common processing
         09 50    E9   1375          BLBC    R0,10$                          ; If LBC then something's wrong
          00B2    30   1378          BSBW    REQUEST_UPDATE                  ; Request running of update algorithm
      51    00    D0   137B          MOVL    #LEV$C_NO_EVT,R1                ; No more events
      50    01    D0   137E          MOVL    #1,R0                           ; Allow state change
                  05   1381  10$:    RSB                                     ; Return state table control in R0/R1
                       1382
                       1382  ACT_RCV_ARTA:                                   ; Receive routing message while running
                       1382                                                  ; the acceptance algorithm
            0A    10   1382          BSBB    PROC_ART                        ; Do common processing
         06 50    E9   1384          BLBC    R0,10$                          ; If LBC then something's wrong
                       1387          ;
                       1387          ;   Terminate the acceptance testing and generate a "circuit up"
                       1387          ;   event.  This is necessary since we've just updated the matrix.
                       1387          ;
         1A A6    94   1387          CLRB    LPD$B_TSTCNT(R6)                ; Don't send any more test messages
      51    10    D0   138A          MOVL    #LEV$C_LIN_UP,R1                ; Signal "circuit up"
                  05   138D  10$:    RSB                                     ; Return state table control in R0/R1
                       138E
                       138E  PROC_ART:                                       ; Common Routing message processing
                       138E          $DISPATCH LPD$B_ETY(R6),TYPE=B,<- ; If we are an endnode,
                       138E                  <ADJ$C_PTY_PH4N,5$>,-   ; never process rtg messages
                       138E                  <ADJ$C_PTY_PH3N,5$>>
                       139D          ;
                       139D          ;   Is the adjacency in the RUN state?  If not, ignore the routing
                       139D          ;   message, since it might have preceeded the necessary Router
                       139D          ;   Hello messages (for broadcast circuits).
                       139D          ;
    0A 22 A6    0A    E1   139D          BBC     #LPD$V_BC,LPD$W_STS(R6),10$ ; If broadcast circuit,
       06 67    01    E0   13A2          BBS     #ADJ$V_RUN,ADJ$B_STS(R7),10$ ; and if not in "run" state,
          51    00    D0   13A6  5$:     MOVL    #LEV$C_NO_EVT,R1                ; No more events
          50          D4   13A9          CLRL    R0                              ; Indicate nothing happened
                      05   13AB          RSB
                           13AC  10$:    ;
                           13AC          ;   Did the operator change the adjacent node's address?
                           13AC          ;
00000014'EF    04 A7      B1   13AC          CMPW    ADJ$W_PNA(R7),LEV_W_PNA     ; Is the address the same as it was?
                  5F      12   13B4          BNEQ    80$                             ; If NEQ then not the same
                           13B6          ;
                           13B6          ;   Copy the routing information into the buffer associated with
```

```
                              13B6  4150         ;   this routing adjacency.
                              13B6  4151         ;
          50    20 A5    3C   13B6  4152         MOVZWL  WQE$W_ADJ_INX(R5),R0      ; Get the ADJ index
 50   00001A88'EF40      D0   13BA  4153         MOVL    NET$AL_AREA_CH[R0],R0     ; Point to cost/hops buffer
                   47    13   13C2  4154         BEQL    70$                       ; If none, then message error
          59    14 A5    3C   13C4  4155         MOVZWL  WQE$L_PM2(R5),R9          ; Get msg offset to routing info
             59    55    C0   13C8  4156         ADDL    R5,R9                     ; Convert to pointer
          58    16 A5    3C   13CB  4157         MOVZWL  WQE$L_PM2+2(R5),R8        ; Get number of bytes of rtginfo
             58    04    C2   13CF  4158 50$:    SUBL    #4,R8                     ; Account for COUNT & STARTID
                   37    15   13D2  4159         BLEQ    70$                       ; Branch if packet format error
             51    89    3C   13D4  4160         MOVZWL  (R9)+,R1                  ; Get number of nodes in segment
             52    89    3C   13D7  4161         MOVZWL  (R9)+,R2                  ; Get starting node number
       51    51    01    78   13DA  4162         ASHL    #1,R1,R1                  ; Compute number of bytes of rtginfo
       52    52    01    78   13DE  4163         ASHL    #1,R2,R2                  ; Compute offset to node's cost/hops
             58    51    C2   13E2  4164         SUBL    R1,R8                     ; Account for cost/hops info
                   24    19   13E5  4165         BLSS    70$                       ; Branch if packet format error
       7E    52    51    C1   13E7  4166         ADDL3   R1,R2,-(SP)               ; Compute ending offset into buffer
 00000080 8F       8E    D1   13EB  4167         CMPL    (SP)+,#NUM_AREAS*2        ; Greater than size of buffer?
                   17    1A   13F2  4168         BGTRU   70$                       ; If so, error in routing message
                   33    BB   13F4  4169         PUSHR   #^M<R0,R1,R4,R5>          ; Save registers
     6042    69    51    28   13F6  4170         MOVC    R1,(R9),(R0)[R2]          ; Copy into cost/hops buffer
                   33    BA   13FB  4171         POPR    #^M<R0,R1,R4,R5>          ; Restore registers
             59    51    C0   13FD  4172         ADDL    R1,R9                     ; Skip past rtginfo
                   58    D5   1400  4173         TSTL    R8                        ; Anything more?
                   CB    14   1402  4174         BGTR    50$                       ; If so, continue
             51    00    D0   1404  4175 90$:    MOVL    #LEV$C_NO_EVT,R1          ; No more events
             50    01    D0   1407  4176         MOVL    #1,R0                     ; Allow state change
                         05   140A  4177         RSB
                              140B  4178
                              140B  4179
                              140B  4180 ;
                              140B  4181 ; Routing message format error
                              140B  4182 ;
                              140B  4183 70$:    $LOG    TPL_LDF,TPL_PRSN_RUCS,,R5        ; Log "checksum error"
             08    11         1413  4184         BRB     85$                              ; Log the event record
                              1415  4185 ;
                              1415  4186 ; Adjacent node address has changed - log event and bring line down
                              1415  4187 ;
                              1415  4188 80$:    $LOG    TPL_LDO,TPL_PRSN_ADJC,,R5        ; Assume address change
             51    24    D0   141D  4189 85$:    MOVL    #LEV$C_LOG_ADE,R1                ; Signal adjacency down event
             50    01    D0   1420  4190         MOVL    #1,R0                            ; Make state change
                         05   1423  4191         RSB
```

```
                                    1424        .SBTTL  REQUEST_UPDATE - Request update of routing database
                                    1424  ;+
                                    1424  ; REQUEST_UPDATE - Request running of the "update" algorithm
                                    1424  ;
                                    1424  ; This routine is called for all normal updates to the routing database.
                                    1424  ; It prevents the update algorithm from being run too often, and hogging
                                    1424  ; the machine, by using a supression timer.
                                    1424  ;
                                    1424  ; Inputs:
                                    1424  ;
                                    1424  ;       None
                                    1424  ;
                                    1424  ; Outputs:
                                    1424  ;
                                    1424  ;       None
                                    1424  ;
                                    1424  ;       R4-R6,R10-R11 are preserved.
                                    1424  ;-
                                    1424  ACT_REQ_UPDATE:                               ; Update database based on CRI change
                          07    10  1424          BSBB    REQUEST_UPDATE              ; Request update
                    51    00    D0  1426          MOVL    #LEV$C_NO_EVT,R1            ; No more events
                    50    01    D0  1429          MOVL    #1,R0                       ; Allow state change
                                05  142C          RSB
                                    142D
                                    142D  REQUEST_UPDATE:                               ; Request running of update algorithm
                                    142D          ;
                                    142D          ;    If the suppression timer is not already ticking exit and wait for
                                    142D          ;    it to fire.  Otherwise reset it and run the update algorithm.
                                    142D          ;
                                    142D          SETBIT  #RTG_V_UPD,RTGFLG           ; Remember request to update
      4B 00000040'EF      00    E2  1435          BBSS    #RTG_V_RUS,RTGFLG,20$       ; Exit if supression timer is ticking
             51    0201 8F      3C  143D          MOVZWL  #<<WQE$C_QUAL_RTG>@8>!-     ; Setup suppression timer i.d.
                                    1442                  NET$C_TID_RUS,R1            ;
                  52    89'AF   9E  1442          MOVAB   B^TIMER_RUS,R2              ; Setup action routine
                     0F80 8F    BB  1446          PUSHR   #^M<R7,R8,R9,R10,R11>       ; Save registers
          5B    00000000'EF     D0  144A          MOVL    NET$GL_CNR_LNI,R11          ; Set CNR address
          5A    00000000'EF     D0  1451          MOVL    NET$GL_PTR_LNI,R10          ; Set local CNF address
                                    1458          $GETFLD lni,l,rsi                   ; Get routing suppression timer value
                  53    58      D0  1465          MOVL    R8,R3                       ; Move to another register
                     0F80 8F    BA  1468          POPR    #^M<R7,R8,R9,R10,R11>       ; Restore registers
                       03 50    E8  146C          BLBS    R0,10$                      ; If not set, provide default
                  53    01      D0  146F          MOVL    #1,R3
 53    00    53   00989680 8F   7A  1472  10$:    EMUL    #10*1000*1000,R3,#0,R3      ; Convert to standard VMS time
                       EB82'    30  147B          BSBW    WQE$RESET_TIM               ; Reset the routing suppression timer
                                    147E          ;
                                    147E          ;    Run the update algorithm on the data base.
                                    147E          ;
                                    147E          CLRBIT  #RTG_V_UPD,RTGFLG           ; Indicate update request satisfied
                          17    10  1486          BSBB    UPDATE                      ; Update the routing data base
                                05  148A  20$:    RSB
                                    1489
                                    1489  TIMER_RUS:                                    ; Update suppression timer has fired
                        F8FC    30  1489          BSBW    KILL_WQE                    ; Deallocate the timer block
                                    148C          CLRBIT  #RTG_V_RUS,RTGFLG           ; Indicate timer no longer ticking
      02 00000040'EF      01    E1  1494          BBC     #RTG_V_UPD,RTGFLG,10$       ; If BS then update has been requested
                          8F    10  149C          BSBB    REQUEST_UPDATE              ; Perform the update & reset timer
                                05  149E  10$:    RSB
                          149F              .SBTTL  UPDATE - Update database and neighbors
                          149F       ;+
                          149F       ; UPDATE - Update the routing data base
                          149F       ;
                          149F       ; Run the routing algorithm, update the routing data base, and
                          149F       ; schedule routing message transmission to all routing nodes.
                          149F       ;
                          149F       ; INPUTS:       None
                          149F       ;
                          149F       ; OUTPUTS:      None
                          149F       ;
                          149F       ;               R4-R6,R10-R11 are preserved.
                          149F       ;-
                          149F       UPDATE:                                        ; Update the routing data base
           0C70 8F   BB   149F              PUSHR   #^M<R4,R5,R6,R10,R11>   ; Save registers
  54    00000000'EF  D0   14A3              MOVL    NET$GL_PTR_VCB,R4       ; Get RCB address
                          14AA              $DISPATCH RCB$B_ETY(R4),TYPE=B,<- ; Do the full decision if we are:
                          14AA                      <ADJ$C_PTY_AREA,5$>,-   ; A level 2 router
                          14AA                      <ADJ$C_PTY_PH4,5$>,-    ; A level 1 router
                          14AA                      <ADJ$C_PTY_PH3,5$>>     ; A Phase III router
                          14BA              ;
                          14BA              ;   If we are an endnode, then run a much shorter and simpler
                          14BA              ;   decision algorithm.
                          14BA              ;
              05D9   30   14BA              BSBW    ENDNODE_DECISION        ; Run endnode algorithm
              00C6   31   14BD              BRW     90$                     ; exit
                          14C0
        00000000'EF  16   14C0       5$:    JSB     NET$GET_RTG3            ; Get routing info
             05 50   E9   14C6              BLBC    R0,9$                   ; Branch if error
             6A A4   B5   14C9              TSTW    RCB$W_MAX_RTG(R4)       ; Any routing adjacencies?
                03   12   14CC              BNEQ    10$                     ; Continue if so
              00B5   31   14CE       9$:    BRW     90$                     ; Nothing to do
                          14D1       10$:   ;
                          14D1              ;   If we are a level 2 router, then update the area database
                          14D1              ;
  54    00000000'EF  D0   14D1              MOVL    NET$GL_PTR_VCB,R4       ; Get RCB address
     03    008A C4   91   14D8              CMPB    RCB$B_ETY(R4),#ADJ$C_PTY_AREA ; Are we level 2 router?
                53   12   14DD              BNEQ    20$                     ; Skip if not
  5B    00000000'EF  D0   14DF              MOVL    NET$GL_CNR_LNI,R11      ; Get LNI root
  5A    00000000'EF  D0   14E6              MOVL    NET$GL_PTR_LNI,R10      ; Get LNI CNF
                          14ED              $GETFLD lni,l,amh               ; Fetch max hops field
             35 50   E9   14FA              BLBC    R0,20$                  ; Br on error
  0000002C'EF    58  9A   14FD              MOVZBL  R8,MAX_HOPS             ; Store it
                          1504              $GETFLD lni,l,amc               ; Fetch max cost field
             1E 50   E9   1511              BLBC    R0,20$                  ; Br on error
  00000030'EF    58  3C   1514              MOVZWL  R8,MAX_COST             ; Store it
      58    008C C4  9A   151B              MOVZBL  RCB$B_MAX_AREA(R4),R8   ; Get max area address
                58   D6   1520              INCL    R8                      ; Get number of area addresses counting
                          1522                                              ; address #0
     5A    20 B448   3E   1522              MOVAW   @RCB$L_PTR_AOA(R4)[R8],R10 ; Point past last OA entry
 5B   00000900'EF48  3E   1527              MOVAW   NET$AW_AREA_C_H[R8],R11 ; Point past last Cost/Hops entry
              02CF   30   152F              BSBW    AREA_DECISION           ; Update the area data base
                          1532       20$:   ;
                          1532              ;   Call the DECISION algorithm to update the level 1 forwarding database
                          1532              ;
  5B    00000000'EF  D0   1532              MOVL    NET$GL_CNR_LNI,R11      ; Get LNI root
  5A    00000000'EF  D0   1539              MOVL    NET$GL_PTR_LNI,R10      ; Get LNI CNF
```

```
                              1540  4308          $GETFLD lni,l,mho                 ; Fetch max hops field
             33 50       E9   154D  4309          BLBC    R0,50$                    ; Br on error
    0000002C'EF   58     9A   1550  4310          MOVZBL  R8,MAX_HOPS               ; Store it
                              1557  4311          $GETFLD lni,l,mco                 ; Fetch max cost field
             1C 50       E9   1564  4312          BLBC    R0,50$                    ; Br on error
    00000030'EF   58     3C   1567  4313          MOVZWL  R8,MAX_COST               ; Store it
          58    5A A4    3C   156E  4314          MOVZWL  RCB$W_MAX_ADDR(R4),R8     ; Get max node address
                   58    D6   1572  4315          INCL    R8                        ; Get number of node addresses counting
                              1574  4316                                            ; address #0
       5A   1C B448      3E   1574  4317          MOVAW   @RCB$L_PTR_OA(R4)[R8],R10 ; Point past last OA entry
 5B    00000100'EF48     3E   1579  4318          MOVAW   NET$AW_MIN_C_H[R8],R11    ; Point past last Cost/Hops entry
                   08    10   1581  4319          BSBB    DECISION                  ; Update the data base
                              1583  4320          ;
                              1583  4321          ;   Send routing messages to our neighbors, if the database changed
                              1583  4322          ;
                 03D9    30   1583  4323 50$:     BSBW    UPD_NEIGHBORS
              0C70 8F    BA   1586  4324 90$:     POPR    #^M<R4,R5,R6,R10,R11>     ; Restore registers
                         05   158A  4325          RSB
```

```
                           158B  4327          .SBTTL  DECISION - Update forwarding database
                           158B  4328  ;+
                           158B  4329  ; DECISION - Update the routing and forwarding databases.
                           158B  4330  ;
                           158B  4331  ; Inputs:
                           158B  4332  ;
                           158B  4333  ;       R11 = Address of last entry+1 of min. cost/hops buffer
                           158B  4334  ;       R10 = Address of last entry+1 of OA vector
                           158B  4335  ;       R8 = Ending address corresponding to last entry in vectors
                           158B  4336  ;       MAX_COST = Maximum cost value allowed for routing database
                           158B  4337  ;       MAX_HOPS = Maximum hops value allowed for routing database
                           158B  4338  ;       RTG_CHG = Vector which indicates which nodes must be processed.
                           158B  4339  ;
                           158B  4340  ; OUTPUTS:      None
                           158B  4341  ;
                           158B  4342  ;               All registers are destroyed.
                           158B  4343  ;-
                           158B  4344  DECISION:
                           158B  4345          ;
                           158B  4346          ;    See if we need to do anything at all.
                           158B  4347          ;
     54   00000000'EF  D0  158B  4348          MOVL    NET$GL_PTR_VCB,R4       ; Get RCB address
          57    5A A4  3C  1592  4349          MOVZWL  RCB$W_MAX_ADDR(R4),R7   ; Get max address
             57    07  C0  1596  4350          ADDL    #7,R7                   ; Allow for roundoff
    57    57    FD 8F  78  1599  4351          ASHL    #-3,R7,R7               ; Divide by bits/byte
  00000080'EF      57  2D  159E  4352          CMPC5   R7,RTG_CHG,-            ; Is the entire RTG_CHG vector 0?
       6E    00    00      15A5  4353                  #0,#0,(SP)
                   01  12  15A8  4354          BNEQ    5$                      ; If at least 1 bit set, do it
                       05  15AA  4355          RSB                             ; Otherwise, exit now
                           15AB  4356  5$:     ;
                           15AB  4357          ;    Record a journal record marking when we have started the
                           15AB  4358          ;    routing algorithms.
                           15AB  4359          ;
                EA52'  30  15AB  4360          BSBW    NET$JNX_CO              ; Initialize journalling co-routine
                14 50  E9  15AE  4361          BLBC    R0,8$                   ; Skip if journalling not enabled
             81    02  90  15B1  4362          MOVB    #^X02,(R1)+             ; Record type = Starting algorithm
                   81  94  15B4  4363          CLRB    (R1)+                   ; spare byte
 36    00  00000080'EF 57  2C  15B6  4364      MOVC5   R7,RTG_CHG,#0,#64-8-2,(R1) ; Journal the routing bitvector
                   61      15BF
             51    53  D0  15C0  4365          MOVL    R3,R1                   ; Update pointer past record
                   9E  16  15C3  4366          JSB     @(SP)+                  ; Log the journal record
                           15C5  4367  8$:     ;
                           15C5  4368          ;    Force the cost/hops for node #0 to always be re-evaluated
                           15C5  4369          ;    each time, because of the code at the bottom of the loop
                           15C5  4370          ;    which resets the "nearest level 2 router" based on the
                           15C5  4371          ;    adjacency for node #0.
                           15C5  4372          ;
                           15C5  4373          SETBIT  #0,RTG_CHG              ; Always re-evaluate node #0
                           15CD  4374          ;
                           15CD  4375          ;    Init registers, and start the loop
                           15CD  4376          ;
     54   00000000'EF  D0  15CD  4377          MOVL    NET$GL_PTR_VCB,R4       ; Get RCB address
                 0092  31  15D4  4378          BRW     100$                    ; Advance to the end of the loop
                           15D7  4379          ;
                           15D7  4380          ;    See if this node needs to be looked at.  If we haven't received
                           15D7  4381          ;    a routing message from any of our neighbors indicating that the
                           15D7  4382          ;    node cost/hops has changed since last time, then skip the node.
```

```
                              15D7  4383         ;
   09 00000080'EF    58   E4  15D7  4384 10$:    BBSC    R8,RTG_CHG,15$           ; Lookup node if necessary
                5A   02   C2  15DF  4385         SUBL    #2,R10                   ; Skip past OA entry for node
                5B   02   C2  15E2  4386         SUBL    #2,R11                   ; Skip past min cost/hops for node
                   0081   31  15E5  4387         BRW     100$                     ; Else, skip the node entirely
                              15E8  4388 15$:    ;
                              15E8  4389         ;   Determine least cost path to this node
                              15E8  4390         ;
                   0115   30  15E8  4391         BSBW    FIND_PATH_TO_NODE        ; Find hops, costs, and adjacency
                              15EB  4392         ;
                              15EB  4393         ;   If the cost or hops to this node exceeds our maximums,
                              15EB  4394         ;   then declare the node unreachable.
                              15EB  4395         ;
      0000002C'EF    51   91  15EB  4396         CMPB    R1,MAX_HOPS              ; Is the node within range?
                     09   1A  15F2  4397         BGTRU   30$                      ; If GTRU then no
      00000030'EF    52   B1  15F4  4398         CMPW    R2,MAX_COST              ; Is the node within range?
                     02   1B  15FB  4399         BLEQU   40$                      ; If LEQU then yes
                     50   D4  15FD  4400 30$:    CLRL    R0                       ; Node is unreachable
                              15FF  4401 40$:    ;
                              15FF  4402         ;   Build the packed cost/hops field
                              15FF  4403         ;
                              15FF  4404         ASSUME  TR3V_RT_COST  EQ  0
            0A       51   F0  15FF  4405         INSV    R1,#TR3V_RT_HOPS,-
            52       05       1602  4406                 #TR3S_RT_HOPS,R2         ; Merge hops/cost
                              1604  4407         ASSUME  TR3S_RT_HOPS+TR3S_RT_COST EQ 15
     52    8000 8F        AA  1604  4408         BICW    #^X<8000>,R2             ; The high bit must be zero (Transport
                              1609  4409                                          ; architectural requirement)
                              1609  4410         ;
                              1609  4411         ;   If the node is now unreachable, then force the cost and hops
                              1609  4412         ;   to infinity, so that our neighbors realize the node is down now
                              1609  4413         ;   (they might have a higher maxcost, and wouldn't realize the
                              1609  4414         ;   node is unreachable until much later).
                              1609  4415         ;
                     50   D5  1609  4416         TSTL    R0                       ; Is the node reachable?
                     05   12  160B  4417         BNEQ    55$                      ; If not,
     52    7FFF 8F        3C  160D  4418         MOVZWL  #^X<7FFF>,R2             ; then make cost/hops infinite
                              1612  4419 55$:    ;
                              1612  4420         ;   Send routing msg only if  MINCOST or MINHOPS have changed.  If
                              1612  4421         ;   there has been a change in the node's reachability then record
                              1612  4422         ;   this fact so that it can be sent to the event logger.
                              1612  4423         ;
                              1612  4424         ASSUME  TR3S_RT_HOPS+TR3S_RT_COST EQ 15
     7B    8000 8F        AA  1612  4425         BICW    #^X<8000>,-(R11)         ; Ignore high bit
                6B   52   B1  1617  4426         CMPW    R2,(R11)                 ; Was there a hops or cost change ?
                     4A   13  161A  4427         BEQL    90$                      ; If EQL then no
           7FFF 8F   52   B1  161C  4428         CMPW    R2,#^X<7FFF>             ; Is node currently unreachable?
                     07   1E  1621  4429         BGEQU   57$                      ; If GEQU yes, reachability change
           7FFF 8F   6B   B1  1623  4430         CMPW    (R11),#^X<7FFF>          ; Was node unreachable before?
                     08   1F  1628  4431         BLSSU   58$                      ; If LSSU no, no reachability change
                              162A  4432 57$:    SETBIT  R8,REACH_EVT             ; Indicate change in reachability status
                6B   52   B0  1632  4433 58$:    MOVW    R2,(R11)                 ; Update the vector
   51     58     FB 8F    78  1635  4434         ASHL    #-LPD$C_SRM_SHFT,R8,R1   ; Compute SRM bit for this node
          52     5C A4    9A  163A  4435         MOVZBL  RCB$B_MAX_LPD(R4),R2     ; Get number of circuits
   53     28 B442         D0  163E  4436 60$:    MOVL    @RCB$C_PTR_LPD(R4)[R2],R3 ; Get LPD address
                     0A   18  1643  4437         BGEQ    65$                      ; Branch if slot not valid
      05 22 A3       04   E1  1645  4438         BBC     #LPD$V_RUN,LPD$W_STS(R3),65$ ; Branch if circuit not up
                              164A  4439                                          ; (skip ADJ$V_RTG check to save time)
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```
                            164A  4440          SETBIT  R1,LPD$G_SRM(R3)        ; Set SRM flag
          EC 52     F5      164F  4441 65$:     SOBGTR  R2,60$                  ; Loop through all circuits
                            1652  4442          ;
                            1652  4443          ;   If the node is a direct partner, and is a Phase II adjacency,
                            1652  4444          ;   then do not include the node in routing messages, to enforce
                            1652  4445          ;   Phase II non-routing rules, but keep the OA vector pointing
                            1652  4446          ;   to the output adjacency for the Phase II node.
                            1652  4447          ;
             50     D5      1652  4448          TSTL    R0                      ; Is node directly adjacent?
             10     13      1654  4449          BEQL    70$                     ; If not, skip Phase II check
  51   2C B440      D0      1656  4450          MOVL    @RCB$L_PTR_ADJ(R4)[R0],R1 ; Get output ADJ address
    02   01 A1      91      165B  4451          CMPB    ADJ$B_PTYPE(R1),#ADJ$C_PTY_PH2 ; Phase II direct adjacency?
             05     12      165F  4452          BNEQ    70$                     ; Branch if not
  6B   7FFF 8F      B0      1661  4453          MOVW    #^X<7FFF>,(R11)         ; If so, don't include in routing msgs
                            1666  4454 70$:     ;
                            1666  4455          ;   Update the OA (output adjacency) vector.
                            1666  4456          ;
          7A 50     B0      1666  4457 90$:     MOVW    R0,-(R10)               ; Update output adjacency to node
          02 58     F4      1669  4458 100$:    SOBGEQ  R8,102$                 ; Loop for each node address
             03     11      166C  4459          BRB     105$                    ; Loop finished - go on
           FF66     31      166E  4460 102$:    BRW     10$                     ; Branch helper - continue looping
                            1671  4461 105$:    ;
                            1671  4462          ;   For entry #0 (nearest level 2 router), we must decide if we
                            1671  4463          ;   are the nearest level 2 router.  If so, force node #0 to a cost
                            1671  4464          ;   and hops of 0.  Else, leave the value as computed from neighbors.
                            1671  4465          ;
                            1671  4466          ;   If no other areas are reachable except our own, then it may mean
                            1671  4467          ;   we are an isolated area router.  If this is the case, then allow
                            1671  4468          ;   routing to continue by simply pretending we are a level 1 router,
                            1671  4469          ;   and propagate the "nearest level 2 router" as determined by our
                            1671  4470          ;   neighbors, and never use the AOA vector for forwarding (since we
                            1671  4471          ;   may not really know the state of the level 2 network).
                            1671  4472          ;
                            1671  4473          CLRBIT  #RCB$V_LVL2,-           ; Assume we cannot do level 2 routing
                            1671  4474                  RCB$B_STATUS(R4)
  03   008A C4      91      1676  4475          CMPB    RCB$B_ETY(R4),#ADJ$C_PTY_AREA ; Are we an area router?
             1F     12      167B  4476          BNEQ    120$                    ; Skip if not
  58   008C C4      9A      167D  4477          MOVZBL  RCB$B_MAX_AREA(R4),R8   ; Get the maximum area number
       20 B448      B5      1682  4478 110$:    TSTW    @RCB$L_PTR_AOA(R4)[R8]  ; Is any other area reachable?
             11     13      1686  4479          BEQL    115$                    ; If not, continue searching
  008B C4    58     91      1688  4480          CMPB    R8,RCB$B_HOMEAREA(R4)   ; Our own area?
             0A     13      168D  4481          BEQL    115$                    ; Skip our own area - it doesn't count
       6A    01     B0      168F  4482          MOVW    #LPD$C_LOC_INX,(R10)    ; If so, mark "nearest" as local ADJ
             6B     B4      1692  4483          CLRW    (R11)                   ; and send "nearest = 0 cost/hops"
                            1694  4484          SETBIT  #RCB$V_LVL2,-           ; Tell Transport it can use the AOA
                            1694  4485                  RCB$B_STATUS(R4)        ; vector - we are not isolated.
          E6 58     F5      1699  4486 115$:    SOBGTR  R8,110$                 ; Loop thru all areas
                            169C  4487 120$:    ;
                            169C  4488          ;   Take the value for entry #0 (nearest level 2 router) and store
                            169C  4489          ;   it in a special place in the RCB so that TRANSPORT can get at
                            169C  4490          ;   it easily.  In addition, set OA(0) to point to ourselves, since
                            169C  4491          ;   the internal convention is that node #0 refers to ourselves.
                            169C  4492          ;
  00AC C4    6A     B0      169C  4493          MOVW    (R10),RCB$W_LVL2(R4)    ; Store path to nearest level 2 router
       6A    01     B0      16A1  4494          MOVW    #LPD$C_LOC_INX,(R10)    ; Set "local" adjacency for node 0
                            16A4  4495                                          ; (node 0 is the always the local node)
                            16A4  4496          ;
```

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                              16A4  4497          ;   Log an event for each node whose reachability status has changed.
                              16A4  4498          ;
          58   03FF 8F   3C   16A4  4499          MOVZWL  #NUM_NODES-1,R8          ; Setup max node address
   40 00000000'EF    58  E5   16A9  4500 200$:    BBCC    R8,REACH_EVT,210$        ; If BS then reachability change
                     58  DD   16B1  4501          PUSHL   R8                       ; Save node address
       55   00000000'EF  9E   16B3  4502          MOVAB   NET$AB_EVT_WQE,R5        ; Point to common event WQE
       54   00000000'EF  D0   16BA  4503          MOVL    NET$GL_PTR_VCB,R4        ; Get RCB
       5B   00000000'EF  D0   16C1  4504          MOVL    NET$GL_CNR_NDI,R11       ; Get the NDI root block
                  E935'  30   16C8  4505          BSBW    NET$LOCATE_NDI           ; Get node's CNF block
             12 A5   58  B0   16CB  4506          MOVW    R8,WQE$W_REQIDT(R5)      ; Setup the node address
             008B C4     F0   16CF  4507          INSV    RCB$B_HOMEAREA(R4),-     ; using the current area
                     0A       16D3  4508                  #TR4$V_ADDR_AREA,-
             12 A5   06       16D4  4509                  #TR4$S_ADDR_AREA,WQE$W_REQIDT(R5)
                     00  90   16D7  4510          MOVB    #EVC$C_TPL_PSTS_RCH,-    ; Assume node is now reachable
                  1E A5       16D9  4511                  WQE$B_EVL_DT1(R5)        ;
             1C B448     B5   16DB  4512          TSTW    @RCB$L_PTR_OA(R4)[R8]    ; Is node now reachable?
                     04  12   16DF  4513          BNEQ    205$                     ; If NEQ then yes
                     01  90   16E1  4514          MOVB    #EVC$C_TPL_PSTS_URC,-    ; Signal "unreachable"
                  1E A5       16E3  4515                  WQE$B_EVL_DT1(R5)        ;
             010E 8F     B0   16E5  4516 205$:    MOVW    #EVC$C_TPL_RCH,-         ; Setup event logging code
                  1C A5       16E9  4517                  WQE$W_EVL_CODE(R5)       ;
                  E912'  30   16EB  4518          BSBW    NET$EVT_INTRAW           ; Log the event
                  58 8ED0     16EE  4519          POPL    R8                       ; Restore node address
                B5 58    F5   16F1  4520 210$:    SOBGTR  R8,200$                  ; Loop for each node
                              16F4  4521          ;
                              16F4  4522          ;   Record a journal record marking when we have finished the
                              16F4  4523          ;   routing algorithms.
                              16F4  4524          ;
                  E909'  30   16F4  4525          BSBW    NET$JNX_CO               ; Initialize journalling co-routine
                  05 50  E9   16F7  4526          BLBC    R0,300$                  ; Skip if journalling not enabled
             81      03  90   16FA  4527          MOVB    #^X03,(R1)+              ; Record type = Ending algorithm
                     9E  16   16FD  4528          JSB     @(SP)+                   ; Log the journal record
                     05       16FF  4529 300$:    RSB                              ; Exit
```

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                          1700  4531          .SBTTL  FIND_PATH_TO_NODE - Find least cost path to node
                          1700  4532 ;+
                          1700  4533 ; FIND_PATH_TO_NODE - Find least cost path to a node in our area
                          1700  4534 ;
                          1700  4535 ; Inputs:       R8 = Node address
                          1700  4536 ;               R4 = RCB address
                          1700  4537 ;
                          1700  4538 ; Outputs:      R1 = Number of hops to node
                          1700  4539 ;               R2 = Cost to node
                          1700  4540 ;               R0 = New ADJ index of path to node
                          1700  4541 ;
                          1700  4542 ;               R4 is preserved.
                          1700  4543 ;-
                          1700  4544 FIND_PATH_TO_NODE:
          0400 8F    BB   1700  4545          PUSHR   #^M<R10>                ; Save registers
                00   ED   1704  4546          CMPZV   #TR4$V_ADDR_DEST,-      ; Is this the local node?
   58    0E A4  0A        1706  4547                  #TR4$S_ADDR_DEST,RCB$W_ADDR(R4),R8
                0F   13   170A  4548          BEQL    3$                      ; Branch if so
          008D C4    B5   170C  4549          TSTW    RCB$W_ALIAS(R4)         ; Is there an alias?
                11   13   1710  4550          BEQL    5$                      ; If so,
                00   ED   1712  4551          CMPZV   #TR4$V_ADDR_DEST,-      ; Is this the alias node number?
   58  008D C4  0A        1714  4552                  #TR4$S_ADDR_DEST,RCB$W_ALIAS(R4),R8
                08   12   1719  4553          BNEQ    5$                      ; If not, proceed
           50   01   9A   171B  4554 3$:      MOVZBL  #LPD$C_LOC_INX,R0       ; Setup index for 'local' adjacency
                51   7C   171E  4555          CLRQ    R1                      ; Zero cost, hops
              00A6   31   1720  4556          BRW     100$                    ; and exit with success
                          1723  4557
           57   01   D0   1723  4558 5$:      MOVL    #1,R7                   ; Init adjacency index
                50   D4   1726  4559          CLRL    R0                      ; Assume unreachable
           51   01   CE   1728  4560          MNEGL   #1,R1                   ; Init min hops value to infinity
           52   01   CE   172B  4561          MNEGL   #1,R2                   ; Init min cost value to infinity
      59   2C B447   D0   172E  4562 7$:      MOVL    @RCB$L_PTR_ADJ(R4)[R7],R9 ; Get ADJ address
     0F 69      01   E1   1733  4563          BBC     #ADJ$V_RUN,ADJ$B_STS(R9),10$ ; Skip check if PNA not valid and
                          1737  4564                                          ; assume cost/hops applies to our area
                0A   EF   1737  4565          EXTZV   #TR4$V_ADDR_AREA,-      ; Get the area that cost/hops applies to
   59    04 A9  06        1739  4566                  #TR4$S_ADDR_AREA,ADJ$W_PNA(R9),R9
                07   13   173D  4567          BEQL    10$                     ; If area = 0, assume our area
    008B C4     59   91   173F  4568          CMPB    R9,RCB$B_HOMEAREA(R4)   ; Is it for our area?
                76   12   1744  4569          BNEQ    20$                     ; If not, skip this one
 59   00000980'EF47  D0   1746  457C 10$:     MOVL    NET$AL_CH_VEC[R7],R9    ; Point to cost/hops buffer
                6C   13   174E  4571          BEQL    20$                     ; Skip if none for this circuit
           5A   57   D0   1750  4572          MOVL    R7,R10                  ; Remember ADJ index for this path
        59    6948   3E   1753  4573          MOVAW   (R9)[R8],R9             ; Point to entry for this node
                          1757  4574          ;
                          1757  4575          ;   Get the cost/hops for this node over this adjacency,
                          1757  4576          ;   and increase it by the hop for ourself.  Also compute
                          1757  4577          ;   the new cost for this path.
                          1757  4578          ;
      56   2C B447   D0   1757  4579          MOVL    @RCB$L_PTR_ADJ(R4)[R7],R6 ; Get address of ADJ block
        56   02 A6   9A   175C  4580          MOVZBL  ADJ$B_[PD_INX(R6),R6    ; Get LPD index
      56   28 B446   D0   1760  4581          MOVL    @RCB$[_PTR_LPD(R4)[R6],R6 ; Get address of LPD
        56   29 A6   9A   1765  4582          MOVZBL  LPD$B_COST(R6),R6       ; Get cost for this circuit
                          1769  4583
                          1769  4584          ASSUME  TR3V_RT_COST  EQ  0
                          1769  4585          ASSUME  TR3S_RT_COST  EQ  10
                          1769  4586
   53   69    FC00 8F    AB   1769  4587          BICW3   #^X<FC00>,(R9),R3       ; Get the cost value
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          53   56    A0  176F  4588           ADDW    R6,R3                         ; Add in the circuit's cost
               48    1D  1772  4589           BVS     20$                           ; If VS then cost is infinite
     53   02FF 8F    B1  1774  4590           CMPW    #^X<2FF>,R3                   ; Has cost overflowed allowed limit?
               41    1F  1779  4591           BLSSU   20$                           ; If LSSU then yes, it's not a minimum
                         177B  4592           ;
                         177B  4593           ;   For a broadcast circuit, the cost/hops buffer contains
                         177B  4594           ;   the state of all endnodes on that broadcast circuit.
                         177B  4595           ;   So, if the node is "reachable" over the broadcast circuit,
                         177B  4596           ;   then we have found the shortest path (by definition),
                         177B  4597           ;   and return success immediately.
                         177B  4598           ;
        5C A4  57    91  177B  4599           CMPB    R7,RCB$B_MAX_LPD(R4)          ; Is this a main LPD adjacency?
               0E    1A  177F  4600           BGTRU   15$                           ; Branch if not
    56    28 B447    D0  1781  4601           MOVL    @RCB$L_PTR_LPD(R4)[R7],R6 ; Get LPD address
   04 22 A6    0A    E1  1786  4602           BBC     #LPD$V_BC,LPD$W_STS(R6),15$ ; Branch if not broadcast circuit
               41    10  178B  4603           BSBB    FIND_ENDNODE_BEA              ; Put node's BEA index in R10
               2D    13  178D  4604           BEQL    20$                           ; Branch if not found (& unlikely)
                         178F  4605 15$:      ;
                         178F  4606           ;   Check to see if this path is "less cost" than the previous
                         178F  4607           ;   minimum cost.  If so, remember this path as the best one.
                         178F  4608           ;   Use the node address of the adjacent node as a tiebreaker.
                         178F  4609           ;
          52   53    B1  178F  4610           CMPW    R3,R2                         ; Is cost value a new minumum ?
               28    1A  1792  4611           BGTRU   20$                           ; If GEQU then no
               11    1F  1794  4612           BLSSU   18$                           ; If LSSU then yes
    56    2C B447    D0  1796  4613           MOVL    @RCB$L_PTR_ADJ(R4)[R7],R6 ; Get address of new ADJ
    55    2C B440    D0  179B  4614           MOVL    @RCB$L_PTR_ADJ(R4)[R0],R5 ; Get address of old ADJ
   04 A5    04 A6    B1  17A0  4615           CMPW    ADJ$W_PNA(R6),ADJ$W_PNA(R5) ; Highest adj. node address
               15    1B  17A5  4616           BLEQU   20$                           ; is the tiebreaker for equal costs
               0A    EF  17A7  4617 18$:      EXTZV   #TR3V_RT_HOPS,-
    55    69   05            17A9  4618               #TR3S_RT_HOPS,(R9),R5         ; Get the hops value
               55    96  17AC  4619           INCB    R5                            ; Add in the hop to the adjacent node
          1F   55    91  17AE  '620           CMPB    R5,#^X<1F>                    ; Has the max hops overflowed ?
               09    1A  17B1  4621           BGTRU   20$                           ; If LSSU then yes, it's not a minimum
          52   53    B0  17B3  4622           MOVW    R3,R2                         ; Save new minimum cost to node
          51   55    90  17B6  4623           MOVB    R5,R1                         ; Save hops to node
          50   5A    D0  17B9  4624           MOVL    R10,R0                        ; Save output ADJ index for path
     53    6A A4     3C  17BC  4625 20$:      MOVZWL  RCB$W_MAX_RTG(R4),R3          ; Get number of routing adjacencies
     02 57     53    F3  17C0  4626           AOBLEQ  R3,R7,30$                     ; Loop until done
               03    11  17C4  4627           BRB     100$                          ; Exit with success
             FF65    31  17C6  4628 30$:      BRW     7$                            ; Continue looping
        0400 8F      BA  17C9  4629 100$:     POPR    #^M<R10>                      ; Restore registers
                     05  17CD  4630           RSB
                         17CE  4631
                         17CE  4632 ;
                         17CE  4633 ; Find BEA adjacency index to an endnode.
                         17CE  4634 ;
                         17CE  4635
                         17CE  4636 FIND_ENDNODE_BEA:
    5A     6A A4     3C  17CE  4637           MOVZWL  RCB$W_MAX_RTG(R4),R10         ; Get starting BEA index
               20    11  17D2  4638           BRB     8$                            ; Start at NBRA+1
    56    2C B44A    D0  17D4  4639 5$:       MOVL    @RCB$L_PTR_ADJ(R4)[R10],R6 ; Get ADJ address
      17 66    00    E1  17D9  4640           BBC     #ADJ$V_INUSE,ADJ$B_STS(R6),8$ ; Skip if not active
               0A    EF  17DD  4641           EXTZV   #TR4$V_ADDR_AREA,-            ; Get partner's area number
  55    04 A6  06        17DF  4642                   #TR4$S_ADDR_AREA,ADJ$W_PNA(R6),R5
               07    13  17E3  4643           BEQL    6$                            ; If area = 0, assume our area
     0088 C4   55    91  17E5  4644           CMPB    R5,RCB$B_HOMEAREA(R4)         ; Our area?
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                08   12  17EA       BNEQ    8$                          ; If not, skip this adjacency
                00   ED  17EC  6$:  CMPZV   #TR4$V_ADDR_DEST,-          ; Does this BEA correspond to the node?
   58    04 A6  0A       17EE               #TR4$S_ADDR_DEST,ADJ$W_PNA(R6),R8
                0A   13  17F2       BEQL    15$                         ; If so, exit with R10 = BEA index
   56      68 A4     3C  17F4  8$:  MOVZWL  RCB$W_MAX_ADJ(R4),R6        ; Get index of last BEA
      D8 5A     56   F3  17F8       AOBLEQ  R6,R10,5$                   ; Loop thru all BEAs
                5A   D4  17FC       CLRL    R10                         ; If BEA not found, skip this path
                         17FE                                           ; (& this should not happen)
                5A   D5  17FE 15$:  TSTL    R10                         ; Return with PSL set
                     05  1800       RSB
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```
                                1801  4656              .SBTTL  AREA_DECISION - Update area forwarding database
                                1801  4657 ;+
                                1801  4658 ; AREA_DECISION - Update the area routing and forwarding databases.
                                1801  4659 ;
                                1801  4660 ; Inputs:
                                1801  4661 ;
                                1801  4662 ;        R11 = Address of last entry+1 of AOA vector
                                1801  4663 ;        R10 = Address of last entry+1 of min. cost/hops buffer
                                1801  4664 ;        R8 = Ending address corresponding to last entry in vectors
                                1801  4665 ;        MAX_COST = Maximum cost value allowed for routing database
                                1801  4666 ;        MAX_HOPS = Maximum hops value allowed for routing database
                                1801  4667 ;
                                1801  4668 ; OUTPUTS:       None
                                1801  4669 ;
                                1801  4670 ;                All registers are destroyed.
                                1801  4671 ;-
                                1801  4672 AREA_DECISION:
54    00000000'EF      D0  1801  4673              MOVL    NET$GL_PTR_VCB,R4       ; Get RCB address
            006D       31  1808  4674              BRW     100$                    ; Advance to the end of the loop
                           180B  4675              ;
                           180B  4676              ;   Determine least cost path to this node
                           180B  4677              ;
            00AF       30  180B  4678 10$:         BSBW    FIND_PATH_TO_AREA       ; Find hops, costs, and adjacency
                           180E  4679              ;
                           180E  4680              ;   If the cost or hops to this node exceeds our maximums,
                           180E  4681              ;   then declare the node unreachable.
                           180E  4682              ;
0000002C'EF    51      91  180E  4683              CMPB    R1,MAX_HOPS             ; Is the node within range?
               09      1A  1815  4684              BGTRU   30$                     ; If GTRU then no
00000030'EF    52      B1  1817  4685              CMPW    R2,MAX_COST             ; Is the node within range?
               02      1B  181E  4686              BLEQU   40$                     ; If LEQU then yes
               50      D4  1820  4687 30$:         CLRL    R0                      ; Node is unreachable
                           1822  4688 40$:         ;
                           1822  4689              ;   Build the packed cost/hops field
                           1822  4690              ;
                           1822  4691              ASSUME  TR3V_RT_COST  EQ  0
         0A    51      F0  1822  4692              INSV    R1,#TR3V_RT_HOPS,-
         52    05          1825  4693                      #TR3S_RT_HOPS,R2        ; Merge hops/cost
                           1827  4694              ASSUME  TR3S_RT_HOPS+TR3S_RT_COST EQ 15
    52    8000 8F      AA  1827  4695              BICW    #^X<8000>,R2            ; The high bit must be zero (Transport
                           182C  4696                                              ; architectural requirement)
                           182C  4697              ;
                           182C  4698              ;   If the area is now unreachable, then force the cost and hops
                           182C  4699              ;   to infinity, so that our neighbors realize the area is down now
                           182C  4700              ;   (they might have a higher maxcost, and wouldn't realize the
                           182C  4701              ;   area is unreachable until much later).
                           182C  4702              ;
               50      D5  182C  4703              TSTL    R0                      ; Is the node reachable?
               05      12  182E  4704              BNEQ    55$                     ; If not,
    52    7FFF 8F      3C  1830  4705              MOVZWL  #^X<7FFF>,R2            ; then make cost/hops infinite
                           1835  4706 55$:         ;
                           1835  4707              ;   Send routing msg only if  MINCOST or MINHOPS have changed.  If
                           1835  4708              ;   there has been a change in the node's reachability then record
                           1835  4709              ;   this fact so that it can be sent to the event logger.
                           1835  4710              ;
                           1835  4711              ASSUME  TR3S_RT_HOPS+TR3S_RT_COST EQ 15
    7B    8000 8F      AA  1835  4712              BICW    #^X<8000>,-(R11)        ; Ignore high bit
```

```
          6B   52    B1  183A  4713          CMPW    R2,(R11)                  ; Was there a hops or cost change ?
               36    13  183D  4714          BEQL    90$                       ; If EQL then no
     7FFF 8F   52    B1  183F  4715          CMPW    R2,#^X<7FFF>              ; Is node currently unreachable?
               07    1E  1844  4716          BGEQU   57$                       ; If GEQU yes, reachability change
     7FFF 8F   6B    B1  1846  4717          CMPW    (R11),#^X<7FFF>           ; Was node unreachable before?
               08    1F  184B  4718          BLSSU   58$                       ; If LSSU no, no reachability change
                         184D  4719 57$:     SETBIT  R8,REACH_EVT              ; Indicate change in reachability status
          6B   52    B0  1855  4720 58$:     MOVW    R2,(R11)                  ; Update the vector
  51    58   FA 8F   78  1858  4721          ASHL    #-LPD$C_ASRM_SHFT,R8,R1 ; Compute SRM bit for this node
       52    5C A4   9A  185D  4722          MOVZBL  RCB$B_MAX_LPD(R4),R2      ; Get number of circuits
   53   28 B442      D0  1861  4723 60$:     MOVL    @RCB$C_PTR_LPD(R4)[R2],R3 ; Get LPD address
               0A    18  1866  4724          BGEQ    65$                       ; Branch if slot not valid
    05 22 A3   04    E1  1868  4725          BBC     #LPD$V_RUN,LPD$W_STS(R3),65$ ; Branch if circuit not up
                         186D  4726                                            ; (skip ADJ$V_RTG check to save time)
                         186D  4727          SETBIT  R1,LPD$G_ASRM(R3)         ; Set SRM flag
             EC 52   F5  1872  4728 65$:     SOBGTR  R2,60$                    ; Loop through all circuits
                         1875  4729          ;
                         1875  4730          ;   Update the AOA (area output adjacency) vector.
                         1875  4731          ;
          7A   50    B0  1875  4732 90$:     MOVW    R0,-(R10)                 ; Update output adjacency to node
             90 58   F5  1878  4733 100$:    SOBGTR  R8,10$                    ; Loop for each node address
          7A   01    B0  187B  4734          MOVW    #LPD$C_LOC_INX,-(R10)     ; Use "local" adjacency for node 0
                         187E  4735                                            ; (node 0 is the always the local node)
               7B    B4  187E  4736          CLRW    -(R11)                    ; Use 0 cost/hops for the local area
                         1880  4737
                         1880  4738          ;
                         1880  4739          ;   Log an event for each node whose reachability status has changed.
                         1880  4740          ;
          58   3F    3C  1880  4741          MOVZWL  #NUM_AREAS-1,R8           ; Setup max area address
2E 00000000'EF   58    E5  1883  4742 200$:    BBCC    R8,REACH_EVT,210$         ; If BS then reachability change
               58    DD  188B  4743          PUSHL   R8                        ; Save node address
  55   00000000'EF   9E  188D  4744          MOVAB   NET$AB_EVT_WQE,R5         ; Point to common event WQE
  54   00000000'EF   D0  1894  4745          MOVL    NET$GL_PTR_VCB,R4         ; Get RCB
       12 A5   58    B0  189B  4746          MOVW    R8,WQE$W_REQIDT(R5)       ; Setup the area address
               00    90  189F  4747          MOVB    #EVC$C_TPL_PSTS_RCH,-     ; Assume node is now reachable
             1E A5       18A1  4748                  WQE$B_EVL_DT1(R5)         ;
         20 B448     B5  18A3  4749          TSTW    @RCB$C_PTR_AOA(R4)[R8]    ; Is node now reachable?
               04    12  18A7  4750          BNEQ    205$                      ; If NEQ then yes
               01    90  18A9  4751          MOVB    #EVC$C_TPL_PSTS_URC,-     ; Signal "unreachable"
             1E A5       18AB  4752                  WQE$B_EVL_DT1(R5)         ;
          0111 8F    B0  18AD  4753 205$:    MOVW    #EVC$C_TPL_ACH,-          ; Setup "area reachability change"
             1C A5       18B1  4754                  WQE$W_EVL_CODE(R5)        ;
             E74A'   30  18B3  4755          BSBW    NET$EVT_INTRAW            ; Log the event
               58 8ED0   18B6  4756          POPL    R8                        ; Restore node address
             C7 58   F5  18B9  4757 210$:    SOBGTR  R8,200$                   ; Loop for each node
                         18BC  4758
                     05  18BC  4759          RSB                               ; Exit
```

```
                              18BD  4761           .SBTTL  FIND_PATH_TO_AREA - Find least cost path to area
                              18BD  4762 ;+
                              18BD  4763 ; FIND_PATH_TO_AREA - Find least cost path to area
                              18BD  4764 ;
                              18BD  4765 ; Inputs:         R8 = Area address
                              18BD  4766 ;                 R4 = RCB address
                              18BD  4767 ;
                              18BD  4768 ; Outputs:        R1 = Number of hops to area
                              18BD  4769 ;                 R2 = Cost to area
                              18BD  4770 ;                 R0 = New ADJ index of path to area
                              18BD  4771 ;
                              18BD  4772 ;                 R4 is preserved.
                              18BD  4773 ;-
                              18BD  4774 FIND_PATH_TO_AREA:
          0400 8F       BB    18BD  4775           PUSHR   #^M<R10>                  ; Save registers
     008B C4   58       91    18C1  4776           CMPB    R8,RCB$B_HOMEAREA(R4)     ; Is this the local area ?
               08       12    18C6  4777           BNEQ    5$                        ; If so,
          50   01       9A    18C8  4778           MOVZBL  #LPD$C_LOC_INX,R0         ; Setup index for 'local' adjacency
               51       7C    18CB  4779           CLRQ    R1                        ; Zero cost, hops
             008A       31    18CD  4780           BRW     100$                      ; and exit
                              18D0  4781
          57   01       D0    18D0  4782 5$:       MOVL    #1,R7                     ; Init adjacency index
               50       D4    18D3  4783           CLRL    R0                        ; Assume unreachable
          51   01       CE    18D5  4784           MNEGL   #1,R1                     ; Init min hops value to infinity
          52   01       CE    18D8  4785           MNEGL   #1,R2                     ; Init min cost value to infinity
 59   00001A88'EF47     D0    18DB  4786 7$:       MOVL    NET$AL_AREA_CH[R7],R9     ; Point to cost/hops buffer
               6D       13    18E3  4787           BEQL    20$                       ; Skip if none for this circuit
          5A   57       D0    18E5  4788           MOVL    R7,R10                    ; Remember ADJ index for this path
       59   6948        3E    18E8  4789           MOVAW   (R9)[R8],R9               ; Point to entry for this area
                              18EC  4790           ;
                              18EC  4791           ;   Get the cost/hops for this area over this adjacency,
                              18EC  4792           ;   and increase it by the hop for ourself.  Also compute
                              18EC  4793           ;   the new cost for this path.
                              18EC  4794           ;
     56   2C B447       D0    18EC  4795           MOVL    @RCB$L_PTR_ADJ(R4)[R7],R6 ; Get address of ADJ block
       56   02 A6       9A    18F1  4796           MOVZBL  ADJ$B_LPD_INX(R6),R6      ; Get LPD index
     56   28 B446       D0    18F5  4797           MOVL    @RCB$L_PTR_LPD(R4)[R6],R6 ; Get address of LPD
       56   29 A6       9A    18FA  4798           MOVZBL  LPD$B_COST(R6),R6         ; Get cost for this circuit
                              18FE  4799
                              18FE  4800           ASSUME  TR3V_RT_COST  EQ  0
                              18FE  4801           ASSUME  TR3S_RT_COST  EQ 10
                              18FE  4802
 53   69   FC00 8F      AB    18FE  4803           BICW3   #^X<FC00>,(R9),R3         ; Get the cost value
          53   56       A0    1904  4804           ADDW    R6,R3                     ; Add in the circuit's cost
               49       1D    1907  4805           BVS     20$                       ; If VS then cost is infinite
     53   02FF 8F       B1    1909  4806           CMPW    #^X<2FF>,R3               ; Has cost overflowed allowed limit?
               42       1F    190E  4807           BLSSU   20$                       ; If LSSU then yes, it's not a minimum
                              1910  4808           ;
                              1910  4809           ;   For a broadcast circuit, the cost/hops buffer contains
                              1910  4810           ;   the state of all endnodes on that broadcast circuit.
                              1910  4811           ;   So, if the area is "reachable" over the broadcast circuit,
                              1910  4812           ;   then we have found the shortest path (by definition),
                              1910  4813           ;   and return success immediately.
                              1910  4814           ;
       5C A4   57       91    1910  4815           CMPB    R7,RCB$B_MAX_LPD(R4)      ; Is this a main LPD adjacency?
               0F       1A    1914  4816           BGTRU   15$                       ; Branch if not
     56   28 B447       D0    1916  4817           MOVL    @RCB$L_PTR_LPD(R4)[R7],R6 ; Get LPD address
```

```
05 22 A6    0A   E1  191B        BBC     #LPD$V_BC,LPD$W_STS(R6),15$ ; Branch if not broadcast circuit
          FEAB   30  1920        BSBW    FIND_ENDNODE_BEA           ; Put node's BEA index in R10
            2D   13  1923        BEQL    20$                        ; Branch if not found (&& unlikely)
                     1925  15$:  ;
                     1925        ;   Check to see if this path is "less cost" than the previous
                     1925        ;   minimum cost.  If so, remember this path as the best one.
                     1925        ;   Use the node address of the adjacent node as a tiebreaker.
                     1925        ;
      52    53   B1  1925        CMPW    R3,R2                         ; Is cost value a new minumum ?
            28   1A  1928        BGTRU   20$                           ; If GEQU then no
            11   1F  192A        BLSSU   18$                           ; If LSSU then yes
  56   2C B447   D0  192C        MOVL    @RCB$L_PTR_ADJ(R4)[R7],R6 ; Get address of new ADJ
  55   2C B440   D0  1931        MOVL    @RCB$L_PTR_ADJ(R4)[R0],R5 ; Get address of old ADJ
04 A5    04 A6   B1  1936        CMPW    ADJ$W_PNA(R6),ADJ$W_PNA(R5) ; Highest adj. node address
            15   1B  193B        BLEQU   20$                           ; is the tiebreaker for equal costs
            0A   EF  193D  18$:  EXTZV   #TR3V_RT_HOPS,-
  55   69   05       193F                #TR3S_RT_HOPS,(R9),R5   ; Get the hops value
            55   96  1942        INCB    R5                            ; Add in the hop to the adjacent node
      1F    55   91  1944        CMPB    R5,#^X<1F>                    ; Has the max hops overflowed ?
            09   1A  1947        BGTRU   20$                           ; If LSSU then yes, it's not a minimum
      52    53   B0  1949        MOVW    R3,R2                         ; Save new minimum cost to area
      51    55   90  194C        MOVB    R5,R1                         ; Save hops to area
      50    5A   D0  194F        MOVL    R10,R0                        ; Save output ADJ index for path
   53   6A  A4   3C  1952  20$:  MOVZWL  RCB$W_MAX_RTG(R4),R3      ; Get number of routing adjacencies
   81 57    53   F3  1956        AOBLEQ  R3,R7,7$                      ; Loop until done
      0400  8F   BA  195A  100$: POPR    #^M<R10>                      ; Restore registers
                 05  195E        RSB
```

```
                          195F  4846          .SBTTL  UPD_NEIGHBORS - Schedule routing messages
                          195F  4847 ;+
                          195F  4848 ; UPD_NEIGHBORS - Schedule routing messages for neighboring nodes
                          195F  4849 ;
                          195F  4850 ; Schedule routing message transmission on all routing and broadcast LPD's.
                          195F  4851 ;
                          195F  4852 ; Inputs:        None
                          195F  4853 ;
                          195F  4854 ; OUTPUTS:       None
                          195F  4855 ;
                          195F  4856 ;               R0-R2 are destroyed.
                          195F  4857 ;-
                          195F  4858 UPD_NEIGHBORS:
         01D0 8F     BB   195F  4859         PUSHR   #^M<R4,R6,R7,R8>                ; Save registers
 54   00000000'EF    D0   1963  4860         MOVL    NET$GL_PTR_VCB,R4               ; Get RCB address
                          196A  4861         $DISPATCH RCB$B_ETY(R4),TYPE=B,<-       ; If we are an endnode,
                          196A  4862                 <ADJ$C_PTY_PH4N,200$>,-         ; never send rtg messages
                          196A  4863                 <ADJ$C_PTY_PH3N,200$>>
      00000000'EF    16   197A  4864         JSB     NET$GET_RTG3                    ; Get routing info
            06 50    E9   1980  4865         BLBC    R0,9$                           ; Branch if error
     58     5C A4    9A   1983  4866         MOVZBL  RCB$B_MAX_LPD(R4),R8            ; Get number of circuits
               03    12   1987  4867         BNEQ    110$                            ; If nonzero, then go ahead
             0098    31   1989  4868 9$:     BRW     200$                            ; Skip entire thing
                          198C  4869         ;
                          198C  4870         ;   Schedule routing message transmission on all routing LPDs
                          198C  4871         ;
  56     28 B448     D0   198C  4872 110$:   MOVL    @RCB$L_PTR_LPD(R4)[R8],R6       ; Get address of LPD
               13    18   1991  4873         BGEQ    113$                            ; Branch if slot not valid
 0E 22 A6      04    E1   1993  4874         BBC     #LPD$V_RUN,LPD$W_STS(R6),113$   ; Br if LPD's circuit inactive
  57     2C B448     D0   1998  4875         MOVL    @RCB$L_PTR_ADJ(R4)[R8],R7       ; Get address of ADJ block
 07 22 A6      0A    E0   199D  4876         BBS     #LPD$V_BC,[PD$W_STS(R6),115$    ; If broadcast circuit
    03 67      02    E0   19A2  4877         BBS     #ADJ$V_RTG,ADJ$B_STS(R7),115$   ; or if routing node, go ahead
             0073    31   19A6  4878 113$:   BRW     130$                            ; Else, skip this LPD entirely
                          19A9  4879         ;
                          19A9  4880         ;   Send area routing messages to adjacent area routers
                          19A9  4881         ;
                          19A9  4882         ASSUME  LPD$C_ASRM_SIZE EQ 1            ; && fix this
  03     008A C4     91   19A9  4883 115$:   CMPB    RCB$B_ETY(R4),#ADJ$C_PTY_AREA   ; Are we an area router?
               2C    12   19AE  4884         BNEQ    117$                            ; If not, skip this
 06 22 A6      0A    E0   19B0  4885         BBS     #LPD$V_BC,LPD$W_STS(R6),116$    ; Skip check if broadcast circuit
    03      01 A7    91   19B5  4886         CMPB    ADJ$B_PTYPE(R7),#ADJ$C_PTY_AREA ; Is the neighbor an area rtr?
               21    12   19B9  4887         BNEQ    117$                            ; If not, skip it
            5E A6    D5   19BB  4888 116$:   TSTL    LPD$G_ASRM(R6)                  ; Any area stuff to send?
               1C    13   19BE  4889         BEQL    117$                            ; Branch if not
               06    E2   19C0  4890         BBSS    #LPD$V_XMT_ART,-                ; Flag need to send area rtg msg
         1C 24 A6         19C2  4891                 LPD$B_XMTF[G(R6),118$           ; and defer if already in progress
 62 A6      5E A6    D0   19C5  4892         MOVL    LPD$G_ASRM(R6),LPD$G_XMT_ASRM(R6) ; Copy SRM flags for transmission
            5E A6    D4   19CA  4893         CLRL    LPD$G_ASRM(R6)                  ; and clear primary flags
            54 A6    96   19CD  4894         INCB    LPD$B_ASRM_POS(R6)              ; Make sure we don't start at the
                          19D0  4895                                                 ; same place in the bitmask each tim
                          19D0  4896                                                 ; (to prevent segment loss repetitio
               01    90   19D0  4897         MOVB    #LPD$C_ASRM_SIZE,-              ; Set number of bits to check
            55 A6         19D2  4898                 LPD$B_ASRM_[EFT(R6)
         50    00    D0   19D4  4899         MOVL    #LEV$C_NO_EVT,R0                ; Setup event
             F381    30   19D7  4900         BSBW    SET_DL[_EVT                     ; Schedule LPD activity
               05    11   19DA  4901         BRB     118$
                          19DC  4902 117$:   CLRBIT  #LPD$V_XMT_ART,LPD$B_XMTFLG(R6) ; Do not send level 2 msgs
                          19E1  4903            ;
                          19E1  4904            ;   Send level 1 routing messages to adjacent level 1 routers
                          19E1  4905            ;
    0F 22 A6    0A    E0  19E1  4906 118$:      BBS     #LPD$V_BC,LPD$W_STS(R6),119$      ; Skip check if broadcast circuit
                0A    EF  19E6  4907            EXTZV   #TR4$V_ADDR_AREA,-                ; Get area of partner node
51     04 A7    06        19E8  4908                    #TR4$S_ADDR_AREA,ADJ$W_PNA(R7),R1
                07    13  19EC  4909            BEQL    119$                              ; If area = 0, assume our area
     008B C4    51    91  19EE  4910            CMPB    R1,RCB$B_HOMEAREA(R4)             ; In our area?
                23    12  19F3  4911            BNEQ    120$                              ; If not, don't send level 1 msg
                          19F5  4912 119$:      ASSUME  LPD$C_SRM_SIZE EQ 32
             56 A6    D5  19F5  4913            TSTL    LPD$G_SRM(R6)                     ; Anything to send?
                1E    13  19F8  4914            BEQL    120$                              ; Branch if not
                04    E2  19FA  4915            BBSS    #LPD$V_XMT_RT,-                   ; Flag need to send routing msg
          1D 24 A6        19FC  4916                            LPD$B_XMTFLG(R6),130$     ; and defer if already in progress
    5A A6    56 A6    D0  19FF  4917            MOVL    LPD$G_SRM(R6),LPD$G_XMT_SRM(R6) ; Copy SRM flags for transmission
             56 A6    D4  1A04  4918            CLRL    LPD$G_SRM(R6)                     ; and clear primary flags
             52 A6    96  1A07  4919            INCB    LPD$B_SRM_POS(R6)                 ; Make sure we don't start at the
                          1A0A  4920                                                      ; same place in the bitmask each tim
                          1A0A  4921                                                      ; (to prevent segment loss repetitio
                20    90  1A0A  4922            MOVB    #LPD$C_SRM_SIZE,-                 ; Set number of bits to check
             53 A6        1A0C  4923                    LPD$B_SRM_LEFT(R6)
          50    00    D0  1A0E  4924            MOVL    #LEV$C_NO_EVT,R0                  ; Setup event
              F347    30  1A11  4925            BSBW    SET_DLC_EVT                       ; Schedule LPD activity
                34    10  1A14  4926            BSBB    START_XRT                         ; Reset routing update timer
                04    11  1A16  4927            BRB     130$                              ; Continue
                          1A18  4928 120$:      CLRBIT  LPD$V_XMT_RT,LPD$B_XMTFLG(R6)     ; No need for routing msg
                          1A1C  4929
             02 58    F5  1A1C  4930 130$:      SOBGTR  R8,140$                           ; Loop for all LPDs
                03    11  1A1F  4931            BRB     200$                              ; Exit when loop completes
              FF68    31  1A21  4932 140$:      BRW     110$                              ; Continue looping
                          1A24  4933
        01D0 8F       BA  1A24  4934 200$:      POPR    #^M<R4,R6,R7,R8>                  ; Restore registers
                      05  1A28  4935            RSB
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```
                          1A29            .SBTTL  TIMER_XRT - Automatic routing update timer
                          1A29       ;+
                          1A29       ; TIMER_XRT - Routing update timer has expired
                          1A29       ;
                          1A29       ; Inputs:       R5 = WQE address
                          1A29       ;
                          1A29       ; Outputs:      None
                          1A29       ;
                          1A29       ;               The WQE is deallocated.
                          1A29       ;-
                          1A29       TIMER_XRT:                                  ; Entered when the routing timer fires
     58    12 A5     3C   1A29               MOVZWL  WQE$W_REQIDT(R5),R8     ; Get LPD index
             F358    30   1A2D               BSBW    KILL_WQE                ; Deallocate the timer block
             126D    30   1A30               BSBW    NET$FIND_LPD            ; Locate LPD
            13 50    E9   1A33               BLBC    R0,90$                  ; If not found, just go away
                          1A36               ;
                          1A36               ;   Set all bits in the SRM bitmask for this circuit, so that
                          1A36               ;   when it comes time to update the neighbor, a complete update
                          1A36               ;   will be sent for all nodes.
                          1A36               ;
                          1A36               ASSUME  LPD$C_SRM_SIZE EQ 32
     56 A6     01    CE   1A36               MNEGL   #1,LPD$G_SRM(R6)        ; Force rtginfo for all nodes to be sent
                          1A3A               ASSUME  LPD$C_ASRM_SIZE EQ 1    ; && fix this
     5E A6     01    CE   1A3A               MNEGL   #1,LPD$G_ASRM(R6)       ; Force rtginfo for all areas to be sent
                          1A3E               ;
                          1A3E               ;   Send routing messages to all our neighbors which have the SRM
                          1A3E               ;   flags set, as we have done above.  If the decision algorithm
                          1A3E               ;   is scheduled to be run soon, then don't send the messages now,
                          1A3E               ;   since they may be out-of-date.  Instead, we rely on the fact
                          1A3E               ;   that routing messages are automatically sent to all our neighbors
                          1A3E               ;   after the algorithm is run.
                          1A3E               ;
03 00000040'EF   00  E0   1A3E               BBS     #RTG_V_RUS,RTGFLG,90$   ; If decision pending, msgs will
                          1A46                                               ; be sent automatically after it runs
             FF16    30   1A46               BSBW    UPD_NEIGHBORS           ; Else, explicitly send the messages
                     05   1A49       90$:    RSB
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                                        1A4A  4974        .SBTTL  Start automatic routing update timer
                                        1A4A  4975  ;+
                                        1A4A  4976  ; START_XRT - Start or reset the automatic routing update timer
                                        1A4A  4977  ;
                                        1A4A  4978  ; Inputs:
                                        1A4A  4979  ;
                                        1A4A  4980  ;       R6 = LPD address
                                        1A4A  4981  ;
                                        1A4A  4982  ; Outputs:
                                        1A4A  4983  ;
                                        1A4A  4984  ;       None
                                        1A4A  4985  ;
                                        1A4A  4986  ;       R0-R3 are destroyed.
                                        1A4A  4987  ;-
                                        1A4A  4988  START_XRT:                                      ; Start routing update timer for LPD
                        0FF0 8F     BB  1A4A  4989          PUSHR   #^M<R4,R5,R6,R7,R8,R9,R10,R11>  ; Save registers
           5B    00000000'EF        D0  1A4E  4990          MOVL    NET$GL_CNR_LNI,R11              ; Get LNI root
           5A    00000000'EF        D0  1A55  4991          MOVL    NET$GL_PTR_LNI,R10              ; Get LNI CNF
              09 22 A6    0A        E0  1A5C  4992          BBS     #LPD$V_BC,LPD$W_STS(R6),10$ ; Branch if broadcast circuit
                                        1A61  4993          $CNFFLD lni,l,fti,R9                    ; Use non-broadcast routing timer
                          07        11  1A68  4994          BRB     20$
                                        1A6A  4995  10$:    $CNFFLD lni,l,brt,R9                    ; Use broadcast routing timer
                       E58C'        30  1A71  4996  20$:    BSBW    CNF$GET_FIELD                   ; Get the routing timer value
                       1A 50        E9  1A74  4997          BLBC    R0,90$                          ; No timer if parameter not set
          51     20 A6    10        78  1A77  4998          ASHL    #16,LPD$W_PTH(R6),R1            ; Shift LPD index into REQIDT
             51    0202 8F          B0  1A7C  4999          MOVW    #<<WQE$C_QUAL_RTG>@8>!-         ; Set routing update timer i.d.
                                        1A81  5000                          NET$C_TID_XRT,R1        ; into lower word
                 52    A5 AF        9E  1A81  5001          MOVAB   B^TIMER_XRT,R2                  ; Setup action routine
53    00    58    00989680 8F       7A  1A85  5002          EMUL    #10*1000*1000,R8,#0,R3          ; Convert to standard VMS time
                       E56F'        30  1A8E  5003          BSBW    WQE$RESET_TIM                   ; Reset the routing update timer
                        0FF0 8F     BA  1A91  5004  90$:    POPR    #^M<R4,R5,R6,R7,R8,R9,R10,R11>  ; Restore registers
                              05        1A95  5005          RSB
```

```
                                1A96            .SBTTL  ENDNODE_DECISION -  Endnode decision algorithm
                                1A96       ;+
                                1A96       ; ENDNODE_DECISION - Endnode decision algorithm
                                1A96       ;
                                1A96       ; This routine is called each time we want to run the decision algorithm
                                1A96       ; and we are an endnode.  It simply ensures that the cost/hops to ourselves
                                1A96       ; is zero, and chooses the least cost circuit as the "designated output
                                1A96       ; adjacency".
                                1A96       ;
                                1A96       ; Inputs:
                                1A96       ;
                                1A96       ;       R4 = RCB address
                                1A96       ;
                                1A96       ; Outputs:
                                1A96       ;
                                1A96       ;       None
                                1A96       ;
                                1A96       ;       Registers R0-R3, R5-R8 are destroyed.
                                1A96       ;-
                                1A96      ENDNODE_DECISION:
                                1A96            ;
                                1A96            ;   Ensure that the cost/hops to ourselves is always 0.
                                1A96            ;
                  00     EF     1A96            EXTZV   #TR4$V_ADDR_DEST,-       ; Get the local node number
      50    0E A4 0A            1A98                    #TR4$S_ADDR_DEST,RCB$W_ADDR(R4),R0
                  17     13     1A9C            BEQL    10$                      ; If zero, then skip it
       00000100'EF40     B4     1A9E            CLRW    NET$AW_MIN_C_H[R0]       ; Zero our own entry
                  00     EF     1AA5            EXTZV   #TR4$V_ADDR_DEST,-       ; Get the alias node number
     50    008D C4 0A            1AA7                    #TR4$S_ADDR_DEST,RCB$W_ALIAS(R4),R0
                  07     13     1AAC            BEQL    10$                      ; If zero, then skip it
       00000100'EF40     B4     1AAE            CLRW    NET$AW_MIN_C_H[R0]       ; Zero our own entry
                                1AB5      10$:  ;
                                1AB5            ;   Choose the least cost circuit as the "designated output
                                1AB5            ;   circuit".
                                1AB5            ;
             52   01     CE     1AB5            MNEGL   #1,R2                            ; Init R2 to least cost so far
                  53     D4     1AB8            CLRL    R3                               ; Init R3 to least cost DRT so far
          58    5C A4    9A     1ABA            MOVZBL  RCB$B_MAX_LPD(R4),R8             ; Get # circuits
        56    28 B448    D0     1ABE      20$:  MOVL    @RCB$[_PTR_LPD(R4)[R8],R6 ; Get address of LPD
                  18     18     1AC3            BGEQ    30$                              ; Branch if slot not valid
             01   58     D1     1AC5            CMPL    R8,#LPD$C_LOC_INX                ; Local LPD?
                  13     13     1AC8            BEQL    30$                              ; Skip the local LPD
       0E 22 A6   04     E1     1ACA            BBC     #LPD$V_RUN,LPD$W_STS(R6),30$ ; Br if inactive
          52    29 A6    91     1ACF            CMPB    LPD$B_COST(R6),R2                ; Least cost circuit?
                  08     1E     1AD3            BGEQU   30$                              ; If not, keep looking
          52    29 A6    9A     1AD5            MOVZBL  LPD$B_COST(R6),R2                ; Save new least cost value
          53    2C A6    3C     1AD9            MOVZWL  LPD$W_DRT(R6),R3                 ; Save new least cost designated router
               DE 58     F5     1ADD      30$:  SOBGTR  R8,20$                           ; Loop thru all circuits
        00AA C4   53     B0     1AE0            MOVW    R3,RCB$W_DRT(R4)                 ; Set DRT for all outgoing transmits
                                1AE5                                                     ; with an unspecified circuit
                         05     1AE5            RSB
```

```
                 1AE6         .SBTTL  ACT_ENT_MOP - Enter MOP state
                 1AE6  ;+
                 1AE6  ; ACT_ENT_MOP   - Circuit has entered MOP mode while in the "run" state
                 1AE6  ;
                 1AE6  ; This routine is called when a it is detected that the circuit has entered
                 1AE6  ; the so called "maintenance mode" -- also known as the "service mode".
                 1AE6  ; An NML process is created to service the circuit.
                 1AE6  ;
                 1AE6  ; INPUTS:        R11     CRI CNR ptr
                 1AE6  ;                R10     CRI CNF ptr
                 1AE6  ;                R6      LPD ptr
                 1AE6  ;                R5      WQE address
                 1AE6  ;                R4      RCB address
                 1AE6  ;
                 1AE6  ; OUTPUTS:       R5      Unchanged
                 1AE6  ;                R1      Next event to be processed
                 1AE6  ;                R0      Low bit set if state change is permitted,
                 1AE6  ;                        Low bit clear to avoid state change
                 1AE6  ;
                 1AE6  ;                All other regs may be clobbered.
                 1AE6  ;-
                 1AE6  ACT_ENT_MOP:                                   ; Put the circuit into a service substate
                 1AE6          ;
                 1AE6          ;       Notify the DLE module
                 1AE6          ;
       E517'  30 1AE6          BSBW    DLE$MOP_REQUEST          ; Handle 'MOP mode" condition
                 1AE9          ;
                 1AE9          ;       Recycle the circuit
                 1AE9          ;
 51     11    D0 1AE9          MOVL    #LEV$C_LIN_DOWN,R1       ; Switch to line down event
 50     01    D0 1AEC          MOVL    #1,R0                    ; Make state change
              05 1AEF          RSB
```

```
                  1AF0        .SBTTL  ACT_DLL_UP - Datalink has initialized
                  1AF0   ;+
                  1AF0   ; ACT_DLL_UP  - The datalink has initialized
                  1AF0   ;
                  1AF0   ; This routine is called after datalink protocol initialization.  It chooses
                  1AF0   ; one of three actions to take:
                  1AF0   ;
                  1AF0   ;
                  1AF0   ;   1.  If the operator state is "off" then the circuit is undergoing restart
                  1AF0   ;       in order to notify the partner node that it is shutting down.  In this
                  1AF0   ;       case, the state change is pre-empted with the LEV$C_OPR_OFF event.
                  1AF0   ;
                  1AF0   ;   2.  Else, if the circuit substate is "service" then the routine pre-empts
                  1AF0   ;       the state change and exits with the LEV$C_ENT_DLE event.
                  1AF0   ;
                  1AF0   ;   3.  Else, the  LPD is prepared to commence Transport layer initialization
                  1AF0   ;       over the circuit.
                  1AF0   ;
                  1AF0   ;
                  1AF0   ; INPUTS:          R11      CRI CNR ptr
                  1AF0   ;                  R10      CRI CNF ptr
                  1AF0   ;                  R9-R8    Scratch
                  1AF0   ;                  R7       ADJ address
                  1AF0   ;                  R6       LPD address
                  1AF0   ;                  R5       WQE address
                  1AF0   ;                  R4       RCB address
                  1AF0   ;                  R3-R0    Scratch
                  1AF0   ;
                  1AF0   ; OUTPUTS:         R5-R7    Preserved
                  1AF0   ;                  R1       Next event to be processed
                  1AF0   ;                  R0       Low bit set if state change is permitted,
                  1AF0   ;                           Low bit clear to avoid state change
                  1AF0   ;
                  1AF0   ;                  All other regs may be clobbered.
                  1AF0   ;-
                  1AF0   ACT_DLL_UP:                                  ; The datalink has initialized
        57   DD   1AF0           PUSHL   R7                           ; Save ADJ address
                  1AF2           ;
                  1AF2           ;   If the operator state is "off" then we are going thru data-link
                  1AF2           ;   re-init as a means to notify the opposite end of the circuit that
                  1AF2           ;   the link is shutting down.
                  1AF2           ;
                  1AF2           $GETFLD  cri,l,sta                   ; Get the operator state
     0A 50   E9   1AFF           BLBC     R0,10$                      ; If LBC then the same as "off"
                  1B02           $DISPATCH R8,<-                      ; Case on operator state
                  1B02               <NMA$C_STATE_OFF, 10$>,-
                  1B02               <NMA$C_STATE_SER, 20$>,-
                  1B02               <NMA$C_STATE_ON,  20$>,-
                  1B02           >
  51    05   D0   1B0C   10$:    MOVL     #LEV$C_OPR_OFF,R1           ; Generate "operator says off" event
        50   D4   1B0F           CLRL     R0                          ; Prevent previously intended state
                  1B11                                                ; transition
        65   11   1B11           BRB      90$                         ; Take common exit
                  1B13   20$:    ;
                  1B13           ;   The operator is not shutting down the circuit.  Either init for
                  1B13           ;   use by Transport, or give it to a direct-access server process.
                  1B13           ;
```

```
           02   E1  1B13             BBC     #LPD$V_DLE,-            ; If BS then marked for direct access
     07 22 A6       1B15                      LPD$W_STS(R6),30$       ; (state could be ON or SERVICE)
        51 1D   D0  1B18             MOVL    #LEV$C_ENT_DLE,R1       ; Generate new event
           50   D4  1B1B             CLRL    R0                      ; Prevent state change
           59   11  1B1D             BRB     90$                     ; Take common exit
                    1B1F             ;
                    1B1F             ;  The datalink is undergoing a normal startup sequence.  Tell
                    1B1F             ;  NETDRIVER about new LPD and schedule the Transport init messages.
                    1B1F             ;
        50 05   D0  1B1F        30$: MOVL    #NETUPD$_DLL_ON,R0      ; Setup function code
         1207   30  1B22             BSBW    TELL_NETDRIVER          ; Tell NETDRIVER
        1B A6   96  1B25             INCB    LPD$B_ASTCNT(R6)        ; Account for Rcv IRP queued to the
                    1B28                                             ; datalink by NETDRIVER on our behalf
                    1B28             ;
                    1B28             ;  If we have been forced into Phase II protocol, mark the
                    1B28             ;  adjacency as Phase II now, so that the correct start msg
                    1B28             ;  is sent.
                    1B28             ;
      008A C4   90  1B28             MOVB    RCB$B_ETY(R4),-         ; Preset "our node type" for circuit
        1D A6       1B2C                     LPD$B_ETY(R6)
                    1B2E             $GETFLD cri,l,xpt               ; Circuit transport protocol
        09 50   E9  1B3B             BLBC    R0,50$                  ; Branch if not set
        57 6E   D0  1B3E             MOVL    (SP),R7                 ; Restore ADJ address
           39   10  1B41             BSBB    XPT_TO_PTY              ; Translate XPT to node type
     1D A6 58   90  1B43             MOVB    R8,LPD$B_ETY(R6)        ; Set "our node type" for circuit
                    1B47        50$: ;
                    1B47             ;  If this is a broadcast circuit, then skip the start/verification
                    1B47             ;  messages, and chain to another action routine, which will handle
                    1B47             ;  broadcast circuit startup.
                    1B47             ;
  07 22 A6 0A   E1  1B47             BBC     #LPD$V_BC,LPD$W_STS(R6),31$ ; Branch if not broadcast circuit
        51 13   D0  1B4C             MOVL    #LEV$C_BC_UP,R1         ; Generate new event
        50      D4  1B4F             CLRL    R0                      ; Prevent state change this time
        25      11  1B51             BRB     90$
                    1B53        31$: ;
                    1B53             ;  Schedule transmission of start/verification messages for a
                    1B53             ;  non-broadcast circuit.
                    1B53             ;
                    1B53             $GETFLD cri,l,xpt               ; Were we forced into a specific type?
        57 6E   D0  1B60             MOVL    (SP),R7                 ; Restore ADJ address
     04 50      E8  1B63             BLBS    R0,32$                  ; If so, don't dally at all
                    1B66             SETBIT  LPD$V_XMT_DALLY,-       ; Dally before sending 1st "start"
                    1B66                     LPD$B_XMTFLG(R6)        ; so that we can adapt to remote node
                88  1B6A        32$: BISB    #LPD$M_XMT_STR!-        ; Schedule "start" msg
                    1B6B                      LPD$M_XMT_VRF!-         ; Schedule "verification" msg
                    1B6B                      LPD$M_XMT_IDLE,-        ; Flag to detect when last msg was sent
     24 A6 0E       1B6B                      LPD$B_XMTFLG(R6)        ;
                    1B6E             ;
                    1B6E             ;  Enter "on-starting" state
                    1B6E             ;
           00   90  1B6E             MOVB    #NMA$C_LINSS_STA,-      ; Enter "starting" substate
        27 A6       1B70                             LPD$B_SUB_STA(R6) ;
        51 00   D0  1B72             MOVL    #LEV$C_NO_EVT,R1        ; No more events
        50 01   90  1B75             MOVB    #1,R0                   ; Allow state transition
        57 8ED0     1B78        90$: POPL    R7                      ; Restore ADJ address
           05       1B7B             RSB
                    1B7C
```

```
                        1B7C  ;
                        1B7C  ; Map TRANSPORT TYPE parameter to node type
                        1B7C  ;
                        1B7C  ; Inputs:
                        1B7C  ;
                        1B7C  ;       R8 = Transport type parameter value
                        1B7C  ;
                        1B7C  ; Outputs:
                        1B7C  ;
                        1B7C  ;       R8 = Corresponding node type (ADJ$C_PTY_xxx)
                        1B7C  ;
                        1B7C  XPT_TO_PTY:
                        1B7C          $DISPATCH R8,<-
                        1B7C                  <NMA$C_CIRXPT_PH2,40$>,- ; Force Phase II init
                        1B7C                  <NMA$C_CIRXPT_PH3,42$>,- ; Force Phase III Routing init
                        1B7C                  <NMA$C_CIRXPT_NR4,44$>> ; Force Phase IV endnode init
58   FF 8F     9A  1B86          MOVZBL  #ADJ$C_PTY_UNK,R8        ; Unknown
         0D    11  1B8A          BRB     48$
   58    02    90  1B8C  40$:    MOVB    #ADJ$C_PTY_PH2,R8        ; Phase II
         08    11  1B8F          BRB     48$
   58    00    90  1B91  42$:    MOVB    #ADJ$C_PTY_PH3,R8        ; Routing III
         03    11  1B94          BRB     48$
   58    05    90  1B96  44$:    MOVB    #ADJ$C_PTY_PH4N,R8       ; Nonrouting IV
               05  1B99  48$:    RSB
```

```
                            1B9A          .SBTTL  DLE-related state changes
                            1B9A  ;+
                            1B9A  ; ACT_ENT_DLE     -  Tell server process that circuit is ready
                            1B9A  ; ACT_EXI_SERV    -  Exit service state if needed
                            1B9A  ; ACT_SYN_FAIL    -  The circuit failed to synchronize
                            1B9A  ; ACT_INI_FAIL    -  I/O failure during Transport initialization.
                            1B9A  ;
                            1B9A  ; INPUTS:         R11     CRI CNR ptr
                            1B9A  ;                 R10     CRI CNF ptr
                            1B9A  ;                 R6      LPD ptr
                            1B9A  ;                 R5      WQE address
                            1B9A  ;                 R4      RCB address
                            1B9A  ;
                            1B9A  ; OUTPUTS:        R5      Unchanged
                            1B9A  ;                 R1      Next event to be processed
                            1B9A  ;                 R0      Low bit set if state change is permitted,
                            1B9A  ;                         Low bit clear to avoid state change
                            1B9A  ;
                            1B9A  ;                 All other regs may be clobbered.
                            1B9A  ;-
                            1B9A  ACT_ENT_DLE:                                  ; Tell server the circuit is ready
              03      E0    1B9A          BBS     #LPD$V_ACCESS,-               ; If BS then circuit is accessed by
        1E 22 A6            1B9C                   LPD$W_STS(R6),40$            ; server process
                            1B9F          ;
                            1B9F          ;    The circuit is up (or at least the driver thinks so) but there is
                            1B9F          ;    no server process accessing the circuit.  Queue a receive to the
                            1B9F          ;    circuit.  When the receive completes it will serve as a signal that
                            1B9F          ;    the remote end of the circuit is requesting service.
                            1B9F          ;
          51  03      9A    1B9F          MOVZBL  #LEV$C_UNJAM,R1               ; Assume some I/O is pending
          1B  A6      95    1BA2          TSTB    LPD$B_ASTCNT(R6)              ; Any other I/O pending ?
              22      12    1BA5          BNEQ    100$                          ; If NEQ yes, recycle the circuit
       51  80 8F      9A    1BA7          MOVZBL  #128,R1                       ; Setup size of P1 buffer
            0F23      30    1BAB          BSBW    NET$DLL_QIO_CO                ; Call co-routine to init WQE
     003C'C2  53      D0    1BAE          MOVL    R3,WQE$C_LENGTH+P1(R2)        ; Point to buffer
  0038'C2  80 8F      9A    1BB3          MOVZBL  #128,WQE$C_LENGTH+P2(R2); Setup buffer size
          50  00'     D0    1BB9          MOVL    S^#IO$_READLBLK,R0            ; Setup I/O function
                      05    1BBC          RSB                                   ; Return to issue I/O, and exit
                            1BBD          ;
                            1BBD          ;    The circuit is already being accessed by a server process.  Tell
                            1BBD          ;    the circuit access module that the circuit is up and then tell
                            1BBD          ;    NETDRIVER to start its receiver.
                            1BBD          ;
          50  00'     D0    1BBD  40$:    MOVL    S^#SS$_NORMAL,R0              ; Indicate success
            E43D'     30    1BC0          BSBW    DLE$LPD_STATUS                ; Tell DLE module of circuit transition
          51  00      D0    1BC3          MOVL    #LEV$C_NO_EVT,R1              ; No more events
          50  01      D0    1BC6          MOVL    #1,R0                         ; Allow state change
                      05    1BC9  100$:   RSB
                            1BCA
                            1BCA  ACT_EXI_SERV:                                 ; Exit service state if needed
              02      E1    1BCA          BBC     #LPD$V_DLE,-                  ; If not marked for direct-access then
        14 22 A6            1BCC                   LPD$W_STS(R6),10$            ; nothing to do
              03      E0    1BCF          BBS     #LPD$V_ACCESS,-               ; If currently being accessed then
        0F 22 A6            1BD1                   LPD$W_STS(R6),10$            ; allow operation to complete
                            1BD4
                            1BD4          BUG_CHECK NETNOSTATE                  ; && What are we doing here??
                            1BD8          CLRBIT  LPD$V_DLE,LPD$W_STS(R6) ; Else clear direct-access flag
```

```
      51     04   D0  1BDC               MOVL    #LEV$C_REQ_SHUT,R1          ; Chain to "request shutdown" event
      50     00'  D0  1BDF               MOVL    S^#SS$_NORMAL,R0            ; Allow state change
                  05  1BE2               RSB
      51     00   D0  1BE3      10$:     MOVL    #LEV$C_NO_EVT,R1            ; No further events
      50     00'  D0  1BE6               MOVL    S^#SS$_NORMAL,R0            ; Allow state change
                  05  1BE9               RSB
                      1BEA
                      1BEA      ACT_SYN_FAIL:                                ; The circuit failed to synchronize
             03   E1  1BEA               BBC     #LPD$V_ACCESS,-             ; If BC then circuit is not being "accessed"
        08 22 A6      1BEC                        LPD$W_STS(R6),10$          ; for direct-link sevice
50    0000'8F     3C  1BEF               MOVZWL  #SS$_DEVINACT,R0            ; "circuit no longer active"
          E409'   30  1BF4               BSBW    DLE$CPD_STATUS              ; Tell DLE module of circuit transition
      51     04   D0  1BF7      10$:     MOVL    #LEV$C_REQ_SHUT,R1          ; Chain to "request shutdown" event
      50     00'  D0  1BFA               MOVL    S^#SS$_NORMAL,R0            ; Allow state change
                  05  1BFD               RSB
                      1BFE
                      1BFE      ACT_INI_FAIL:                                ; I/O failure during transport init
                      1BFE               BUMP    B,LPD$B_CNT_IFL(R6)         ; Increment circuit init failure count
      51     11   D0  1C07               MOVL    #LEV$C_CIN_DOWN,R1          ; Signal "circuit down" event
             50   D4  1C0A               CLRL    R0                          ; Do not change state for this event
                  05  1C0C               RSB
                      1C0D
                      1C0D      ACT_X25_RESET:                               ; X.25 "reset"
             51   D4  1C0D               CLRL    R1                          ; No QIO buffer needed
           0EBF   30  1C0F               BSBW    NET$DLL_QIO_CO              ; Allocate and init WQE (co-routine)
0030'C2      03   D0  1C12               MOVL    #PSI$C_RESET,WQE$C_LENGTH+P4(R2) ; Set P4 to "reset confirmation"
   10 A2     00   90  1C17               MOVB    #LEV$C_NO_EVT,WQE$B_EVT(R2) ; Do nothing when I/O completes
   14 A2     00   90  1C1B               MOVB    #LEV$C_NO_EVT,WQE$L_PM2(R2) ; Do nothing if I/O fails
50    0000'8F     3C  1C1F               MOVZWL  #IO$_NETCONTROL,R0          ; Set I/O function code
                  05  1C24               RSB                                 ; Issue I/O and exit
```

```
                          1C25          .SBTTL  ACT_RUN_DOWN, ACT_SET_OPER
                          1C25  ;+
                          1C25  ; ACT_RUN_DOWN - Run down a circuit
                          1C25  ; ACT_SET_OPER - Restart a stalled circuit
                          1C25  ;
                          1C25  ; INPUTS:       R11     CRI CNR ptr
                          1C25  ;               R10     CRI CNF ptr
                          1C25  ;               R6      LPD ptr
                          1C25  ;               R5      WQE address
                          1C25  ;               R4      RCB address
                          1C25  ;
                          1C25  ; OUTPUTS:      R5      Unchanged
                          1C25  ;               R1      Next "event longword" to be processed
                          1C25  ;               R0      Low bit set if state change is permitted,
                          1C25  ;                       Low bit clear to avoid state change
                          1C25  ;
                          1C25  ;               All other registers may be clobbered
                          1C25  ;-
                          1C25  ACT_FAILED:
            0B      90    1C25          MOVB    #NMA$C_LINSS_FAI,-      ; Mark outgoing call "failed"
         27 A6            1C27                  LPD$B_SUB_STA(R6)       ; (requiring operator intervention)
      51    00      D0    1C29          MOVL    #LEV$C_NO_EVT,R1        ; No more events
      50    01      D0    1C2C          MOVL    #1,R0                   ; Allow state change (to S state)
                    05    1C2F          RSB
                          1C30
                          1C30  ACT_RUN_DOWN:                           ; Cancel all timers, etc.
    51    20 A6     9A    1C30          MOVZBL  LPD$B_PTH_INX(R6),R1    ; Get LPD index
  51    51    10    78    1C34          ASHL    #16,RT,R1               ; Shift into upper word
  51    0100 8F     B0    1C38          MOVW    #WQE$C_QUAL_DLL@8,R1    ; Setup QUAL, zero EVT for cancel all
           E3C0'    30    1C3)          BSBW    WQE$CANCEL_TIM          ; Cancel all timers for the LPD cell
                          1C40          CLRBIT  LPD$V_STRTIM,-          ; Start suppression timer is no longer
                          1C40                  LPD$W_STS(R6)           ; ticking
                          1C44          $GETFLD cri,l,sta               ; Get "operator" state
         05 50      E9    1C51          BLBC    R0,10$                  ; If LBC then assume OFF
      58    01      91    1C54          CMPB    #NMA$C_STATE_OFF,R8     ; Is it OFF ?
            0F      12    1C57          BNEQ    50$                     ; If NEQ no
                          1C59  10$:    ;
                          1C59          ;   The operator is turning the line off.
                          1C59          ;
  1E 22 A6    03    E1    1C59          BBC     #LPD$V_ACCESS,LPD$W_STS(R6),100$ ; If server process active,
  50    0000'8F     3C    1C5E          MOVZWL  #SS$_DEVINACT,R0        ; "circuit no longer active"
           E39A'    30    1C63          BSBW    DLE$LPD_STATUS          ; Tell DLE module of circuit transition
              14    11    1C66          BRB     100$                    ; Continue
                          1C68          ;
                          1C68          ;   If the circuit substate has been marked "failed" (as a
                          1C68          ;   result of "maximum recalls" exceeded), then do not allow
                          1C68          ;   further circuit startup attempts until the operator explicitly
                          1C68          ;   turns the circuit on (which clears substate).
                          1C68          ;
         27 A6      91    1C68  50$:    CMPB    LPD$B_SUB_STA(R6),-     ; "failed" circuit?
            0B            1C6B                  #NMA$C_LINSS_FAI
            0E      13    1C6C          BEQL    100$                    ; If so, stay in this state
                          1C6E                                          ; until operator intervention
                          1C6E          ;
                          1C6E          ;   The circuit is entering a stalled state waiting for a server
                          1C6E          ;   process to start some activity.  Set a timer so that we don't wait
                          1C6E          ;   for ever.
```

```
                                   1C6E  5376              ;
     53   00000000 23C34600 8F  7D 1C6E  5377              MOVQ     #60*<10*1000*1000>,R3    ; Wait 60 seconds
                          0FA4  30 1C79  5378              BSBW     SET_IOTIM                ; Start the timer
                     51     01  D0 1C7C  5379 100$:        MOVL     #LEV$C_EXIT,R1           ; No further events
                     50     01  D0 1C7F  5380              MOVL     #1,R0                    ; Allow state transition
                                05 1C82  5381              RSB
                                   1C83  5382
                                   1C83  5383
                                   1C83  5384 ACT_SET_OPER:                                ; Restart a stalled line
            08 22 A6        03  E1 1C83  5385              BBC      #LPD$V_ACCESS,LPD$W_STS(R6),100$ ; If server process active,
             50       0000'8F   3C 1C88  5386              MOVZWL   #SS$_DEVINACT,R0         ; "circuit no longer active"
                         E370'  30 1C8D  5387              BSBW     DLE$CPD_STATUS           ; Tell DLE module of circuit transition
                                   1C90  5388 100$:        $GETFLD  cri,l,sta                ; Get "operator" state
             51       00FC'C8   9A 1C9D  5389              MOVZBL   OPR_EVT_MAP(R8),R1       ; Get corresponding event
                     50     01  D0 1CA2  5390              MOVL     #1,R0                    ; Allow state change
                                05 1CA5  5391              RSB                               ; Process new event
```

```
                              1CA6              .SBTTL  ACT_TST_DL - Circuit acceptance algorithm
                              1CA6       ;+
                              1CA6       ; ACT_TST_DL   - Run circuit acceptance algorithm
                              1CA6       ;
                              1CA6       ; INPUTS:          R11     CRI CNR ptr
                              1CA6       ;                  R10     CRI CNF ptr
                              1CA6       ;                  R7      ADJ address
                              1CA6       ;                  R6      LPD address
                              1CA6       ;                  R5      WQE address
                              1CA6       ;                  R4      RCB address
                              1CA6       ;
                              1CA6       ; OUTPUTS:         R5-R7   Preserved
                              1CA6       ;                  R1      Next event to be processed
                              1CA6       ;                  R0      Low bit set if state change is permitted,
                              1CA6       ;                          Low bit clear to avoid state change
                              1CA6       ;
                              1CA6       ;                  All other regs may be clobbered.
                              1CA6       ;-
                              1CA6      ACT_TST_DL:                                     ; Run circuit acceptance algorithm
                 0E0A    30   1CA6              BSBW    CHK_IO                          ; Okay to xmit?
              51   01    D0   1CA9              MOVL    #LEV$C_EXIT,R1                  ; Assume we cannot xmit
               08  50    E9   1CAC              BLBC    R0,10$                          ; If LBC then no
               1A  A6    95   1CAF              TSTB    LPD$B_TSTCNT(R6)                ; Any test messages to xmit?
                   07    1A   1CB2              BGTRU   20$                             ; If so, send one
              51   10    D0   1CB4              MOVL    #LEV$C_LIN_UP,R1                ; Signal circuit up event
              50   01    90   1CB7      10$:    MOVB    #1,R0                           ; Always allow state change
                         05   1CBA              RSB
                              1CBB
                              1CBB              ;
                              1CBB              ;     Allocate and setup the buffer
                              1CBB              ;
            51    83 8F  9A   1CBB      20$:    MOVZBL  #1+2+1+TR3C_TST_MAX,R1          ; Setup max test size
            06 A7   51   B1   1CBF              CMPW    R1,ADJ$W_BUFSIZ(R7)             ; Too big?
                   04    1B   1CC3              BLEQU   30$                             ; If LEQU then no
            51    06 A7  3C   1CC5              MOVZWL  ADJ$W_BUFSIZ(R7),R1             ; Use partner's rcv buf size
         58   51    04   C3   1CC9      30$:    SUBL3   #1+2+1,R1,R8                    ; Save size of test data field
                 0E01    30   1CCD              BSBW    NET$DLL_QIO_CO                  ; Call co-routine to allocate buffer
          003C'C2   53   D0   1CD0              MOVL    R3,WQE$C_LENGTH+P1(R2)          ; Point to I/O buffer
          0038'C2   53   CE   1CD5              MNEGL   R3,WQE$C_LENGTH+P2(R2)          ; Bias I/O buffer length
                              1CDA              ;
                              1CDA              ;    Build the message
                              1CDA              ;
              83   08    90   1CDA              MOVB    #TR2C_MSG_NOP,(R3)+             ; Enter Phase II test msg type code
          02    01 A7    91   1CDD              CMPB    ADJ$B_PTYPE(R7),#ADJ$C_PTY_PH2 ; Phase II partner?
                   1B    13   1CE1              BEQL    40$                             ; If so, assumption correct
          FF A3    05    90   1CE3              MOVB    #TR3C_MSG_TST,-1(R3)            ; Partner is Phase III, replace type
                              1CE7                                                      ; code with Phase III test msg type code
                   00    EF   1CE7              EXTZV   #TR4$V_ADDR_DEST,-              ; Get our address (without area)
       50    0E A4   0A       1CE9                      #TR4$S_ADDR_DEST,RCB$W_ADDR(R4),R0
              83   50    B0   1CED              MOVW    R0,(R3)+                        ; Enter source node address
              83   58    90   1CF0              MOVB    R8,(R3)+                        ; Enter # of test data bytes
                   34    BB   1CF3              PUSHR   #^M<R2,R4,R5>                   ; Save regs
  63   58   AA 8F   6E   00   2C   1CF5         MOVC5   #0,(SP),#^X<AA>,R8,(R3)         ; Enter test data
                   34    BA   1CFC              POPR    #^M<R2,R4,R5>                   ; Restore regs
               1A  A6    97   1CFE      40$:    DECB    LPD$B_TSTCNT(R6)                ; Account for this test message
          0038'C2   53   C0   1D01              ADDL    R3,WQE$C_LENGTH+P2(R2)          ; Setup buffer size
              50   00'   D0   1D06              MOVL    S^#IO$_WRITELBLK,R0             ; Setup I/O fct code
```

```
05  1D09  5450          RSB                              ; Return to co-routine to xmit
```

```
                     1D0A  5452           .SBTTL  ACT_ENT_RUN - Enter RUN state
                     1D0A  5453 ;+
                     1D0A  5454 ; ACT_ENT_RUN - Enter the RUN state for a non-broadcast circuit
                     1D0A  5455 ;
                     1D0A  5456 ; INPUTS:         R11     CRI CNR ptr
                     1D0A  5457 ;                 R10     CRI CNF ptr
                     1D0A  5458 ;                 R7      ADJ address
                     1D0A  5459 ;                 R6      LPD address
                     1D0A  5460 ;                 R5      WQE address
                     1D0A  5461 ;                 R4      RCB address
                     1D0A  5462 ;
                     1D0A  5463 ; OUTPUTS:        R5-R7   Preserved
                     1D0A  5464 ;                 R1      Next event to be processed
                     1D0A  5465 ;                 R0      Low bit set if state change is permitted,
                     1D0A  5466 ;                         Low bit clear to avoid state change
                     1D0A  5467 ;
                     1D0A  5468 ;                 All other regs may be clobbered.
                     1D0A  5469 ;-
                     1D0A  5470 ACT_ENT_RUN:                                    ; Enter RUN state
          04    E2   1D0A  5471         BBSS    #LPD$V_RUN,-                    ;
    08 22 A6         1D0C  5472                 LPD$W_STS(R6),7$                ; Mark circuit as active for data msgs
       60 A4    96   1D0F  5473         INCB    RCB$B_ACT_DLL(R4)               ; Account for datalink
       5D A4    90   1D12  5474         MOVB    RCB$B_MAX_SNK(R4),-             ; Init square root limiter
       1E A6         1D15  5475                 LPD$B_XMT_SRL(R6)               ;
                     1D17  5476 7$:     SETBIT  #ADJ$V_RUN,ADJ$B_STS(R7) ; Mark adjacency is up
                     1D1B  5477         ;
                     1D1B  5478         ;   Start listen timer going, as long as this isn't a Phase II
                     1D1B  5479         ;   link (Phase II didn't have any mandatory hello timer).
                     1D1B  5480         ;
   02    01 A7  91   1D1B  5481         CMPB    ADJ$B_PTYPE(R7),#ADJ$C_PTY_PH2 ; If not Phase II link,
          04    13   1D1F  5482         BEQL    8$
                     1D21  5483         SETBIT  #ADJ$V_LSN,ADJ$B_STS(R7) ; Start listen timer going
                     1D25  5484 8$:     ;
                     1D25  5485         ;   If the partner node is a endnode or a Phase II node, then init
                     1D25  5486         ;   the cell in the cost/hops matrix associated with this node to
                     1D25  5487         ;   indicate that the node is directly adjacent.  This is because
                     1D25  5488         ;   we will never get any other notification (such as a routing
                     1D25  5489         ;   message) to update the cell.  The actual cost will be correctly
                     1D25  5490         ;   computed when the decision algorithm is run.
                     1D25  5491         ;
                     1D25  5492         $DISPATCH ADJ$B_PTYPE(R7),TYPE=B,<- ; Based on adjacency type
                     1D25  5493                 <ADJ$C_PTY_PH2,10$>,-   ; Phase II nodes
                     1D25  5494                 <ADJ$C_PTY_PH3N,10$>,-  ; Phase III endnodes
                     1D25  5495                 <ADJ$C_PTY_PH4N,10$>>   ; Phase IV endnodes
          35    11   1D34  5496         BRB     40$                     ; Else, skip it
                     1D36  5497
   51    02 A7  9A   1D36  5498 10$:    MOVZBL  ADJ$B_LPD_INX(R7),R1    ; Get the circuit's index
          0A    EF   1D3A  5499         EXTZV   #TR4$V_ADDR_AREA,-      ; Get area address
 52   04 A7  06      1D3C  5500                 #TR4$S_ADDR_AREA,ADJ$W_PNA(R7),R2
          16    13   1D40  5501         BEQL    30$                     ; If area = 0, assume our area
  008B C4  52   91   1D42  5502         CMPB    R2,RCB$B_HOMEAREA(R4)   ; Our area?
          0F    13   1D47  5503         BEQL    30$                     ; If so, set the right cost/hops
51   00001A88'EF41  D0   1D49  5504         MOVL    NET$AL_AREA_CH[R1],R1   ; Get address of area cost/hops buffer
          18    13   1D51  5505         BEQL    40$                     ; If none, skip it
        6142    B4   1D53  5506         CLRW    (R1)[R2]                ; Set area cost/hops to "adjacent"
          13    11   1D56  5507         BRB     40$
          00    EF   1D58  5508 30$:    EXTZV   #TR4$V_ADDR_DEST,-      ; Get node address within our area
```

```
     52   04 A7    0A     1D5A                    #TR4$S_ADDR_DEST,ADJ$W_PNA(R7),R2
51   00000980'EF41    D0  1D5E           MOVL     NET$AL_CH_VEC[R1],R1       ; Get address of cost/hops buffer
                 03   13  1D66           BEQL     40$                        ; If none, skip it
               6142   B4  1D68           CLRW     (R1)[R2]                   ; Set cost/hops word to "adjacent"
              E292'   30  1D6B   40$:    BSBW     UPDATE_ALL                 ; Re-run decision algorithm
                          1D6E                                               ; and force routing msgs to be sent
                          1D6E           ;
                          1D6E           ;    Announce the circuit is up
                          1D6E           ;
                          1D6E           $LOG     TPL_LUP,,,R5               ; Set "circuit up" event
              E287'   30  1D76           BSBW     NET$EVT_INTRAW             ; Log the event record
                          1D79           ;
                          1D79           ;    Start the automatic routing update timer, which causes
                          1D79           ;    a routing message to be sent on this circuit each tick.
                          1D79           ;
               FCCE   30  1D79           BSBW     START_XRT                  ; Start routing timer
          51     00   D0  1D7C           MOVL     #LEV$C_NO_EVT,R1           ; No more transitions
          50     01   90  1D7F           MOVB     #1,R0                      ; Allow state change
                      05  1D82           RSB
                      1D83           .SBTTL  ACT_BC_UP - Broadcast datalink has initialized
                      1D83   ;+
                      1D83   ; ACT_BC_UP     -  Start broadcast circuit Transport initialization
                      1D83   ;
                      1D83   ; Inputs:
                      1D83   ;
                      1D83   ;       R11 = CRI CNR address
                      1D83   ;       R10 = CRI CNF address
                      1D83   ;       R7 = ADJ address
                      1D83   ;       R6 = LPD address
                      1D83   ;       R5 = WQE address
                      1D83   ;       R4 = RCB address
                      1D83   ;
                      1D83   ; Outputs:
                      1D83   ;
                      1D83   ;       R1 = Next event to be processed
                      1D83   ;       R0 = True if state change allowed, false if not.
                      1D83   ;-
                      1D83   ACT_BC_UP:
         04     E2    1D83           BBSS    #LPD$V_RUN,-             ;
   08 22 A6           1D85                   LPD$W_STS(R6),7$         ; Mark circuit as active for data msgs
      60 A4     96    1D88           INCB    RCB$B_ACT_DLL(R4)        ; Account for datalink
      5D A4     90    1D8B           MOVB    RCB$B_MAX_SNK(R4),-      ; Init square root limiter
      1E A6           1D8E                   LPD$B_XMT_SRL(R6)        ;
                      1D90   7$:     SETBIT  ADJ$V_RTG,ADJ$B_STS(R7) ; Mark as routing adjacency
                      1D93           ;
                      1D93           ;   For broadcast circuits, preset the "partner buffer size" in
                      1D93           ;   the main adjacency to our own buffer size.  This field will
                      1D93           ;   be updated to always contain the minimum buffer size of all
                      1D93           ;   the BRAs on the circuit.
                      1D93           ;
      50 A6     B0    1D93           MOVW    LPD$W_BUFSIZ(R6),-       ; Preset partner buffer size to our
      06 A7           1D96                   ADJ$W_BUFSIZ(R7)         ; buffer size (main BC ADJ case)
                      1D98           ;
                      1D98           ;   Tell NETDRIVER to send a Router/Endnode Hello message immediately
                      1D98           ;
   50   0D      9A    1D98           MOVZBL  #NETUPD$_SEND_HELLO,R0   ; Set function code
      0F8E      30    1D9B           BSBW    TELL_NETDRIVER           ; Call NETDRIVER to send hello msg
                      1D9E           ;
                      1D9E           ;   Re-calculate the square root limiters, to account for the
                      1D9E           ;   additional circuit now active.
                      1D9E           ;
     E25F'      30    1D9E           BSBW    UPDATE_ALL               ; Update routing database
                      1DA1           ;
                      1DA1           ;   Log a "circuit up" event record.
                      1DA1           ;
                      1DA1           $LOG    TPL_LUP,,,R5             ; Set "circuit up" event
     E254'      30    1DA9           BSBW    NET$EVT_INTRAW           ; Log the event record
                      1DAC           ;
                      1DAC           ;   If we are a router, start the "election suppression" timer to
                      1DAC           ;   prevent our election from being resolved before we've had a chance
                      1DAC           ;   to hear from everybody.
                      1DAC           ;
05    1D A6     91    1DAC           CMPB    LPD$B_ETY(R6),#ADJ$C_PTY_PH4N ; Are we an endnode?
         2A     13    1DB0           BEQL    20$                      ; If so, skip this
51    20 A6     9A    1DB2           MOVZBL  LPD$B_PTH_INX(R6),R1     ; Get LPD index
51    51  10    78    1DB6           ASHL    #16,R1,R1                ; Shift into upper word
```

```
                    51    011B 8F    B0  1DBA  5586          MOVW    #<<WQE$C_QUAL_DLL>@8>!- ; Overlay QUAL and EVT fields
                                         1DBF  5587                     LEV$C_ELECT_TIM,R1
                    52    EFBD CF    9E  1DBF  5588          MOVAB   NET$DLL_PRC_WQE,R2      ; Setup action routine address
                               05    7A  1DC4  5589          EMUL    #TR$C_TIM_DRDELAY,-     ; Set timer value
           53   00    00989680 8F        1DC6  5590                  #10*1000*1000,#0,R3
                           E230'     30  1DCD  5591          BSBW    WQE$RESET_TIM           ; Set the timer
                54    00000000'EF    D0  1DD0  5592          MOVL    NET$GL_PTR_VCB,R4       ; Recover RCB address
                                         1DD7  5593          SETBIT  #LPD$V_ELECT_TIM,-      ; Mark suppression timer ticking
                                         1DD7  5594                  LPD$W_STS(R6)
                                         1DDC  5595 20$:     ;
                                         1DDC  5596          ;   Start the automatic routing update timer, which causes
                                         1DDC  5597          ;   a routing message to be sent on this circuit each tick.
                                         1DDC  5598          ;
                           FC6B      30  1DDC  5599          BSBW    START_XRT               ; Start routing timer
                                         1DDF  5600          ;
                                         1DDF  5601          ;   Notify DLE module that broadcast circuit is up, so that it
                                         1DDF  5602          ;   can enable the "load/dump" and "loopback" protocol types.
                                         1DDF  5603          ;
                           E21E'     30  1DDF  5604          BSBW    DLE$BC_UP               ; Enable service on circuit
                         51    00    D0  1DE2  5605          MOVL    #LEV$C_NO_EVT,R1        ; No more transitions
                         50    01    90  1DE5  5606          MOVB    #1,R0                   ; Allow state change
                               05        1DE8  5607          RSB
```

```
                              1DE9          .SBTTL  BRA_UP - Setup new adjacency for BRA
                              1DE9  ;+
                              1DE9  ; BRA_UP - Setup new adjacency control block for broadcast router
                              1DE9  ;
                              1DE9  ; This routine is called when a broadcast router is heard from to
                              1DE9  ; allocate a new ADJ block and declare the node up.
                              1DE9  ;
                              1DE9  ; Inputs:
                              1DE9  ;
                              1DE9  ;       R6 = LPD address
                              1DE9  ;       R5 = WQE address
                              1DE9  ;       R4 = RCB address
                              1DE9  ;       LEV_W_PNA = Address of node which sent message
                              1DE9  ;       LEV_B_PRIORITY = BRA's router priority (0 if none or not available)
                              1DE9  ;       PTYPE = Type of node parsed from message
                              1DE9  ;
                              1DE9  ; Outputs:
                              1DE9  ;
                              1DE9  ;       R0 = status code
                              1DE9  ;       R6 = LPD address
                              1DE9  ;       R7 = ADJ address
                              1DE9  ;       R8 = ADJ index
                              1DE9  ;
                              1DE9  ;       R1-R3 are destroyed.
                              1DE9  ;-
                              1DE9  BRA_UP:
                              1DE9          ;
                              1DE9          ;   See if there is already a BRA slot for this circuit/node
                              1DE9          ;   pair.  This would be the case if we received several Router
                              1DE9          ;   Hello messages in a row - the first would create the BRA,
                              1DE9          ;   and the subsequent messages should not create duplicate BRAs.
                              1DE9          ;
          58    5C A4     9A  1DE9          MOVZBL  RCB$B_MAX_LPD(R4),R8    ; Get number of circuits
          53    6A A4     3C  1DED          MOVZWL  RCB$W_MAX_RTG(R4),R3    ; Set ending ADJ index
                   19     11  1DF1          BRB     5$                      ; Start with slot NC+1
         57   2C B448     D0  1DF3  2$:     MOVL    @RCB$L_PTR_ADJ(R4)[R8],R7 ; Get ADJ address
  04 A7   00000014'EF     B1  1DF8          CMPW    LEV_W_PNA,ADJ$W_PNA(R7) ; Does the node address match?
                   0A     12  1E00          BNEQ    5$                      ; Branch if not
                20 A6     91  1E02          CMPB    LPD$B_PTH_INX(R6),-     ; Does the circuit match?
                02 A7         1E05                  ADJ$B_LPD_INX(R7)
                   03     12  1E07          BNEQ    5$                      ; If duplicate found,
                 009D     31  1E09          BRW     90$                     ; Do nothing - exit with this ADJ
        E3 58      53     F3  1E0C  5$:     AOBLEQ  R3,R8,2$                ; Loop thru all BRA slots
                              1E10          ;
                              1E10          ;   If we are an endnode, do not allow more than 1 BRA at
                              1E10          ;   a time (since the BRA is always the designated router).
                              1E10          ;   As a result, if we have encountered a new BRA at this
                              1E10          ;   point, bring down the old BRA with "adjancency down".
                              1E10          ;
          05    1D A6     91  1E10          CMPB    LPD$B_ETY(R6),#ADJ$C_PTY_PH4N   ; Are we an endnode?
                   24     12  1E14          BNEQ    8$                      ; Branch if not
          50    5C A4     9A  1E16          MOVZBL  RCB$B_MAX_LPD(R4),R0    ; Get # circuits
          50    2C A6     B1  1E1A          CMPW    LPD$W_DRT(R6),R0        ; Any external DRT active now?
                   1A     15  1E1E          BLEQ    8$                      ; Branch if not
                2C A6     B0  1E20          MOVW    LPD$W_DRT(R6),-         ; Move DRT adjacency index to WQE
                20 A5         1E23                  WQE$W_ADJ_INX(R5)
                              1E25          $LOG    TPL_ARJ,,,R5            ; Setup "adjacency rejected"
```

```
                       18 A5     D4   1E2D   5666          CLRL     WQE$L_EVL_PKT(R5)       ; Indicate no packet for this event
                        E1CD'    30   1E30   5667          BSBW     NET$EVT_INTRAW          ; Log the event record
                 58   2C A6      3C   1E33   5668          MOVZWL   LPD$W_DRT(R6),R8        ; Get designated BRA index
                        028B     30   1E37   5669          BSBW     ADJ_DOWN                ; Bring the adjacency down
                                      1E3A   5670          ;
                                      1E3A   5671          ;    Allocate a new BRA adjacency slot
                                      1E3A   5672          ;
                 58   5C A4      9A   1E3A   5673 8$:      MOVZBL   RCB$B_MAX_LPD(R4),R8    ; Get number of circuits
                 53   6A A4      3C   1E3E   5674          MOVZWL   RCB$W_MAX_RTG(R4),R3    ; Set ending ADJ index
                          09     11   1E42   5675          BRB      15$                     ; Start with slot NC+1
               57   2C B448      D0   1E44   5676 10$:     MOVL     @RCB$L_PTR_ADJ(R4)[R8],R7 ; Get ADJ address
                 37 67    00     E1   1E49   5677          BBC      #ADJ$V_INUSE,ADJ$B_STS(R7),20$ ; Branch if slot available
                 F3 58    53     F3   1E4D   5678 15$:     AOBLEQ   R3,R8,10$               ; Loop thru all BRA slots
                                      1E51   5679          ;
                                      1E51   5680          ;    The BRA database is full.  Eject the lowest priority BRA.
                                      1E51   5681          ;
          52    0000001C'EF      9A   1E51   5682          MOVZBL   LEV_B_PRIORITY,R2       ; Get BRA router priority, if known
                          24     13   1E58   5683          BEQL     18$                     ; If not known, then eject newest BRA
          53    00000014'EF      3C   1E5A   5684          MOVZWL   LEV_W_PNA,R3            ; Pass newest BRA's address
                          4A     10   1E61   5685          BSBB     LOWEST_PRIO_BRA         ; Determine lowest priority BRA
                          58     D5   1E63   5686          TSTL     R8                      ; If newest BRA is lowest priority,
                          17     13   1E65   5687          BEQL     18$                     ; then simply ignore the message
                 20 A5    58     B0   1E67   5688          MOVW     R8,WQE$W_ADJ_INX(R5)    ; Move adjacency index to WQE
                                      1E6B   5689          $LOG     TPL_ARJ,,,R5            ; Setup "adjacency rejected"
                       18 A5     D4   1E73   5690          CLRL     WQE$L_EVL_PKT(R5)       ; Indicate no packet for this event
                        E187'    30   1E76   5691          BSBW     NET$EVT_INTRAW          ; Log the event record
                        0249     30   1E79   5692          BSBW     ADJ_DOWN                ; Bring the adjacency down
                          BC     11   1E7C   5693          BRB      8$                      ; Now allocate the slot just freed up
                                      1E7E   5694          ;
                                      1E7E   5695          ;    The new BRA happens to be the lowest priority BRA, and thus,
                                      1E7E   5696          ;    we must ignore the message we just received from it.
                                      1E7E   5697          ;
               50    0000'8F     3C   1E7E   5698 18$:     MOVZWL   #SS$_INSFMEM,R0         ; Indicate BRA database full
                                 05   1E83   5699          RSB                              ; and exit
                                      1E84   5700          ;
                                      1E84   5701          ;    ADJ slot found - initialize it
                                      1E84   5702          ;
                          30     BB   1E84   5703 20$:     PUSHR    #^M<R4,R5>              ; Save registers
      67    0D    00    6E    00     2C   1E86   5704          MOVC5    #0,(SP),#0,#ADJ$C_LENGTH,(R7) ; Zero ADJ cell
                          30     BA   1E8C   5705          POPR     #^M<R4,R5>              ; Restore registers
                                 88   1E8E   5706          BISB     #ADJ$M_INUSE!-          ; Mark the slot in use
                                      1E8F   5707                    ADJ$M_RTG!-            ; Mark as routing adjacency
                                      1E8F   5708                    ADJ$M_LSN,-            ; Start the listen timer going
                       67    0D       1E8F   5709                   ADJ$B_STS(R7)
              02 A7    20 A6     B0   1E91   5710          MOVW     LPD$W_PTH(R6),ADJ$W_LPD(R7) ; Store associated LPD
        04 A7   00000014'EF      B0   1E96   5711          MOVW     LEV_W_PNA,ADJ$W_PNA(R7) ; Set partner node address
        01 A7   00000038'EF      90   1E9E   5712          MOVB     PTYPE,ADJ$B_PTYPE(R7)   ; Set partner type
                                      1EA6   5713          ;
                                      1EA6   5714          ;    Allocate cost/hops buffer for routing with this node
                                      1EA6   5715          ;
                        E518     30   1EA6   5716          BSBW     ALLOC_COSTHOPS          ; Allocate a cost/hops buffer
                                      1EA9   5717          ;
                                      1EA9   5718          ;    Leave RUN flag off, until we hear a Router Hello message from
                                      1EA9   5719          ;    the remote router node with our address in it, indicating that
                                      1EA9   5720          ;    two-way communication has been established.  Only then will
                                      1EA9   5721          ;    the router be declared up.
                                      1EA9   5722          ;
```

```
                    50   00'  D0  1EA9   5723 90$:     MOVL    S^#SS$_NORMAL,R0          ; Successful
                              05  1EAC   5724          RSB
```

```
                     1EAD          .SBTTL  LOWEST_PRIO_BRA - Find lowest priority BRA
                     1EAD      ;+
                     1EAD      ; LOWEST_PRIO_BRA - Determine the lowest priority BRA
                     1EAD      ;
                     1EAD      ; This routine is called when we must determine the lowest priority
                     1EAD      ; BRA in the event that the BRA database is full, and we just heard
                     1EAD      ; from another BRA.
                     1EAD      ;
                     1EAD      ; Inputs:
                     1EAD      ;
                     1EAD      ;       R6 = LPD address
                     1EAD      ;       R5 = WQE address
                     1EAD      ;       R4 = RCB address
                     1EAD      ;       R3 = Newest BRA's address
                     1EAD      ;       R2 = Newest BRA's router priority
                     1EAD      ;
                     1EAD      ; Outputs:
                     1EAD      ;
                     1EAD      ;       R8 = Lowest priority BRA, 0 if "Newest BRA" is lowest priority
                     1EAD      ;
                     1EAD      ;       R0-R3,R7 are destroyed.
                     1EAD      ;-
                     1EAD      LOWEST_PRIO_BRA:
            58   D4  1EAD              CLRL    R8                                  ; Indicate no lowest ADJ yet
  57    5C  A4   9A  1EAF              MOVZBL  RCB$B_MAX_LPD(R4),R7                ; Get number of circuits
  51    6A  A4   3C  1EB3              MOVZWL  RCB$W_MAX_RTG(R4),R1                ; Set ending ADJ index
            22   11  1EB7              BRB     55$                                 ; Start at slot NC+1
 50   2C B447    D0  1EB9      50$:    MOVL    @RCB$L_PTR_ADJ(R4)[R7],R0           ; Get ADJ address
  19 60     00   E1  1EBE              BBC     #ADJ$V_INUSE,ADJ$B_STS(R0),55$      ; Skip if slot not in use
  52    0C  A0   91  1EC2              CMPB    ADJ$B_BCPRI(R0),R2                  ; Lower priority?
            13   1A  1EC6              BGTRU   55$                                 ; Branch if not
            06   1F  1EC8              BLSSU   52$                                 ; Branch if so
  53    04  A0   B1  1ECA              CMPW    ADJ$W_PNA(R0),R3                    ; If equal, compare addresses
            0B   1E  1ECE              BGEQU   55$                                 ; If address lower,
  53    04  A0   3C  1ED0      52$:    MOVZWL  ADJ$W_PNA(R0),R3                    ; Update "lowest priority BRA"
  52    0C  A0   9A  1ED4              MOVZBL  ADJ$B_BCPRI(R0),R2                  ; Update "lowest priority"
       58   57   D0  1ED8              MOVL    R7,R8                               ; Update "lowest prio. index"
  DA 57     51   F3  1EDB      55$:    AOBLEQ  R1,R7,50$                           ; Loop thru all routers
                 05  1EDF              RSB
```

```
                                1EE0  5766          .SBTTL  BEA_UP - Setup new adjacency for BEA
                                1EE0  5767 ;+
                                1EE0  5768 ; BEA_UP - Setup new adjacency control block for broadcast endnode
                                1EE0  5769 ;
                                1EE0  5770 ; This routine is called when a broadcast endnode is heard from to
                                1EE0  5771 ; allocate a new ADJ block and declare the node up.
                                1EE0  5772 ;
                                1EE0  5773 ; Inputs:
                                1EE0  5774 ;
                                1EE0  5775 ;       R6 = LPD address
                                1EE0  5776 ;       LEV_W_PNA = Address of node which sent message
                                1EE0  5777 ;
                                1EE0  5778 ; Outputs:
                                1EE0  5779 ;
                                1EE0  5780 ;       R0 = status code
                                1EE0  5781 ;       R6 = LPD address
                                1EE0  5782 ;       R7 = ADJ address
                                1EE0  5783 ;       R8 = ADJ index
                                1EE0  5784 ;
                                1EE0  5785 ;       R1-R5 are destroyed.
                                1EE0  5786 ;-
                                1EE0  5787 BEA_UP:
                                1EE0  5788                  ;
                                1EE0  5789                  ;    See if there is already a BEA slot for this endnode.
                                1EE0  5790                  ;    This would be the case if we received several Hello
                                1EE0  5791                  ;    messages in a row - the first would create the BEA, and
                                1EE0  5792                  ;    the subsequent messages should not create duplicate BEAs.
                                1EE0  5793                  ;
          58   6A A4      3C    1EE0  5794          MOVZWL  RCB$W_MAX_RTG(R4),R8      ; Get NC + NBRA
          53   68 A4      3C    1EE4  5795          MOVZWL  RCB$W_MAX_ADJ(R4),R3      ; Set ending ADJ index
                  0F      11    1EE8  5796          BRB     5$                        ; Start with slot NC+1
          57   2C B448    D0    1EEA  5797 2$:      MOVL    @RCB$L_PTR_ADJ(R4)[R8],R7 ; Get ADJ address
   04 A7   00000014'EF    B1    1EEF  5798          CMPW    LEV_W_PNA,ADJ$W_PNA(R7)  ; Does the node address match?
                  77      13    1EF7  5799          BEQL    90$                       ; If duplicate found, do nothing
             ED 58  53    F3    1EF9  5800 5$:      AOBLEQ  R3,R8,2$                  ; Loop thru all BRA slots
                                1EFD  5801                  ;
                                1EFD  5802                  ;    Allocate a new BEA adjacency slot
                                1EFD  5803                  ;
          58   6A A4      3C    1EFD  5804          MOVZWL  RCB$W_MAX_RTG(R4),R8      ; Get NC + NBRA
          53   68 A4      3C    1F01  5805          MOVZWL  RCB$W_MAX_ADJ(R4),R3      ; Set ending ADJ index
                  09      11    1F05  5806          BRB     15$                       ; Start with slot NC+NBRA+1
          57   2C B448    D0    1F07  5807 10$:     MOVL    @RCB$L_PTR_ADJ(R4)[R8],R7 ; Get ADJ address
             0A 67  00    E1    1F0C  5808          BBC     #ADJ$V_INUSE,ADJ$B_STS(R7),20$ ; Branch if slot available
             F3 58  53    F3    1F10  5809 15$:     AOBLEQ  R3,R8,TO$                 ; Loop thru all BEA slots
          50   0000'8F    3C    1F14  5810          MOVZWL  #SS$_INSFMEM,R0           ; Indicate BEA database full
                  05            1F19  5811          RSB                               ; and exit
                                1F1A  5812 20$:             ;
                                1F1A  5813                  ;    ADJ slot found - initialize it
                                1F1A  5814                  ;
                  30      BB    1F1A  5815          PUSHR   #^M<R4,R5>                ; Save registers
 67   0D   00   6E   00   2C    1F1C  5816          MOVC5   #0,(SP),#0,#ADJ$C_LENGTH,(R7) ; Zero ADJ cell
                  30      BA    1F22  5817          POPR    #^M<R4,R5>                ; Restore registers
                  88            1F24  5818          BISB    #ADJ$M_INUSE!-            ; Mark the slot in use
                                1F25  5819                    ADJ$M_RUN!-             ; Mark adjacency up for routing
                                1F25  5820                    ADJ$M_LSN,-             ; Start the listen timer going
             67   0B            1F25  5821                  ADJ$B_STS(R7)             ; and mark adjacency up for routing
       02 A7   20 A6      B0    1F27  5822          MOVW    LPD$W_PTH(R6),ADJ$W_LPD(R7) ; Store associated LPD
```

```
04 A7   00000014'EF   B0  1F2C          MOVW    LEV_W_PNA,ADJ$W_PNA(R7) ; Set partner node address
       01 A7     05   90  1F34          MOVB    #ADJ$C_PTY_PH4N,ADJ$B_PTYPE(R7) ; Set partner type
                          1F38          ;
                          1F38          ;   Set entry in cost/hops matrix for the main NI adjacency
                          1F38          ;   to indicate that it is reachable (hops=0, cost=0).  The
                          1F38          ;   cost/hops will be correctly computed to include this
                          1F38          ;   node when the decision algorithm is run.
                          1F38          ;
       51    20 A6   9A  1F38          MOVZBL  LPD$B_PTH_INX(R6),R1     ; Get LPD index
                 0A   EF  1F3C          EXTZV   #TR4$V_ADDR_AREA,-       ; Get area address
     52    04 A7   06      1F3E                  #TR4$S_ADDR_AREA,ADJ$W_PNA(R7),R2
                 16   13  1F42          BEQL    30$                      ; If area = 0, assume our area
        008B C4  52   91  1F44          CMPB    R2,RCB$B_HOMEAREA(R4)    ; Our area?
                 0F   13  1F49          BEQL    30$                      ; If so, set the right cost/hops
   51    00001A88'EF41   D0  1F4B          MOVL    NET$AL_AREA_CH[R1],R1    ; Get address of area cost/hops buffer
                 18   13  1F53          BEQL    40$                      ; If none, skip it
               6142   B4  1F55          CLRW    (R1)[R2]                 ; Set area cost/hops to "adjacent"
                 13   11  1F58          BRB     40$
                 00   EF  1F5A  30$:    EXTZV   #TR4$V_ADDR_DEST,-       ; Get node address within our area
     52   04 A7    0A      1F5C                  #TR4$S_ADDR_DEST,ADJ$W_PNA(R7),R2
   51    00000980'EF41   D0  1F60          MOVL    NET$AL_CH_VEC[R1],R1     ; Get address of cost/hops buffer
                 03   13  1F68          BEQL    40$                      ; If none, skip it
               6142   B4  1F6A          CLRW    (R1)[R2]                 ; Set cost/hops word to "adjacent"
                          1F6D  40$:    ;
                          1F6D          ;   Update the routing database
                          1F6D          ;
              E090'   30  1F6D          BSBW    UPDATE_ALL               ; Re-run decision algorithm
                          1F70                                           ; and force routing msgs to be sent
         50     00'   D0  1F70  90$:    MOVL    S^#SS$_NORMAL,R0         ; Successful
                      05  1F73          RSB
```

```
                       1F74          .SBTTL  Error action routines for "RUN" state
                       1F74     ;+
                       1F74     ; ACT_RUN_SYNC -   Synchronization lost while in the "run" state
                       1F74     ; ACT_RUN_UXPK -   Unexpected packet type while in the "run" state
                       1F74     ; ACT_ENT_MPR  -   Circuit has entered MOP mode while in the "run" state
                       1F74     ; ACT_RUN_SHUT -   Shut down the datalink while in the "run" state
                       1F74     ;
                       1F74     ; INPUTS:          R11     CRI CNR ptr
                       1F74     ;                  R10     CRI CNF ptr
                       1F74     ;                  R6      LPD ptr
                       1F74     ;                  R5      WQE address
                       1F74     ;                  R4      RCB address
                       1F74     ;
                       1F74     ; OUTPUTS:         R5      Unchanged
                       1F74     ;                  R1      Next event to be processed
                       1F74     ;                  R0      Low bit set if state change is permitted,
                       1F74     ;                          Low bit clear to avoid state change
                       1F74     ;
                       1F74     ;                  All other regs may be clobbered.
                       1F74     ;-
                       1F74    ACT_RUN_SYNC:                                    ; Circuit down - synchronization lost
                       1F74             $LOG    TPL_LDF,TPL_PRSN_SYNC,,R5 ; Setup logging data
      51    23    D0   1F7C             MOVL    #LEV$C_LOG_CDE,R1          ; Signal "circuit down" event
            50    D4   1F7F             CLRL    R0                         ; Do not change state for this event
                  05   1F81             RSB
                       1F82
                       1F82    ACT_RUN_UXPK:                                    ; Circuit down - unexpected packet type
                       1F82             $LOG    TPL_LDS,TPL_PRSN_UXPK,,R5 ; Setup logging data
      51    24    D0   1F8A             MOVL    #LEV$C_LOG_ADE,R1          ; Signal "adjacency down" event
            50    D4   1F8D             CLRL    R0                         ; Do not change state for this event
                  05   1F8F             RSB
                       1F90
                       1F90    ACT_ENT_MPR:                                     ; Enter MOP mode from the run state
            36    10   1F90             BSBB    EXIT_RUN_STATE             ; Exit the "run" state
          02E6    30   1F92             BSBW    ACT_QIO_SHUT               ; Shutdown the circuit
      51    21    D0   1F95             MOVL    #LEV$C_IRP_MM,R1           ; Resignal MOP mode event
      50    01    D0   1F98             MOVL    #1,R0                      ; Allow state change
                  05   1F9B             RSB
                       1F9C
                       1F9C    ACT_RUN_SHUT:
            2A    10   1F9C             BSBB    EXIT_RUN_STATE             ; Exit the "run" state
      51    04    D0   1F9E             MOVL    #LEV$C_REQ_SHUT,R1         ; Chain to "request shutdown" event
      50    01    D0   1FA1             MOVL    #1,R0                      ; Allow state change
                  05   1FA4             RSB
                       1FA5
                       1FA5    ACT_ADJ_DOWN:
                       1FA5             ;
                       1FA5             ;   If this is a non-broadcast circuit, or the adjacency is the
                       1FA5             ;   primary circuit adjacency, then bring down the entire circuit.
                       1FA5             ;   Otherwise, mark the adjacency down, and leave the circuit running.
                       1FA5             ;
18 22 A6    0A    E1   1FA5             BBC     #LPD$V_BC,LPD$W_STS(R6),50$ ; Branch if non-broadcast circuit
   50    5C A4    9A   1FAA             MOVZBL  RCB$B_MAX_LPD(R4),R0       ; Get number of circuits
   50    20 A5    B1   1FAE             CMPW    WQE$W_ADJ_INX(R5),R0       ; Is it the main circuit adjacency?
            0E    1B   1FB2             BLEQU   50$                        ; If so, shutdown entire circuit
   58    20 A5    3C   1FB4             MOVZWL  WQE$W_ADJ_INX(R5),R8       ; Get ADJ index
          010A    30   1FB8             BSBW    ADJ_DOWN                   ; Mark adjacency down
```

```
51   00   D0  1FBB  5911          MOVL    #LEV$C_NO_EVT,R1          ; Nothing more to do
50   01   D0  1FBE  5912          MOVL    #1,R0
          05  1FC1  5913          RSB
              1FC2  5914          ;
              1FC2  5915          ;    Shutdown the entire circuit
              1FC2  5916          ;
51   11   D0  1FC2  5917 50$:     MOVL    #LEV$C_LIN_DOWN,R1        ; Chain to bring down entire circuit
     50   D4  1FC5  5918          CLRL    R0                        ; Do not change state
          05  1FC7  5919          RSB
```

```
                          1FC8          .SBTTL  EXIT_RUN_STATE - Exit the RUN state
                          1FC8   ;+
                          1FC8   ; EXIT_RUN_STATE - Perform any cleanup before exiting the "run" state
                          1FC8   ;
                          1FC8   ; Inputs:
                          1FC8   ;
                          1FC8   ;      R11 = CRI CNR address
                          1FC8   ;      R10 = CRI CNF address
                          1FC8   ;      R7 = ADJ address
                          1FC8   ;      R6 = LPD address
                          1FC8   ;      R4 = RCB address
                          1FC8   ;
                          1FC8   ; Outputs:
                          1FC8   ;
                          1FC8   ;      None
                          1FC8   ;-
                          1FC8   EXIT_RUN_STATE:
                          1FC8          BUMP    B,LPD$B_CNT_LDN(R6)     ; Increment circuit down count
             04     E5    1FD1          BBCC    #LPD$V_RUN,-            ; If leaving run state then
       03 22 A6           1FD3                   LPD$W_STS(R6),7$        ;
          60 A4     97    1FD6          DECB    RCB$B_ACT_DLL(R4)       ; Account for loss of datalink
                          1FD9   7$:    ;
                          1FD9          ;   Mark as unreachable all nodes which were to use this path
                          1FD9          ;
   53     20 A6     9A    1FD9          MOVZBL  LPD$B_PTH_INX(R6),R3    ; Get index of LPD now inactive
   52     5A A4     3C    1FDD          MOVZWL  RCB$W_MAX_ADDR(R4),R2   ; Get maximum number of nodes
       51    01     D0    1FE1          MOVL    #1,R1                   ; Start at node #1
  50    1C B441     3C    1FE4   10$:   MOVZWL  @RCB$L_PTR_OA(R4)[R1],R0 ; Get output ADJ for this node
             0F     13    1FE9          BEQL    20$                     ; Branch if none
  50    2C B440     D0    1FEB          MOVL    @RCB$L_PTR_ADJ(R4)[R0],R0 ; Get ADJ address
   53     02 A0     B1    1FF0          CMPW    ADJ$B_LPD_INX(R0),R3    ; Does this ADJ use the LPD?
             04     12    1FF4          BNEQ    20$                     ; Branch if not
        1C B441     B4    1FF6          CLRW    @RCB$L_PTR_OA(R4)[R1]   ; Mark node unreachable
   E6 51     52     F3    1FFA   20$:   AOBLEQ  R2,R1,10$               ; Loop through entire OA vector
                          1FFE          ;
                          1FFE          ;   Mark as unreachable all nodes which were to use this path
                          1FFE          ;
          20 A4     D5    1FFE          TSTL    RCB$L_PTR_AOA(R4)       ; Are we an area router?
             22     13    2001          BEQL    25$                     ; If not, skip it
  52    008C C4     9A    2003          MOVZBL  RCB$B_MAX_AREA(R4),R2   ; Get maximum number of areas
       51    01     D0    2008          MOVL    #1,R1                   ; Start at area #1
  50    20 B441     3C    200B   22$:   MOVZWL  @RCB$L_PTR_AOA(R4)[R1],R0 ; Get output ADJ for this area
             0F     13    2010          BEQL    24$                     ; Branch if none
  50    2C B440     D0    2012          MOVL    @RCB$L_PTR_ADJ(R4)[R0],R0 ; Get ADJ address
   53     02 A0     B1    2017          CMPW    ADJ$B_LPD_INX(R0),R3    ; Does this ADJ use the LPD?
             04     12    201B          BNEQ    24$                     ; Branch if not
        20 B441     B4    201D          CLRW    @RCB$L_PTR_AOA(R4)[R1]  ; Mark area unreachable
   E6 51     52     F3    2021   24$:   AOBLEQ  R2,R1,22$               ; Loop through entire AOA vector
                          2025   25$:   ;
                          2025          ;   Bring down the adjacency which initiated this event
                          2025          ;
   58     20 A5     3C    2025          MOVZWL  WQE$W_ADJ_INX(R5),R8    ; Set index of ADJ we have in-hand
           0099     30    2029          BSBW    ADJ_DOWN                ; Bring down adjacency
                          202C          ;
                          202C          ;   If this is a broadcast circuit, then bring down any
                          202C          ;   adjacencies that are associated with this circuit.
                          202C          ;
          34 22 A6    0A   E1  202C  5978            BBC     #LPD$V_BC,LPD$W_STS(R6),50$ ; If non-broadcast circuit, we're done
             52    68 A4   3C  2031  5979            MOVZWL  RCB$W_MAX_ADJ(R4),R2    ; Get number of adjacencies
                58    01   D0  2035  5980            MOVL    #1,R8                   ; Start at ADJ #1
           50    2C B448   D0  2038  5981 30$:       MOVL    @RCB$L_PTR_ADJ(R4)[R8],R0 ; Get ADJ address
             0A 60    00   E1  203D  5982            BBC     #ADJ$V_INUSE,ADJ$B_STS(R0),40$ ; Branch if slot not in use
          20 A6    02 A0   91  2041  5983            CMPB    ADJ$B_LPD_INX(R0),LPD$B_PTH_INX(R6) ; Does it point to LPD?
                      03   12  2046  5984            BNEQ    40$                     ; If not, go on
                    007A   30  2048  5985            BSBW    ADJ_DOWN                ; Bring down the adjacency
               E9 58  52   F3  204B  5986 40$:       AOBLEQ  R2,R8,30$               ; Loop thru entire ADJ vector
                               204F  5987            ;
                               204F  5988            ;    Make sure the "designated router" is reset when the
                               204F  5989            ;    circuit is brought down, just in case it fails to get
                               204F  5990            ;    reset properly elsewhere.
                               204F  5991            ;
                   20 A6   9B  204F  5992            MOVZBW  LPD$B_PTH_INX(R6),-     ; Indicate no "known" designated router
                   2C A6       2052  5993                    LPD$W_DRT(R6)           ; (make it the circuit itself)
                               2054  5994            ;
                               2054  5995            ;    Reset router/state list to a null string, since there are
                               2054  5996            ;    no longer any BRAs for this adjacency.
                               2054  5997            ;
             50    2E A6   D0  2054  5998            MOVL    LPD$L_RTR_LIST(R6),R0   ; Get address of election list
                      08   13  2058  5999            BEQL    45$                     ; Skip if none
                      60   94  205A  6000            CLRB    (R0)                    ; Reset election list to null
                               205C  6001            ;
                               205C  6002            ;    Send an "I'm going away" message (empty RHEL), if possible,
                               205C  6003            ;    to notify other nodes that we are going away.
                               205C  6004            ;
                50    0D   9A  205C  6005            MOVZBL  #NETUPD$_SEND_HELLO,R0  ; Set function code
                    0CCA   30  205F  6006            BSBW    TELL_NETDRIVER          ; Call NETDRIVER to send hello msg
                               2062  6007 45$:       ;
                               2062  6008            ;    Notify DLE module that broadcast circuit is down, so that it
                               2062  6009            ;    can disable the "load/dump" and "loopback" protocol types.
                               2062  6010            ;
                   DF9B'   30  2062  6011            BSBW    DLE$BC_DOWN             ; Disable service on circuit
                               2065  6012            ;
                               2065  6013            ;    Store infinite cost/hops for all nodes in the cost/hops buffer
                               2065  6014            ;    associated with the circuit going down.  When the decision
                               2065  6015            ;    algorithm is run again, the cost/hops to all nodes will be
                               2065  6016            ;    re-computed.
                               2065  6017            ;
             53    20 A6   9A  2065  6018 50$:       MOVZBL  LPD$B_PTH_INX(R6),R3    ; Get index of LPD now inactive
                      38   BB  2069  6019            PUSHR   #^M<R3,R4,R5>           ; Save critical regs
     50    00000980'EF43   D0  206B  6020            MOVL    NET$AL_CH_VEC[R3],R0    ; Get address of cost/hops buffer
                      0C   13  2073  6021            BEQL    52$                     ; Skip if none
        FF 8F    6E   00   2C  2075  6022            MOVC5   #0,(SP),#-1,-           ; Store infinity in each cell for
           60    0800 8F       207A  6023                    #2*NUM_NODES,(R0)       ;  each node as known to this circuit
                  53  6E   D0  207E  6024            MOVL    (SP),R3                 ; Recover R3
     50    00001A88'EF43   D0  2081  6025 52$:       MOVL    NET$AL_AREA_CH[R3],R0   ; Get address of cost/hops buffer
                      09   13  2089  6026            BEQL    55$                     ; Skip if none
        FF 8F    6E   00   2C  208B  6027            MOVC5   #0,(SP),#-1,-           ; Store infinity in each cell for
           60    0080 8F       2090  6028                    #2*NUM_AREAS,(R0)       ;  each node as known to this circuit
                      38   BA  2094  6029 55$:       POPR    #^M<R3,R4,R5>           ; Restore regs
                               2096  6030            ;
                               2096  6031            ;    When exiting "run" state for any reason on a X.25 PVC (including
                               2096  6032            ;    because the remote side sent us a reset), issue a reset to the
                               2096  6033            ;    remote side to ensure that it restarts the initialization sequence.
                               2096  6034            ;    We can't get into an infinite loop doing this, because its only
```

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                          2096            ;   done when exiting the run state.
                          2096            ;
              07     E1   2096            BBC     #LPD$V_X25,-             ; If X.25 circuit,
        26 22 A6          2098                    LPD$W_STS(R6),60$
                          209B            $GETFLD cri,l,use                ; Get circuit usage
           16 50     E9   20A8            BLBC    R0,60$
        00    58     D1   20AB            CMPL    R8,#NMA$C_CIRUS_PER      ; X.25 PVC?
              11     12   20AE            BNEQ    60$                      ; If so,
              51     D4   20B0            CLRL    R1                       ; No QIO buffer needed
            0A1C     30   20B2            BSBW    NET$DLL_QIO_CO           ; Allocate and init WQE (co-routine)
   0030'C2    03     D0   20B5            MOVL    #PSI$C_RESET,WQE$C_LENGTH+P4(R2) ; Set P4 to "reset initiate"
   50   0000'8F      3C   20BA            MOVZWL  #IO$_NETCONTROL,R0       ; Set I/O function code
              9E     16   20BF            JSB     @(SP)+                   ; Issue I/O request
                          20C1      60$:  ;
                          20C1            ;   Update the routing data base to account for the decrease
                          20C1            ;   in active circuits, as well as to remove all least cost
                          20C1            ;   paths over this circuit.
                          20C1            ;
           DF3C'     30   20C1            BSBW    UPDATE_ALL               ; Re-run decision algorithm
                          20C4                                             ; and force routing msgs to be sent
                     05   20C4            RSB
```

```
                                     20C5   6057            .SBTTL  ADJ_DOWN - Mark adjacency as shutdown
                                     20C5   6058 ;+
                                     20C5   6059 ; ADJ_DOWN - Shutdown the adjacency
                                     20C5   6060 ;
                                     20C5   6061 ; This routine is called to mark an adjacency as shutdown.
                                     20C5   6062 ;
                                     20C5   6063 ; Inputs:
                                     20C5   6064 ;
                                     20C5   6065 ;       R8 = ADJ index
                                     20C5   6066 ;       R6 = LPD address
                                     20C5   6067 ;       R4 = RCB address
                                     20C5   6068 ;
                                     20C5   6069 ; Outputs:
                                     20C5   6070 ;
                                     20C5   6071 ;       None
                                     20C5   6072 ;
                                     20C5   6073 ;       No registers are destroyed.
                                     20C5   6074 ;-
                                     20C5   6075 ADJ_DOWN:
                008E 8F       BB     20C5   6076        PUSHR   #^M<R1,R2,R3,R7>        ; Save registers
        57   2C B448          D0     20C9   6077        MOVL    @RCB$L_PTR_ADJ(R4)[R8],R7 ; Get ADJ address
                   00         EF     20CE   6078        EXTZV   #TR4$V_ADDR_DEST,-      ; Save node # for later in routine
     53    04 A7   0A                20D0   6079                #TR4$S_ADDR_DEST,ADJ$W_PNA(R7),R3 ; (assume it's in our area)
                04 A7         B4     20D4   6080        CLRW    ADJ$W_PNA(R7)           ; Adjacent node is unknown
                06 A7         B4     20D7   6081        CLRW    ADJ$W_BUFSIZ(R7)        ; Reset buffer size
                   0E         8A     20DA   6082        BICB    #ADJ$M_RUN!ADJ$M_LSN!ADJ$M_RTG,- ; Clear flags
                   67                20DC   6083                ADJ$B_STS(R7)
                FF 8F         90     20DD   6084        MOVB    #ADJ$C_PTY_UNK,-        ; Mark partner type unknown
                01 A7                20E0   6085                ADJ$B_PTYPE(R7)
                                     20E2   6086        ;
                                     20E2   6087        ;   If this is the main circuit adjacency, then do nothing more
                                     20E2   6088        ;   then resetting the fields in the ADJ.
                                     20E2   6089        ;
        50    5C A4           9A     20E2   6090        MOVZBL  RCB$B_MAX_LPD(R4),R0    ; Get number of circuits
           50    58           B1     20E6   6091        CMPW    R8,R0                   ; Is this the main circuit adajcency?
                 26           1B     20E9   6092        BLEQU   90$                     ; If so, don't ever deallocate it
                 00           E5     20EB   6093        BBCC    #ADJ$V_INUSE,-          ; Mark slot no longer in use
              22 67                  20ED   6094                ADJ$B_STS(R7),90$       ; and exit if already was marked down
                 57           D4     20EF   6095        CLRL    R7                      ; Invalidate pointer
        6A A4    58           B1     20F1   6096        CMPW    R8,RCB$W_MAX_RTG(R4)    ; BRA or BEA?
                 05           14     20F5   6097        BGTR    30$                     ; Branch if endnode
                                     20F7   6098        ;
                                     20F7   6099        ;   If this is a broadcast router, then call another routine
                                     20F7   6100        ;   to handle it.
                                     20F7   6101        ;
               001F           30     20F7   6102        BSBW    BRA_DOWN                ; Mark BRA down
                 12           11     20FA   6103        BRB     50$
                                     20FC   6104        ;
                                     20FC   6105        ;   If this is an endnode, then set the cost/hops to this node
                                     20FC   6106        ;   to infinity.
                                     20FC   6107        ;
        50    20 A6           9A     20FC   6108 30$:   MOVZBL  LPD$B_PTH_INX(R6),R0    ; Get LPD index
  50   00000980'EF40          D0     2100   6109        MOVL    NET$AC_CH_VEC[R0],R0    ; Get address of cost/hops buffer
                 04           13     2108   6110        BEQL    50$                     ; If none, skip it
         6043    01           AE     210A   6111        MNEGW   #1,(R0)[R3]             ; Set cost/hops to infinity
                                     210E   6112        ;
                                     210E   6113        ;   Update the routing database to account for the change in
```

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                      210E  6114        ;   the cost/hops matrix.
                      210E  6115        ;
         DEEF'   30   210E  6116 50$:   BSBW    UPDATE_ALL              ; Re-run decision algorithm
                      2111  6117                                        ; and force routing msgs to be sent
     50    01    D0   2111  6118 90$:   MOVL    #1,R0                   ; Success
     008E  8F    BA   2114  6119        POPR    #^M<R1,R2,R3,R7>        ; Restore registers
                 05   2118  6120        RSB
```

```
                                  2119          .SBTTL  BRA_DOWN - Mark BRA down
                                  2119  ;+
                                  2119  ; BRA_DOWN - Mark BRA down
                                  2119  ;
                                  2119  ; This routine is called when a BRA is removed from the adjacency database.
                                  2119  ;
                                  2119  ; Inputs:
                                  2119  ;
                                  2119  ;       R8 = ADJ index
                                  2119  ;       R6 = LPD address
                                  2119  ;       R4 = RCB address
                                  2119  ;
                                  2119  ; Outputs:
                                  2119  ;
                                  2119  ;       None
                                  2119  ;
                                  2119  ;       R0-R3 are destroyed.
                                  2119  ;-
                                  2119 BRA_DOWN:
                                  2119          ;
                                  2119          ;   If this BRA was the designated router, then reset the ADJ index
                                  2119          ;   for the designated router, indicating no designated router.
                                  2119          ;
              2C A6    58    B1   2119          CMPW    R8,LPD$W_DRT(R6)        ; Is the designated router going down?
                       05    12   211D          BNEQ    5$                      ; Branch if not
                    20 A6    9B   211F          MOVZBW  LPD$B_PTH_INX(R6),-     ; Indicate no "known" designated router
                    2C A6         2122                  LPD$W_DRT(R6)           ; (make it the NI itself)
                                  2124 5$:      ;
                                  2124          ;   For broadcast routers, remove its entry from our Router
                                  2124          ;   Hello NI LIST, and set cost/hops to all nodes thru this
                                  2124          ;   router to infinity (by deallocating the cost/hops buffer
                                  2124          ;   for this router adjacency slot).
                                  2124          ;
                                  2124          $DISPATCH LPD$B_ETY(R6),TYPE=B,<- ; If we are an endnode,
                                  2124                  <ADJ$C_PTY_PH4N,10$>,-  ; skip the following
                                  2124                  <ADJ$C_PTY_PH3N,10$>>
                     0067    30   2133          BSBW    BUILD_RTR_LIST          ; Re-build RTR_LIST, minus this router
     50    00000980'EF48    D0   2136          MOVL    NET$AL_CH_VEC[R8],R0    ; Get cost/hops buffer
                       0D    13   213E          BEQL    10$                     ; Skip if not there
                 50    0C    C2   2140          SUBL    #12,R0                  ; Get address of real buffer
                    DEBA'    30   2143          BSBW    NET$DEALLOCATE          ; Deallocate it
           00000980'EF48    D4   2146          CLRL    NET$AL_CH_VEC[R8]       ; Indicate buffer no longer present
     50    00001A88'EF48    D0   214D 10$:     MOVL    NET$AL_AREA_CH[R8],R0   ; Get area cost/hops buffer
                       0D    13   2155          BEQL    15$                     ; Skip if not there
                 50    0C    C2   2157          SUBL    #12,R0                  ; Get address of real buffer
                    DEA3'    30   215A          BSBW    NET$DEALLOCATE          ; Deallocate it
           00001A88'EF48    D4   215D          CLRL    NET$AL_AREA_CH[R8]      ; Indicate buffer no longer present
                                  2164 15$:     ;
                                  2164          ;   Re-calculate the "minimum blocksize of all BRAs on the NI"
                                  2164          ;   (which is stored in the main adjacency of the NI, and is used
                                  2164          ;   to determine the size of routing messages sent over the NI)
                                  2164          ;   by scanning all active BRAs left, and determining the minimum.
                                  2164          ;
             50    20 A6    9A   2164          MOVZBL  LPD$B_PTH_INX(R6),R0    ; Get LPD index
          50    2C B440    D0   2168          MOVL    @RCB$L_PTR_ADJ(R4)[R0],R0 ; Get main ADJ address for BC
                 50 A6    B0   216D          MOVW    LPD$W_BUFSIZ(R6),-      ; Preset minimum to our size
                 06 A0         2170                  ADJ$W_BUFSIZ(R0)
```

```
        52   5C A4   9A  2172  6179          MOVZBL  RCB$B_MAX_LPD(R4),R2     ; Get number of circuits
        53   6A A4   3C  2176  6180          MOVZWL  RCB$W_MAX_RTG(R4),R3     ; Set ending ADJ index
                1C   11  217A  6181          BRB     25$                      ; Start with slot NC+1
       51   2C B442  D0  217C  6182 20$:     MOVL    @RCB$L_PTR_ADJ(R4)[R2],R1 ; Get ADJ address
         13 61   01  E1  2181  6183          BBC     #ADJ$V_RUN,ADJ$B_STS(R1),25$ ; Skip if BRA not running
             20 A6   91  2185  6184          CMPB    LPD$B_PTH_INX(R6),-      ; Is it on this NI?
             02 A1       2188  6185                  ADJ$B_LPD_INX(R1)
                0C   12  218A  6186          BNEQ    25$                      ; If not, skip it
             06 A1   B1  218C  6187          CMPW    ADJ$W_BUFSIZ(R1),-       ; Buffer size less than minimum?
             06 A0       218F  6188                  ADJ$W_BUFSIZ(R0)
                05   1E  2191  6189          BGEQU   25$                      ; Branch if not
             06 A1   B0  2193  6190          MOVW    ADJ$W_BUFSIZ(R1),-       ; If so, store the minimum
             06 A0       2196  6191                  ADJ$W_BUFSIZ(R0)
         E0 52   53  F3  2198  6192 25$:     AOBLEQ  R3,R2,20$                ; Loop thru all BRA slots
                     05  219C  6193          RSB
```

```
                              219D                 .SBTTL  BUILD_RTR_LIST - Re-build NI router/state list
                              219D         ;+
                              219D         ; BUILD_RTR_LIST - Re-build NI router/state list
                              219D         ;
                              219D         ; This routine is called when the router adjacency database changes,
                              219D         ; to rebuild the NI router/state list for our Router Hello message.
                              219D         ;
                              219D         ; Inputs:
                              219D         ;
                              219D         ;       R6 = LPD address
                              219D         ;       R4 = RCB address
                              219D         ;
                              219D         ; Outputs:
                              219D         ;
                              219D         ;       R0 = True if election list has not changed since the last one
                              219D         ;               ("election stablized").  False if it's different than
                              219D         ;               the last one (send it out now).
                              219D         ;
                              219D         ;       R1-R3 are destroyed.
                              219D         ;-
                              219D         BUILD_RTR_LIST:
              0180 8F    BB   219D                 PUSHR   #^M<R7,R8>                      ; Save registers
   5E     000000ED 8F    C2   21A1                 SUBL    #1+TR4C_MAX_RSLIST,SP           ; Allocate buffer on stack
             53    5E    D0   21A8                 MOVL    SP,R3                           ; Point to buffer
                              21AB                 ;
                              21AB                 ;    Scan all BRA adjacencies, and for each slot in use on this LPD,
                              21AB                 ;    store an entry in the list.
                              21AB                 ;
          58    5C A4    9A   21AB                 MOVZBL  RCB$B_MAX_LPD(R4),R8            ; Get number of circuits
                   58    D6   21AF                 INCL    R8                              ; Set starting ADJ index
          51    6A A4    3C   21B1                 MOVZWL  RCB$W_MAX_RTG(R4),R1            ; Set ending ADJ index
       57    2C B448     D0   21B5         50$:    MOVL    @RCB$L_PTR_ADJ(R4)[R8],R7       ; Get ADJ address
        24 67      00    E1   21BA                 BBC     #ADJ$V_INUSE,ADJ$B_STS(R7),55$  ; Skip if slot not in use
             20 A6       91   21BE                 CMPB    LPD$B_PTH_INX(R6),-             ; Is it on this NI?
             02 A7            21C1                         ADJ$B_LPD_INX(R7)
                1D       12   21C3                 BNEQ    55$                             ; If not, skip it
   83     000400AA 8F    D0   21C5                 MOVL    #TR$C_NI_PREFIX,(R3)+           ; Store standard Phase IV prefix
          83    04 A7    B0   21CC                 MOVW    ADJ$W_PNA(R7),(R3)+             ; Store node address
                              21D0                 ASSUME  TR4V_RS_PRIO EQ 0
          83    0C A7    90   21D0                 MOVB    ADJ$B_BCPRI(R7),(R3)+           ; Store router priority
                              21D4                 SETBIT  TR4V_RS_TWOWAY,-1(R3)           ; Assume two-way established
        05 67      01    E0   21D9                 BBS     #ADJ$V_RUN,ADJ$B_STS(R7),55$    ; Branch if two-way
                              21DD                 CLRBIT  TR4V_RS_TWOWAY,-1(R3)           ; Else, clear two-way flag
        CF 58      51    F3   21E2         55$:    AOBLEQ  R1,R8,50$                       ; Loop thru all routers
           53      5E    C2   21E6                 SUBL    SP,R3                           ; Compute size of new list
                              21E9                 ;
                              21E9                 ;    See if new election list is different than our old one.  If
                              21E9                 ;    so, set a flag for the caller.
                              21E9                 ;
                   3E    BB   21E9                 PUSHR   #^M<R1,R2,R3,R4,R5>             ; Save registers
          51    2E A6    D0   21EB                 MOVL    LPD$L_RTR_LIST(R6),R1           ; Get address of buffer
             50    81    9A   21EF                 MOVZBL  (R1)+,R0                        ; Get size of current list
61    50    00    14 AE    53    2D   21F2                 CMPC5   R3,5*4(SP),#0,R0,(R1)           ; Is the new list different?
                   04    13   21F9                 BEQL    57$                             ; If so,
                   50    D4   21FB                 CLRL    R0                              ; "Election not stable yet"
                   03    11   21FD                 BRB     59$
             50    01    D0   21FF         57$:    MOVL    #1,R0                           ; "Election stablized"
```

```
            3E    BA   2202   6252 59$:    POPR    #^M<R1,R2,R3,R4,R5>           ; Restore registers
                       2204   6253         ;
                       2204   6254         ;   Store new list in LPD buffer
                       2204   6255         ;
       51    2E A6    D0   2204   6256         MOVL    LPD$L_RTR_LIST(R6),R1         ; Get address of buffer
          81    53    90   2208   6257         MOVB    R3,(R1)+                      ; Store size of list
                31    BB   220B   6258         PUSHR   #^M<R0,R4,R5>                 ; Save registers
   61    0C AE    53    28   220D   6259         MOVC    R3,3*4(SP),(R1)               ; Store entire list
                31    BA   2212   6260         POPR    #^M<R0,R4,R5>                 ; Restore registers
  5E    000000ED 8F    C0   2214   6261         ADDL    #1+TR4C_MAX_RSLIST,SP         ; Deallocate buffer on stack
           0180 8F    BA   221B   6262         POPR    #^M<R7,R8>                    ; Restore registers
                      05   221F   6263         RSB
```

```
                              2220         .SBTTL  ELECT_ROUTER - Elect designated router
                              2220  ;+
                              2220  ; ELECT_ROUTER - Elect the "designated router" for this circuit
                              2220  ;
                              2220  ; This routine elects the designated router from among all the routers
                              2220  ; on this NI.  Since every router uses the same algorithm to decide,
                              2220  ; all the routers arrive at the same conclusion without consultation.
                              2220  ; This routine must only be called if we are a router (if an endnode
                              2220  ; was to set its DRT to ourself, we would probably crash).
                              2220  ;
                              2220  ; Inputs:
                              2220  ;
                              2220  ;       R6 = LPD address
                              2220  ;       R4 = RCB address
                              2220  ;
                              2220  ; Outputs:
                              2220  ;
                              2220  ;       R1 = Adjacency index of "designated router"
                              2220  ;       R2 = Priority of "designated router"
                              2220  ;       R3 = Node address of "designated router"
                              2220  ;
                              2220  ;       R0 is destroyed.
                              2220  ;-
                              2220  ELECT_ROUTER:
       0380 8F          BB    2220          PUSHR   #^M<R7,R8,R9>                   ; Save registers
  59   008B C4          9A    2224          MOVZBL  RCB$B_HOMEAREA(R4),R9           ; Get our own area number
        58   01         D0    2229          MOVL    #LPD$C_LOC_INX,R8               ; Set "current DRT adj index"
  52      2A A6         9A    222C          MOVZBL  LPD$B_BCPRI(R6),R2              ; Set "highest priority"
  53      0E A4         3C    2230          MOVZWL  RCB$W_ADDR(R4),R3               ; Set "current DRT address"
  57      5C A4         9A    2234          MOVZBL  RCB$B_MAX_LPD(R4),R7            ; Get number of circuits
  51      6A A4         3C    2238          MOVZWL  RCB$W_MAX_RTG(R4),R1            ; Set ending ADJ index
             31         11    223C          BRB     55$                             ; Start at slot NC+1
  50    2C B447         D0    223E  50$:    MOVL    @RCB$L_PTR_ADJ(R4)[R7],R0       ; Get ADJ address
     28 60      00      E1    2243          BBC     #ADJ$V_INUSE,ADJ$B_STS(R0),55$  ; Skip if slot not in use
          20 A6         91    2247          CMPB    LPD$B_PTH_INX(R6),-             ; Is it on this NI?
          02 A0               224A                  ADJ$B_LPD_INX(R0)
             21         12    224C          BNEQ    55$                             ; If not, skip it
             0A         ED    224E          CMPZV   #TR4$V_ADDR_AREA,-              ; Is it in our area?
 59     04 A0           06    2250                  #TR4$S_ADDR_AREA,ADJ$W_PNA(R0),R9
             19         12    2254          BNEQ    55$                             ; If not, skip it
  52      0C A0         91    2256          CMPB    ADJ$B_BCPRI(R0),R2              ; Higher priority?
             13         1F    225A          BLSSU   55$                             ; Branch if not
             06         1A    225C          BGTRU   52$                             ; Branch if so
  53      04 A0         B1    225E          CMPW    ADJ$W_PNA(R0),R3                ; If equal, compare addresses
             0B         1B    2262          BLEQU   55$                             ; If address lower, skip it
  53      04 A0         3C    2264  52$:    MOVZWL  ADJ$W_PNA(R0),R3                ; Update "current DRT address"
  52      0C A0         9A    2268          MOVZBL  ADJ$B_BCPRI(R0),R2              ; Update "highest priority"
        58   57         D0    226C          MOVL    R7,R8                           ; Update "current DRT index"
     CB 57   51         F3    226F  55$:    AOBLEQ  R1,R7,50$                       ; Loop thru all routers
        51   58         D0    2273          MOVL    R8,R1                           ; Return DRT index in R1
       0380 8F          BA    2276          POPR    #^M<R7,R8,R9>                   ; Restore registers
                        05    227A          RSB
                        227B          .SBTTL  ACT_QIO_SHUT - Shutdown the datalink
                        227B     ;+
                        227B     ; ACT_QIO_SHUT   -  Shutdown the datalink
                        227B     ;
                        227B     ; INPUTS:         R11     CRI CNR ptr
                        227B     ;                 R10     CRI CNF ptr
                        227B     ;                 R6      LPD ptr
                        227B     ;                 R5      WQE address
                        227B     ;                 R4      RCB address
                        227B     ;
                        227B     ; OUTPUTS:        R5      Unchanged
                        227B     ;                 R1      Next event to be processed
                        227B     ;                 R0      Low bit set if state change is permitted,
                        227B     ;                         Low bit clear to avoid state change
                        227B     ;
                        227B     ;                 All other regs may be clobbered.
                        227B     ;-
                        227B    ACT_QIO_SHUT:                           ; Shut down the datalink
                        227B            ;
                        227B            ;   Reset LPD fields
                        227B            ;
                        227B            CLRBIT  LPD$V_INCOMING,LPD$W_STS(R6) ; Clear X.25 incoming call flag
       24 A6    94      2280            CLRB    LPD$B_XMTFLG(R6)        ; Clear Transport xmit flags
       FF 8F    90      2283            MOVB    #ADJ$C_PTY_UNK,-        ; Clear "our node type" for this circuit
       1D A6            2286                    LPD$B_ETY(R6)           ; (setup later in DLL_UP)
                        2288            ;
                        2288            ;   Reset the main circuit adjacency, in the event that we got
                        2288            ;   here as a result of an initialization failure (since if we
                        2288            ;   exit run state, the main circuit adjacency is reset).
                        2288            ;
 58    20 A6    9A      2288            MOVZBL  LPD$B_PTH_INX(R6),R8    ; Get LPD index
        FE36    30      228C            BSBW    ADJ_DOWN                ; Reset main circuit adjacency
                        228F            ;
                        228F            ;   Reset substate for circuit
                        228F            ;
          0A    90      228F            MOVB    #NMA$C_LINSS_SYN,-      ; Change to "synchronizing" substate
       27 A6            2291                    LPD$B_SUB_STA(R6)       ;
          02    E1      2293            BBC     #LPD$V_DLE,-            ; If BC then not going down for
    04 22 A6            2295                    LPD$W_STS(R6),10$       ; "service" functions
          06    90      2298            MOVB    #NMA$C_LINSS_ASE,-      ; Init substate as "auto-service"
       27 A6            229A                    LPD$B_SUB_STA(R6)       ;
 22 A6    07    E0      229C    10$:    BBS     #LPD$V_X25,LPD$W_STS(R6),- ; If X.25, use DEACCESS, not SETMODE
          0E            22A0                    X25_SHUTDOWN
                        22A1            ;
                        22A1            ;   Cancel any outstanding QIOs in progress on the datalink
                        22A1            ;
        0995    30      22A1            BSBW    RESET_CHAN              ; Cancel any lingering I/O
                        22A4            ;
                        22A4            ;   Issue a SETMODE to reset the datalink
                        22A4            ;
          51    D4      22A4            CLRL    R1                      ; Indicate no need to extend P1 buffer
        0828    30      22A6            BSBW    NET$DLL_QIO_CO          ; Allocate and init WQE (co-routine)
     0000'8F    3C      22A9            MOVZWL  #IO$_SETMODE!-          ; Setup function code
          50            22AD                    IO$M_SHUTDOWN,R0        ;
                05      22AE            RSB                             ; Return to co-routine
                        22AF
                        22AF     ;
```

```
                              22AF  6375 ; Shutdown X.25 datalink using DEACCESS
                              22AF  6376 ;
                              22AF  6377 X25_SHUTDOWN:
                              22AF  6378         $GETFLD cri,l,use               ; Get circuit usage
             05 50     E9     22BC  6379         BLBC    R0,X25_DEACCESS         ; Error if not found
          00    58     D1     22BF  6380         CMPL    R8,#NMA$C_CIRUS_PER     ; PVC?
                10     13     22C2  6381         BEQL    X25_PVC_SHUTDOWN        ; If so, use different shutdown
                              22C4  6382 X25_DEACCESS:
                              22C4  6383         CLRBIT  LPD$V_PVC_ACCESSED,-    ; Indicate circuit no longer ACCESSed
                              22C4  6384                 LPD$B_PVCFLG(R6)
                51     D4     22C9  6385         CLRL    R1                      ; Indicate no need for QIO buffer
              0803     30     22CB  6386         BSBW    NET$DLL_QIO_CO          ; Allocate and init WQE (co-routine)
    50     0000'8F     3C     22CE  6387         MOVZWL  #IO$_DEACCESS,R0        ; Setup function code
                       05     22D3  6388         RSB                             ; Issue QIO and exit
                              22D4  6389
                              22D4  6390 ;
                              22D4  6391 ;  nly issue a DEACCESS of a PVC if we are turning off the circuit.  This
                              22D4  6392 ; allows the X.25 level 2 software to retain its knowledge of the state of
                              22D4  6393 ; the circuit - so that if a "reset" is outstanding, our next reset will
                              22D4  6394 ; confirm it and keep the circuit in a consistent state.
                              22D4  6395 ;
                              22D4  6396
                              22D4  6397 X25_PVC_SHUTDOWN:
                              22D4  6398         $GETFLD cri,l,sta               ; Get circuit state
             E0 50     E9     22E1  6399         BLBC    R0,X25_DEACCESS         ; Error if not found
          01    58     D1     22E4  6400         CMPL    R8,#NMA$C_STATE_OFF     ; Turning circuit off?
                DB     13     22E7  6401         BEQL    X25_DEACCESS            ; If so, DEACCESS circuit
          51    16     D0     22E9  6402         MOVL    S^#EV$C_IO_SUCC,R1      ; Signal IO_SUCC to go to next state
          50    01     D0     22EC  6403         MOVL    #1,R0                   ; Allow state change
                       05     22EF  6404         RSB
```

```
                              22F0         .SBTTL  ACT_QIO_STRT - Start the datalink
                              22F0    ;+
                              22F0    ; ACT_QIO_STRT    -  Startup the datalink
                              22F0    ;
                              22F0    ; INPUTS:         R11     CRI CNR ptr
                              22F0    ;                 R10     CRI CNF ptr
                              22F0    ;                 R6      LPD ptr
                              22F0    ;                 R5      WQE address
                              22F0    ;                 R4      RCB address
                              22F0    ;
                              22F0    ; OUTPUTS:        R5      Unchanged
                              22F0    ;                 R1      Next event to be processed
                              22F0    ;                 R0      Low bit set if state change is permitted,
                              22F0    ;                         Low bit clear to avoid state change
                              22F0    ;
                              22F0    ;                 All other regs may be clobbered.
                              22F0    ;-
                              22F0    ACT_QIO_STRT:                           ; Startup the datalink
                              22F0            ;
                              22F0            ;   If there is still an I/O pending to the circuit, then wait
                              22F0            ;   a bit for remaining I/O to be rundown.
                              22F0            ;
                              22F0            ;   This is done because we may still have messages on the AQB
                              22F0            ;   from NETDRIVER relating to this circuit left to process.
                              22F0            ;   This is done BEFORE the suppression timer so that minor
                              22F0            ;   delays in processing the AQB messages do not force circuit
                              22F0            ;   recycle to wait a full suppression interval.
                              22F0            ;
              1B A6      95   22F0            TSTB    LPD$B_ASTCNT(R6)        ; Any asynch activity outstanding?
                 05      12   22F3            BNEQ    18$                     ; If yes, then cannot continue
              1C A6      95   22F5            TSTB    LPD$B_IRPCNT(R6)        ; Does NETDRIVER still have references?
                 06      13   22F8            BEQL    20$                     ; If NEQ, then wait for NETDRIVER
                              22FA                                            ; to wake us up with CRD event
           51    01      D0   22FA    18$:    MOVL    #LEV$C_EXIT,R1          ; Exit state table immediately
               00A3      31   22FD            BRW     90$                     ; Exit inhibiting state change
                              2300    20$:    ;
                              2300            ;   Start the "start suppression" timer to prevent the circuit from
                              2300            ;   restarting too rapidly.  If the RECALL TIMER parameter is
                              2300            ;   specified, use that delay.  Otherwise, use a fixed timer value.
                              2300            ;
                 01      E3   2300            BBCS    #LPD$V_STRTIM,-         ; If BS then timer is already ticking
           03 22 A6           2302                    LPD$W_STS(R6),10$
               0098      31   2305            BRW     80$
          51   20 A6     9A   2308    10$:    MOVZBL  LPD$B_PTH_INX(R6),R1    ; Get LPD index
       51   51   10      78   230C            ASHL    #16,R1,R1               ; Shift into upper word
       51   011A 8F      B0   2310            MOVW    #<<WQE$C_QUAL_DLL>@8>!- ; Overlay QUAL and EVT fields
                              2315                      LEV$C_STRT_TIM,R1     ;
    52    00002412'EF    9E   2315            MOVAB   STRT_TIMER_TICK,R2      ; Setup action routine address
                              231C            $GETFLD cri,L,rct               ; Get RECALL TIMER parameter
              03 50      E8   2329            BLBS    R0,15$                  ; If not set, use default timer
              58   0A    D0   232C            MOVL    #TR$C_TIM_RESTRT,R8     ; Provide a default value
53   00   00989680 8F  58  7A 232F    15$:    EMUL    R8,#10*1000*1000,#0,R3  ; Set start supression timer
              DCC5'      30   2338            BSBW    WQE$RESET_TIM           ; Reset the timer
    54    00000000'EF    D0   233B            MOVL    NET$GL_PTR_VCB,R4       ; Recover RCB address
                              2342            ;
                              2342            ;   Check if the associated line is turned on
                              2342            ;
```

```
            02AF   30  2342            BSBW    CHK_CIRC_START           ; Check if circuit can be started
           58 50   E9  2345            BLBC    R0,80$                   ; If not allowed, exit
                       2348            ;
                       2348            ;   Increment the number of startup attempts we've made in trying
                       2348            ;   to get this circuit initialized.  (This counter is used for
                       2348            ;   outgoing X.25 calls to prevent too many charges from piling
                       2348            ;   up.  It also can be used for statistics).
                       2348            ;
           0B A6   96  2348            INCB    LPD$B_STARTUPS(R6)       ; Increment number of startup attempts
                       234B            ;
                       234B            ;   If the state is set to SERVICE, setup for direct-access mode
                       234B            ;
                       234B            $GETFLD cri,l,sta                ; Get the "operater" state
           09 50   E9  2358            BLBC    R0,60$                   ; If LBC then assume "OFF" state
       58     02   D1  235B            CMPL    S^#NMA$C_STATE_SER,R8    ; Service state ?
              04   12  235E            BNEQ    60$                      ; If NEQ then no
                       2360            SETBIT  LPD$V_DLE,LPD$W_STS(R6)  ; Else setup for direct-access
                       2364  60$:      ;
                       2364            ;   For X.25 circuits, use different startup sequence
                       2364            ;
    03 22 A6    07  E1  2364            BBC     #LPD$V_X25,LPD$W_STS(R6),65$ ; Branch if not X.25
            00B7   31  2369            BRW     X25_STARTUP              ; Use different startup sequence
                       236C            ;
                       236C            ;   If LPD$_TOGGLE is set, then we must toggle the controller or
                       236C            ;   if XM$_ERR_FATAL is set then we must restart the controller.
                       236C            ;   This check must be made in the UCB.
                       236C            ;
       52  28 A6   9A  236C  65$:      MOVZBL  LPD$B_PLVEC(R6),R2       ; Get PLVEC index
       50  10 A6   D0  2370            MOVL    LPD$L_UCB(R6),R0         ; Get device UCB
              17   13  2374            BEQL    70$                      ; If EQL then none
              0C   E4  2376            BBSC    #LPD$V_TOGGLE,-          ; Br if we must toggle the line
        0F 22 A6       2378                    LPD$W_STS(R6),67$        ;
01   00000000'EF42   91  237B            CMPB    PLVEC$AB_DEV[R2],-       ; DMC11 ?
                       2383                    #DEVTRN$C_DEV_DMC        ;
              08   13  2383            BEQL    70$                      ; If EQL yes, ignore XM$V_ERR_FATAL
              10   E1  2385            BBC     #XM$V_ERR_FATAL,-        ; If BS the fatal controller error,
        03 44 A0       2387                    UCB$L_DEVDEPEND(R0),70$  ; must toggle controller
            02A6   30  238A  67$:      BSBW    TOGGLE_LINE              ; Toggle the controller
                       238D                                             ; ...ignore errors
                       238D            ;
                       238D            ;   Reset the Circuit characteristics
                       238D            ;
                       238D  70$:      $CNFFLD cri,s,chr,R9             ; Identify characteristics buffer
       52  14 A6   3C  2394            MOVZWL  LPD$W_CHAN(R6),R2        ; Get I/O channel
              51   D4  2398            CLRL    R1                       ; Clear illegal I/O modifier mask
           DC63'   30  239A            BSBW    NET$SET_QIOW             ; Get buffer and issue $QIOW
           06 50   E8  239D            BLBS    R0,200$                  ; If LBS then okay, br to continue
       51     00   D0  23A0  80$:      MOVL    #LEV$C_NO_EVT,R1         ; Nothing else to do
              50   94  23A3  90$:      CLRB    R0                       ; Don't allow state change
              05       23A5            RSB
                       23A6  200$:     ;
                       23A6            ;   Setup the "input packet limiter" value based on the number of
                       23A6            ;   receive buffers assigned to the circuit's controller.  This is a
                       23A6            ;   heuristic based on the idea that controller's requiring more
                       23A6            ;   receive buffering (fast lines, satellite lines) also should be
                       23A6            ;   allowed more local packet output buffering in order to prevent
                       23A6            ;   severe performance degradation.
```

```
                          23A6                  ;
                          23A6                  $GETFLD cri,l,mwi               ; Get maximum X.25 window size
             3A 50    E8  23B3                  BLBS    R0,210$                 ; If set, use it as "input packet
                          23B6                                                  ; limiter" for non-X.25 circuit
           0C00 8F    BB  23B6                  PUSHR   #^M<R10,R11>            ; Save regs
   5B  00000000'EF    D0  23BA                  MOVL    NET$GL_CNR_PLI,R11      ; Get PLI root block
                5A    D4  23C1                  CLRL    R10                     ; Search from begining of list
      58     28 A6    9A  23C3                  MOVZBL  LPD$B_PLVEC(R6),R8      ; Search key is the PLVEC index
                          23C7                  $SEARCH eql,pli,l,plvec         ; Find PLI's CNF block
             0D 50    E9  23D6                  BLBC    R0,205$                 ; If LBC then not found
                          23D9                  $GETFLD pli,l,bfn               ; Get number of receive buffers
           0C00 8F    BA  23E6  205$:           POPR    #^M<R10,R11>            ; Restore regs
             03 50    E8  23EA                  BLBS    R0,210$                 ; If LBS then <pli,l,bfn> value exists
          58    04    D0  23ED                  MOVL    #4,R8                   ; Use 4 as the default
       1F A6    58    90  23F0  210$:           MOVB    R8,LPD$B_XMT_IPL(R6)    ; Use it as input packet limiter
                          23F4                  ;
                          23F4                  ;   Issue startup QIO
                          23F4                  ;
                51    D4  23F4                  CLRL    R1                      ; No I/O buffer needed
              06D8    30  23F6                  BSBW    NET$DLL_QIO_CO          ; Allocate and init WQE (co-routine)
      57     28 A6    9A  23F9                  MOVZBL  LPD$B_PLVEC(R6),R7      ; Get PLVEC index
01    00000000'EF47   91  23FD                  CMPB    PLVEC$AB_DEV[R7],-      ; DMC?
                          2405                          #DEVTRN$C_DEV_DMC
                05    12  2405                  BNEQ    240$                    ; If so,
       0034'C2  58    D0  2407                  MOVL    R8,WQE$C_LENGTH+P3(R2)  ; Setup DMC # buffers parameter in P3
           0000'8F    3C  240C  240$:           MOVZWL  #IO$_SETMODE!-          ; Setup the default function code
                50        2410                           IO$M_STARTUP,R0        ;
                      05  2411                  RSB                             ; Return to issue QIO
                          2412
                          2412  ;
                          2412  ; The start supression timer has expired.  Another attempt at starting the
                          2412  ; datalink should be initiated.
                          2412  ;
                          2412
                          2412  STRT_TIMER_TICK:
              EA35    30  2412                  BSBW    FIND_WQE_CTX            ; Locate CNF, LPD, ADJ blocks
             07 50    E9  2415                  BLBC    R0,10$                  ; If LPD no longer exists, skip event
                          2418                  CLRBIT  LPD$V_STRTIM,LPD$W_STS(R6) ; Indicate timer no longer running
              E974    30  241C                  BSBW    PROC_EVT                ; Process the event
              E966    30  241F  10$:            BSBW    KILL_WQE                ; Deallocate the WQE
                      05  2422                  RSB                             ; Return to caller
```

```
                    2423
                    2423  ;
                    2423  ; Startup X.25 datalink
                    2423  ;
                    2423
                    2423  X25_STARTUP:
                    2423          $GETFLD cri,l,mwi                 ; Get maximum X.25 window size
       03 50    E8  2430          BLBS    R0,62$                    ; Use it, if specified
    58    04    D0  2433          MOVL    #4,R8                     ; Use default value of 4
 1F A6    58    90  2436  62$:    MOVB    R8,LPD$B_XMT_IPL(R6)      ; Set input packet limiter
                    243A          $GETFLD cri,l,use                 ; Get circuit usage parameter
       0A 50    E9  2447          BLBC    R0,80$                    ; If not present, defaulting error
                    244A          $DISPATCH R8,<-                   ; Dispatch on X.25 circuit usage
                    244A             <NMA$C_CIRUS_PER,100$>,-       ; Permanent virtual circuit
                    244A             <NMA$C_CIRUS_OUT,200$>,-       ; Outgoing switched virtual circuit
                    244A             <NMA$C_CIRUS_INC,300$>,-       ; Wait for incoming call
                    244A          >
    51    00    D0  2454  80$:    MOVL    #LEV$C_NO_EVT,R1          ; No more events
          50    D4  2457          CLRL    R0                        ; Do not allow state change
                05  2459          RSB
                    245A
                    245A  ;
                    245A  ; Schedule PVC startup event.  This is done as a separate event because
                    245A  ; PVC startup is a multiple step process, since 3 QIOs have to be issued
                    245A  ;
          07    E0  245A  100$:   BBS     #LPD$V_PVC_ACCESSED,-     ; Is circuit already ACCESSed?
    0B 25 A6        245C                  LPD$B_PVCFLG(R6),150$     ; then skip this step
                88  245F          BISB    #LPD$M_PVC_ACCESS!-       ; For X.25 startup, schedule access,
                    2460                   LPD$M_PVC_RESTRT!-       ; restart, and
                    2460                   LPD$M_PVC_RESET,-        ; reset operations for the
 25 A6    07        2460                  LPD$B_PVCFLG(R6)          ; next time we start the X.25 datalink
    51    18    D0  2463          MOVL    #LEV$C_PVC_START,R1       ; Signal PVC startup needed
    50    01    D0  2466          MOVL    #1,R0                     ; Allow state change
                05  2469          RSB
                    246A
    51    10    D0  246A  150$:   MOVL    #LEV$C_LIN_UP,R1          ; Signal circuit is "up"
    50    01    D0  246D          MOVL    #1,R0                     ; Allow state change
                05  2470          RSB
                    2471
                    2471  ;
                    2471  ; Make outgoing switched call for X.25 datalink
                    2471  ;
                    2471  200$:   ;
                    2471          ;   If we have attempted to make the outgoing call too many times
                    2471          ;   (controlled by the MAXIMUM RECALLS parameter), then give up
                    2471          ;   and marked the circuit "failed".  This is done, rather than
                    2471          ;   turning off the circuit and deallocating the LPD, so that
                    2471          ;   the counters remain around afterwards.
                    2471          ;
                    2471          $GETFLD cri,l,mrc                 ; Get MAXIMUM RECALLS parameter
       0F 50    E9  247E          BLBC    R0,210$                   ; If not set, allow infinite retry
 58    0B A6    91  2481          CMPB    LPD$B_STARTUPS(R6),R8     ; Have we exceed the maximum?
          09    1B  2485          BLEQU   210$                      ; If not, let it go
       0B A6    94  2487          CLRB    LPD$B_STARTUPS(R6)        ; Reset # startup attempts
    51    1C    D0  248A          MOVL    #LEV$C_FAILED,R1          ; Mark circuit "failed"
          50    D4  248D          CLRL    R0                        ; Do not change state
                05  248F          RSB                               ; Process next event
```

```
                        2490  6619              ;
                        2490  6620              ;    Call PSI to make the call
                        2490  6621              ;
                        2490  6622 210$:        $GETFLD cri,l,mbl              ; Get MAXIMUM DATA parameter
           58     DD    249D  6623              PUSHL    R8                    ; Push value (0 if not set)
                        249F  6624              $GETFLD cri,l,mwi              ; Get MAXIMUM WINDOW parameter
           58     DD    24AC  6625              PUSHL    R8                    ; Push value (0 if not set)
                        24AE  6626              $GETFLD cri,s,num              ; Get remote DTE address
        52 50     E9    24BB  6627              BLBC     R0,290$               ; If not present, defaulting error
     59    5E     D0    24BE  6628              MOVL     SP,R9                 ; Point to MWI, MBL longwords
     51    2C     D0    24C1  6629              MOVL     #8+21+15,R1           ; Set length of extra QIO buffer
         060A     30    24C4  6630              BSBW     NET$DLL_QIO_CO        ; Allocate and init WQE (co-routine)
 0038'C2   53     D0    24C7  6631              MOVL     R3,WQE$C_LENGTH+P2(R2)  ; Set P2 to NCB descriptor
   50    08 A3    9E    24CC  6632              MOVAB    8(R3),R0              ; Point to actual P2 buffer
     83    50     CE    24D0  6633              MNEGL    R0,(R3)+              ; Construct NCB descriptor
     83    50     D0    24D3  6634              MOVL     R0,(R3)+
           69     D5    24D6  6635              TSTL     (R9)                  ; MAXIMUM WINDOW specified?
           09     13    24D8  6636              BEQL     230$                  ; Branch if not
     83    08     B0    24DA  6637              MOVW     #8,(R3)+              ; Set size of item
     83    16     B0    24DD  6638              MOVW     #PSI$C_NCB_WINSIZE,(R3)+ ; Set item code
     83    69     D0    24E0  6639              MOVL     (R9),(R3)+            ; Store maximum window size
        04 A9     D5    24E3  6640 230$:        TSTL     4(R9)                 ; MAXIMUM DATA specified?
           0A     13    24E6  6641              BEQL     240$                  ; Branch if not
     83    08     B0    24E8  6642              MOVW     #8,(R3)+              ; Set size of item
     83    15     B0    24EB  6643              MOVW     #PSI$C_NCB_PKTSIZE,(R3)+ ; Set item code
   83   04 A9     D0    24EE  6644              MOVL     4(R9),(R3)+           ; Store maximum packet size
83   57    05     A1    24F2  6645 240$:        ADDW3    #5,R7,(R3)+           ; Set size of item
     83    01     B0    24F6  6646              MOVW     #PSI$C_NCB_REMDTE,(R3)+ ; Set item code
           34     BB    24F9  6647              PUSHR    #^M<R2,R4,R5>         ; Save registers
     83    57     90    24FB  6648              MOVB     R7,(R3)+              ; Move byte count of DTE string
63   68    57     28    24FE  6649              MOVC     R7,(R8),(R3)          ; Move DTE address into NCB
           34     BA    2502  6650              POPR     #^M<R2,R4,R5>         ; Restore registers
 0038'D2   53     C0    2504  6651              ADDL     R3,@WQE$C_LENGTH+P2(R2) ; Set size in P2 descriptor
50   0000'8F      3C    2509  6652              MOVZWL   #IO$_ACCESS,R0        ; Setup I/O function code
           9E     16    250E  6653              JSB      @(SP)+                ; Queue I/O
     5E    08     C0    2510  6654 290$:        ADDL     #8,SP                 ; Pop max window & max data
     51    00     D0    2513  6655              MOVL     #LEV$C_NO_EVT,R1      ; No more events
                  05    2516  6656              RSB                            ; Exit with R0 set true/false
                        2517  6657
                        2517  6658 ;
                        2517  6659 ; Mark the circuit as being able to accept incoming X.25 calls
                        2517  6660 ;
                        2517  6661 300$:        SETBIT   LPD$V_INCOMING,LPD$W_STS(R6) ; Mark circuit waiting for call
         FF35     31    251C  6662              BRW      80$                   ; Exit without any state change
```

```
                               251F  6664          .SBTTL  ACT_PVC_START - Start an X.25 PVC in multiple steps
                               251F  6665 ;+
                               251F  6666 ; ACT_PVC_START - Start a PVC in multiple steps
                               251F  6667 ;
                               251F  6668 ; Inputs:
                               251F  6669 ;
                               251F  6670 ;       R11 = CRI CNR address
                               251F  6671 ;       R10 = CRI CNF address
                               251F  6672 ;       R6 = LPD address
                               251F  6673 ;       R5 = WQE address
                               251F  6674 ;       R4 = RCB address
                               251F  6675 ;
                               251F  6676 ; Outputs:
                               251F  6677 ;
                               251F  6678 ;       R1 = Next event to be processed
                               251F  6679 ;       R0 = True if state change allowed, false if not.
                               251F  6680 ;-
                               251F  6681 ACT_PVC_START:
                               251F  6682 ;
                               251F  6683 ;   Determine the next step to be done in the startup process
                               251F  6684 ;
  52   25 A6   04    00    EA  251F  6685          FFS     #0,#4,LPD$B_PVCFLG(R6),R2 ; Get next thing we have to do
                               2525  6686                                          ; (NOTE: only use low nibble)
                   0A    13    2525  6687          BEQL    900$                      ; If nothing left, startup is complete
                               2527  6688          $DISPATCH R2,<-                   ; Dispatch on flag
                               2527  6689             <LPD$V_PVC_ACCESS,110$>,-      ; Issue the IO$_ACCESS function
                               2527  6690             <LPD$V_PVC_RESTRT,120$>,-      ; Issue a "restart confirmation"
                               2527  6691             <LPD$V_PVC_RESET,130$>,-       ; Issue a "reset" or "reset confirmation"
                               2527  6692          >
             51    10    D0    2531  6693 900$:    MOVL    #LEV$C_LIN_UP,R1          ; Signal that startup is complete
             50    01    D0    2534  6694          MOVL    #1,R0                     ; Allow state change
                         05    2537  6695          RSB
                               2538  6696 ;
                               2538  6697 ; Issue IO$_ACCESS function to access the PVC
                               2538  6698 ;
                               2538  6699 110$:    $GETFLD cri,s,nam                 ; Get PVC name
          70 50          E9    2545  6700          BLBC    R0,80$                    ; If not present, CNF is not right
                               2548  6701          CLRBIT  LPD$V_PVC_ACCESS,LPD$B_PVCFLG(R6) ; Indicate this work is done
             51    1C    D0    254C  6702          MOVL    #8+5+T5,RT                ; Set length of extra QIO buffer
               057F      30    254F  6703          BSBW    NET$DLL_QIO_CO            ; Allocate and init WQ' (co-routine)
      0038'C2      53    D0    2552  6704          MOVL    R3,WQE$C_LENGTH+P2(R2)    ; Set P2 to NCB descriptor
      83     57    05    C1    2557  6705          ADDL3   #5,R7,(R3)+               ; Construct NCB descriptor
        83   04    A3    9E    255B  6706          MOVAB   4(R3),(R3)+
      83     57    05    A1    255F  6707          ADDW3   #5,R7,(R3)+               ; Set size of item
             83    18    B0    2563  6708          MOVW    #PSI$C_NCB_PVCNAM,(R3)+   ; Set item code
                   3C    BB    2566  6709          PUSHR   #^M<R2,R3,R4,R5>          ; Save registers
             83    57    90    2568  6710          MOVB    R7,(R3)+                  ; Move byte count of PVC name
      63     68    57    28    256B  6711          MOVC    R7,(R8),(R3)              ; Move PVC name into NCB
                   3C    BA    256F  6712          POPR    #^M<R2,R3,R4,R5>          ; Restore registers
      50   0000'8F       3C    2571  6713          MOVZWL  #IO$_ACCESS,R0            ; Setup I/O function code
        10 A2      18    90    2576  6714          MOVB    #LEV$C_PVC_START,WQE$B_EVT(R2) ; Return here if I/O successful
                         05    257A  6715          RSB                               ; Issue I/O and exit
                               257B  6716 ;
                               257B  6717 ; Issue "restart confirmation" on the PVC, and ignore any error if there
                               257B  6718 ; is no restart to confirm.  This is done because the PVC is always active,
                               257B  6719 ; and a restart operation puts the circuit into a known state.
                               257B  6720 ;
                   257B  6721 120$:   SETBIT  LPD$V_PVC_ACCESSED,-      ; Indicate PVC now ACCESSed
                   257B  6722                 LPD$B_PVCFLG(R6)
                   2580  6723         CLRBIT  LPD$V_PVC_RESTRT,LPD$B_PVCFLG(R6) ; Indicate this work is done
          51   D4  2584  6724         CLRL    R1                        ; No QIO buffer needed
        0548   30  2586  6725         BSBW    NET$DLL_QIO_CO            ; Allocate and init WQE (co-routine)
0030'C2   07   D0  2589  6726         MOVL    #PSI$C_RESTART,WQE$C_LENGTH+P4(R2) ; Set P4 to "restart"
50   0000'8F   3C  258E  6727         MOVZWL  #IO$_NETCONTROL,R0        ; Set I/O function code
  10 A2   18   90  2593  6728         MOVB    #LEV$C_PVC_START,WQE$B_EVT(R2) ; Return here if I/O successful
  14 A2   18   90  2597  6729         MOVB    #LEV$C_PVC_START,WQE$L_PM2(R2) ; Return here if I/O fails too
               05  259B  6730         RSB                               ; Issue I/O and exit
                   259C  6731 ;
                   259C  6732 ; Issue "reset" or "reset confirmation" on the PVC, and ignore any errors.
                   259C  6733 ; This is done to clear any outstanding received messages from the previous
                   259C  6734 ; user of the PVC.
                   259C  6735 ;
                   259C  6736 130$:   CLRBIT  LPD$V_PVC_RESET,LPD$B_PVCFLG(R6) ; Indicate this work is done
          51   D4  25A0  6737         CLRL    R1                        ; No QIO buffer needed
        052C   30  25A2  6738         BSBW    NET$DLL_QIO_CO            ; Allocate and init WQE (co-routine)
0030'C2   03   D0  25A5  6739         MOVL    #PSI$C_RESET,WQE$C_LENGTH+P4(R2) ; Set P4 to "reset"
50   0000'8F   3C  25AA  6740         MOVZWL  #IO$_NETCONTROL,R0        ; Set I/O function code
  10 A2   18   90  25AF  6741         MOVB    #LEV$C_PVC_START,WQE$B_EVT(R2) ; Return here if I/O successful
  14 A2   18   90  25B3  6742         MOVB    #LEV$C_PVC_START,WQE$L_PM2(R2) ; Return here if I/O fails too
               05  25B7  6743         RSB                               ; Issue I/O and exit
                   25B8  6744
                   25B8  6745 ;
                   25B8  6746 ; Come here if an error was encountered before beginning the startup
                   25B8  6747 ; to abort the operation, and wait until the supression timer causes it to
                   25B8  6748 ; be tried again.
                   25B8  6749 ;
     51   00   D0  25B8  6750 80$:    MOVL    #LEV$C_NO_EVT,R1          ; No more events
          50   D4  25BB  6751         CLRL    R0                        ; Don't allow state change
               05  25BD  6752         RSB
```

```
                          25BE          .SBTTL  ACT_X25_CALL - Accept incoming X.25 call
                          25BE  ;+
                          25BE  ; ACT_X25_CALL - Accept incoming X.25 call
                          25BE  ;
                          25BE  ; This circuit has already been determined to be waiting for an incoming
                          25BE  ; cal, and allocated for that purpose.  All we have to do for this event
                          25BE  ; is issue the ACCEPT QIO.  On successful I/O completion, the transition
                          25BE  ; will be made to the Routing Initialization state.
                          25BE  ;
                          25BE  ; Inputs:
                          25BE  ;
                          25BE  ;       R11 = CRI CNR address
                          25BE  ;       R10 = CRI CNF address
                          25BE  ;       R6 = LPD address
                          25BE  ;       R5 = WQE address
                          25BE  ;       R4 = RCB address
                          25BE  ;
                          25BE  ; Outputs:
                          25BE  ;
                          25BE  ;       R1 = Next event to be processed
                          25BE  ;       R0 = True if state change allowed, false if not.
                          25BE  ;-
                          25BE  ACT_X25_CALL:
   51    14 A5      3C    25BE          MOVZWL  WQE$L_PM2(R5),R1          ; Get size of X.25 NCB
      51    08      C0    25C2          ADDL    #8,R1                     ; Add in size of NCB descriptor
          0509      30    25C5          BSBW    NET$DLL_QIO_CO            ; Allocate and init WQE (co-routine)
 0038'C2    53      D0    25C8          MOVL    R3,WQE$C_LENGTH+P2(R2)    ; Set P2 to NCB descriptor
   83    14 A5      3C    25CD          MOVZWL  WQE$L_PM2(R5),(R3)+       ; Construct NCB descriptor
   83    04 A3      9E    25D1          MOVAB   4(R3),(R3)+
            3C      BB    25D5          PUSHR   #^M<R2,R3,R4,R5>          ; Save registers
         14 A5      28    25D7          MOVC    WQE$L_PM2(R5),-           ; Move NCB into I/O WQE
   63    24 A5            25DA                  WQE$C_LENGTH(R5),(R3)
            3C      BA    25DD          POPR    #^M<R2,R3,R4,R5>          ; Restore registers
            13      10    25DF          BSBB    CHK_CIRC_START            ; Check if circuit can be started
         06 50      E9    25E1          BLBC    R0,10$                    ; Branch if not
   50    0000'8F    3C    25E4          MOVZWL  #IO$_ACCESS!IO$M_ACCEPT,R0 ; Setup I/O function code
                    05    25E9          RSB                               ; Issue QIO and exit
                          25EA  ;
                          25EA  ; Circuit is not in a state to be started - change QIO to be a ''REJECT''
                          25EA  ; and on I/O completion, cause the circuit to be recycled.
                          25EA  ;
   50    0000'8F    3C    25EA  10$:    MOVZWL  #IO$_ACCESS!IO$M_ABORT,R0 ; Setup I/O function code
    10 A2    04     90    25EF          MOVB    #LEV$C_REQ_SHUT,WQE$B_EVT(R2) ; Recycle circuit on success
                    05    25F3          RSB                               ; Issue QIO and exit
```

```
                             25F4             .SBTTL  CHK_CIRC_START - Check if circuit can be started
                             25F4       ;+
                             25F4       ; CHK_CIRC_START - Check if circuit can be started
                             25F4       ;
                             25F4       ; Determine if the circuit can be started by examining the associated
                             25F4       ; line state, and by making sure that the ACP's state is on.
                             25F4       ;
                             25F4       ; Inputs:
                             25F4       ;
                             25F4       ;         R4 = RCB address
                             25F4       ;         R6 = LPD address
                             25F4       ;
                             25F4       ; Outputs:
                             25F4       ;
                             25F4       ;         R0 = True if startup allowed, else false
                             25F4       ;
                             25F4       ;         No other registers are destroyed.
                             25F4       ;-
                             25F4       CHK_CIRC_START:
                  52   DD    25F4             PUSHL   R2                        ; Save registers
                             25F6             ;
                             25F6             ;   Check to make sure that the associated line is "on"
                             25F6             ;
             52  28 A6   9A    25F6             MOVZBL  LPD$B_PLVEC(R6),R2        ; Get the associated line index
           00000000'EF   16    25FA             JSB     NET$GET_VEC2              ; Setup the line
                 2A 50   E9    2600             BLBC    R0,80$                    ; If LBC then setup failed
          0A 22 A6  07   E0    2603             BBS     #LPD$V_X25,LPD$W_STS(R6),25$ ; If X.25, there is no assoc. line
  00     00000000'EF42   91    2608             CMPB    PLVEC$AB_STATE[R2],-      ; Is the line "on"
                             2610                     #NMA$C_STATE_ON           ;
                  1B   12    2610             BNEQ    80$                       ; If NEQ no, can't start circuit
                             2612             ;
                             2612             ;   Check to make sure that the ACP state is not "off" or "init".
                             2612             ;
                             2612       25$:  $DISPATCH TYPE=B,RCB$B_STI(R4),<-
                             2612                     <ACP$C_STA_I, 80$>,-      ; Initializing
                             2612                     <ACP$C_STA_N, 50$>,-      ; On
                             2612                     <ACP$C_STA_R, 50$>,-      ; Restricted
                             2612                     <ACP$C_STA_S, 30$>,-      ; Shut
                             2612                     <ACP$C_STA_F, 80$>,-      ; Off
                             2612                     <ACP$C_STA_H, 80$>,-      ; Hibernating (due to bug)
                             2612             >
               54 A4   B5    2623       30$:  TSTW    RCB$W_MCOUNT(R4)          ; Time to shut down ?
                  05   13    2626             BEQL    80$                       ; If so, go away
            50    01   D0    2628       50$:  MOVL    #1,R0                     ; Successful
                  02   11    262B             BRB     90$
                             262D
                  50   D4    262D       80$:  CLRL    R0                        ; Do not allow circuit on
               52 8ED0       262F       90$:  POPL    R2                        ; Restore registers
                     05      2632             RSB
```

```
                              2633        .SBTTL  TOGGLE_LINE - Shutdown and startup line
                              2633  ;+
                              2633  ; TOGGLE_LINE - Toggle line state
                              2633  ;
                              2633  ; The line is indicating a fatal device error.  Turn the device
                              2633  ; OFF and ON in order to re-initialize it.
                              2633  ;
                              2633  ; Inputs:
                              2633  ;
                              2633  ;       R2 = PLVEC index
                              2633  ;
                              2633  ; Outputs:
                              2633  ;
                              2633  ;       R0 = Status from startup operation
                              2633  ;-
                              2633  TOGGLE_LINE:                                  ; Toggle line state
           0C64 8F       BB   2633        PUSHR   #^M<R2,R5,R6,R10,R11>         ; Save crucial regs
             56   52     D0   2637        MOVL    R2,R6                         ; Move PLVEC pointer to safe reg
   5B   00000000'EF      D0   263A        MOVL    NET$GL_CNR_PLI,R11            ; Get PLI root block
                  5A     D4   2641        CLRL    R10                           ; Search from begining of list
             58   56     D0   2643        MOVL    R6,R8                         ; Search key is the PLVEC index
                              2646        $SEARCH eql,pli,l,plvec               ; Find PLI's CNF block
              1C 50      E9   2655        BLBC    R0,100$                       ; If LBC then not found
  7E    00000000'EF46    9A   2658        MOVZBL  PLVEC$AB_STATE[R6],-(SP)      ; Save previous state
                  01     90   2660        MOVB    #NMA$C_STATE_OFF,-            ; Prepare to turn line off
        00000000'EF46         2662                PLVEC$AB_STATE[R6]            ;
                  0F     10   2668        BSBB    110$                          ; Turn the line off
                              266A                                              ; ...ignore errors
                  8E     F6   266A        CVTLB   (SP)+,-                       ; Prepare to turn line back on
        00000000'EF46         266C                PLVEC$AB_STATE[R6]            ;
                  05     10   2672        BSBB    110$                          ; Turn the line on
           0C64 8F       BA   2674  100$: POPR    #^M<R2,R5,R6,R10,R11>         ; Restore regs
                  05          2678        RSB                                   ; Return status in R0
                              2679
  52    00000000'EF46    3C   2679  110$: MOVZWL  PLVEC$AW_CHAN[R6],R2          ; Get I/O channel
                  51     D4   2681        CLRL    R1                            ; Clear "illegal" I/O fct code mask
                              2683        $CNFFLD pli,s,chr,R9                  ; Setup characteristics buffer i.d.
              D973'      30   268A        BSBW    NET$SET_QIOW                  ; Turn the line on
                  05          268D        RSB
```

```
                                 268E  6889         .SBTTL  ACT_XMT - Transmit pending messages
                                 268E  6890 ;+
                                 268E  6891 ; ACT_XMT   -   Conditionally xmit a message
                                 268E  6892 ;
                                 268E  6893 ; INPUTS:       R11     CRI CNR ptr
                                 268E  6894 ;               R10     CRI CNF ptr
                                 268E  6895 ;               R7      ADJ address
                                 268E  6896 ;               R6      LPD address
                                 268E  6897 ;               R5      WQE address
                                 268E  6898 ;               R4      RCB address
                                 268E  6899 ;
                                 268E  6900 ; OUTPUTS:      R5      Unchanged
                                 268E  6901 ;               R1      Next event to be processed
                                 268E  6902 ;               R0      Low bit set if state change is permitted,
                                 268E  6903 ;                       Low bit clear to avoid state change
                                 268E  6904 ;
                                 268E  6905 ;               All other regs may be clobbered.
                                 268E  6906 ;-
                                 268E  6907 ACT_XMT:                                   ; Xmit message if possible
                  0422     30    268E  6908         BSBW    CHK_IO                     ; Okay to xmit?
                 1A 50     E9    2691  6909         BLBC    R0,10$                     ; If LBC no
  52    24 A6   08    00   EA    2694  6910         FFS     #0,#8,LPD$B_XMTFLG(R6),R2 ; Get xmit flag
                    12     13    269A  6911         BEQL    10$                        ; If EQL then none set
                                 269C  6912         $DISPATCH R2,<-                    ; Dispatch on xmit flag
                                 269C  6913             <LPD$V_XMT_DALLY,XMT_DALLY>,- ; Wait to send start message
                                 269C  6914             <LPD$V_XMT_STR,  XMT_STR>,-  ; Transport "Start" message
                                 269C  6915             <LPD$V_XMT_VRF,  XMT_VRF>,-  ; Transport "Verification" message
                                 269C  6916             <LPD$V_XMT_RT,   XMT_RT>,-   ; Transport "Routing" message
                                 269C  6917             <LPD$V_XMT_ART,  XMT_ART>,-  ; Transport "Area Routing" message
                                 269C  6918             <LPD$V_XMT_IDLE, 100$>,-     ; All Transport init messages xmitted
                                 269C  6919         >
              51    01     D0    26AE  6920 10$:    MOVL    #LEV$C_EXIT,R1             ; Nothing to do, exit state table
              50    01     D0    26B1  6921         MOVL    #1,R0                      ; Allow state change
                           05    26B4  6922         RSB                                ;
                                 26B5  6923
                                 26B5  6924 100$:   CLRBIT  LPD$V_XMT_IDLE,-           ; Clear the flag
                                 26B5  6925                 LPD$B_XMTFLG(R6)           ;
              51    0F     D0    26B9  6926         MOVL    S^#LEV$C_XMT_IDLE,R1       ; Xmitter is idle during Transport init
              50    01     D0    26BC  6927         MOVL    #1,R0                      ; Allow state change
                           05    26BF  6928         RSB                                ;
```

```
                              26C0  6930          .SBTTL  XMT_DALLY - Dally before sending start message
                              26C0  6931  ;+
                              26C0  6932  ; XMT_DALLY - Dally before sending start message
                              26C0  6933  ;
                              26C0  6934  ; This routine is called to dally for a while before sending out the
                              26C0  6935  ; Start message.  This is so that we can properly initialize with older
                              26C0  6936  ; nodes which do not properly parse/ignore Phase IV start messages.  By
                              26C0  6937  ; dallying a while before sending, it gives us a chance to hear his start
                              26C0  6938  ; message, and send the correct version of the message based on the type
                              26C0  6939  ; of message he sends.
                              26C0  6940  ;
                              26C0  6941  ; Inputs:
                              26C0  6942  ;
                              26C0  6943  ;       R11 = CRI CNR address
                              26C0  6944  ;       R10 = CRI CNF address
                              26C0  6945  ;       R7 = ADJ address
                              26C0  6946  ;       R6 = LPD address
                              26C0  6947  ;
                              26C0  6948  ; Outputs:
                              26C0  6949  ;
                              26C0  6950  ;       None
                              26C0  6951  ;-
                              26C0  6952 XMT_DALLY:
         51    20 A6     3C   26C0  6953          MOVZWL  LPD$W_PTH(R6),R1        ; Get LPD ID
      51    51    10     78   26C4  6954          ASHL    #16,RT,R1               ; Shift into upper word (REQIDT)
      51    0100 8F      B0   26C8  6955          MOVW    #<WQE$C_QUAL_DLL@8>!-   ; Setup timer qualifier
                              26CD  6956                  LEV$C_NO_EVT,R1         ; and timer event
  53    00000000 01312D00 8F  7D   26CD  6957          MOVQ    #TR$C_TIM_DALLY*-       ; Set dally timer
                              26D8  6958                  10*1000*1000,R3
      52    E6A4 CF      9E   26D8  6959          MOVAB   NET$DLL_PRC_WQE,R2      ; and process event when it fires
             D920'       30   26DD  6960          BSBW    WQE$RESET_TIM           ; Start timer
                              26E0  6961          CLRBIT  #LPD$V_XMT_DALLY,-      ; We've done this now
                              26E0  6962                  LPD$B_XMTFLG(R6)
         51    01        D0   26E5  6963          MOVL    #LEV$C_EXIT,R1          ; Exit state table immediately
         50    01        D0   26E8  6964          MOVL    #1,R0                   ; Allow state change (if any)
                         05   26EB  6965          RSB
```

```
                              26EC             .SBTTL  XMT_STR - Transmit start message
                              26EC       ;+
                              26EC       ; XMT_STR -       Build and transmit a Transport "start" message
                              26EC       ;
                              26EC       ; INPUTS:         R11     CRI CNR ptr
                              26EC       ;                 R10     CRI CNF ptr
                              26EC       ;                 R7      ADJ address
                              26EC       ;                 R6      LPD address
                              26EC       ;                 R4      RCB address
                              26EC       ;
                              26EC       ; OUTPUTS:        R5      Unchanged
                              26EC       ;                 R1      Next event to be processed
                              26EC       ;                 R0      Low bit set if state change is permitted,
                              26EC       ;                         Low bit clear to avoid state change
                              26EC       ;
                              26EC       ;                 All other registers may be clobbered
                              26EC       ;-
                              26EC       XMT_STR:                                        ; Xmt a transport initialization msg
                              26EC               ASSUME  TR3C_STR_LNG  LE TR2C_STR_MXL
                              26EC
         51    50 8F     9A   26EC               MOVZBL  #TR2C_STR_MXL,R1                ; Setup size of P1 buffer
               03DE      30   26F0               BSBW    NET$DCL_QIO_CO                  ; Call co-routine to init WQE
      003C'C2    53      D0   26F3               MOVL    R3,WQE$C_LENGTH+P1(R2)          ; Point to buffer
      0038'C2    53      CE   26F8               MNEGL   R3,WQE$C_LENGTH+P2(R2)          ; Bias I/O buffer size
  5B   00000000'EF       D0   26FD               MOVL    NET$GL_CNR_LNI,R11              ; Set CNR for local data base
  5A   00000000'EF       D0   2704               MOVL    NET$GL_PTR_LNI,R10              ; Get LNI CNF
         50    1D A6     9A   270B               MOVZBL  LPD$B_ETY(R6),R0                ; Get our (adapted) "node type"
50   0000014A'EF40       9A   270F               MOVZBL  PTY_TO_PHASE[R0],R0             ; Get our (adapted) "phase"
                              2717               $DISPATCH R0,<-
                              2717                       <2,STR2>,-                      ; Phase II
                              2717                       <3,STR3>,-                      ; Phase III
                              2717                       <4,STR4>>                       ; Phase IV
         51    01        D0   2721               MOVL    S^#LEV$C_EXIT,R1                ; Don't do anything
               50        94   2724               CLRB    R0                              ; Inhibit state change
               05             2726               RSB                                     ; Return with LBC in R0
                              2727               ;
                              2727               ;   Build and transmit Phase II "init" message
                              2727               ;
               57        DD   2727       STR2:   PUSHL   R7                              ; Save registers
      83    58 8F        90   2729               MOVB    #TR2C_MSG_INI,(R3)+             ; Enter message type code
         83    01        90   272D               MOVB    #TR2C_INI_STR,(R3)+             ; Enter message sub-type code
                              2730
               00        EF   2730               EXTZV   #TR4$V_ADDR_DEST,-              ; Get our address (without area)
   50    0E A4 0A             2732                       #TR4$S_ADDR_DEST,RCB$W_ADDR(R4),R0
         50    02        A4   2736               MULW    #2,R0                           ; Start converting address to EX-2 field
         50    02        86   2739               DIVB2   #2,R0                           ; Now bits 7-15 are shifted
 83   50    0080 8F      A9   273C               BISW3   #128,R0,(R3)+                   ; Set the extend bit and enter it
                              2742               $CNFFLD lni,s,nam,R9                    ; Identify local node name field
            00A1         30   2749               BSBW    MOVIT                           ; Fetch and enter the string
         83    00        90   274C               MOVB    #TR2C_STR_FCT,(R3)+             ; Enter supported functions
         83    07        90   274F               MOVB    #TR2C_STR_REQ!-                 ;
                              2752                        TR2M_REQ_VRF,(R3)+             ; Enter 'requests'
      83    50 A6        B0   2752               MOVW    LPD$W_BUFSIZ(R6),(R3)+          ; Enter block size
      83    7C A4        B0   2756               MOVW    RCB$W_ECLSEGSIZ(R4),(R3)+ ; Enter NSP segment size
      83    58 A4        B0   275A               MOVW    RCB$W_MAX_LNK(R4),(R3)+   ; Enter max links
   83     0103 8F        B0   275E               MOVW    #^X<0T03>,(R3)+                 ; Enter PhaseII compatable routing
               83        94   2763               CLRB    (R3)+                           ; version (3.1.0)
      83   0103 8F    B0  2765          MOVW    #^X<0103>,(R3)+          ; Enter PhaseII compatable NSP version
                 83   94  276A          CLRB    (R3)+                    ; (3.1.0)
                          276C          $CNFFLD lni,s,ide,R9             ; Identify system version field
                 78   10  2773          BSBB    MOVIT                    ; Fetch and enter the string
                 57 8ED0  2775          POPL    R7                       ; Restore registers
                 66   11  2778          BRB     XMT                      ; Return to co-routine to xmt the msg
                          277A          ;
                          277A          ;  Build Phase III "start" message
                          277A          ;
            83   01   90  277A STR3:    MOVB    #TR3C_MSG_STR,(R3)+      ; Enter msg type code
                 00   EF  277D          EXTZV   #TR4$V_ADDR_DEST,-       ; Get our address (without area)
     50    0E A4 0A       277F                  #TR4$S_ADDR_DEST,RCB$W_ADDR(R4),R0
            83   50   B0  2783          MOVW    R0,(R3)+                 ; Enter the local address in msg
                          2786          $DISPATCH LPD$B_ETY(R6),TYPE=B,<-
                          2786                  <ADJ$C_PTY_PH3,2$>,-     ; Phase III routing
                          2786                  <ADJ$C_PTY_PH3N,3$>>     ; Phase III endnode
            83   02   90  278F 2$:      MOVB    #TR3C_NTY_PH3,(R3)+      ; Set local node type (Level 1 Routing)
                 03   11  2792          BRB     10$
            83   03   90  2794 3$:      MOVB    #TR3C_NTY_PH3N,(R3)+     ; Set local node type (Nonrouting)
                          2797 10$:     SETBIT  #TR3V_REQ_VRF,-1(R3)     ; request for verification
         83    50 A6  B0  279C          MOVW    LPD$W_BUFSIZ(R6),(R3)+   ; Enter block size
      83   0301 8F    B0  27A0          MOVW    #TR3C_TIVER,(R3)+        ; Enter routing version number
            83   00   90  27A5          MOVB    #0,(R3)+                 ; Enter user ECO number
                 83   94  27A8          CLRB    (R3)+                    ; Enter the verification seed
                 34   11  27AA          BRB     XMT                      ; Transmit the message
                          27AC          ;
                          27AC          ;  Build and transmit Phase IV "start" message
                          27AC          ;
            83   01   90  27AC STR4:    MOVB    #TR4C_MSG_STR,(R3)+      ; Enter msg type code
         83    0E A4  B0  27AF          MOVW    RCB$W_ADDR(R4),(R3)+     ; Enter the local address
                          27B3          $DISPATCH LPD$B_ETY(R6),TYPE=B,<-
                          27B3                  <ADJ$C_PTY_AREA,1$>,-    ; Phase IV level 2 routing
                          27B3                  <ADJ$C_PTY_PH4,2$>,-     ; Phase IV routing
                          27B3                  <ADJ$C_PTY_PH4N,3$>>     ; Phase IV endnode
            83   02   90  27BE 2$:      MOVB    #TR4C_NTY_ROU,(R3)+      ; Set local node type (Level 1 Routing)
                 08   11  27C1          BRB     10$
            83   01   90  27C3 1$:      MOVB    #TR4C_NTY_ARO,(R3)+      ; Set local node type (Level 2 Routing)
                 03   11  27C6          BRB     10$
            83   03   90  27C8 3$:      MOVB    #TR4C_NTY_NROU,(R3)+     ; Set local node type (Nonrouting)
                          27CB 10$:     SETBIT  #TR4V_REQ_VRF,-1(R3)     ; Set request for verification
         83    50 A6  B0  27D0          MOVW    LPD$W_BUFSIZ(R6),(R3)+   ; Enter block size
            83   02   B0  27D4          MOVW    #TR4C_TIVER,(R3)+        ; Enter routing version number
            83   00   90  27D7          MOVB    #0,(R3)+                 ; Enter user ECO number
         83    18 A6  B0  27DA          MOVW    LPD$W_INT_TLK(R6),(R3)+  ; Enter hello timer
                 83   94  27DE          CLRB    (R3)+                    ; No optional data
                          27E0          ;
                          27E0          ;  Transmit message
                          27E0          ;
      0038'C2    53   C0  27E0 XMT:     ADDL    R3,WQE$C_LENGTH+P2(R2)   ; Calculate I/O buffer size
            50   00'  D0  27E5          MOVL    S^#IO$_WRITELBLK,R0      ; Setup I/O function
                          27E8          CLRBIT  LPD$V_XMT_STR,-          ; No further need to send message
                          27E8                   LPD$B_XMTFLG(R6)        ;
                      05  27EC          RSB                              ; Return to co-routine, then to caller
                          27ED
                          27ED
               D810'  30  27ED MOVIT:   BSBW    CNF$GET_FIELD            ; Fetch the string
            83   57   90  27F0          MOVB    R7,(R3)+                 ; Enter count field
```

```
                 03   11  27F3  7081          BRB     MOVITU                  ; Go to end of loop
            83   88   90  27F5  7082 MC1:     MOVB    (R8)+,(R3)+             ; Enter text without clobbering  R0-R5
              FA 57   F4  27F8  7083 MOVITU:  SOBGEQ  R7,MC1                  ; Loop for each character
                      05  27FB  7084          RSB
```

```
                                     27FC  7086         .SBTTL  XMT_VRF - Transmit verification message
                                     27FC  7087 ;+
                                     27FC  7088 ; XMT_VRF   - Build and transmit Transport verification message
                                     27FC  7089 ;
                                     27FC  7090 ; INPUTS:       R11     CRI CNR ptr
                                     27FC  7091 ;               R10     CRI CNF ptr
                                     27FC  7092 ;               R7      ADJ ptr
                                     27FC  7093 ;               R6      LPD ptr
                                     27FC  7094 ;               R4      RCB ptr
                                     27FC  7095 ;
                                     27FC  7096 ; OUTPUTS:      R5      Unchanged
                                     27FC  7097 ;               R1      Next "event longword" to be processed
                                     27FC  7098 ;               R0      Low bit set if state change is permitted,
                                     27FC  7099 ;                       Low bit clear to avoid state change
                                     27FC  7100 ;
                                     27FC  7101 ;               All other registers may be clobbered
                                     27FC  7102 ;-
                                     27FC  7103 XMT_VRF:                                ; Xmt Transport verification message
              5B   00000000'EF   D0  27FC  7104         MOVL    NET$GL_CNR_NDI,R11      ; Set CNR for remote node data base
                    58  04 A7    3C  2803  7105         MOVZWL  ADJ$W_PNA(R7),R8        ; Get partner's node address
                           06    12  2807  7106         BNEQ    20$                     ; Not yet known  if EQL
                       51  01    D0  2809  7107         MOVL    S^#LEV$C_EXIT,R1        ; Partner is not yet known, - i.e.,
                                     280C  7108                                         ;  no 'start' message yet
                           50    94  280C  7109         CLRB    R0                      ; Inhibit state change
                                 05  280E  7110         RSB                             ; Return with LBC in R0
                                     280F  7111 20$:    ;
                                     280F  7112         ;   Get the transmit verification password
                                     280F  7113         ;
                           57    DD  280F  7114         PUSHL   R7                      ; Save ADJ address
                          D7EC'  30  2811  7115         BSBW    NET$NDI_BY_ADD          ; Find NDI CNF for partner node
                           57    D4  2814  7116         CLRL    R7                      ; Zero password string size assuming
                                     2816  7117                                         ; no NDI was found
                        0D 50    E9  2816  7118         BLBC    R0,30$                  ; If LBC then no NDI was found
                                     2819  7119         $GETFLD ndi.s.tpa               ; Get transmit password descriptor
                                     2826  7120                                         ; R7,R8 = 0 on return if field is null
                       58  57    7D  2826  7121 30$:    MOVQ    R7,R8                   ; Pass password descriptor in R8/R9
                           57 8ED0   2829  7122         POPL    R7                      ; Restore ADJ address
                                     282C  7123         ;
                                     282C  7124         ;   Build and transmit the message
                                     282C  7125         ;
                    51  46 8F    9A  282C  7126         MOVZBL  #TR_C_VRF_LNG+2,R1      ; Setup size of I/O buffer   ;! +2 is tmp
                          029E   30  2830  7127         BSBW    NET$DCL_QIO_CO          ; Call co-routine to init WQE
                  003C'C2  53    D0  2833  7128         MOVL    R3,WQE$C_LENGTH+P1(R2)  ; Point to buffer
                  0038'C2  53    CE  2838  7129         MNEGL   R3,WQE$C_LENGTH+P2(R2)  ; Bias I/O buffer size
                    50  1D A6    9A  283D  7130         MOVZBL  LPD$B_ETY(R6),R0        ; Get our (adapted) "node type"
            50   0000014A'EF40   9A  2841  7131         MOVZBL  PTY_TO_PHASE[R0],R0     ; Get our (adapted) "phase"
                                     2849  7132         $DISPATCH R0,<=
                                     2849  7133                 <2,60$>,-               ; Phase II
                                     2849  7134                 <3,50$>,-               ; Phase III
                                     2849  7135                 <4,40$>>                ; Phase IV
                       51  01    D0  2853  7136         MOVL    S^#LEV$C_EXIT,R1        ; Don't do anything
                           50    94  2856  7137         CLRB    R0                      ; Inhibit state change
                                 05  2858  7138         RSB                             ; Return with LBC in R0
                                     2859  7139         ;
                                     2859  7140         ;   Build Phase IV header
                                     2859  7141         ;
                       83  03    90  2859  7142 40$:    MOVB    #TR4C_MSG_VRF,(R3)+     ; Enter message type code
```

```
             83   0E A4   B0 285C          MOVW    RCB$W_ADDR(R4),(R3)+     ; Enter local node address
                83   58   90 2860          MOVB    R8,(R3)+                 ; Enter length of password
                50   58   D0 2863          MOVL    R8,R0                    ; Setup msg psw field size
                     1E   11 2866          BRB     70$                      ; Continue in common
                             2868          ;
                             2868          ;       Build Phase III header
                             2868          ;
                83   03   90 2868 50$:     MOVB    #TR3C_MSG_VRF,(R3)+      ; Enter message type code
                     00   EF 286B          EXTZV   #TR4$V_ADDR_DEST,-       ; Get our address (without area)
        50   0E A4   0A      286D                  #TR4$S_ADDR_DEST,RCB$W_ADDR(R4),R0
                83   50   B0 2871          MOVW    R0,(R3)+                 ; Enter local node address
                83   58   90 2874          MOVB    R8,(R3)+                 ; Enter length of password
                50   58   D0 2877          MOVL    R8,R0                    ; Setup msg psw field size
                     0A   11 287A          BRB     70$                      ; Continue in common
                             287C          ;
                             287C          ;       Build Phase II header
                             287C          ;
             83   58 8F   90 287C 60$:     MOVB    #TR2C_MSG_INI,(R3)+      ; Enter message type code
                83   02   90 2880          MOVB    #TR2C_INI_VRF,(R3)+      ; Enter message sub-type code
                50   08   D0 2883          MOVL    #8,R0                    ; Setup msg psw field size
                             2886          ;
                             2886          ;       Move the password
                             2886          ;
                     34   BB 2886 70$:     PUSHR   #^M<R2,R4,R5>            ; Save regs
   63   50   00   69   58   2C 2888        MOVC5   R8,(R9),#0,R0,(R3)       ; Move the password - null fill
                     34   BA 288E          POPR    #^M<R2,R4,R5>            ; Restore regs
            0038'C2  53   C0 2890          ADDL    R3,WQE$C_LENGTH+P2(R2)   ; Calculate I/O buffer size
                50   00'  D0 2895          MOVL    S^#IO$_WRITELBLK,R0      ; Setup I/O function
                             2898          CLRBIT  LPD$V_XMT_VRF,-          ; No further need to send message
                             2898                   LPD$B_XMTFLG(R6)        ;
                          05 289C          RSB                              ; Return to co-routine, then to caller
```

```
                             289D   7175          .SBTTL  XMT_RT - Transmit a routing message
                             289D   7176 ;+
                             289D   7177 ; XMT_RT - Transmit a routing message
                             289D   7178 ;
                             289D   7179 ;  INPUTS:      R11      CRI CNR ptr
                             289D   7180 ;               R10      CRI CNF ptr
                             289D   7181 ;               R7       ADJ ptr
                             289D   7182 ;               R6       LPD ptr
                             289D   7183 ;               R4       RCB address
                             289D   7184 ;
                             289D   7185 ;  OUTPUTS:     R5       Unchanged
                             289D   7186 ;               R1       Next event to be processed
                             289D   7187 ;               R0       Low bit set if state change is permitted,
                             289D   7188 ;                        Low bit clear to avoid state change
                             289D   7189 ;
                             289D   7190 ;               All other regs may be clobbered
                             289D   7191 ;-
                             289D   7192 XMT_RT:                                    ; Xmit routing message
                             289D   7193          $DISPATCH LPD$B_ETY(R6),TYPE=B,<- ; If we are an endnode,
                             289D   7194                  <ADJ$C_PTY_PH4N,110$>,- ; never send rtg messages
                             289D   7195                  <ADJ$C_PTY_PH3N,110$>>
                  0A   E0    28AC   7196          BBS     #LPD$V_BC,-               ; If broadcast circuit, always
               70 22 A6      28AE   7197                  LPD$W_STS(R6),XMT_RT4     ; send Phase IV routing messages
             50   1D A6   9A 28B1   7198          MOVZBL  LPD$B_ETY(R6),R0          ; Get our (adapted) "node type"
   04    0000014A'EF40    91 28B5   7199          CMPB    PTY_TO_PHASE[R0],#4       ; Are we supposed to be Phase IV?
                  62   13    28BD   7200          BEQL    XMT_RT4                   ; If so, go to Phase IV routine
                             28BF   7201          ;
                             28BF   7202          ;    Allocate and setup the buffer
                             28BF   7203          ;
             51   5A A4   3C 28BF   7204          MOVZWL  RCB$W_MAX_ADDR(R4),R1     ; Get number of nodes
               51   51   C0  28C3   7205          ADDL    R1,R1                     ; Need 1 word per entry
               51   05   C0  28C6   7206          ADDL    #3+2,R1                   ; Add in header and trailer
                0205   30    28C9   7207          BSBW    NET$DLL_QIO_CO            ; Call co-routine to allocate buffer
          003C'C2   53   D0  28CC   7208          MOVL    R3,WQE$C_LENGTH+P1(R2)    ; Point to I/O buffer
          0038'C2   53   CE  28D1   7209          MNEGL   R3,WQE$C_LENGTH+P2(R2)    ; Bias the I/O buffer length
                             28D6   7210          ;
                             28D6   7211          ;   Build the message
                             28D6   7212          ;
                    57   DD  28D6   7213          PUSHL   R7                        ; Save registers
               83   07   90  28D8   7214          MOVB    #TR3C_MSG_RT,(R3)+        ; Enter type code
                    00   EF  28DB   7215          EXTZV   #TR4$V_ADDR_DEST,-        ; Get our address (without area)
        50   0E A4  0A       28DD   7216                  #TR4$S_ADDR_DEST,RCB$W_ADDR(R4),R0
               83   50   B0  28E1   7217          MOVW    R0,(R3)+                  ; Enter source node address
                    57   D4  28E4   7218          CLRL    R7                        ; Init check sum
             50   5A A4   3C 28E6   7219          MOVZWL  RCB$W_MAX_ADDR(R4),R0     ; Get number of nodes
               51   01   D0  28EA   7220          MOVL    #1,R1                     ; Init the node index
   58    00000100'EF41   B0  28ED   7221 50$:     MOVW    NET$AW_MIN_C_H[R1],R8     ; Get cost-hops to the node
               83   58   B0  28F5   7222          MOVW    R8,(R3)+                  ; Enter cost-hops to the node
               57   58   A0  28F8   7223          ADDW    R8,R7                     ; Include in checksum
               57   00   D8  28FB   7224          ADWC    #0,R7                     ; 1's complement add - needs
                             28FE   7225                                            ; "end around carry"
                    51   D6  28FE   7226          INCL    R1                        ; Advance the node index
                 EA 50   F5  2900   7227          SOBGTR  R0,50$                    ; Loop for each node
               83   57   B0  2903   7228          MOVW    R7,(R3)+                  ; Enter the check sum
                  57 8ED0    2906   7229          POPL    R7                        ; Restore registers
          0038'C2   53   C0  2909   7230          ADDL    R3,WQE$C_LENGTH+P2(R2)    ; Setup I/O buffer size
               50   00'  D0  290E   7231          MOVL    S^#IO$_WRITELBLK,R0       ; Setup I/O fct code
```

```
                 2911  7232          CLRBIT  LPD$V_XMT_RT,-          ; No further need to send message
                 2911  7233                    LPD$B_XMTFLG(R6)      ;
             05  2915  7234          RSB                             ; Return to co-routine to xmit
                 2916  7235
                 2916  7236 ;
                 2916  7237 ; We are an endnode.  Don't send routing messages.
                 2916  7238 ;
                 2916  7239
                 2916  7240 110$:   CLRBIT  LPD$V_XMT_RT,-          ; No further need to send message
                 2916  7241                    LPD$B_XMTFLG(R6)      ;
 51    00    D0  291A  7242          MOVL    #LEV$C_NO_EVT,R1        ; No more events
 50    01    D0  291D  7243          MOVL    #1,R0                   ; Allow state change
             05  2920  7244          RSB
```

```
                                 2921        .SBTTL  XMT_RT4 - Transmit a Phase IV routing message
                                 2921 ;+
                                 2921 ; XMT_RT4 - Transmit a Phase IV segmented routing message
                                 2921 ;
                                 2921 ; Inputs:
                                 2921 ;
                                 2921 ;       R11 = CRI CNR address
                                 2921 ;       R10 = CRI CNF address
                                 2921 ;       R7 = ADJ address
                                 2921 ;       R6 = LPD address
                                 2921 ;       R4 = RCB address
                                 2921 ;
                                 2921 ; Outputs:
                                 2921 ;
                                 2921 ;       R1 = Next event to be processed
                                 2921 ;       R0 = True if state change allowed, else false.
                                 2921 ;-
                                 2921 XMT_RT4:
                 53 A6     95    2921        TSTB    LPD$B_SRM_LEFT(R6)       ; Any bits left to check?
                    0B     12    2924        BNEQ    5$                       ; Branch if so
                                 2926 3$:    CLRBIT  LPD$V_XMT_RT,LPD$B_XMTFLG(R6) ; Indicate "transmission" done
             51     00     D0    292A        MOVL    #LEV$C_NO_EVT,R1         ; No more events
             50     01     DC    292D        MOVL    #1,R0                    ; Allow state change
                           05    2930        RSB
                                 2931 5$:    ;
                                 2931        ;   Allocate and setup the buffer
                                 2931        ;
          59     06 A7     3C    2931        MOVZWL  ADJ$W_BUFSIZ(R7),R9      ; Get adjacent node's buffer size
                    04     12    2935        BNEQ    8$                       ; Branch if "known"
          59     50 A6     3C    2937        MOVZWL  LPD$W_BUFSIZ(R6),R9      ; (& should never get here)
                                 293B                                         ; Else, use our own buffer size
             51     59     D0    293B 8$:    MOVL    R9,R1                    ; Indicate size of extra buffer
                  0190     30    293E        BSBW    NET$DLL_QIO_CO           ; Call co-routine to allocate buffer
       003C'C2      53     D0    2941        MOVL    R3,WQE$C_LENGTH+P1(R2)   ; Point to I/O buffer
       0038'C2      53     CE    2946        MNEGL   R3,WQE$C_LENGTH+P2(R2)   ; Bias the I/O buffer size
       58   59      06     C3    294B        SUBL3   #6,R9,R8                 ; Subtract out required overhead
   58   00000044 8F        C6    294F        DIVL    #4+<2*LPD$C_SRM_NODES>,R8 ; Compute number of segments
                                 2956                                         ; which neighbor can handle in 1 packet
             83     07     90    2956        MOVB    #TR4C_MSG_RT,(R3)+       ; Enter type code
          83     0E A4     B0    2959        MOVW    RCB$W_ADDR(R4),(R3)+     ; Enter source node address
                    83     94    295D        CLRB    (R3)+                    ; Skip reserved byte
                    53     DD    295F        PUSHL   R3                       ; Save address of first segment
                                 2961        ;
                                 2961        ;   For each segment with it's bit set in the SRM bitmask,
                                 2961        ;   copy the associated cost/hops entries from the cost/hops matrix
                                 2961        ;   into the message.  Make special provisions so that node numbers
                                 2961        ;   less than 1, and greater than MAX ADDRESS are not sent.
                                 2961        ;
                                 2961        ASSUME  LPD$C_SRM_SIZE EQ 32
                 E0 8F     8A    2961 10$:   BICB    #^C<LPD$C_SRM_SIZE-1>,- ; Make sure index is always a modulo
                 52 A6           2964                LPD$B_SRM_POS(R6)        ; of the bitmask size (wrap around)
          50     52 A6     9A    2966        MOVZBL  LPD$B_SRM_POS(R6),R0     ; Get current position in SRM bitmask
                 52 A6     96    296A        INCB    LPD$B_SRM_POS(R6)        ; Update current segment number
      43 5A A6      50     E5    296D        BBCC    R0,LPD$G_XMT_SRM(R6),30$ ; Skip if segment not to be sent
                                 2972        CLRBIT  R0,LPD$G_SRM(R6)         ; Optimize next pass; already done
        50    50    05     78    2977        ASHL    #LPD$C_SRM_SHFT,R0,R0    ; Compute starting node address
          5A A4     50     B1    297B        CMPW    R0,RCB$W_MAX_ADDR(R4)    ; Higher than MAX ADDRESS?
```

```
                       34   1A  297F  7303          BGTRU   30$                       ; If so, do not send
             51   50   20   C1  2981  7304          ADDL3   #LPD$C_SRM_NODES,R0,R1    ; Compute ending+1 node address
                       51   D7  2985  7305          DECL    R1                        ; Compute ending node address
              5A  A4   51   B1  2987  7306          CMPW    R1,RCB$W_MAX_ADDR(R4)     ; Ending address < MAX ADDRESS ?
                       04   1B  298B  7307          BLEQU   20$                       ; Branch if ok
             51   5A   A4   3C  298D  7308          MOVZWL  RCB$W_MAX_ADDR(R4),R1     ; Never send > MAX ADDRESS
                  51   50   C2  2991  7309 20$:     SUBL    R0,R1                     ; Compute number of nodes-1 in segment
                       51   D6  2994  7310          INCL    R1                        ; Compute number of nodes in segment
                       1D   13  2996  7311          BEQL    30$                       ; Branch if nothing to send
                  83   51   B0  2998  7312          MOVW    R1,(R3)+                  ; Set number of nodes in segment
                  83   50   B0  299B  7313          MOVW    R0,(R3)+                  ; Set starting node address
                       34   BB  299E  7314          PUSHR   #^M<R2,R4,R5>             ; Save registers
      50   00000100'EF40    3E  29A0  7315          MOVAW   NET$AW_MIN_C_H[R0],R0     ; Get address of cost/hops entries
                  51   02   C4  29A8  7316          MULL    #2,R1                     ; Compute number of bytes in segment
             63   60   51   28  29AB  7317          MOVC    R1,(R0),(R3)              ; Store cost/hops entries in msg
                       34   BA  29AF  7318          POPR    #^M<R2,R4,R5>             ; Restore registers
                       58   D7  29B1  7319          DECL    R8                        ; Indicate segment filled
                       05   13  29B3  7320          BEQL    35$                       ; Branch if cannot fit any more segments
                  53   A6   97  29B5  7321 30$:     DECB    LPD$B_SRM_LEFT(R6)        ; Decrement number of bits left to check
                       A7   14  29B8  7322          BGTR    10$                       ; Loop through all segments
                                29BA  7323  ;
                                29BA  7324  ;       Compute checksum on all segments in message, and store it
                                29BA  7325  ;
                       50 8ED0  29BA  7326 35$:     POPL    R0                        ; Get address of first segment
                  53   50   D1  29BD  7327          CMPL    R0,R3                     ; Any segments at all?
                       1A   13  29C0  7328          BEQL    70$                       ; Branch if not
                  51   01   D0  29C2  7329          MOVL    #1,R1                     ; Init checksum
                  51   80   A0  29C5  7330 40$:     ADDW    (R0)+,R1                  ; Add to 1's complement checksum
                  51   00   D8  29C8  7331          ADWC    #0,R1                     ; add "end around carry"
                  53   50   D1  29CB  7332          CMPL    R0,R3                     ; At end of message?
                       F5   1F  29CE  7333          BLSSU   40$                       ; Continue if not
                  83   51   B0  29D0  7334          MOVW    R1,(R3)+                  ; Store checksum
                                29D3  7335  ;
                                29D3  7336  ;       Send the message
                                29D3  7337  ;
             0038'C2   53   C0  29D3  7338          ADDL    R3,WQE$C_LENGTH+P2(R2)    ; Set I/O buffer size
                  50   00'  D0  29D8  7339          MOVL    S^#IO$_WRITELBLK,R0       ; Set I/O function code
                            05  29DB  7340          RSB                               ; Return to issue I/O
                                29DC  7341
                                29DC  7342  ;
                                29DC  7343  ;       No segments in message.  Do not send anything.
                                29DC  7344  ;
                       50   D4  29DC  7345 70$:     CLRL    R0                        ; Do not issue I/O
                       9E   16  29DE  7346          JSB     @(SP)+                    ; Return to abort co-routine
                     FF43   31  29E0  7347          BRW     3$                        ; Indicate we are done
```

```
                        29E3            .SBTTL  XMT_ART - Transmit a Phase IV area routing message
                        29E3      ;+
                        29E3      ; XMT_ART - Transmit a Phase IV segmented area routing message
                        29E3      ;
                        29E3      ; Inputs:
                        29E3      ;
                        29E3      ;       R11 = CRI CNR address
                        29E3      ;       R10 = CRI CNF address
                        29E3      ;       R7 = ADJ address
                        29E3      ;       R6 = LPD address
                        29E3      ;       R4 = RCB address
                        29E3      ;
                        29E3      ; Outputs:
                        29E3      ;
                        29E3      ;       R1 = Next event to be processed
                        29E3      ;       R0 = True if state change allowed, else false.
                        29E3      ;-
                        29E3      XMT_ART:
         55 A6      95  29E3              TSTB    LPD$B_ASRM_LEFT(R6)       ; Any bits left to check?
            0C      12  29E6              BNEQ    5$                        ; Branch if so
                        29E8      3$:     CLRBIT  LPD$V_XMT_ART,LPD$B_XMTFLG(R6) ; Indicate "transmission" done
      51    00      D0  29ED              MOVL    #LEV$C_NO_EVT,R1          ; No more events
      50    01      D0  29F0              MOVL    #1,R0                     ; Allow state change
                    05  29F3              RSB
                        29F4      5$:     ;
                        29F4              ;       Allocate and setup the buffer
                        29F4              ;
      59    06 A7   3C  29F4              MOVZWL  ADJ$W_BUFSIZ(R7),R9       ; Get adjacent node's buffer size
            04      12  29F8              BNEQ    8$                        ; Branch if "known"
      59    50 A6   3C  29FA              MOVZWL  LPD$W_BUFSIZ(R6),R9       ; (& should never get here)
                        29FE                                                ; Else, use our own buffer size
      51    59      D0  29FE      8$:     MOVL    R9,R1                     ; Indicate size of extra buffer
          00CD      30  2A01              BSBW    NET$DLL_QIO_CO            ; Call co-routine to allocate buffer
  003C'C2   53      D0  2A04              MOVL    R3,WQE$C_LENGTH+P1(R2)    ; Point to I/O buffer
  0038'C2   53      CE  2A09              MNEGL   R3,WQE$C_LENGTH+P2(R2)    ; Bias the I/O buffer size
  58  59    06      C3  2A0E              SUBL3   #6,R9,R8                  ; Subtract out required overhead
58  00000084 8F     C6  2A12              DIVL    #4+<2*LPD$C_ASRM_AREAS>,R8 ; Compute number of segments
                        2A19                                                ; which neighbor can handle in 1 packet
      83    09      90  2A19              MOVB    #TR4C_MSG_ART,(R3)+       ; Enter type code
    83    0E A4     B0  2A1C              MOVW    RCB$W_ADDR(R4),(R3)+      ; Enter source area address
            83      94  2A20              CLRB    (R3)+                     ; Skip reserved byte
            53      DD  2A22              PUSHL   R3                        ; Save address of first segment
                        2A24              ;
                        2A24              ;       For each segment with it's bit set in the SRM bitmask,
                        2A24              ;       copy the associated cost/hops entries from the cost/hops matrix
                        2A24              ;       into the message.  Make special provisions so that node numbers
                        2A24              ;       less than 1, and greater than MAX ADDRESS are not sent.
                        2A24              ;
                        2A24              ASSUME  LPD$C_ASRM_SIZE EQ 1      ; && fix this
         FF 8F      8A  2A24      10$:    BICB    #^C<LPD$C_ASRM_SIZE-1>,- ; Make sure index is always a modulo
         54 A6          2A27                      LPD$B_ASRM_POS(R6)        ; of the bitmask size (wrap around)
      50    54 A6   9A  2A29              MOVZBL  LPD$B_ASRM_POS(R6),R0     ; Get current position in SRM bitmask
            54 A6   96  2A2D              INCB    LPD$B_ASRM_POS(R6)        ; Update current segment number
   50 62 A6    50   E5  2A30              BBCC    R0,LPD$G_XMT_ASRM(R6),30$ ; Skip if segment not to be sent
                        2A35              CLRBIT  R0,LPD$G_ASRM(R6)         ; Optimize next pass; already done
   50     50    06  78  2A3A              ASHL    #LPD$C_ASRM_SHFT,R0,R0    ; Compute starting area address
  008C C4   50      91  2A3E              CMPB    R0,RCB$B_MAX_AREA(R4)     ; Higher than MAX AREA?
```

```
                        40   1A  2A43  7406          BGTRU   30$                          ; If so, do not send
    51    50  00000040 8F   C1  2A45  7407          ADDL3   #LPD$C_ASRM_AREAS,R0,R1      ; Compute ending+1 area address
                        51   D7  2A4D  7408          DECL    R1                           ; Compute ending area address
                        50   D5  2A4F  7409          TSTL    R0                           ; Starting address > 0 ?
                        02   1A  2A51  7410          BGTRU   15$                          ; Branch if ok
                        50   D6  2A53  7411          INCL    R0                           ; Never send area #0
             008C C4    51   91  2A55  7412 15$:     CMPB    R1,RCB$B_MAX_AREA(R4)        ; Ending address < MAX AREA ?
                        05   1B  2A5A  7413          BLEQU   20$                          ; Branch if ok
             51   008C C4    9A  2A5C  7414          MOVZBL  RCB$B_MAX_AREA(R4),R1        ; Never send > MAX AREA
                   51   50   C2  2A61  7415 20$:     SUBL    R0,R1                        ; Compute number of nodes-1 in segment
                        51   D6  2A64  7416          INCL    R1                           ; Compute number of nodes in segment
                        1D   13  2A66  7417          BEQL    30$                          ; Branch if nothing to send
                   83   51   B0  2A68  7418          MOVW    R1,(R3)+                     ; Set number of nodes in segment
                   83   50   B0  2A6B  7419          MOVW    R0,(R3)+                     ; Set starting node address
                        34   BB  2A6E  7420          PUSHR   #^M<R2,R4,R5>                ; Save registers
        50   00000900'EF40   3E  2A70  7421          MOVAW   NET$AW_AREA_C_H[R0],R0       ; Get address of cost/hops entries
                   51   02   C4  2A78  7422          MULL    #2,R1                        ; Compute number of bytes in segment
             63   60    51   28  2A7B  7423          MOVC    R1,(R0),(R3)                 ; Store cost/hops entries in msg
                        34   BA  2A7F  7424          POPR    #^M<R2,R4,R5>                ; Restore registers
                        58   D7  2A81  7425          DECL    R8                           ; Indicate segment filled
                        05   13  2A83  7426          BEQL    35$                          ; Branch if cannot fit any more segments
                     55 A6   97  2A85  7427 30$:     DECB    LPD$B_ASRM_LEFT(R6)          ; Decrement number of bits left to check
                        9A   14  2A88  7428          BGTR    10$                          ; Loop through all segments
                                 2A8A  7429          ;
                                 2A8A  7430          ;    Compute checksum on all segments in message, and store it
                                 2A8A  7431          ;
                        50 8ED0  2A8A  7432 35$:     POPL    R0                           ; Get address of first segment
                   53   50   D1  2A8D  7433          CMPL    R0,R3                        ; Any segments at all?
                        1A   13  2A90  7434          BEQL    70$                          ; Branch if not
                   51   01   D0  2A92  7435          MOVL    #1,R1                        ; Init checksum
                   51   80   A0  2A95  7436 40$:     ADDW    (R0)+,R1                     ; Add to 1's complement checksum
                   51   00   D8  2A98  7437          ADWC    #0,R1                        ; add ''end around carry''
                   53   50   D1  2A9B  7438          CMPL    R0,R3                        ; At end of message?
                        F5   1F  2A9E  7439          BLSSU   40$                          ; Continue if not
                   83   51   B0  2AA0  7440          MOVW    R1,(R3)+                     ; Store checksum
                                 2AA3  7441          ;
                                 2AA3  7442          ;    Send the message
                                 2AA3  7443          ;
             0038'C2    53   C0  2AA3  7444          ADDL    R3,WQE$C_LENGTH+P2(R2)       ; Set I/O buffer size
                   50   00'  D0  2AA8  7445          MOVL    S^#IO$_WRITELBLK,R0          ; Set I/O function code
                             05  2AAB  7446          RSB                                  ; Return to issue I/O
                                 2AAC  7447
                                 2AAC  7448          ;
                                 2AAC  7449          ;    No segments in message.  Do not send anything.
                                 2AAC  7450          ;
                        50   D4  2AAC  7451 70$:     CLRL    R0                           ; Do not issue I/O
                        9E   16  2AAE  7452          JSB     @(SP)+                       ; Return to abort co-routine
                      FF35   31  2AB0  7453          BRW     3$                           ; Indicate we are done
```

```
                         2AB3          .SBTTL  CHK_IO - Check for multiple transmits
                         2AB3  ;+
                         2AB3  ; CHK_IO - See if its okay to transmit a message
                         2AB3  ;
                         2AB3  ; This routine ensures that only 1 transmit is outstanding at a time.
                         2AB3  ; This restriction applies only to non-broadcast circuits.
                         2AB3  ;
                         2AB3  ; Inputs:       R6 = LPD address
                         2AB3  ;
                         2AB3  ; Outputs:      R0 = True if ok to send
                         2AB3  ;                    False if transmit is outstanding - cannot transmit
                         2AB3  ;-
                         2AB3  CHK_IO:                                      ; See if its okay to xmit
               00    E1  2AB3          BBC     #LPD$V_ACTIVE,-              ; If circuit is no longer active,
         16 22 A6        2AB5                     LPD$W_STS(R6),70$         ; do not allow the I/O
            50 01    D0  2AB8          MOVL    #1,R0                        ; Assume its okay to xmit
      08 22 A6 0A    E1  2ABB          BBC     #LPD$V_BC,LPD$W_STS(R6),20$ ; If broadcast circuit, its ok
                         2AC0          ;
                         2AC0          ;   Allow up to 20 transmits at a time for NI circuits
                         2AC0          ;
         15  1B A6   91  2AC0          CMPB    LPD$B_ASTCNT(R6),#21         ; Is AST queue getting too big?
               0A    1B  2AC4          BLEQU   90$                          ; If not, allow it
               06    11  2AC6          BRB     70$                          ; Else, disallow it
                         2AC8          ;
                         2AC8          ;   Allow only 1 transmit at a time for point-to-point circuits
                         2AC8          ;
         01  1B A6   91  2AC8  20$:    CMPB    LPD$B_ASTCNT(R6),#1          ; Is AST queue getting too big?
                         2ACC                                               ; (ASTCNT=1 if no transmits are active,
                         2ACC                                               ;  the 1 is for the active receiver)
               02    1B  2ACC          BLEQU   90$                          ; If not, allow it
               50    D4  2ACE  70$:    CLRL    R0                           ; Message cannot be sent
                     05  2AD0  90$:    RSB                                  ; Done
```

```
                          2AD1          .SBTTL  NET$DLL_QIO_CO - Common QIO routine
                          2AD1     ;+
                          2AD1     ; NET$DLL_QIO_CO        - Common co-routine to issue a DLL QIO
                          2AD1     ;
                          2AD1     ; Inputs:           R6 = LPD address
                          2AD1     ;                   R1 = Maximum size of optional buffer needed for QIO
                          2AD1     ;
                          2AD1     ; Outputs:          R1      Next "event longword" to be processed
                          2AD1     ;                   R0      Low bit set if state change is permitted,
                          2AD1     ;                           Low bit clear to avoid state change
                          2AD1     ;
                          2AD1     ;                   R2-R4 are destroyed.
                          2AD1     ;
                          2AD1     ; This routine makes a co-routine call back to the caller after it sets
                          2AD1     ; up the WQE for the QIO.  On return from the co-routine call, this routine
                          2AD1     ; will issue the QIO and cause the appropriate event transition to be taken.
                          2AD1     ;
                          2AD1     ; Input to co-routine:
                          2AD1     ;
                          2AD1     ;                   R2 = WQE address
                          2AD1     ;                   R3 = Pointer to optional QIO buffer (if any)
                          2AD1     ;                   R6 = LPD address
                          2AD1     ;
                          2AD1     ;                   R4-R5,R7-R11 contain original values.
                          2AD1     ;
                          2AD1     ; Output from co-routine:
                          2AD1     ;
                          2AD1     ;                   R0 = Function code for QIO
                          2AD1     ;-
             00000000     2AD1             IOSB =   0                      ; Define WQE extensions to hold the I/O
             00000008     2AD1             P5   =   8                      ; status block and the QIO parameters
             0000000C     2AD1             P4   =  12                      ;
             00000010     2AD1             P3   =  16                      ;
             00000014     2AD1             P2   =  20                      ;
             00000018     2AD1             P1   =  24                      ;
             0000001C     2AD1             FUNC =  28                      ; I/O function (word)
             00000020     2AD1             IOWQE_LENGTH = 32               ; Size of extension (longword aligned)
                          2AD1                                             ;
                          2AD1     NET$DLL_QIO_CO:                         ; Common DLL Qio co-routine
        50    03    D0    2AD1             MOVL    #WQE$C_SUB_AST,R0       ; Indicate WQE subtype
        51    22    C0    2AD4             ADDL    #IOWQE_LENGTH+2,R1      ; Add in WQE I/O extension
                          2AD7                                             ; Add 2 bytes in case CRC16 needed (X25)
           D526'    30    2AD7             BSBW    WQE$ALLOCATE            ; Allocate the element - always succeeds
           20 A6    B0    2ADA             MOVW    LPD$W_PTH(R6),-         ;
           12 A2          2ADD                         WQE$W_REQIDT(R2)    ; Setup path i.d.
              16    9B    2ADF             MOVZBW  S^#LEV$C_IO_SUCC,-      ; Setup default QIO success event
           10 A2          2AE1                         WQE$B_EVT(R2)       ;
              15    D0    2AE3             MOVL    #LEV$C_IO_FAIL,-        ; Setup default QIO failure event
           14 A2          2AE5                         WQE$L_PM2(R2)       ;
0C A2   00002BE0'EF   9E    2AE7           MOVAB   QIOAST,WQE$L_ACTION(R2) ; Setup post processing routine
     53    24 A2    9E    2AEF             MOVAB   WQE$C_LENGTH+IOSB(R2),R3; Get start WQE extension
              83    7C    2AF3             CLRQ    (R3)+                   ; Zero the IOSB image
              83    7C    2AF5             CLRQ    (R3)+                   ; Zero P5 and P4
              83    7C    2AF7             CLRQ    (R3)+                   ; Zero P3 and P2
              83    D4    2AF9             CLRL    (R3)+                   ; Zero P1
   08 22 A6    0A   E1    2AFB             BBC     #LPD$V_BC,LPD$W_STS(R6),10$ ; Skip if non-broadcast driver
2C A2   00000100'EF   9E    2B00           MOVAB   NET$G_ALL_ROU,WQE$C_LENGTH+P5(R2) ; Set P5 = "all routers"
```

```
        53   46 A2    9E  2B08  7545 10$:     MOVAB   WQE$C_LENGTH+IOWQE_LENGTH+2(R2),R3 ; Point to optional buffer
                9E    16  2B0C  7546          JSB     @(SP)+                          ; Get QIO data
        40 A2   50    B0  2B0E  7547          MOVW    R0,WQE$C_LENGTH+FUNC(R2);       Store I/O function code
                03    12  2B12  7548          BNEQ    15$                             ; Br if function supplied
              00B7    31  2B14  7549          BRW     200$                            ; Caller bailed out of I/O
                          2B17  7550 15$:     ;
                          2B17  7551          ;  If we are transmitting an X.25 datagram, then calculate the CRC-16
                          2B17  7552          ;  and append it to the front of the buffer.
                          2B17  7553          ;
     23 22 A6   07    E1  2B17  7554          BBC     #LPD$V_X25,LPD$W_STS(R6),20$ ; Skip if not X.25 datalink
      0000'8F   50    B1  2B1C  7555          CMPW    R0,#IO$_WRITELBLK               ; Writing a datagram?
                1C    12  2B21  7556          BNEQ    20$                             ; Branch if not
                52    DD  2B23  7557          PUSHL   R2                              ; Save WQE address
 00   00000106'EF     0B  2B25  7558          CRC     CRC16,#0,-                      ; Calculate CRC16 checksum
             38 A2        2B2C  7559                  WQE$C_LENGTH+P2(R2),-
             3C B2        2B2E  7560                  @WQE$C_LENGTH+P1(R2)
                52  8ED0  2B30  7561          POPL    R2                              ; Restore WQE address
        38 A2   02    C0  2B33  7562          ADDL    #2,WQE$C_LENGTH+P2(R2)          ; Account for CRC16 in length
        3C A2   02    C2  2B37  7563          SUBL    #2,WQE$C_LENGTH+P1(R2)          ; Move back message pointer
        3C B2   50    B0  2B3B  7564          MOVW    R0,@WQE$C_LENGTH+P1(R2)         ; Append to front of msg
                          2B3F  7565 20$:     ;
                          2B3F  7566          ;  If this is a write request, then journal the data
                          2B3F  7567          ;
             40 A2    B1  2B3F  7568          CMPW    WQE$C_LENGTH+FUNC(R2),-         ; Write request?
           0000'8F        2B42  7569                  #IO$_WRITELBLK
                1D    12  2B45  7570          BNEQ    25$                             ; If so,
             D4B6'    30  2B47  7571          BSBW    NET$JNX_CO                      ; Initialize journalling co-routine
             17 50    E9  2B4A  7572          BLBC    R0,25$                          ; Skip if journalling not enabled
                81    94  2B4D  7573          CLRB    (R1)+                           ; Record type = start of transmit
        81   20 A6    90  2B4F  7574          MOVB    LPD$B_PTH_INX(R6),(R1)+         ; LPD index
        81   38 A2    B0  2B53  7575          MOVW    WQE$C_LENGTH+P2(R2),(R1)+       ; Length of message
             38 A2    2C  2B57  7576          MOVC5   WQE$C_LENGTH+P2(R2),-           ; Store data into journal record
             3C B2        2B5A  7577                  @WQE$C_LENGTH+P1(R2),-
     61      34  00       2B5C  7578                  #0,#64-12,(R1)
        51      53    D0  2B5F  7579          MOVL    R3,R1                           ; Set ending address of record
                9E    16  2B62  7580          JSB     @(SP)+                          ; Log the journal record
                          2B64  7581 25$:     ;
                          2B64  7582          ;  Queue the I/O
                          2B64  7583          ;
                          2B64  7584          $QIO_S  -                               ; Issue QIO
                          2B64  7585                  FUNC = WQE$C_LENGTH+FUNC(R2),-
                          2B64  7586                  EFN  = #NET$C_EFN_ASYN,-
                          2B64  7587                  CHAN = LPD$W_CHAN(R6),-
                          2B64  7588                  IOSB = WQE$C_LENGTH+IOSB(R2),-
                          2B64  7589                  P5   = WQE$C_LENGTH+P5(R2),-
                          2B64  7590                  P4   = WQE$C_LENGTH+P4(R2),-
                          2B64  7591                  P3   = WQE$C_LENGTH+P3(R2),-
                          2B64  7592                  P2   = WQE$C_LENGTH+P2(R2),-
                          2B64  7593                  P1   = @WQE$C_LENGTH+P1(R2),-; $QIO_S macro does a PUSHAB for P1
                          2B64  7594                  ASTADR = B^NET$DLLQIOAST,-  ;
                          2B64  7595                  ASTPRM = R2                 ; Use the WQE ptr as parameter
             1B A6    96  2B8E  7596          INCB    LPD$B_ASTCNT(R6)                ; Account for $QIO
        53      50    D0  2B91  7597          MOVL    R0,R3                           ; Save I/O status
             D469'    30  2B94  7598          BSBW    NET$JNX_CO                      ; Initialize journalling co-routine
             10 50    E9  2B97  7599          BLBC    R0,30$                          ; Branch if journalling not enabled
        81      11    90  2B9A  7600          MOVB    #^X11,(R1)+                     ; Journal record type = QIO
     81      20 A6    90  2B9D  7601          MOVB    LPD$B_PTH_INX(R6),(R1)+         ; LPD index
```

```
                81   40 A2   B0  2BA1   7602          MOVW    WQE$C_LENGTH+FUNC(R2),(R1)+ ; I/O function code
                   81   53   D0  2BA5   7603          MOVL    R3,(R1)+                    ; Status from QIO request
                        9E   16  2BA8   7604          JSB     @(SP)+                      ; Log the journalling record
                     10 53   E9  2BAA   7605 30$:     BLBC    R3,50$                      ; Br if QIO request failed
                                 2BAD   7606          ;
                                 2BAD   7607          ;   I/O queued.  Set timer and wait for AST
                                 2BAD   7608          ;
    53   00000000 6B49D200 8F    7D  2BAD   7609          MOVQ    #TR$C_TIM_DLLIO*-           ; Setup I/O timer interval
                                 2BB8   7610                  10*1000*1000,R3             ; in quadword VMS clock ticks
                      0065   30  2BB8   7611          BSBW    SET_IOTIM                   ; Cancel old timer, set new one
                        0A   11  2BBB   7612          BRB     100$                        ; Continue
                                 2BBD   7613          ;
                                 2BBD   7614          ;   I/O failure.  Setup status and queue WQE
                                 2BBD   7615          ;
                24 A2   53   B0  2BBD   7616 50$:     MOVW    R3,WQE$C_LENGTH+IOSB(R2); Store status in IOSB field
                   50   52   D0  2BC1   7617          MOVL    R2,R0                       ; Get the WQE address
                     D439'   30  2BC4   7618          BSBW    WQE$INSQUE                  ; Queue it
                   51   00   D0  2BC7   7619 100$:    MOVL    S^#LEV$C_NO_EVT,R1          ; Setup next event longword
                   50   01   90  2BCA   7620          MOVB    #1,R0                       ; Allow state change
                             05  2BCD   7621          RSB
                                 2BCE   7622
                                 2BCE   7623 200$:                                        ; Caller doesn't want to issue I/O
                   50   52   D0  2BCE   7624          MOVL    R2,R0                       ; Set the WQE address
                     D42C'   30  2BD1   7625          BSBW    NET$DEALLOCATE              ; Deallocate it
                        F1   11  2BD4   7626          BRB     100$                        ; and return success
                                 2BD6   7627
                                 2BD6   7628 NET$DLLQIOAST:
                          0000   2BD6   7629          .WORD   0                           ; No need to save regs
                50     04 AC   D0  2BD8   7630          MOVL    4(AP),R0                    ; Get the WQE address
                     D421'   30  2BDC   7631          BSBW    WQE$INSQUE                  ; Queue it
                        04       2BDF   7632          RET
                                 2BE0   7633
                51     10 A5   D0  2BE0   7634 QIOAST: MOVL    WQE$W_REQIDT-2(R5),R1       ; Put Path i.d. into high order word
             51     0114 8F    B0  2BE4   7635          MOVW    #<<WQE$C_QUAL_DLL>@8>!-     ; Setup timer qualifier
                                 2BE9   7636                    LEV$C_IO_TIMOUT,R1        ; and timer event
                     D414'   30  2BE9   7637          BSBW    WQE$CANCEL_TIM              ; Cancel the timer
                      E25B   30  2BEC   7638          BSBW    FIND_WQE_CTX                ; Locate CNF, LPD, ADJ blocks
                     26 50   E9  2BEF   7639          BLBC    R0,230$                     ; If LPD no longer exists, skip event
                     1B A6   97  2BF2   7640          DECB    LPD$B_ASTCNT(R6)            ; Account for AST
                     D408'   30  2BF5   7641          BSBW    NET$JNX_CO                  ; Initialize journalling co-routine
                     11 50   E9  2BF8   7642          BLBC    R0,30$                      ; Branch if journalling not enabled
                   81   22   90  2BFB   7643          MOVB    #^X22,(R1)+                 ; Journal record type = QIO AST
                81   20 A6   90  2BFE   7644          MOVB    LPD$B_PTH_INX(R6),(R1)+     ; LPD index
                81   40 A5   B0  2C02   7645          MOVW    WQE$C_LENGTH+FUNC(R5),(R1)+ ; I/O function code
                81   24 A5   7D  2C06   7646          MOVQ    WQE$C_LENGTH+IOSB(R5),(R1)+ ; I/O completion status
                        9E   16  2C0A   7647          JSB     @(SP)+                      ; Log the journalling record
                  05 24 A5   E8  2C0C   7648 30$:     BLBS    WQE$C_LENGTH+IOSB(R5),220$ ; If LBC then I/O failed
             10 A5   14 A5   90  2C10   7649          MOVB    WQE$L_PM2(R5),WQE$B_EVT(R5) ; Set failure event
                      E17B   30  2C15   7650 220$:    BSBW    PROC_EVT                    ; Process the event
                      E16D   30  2C18   7651 230$:    BSBW    KILL_WQE                    ; Deallocate the WQE
                             05  2C1B   7652          RSB
                                 2C1C   7653
                                 2C1C   7654 500$:    BUG_CHECK  NETNOSTATE,FATAL         ; Signal the bug
```

```
                           2C20  7656          .SBTTL  SET_IOTIM - Set I/O timer
                           2C20  7657 ;+
                           2C20  7658 ; SET_IOTIM - Set I/O timer
                           2C20  7659 ;
                           2C20  7660 ; INPUTS:          R6      LPD ptr
                           2C20  7661 ;                  R3/R4   Quadword value of timer
                           2C20  7662 ;
                           2C20  7663 ; OUTPUTS:         R5-R11  Preserved
                           2C20  7664 ;-
                           2C20  7665 SET_IOTIM:                                    ; Start the I/O timer
  50    0114 8F      B0    2C20  7666          MOVW    #<<WQE$C_QUAL_DLL>@8>!-      ; Setup timer qualifier
                           2C25  7667                     LEV$C_IO_TIMOUT,R0        ; and timer event
     51    20 A6     B0    2C25  7668          MOVW    LPD$W_PTR(R6),R1             ; Get LPD index
  51   51    10      78    2C29  7669          ASHL    #16,R1,R1                    ; Shift into upper word (REQIDT)
       51    50      B0    2C2D  7670          MOVW    R0,R1                        ;
  52   E14C CF       9E    2C30  7671          MOVAB   NET$DLL_PRC_WQE,R2           ; Setup action routine address
          D3C8'      30    2C35  7672          BSBW    WQE$RESET_TIM                ; Reset the timer
                     05    2C38  7673          RSB
```

```
                   2C39         .SBTTL  RESET_CHAN - Cancel all device I/O
                   2C39  ;+
                   2C39  ; RESET_CHAN      - Cancel all the I/O queued to device.
                   2C39  ;
                   2C39  ; FUNCTIONAL DESCRIPTION:
                   2C39  ;
                   2C39  ; If a channel is active to the driver then call the driver to cancel ALL
                   2C39  ; the I/O on the device.  A $CANCEL is not sufficient since the PID field
                   2C39  ; of the internal IRPs queued to the data link driver by NETDRIVER would
                   2C39  ; not match hence not all of the packets would be cancelled.
                   2C39  ;
                   2C39  ; INPUTS:         R11     CRI CNR pointer
                   2C39  ;                 R10     CRI CNF pointer
                   2C39  ;                 R6      LPD pointer
                   2C39  ;
                   2C39  ; OUTPUTS:        R0      Status
                   2C39  ;
                   2C39  ;-                All registers are preserved
                   2C39  ;-
                   2C39 RESET_CHAN:
                   2C39         $CANCEL_S CHAN = LPD$W_CHAN(R6) ; Cancel stuff on the queue
      50   01  D0  2C44         MOVL    #1,R0                   ; Return success
               05  2C47         RSB
```

```
                                2C48          .SBTTL  NET$GET_LPD_CRI - Locate CNF given LPD index
                                2C48    ;+
                                2C48    ; NET$GET_LPD_CRI - Locate CNR and CNF given LPD index
                                2C48    ;
                                2C48    ; INPUTS          R11-R9  Scratch
                                2C48    ;                 R8      Low byte contains LPD index
                                2C48    ;                 R7,R6   Scratch
                                2C48    ;
                                2C48    ; OUTPUTS:        R11     CNR address
                                2C48    ;                 R10     CNF address
                                2C48    ;                 R9-R7   Garbage
                                2C48    ;                 R6      LPD if low bit set in R0
                                2C48    ;                 R0      Low bit set if successful
                                2C48    ;                         Low bit clear otherwise
                                2C48    ;-
                                2C48    NET$GET_LPD_CRI::
      5B    00000000'EF    D0   2C48            MOVL    NET$GL_CNR_CRI,R11      ; Get data base root for CRI
                     5A    D4   2C4F            CLRL    R10                     ; No CNF yet
                     4D    10   2C51            BSBB    NET$FIND_LPD            ; Find the LPD via index in R8
                  1B 50    E9   2C53            BLBC    R0,10$                  ; If LPD then none
               50    5B    D0   2C56            MOVL    R11,R0                  ; Make a copy
          58   20    A6    3C   2C59            MOVZWL  LPD$W_PTH(R6),R8        ; Get full LPD path i.d.
               50    60    D0   2C5D    5$:     MOVL    CNF$L_FLINK(R0),R0      ; Get next CNF
               5B    50    D1   2C60            CMPL    R0,R11                  ; At head of list?
                     0C    13   2C63            BEQL    10$                     ; If EQL yes, return with LBC in R0
            12 A0    58    B1   2C65            CMPW    R8,CNF$W_ID(R0)         ; This it?
                     F2    12   2C69            BNEQ    5$                      ; If NEQ keep trying
               5A    50    D0   2C6B            MOVL    R0,R10                  ; Copy CNF address
               50   00'    D0   2C6E            MOVL    S^#SS$_NORMAL,R0        ; Set status
                           05   2C71    10$:    RSB                             ; Done
```

```
                                2C72   7730            .SBTTL  NET$ADJ_LPD_CRI - Locate CNF given ADJ index
                                2C72   7731  ;+
                                2C72   7732  ; NET$ADJ_LPD_CRI - Locate CNR and CNF given ADJ index
                                2C72   7733  ;
                                2C72   7734  ; INPUTS          R11-R9  Scratch
                                2C72   7735  ;                 R8      Low byte contains ADJ index
                                2C72   7736  ;                 R7,R6   Scratch
                                2C72   7737  ;
                                2C72   7738  ; OUTPUTS:        R11     CNR address
                                2C72   7739  ;                 R10     CNF address
                                2C72   7740  ;                 R9-R8   Garbage
                                2C72   7741  ;                 R7      ADJ address
                                2C72   7742  ;                 R6      LPD address
                                2C72   7743  ;                 R0      Low bit set if successful
                                2C72   7744  ;                         Low bit clear otherwise
                                2C72   7745  ;-
                                2C72   7746  NET$ADJ_LPD_CRI::
       5B    00000000'EF    D0  2C72   7747            MOVL    NET$GL_CNR_CRI,R11       ; Get data base root for CRI
                     5A    D4  2C79   7748            CLRL    R10                      ; No CNF yet
                     49    10  2C7B   7749            BSBB    NET$FIND_ADJ             ; Find LPD & ADJ via index in R8
                1B   50    E9  2C7D   7750            BLBC    R0,10$                   ; If LPD then none
               50    5B    D0  2C80   7751            MOVL    R11,R0                   ; Make a copy
          58   20    A6    3C  2C83   7752            MOVZWL  LPD$W_PTH(R6),R8         ; Get full LPD path i.d.
               50    60    D0  2C87   7753  5$:       MOVL    CNF$L_FLINK(R0),R0       ; Get next CNF
               5B    50    D1  2C8A   7754            CMPL    R0,R11                   ; At head of list?
                     0C    13  2C8D   7755            BEQL    10$                      ; If EQL yes, return with LBC in R0
          12 A0      58    B1  2C8F   7756            CMPW    R8,CNF$W_ID(R0)          ; This it?
                     F2    12  2C93   7757            BNEQ    5$                       ; If NEQ keep trying
               5A    50    D0  2C95   7758            MOVL    R0,R10                   ; Copy CNF address
               50    00'   D0  2C98   7759            MOVL    S^#SS$_NORMAL,R0         ; Set status
                           05  2C9B   7760  10$:      RSB                              ; Done
```

```
                        2C9C  7762          .SBTTL  NET$LOCATE_LPD - Locate LPD given CNF
                        2C9C  7763 ;+
                        2C9C  7764 ; NET$LOCATE_LPD
                        2C9C  7765 ;
                        2C9C  7766 ; INPUTS:        R11     CNR address
                        2C9C  7767 ;                R10     CNF address
                        2C9C  7768 ;                R9-R6   Scratch
                        2C9C  7769 ;
                        2C9C  7770 ; OUTPUTS:       R11,R10 Preserved
                        2C9C  7771 ;                R9-R7   Garbage
                        2C9C  7772 ;                R6      LPD if low bit set in R0
                        2C9C  7773 ;                        Zero if low bit clear in R0
                        2C9C  7774 ;                R0      SS$_NORMAL    if successful
                        2C9C  7775 ;                        SS$_DEVINACT  otherwise
                        2C9C  7776 ;-
                        2C9C  7777 NET$LOCATE_LPD::
     58   12 AA    3C   2C9C  7778          MOVZWL  CNF$W_ID(R10),R8         ; Get LPD i.d.
                        2CA0  7779                                           ; And fall thru
```

```
                          2CA0         .SBTTL  NET$FIND_LPD - Find LPD given LPD index
                          2CA0  ;+
                          2CA0  ; NET$FIND_LPD - Find LPD given LPD index
                          2CA0  ;
                          2CA0  ; INPUTS:       R8      Low byte contains LPD index
                          2CA0  ;               R6      Scratch
                          2CA0  ;
                          2CA0  ; OUTPUTS:      R8      Garbage
                          2CA0  ;               R6      LPD if low bit set in R0
                          2CA0  ;                       Zero if low bit clear in R0
                          2CA0  ;               R0      SS$_NORMAL    if successful
                          2CA0  ;                       SS$_DEVINACT  otherwise
                          2CA0  ;-
                          2CA0  NET$FIND_LPD::
 50   00000000'EF    D0   2CA0         MOVL    NET$GL_PTR_VCB,R0       ; Get the RCB address
           58   58   9A   2CA7         MOVZBL  R8,R8                   ; Get low byte of LPD index
                12   13   2CAA         BEQL    10$                     ; If EQL then there's none
      5C A0     58   91   2CAC         CMPB    R8,RCB$B_MAX_LPD(R0)    ; Within range ?
                0C   14   2CB0         BGTR    10$                     ; If not, branch
    56   28 B048     D0   2CB2         MOVL    @RCB$L_PTR_LPD(R0)[R8],R6 ; Get LPD address
                05   18   2CB7         BGEQ    10$                     ; Branch if not valid
         50    00'   D0   2CB9         MOVL    S^#SS$_NORMAL,R0        ; Indicate success
                07   11   2CBC         BRB     15$                     ; Take common exit
                56   D4   2CBE  10$:   CLRL    R6                      ; Nullify LPD pointer
    50     0000'8F   3C   2CC0         MOVZWL  #SS$_DEVINACT,R0        ; Indicate failure
                     05   2CC5  15$:   RSB
```

```
                        2CC6  7808         .SBTTL  NET$FIND_ADJ - Find LPD & ADJ given ADJ index
                        2CC6  7809 ;+
                        2CC6  7810 ; NET$FIND_ADJ - Find LPD & ADJ given ADJ index
                        2CC6  7811 ;
                        2CC6  7812 ; INPUTS:        R8      Low word contains ADJ index
                        2CC6  7813 ;                R6-R7   Scratch
                        2CC6  7814 ;
                        2CC6  7815 ; OUTPUTS:       R8      Garbage
                        2CC6  7816 ;                R7      ADJ address
                        2CC6  7817 ;                R6      LPD address
                        2CC6  7818 ;                R0      SS$_NORMAL     if successful
                        2CC6  7819 ;                        SS$_DEVINACT   otherwise
                        2CC6  7820 ;-
                        2CC6  7821 NET$FIND_ADJ::
50   00000000'EF   D0   2CC6  7822         MOVL    NET$GL_PTR_VCB,R0          ; Get the RCB address
          58   58   3C   2CCD  7823         MOVZWL  R8,R8                      ; Get low word of ADJ index
               1C   13   2CD0  7824         BEQL    10$                        ; If EQL then there's none
     68 A0     58   B1   2CD2  7825         CMPW    R8,RCB$W_MAX_ADJ(R0)       ; Within range ?
               16   14   2CD6  7826         BGTR    10$                        ; If not, branch
   57   2C B048     D0   2CD8  7827         MOVL    @RCB$L_PTR_ADJ(R0)[R8],R7 ; Get ADJ address
    0D 67      00   E1   2CDD  7828         BBC     #ADJ$V_INUSE,ADJ$B_STS(R7),10$ ; Branch if slot not in use
     58    02 A7    9A   2CE1  7829         MOVZBL  ADJ$B_[PD_INX(R7),R8       ; Get LPD index
   56   28 B048     D0   2CE5  7830         MOVL    @RCB$[_PTR_LPD(R0)[R8],R6 ; Get LPD address
          50   00'  D0   2CEA  7831         MOVL    S^#SS$_NORMAL,R0           ; Indicate success
                    05   2CED  7832         RSB
                         2CEE  7833
               57   D4   2CEE  7834 10$:    CLRL    R7                         ; Nullify pointer
   50     0000'8F   3C   2CF0  7835         MOVZWL  #SS$_DEVINACT,R0           ; Indicate failure
                    05   2CF5  7836         RSB
```

```
                            2CF6          .SBTTL  NET$GET_PLVECLPD - Find next active LPD
                            2CF6  ;+
                            2CF6  ; NET$GET_PLVECLPD      - Find next active LPD using the indicated line (PLVEC)
                            2CF6  ;
                            2CF6  ; INPUTS:        R4      PLVEC index
                            2CF6  ;                R1      Previous LPD index (scan starts with R1 +1)
                            2CF6  ;
                            2CF6  ; OUPUTS:        R1      New LPD address
                            2CF6  ;                R0      SS$_NORMAL     if successful
                            2CF6  ;                        SS$_DEVINACT  otherwise
                            2CF6  ;-
                            2CF6  NET$GET_PLVECLPD::                               ; Find next active LPD using this line
                   53   DD  2CF6          PUSHL    R3                             ; Save reg
   53   00000000'EF   D0  2CF8          MOVL     NET$GL_PTR_VCB,R3              ; Get the RCB address
                   51   D6  2CFF  20$:    INCL     R1                             ; Start at next LPD
          5C A3   51   91  2D01          CMPB     R1,RCB$B_MAX_LPD(R3)           ; Within range ?
                   1A   1A  2D05          BGTRU    100$                           ; If not, branch
      50    28 B341   D0  2D07          MOVL     @RCB$L_PTR_LPD(R3)[R1],R0      ; Get next LPD address
                   F1   18  2D0C          BGEQ     20$                            ; Branch if not valid
                   00   E1  2D0E          BBC      #LPD$V_ACTIVE,-                ; Is LPD active ?
            EC 22 A0        2D10                       LPD$W_STS(R0),20$          ; If BC then no
          28 A0   54   91  2D13          CMPB     R4,LPD$B_PLVEC(R0)             ; Is it using the indicated line?
                   E6   12  2D17          BNEQ     20$                            ; If EQL yes, we've found the LPD
              51   50   D0  2D19          MOVL     R0,R1                          ; Copy LPD pointer
              50   00'  D0  2D1C          MOVL     S^#SS$_NORMAL,R0               ; Indicate success
                   07   11  2D1F          BRB      110$                           ; Take common exit
                   51   D4  2D21  100$:   CLRL     R1                             ; Nullify LPD pointer
      50      0000'8F   3C  2D23          MOVZWL   #SS$_DEVINACT,R0               ; Indicate failure
                53 8ED0     2D28  110$:   POPL     R3                             ; Restore reg
                        05  2D2B          RSB
                            2D2C
```

```
                              2D2C  7870         .SBTTL  TELL_NETDRIVER - Inform NETDRIVER of an event
                              2D2C  7871  ;+
                              2D2C  7872  ; TELL_NETDRIVER        - Inform NETDRIVER of an event
                              2D2C  7873  ;
                              2D2C  7874  ; INPUTS:       R0 = Function code (NETUPD$_DLL_)
                              2D2C  7875  ;               R6 = LPD address
                              2D2C  7876  ;
                              2D2C  7877  ; OUTPUTS:      R0 = Status
                              2D2C  7878  ;
                              2D2C  7879  ;               All other registers are preserved.
                              2D2C  7880  ;-
                              2D2C  7881  TELL_NETDRIVER:                              ;
               3E       BB    2D2C  7882         PUSHR   #^M<R1,R2,R3,R4,R5>          ; Save critical regs
   55   00000000'EF     D0    2D2E  7883         MOVL    NET$GL_NET_UCB,R5            ; Get the ACP's NET UCB
   52   00000000'EF     D0    2D35  7884         MOVL    NET$GL_PTR_VCB,R2            ; Get RCB
             51    56   D0    2D3C  7885         MOVL    R6,R1                        ; Get the LPD address
            D2BE'       30    2D3F  7886         BSBW    CALL_NETDRIVER               ; Tell NETDRIVER
               3E       BA    2D42  7887         POPR    #^M<R1,R2,R3,R4,R5>          ; Restore regs
                        05    2D44  7888         RSB
                              2D45  7889  .END
```

```
$$T1                           = 00000000                  ADJ$C_LENGTH                 = 0000000D
$$_NSPMSG                      = 00000000                  ADJ$C_PTY_AREA               = 00000003
$$_TR3MSG                      = 00000000                  ADJ$C_PTY_PH2                = 00000002
$$_TR4MSG                      = 00000000                  ADJ$C_PTY_PH3                = 00000000
ACP$C_STA_F                    = 00000004                  ADJ$C_PTY_PH3N               = 00000001
ACP$C_STA_H                    = 00000005                  ADJ$C_PTY_PH4                = 00000004
ACP$C_STA_I                    = 00000000                  ADJ$C_PTY_PH4N               = 00000005
ACP$C_STA_N                    = 00000001                  ADJ$C_PTY_UNK                = FFFFFFFF
ACP$C_STA_R                    = 00000002                  ADJ$M_INUSE                  = 00000001
ACP$C_STA_S                    = 00000003                  ADJ$M_LSN                    = 00000008
ACT_ADJ_DOWN                     00001FA5 R      06        ADJ$M_RTG                    = 00000004
ACT_BC_UP                        00001D83 R      06        ADJ$M_RUN                    = 00000002
ACT_BUG                          00000E8E R      06        ADJ$V_INUSE                  = 00000000
ACT_DLL_UP                       00001AF0 R      06        ADJ$V_LSN                    = 00000003
ACT_ELECT                        000011EB R      06        ADJ$V_RTG                    = 00000002
ACT_ENT_DLE                      00001B9A R      06        ADJ$V_RUN                    = 00000001
ACT_ENT_MOP                      00001AE6 R      06        ADJ$W_BUFSIZ                 = 00000006
ACT_ENT_MPR                      00001F90 R      06        ADJ$W_INT_LSN                = 00000008
ACT_ENT_RUN                      00001D0A R      06        ADJ$W_LPD                    = 00000002
ACT_EXIT                         00000E96 R      06        ADJ$W_PNA                    = 00000004
ACT_EXI_SERV                     00001BCA R      06        ADJ$W_TIM_LSN                = 0000000A
ACT_FAILED                       00001C25 R      06        ADJ_DOWN                       000020C5 R      06
ACT_INI_FAIL                     00001BFE R      06        ADJ_DOWN_EVENT                 00000862 R      06
ACT_LOG_ADE                      00000EAE R      06        ALLOC_COSTHOPS                 000003C1 R      06
ACT_LOG_CDE                      00000EA4 R      06        ALLOC_LPD                      00000168 R      06
ACT_LOG_NFE                      00000EB8 R      06        APL                            00000874 R      06
ACT_NOP                          00000E9D R      06        APEA_DECISION                  00001801 R      06
ACT_NYI                          00000E92 R      06        BEA_UP                         00001EE0 R      06
ACT_PVC_START                    0000251F R      06        BIT...                       = 0000000A
ACT_QIO_SHUT                     0000227B R      06        BRA_DOWN                       00002119 R      06
ACT_QIO_STRT                     000022F0 R      06        BRA_UP                         00001DE9 R      06
ACT_RCV_2STR                     00000EC2 R      06        BUG$_NETNOSTATE                ********   X    06
ACT_RCV_ART                      00001373 R      06        BUILD_RTR_LIST                 0000219D R      06
ACT_RCV_ARTA                     00001382 R      06        CALL_NETDRIVER                 ********   X    06
ACT_RCV_EHEL                     000011FE R      06        CCB$C_UCB                    = 00000000
ACT_RCV_RHEL                     000010D9 R      06        CHECK_REQ_PARAMS               000004DE R      06
ACT_RCV_RT                       0000124F R      06        CHK_CIRC_START                 000025F4 R      06
ACT_RCV_RTA                      0000125E R      06        CHK_IO                         00002AB3 R      06
ACT_RCV_STR                      00000EC6 R      06        CHK_RUS4                       00000C12 R      06
ACT_RCV_VRF                      00000FFB R      06        CNF$GET_FIELD                  ********   X    06
ACT_REQ_UPDATE                   00001424 R      06        CNF$KEY_SEARCH                 ********   X    06
ACT_RUN_DOWN                     00001C30 R      06        CNF$L_FLINK                  = 00000000
ACT_RUN_SHUT                     00001F9C R      06        CNF$PUT_FIELD                  ********   X    06
ACT_RUN_SYNC                     00001F74 R      06        CNF$W_ID                     = 00000012
ACT_RUN_UXPK                     00001F82 R      06        CNF$_ADVANCE                 = 00000000
ACT_SET_OPER                     C0001C83 R      06        CNF$_QUIT                    = 00000002
ACT_SYN_FAIL                     00001BEA R      06        CNF$_TAKE_CURR               = 00000003
ACT_TST_DL                       00001CA6 R      06        CNF$_TAKE_PREV               = 00000001
ACT_X25_CALL                     000025BE R      06        COND_DEAL_LPD                  00000424 R      06
ACT_X25_RESET                    00001C0D R      06        CRC16                          00000106 R      02
ACT_XMT                          0000268E R      06        CRD                            00000720 R      06
ADAPT_TO_PARTNER                 00000FAD R      06        CXB$C_OVERHEAD               = 0000004C
ADJ                              00000786 R      06        DDT$L_FDT                    = 00000008
ADJ$B_BCPRI                    = 0000000C                  DEAL_LPD                       0000044D R      06
ADJ$B_LPD_INX                  = 00000002                  DECISION                       0000158B R      06
ADJ$B_PTYPE                    = 00000001                  DEVTRN$C_DEV_CI              = 00000004
ADJ$B_STS                      = 00000000                  DEVTRN$C_DEV_DMC             = 00000001
```

```
DEVTRN$C_DEV_PPUNA              = 0000000A                IO$_READLBLK                      ********     X   06
DEVTRN$C_DEV_UNA                = 00000009                IO$_SETMODE                       ********     X   06
DISPATCH                          000006FC R       06     IO$_WRITELBLK                     ********     X   06
DLE$BC_DOWN                       ********     X   06     IOC$VERIFYCHAN                    ********     X   06
DLE$BC_UP                         ********     X   06     IOSB                            = 00000000
DLE$LPD_STATUS                    ********     X   06     IOWQE_LENGTH                    = 00000020
DLE$MOP_REQUEST                   ********     X   06     IRP                               0000073E R       06
ELECT_ROUTER                      00002220 R       06     IRP$L_IOST1                     = 00000038
ENDNODE_DECISION                  00001A96 R       06     IRP$L_IOST2                     = 0000003C
EVC$C_TPL_ACH                   = 00000111                IRP$L_SVAPTE                    = 0000002C
EVC$C_TPL_APL                   = 00000100                IRP$W_FUNC                      = 00000020
EVC$C_TPL_ARJ                   = 00000110                KILL_WQE                          00000D88 R       06
EVC$C_TPL_AUP                   = 0000010F                LEV$AW_STA_TAB                    00000000 R       03
EVC$C_TPL_IOF                   = 0000010D                LEV$C_ADJ_DOWN                  = 00000012  G
EVC$C_TPL_ISF                   = 0000010C                LEV$C_BC_UP                     = 00000013  G
EVC$C_TPL_LDF                   = 00000107                LEV$C_BUG                       = 00000002  G
EVC$C_TPL_LDO                   = 00000113                LEV$C_DLE_ACC                   = 0000001E  G
EVC$C_TPL_LDS                   = 00000112                LEV$C_ELECT_TIM                 = 0000001B  G
EVC$C_TPL_LUP                   = 0000010A                LEV$C_ENT_DCE                   = 0000001D  G
EVC$C_TPL_OPL                   = 00000103                LEV$C_EVENTS                    = 00000025
EVC$C_TPL_PFM                   = 00000104                LEV$C_EXIT                      = 00000001  G
EVC$C_TPL_PRSN_ADJB             = 00000008                LEV$C_FAILED                    = 0000001C  G
EVC$C_TPL_PRSN_ADJC             = 00000004                LEV$C_IO_FAIL                   = 00000015  G
EVC$C_TPL_PRSN_ADJR             = 00000007                LEV$C_IO_SUCC                   = 00000016  G
EVC$C_TPL_PRSN_DROP             = 0000000E                LEV$C_IO_TIMOUT                 = 00000014  G
EVC$C_TPL_PRSN_LTMO             = 0000000A                LEV$C_IRP_DOWN                  = 00000020  G
EVC$C_TPL_PRSN_RUCS             = 00000003                LEV$C_IRP_MM                    = 00000021  G
EVC$C_TPL_PRSN_SYNC             = 00000000                LEV$C_IRP_RESET                 = 0000001F  G
EVC$C_TPL_PRSN_UXPK             = 00000002                LEV$C_LIN_DOWN                  = 00000011  G
EVC$C_TPL_PRSN_VREQ             = 0000000D                LEV$C_LIN_UP                    = 00000010  G
EVC$C_TPL_PRSN_VRSK             = 00000006                LEV$C_LOG_ADE                   = 00000024  G
EVC$C_TPL_PRU                   = 00000105                LEV$C_LOG_CDE                   = 00000023  G
EVC$C_TPL_PSTS_RCH              = 00000000                LEV$C_LOG_NFE                   = 00000022  G
EVC$C_TPL_PSTS_URC              = 00000001                LEV$C_MAX_EVT                   = 00000024
EVC$C_TPL_RCH                   = 0000010E                LEV$C_NO_EVT                    = 00000000  G
EVC$C_TPL_RPL                   = 00000102                LEV$C_OPR_OFF                   = 00000005  G
EVC$C_TPL_UPL                   = 00000101                LEV$C_OPR_ON                    = 00000006  G
EVC$C_TPL_VFR                   = 00000106                LEV$C_OPR_SRV                   = 00000007  G
EXE$GL_ABSTIM                     ********     X   06     LEV$C_PVC_START                 = 00000018  G
EXIT_RUN_STATE                    00001FC8 R       06     LEV$C_RCV_ART                   = 0000000C  G
FDT_IOTYPE                      = 00000008                LEV$C_RCV_EHEL                  = 0000000E  G
FDT_LEGAL                       = 00000000                LEV$C_RCV_RHEL                  = 0000000D  G
FILL_JNL                          00000E15 R       06     LEV$C_RCV_RT                    = 0000000B  G
FIND_ENDNODE_BEA                  000017CE R       06     LEV$C_RCV_STR                   = 00000008  G
FIND_PATH_TO_AREA                 000018BD R       06     LEV$C_RCV_VRF                   = 00000009  G
FIND_PATH_TO_NODE                 00001700 R       06     LEV$C_RCV_VVF                   = 0000000A  G
FIND_WQE_CTX                      00000E4A R       06     LEV$C_REQ_SHUT                  = 00000004  G
FORCE_FULL_DECISION               0000002A R       06     LEV$C_STATES                    = 00000010
FUNC                            = 0000001C                LEV$C_STA_.                     = 00000000
IGNORE_MSG                        000007F9 R       06     LEV$C_STA_A                     = 00000004
IO$M_ABORT                        ********     X   06     LEV$C_STA_B                     = 00000005
IO$M_ACCEPT                       ********     X   06     LEV$C_STA_C                     = 00000006
IO$M_SHUTDOWN                     ********     X   06     LEV$C_STA_D                     = 00000007
IO$M_STARTUP                      ********     X   06     LEV$C_STA_J                     = 00000008
IO$_ACCESS                        ********     X   06     LEV$C_STA_M                     = 00000003
IO$_DEACCESS                      ********     X   06     LEV$C_STA_R                     = 00000009
IO$_NETCONTROL                    ********     X   06     LEV$C_STA_S                     = 00000000
```

```
LEV$C_STA_W                      = 00000001
LEV$C_STA_Y                      = 00000002
LEV$C_STRT_TIM                   = 0000001A  G
LEV$C_UNJAM                      = 00000003  G
LEV$C_X25_CALL                   = 00000017  G
LEV$C_X25_RESET                  = 00000019  G
LEV$C_XMT_IDLE                   = 0000000F  G
LEV_AC_ACTTAB                      00000000 R       02
LEV_B_PRIORITY                     0000001C R       04
LEV_L_ADJ                          00000010 R       04
LEV_L_LPD                          0000000C R       04
LEV_Q_CRI                          00000004 R       04
LEV_Q_PSWDESC                      00000024 R       04
LEV_W_BLKSIZE                      00000013 R       04
LEV_W_HELLO                        00000020 R       04
LEV_W_PNA                          00000014 R       04
LOWEST_PRIO_BRA                    00001EAD R       06
LPD$B_ASRM_LEFT                  = 00000055
LPD$B_ASRM_POS                   = 00000054
LPD$B_ASTCNT                     = 0000001B
LPD$B_BCPRI                      = 0000002A
LPD$B_CNT_IFL                    = 0000004F
LPD$B_CNT_LDN                    = 0000004E
LPD$B_COST                       = 00000029
LPD$B_ETY                        = 0000001D
LPD$B_IRPCNT                     = 0000001C
LPD$B_PLVEC                      = 00000028
LPD$B_PTH_INX                    = 00000020
LPD$B_PVCFLG                     = 00000025
LPD$B_SRM_LEFT                   = 00000053
LPD$B_SRM_POS                    = 00000052
LPD$B_STARTUPS                   = 0000000B
LPD$B_STI                        = 00000026
LPD$B_SUB_STA                    = 00000027
LPD$B_TSTCNT                     = 0000001A
LPD$B_XMTFLG                     = 00000024
LPD$B_XMT_IPL                    = 0000001F
LPD$B_XMT_SRL                    = 0000001E
LPD$C_ASRM_AREAS                 = 00000040
LPD$C_ASRM_SHFT                  = 00000006
LPD$C_ASRM_SIZE                  = 00000001
LPD$C_LENGTH                     = 0000006A
LPD$C_LOC_INX                    = 00000001
LPD$C_SRM_NODES                  = 00000020
LPD$C_SRM_SHFT                   = 00000005
LPD$C_SRM_SIZE                   = 00000020
LPD$G_ASRM                       = 0000005E
LPD$G_SRM                        = 00000056
LPD$G_XMT_ASRM                   = 00000062
LPD$G_XMT_SRM                    = 0000005A
LPD$L_ABS_TIM                    = 00000036
LPD$L_RCV_IRP                    = 00000032
LPD$L_RTR_LIST                   = 0000002E
LPD$L_UCB                        = 00000010
LPD$M_PVC_ACCESS                 = 00000001
LPD$M_PVC_RESET                  = 00000004
LPD$M_PVC_RESTRT                 = 00000002
```

```
LPD$M_TOGGLE                     = 00001000
LPD$M_XMT_IDLE                   = 00000008
LPD$M_XMT_STR                    = 00000002
LPD$M_XMT_VRF                    = 00000004
LPD$Q_REQ_WAIT                   = 00000000
LPD$V_ACCESS                     = 00000003
LPD$V_ACTIVE                     = 00000000
LPD$V_ALIGNQ                     = 0000000E
LPD$V_ALIGNW                     = 0000000D
LPD$V_BC                         = 0000000A
LPD$V_DLE                        = 00000002
LPD$V_ELECT_TIM                  = 0000000F
LPD$V_INCOMING                   = 00000009
LPD$V_PVC_ACCESS                 = 00000000
LPD$V_PVC_ACCESSED               = 00000007
LPD$V_PVC_RESET                  = 00000002
LPD$V_PVC_RESTRT                 = 00000001
LPD$V_RBF                        = 00000006
LPD$V_RUN                        = 00000004
LPD$V_STRTIM                     = 00000001
LPD$V_TOGGLE                     = 0000000C
LPD$V_X25                        = 00000007
LPD$V_XBF                        = 00000005
LPD$V_XMT_ART                    = 00000006
LPD$V_XMT_DALLY                  = 00000000
LPD$V_XMT_IDLE                   = 00000003
LPD$V_XMT_RT                     = 00000004
LPD$V_XMT_STR                    = 00000001
LPD$V_XMT_VRF                    = 00000002
LPD$W_BUFSIZ                     = 00000050
LPD$W_CHAN                       = 00000014
LPD$W_DRT                        = 0000002C
LPD$W_INT_TLK                    = 00000018
LPD$W_PTH                        = 00000020
LPD$W_STS                        = 00000022
LPD$W_TIM_TLK                    = 00000016
LSN                                0000082E R       06
MAX_COST                           00000030 R       04
MAX_HOPS                           0000002C R       04
MAX_SRL                            00000146 R       02
MC1                                000027F5 R       06
MOVIT                              000027ED R       06
MOVITU                             000027F8 R       06
MSG_MAP_TABLE                      000000B4 R       02
NET$AB_EVT_WQE                     ********    X    06
NET$ADJ_LPD_CRI                    00002C72 RG      06
NET$ALLOCATE                       ********    X    06
NET$ALONPGD_Z                      ********    X    06
NET$AL_AREA_CH                     00001A88 RG      05
NET$AL_CH_VEC                      00000980 RG      05
NET$AW_AREA_C_H                    00000900 RG      05
NET$AW_MIN_C_H                     00000100 RG      05
NET$C_ACT_TIMER                  = 0000001E
NET$C_EFN_ASYN                   = 00000002
NET$C_EFN_WAIT                   = 00000001
NET$C_IPL                        = 00000008
NET$C_MAXACCFLD                  = 00000027
```

```
NET$C_MAXLINNAM           = 0000000F                 NETMSG$C_ADJ              = 0000000C
NET$C_MAXLNK              = 000003FF                 NETMSG$C_APL              = 00000005
NET$C_MAXNODNAM           = 00000006                 NETMSG$C_CRD              = 0000000B
NET$C_MAXOBJNAM           = 0000000C                 NETMSG$C_IRP              = 00000004
NET$C_MAX_AREAS           = 0000003F                 NETMSG$C_LSN              = 00000009
NET$C_MAX_LINES           = 00000040                 NETMSG$C_NOL              = 00000007
NET$C_MAX_NCB             = 0000006E                 NETMSG$C_NUL              = 00000006
NET$C_MAX_NODES           = 000003FF                 NETMSG$C_OPL              = 0000000A
NET$C_MAX_OBJ             = 000000FF                 NETMSG$C_PFE              = 00000008
NET$C_MAX_WQE             = 00000014                 NETMSG$C_UNK              = 00000001
NET$C_MINBUFSIZ           = 000000C0                 NETUPD$_DLL_ON            = 00000005
NET$C_TID_ACT             = 00000003                 NETUPD$_REACT_RCV         = 0000000C
NET$C_TID_RUS             = 00000001                 NETUPD$_SEND_HELLO        = 0000000D
NET$C_TID_XRT             = 00000002                 NFB$C_CRI_BLK             = 04000003
NET$C_TRCTL_CEL           = 00000002                 NFB$C_CRI_CHR             = 04020043
NET$C_TRCTL_OVR           = 00000005                 NFB$C_CRI_COS             = 04010018
NET$C_UTLBUFSIZ           = 00001000                 NFB$C_CRI_HET             = 04010019
NET$DEALLOCATE              ********   X    06       NFB$C_CRI_MBL             = 04010022
NET$DLLQIOAST               00002BD6 R      06       NFB$C_CRI_MRC             = 0401001B
NET$DLLUPDLNI               00000000 RG     07       NFB$C_CRI_MWI             = 04010023
NET$DLL_ALL_OFF             0000003C RG     06       NFB$C_CRI_NAM             = 04020041
NET$DLL_OPR_SET             00000071 RG     06       NFB$C_CRI_NUM             = 04020048
NET$DLL_PRC_WQE             00000D80 R      06       NFB$C_CRI_RCT             = 0401001C
NET$DLL_QIO_CO              00002AD1 R      06       NFB$C_CRI_RPR             = 04010035
NET$DLL_RCV                 00000671 RG     06       NFB$C_CRI_STA             = 04010013
NET$DLL_X25_CALL            00000577 RG     06       NFB$C_CRI_TYP             = 04010020
NET$DLL_X25_RESET           00000630 RG     06       NFB$C_CRI_USE             = 0401001F
NET$EVT_INTRAW              ********   X    06       NFB$C_CRI_VER             = 04000004
NET$FIND_ADJ                00002CC6 RG     06       NFB$C_CRI_VMSNAM          = 04020042
NET$FIND_LPD                00002CA0 RG     06       NFB$C_CRI_XPT             = 04010033
NET$GET_LPD_CRI             00002C48 RG     06       NFB$C_LNI_AMC             = 01010030
NET$GET_PLVECLPD            00002CF6 RG     06       NFB$C_LNI_AMH             = 01010031
NET$GET_RTG                 ********   X    06       NFB$C_LNI_BRT             = 0101002C
NET$GET_RTG2                ********   X    06       NFB$C_LNI_IDE             = 01020043
NET$GET_RTG3                ********   X    06       NFB$C_LNI_MCO             = 01010020
NET$GET_VEC                 ********   X    06       NFB$C_LNI_MHO             = 01010021
NET$GET_VEC2                ********   X    06       NFB$C_LNI_NAM             = 01020041
NET$GET_VEC3                ********   X    06       NFB$C_LNI_RSI             = 0101001C
NET$GL_CNR_CRI              ********   X    06       NFB$C_LNI_RTI             = 0101001B
NET$GL_CNR_LNI              ********   X    06       NFB$C_NDI_RPA             = 02020054
NET$GL_CNR_NDI              ********   X    06       NFB$C_NDI_TPA             = 02020055
NET$GL_CNR_PLI              ********   X    06       NFB$C_OP_EQL              = 00000000
NET$GL_INITVER              00000000 RG     04       NFB$C_PLI_BFN             = 0501001E
NET$GL_NET_UCB              ********   X    06       NFB$C_PLI_BUS             = 0501001F
NET$GL_PTR_LNI              ********   X    06       NFB$C_PLI_CHR             = 05020043
NET$GL_PTR_VCB              ********   X    07       NFB$C_PLI_DEVNAM          = 05020047
NET$GQ_MBX_NAME             ********   X    06       NFB$C_PLI_PLVEC           = 05010020
NET$GW_X25_CHAN             ********   X    06       NFB$C_PLI_VMSNAM          = 05020042
NET$G_ALL_ROU               00000100 R      02       NMA$C_CIRTY_X25           = 00000003
NET$INIT_ROUTING            00000000 RG     06       NMA$C_CIRUS_INC           = 00000001
NET$JNX_CO                  ********   X    06       NMA$C_CIRUS_OUT           = 00000002
NET$LOCATE_LPD              00002C9C RG     06       NMA$C_CIRUS_PER           = 00000000
NET$LOCATE_NDI              ********   X    06       NMA$C_CIRVE_DIS           = 00000001
NET$LOCLPD_DOWN             ********   X    06       NMA$C_CIRVE_ENA           = 00000000
NET$M_MAXLNKMSK           = 000003FF                 NMA$C_CIRXPT_NR4          = 00000004
NET$NDI_BY_ADD              ********   X    06       NMA$C_CIRXPT_PH2          = 00000002
NET$SET_QIOW                ********   X    06       NMA$C_CIRXPT_PH3          = 00000003
```

```
NMA$C_LINSS_ASE                = 00000006                 NSP$M_FLW_DRV                  = 000000F0
NMA$C_LINSS_FAI                = 0000000B                 NSP$M_FLW_INT                  = 00000020
NMA$C_LINSS_STA                = 00000000                 NSP$M_FLW_INUSE                = 00000010
NMA$C_LINSS_SYN                = 0000000A                 NSP$M_FLW_LISUB                = 00000004
NMA$C_STATE_OFF                = 00000001                 NSP$M_FLW_MODE                 = 00000003
NMA$C_STATE_ON                 = 00000000                 NSP$M_FLW_SP1                  = 00000008
NMA$C_STATE_SER                = 00000002                 NSP$M_FLW_SP2                  = 00000040
NOL                              0000089E R      06       NSP$M_FLW_SP3                  = 00000080
NON_FATAL                        000008B1 R      06       NSP$M_FLW_XOFF                 = 00000001
NSP$$$_QUAL_ACK                = 00000000                 NSP$M_FLW_XON                  = 00000002
NSP$$$_QUAL_ALTFLW             = 00000000                 NSP$M_INF_VER                  = 00000003
NSP$$$_QUAL_DATA               = 00000000                 NSP$M_MSG_INT                  = 00000020
NSP$$$_QUAL_FLW                = 00000000                 NSP$M_MSG_LI                   = 00000010
NSP$$$_QUAL_INF                = 00000000                 NSP$M_SRV_01                   = 00000003
NSP$$$_QUAL_MSG                = 00000000                 NSP$M_SRV_EXT                  = 00000080
NSP$$$_QUAL_SRV                = 00000000                 NSP$M_SRV_FLW                  = 0000000C
NSP$C_EXT_LNK                  = 0000001E                 NSP$M_SRV_REQ                  = 000000F3
NSP$C_FLW_DATA                 = 00000000                 NSP$M_SRV_SP1                  = 00000070
NSP$C_FLW_INT                  = 00000001                 NSP$R_QUAL                     = 00000000
NSP$C_FLW_NOP                  = 00000000                 NSP$S_ACK_NUM                  = 0000000C
NSP$C_FLW_XOFF                 = 00000001                 NSP$S_ACK_SP2                  = 00000002
NSP$C_FLW_XON                  = 00000002                 NSP$S_DATA_SP                  = 00000005
NSP$C_HSZ_ACK                  = 00000007                 NSP$S_FLW_CHAN                 = 00000002
NSP$C_HSZ_CA                   = 00000003                 NSP$S_FLW_DRV                  = 00000004
NSP$C_HSZ_CC                   = 00000064                 NSP$S_FLW_MODE                 = 00000002
NSP$C_HSZ_CD                   = 000000F0                 NSP$S_INF_VER                  = 00000002
NSP$C_HSZ_CI                   = 000000F0                 NSP$S_MSG_SP1                  = 00000004
NSP$C_HSZ_DATA                 = 00000009                 NSP$S_NSPMSG                   = 00000005
NSP$C_HSZ_DC                   = 00000016                 NSP$S_QUAL                     = 00000005
NSP$C_HSZ_DI                   = 00000016                 NSP$S_QUAL_ACK                 = 00000002
NSP$C_HSZ_INT                  = 00000009                 NSP$S_QUAL_ALTFLW              = 00000001
NSP$C_HSZ_LS                   = 00000009                 NSP$S_QUAL_DATA                = 00000001
NSP$C_INF_V31                  = 00000001                 NSP$S_QUAL_FLW                 = 00000001
NSP$C_INF_V32                  = 00000000                 NSP$S_QUAL_INF                 = 00000001
NSP$C_INF_V33                  = 00000002                 NSP$S_QUAL_MSG                 = 00000005
NSP$C_MAXHDR                   = 00000009                 NSP$S_QUAL_SRV                 = 00000001
NSP$C_MSG_CA                   = 00000024                 NSP$S_SRV_01                   = 00000002
NSP$C_MSG_CC                   = 00000028                 NSP$S_SRV_FLW                  = 00000002
NSP$C_MSG_CI                   = 00000018                 NSP$S_SRV_SP1                  = 00000003
NSP$C_MSG_DATA                 = 00000000                 NSP$V_ACK_NAK                  = 0000000C
NSP$C_MSG_DC                   = 00000048                 NSP$V_ACK_NUM                  = 00000000
NSP$C_MSG_DI                   = 00000038                 NSP$V_ACK_SP2                  = 0000000D
NSP$C_MSG_DTACK                = 00000004                 NSP$V_ACK_VALID                = 0000000F
NSP$C_MSG_INT                  = 00000030                 NSP$V_DATA_BOM                 = 00000005
NSP$C_MSG_LIACK                = 00000014                 NSP$V_DATA_EOM                 = 00000006
NSP$C_MSG_LS                   = 00000010                 NSP$V_DATA_OVFW                = 00000007
NSP$C_SRV_MFC                  = 00000002                 NSP$V_DATA_SP                  = 00000000
NSP$C_SRV_NFC                  = 00000000                 NSP$V_FLW_CHAN                 = 00000002
NSP$C_SRV_REQ                  = 00000001                 NSP$V_FLW_DRV                  = 00000004
NSP$C_SRV_SFC                  = 00000001                 NSP$V_FLW_INT                  = 00000005
NSP$M_ACK_NAK                  = 00001000                 NSP$V_FLW_INUSE                = 00000004
NSP$M_ACK_NUM                  = 00000FFF                 NSP$V_FLW_LISUB                = 00000002
NSP$M_ACK_VALID                = 00008000                 NSP$V_FLW_MODE                 = 00000000
NSP$M_DATA_BOM                 = 00000020                 NSP$V_FLW_SP1                  = 00000003
NSP$M_DATA_EOM                 = 00000040                 NSP$V_FLW_SP2                  = 00000006
NSP$M_DATA_OVFW                = 00000080                 NSP$V_FLW_SP3                  = 00000007
NSP$M_FLW_CHAN                 = 0000000C                 NSP$V_FLW_XOFF                 = 00000000
```

```
NSP$V_FLW_XON                   = 00000001                         RCB$B_MAX_SNK                   = 0000005D
NSP$V_INF_VER                   = 00000000                         RCB$B_STATUS                    = 0000000B
NSP$V_MSG_INT                   = 00000005                         RCB$B_STI                       = 00000061
NSP$V_MSG_LI                    = 00000004                         RCB$L_PTR_ADJ                   = 0000002C
NSP$V_MSG_SP1                   = 00000000                         RCB$L_PTR_AOA                   = 00000020
NSP$V_SRV_01                    = 00000000                         RCB$L_PTR_JNX                   = 00000018
NSP$V_SRV_EXT                   = 00000007                         RCB$L_PTR_LPD                   = 00000028
NSP$V_SRV_FLW                   = 00000002                         RCB$L_PTR_OA                    = 0000001C
NSP$V_SRV_SP1                   = 00000004                         RCB$V_LVL2                      = 00000000
NSP$W_DSTLNK                    = 00000001                         RCB$W_ADDR                      = 0000000E
NSP$W_SRCLNK                    = 00000003                         RCB$W_ALIAS                     = 0000008D
NUL                               00000889 R       06              RCB$W_CNT_NUL                   = 0000009A
NULL                              0000003C R       04              RCB$W_DRT                       = 000000AA
NUM_AREAS                       = 00000040                         RCB$W_ECLSEGSIZ                 = 0000007C
NUM_CIRCS                       = 00000041                         RCB$W_LVL2                      = 000000AC
NUM_NODES                       = 00000400                         RCB$W_MAX_ADDR                  = 0000005A
OPL                               0000086A R       06              RCB$W_MAX_ADJ                   = 00000068
OPR_EVT_MAP                       000000FC R       02              RCB$W_MAX_LNK                   = 00000058
P1                              = 00000018                         RCB$W_MAX_PKT                   = 00000082
P2                              = 00000014                         RCB$W_MAX_RTG                   = 0000006A
P3                              = 00000010                         RCB$W_MCOUNT                    = 00000054
P4                              = 0000000C                         RCB$W_TOTBUFSIZ                 = 0000007E
P5                              = 00000008                         RCV_ART                           00000BC3 R       06
PARSE_PH2_ADDR                    00000C8B R       06              RCV_EHEL                          00000A91 R       06
PARSE_PH3_ADDR                    00000CB8 R       06              RCV_RHEL                          00000A0E R       06
PARSE_PH4_ADDR                    00000CB8 R       06              RCV_RT                            00000AE8 R       06
PARSE_VERSION                     00000D04 R       06              RCV_RT3                           00000AF5 R       06
PFE                               0000084F R       06              RCV_RT4                           00000B66 R       06
PLVEC$AB_DEV                      ********   X     06              RCV_STR2                          000008B9 R       06
PLVEC$AB_REFC                     ********   X     06              RCV_STR3                          00000915 R       06
PLVEC$AB_STATE                    ********   X     06              RCV_STR4                          00000971 R       06
PLVEC$AL_UCB                      ********   X     06              RCV_VRF2                          000009CF R       06
PLVEC$AW_CHAN                     ********   X     06              RCV_VRF3                          000009DF R       06
PLVEC$GB_MAX                      ********   X     06              RCV_VRF4                          000009DF R       06
PR$_IPL                           ********   X     07              REACH_EVT                         00000000 R       05
PROC_ART                          0000138E R       06              REQUEST_UPDATE                    0000142D R       06
PROC_EVT                          00000D93 R       06              RESET_CHAN                        00002C39 R       06
PROC_RT                           0000126A R       06              RTGFLG                            00000040 R       04
PSI$C_NCB_PKTSIZE               = 00000015                         RTG_CHG                           00000080 R       05
PSI$C_NCB_PVCNAM                = 00000018                         RTG_CHG_LEN                     = 00000080
PSI$C_NCB_REMDTE                = 00000001                         RTG_V_ROS                       = 00000000
PSI$C_NCB_WINSIZE               = 00000016                         RTG_V_UPD                       = 00000001
PSI$C_RESET                     = 00000003                         SET_DLL_EVT                       00000D5B RG      06
PSI$C_RESTART                   = 00000007                         SET_IOTIM                         00002C20 R       06
PTYPE                             00000038 R       04              SIZ...                          = 00000001
PTY_TO_PHASE                      0000014A R       02              SS$_BADPARAM                      ********   X     06
PTY_TO_VERSION                    00000154 R       02              SS$_DEVINACT                      ********   X     06
QIOAST                            00002BE0 R       06              SS$_INSFARG                       ********   X     06
RCB$B_ACT_DLL                   = 00000060                         SS$_INSFMEM                       ********   X     06
RCB$B_CNT_APL                   = 00000095                         SS$_NORMAL                        ********   X     06
RCB$B_CNT_NOL                   = 00000094                         SS$_NOSUCHDEV                     ********   X     06
RCB$B_CNT_PFE                   = 00000097                         SS$_RESET                         ********   X     06
RCB$B_CNT_RUL                   = 00000098                         START_XRT                         00001A4A R       06
RCB$B_ETY                       = 0000008A                         STR2                              00002727 R       06
RCB$B_HOMEAREA                  = 0000008B                         STR3                              0000277A R       06
RCB$B_MAX_AREA                  = 0000008C                         STR4                              000027AC R       06
RCB$B_MAX_LPD                   = 0000005C                         STRT_TIMER_TICK                   00002412 R       06
```

```
SYS$ASSIGN                       ********  GX    06          TR3$S_TR3MSG                   = 00000001
SYS$CANCEL                       ********  GX    06          TR3$V_MSG_CTL                  = 00000000
SYS$DASSGN                       ********  GX    06          TR3$V_MSG_RTH                  = 00000001
SYS$QIO                          ********  GX    06          TR3$V_RTFLG_012                = 00000000
TELL_NETDRIVER                   00002D2C R      06          TR3$V_RTFLG_5                  = 00000005
TIMER_RUS                        00001489 R      06          TR3$V_RTFLG_7                  = 00000007
TIMER_XRT                        00001A29 R      06          TR3$V_RTFLG_PH2                = 00000006
TOGGLE_LINE                      00002633 R      06          TR3$V_RTFLG_RQR                = 00000003
TR$C_MAXHDR                    = 0000001C                    TR3$V_RTFLG_RTS                = 00000004
TR$C_NI_ALLEND1                = 040000AB                    TR3C_MAX_PSQ                   = 00000040
TR$C_NI_ALLEND2                = 00000000                    TR3C_MSG_RT                    = 00000007
TR$C_NI_ALLROU1                = 030000AB                    TR3C_MSG_RTH                   = 00000002
TR$C_NI_ALLROU2                = 00000000                    TR3C_MSG_STR                   = 00000001
TR$C_NI_PREFIX                 = 000400AA                    TR3C_MSG_TST                   = 00000005
TR$C_NI_PROT                   = 00000360                    TR3C_MSG_VRF                   = 00000003
TR$C_PRI_ECL                   = 0000001F                    TR3C_NTY_PH3                   = 00000002
TR$C_PRI_RTHRU                 = 0000001F                    TR3C_NTY_PH3N                  = 00000003
TR$C_TIM_DALLY                 = 00000002                    TR3C_NUM_TST                   = 00000003
TR$C_TIM_DLLIO                 = 000000B4                    TR3C_RT_LNG                    = 00000005
TR$C_TIM_DRDELAY               = 00000005                    TR3C_STR_LNG                   = 0000000A
TR$C_TIM_RESTRT                = 0000000A                    TR3C_STR_RSXL                  = 00000009
TR2C_INI_STR                   = 00000001                    TR3C_TIVER                     = 00000301
TR2C_INI_VRF                   = 00000002                    TR3C_TST_MAX                   = 0000007F
TR2C_MAX_PNA                   = 000000FF                    TR3C_VRF_LNG                   = 00000004
TR2C_MSG_INI                   = 00000058                    TR3C_VRF_MXL                   = 00000044
TR2C_MSG_NOP                   = 00000008                    TR3S_REQ_NTY                   = 00000002
TR2C_NOP_LNG                   = 00000001                    TR3S_RT_COST                   = 0000000A
TR2C_NUM_NOP                   = 00000000                    TR3S_RT_HOPS                   = 00000005
TR2C_PSW_LNG                   = 00000008                    TR3V_REQ_NTY                   = 00000000
TR2C_STR_FCT                   = 00000000                    TR3V_REQ_VRF                   = 00000002
TR2C_STR_LNG                   = 0000000A                    TR3V_RT_COST                   = 00000000
TR2C_STR_MXL                   = 00000050                    TR3V_RT_HOPS                   = 0000000A
TR2C_STR_REQ                   = 00000006                    TR4$$$_QUAL_ADDR               = 00000000
TR2C_VRF_LNG                   = 00000002                    TR4$$$_QUAL_RTFLG              = 00000000
TR2M_FCT_INT                   = 00000002                    TR4$$$_QUAL_SCLASS             = 00000000
TR2M_REQ_VRF                   = 00000001                    TR4$C_BCE_MID1                 = 040000AB
TR2V_REQ_VRF                   = 00000000                    TR4$C_BCE_MID2                 = 00000000
TR3$$$_QUAL_MSG                = 00000000                    TR4$C_BCR_MID1                 = 030000AB
TR3$$$_QUAL_RTFLG              = 00000000                    TR4$C_BCR_MID2                 = 00000000
TR3$C_HSZ_DATA                 = 00000006                    TR4$C_BCT3MULT                 = 00000008
TR3$C_MSG_DATA                 = 00000002                    TR4$C_END_NODE                 = 00000003
TR3$C_MSG_HELLO                = 00000005                    TR4$C_HIORD                    = 000400AA
TR3$C_MSG_INIT                 = 00000001                    TR4$C_HSZ_DATA                 = 00000015
TR3$C_MSG_NOP2                 = 00000008                    TR4$C_MSG_BCEHEL               = 0000000D
TR3$C_MSG_ROUT                 = 00000007                    TR4$C_MSG_BCRHEL               = 0000000B
TR3$C_MSG_STR2                 = 00000058                    TR4$C_MSG_LDATA                = 00000006
TR3$C_MSG_VERF                 = 00000003                    TR4$C_MSG_RDATA                = 00000002
TR3$M_MSG_CTL                  = 00000001                    TR4$C_PRO_TYPE                 = 00000360
TR3$M_MSG_RTH                  = 00000002                    TR4$C_RTR_LVL1                 = 00000002
TR3$M_RTFLG_PH2                = 00000040                    TR4$C_RTR_LVL2                 = 00000001
TR3$M_RTFLG_RQR                = 00000008                    TR4$C_T3MULT                   = 00000002
TR3$M_RTFLG_RTS                = 00000010                    TR4$C_VER_HIB                  = 00000000
TR3$R_QUAL                     = 00000000                    TR4$C_VER_LOWW                 = 00000002
TR3$S_QUAL                     = 00000001                    TR4$M_ADDR_AREA                = 0000FC00
TR3$S_QUAL_MSG                 = 00000001                    TR4$M_ADDR_DEST                = 000003FF
TR3$S_QUAL_RTFLG               = 00000001                    TR4$M_RTFLG_INI                = 00000020
TR3$S_RTFLG_012                = 00000003                    TR4$M_RTFLG_LNG                = 000000
```

```
TR4$M_RTFLG_RQR                  = 00000008
TR4$M_RTFLG_RTS                  = 00000010
TR4$R_QUAL                       = 00000000
TR4$S_ADDR_AREA                  = 00000006
TR4$S_ADDR_DEST                  = 0000000A
TR4$S_QUAL                       = 00000002
TR4$S_QUAL_ADDR                  = 00000002
TR4$S_QUAL_RTFLG                 = 00000001
TR4$S_QUAL_SCLASS                = 00000001
TR4$S_RTFLG_01                   = 00000002
TR4$S_RTFLG_VER                  = 00000002
TR4$S_SCLASS_57                  = 00000003
TR4$S_TR4MSG                     = 00000002
TR4$V_ADDR_AREA                  = 0000000A
TR4$V_ADDR_DEST                  = 00000000
TR4$V_RTFLG_01                   = 00000000
TR4$V_RTFLG_INI                  = 00000005
TR4$V_RTFLG_LNG                  = 00000002
TR4$V_RTFLG_RQR                  = 00000003
TR4$V_RTFLG_RTS                  = 00000004
TR4$V_RTFLG_VER                  = 00000006
TR4$V_SCLASS_1                   = 00000001
TR4$V_SCLASS_57                  = 00000005
TR4$V_SCLASS_BC                  = 00000004
TR4$V_SCLASS_LS                  = 00000002
TR4$V_SCLASS_METR                = 00000000
TR4$V_SCLASS_SUBA                = 00000003
TR4C_ART_LNG                     = 00000006
TR4C_BCT3MULT                    = 00000003
TR4C_EHEL_LNG                    = 00000020
TR4C_MAX_PSW                     = 00000040
TR4C_MAX_RSLIST                  = 000000EC
TR4C_MSG_ART                     = 00000009
TR4C_MSG_EHEL                    = 0000000D
TR4C_MSG_ENH                     = 00000006
TR4C_MSG_RHEL                    = 0000000B
TR4C_MSG_RT                      = 00000007
TR4C_MSG_STR                     = 00000001
TR4C_MSG_VRF                     = 00000003
TR4C_NTY_ARO                     = 00000001
TR4C_NTY_NROU                    = 00000003
TR4C_NTY_ROU                     = 00000002
TR4C_RHEL_LNG                    = 0000001B
TR4C_RT_LNG                      = 00000006
TR4C_STR_LNG                     = 0000000C
TR4C_T3MULT                      = 00000002
TR4C_TIVER                       = 00000002
TR4C_VRF_LNG                     = 00000004
TR4C_VRF_MXL                     = 00000044
TR4S_REQ_NTY                     = 00000002
TR4S_RS_PRIO                     = 00000006
TR4S_RT_COST                     = 0000000A
TR4S_RT_HOPS                     = 00000005
TR4V_REQ_NTY                     = 00000000
TR4V_REQ_VRF                     = 00000002
TR4V_RS_PRIO                     = 00000000
TR4V_RS_TWOWAY                   = 00000007

TR4V_RT_COST                     = 00000000
TR4V_RT_HOPS                     = 0000000A
TR_C_MAX_PSW                     = 00000040
TR_C_VRF_LNG                     = 00000044
UCB$C_DDT                        = 00000088
UCB$L_DEVDEPEND                  = 00000044
UCB$W_UNIT                       = 00000054
UNK                                000007FC R       06
UPDATE                             0000149F R       06
UPDATE_ALL                         00000000 R       07
UPDATE_MATRIX                      00001310 R       06
UPDATE_TIMER                       00000021 R       06
UPD_NEIGHBORS                      0000195F R       06
WQE$ALLOCATE                       ********     X   06
WQE$B_EVL_DT1                    = 0000001E
WQE$B_EVT                        = 00000010
WQE$CANCEL_TIM                     ********     X   06
WQE$C_LENGTH                     = 00000024
WQE$C_QUAL_DLL                   = 00000001
WQE$C_QUAL_RTG                   = 00000002
WQE$C_SUB_ACP                    = 00000001
WQE$C_SUB_AST                    = 00000003
WQE$DEALLOCATE                     ********     X   06
WQE$INSQUE                         ********     X   06
WQE$L_ACTION                     = 0000000C
WQE$L_EVL_PKT                    = 00000018
WQE$L_PM2                        = 00000014
WQE$RESET_TIM                      ********     X   07
WQE$W_ADJ_INX                    = 00000020
WQE$W_EVL_CODE                   = 0000001C
WQE$W_REQIDT                     = 00000012
X25_DEACCESS                       000022C4 R       06
X25_PVC_SHUTDOWN                   000022D4 R       06
X25_SHUTDOWN                       000022AF R       06
X25_STARTUP                        00002423 R       06
XM$V_ERR_FATAL                   = 00000010
XM$V_ERR_MAINT                   = 00000013
XMT                                000027E0 R       06
XMTFLG                             00000034 R       04
XMT_ART                            000029E3 R       06
XMT_DALLY                          000026C0 R       06
XMT_RT                             0000289D R       06
XMT_RT4                            00002921 R       06
XMT_STR                            000026EC R       06
XMT_VRF                            000027FC R       06
XPT_TO_PTY                         00001B7C R       06
_$$                              = 00000050
_$SENT                           = 00000000
_$LOG                            = 00020112
_$MAXINX                         = 0000002C
_$TMP                            = 00000000 R       02
```

```
                                                    +----------------+
                                                    ! Psect synopsis !
                                                    +----------------+

PSECT name                      Allocation          PSECT No.  Attributes
----------                      ----------          ---------  ----------
.  ABS  .                       00000000  (    0.)  00 (  0.)  NOPIC   USR   CON   ABS   LCL NOSHR NOEXE NORD   NOWRT NOVEC BYTE
$ABS$                           00000000  (    0.)  01 (  1.)  NOPIC   USR   CON   ABS   LCL NOSHR   EXE   RD     WRT NOVEC BYTE
NET_PURE                        00000168  (  360.)  02 (  2.)  NOPIC   USR   CON   REL   LCL NOSHR NOEXE   RD   NOWRT NOVEC LONG
TABLES_PURE                     000004A0  ( 1184.)  03 (  3.)  NOPIC   USR   CON   REL   GBL NOSHR NOEXE   RD   NOWRT NOVEC BYTE
NET_IMPURE                      00000042  (   66.)  04 (  4.)  NOPIC   USR   CON   REL   LCL NOSHR NOEXE   RD     WRT NOVEC LONG
TABLES_IMPURE                   00002B90  (11152.)  05 (  5.)  NOPIC   USR   CON   REL   GBL NOSHR NOEXE   RD     WRT NOVEC LONG
NET_CODE                        00002D45  (11589.)  06 (  6.)  NOPIC   USR   CON   REL   LCL NOSHR   EXE   RD   NOWRT NOVEC BYTE
NET_LOCK_CODE                   000000BD  (  189.)  07 (  7.)  NOPIC   USR   CON   REL   GBL NOSHR   EXE   RD   NOWRT NOVEC BYTE

                                                 +------------------------+
                                                 ! Performance indicators !
                                                 +------------------------+

Phase                    Page faults    CPU Time       Elapsed Time
-----                    -----------    --------       ------------
Initialization                   30     00:00:00.11    00:00:00.68
Command processing              124     00:00:01.04    00:00:04.35
Pass 1                         2249     00:01:17.81    00:01:58.31
Symbol table sort                 2     00:00:05.87    00:00:06.84
Pass 2                         1521     00:00:22.39    00:00:35.82
Symbol table output               1     00:00:00.66    00:00:00.78
Psect synopsis output             4     00:00:00.04    00:00:00.12
Cross-reference output            0     00:00:00.00    00:00:00.00
Assembler run totals           3934     00:01:47.95    00:02:46.98

The working set limit was 1650 pages.
418475 bytes (818 pages) of virtual memory were used to buffer the intermediate code.
There were 210 pages of symbol table space allocated to hold 3408 non-local and 643 local symbols.
7889 source lines were read in Pass 1, producing 70 object records in Pass 2.
76 pages of virtual memory were used to define 64 macros.

                                                +--------------------------+
                                                ! Macro library statistics !
                                                +--------------------------+

Macro library name                               Macros defined
------------------                               --------------
_$255$DUA28:[SHRLIB]NMALIBRY.MLB;1                     1
_$255$DUA28:[SHRLIB]EVCDEF.MLB;1                       1
_$255$DUA28:[NETACP.OBJ]NETDRV.MLB;1                   1
_$255$DUA28:[NETACP.OBJ]NET.MLB;1                     20
_$255$DUA28:[SYS.OBJ]LIB.MLB;1                         8
_$255$DUA28:[SYSLIB]STARLET.MLB;2                     16
TOTALS (all libraries)                                47

3429 GETS were required to define 47 macros.

There were no errors, warnings or information messages.

MACRO/LIS=LIS$:NETDLLTRN/OBJ=OBJ$:NETDLLTRN MSRC$:NETDLLTRN/UPDATE=(ENH$:NETDLLTRN)+EXECML$/LIB+LIB$:NET/LIB+LIB$:NETDRV/LIB+SHRLIB$
```

0276 AH-BT13A-SE
VAX/VMS V4.0

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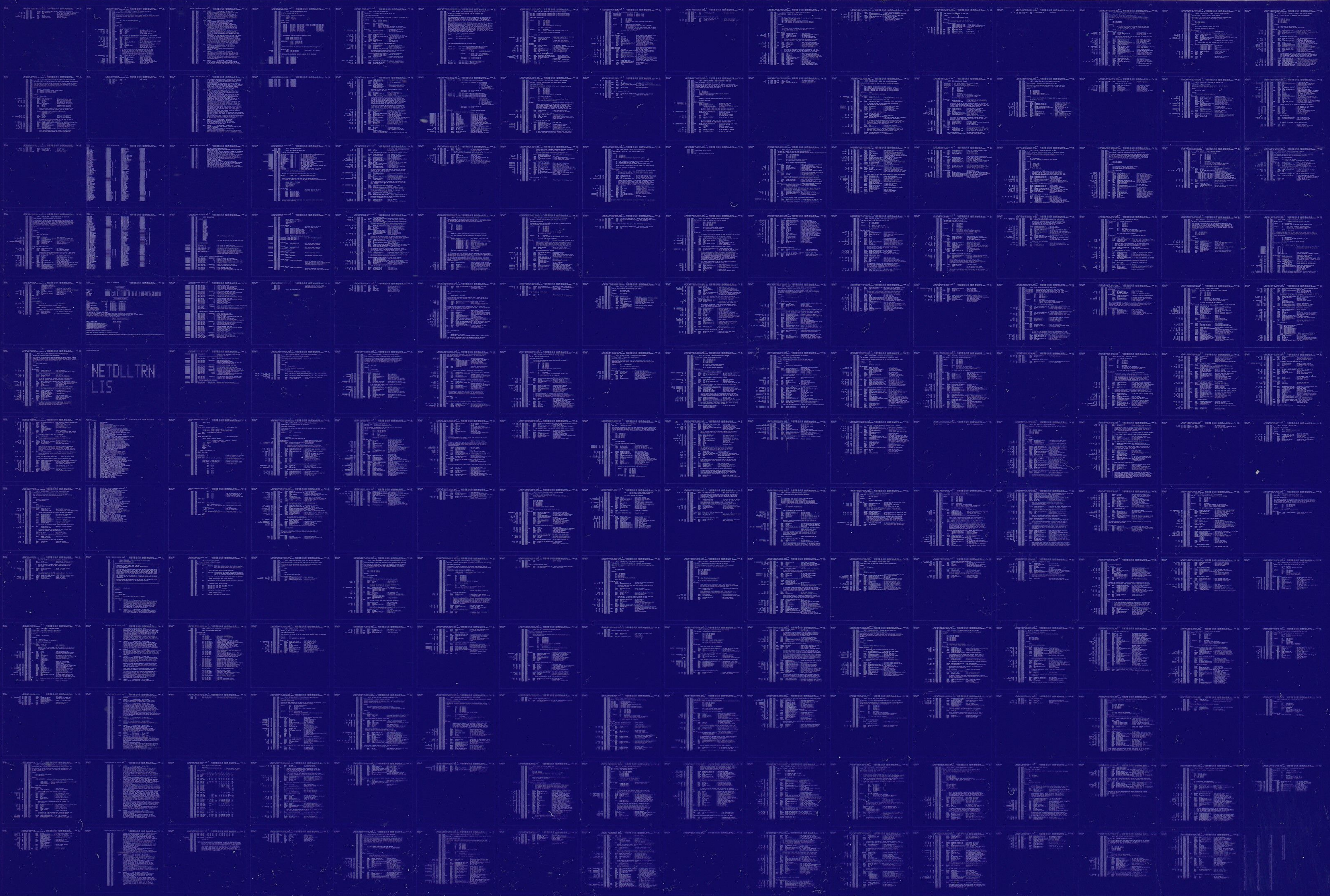

NETDLLTRN
LIS

0277 AH-BT13A-SE
VAX/VMS V4.0

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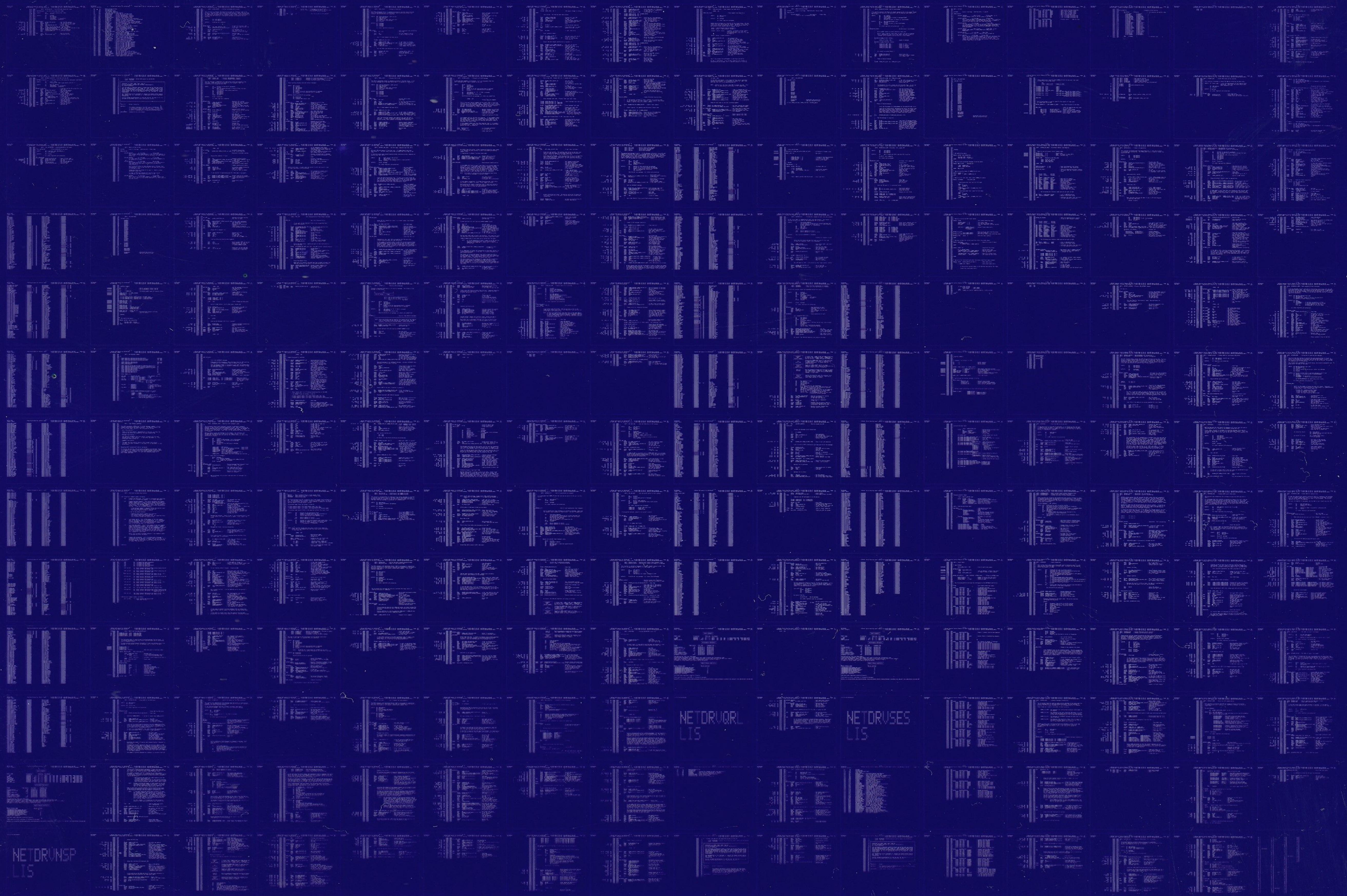

NETDRVQRL
LIS

NETDRVSES
LIS

NETDRVNSP
LIS