Report No. 5882

INTERNETWORKING OPERATIONS

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INTERNETWORKING OPERATIONS

GOALS

This module will familiarize students with the function of gateways and the control tools for monitoring and trouble-shooting gateways on the network.

Class Duration

One six-hour day.

Maximum Class Size

Seven students

Location

BBNCC Network Controller's Training Center

Student Prerequisites

The prerequisites for this module are the successful completion of the Network Utilities Module and familiarity with network control functions.

Instructional Techniques

The class will be geared toward integrating this instructional module into the material and laboratories that have been previously taught in the Network Controllers course.

Documentation

Each student will be given course notes and Internetworking Training materials relative to this module. A library of reference and related materials will be available in the classroom.

Equipment

Terminal screen projector. View graph projector, white screens, white boards, eight terminals, lightbox and a logger. Students must have access to a Network Monitoring Center.

Evaluation Techniques

The students will be tested for their grasp of general concepts and their practical laboratory skills. Each student will be expected to demonstrate their ability to operate all of the equipment and to solve problems.

Attendance is required every day of the class. Those students who fulfill the evaluation requirements will be given certificates.

Description of Subject Matter

I. INTRODUCTION TO GATEWAYS

- -Review network
- -Function
- -Gateways-Mail Bridges
- -Hardware
- -Software

II. MONITORING

- -Lightbox
- -Logger
- -Wall map

III. COMMANDS

- -Summary of Commands

IV. GATEWAY CONTROL

- -Common Problems
- -Gateway down
- -Analysis of problem
- -Bringing the gateway up
- -Logging action

V. REPORTS

VI. TRAPS

CONTENTS

CHAPTER 1
INTRODUCTION

1 INTRODUCTION

1.1 Purpose Of This Manual

This manual "Internetworking Operations" should be used in addition to the materials that have been provided for the Network Controller's Course. References to material that does not have a direct relationship to the course objectives are provided for clarification purposes, and a general understanding of networks, and how networks are controlled from the INOC (Internetworking Operations Center) or Monitoring Center.

1.2 Network

A network is made up of hosts, PSNs (Packet Switching Node), or IMPs (Interface Message Processor), and may also have TACs (Terminal Access Controllers), or PADs (Packet Assembler Disassembler). Moving traffic from one network to another involves the use of Gateways or Mail Bridges.

1.3 Mail Bridges and Gateways

The BBNCC Mail Bridge is a special function Gateway which can selectively exclude traffic other than SMTP (Simple Mail Transfer Protocol) mail. Certain hosts have full access to the network, but others are limited to mail

1.4 Hardware

The Gateway consists of an LSI-11/23 processor, 64 Kwords of memory, a pair of 1822 DH (Distant Host) network interfaces, and supporting hardware. The Gateway appears to be an 1822 "distant" host on each of the two nets it joins. It contains hardware to initialize the system and start its network interfaces.

1.5 Software

The gateway has a loader program in PROM (Programmable Read Only Memory) that accepts software down-line loading from a remote system through one of the network ports, and the main program that is loaded from a remote system.

CHAPTER 2
MONITORING

2 MONITORING

2.1 Lightbox

One of the most valuable pieces of equipment that the network controller has is the lightbox. It is the pictorial representation of the condition of the network, and the controller can monitor the condition of the gateways at a glance.

The following illustration is an example of a lightbox on a VT100 monitor.

Gateway Status Display

AERO	Milnet	UP	AEROnet	UP	AERO-130	UP	MILSAC	Arpanet	UP	Milnet	UP		
BBN	Arpanet	UP	BBN-net	UP			MILSRI	Arpanet	UP	Milnet	UP		
BBNPR	Arpanet	UP	BBN-PR	UP	RCCether	UP	MINET	Milnet	UP	Minet	UP		
CSS	Arpanet	UP	Satnet	UP			NTARE	Satnet	NR	NDRE-Tiu	DN	NTA-ring	DN
DCEC	Arpanet	UP	Satnet	DN	XDN	UP	PURDUE	Arpanet	UP	Purdue-CS	UP		
DFVLR	Satnet	UP	DFVLR-net	UP			RSRE	Satnet	UP	RSRE-acc	UP	RSRE-null	UP
IPTO	Arpanet	UP	ARPA-LAN	UP			TACT	Milnet	UP	TACTnet	UP		
ISI	Arpanet	UP	ISInet	UP			UCL	Satnet	UP	RSRE-null	UP	Ucinet	UP
MILARP	Arpanet	UP	Milnet	UP				UCL-TAC	UP				
MILBEN	Arpanet	UP	Milnet	UP			VAN	Arpanet	UP	PDN	UP		
MILDCE	Arpanet	UP	Milnet	UP			WISC	Arpanet	UP	Wisconsin	UP		
MILISI	Arpanet	UP	Milnet	UP			WSMR	Milnet	UP	WSMR-net	UP		
MILLEL	Arpanet	UP	Milnet	UP			YUMA	Milnet	UP	YPGnet	UP		

Lst st chng: Fri Dec 21 23:35:29 1984 (EST)
(a. d. z. s. v. g. t. h. f. c. e. q. ?):

Time now: Sat Dec 22 00:04:16 1984 (EST)

2.2 Logger

The lightbox provides the controller with a pictorial summary of the condition of the gateways on the network, and the logger provides a detailed summary of what is happening on the network relative to gateways.

The logger immediately reports the status of a gateway if a malfunction or a power failure occurs. It provides a means of analyzing the condition which will provide valuable information for controller action.

2.3 Wallmap

The wall map, like the lightbox, provides the controller with a graphic summary of the components of the network, hosts, nodes, lines and gateways. The map may also include additional information such as network addresses for components which is also helpful when a controller has to intervene in a network event.

CHAPTER 3
COMMANDS

3 COMMANDS

The following list contains the commands and a brief description of the command, and how it may be used by the controller to correct a malfunction and get the gateways back on-line.

3.1 Summary of Commands

‹gwname› = gateway name

Command	Function
ghalt ‹gwname›	Puts the gateway in its loader. Normally used only when reloading the gateway softw The gateway must be running.
gload ‹gwname›	Loads gateway with new copy of software. The gateway must be in its loader.
grestart ‹gwname	Restarts the gateway. May be useful to force the resetting of an interfac The gateway must be running.
gstatus ‹gwname›	Polls gateway for HMP status message. Useful for checking interface status, software vers time of last restart, etc. The -t switch provides status about the poll itself
g.info ‹gwname›	Displays site, personnel, and hardware information about the gateway.

gdisp -r	Gateway status display, real-time. Lightbox for gateways.
ggpinit ‹gwname›	Restart routing in gateway. Useful to clear routing loops. How you detect then a different matter. Requires permission.
gmeas -msg ‹gwname›	Turn on gateway message generator. Requires permission. Not generally used for control.
gtinfo ‹name or address›	If the name or address (IP format) corresponds to a known gateway the names(s) and interface addresses the gateway are displayed. Not generally used for control.
gtecho ‹dest›	Send an ICMP echo request to destination, and repor echo reply if any. Destination may be a gateway name, or an IP address in standard a.b.c.d format. Not generally used for control.

CHAPTER 4
GATEWAY CONTROL

4 GATEWAY CONTROL

4.1 Common Problems

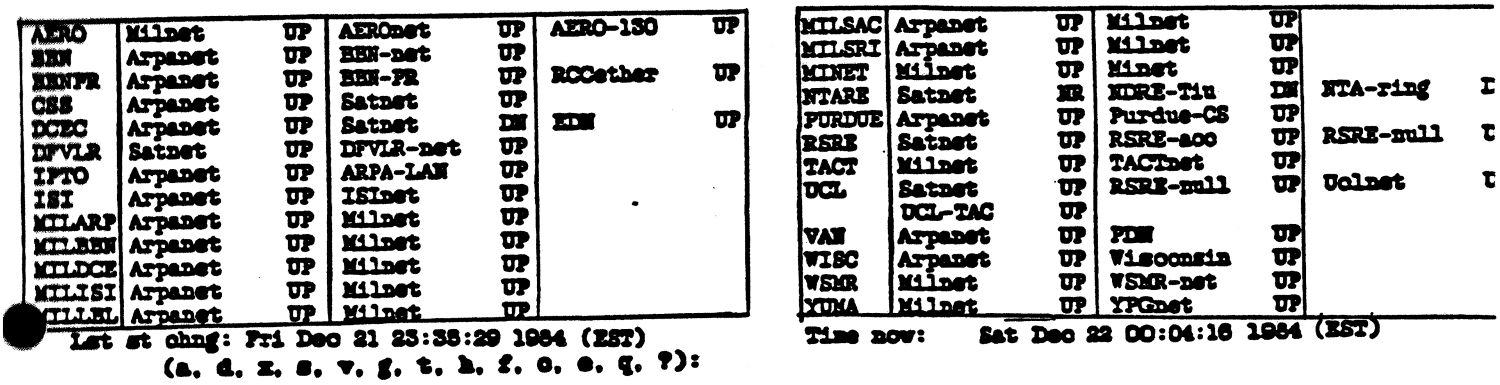
Gateways go down for many reasons, but some of the most common are:

- o power failure
- o hardware
- o software

4.2 Procedure

When a gateway goes down you must first determine the reason for the outage. The lightbox will show the gateway down. Look at the logger to see what information you can get from this report. A sample lightbox display is shown below.

Gateway Status Display



AERO	Milnet	UP	AEROnet	UP	AERO-130	UP		
BBN	Arpanet	UP	BBN-net	UP				
BBNPR	Arpanet	UP	BBN-PR	UP	RCCether	UP		
CSS	Arpanet	UP	Satnet	UP				
DCEC	Arpanet	UP	Satnet	DN	EDN	UP		
DFVLR	Satnet	UP	DFVLR-net	UP				
IFTO	Arpanet	UP	ARPA-LAN	UP				
ISI	Arpanet	UP	ISInet	UP				
MILARP	Arpanet	UP	Milnet	UP				
MILBBN	Arpanet	UP	Milnet	UP				
MILDCE	Arpanet	UP	Milnet	UP				
MILISI	Arpanet	UP	Milnet	UP				
MILLEL	Arpanet	UP	Milnet	UP				
MILSAC	Arpanet	UP	Milnet	UP				
MILSRI	Arpanet	UP	Milnet	UP				
MINET	Milnet	UP	Minet	UP				
NTARE	Satnet	NR	NDRE-Tiu	DN	NTA-ring	D		
PURDUE	Arpanet	UP	Purdue-CS	UP				
RSRE	Satnet	UP	RSRE-acc	UP	RSRE-null	U		
TACT	Milnet	UP	TACTnet	UP				
UCL	Satnet	UP	RSRE-null	UP	Uclnet	U		
	UCL-TAC	UP						
VAN	Arpanet	UP	PDN	UP				
WISC	Arpanet	UP	Wisconsin	UP				
WSMR	Milnet	UP	WSMR-net	UP				
YUMA	Milnet	UP	YPGnet	UP				

Lst st chng: Fri Dec 21 23:38:29 1984 (EST)
(a. d. z. s. v. g. t. h. f. o. e. q. ?):

Time now: Sat Dec 22 00:04:16 1984 (EST)

4.2.1 If a gateway goes down for no apparent reason it is necessary to troubleshoot the gateway with the following procedure. Our example will use the gateway named "bbn" which is the gateway between the Arpanet and the BBN-net.

If a power failure occurs at the gateway there will be no indication that the gateway is down other than the report on the lightbox but, no reasons for the outage are given.

The controller should troubleshoot the gateway beginning with the "gstatus" command followed by the name of the gateway.

```
gstatus bbn
```

You will see the status of the gateway, and a sample display follows.

```
        gstatus: 12/10/84 12:42
        For documentation, type "gstatus \?"
Beginning at Wed Dec 12 11:40:38 1984 (EST)
Source Host: 8.7.0.14 (BBN-net bbnccm)

Gateway 1 BBN 10.4.0.82 (Arpanet)       Wed Dec 12 11:40:52 1984 (EST)

Version 1007    Patch 1

Last restarted more than 6 weeks ago
Features on: THR
RUP sequence number = 022245
Memory:  5300 bytes in use, 13008 bytes idle, 32 bytes free

Interfaces:
        UP:     BBN 10.4.0.82 (Arpanet) (since 12/4 14:46)
                output q: 0, allocated: 9, data size: 1006

        UP:     BBN 8.3.0.8 (BBN-net) (since 12/4 14:46)
                output q: 0, allocated: 7, data size: 1006


gstatus terminated at Wed Dec 12 11:40:56 1984 (EST)

        gstatus: 12/10/84 12:42
        For documentation, type "gstatus \?"
Beginning at Wed Dec 12 11:41:51 1984 (EST)
Source Host: 8.7.0.14 (BBN-net bbnccm)
```

The "impstatus" command followed with the entityname of the gateway's node will show you whether the gateway is down or the node is down. If the node is up and the gateway is down it can be assumed that the gateway is in its loader/dumper.

```
impstatus n102
```

If you see that the interface is down try to restart the gateway. Restarting the gateway will re-initialize the software and then restart the interface. This can happen if there is too much traffic and the gateway becomes congested, a simple restart may clear the problem.

```
grestart bbn
```

Be certain that you use the prefix "g" when you type the gateway command. If you should type "restart" without the "g" prefix the system would attempt to restart a node rather than a gateway.

If the interface is down on the other side of the gateway and you attempt to reset the gateway with the "grestart" command the gateway will not come up. You will have to contact the liaison person on the other side of the gateway for additional information.

4.2.2 If your interface is up but the interface on the other side of the gateway is down use the "ginfo" command followed with the entityname of the gateway to get the information that you need such as the liaison person's name and telephone number. The controller at the other end will probably recycle their interface. A sample "ginfo" display is shown on the next page.

Gateway name:BBN

Internet addresses:10.3.0.72

Timezone (note: daylight-savings time change different in Europe
and Asia): EDT

Machine type (LSI-03, LSI 11/23, PDP 11/35, etc):LSI-03

Configuration (ARPAnet 1822, Satnet, etc.):1822/(BBNNET)

Notes:

Front panel (mailbridge/sigma, sri/acc, LSI-11, PDP 11/35):sri/acc

Boot device (robustness I, BDV-11, paper tape, etc.):robustness I

Restart loader address:17300

Reboot procedure (paper tape, prom boot, TU58, etc.):HALT Button, wait

Passive loader start address (if any):

Robustness exec starting address:

Emergency Contacts: (Area Code 617)
1. UCC x.3971
2.
3.

Other Contacts (onsite, after hours):
1. John Goodrich h. 861-0659
2.
3.

Machine location: UCC Room

Telephones.
Near Gateway:
Other number:

Mailing address:

Last info update: 01/19/84 PST

4.2.3 If there is a problem with your interface it will probably between the gateway and the node. If this is the case it is necessary that you loop the interface at the node, and run a hitest. After you get the hitest report be sure to unloop the host interface and do a fixhac. It is necessary to do a fixhac to correct the "hacword" which has been changed to 2 when you looped the host interface at the node. This disables all users from using that host port. The host will be reported as "up", but the permissions have been changed and no one can get to the host.

```
loop n102 -hi=1

hitest n102 -hi=1

unloop n102 -hi=1

fixhac n102
```

Now it is necessary to do load the software into the gateway with the "ghalt" command, but it is first necessary to halt the gateway, and put it into its loader/dumper.

```
ghalt bbn

gload bbn
```

The gateway should be up now.

4.2.4 If Both Interfaces Are Down

If the gateway is in its loader/dumper or does not respond at all try to send a load to the gateway.

```
gload bbn
```

You will get a report if the gateway is not in its loader/dumper. If the gateway is in its loader/dumper it will start its load program, and you will get the message that it is "Building load image..." and that the program is "reloading the gateway" if it is in its loader/dumper. The program will report that it is finished, and you will get the INOC prompt. All gateway neighbors will report that the gateway is up.

If the gateway does not respond it is necessary to have someone at the site look at the gateway and determine if there is a power failure, or it may be necessary to have the site liaison "powercycle" the gateway be resetting the "on/off" switch.

4.3 If INOC is Down

The following is not a part of the normal operating procedure and should be done only when an administrator requests that you follow the procedure that is outlined below.

If the INOC is down it may be necessary to get into the operating system (TOPS -20) to load the gateway. You will get more information, and this may be a more reliable version of the software. You can only dump or load the system at this point.

It is necessary to login as control and type your password on the same line.

```
login ‹control› ‹password›

conn ps: ‹gateway.gwname›    or  xnet4

;t call ‹ESC›
```

The response on your terminal should be "Debugging process 0. If it reads 177 rather than 0 the gateway is not in its loader/dumper.

Type the following to download the gateway.

```
;;y gtway.bin
```

When the load is finished you will be notified with an "OK".

To start the gateway type:

```
‹ESC› ‹ESC› g
```

Check the netlog to make sure that the gateway is reporting

up.

Some Useful TOPS-20 commands are:

^ b To monitor a Network connection

^ e To abort a Network connection

; h To exit from TOPS-20

Check the gateway from INOC with the "gstatus"command.

gstatus bbn

4.4 Fill out the report in the log book

4.5 Some additional reasons for a gateway going down are:

- o Hardware failure
- o Software failure

If all of the above procedures fail it is probably due to a hardware or software failure. If you have determined that it one of these reasons it is necessary that you escalate and notify the proper person according to the procedure that has been established for your operating center.

5 REPORTS

5.1 The following example shows a typical report that is generated by the "gmeas" command.

```
   last update Tue Oct 18 11.19:10 EDT 1983 by control
   last update Thu Jan 19 12:58:27 EST 1984 by control
        gmeas: 12/10/84 12:42
        For documentation, type "gmeas \?"
Beginning at Wed Dec 12 11:53:10 1984 (EST)
Source Host: 10.2.0.82 (Arpanet bbn-inoc)

TEST0 10.0.0.63 (Arpanet) is down
                (1822 DEAD Received: Host not responding)

gmeas terminated at Wed Dec 12 11:54:05 1984 (EST)

        gmeas: 12/10/84 12:42
        For documentation, type "gmeas \?"
Beginning at Wed Dec 12 11:56:09 1984 (EST)
Source Host: 10.2.0.82 (Arpanet bbn-inoc)
Init and sched done at Wed Dec 12 11:56:15 1984 (EST)

Sending Gwy Cntrl to TEST0 10.0.0.63 (Arpanet) (1822 id = 1)

                via 0/63 TEST0 at 11:56:20

 RETRANSMISSION 1:
     Sending Gwy Cntrl to TEST0 10.0.0.63 (Arpanet) (1822 id = 2)
                via 0/63 TEST0 at 11:56:29

 RETRANSMISSION 2:
     Sending Gwy Cntrl to TEST0 10.0.0.63 (Arpanet) (1822 id = 3)
                via 0/63 TEST0 at 11:56:43
```

6 TRAPS

6.1 The following is a sample of the report that is generated by the "gtrap" command.

```
        gtraps: 11/25/84 16.40
        For documentation, type "gtraps \?"
Real-time log beginning at Wed Dec 12 11:51:37 1984 (EST)


gtraps: No events from 11:52 through 11:56

Wed Dec 12 1984 (EST)
11:58 GWY TEST0  T1051: Restarted with version 1007
      GWY TEST0  T1015: 1822: no match for RFNM from INOC 10.2.0.82 (2.)
      GWY TEST0  T2008: Interface TSTGW 8.0.0.9 up
      GWY TEST0  T2008: Interface TEST0 10.0.0.63 up
      GWY TEST0  T1015: 1822: no match for RFNM from TEST0 10.0.0.63 (2.)
      GWY TEST0  T1202: VDH line up
      GWY TEST0  T1203: SATNET line up (2.)
11:59 GWY TEST0  T2008: Interface 31.0.0.61 up
Wed Dec 12 1984 (EST)
12:02 GWY TEST0  T1051: Restarted with version 1007
      GWY TEST0  T1013: Interface Reset from IMP on 10.0.0.63
```

A complete summary of the trap codes appears on the following pages.

```
Gateway Version 1007 Trap Listing
Trap    149.    ;EGP timer bug at R0
Trap    1000.   ;RFNM count - packet flushed r0r1
Trap    1001.   ;Protocol R4 from R0R1 is unknown
Trap    1002.   ;ENQ failed - packet flushed  R0R1 -> R2R3
Trap    1003.   ;Bad IP Version R5 from R0R1 via R2R3
Trap    1004.   ;IP header length R5 from R0R1 via R2R3
Trap    1005.   ;IP checksum R5 from R0R1 via R2R3
Trap    1006.   ;Time expired  R0R1 -> R2R3
Trap    1007.   ;Input packet dropped from interface R0R1
Trap    1008.   ;Can't fragment - DF set  R0R1 -> R2R3
Trap    1010.   ;ICMP Redirect r0r1 -> r2r3 to r4r5
Trap    1011.   ;ICMP - Illegal ICMP type r0
Trap    1012.   ;ICMP type r4 from r0r1
Trap    1013.   ;Interface Reset from IMP on interface r0r1
Trap    1014.   ;1822 error R2 subtyp R3 host R0R1
Trap    1015.   ;Arpa: No match for message type r2 from r0r1
Trap    1016.   ;Rs.net - no buffers for read
Trap    1017.   ;1822 strange packet, net R0, content R1R2R3R4R5
Trap    1018.   ;IP Packet only R5 bytes long from R0R1 via R2R3
Trap    1019.   ;IP len R5 .gt. icl len R4 from R0R1 via R2R3
Trap    1020.   ;ICMP rcd bad cksum R4 from R0R1
Trap    1021.   ;ICMP Redirect (loadsplit) r0r1 -> r2r3 to r4r5
Trap    1022.   ;ICMP SQ to R3R4
Trap    1023.   ;1822 rfnm counter says room but all (8) slots full
Trap    1024.   ;1822 overdue RFNM from R0R1
Trap    1025.   ;HC.ARPA: Reg msg on non IP link R0 from R4R5
Trap    1026.   ;1822 NOP address claims to be R0R1
Trap    1027.   ;1822 subtype 3 not enabled for r0r1->r2r3
Trap    1028.   ;1822 r4 too long for subtype 3 r0r1->r2r3
Trap    1030.   ;HLDC - Data transfer fail
Trap    1031.   ;HDLC - Link up
Trap    1032.   ;HDLC - Link down
Trap    1033.   ;HDLC - Link connection fail - r0
Trap    1034.   ;HDLC - Link connection command fail - r0
Trap    1035.   ;HDLC - line card reset
Trap    1036.   ;HDLC - node to line card error
Trap    1040.   ;IP Option: Option# too big R0R1->R2R3
Trap    1041.   ;IP Option: Bad Source Route Ptr R0R1 -> R2R3
Trap    1042.   ;IP Option: Undefined option - R4 R0R1->R2R3
Trap    1043.   ;IP Option: Bad Strict Src Route R0R1 -> R2R3
Trap    1045.   ;IPFORUS: Fragmented pkt MF set R0R1 -> R2R3
Trap    1046.   ;IPFORUS: Fragmented pkt OFF non zero R0R1->R2R3
Trap    1047.   ;CHKSUM: IP checksum with R2 length R1 buffer
Trap    1048.   ;Almost sent ICMP type R4 for ICMP type R5 R0R1 -> R2R3
Trap    1050.   ;Power Restored
Trap    1051.   ;Gateway Restarted
Trap    1055.   ;Reducing Max Outstanding Reads
Trap    1060.   ;XNET debug from r0r1
Trap    1100.   ;PR.TC  Error sending TOP
Trap    1101.   ;RC.PR  Error on Read Completion
Trap    1102.   ;WC.PR  Error on Write Completion
Trap    1103.   ;HC.PR  Error on Transfer
Trap    1104.   ;PRCHK Reflect Bit Set
Trap    1105.   ;PRCHK  Unsupported Type R0 Rcvd
Trap    1106.   ;PRCHK Bad Header Length = R0
Trap    1107.   ;PRCHK Bad Packet Length = R0
Trap    1108.   ;PRCHK Bad Header Version # = R0
Trap    1109.   ;PR.RFC Error reflecting a Packet
Trap    1150.   ;fiber: bad hdr rcd bytes R2R3
Trap    1200.   ;VDH line looped
Trap    1201.   ;VDH line unlooped
Trap    1202.   ;Satnet - Satnet VDH line up
Trap    1203.   ;Satnet - line up
Trap    1204.   ;Satnet - Satnet VDH line down
Trap    1205.   ;Satnet - SIMP in loader
Trap    1206.   ;Satnet - Got data with errors
Trap    1207.   ;Satnet - Got format error
Trap    1500.   ;Bad HMP MTYP R5 rcvd from R0R1
Trap    1501.   ;Bad HMP STYP from R0R1
Trap    1502.   ;Bad HMP Password from R0R1
Trap    1503.   ;Bad HMP Poll MTYP from R0R1
Trap    1504.   ;HMPSTAT - Status msg full
Trap    1505.   ;HMPVER No data is message from R0R1
Trap    1506.   ;HMPVER Bad checksum from R0R1
Trap    1508.   ;THUINT - Zero time interval
Trap    1509.   ;THUSRT - Thruput turned ON, Time int = R0
```

```
Trap    1510.   ;HMPCHK Called w/ Zero count
Trap    1511.   ;HMPTHU - Message full
Trap    1512.   ;HMPHTM - Message full
Trap    1513.   ;HMCTL - Bad Poll for CTL ACK from R1R0
Trap    1514.   ;HTMSRT - HTM turned ON, Time int = R0
Trap    1515.   ;HTMINT - Zero time interval
Trap    1516.   ;HTMSRT - HTM Turned off
Trap    1517.   ;THUSRT - Thruput turned off
Trap    1518.   ;HMPSTAT - Status msg full
Trap    1519.   ;THUINT - Illegal to change time when ON
Trap    1520.   ;HMPTRAP - Trap buffer full, R0 Traps Lost
Trap    1521.   ;HTMINT - Illegal to set time when on
Trap    1522.   ;HTMGGP - Illegal to change parm when on
Trap    1600.   ;EGP bad pkt from R0R1, wrong net R2R3
Trap    1601.   ;EGP bad pkt from R0R1, length R3 .lt. R4
Trap    1602.   ;EGP bad pkt from R0R1, checksum is R4
Trap    1603.   ;EGP bad pkt from R0R1, prot vers is R4
Trap    1604.   ;EGP bad pkt from R0R1, on my autonomous system R4
Trap    1605.   ;EGP nbr up - R0R1
Trap    1607.   ;EGP NR msg from R0R1 scanned R.2, bad R.3, at byte R4
Trap    1608.   ;EGP NR msg - net R2R3 .ne. R0R1
Trap    1609.   ;EGP NR msg from R0R1 ran over end
Trap    1610.   ;EGP control - nbr R0R1 already in state R2
Trap    1611.   ;EGP nbr R0R1 sent R.3 in state R2
Trap    1612.   ;EGP bad pkt from R0R1, R.3 in state R2, sending cease
Trap    1613.   ;EGP bad pkt from R0R1, R.3 in state R2, sending ERR MSG
Trap    1614.   ;EGP control - nbr R0R1 refuses to play
Trap    1615.   ;EGP nbr R0R1 requesting cease
Trap    1616.   ;EGP timeout on nbr R0R1, being dropped
Trap    1617.   ;EGP err msg from R0R1, id was R2, type R.3
Trap    1618.   ;EGP control - nbr R0R1 has accepted us
Trap    1619.   ;EGP control - nbr R0R1 has been dropped
Trap    1620.   ;EGP control -  new nbr request from R0R1 accepted
Trap    1621.   ;EGP control -  new nbr request from R0R1 refused
Trap    1700.   ;Inserting mapping for IP addr R0R1 to Ethernet R2R3R4
Trap    1701.   ;hb.eth: Sending Plummer Request pkt for R0R1-R2R3
Trap    1702.   ;hc.eth: Sending Plummer Reply to IP R0R1, Eth R2R3R4
Trap    1703.   ;Ethernet translation table full
Trap    1710.   ;HC.VAN: Invalid packet/state pair
Trap    1711.   ;HC.VAN: received X.25 accept on LCN r4
Trap    1712.   ;HC.VAN: rcvd X.25 Clear LCN r4
Trap    1713.   ;HC.VAN: rcvd X.25 Clear VCN for VCN r1, LCN r4
Trap    1714.   ;HC.VAN: received X.25 Restart
Trap    1717.   ;HC.VAN: X.25 error r4 (octal) occurred
Trap    1718.   ;HC.VAN: X.25 link changing from state r3 to r0 (octal)
Trap    1719.   ;HC.VAN: Invalid X.25 pkt type r4 (octal) received
Trap    1720.   ;HB.VAN: making X.25 call for DG r0r1 - r2r3, LCN r4
Trap    1721.   ;Refusing to make X.25 call for DG r0r1 - r2r3
Trap    1722.   ;HB.VAN: can't find X.25 addr for DG r0r1 - r2r3
Trap    1723.   ;HB.VAN: making reverse X.25 call for r0r1-r2r3, LCN r4
Trap    1724.   ;XQCP Driver: RdSAbo called
Trap    1725.   ;XQCP Driver: RdSAbA called
Trap    1726.   ;XQCP Driver: RdAbort called
Trap    1727.   ;XQCP Driver: RRAPS called
Trap    1728.   ;XQCP driver: WrSAbo called
Trap    1729.   ;XQCP driver: WrSAbA called
Trap    1730.   ;Sg.VAN: Sending X.25 Clear on LCN r4
Trap    1731.   ;X.25 access refused for DG r0r1 - r2r3
Trap    1732.   ;XQCP driver: WrAbort called
Trap    1733.   ;XQCP driver: WrAbo called
Trap    1750.   ;XQCP HDH hdr r2 ,XQCP hdr r3 (2 octal bytes ea.)
Trap;   1751.   ;HDHIni called--HDH reinitializing
Trap    2001.   ;neighbor down - R0R1
Trap    2002.   ;GGP type R4 from R0R1
Trap    2004.   ;neighbor up - R0R1
Trap    2005.   ;new neighbor - R0R1
Trap    2008.   ;interface R0R1 up
Trap    2009.   ;interface R0R1 down
Trap    2010.   ;too many rt entries sending to R2R3
Trap    2011.   ;new fmt net R0R1 reported from R2R3
Trap    2012.   ;no room for new net from R0R1
Trap    2013.   ;type R4 too short from R0R1
Trap    2015.   ;new route update too short from R0R1
Trap    2016.   ;new fmt redundant route from R0R1
Trap    2017.   ;reroute R0R1 -> R2R3 via R4R5
Trap    2018.   ;no room for neighbor R0R1
Trap    2019.   ;send update # R4 to R0R1
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Trap    2020.   ;trace in hdr R0R1.R2R3.R4R5
Trap    2021.   ;trace IP hdr R0R1.R2R3.R4R5
Trap    2022.   ;trace ip add R0R1->R2R3
Trap    2023.   ;GGP type R4 from remote host R0R1->R2R3
Trap    2024.   ;nets full, drop net R0R1
Trap    2025.   ;restart signaled in R0
Trap    2026.   ;GGP reinitializing
Trap    2028.   ;GGP ingore RUP from R0R1 seq=R2 expect=R3
Trap    2050.   ;ACCESS:  MailOnly  R0.R1 -> R2.R3  Protocol R4
Trap    2051.   ;ACCESS:  MailOnly  R0.R1 -> R2.R3  TCP  SP R4 - DP R5
Trap    2052.   ;ACCESS:  NotAllowed  R0.R1 -> R2.R3  Protocol R4
Trap    2053.   ;ACCESS:  NotAllowed  R0.R1 -> R2.R3  TCP SP R4 - DP R5
Trap    2060.   ;SPLIT: r0.r1 not on local net
Trap    2061.   ;SPLIT: Either r0.r1 or r2.r3 is an interface.
Trap    2062.   ;SPLIT: Multiple entries r0, r1 for this gateway
Trap    2063.   ;SPLIT: This gateway not in ldgrp table.
Trap    2064.   ;SPLIT: Adding R0.R1 to Neighbor Table
Trap    2065.   ;SPLIT: Unable to Add r0.r1 to Neighbor Table
Trap    2066.   ;SPLIT: Loadsharing Initialization Failure (R0 neighbors)
Trap    2100.   ;MSG gen on, len R2, time R3, to R0R1
Trap    2102.   ;MSG gen off. sent R0, drop R2, time r1
Trap    2103.   ;MSG gen rcd R2, errs R3 from R0R1
Trap    2104.   ;MSG gen rcd R2, no errors
Trap    2105.   ;MSG gen snt to R2R3
Trap    2106.   ;MSG gen rcd fm R0R1
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