



H320IP NetEx/IP[™] **for 32- & 64-bit HP-UX Systems**

Release 6.6.4-1

Memo To Users
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MTU-H320IP-05

Introduction

This document provides information for the H320IP NetEx/IP product. The H320IP product implements the host based NetEx/IP product for Hewlett-Packard 32- & 64-bit HP-UX operating systems. HCM connectivity is provided by HP FDDI adapters. This product has been tested with HP-UX B11.11 using the HCM driver over FDDI, and IP over both FDDI and 100BaseT Ethernet.

Related Documentation

Additional information about this NetEx/IP software may be found in the *NetEx/IP for Unix Systems Release 6.0 Software Reference Manual*.

Support

Support for NetEx/IP and associated products is available via:

- 24x7 telephone at (800) 854-0359
- the worldwide web: <http://www.netex.com/>
- email: <mailto:support@netex.com>

An on-line version of the current Memo To Users and Reference Manual may be found at:

www.netex.com/support/

Service Notes

This release of NetEx/IP attempts to conform to HP's version of the OSF/1 file system layout. This is documented in the HP publication 'HP-UX 10.0 File System Layout Whitepaper'. This required that all of the files for NetEx/IP and related applications be moved. The following shows the locations of some of the more important files:

Directory or File Name	Description
/opt/netex	NetEx/IP base directory
/opt/netex/cmds/ntxoper	Operator interface
/etc/opt/netex/ntx_default	configuration for NetEx/IP
/var/opt/netex/ntxlog	NetEx/IP log file
/etc/opt/netex/ntx_pam	Address map location
/var/opt/netex/netexserver	NetEx/IP interprocess communication point
/opt/hcmd/hcmd	HCM daemon
/etc/opt/hcmd/conf	HCM configuration
/opt/hcmd/hcmstat	Status command
/usr/include/netex.h	NRB definition file
/usr/ccs/lib/libntx.a	effectively the same place

The directory /opt/netex/cmds is added during installation to /etc/PATH so that the NetEx/IP operator commands are generally available.

A soft link from /usr/nsc/netex/nsc_netexserver to /var/opt/netex/netexserver is created during installation so that earlier versions of user applications can still be run. It is NOT necessary to relink user applications.

1. Systems with large numbers of network interfaces (approximately 8 or more) may overflow a buffer in hcmd and cause hcmd to not recognize the FDDI interface.
2. Some HP9000/7xx systems may use a FDDI board supplied by Interphase Corp. The driver for this board does not read the full FDDI address and NetEx/IP will not work with it unless the board is at version SXD00076-A08, or later.
3. There has been a change to the displayed messages in ntxlog during NetEx/IP startup. After the initialization parameters and release level have been displayed, the following messages will be shown:

```
** 0009 Fri Aug 22 12:56:30 2003 - NETEX driver interface initialization pending *  
** 0010 Fri Aug 22 12:56:30 2003 - NETEX entering "intra-host" mode *  
** 0011 Fri Aug 22 12:56:31 2003 - NETEX initialization complete. *  
** 0012 Fri Aug 22 12:56:31 2003 - NETEX exiting "intra-host" mode *
```

This is now the normal sequence of messages and not an indication of an error.

New Features

New NTX_DEFAULT parameters

There are three new parameters available in the NTX_DEFAULT file:

- ROPCLASS (Remote Operator Class) – Maybe be set to A or G. “A” will allow privileged instructions such as SET, HALT, etc. to be issued via the remote operator facility. “G” only allows non-privileged operator commands (DISPLAY, etc.). The default setting is “G”.
- NODNS – When set to 1 (true), NetEx/IP will skip DNS lookups when the PAMFILE is read. The default is 0 (false). This is only useful if the user intends to ONLY use the “SET IPRUTE” command to manually map *toGNA* addresses to *toIP* addresses.
- PREFPROT – Defines the default preferred protocol type to use when connecting to hosts that support multiple NetEx/IP protocol types. Valid values are 2 or 4. Default is 4.

New NetEx/IP operator commands

There are three new NetEx/IP operator commands:

- HALT Adapter <uuss>

UUSS is the four HEX character network address (DREF) of the adapter to be halted.

Link or gateway adapters may not be halted at this time.

When a local adapter is halted, NetEx/IP immediately stops writing to or reading from the halted adapter. This is true regardless of the state of connections using that adapter. If a remote host attempts to establish a new connection on a route through a halted adapter, the local NetEx/IP will ignore those messages sent by the remote host.

Non-local adapters are adapters that are not attached to the host on which this NetEx/IP is running. After non-local adapters are halted, all new connections are established using routes through other adapters.

Once a session connection is established through a remote adapter, that session continues even after a HALT command has been entered for it.

- STart Adapter <uuss>

UUSS is the four HEX character network address (DREF) of the adapter to be started.

The operator may start an adapter that is halted to NetEx/IP.

- Display HALTED

The operator may display a list of halted adapters.

Other changes and additions

- A correction has been made to speed up the processing of batched operator commands.
- Miscellaneous corrections to the documentation in the installation section.

Previous Release

Changes available from the previous release

A code change was made to modify the HCM driver to run under the HP-UX B.11.00 64-bit operating system. The other major change made was to the content and structure of the release. As of this release, the source code is no longer being distributed with the executable code.

Minor modifications have been made to other modules/routines:

- HCMD has had the size of an internal table increased to handle case where there are more than 4 network devices connected to the system. If this table ever overflows, an error message will be printed out.
- The test programs under `/opt/netex/tests` have been modified to correctly calculate the data rate and amount of data transferred. On long test transfers, these values would go negative.
- An error that caused `'ntx'` to look in the wrong default locations if the file locations were allowed to default in the `'ntx_default'` file has been corrected.

IP Support

NetEx/IP release 5.0 provided support for communications over standard IP networks. No changes were required to NetEx/IP applications, since the NetEx/IP Application Programming Interfaces (API's) have not been changed.

H320IP also supports HYPERchannel networks in addition to the IP networks. This means that migrating to a NetEx/IP network does not require all NetEx/IP hosts and the network to all be upgraded at the same time. One possible implementation scenario is to install the NetEx/IP software on as many hosts as possible, but then continue using the HYPERchannel network. As subsequent schedules and requirements are defined, individual network segments can be staged for migration from HYPERchannel-based networks to IP-based networks in a planned manner.

At initialization time (and when LOAD NCT is done) all remote host GNA addresses are resolved to IP addresses via DNS lookups. These addresses comprise the HYPERChannel *toGNA* address, as defined in the NetEx/IP NCT by the NETADDR (*uu*) and SMGDREF (*ss*) parameters. If the DNS lookup is successful, an entry is dynamically created in the routing table that maps the *toGNA* and *toIP* addresses. Subsequent searches of the table on behalf of new messages will find this new entry, thus avoiding additional DNS lookups.

Remote host addresses that are not in the local NCT, but that may send messages to the local host, can also be added to the lookup table via the SET IPRROUTE command.

Network Configuration Table

No changes were made to either the Network Configuration Table (NCT) or the Configuration Manager in support of NetEx/IP. The mechanism for adapting the NCT to support IP networks is as follows:

- Use the TRUNK statement to define the IP network.
- Use the T0 parameter on the ADAPTER statement(s) of the NetEx/IP host to indicate connectivity on the IP network
- Use the ADAPTER statement to define the Network Adapter

- Use the NETADDR and SMGDREF parameters on each NetEx/IP ADAPTER statement to identify a unique network device address

The following commands have been added to support the new IP addressing features:

- SET IPROUTE
- DISPLAY IPROUTE
- CLEAR IPROUTE

Details of the format and effect of these commands may be found in the *NetEx/IP for Unix Systems Release 6.0 Software Reference Manual*.

Three new NTX_DEFAULT commands have also been implemented: IPRECV, IPSEND, IPCHKSUM. Refer to the “Installation” section of this document for details.

Code Conversion Table

The code conversion table can now be modified without a recompile.

Customers can execute the command “/opt/netex/cmds/cctbld filename” (where filename is a file location on the host) to create a text file version that they can edit. The default location for the file is /etc/opt/netex/cctable.

However, if the customer creates the file in an alternate location, they must add the variable “cctable” to the NTX_DEFAULT along with the fully qualified pathname of the file.

NetEx/IP checks for the existence of a code conversion file during startup. If an alternate code conversion table does not exist, NetEx/IP will use the built-in default table.

Installation Notes

Prerequisites

The following are hardware and software prerequisites for installing the H320IP NetEx/IP product.

- An HP 9000/8xx or HP 9000/7xx system.
- An HP FDDI interface with STREAMS and DLPI (optional if running over IP networks only).
- An HP system running HP-UX 11.00.
- At least one other processor on the HYPERchannel or DX network running the appropriate NetEx/IP software (not required for intra-host test/evaluation).
- Customers must obtain a software KEY from NESi prior to running the H320IP software. Customers must contact NESi customer support with the customer site name, hostname, and the NetEx/IP product designator (e.g., H320IP). NESi customer support will supply the necessary key once this information has been received. The customer needs to place this key into the NESikeys file as discussed later in this section.

All requirements for the equipment listed above must be met before proceeding with the installation.

Hardware Installation

Install the HP FDDI interface board using the HP-supplied installation procedure. Make sure the STREAMS environment and the DLPI interface are installed.

Software Installation

Installing and configuring the H320IP NetEx/IP software consists of the following steps.

1. Remove any previously installed releases of H320IP.
2. Installing the H320IP product tape (or distribution file).
3. Editing the PRODCONF file.
4. Editing the NESikeys file.
5. Editing the NTX_DEFAULT file.
6. Building an NCT.
7. Editing the CONF file (for HYPERchannel networks) or DNS tables (for IP networks).
8. Modify the NetEx/IP code conversion table (optional).
9. Changing the maximum STREAMS block size.
10. Starting the NetEx/IP daemon (for HYPERchannel networks only).
11. Starting NetEx/IP.
12. Modifying the system startup file.

This installation will reboot the host.

Remove any previously installed releases of H320IP

Prior to installing this software product, it is highly recommended that the “hcmd” and “ntx” processes be stopped and that any previous releases of H320IP be removed. Software removal should be performed through the software management facility that is a part of the SAM system administration program.

The software removal process via SAM should create the `/tmp/nesi/hcmd` and `/tmp/nesi/netex` directories. The `/etc/opt/hcmd/conf` file will be copied into `/tmp/nesi/hcmd`. The `/etc/opt/netex/ntx_default`, `/etc/opt/netex/ntx_pam`, and `/etc/opt/netex/prodconf` files will be copied into `/tmp/nesi/netex`. The text source file (NCT) that is used to create `ntx_pam`

NOTE: Removal of the currently running H320 software will result in a system reboot.

Install the H320IP Distribution

NetEx/IP is composed of one product, H320_R6_6_4_RUN.

There are three sub-products, HCM32, HCM64 and NETEX32. If your HP system is running in 32-bit mode, the SAM (System Administration Manager) software management utility will automatically select and install the 32-bit HCM driver as part of the NetEx/IP install. If the HP system is running in 64-bit mode, SAM will automatically select and install the 64-bit HCM driver as part of the NetEx/IP install.

<u>PRODUCT</u>	<u>SUB-PRODUCT</u>	<u>Description</u>
H320_R6_6_4_RUN	HCM32	32-bit HYPERchannel emulation driver for FDDI.
	HCM64	64-bit HYPERchannel emulation driver for FDDI.
	NETEX32	NetEx/IP HYPERchannel protocol stack for UDP and HCM FDDI.

The H320_R6_6_4_RUN product contains everything necessary to run the NetEx/IP protocol stack. The software may be distributed on CD-ROM, 4mm DAT tape, or as a downloaded file. If the software arrived on a CD-ROM, the user will need to mount the CD-ROM. Mounting a CD-ROM is accomplished by issuing a command similar to:

```
# mount -d /dev/dsk/c1t2d0 /cdrom
```

The suggested installation procedure for the software is as follows:

1. Start SAM and then choose the “Software Management” area. In the “Software Management” area, select “Install Software to Local Host”.
2. If you downloaded the software or received it on a CD-ROM, the method of installing the software will be similar. When prompted:
 - Set the “Source Depot Type” to “Local Directory”.
 - No change is required for the “Source Host Name” field.

- Set the “Source Depot Path” to the directory where the CD-ROM was mounted and the package file name (e.g., “/cdrom/H320-6.6.4-1”) or to the absolute path for the package location (e.g., “/tmp/H320-6.6.4-1”).

If you received the software on a 4mm DAT tape:

- Set the “Source Depot Type” to “Local Tape”.
3. Select the product, “H320_R6_6_4_RUN” (arrow keys then press the space bar).
 4. Choose “Mark for Install” or “Install (analysis)” from the Actions menu (tab ‘a’ then ‘m’)
 5. If the software is to be run in an IP only environment (i.e., no FDDI HYPERchannel emulation), the user may wish to deselect the HCM32/HCM64 fileset from the install as it is not required for an IP-only NetEx/IP installation. The HCM driver is only required to interface with non-IP NetEx/IP hosts.
 6. Choose “Install” (tab ‘a’ then ‘i’) from the Actions menu

Configuration of H320IP

Once the software package installation has been successfully completed, it will be time to complete the installation of the software. The following instructions address editing the files associated with product activation (/etc/opt/netex/prodconf and /usr/nesi/netex/NESikeys), updating the configuration files for HCMD (the CONF file), the configuration file for NetEx/IP (the NTX_DEFAULT file), creating a Network Configuration Table (NCT), creating the Physical Address Map file (PAM file), updating/creating the NetEx/IP addressing, and starting the HCMD and NetEx/IP processes.

Step 1: Edit the ‘prodconf’ file (optional)

Each NESi software product that has integrated the License Verification Software facility now contains a product configuration file. The NetEx/IP product includes this file in its installation distribution set.

During installation, this file (*prodconf*) is installed in /etc/opt/netex/newconfig by default. You will need to move or copy this file to /etc/opt/netex.

The default *prodconf* file shipped with NetEx/IP contains the following information:

```
# Network Executive Software, Inc.
# H320 NTX Product Configuration file
LICPATH      /usr/nesi/NESikeys      #NESi License Key file
```

A ‘#’ character denotes a comment. Non-comment records must contain a keyword/value string. The initial version of this file contains only a single keyword/value record:

- LICPATH – this keyword defines the full path to the NESi License Key File (see Step 2).

NESi recommends that users leave the NESikeys file in the default installed location.

Step 2: Edit the ‘NESikeys’ file

A single NESi License Key file must reside on each system where one or more NESi products containing license support will be installed. The following guidelines apply:

- The default file name is *NESikeys*.

- The LICPATH keyword/value pair in the product configuration file, *prodconf*, (see “Step 1. Edit the ‘prodconf’ file”) specifies the full path name to this file. The default is: */usr/nesi/NESikeys*.
- The systems programmer installing the software must initially create this file prior to invocation of any NetEx/IP components.
- A leading ‘#’ character in a file record denotes a comment line.
- The systems programmer installing this software must edit this file to add a new encrypted Software Key each time such a key is obtained from NESi for H320IP and/or other license-enabled NESi products. This should be done prior to installing the product, and must be done prior to any attempt to run the product successfully.
- The file may contain multiple keys per product due to new product releases or a change to the platform’s fingerprint (on UNIX this corresponds to the hostname for the target host). To make the file easier to maintain over time, it is recommended that you precede each Key entry with a comment line that documents the product designator (e.g., H320IP) and release level of the product that the key is associated with. It will then be easier to delete older Keys that are no longer valid for the product.
- The following shows an example of what a *NESikeys* file might look like after adding several Keys to the file:

```
# Network Executive Software, Inc. Software License Key file
# Key for EFT323 N1 (4-15-01):
86481096ff6c3ebb9b34099b7e639fef
# Key for H320IP R6.0:
e0fef4aaae2aa01e3d7f35d53039612da5e4abcd05a829a4
```

Step 3: Edit the **NTX_DEFAULT** file

The file */etc/opt/netex/newconfig/ntx_default* is included in the distribution and contains the defaults values for NetEx/IP parameters. Copy this file to */etc/opt/netex* and then edit this copy.

The first entry in the file defines the name of your local host. Edit this entry to reflect the name of your system as it appears in the Network Configuration Table (NCT). Edit or modify any other parameters for your host and site. The following table lists all of the default parameter values.

NTX_Parameter	Default	Definition
local	LOCAL	This is the name of your host. The local host name is the same name defined in the HOST statement in the NCT and during the MAKEPAM phase of building the PAM file.

NTX_Parameter	Default	Definition
logerrors	default	<p>The two allowed values are “default” and “all”:</p> <p>DEFAULT</p> <p>This value logs adapter and communications errors that are uncommon. Some of these errors are normal but can occur only once every few hours.</p> <p>ALL</p> <p>This value logs all adapter and communications errors.</p>
mbxname	/var/opt/netex/netexserver	<p>This is the name of the pipe used to move NRB and DATA requests from the user address space into NetEx/IP address space.</p> <p>This name is built into the user interface routines. If this is changed, the code in the interface routines must be changed and the interface routines rebuilt.</p> <p>If this is changed, the environmental variable NETEX_DEVICE must be set to the full path name of the new pipe in each job that references NetEx/IP.</p>
pamfile	/etc/opt/netex/ntx_pam	<p>This is the name of the PAM file NetEx/IP will use to load the initial NCT. This name should match the name specified in the Configuration Manager MAKEPAM command.</p>
ntxlogname	/var/opt/netex/ntxlog	<p>This is the name of the NetEx/IP log file. Messages associated with the operation of H320IP NetEx/IP are logged in this file.</p>
cctable	/etc/opt/netex/cctable	<p>This is the name of a site modified NetEx/IP code conversion table.</p>
ackcredit	2	<p>This is the number of buffers that NetEx/IP sends without returning an explicit ack.</p> <p>Note: More buffers may be in the process of being sent. Increasing this value has little effect on system load and may decrease NetEx/IP throughput.</p>
bufcnt	96	<p>This is the number of “segment” sized buffers available for all input and output.</p> <p>Note: This parameter should be increased to match the maximum amount of data expected to be in transit (being sent but not yet acknowledged) divided by “segment”.</p>

NTX_Parameter	Default	Definition
connto	25	This is the initial value for CONNECT TIME-OUT
datato	300	This is the initial value for DATA TIMEOUT. In a heavily loaded system or during transfers to tape, this value should be increased to about 1000.
deadto	60	This is the initial value for DEAD TIMEOUT.
defblkkin	32768	This is the default value for NRBBLKIN, if the value zero is specified.
defblkout	32768	This is the default value for NRBBLKOUT, if the value zero is specified.
defmsecsonewaydelay	0	<p>This is the propagation delay of the network, expressed in milliseconds, and is used if there is no delay value specified in the PAM for this network path.</p> <p>For Type 2 protocol connections, this value represents a fixed propagation delay that never changes.</p> <p>For Type 4 protocol connections, this value represents a starting point that is used for internal bandwidth capacity calculations. However, the delay is continuously measured during each session, and if it changes, the updated value is used for subsequent internal bandwidth capacity calculations.</p>
dreadqueue	6	This is the number of reads that NetEx/IP has outstanding to the DRIVER. This value may need to be increased, if many very small transfers are needed.
highresmsecs	10	This is the value of the internal high resolution timer. It is used for internal rate throttling, and should not be changed.
idleto	6	This is the initial value for IDLE TIME. In networks with many errors or contention, it may help to drop this value to 2 or 3.
maxblkkin	32768	This is the maximum NRBBLKIN value in bytes.
maxblkout	32768	This is the maximum NRBBLKOUT value in bytes.

NTX_Parameter	Default	Definition
maxkbitspersec	0	This is the maximum rate at which NetEx/IP will deliver data to the network for each network connection. If zero is specified, data will be delivered with no internal throttling. This value is only used for connections to hosts that do not have a 'rate' value specified in the PAM. This value is specified in Kbits per second. For example, a value of 50 means 50Kbs; a value of 50000 means 50Mbs (i.e. 50,000 Kbs).
maxmbxxfer	32768	This is the maximum block that can be sent across the STREAMS pipe facility.
mbufin	5	This is the number of input blocks that NetEx/IP will allow to be outstanding for each user. This may have to be increased for long telecommunications delays.
mbufout	5	This is the number of output blocks that NetEx/IP will allow to be outstanding for each user. This may have to be increased for long telecommunications delays.
msglvl	immediate	This is the value that controls the verbosity of the message displays. A value must be specified as one of the following: <ul style="list-style-type: none"> • immediate • important • interesting • moderate • monitor • debug • blither A value of 'important' (or lower) must be specified to enable NetEx/IP session establishment messages to be recorded in the 'ntxlog' file.
numlogs	5	This value defines the maximum number of 'ntxlog' files that are saved by the 'swlog' command.
prefprot	4	This value defines the default preferred protocol type to use when connecting to hosts that support multiple NetEx/IP protocol types. Valid values are 2 or 4.

NTX_Parameter	Default	Definition
rcvratesecs	6	This is the time interval (in seconds) after which the receive rate for a network connection is re-calculated. The receive rate refers to the rate at which the application is receiving data from NetEx/IP.
ropclass	G	This defines the default remote operator class for the NetEx/IP operator console. Allowed values are A or G. "A" will allow privileged instructions such as SET, HALT, etc. to be issued via the remote operator facility. "G" only allows non-privileged operator commands (DISPLAY, etc.).
segsize	32768	This is the maximum size of a single transmission across the HYPERchannel medium. The maximum for "A", "N", or "P" series is probably determined by existing NetEx/IP programs. A common value for "A" or "N" is 16384.
sesmax	8	This is the maximum number of users active at any one time.
timer	2	This is the initial value for the watchdog timer.
dbgdata	0	This is the maximum number of data bytes to trace for any associated data blocks.
dbgmsg	0	This parameter enables or disables the tracing of HYPERchannel messages between NetEx/IP and the network. A value of 0 turns tracing off; any other value turns tracing on.
dbgreg	0	This parameter enables or disables the tracing of user requests arriving at the NetEx/IP protocol stack. A value of 0 turns tracing off; any other value turns tracing on.
dbgret	0	This parameter enables or disables the tracing of user responses being returned from the NetEx/IP protocol stack. A value of 0 turns tracing off; any other value turns tracing on.
iprecv	250000	IP Receive buffer size
ipsend	250000	IP Send buffer size
ipchksum	1	Not implemented
iplintrf	1	If true (1), one IP socket/device for all interfaces. If false (0), a socket/device for each IP interface.

NTX_Parameter	Default	Definition
nodns	0	When set to 1 (true), NetEx/IP will skip DNS lookups when the PAMFILE is read. This is only useful if the user intends to ONLY use the "SET IPROUTE" command to manually map <i>toGNA</i> addresses to <i>toIP</i> addresses.
device1	/dev/hcm1	This is the device name of the HCM device interface.
device2	UDP-6950-0000UUSS	This is the device name of the IP device interface. UUSS is the NETADDR and SMGDREF specified in the NCT for the IP interface. The '6950' is the UDP port.
device3	(blank – this indicates other interfaces do not exist)	This is the device name of the third network device interface.
device4	(blank – this indicates other interfaces do not exist)	This is the device name of the fourth network device interface.
The following parameters are only applicable to protocol type 4 connections:		
defstartkbitspersec	0	This is the starting throughput rate at which NetEx/IP will attempt to deliver data to the network for each network connection. If zero is specified, data will be delivered with no internal throttling. This value is only used for connections to hosts that do not have a 'rate' value specified in the PAM or NRB. This value is specified in Kbits per second. For example, a value of 50 means 50Kbs; a value of 50000 means 50Mbs (i.e. 50,000 Kbs).
ratedelaydecp	250 (25.0%)	This is the percentage factor used to decrease the sending rate of a network connection if the round-trip delay increases. This recalculation is performed after the expiration of each interval specified by the 'rtdelayincsecs' parameter. The value specified represents a percentage multiplied by a factor of 10.
rateequivph	975 (97.5%)	This is the high bound of the send and receive equivalence adjustment (see 'rateequivps'). The value specified represents a percentage multiplied by a factor of 10.
rateequivpl	500 (50.0%)	This is the low bound of the send and receive equivalence adjustment (see 'rateequivps'). The value specified represents a percentage multiplied by a factor of 10.

NTX_Parameter	Default	Definition
rateequivps	850 (85.0%)	This is the percentage factor used to determine equivalence of the send and receive rates for each network connection. These rates are assumed to be equal if they fall within this percentage of each other. This is the initial value used for each network connection, and can be dynamically adjusted based on activity and performance of the network. The value specified represents a percentage multiplied by a factor of 10.
rcvdataqhbytes	5000000	This is the high threshold value (in bytes) for the size of the receiving NetEx/IP DataQue for each network connection. If the size of the Data Queue exceeds this value, subsequent blocks received on the network that are greater than the highest received LRN are NAK'ed and discarded. Subsequent blocks will continue to be discarded until the size of the DataQue is reduced to the value specified by 'rcvdataqlbytes'.
rcvdataqlbytes	3000000	This is the low threshold value (in bytes) for the size of the receiving NetEx/IP DataQue for each network connection. See the 'rcvdataqhbytes' parameter for the description of how this value is used.
rtdelayincsecs	60	This is the interval (in seconds) used by the sending side of a network connection after which a check is made for an increase in the round trip delay.
sndratedecsecs	18	This is the interval (in seconds) used by the sending side of a network connection after which a check is made for a rate decrease (i.e. the receive rate is less than 'rateequivps' of the send rate). If an adjustment is required, the sending rate is decreased by the current value of 'sndrateps'.
sndrateincsecs	60	This is the interval (in seconds) used by the sending side of a network connection after which an attempt is made to increase the sending rate, as long as a decrease in the sending rate has not occurred during the interval.
sndrateph	500 (50.0%)	This is the high bound of the 'sndrateps' adjustment for each network connection. The value specified represents a percentage multiplied by a factor of 10.

NTX_Parameter	Default	Definition
sndratepl	10 (1.0%)	This is the low bound of the 'sndrateps' adjustment for each network connection. The value specified represents a percentage multiplied by a factor of 10.
sndrateps	100 (10.0%)	This is the percentage factor used to increase or decrease the send rate for each network connection. The send rate may be increased after the expiration of the interval specified by 'sndrateincsecs'. The send rate may be decreased after the expiration of the interval specified by 'sdratedecsecs'. The value specified represents a percentage multiplied by a factor of 10.
startratep	750 (75.0%)	This is the percentage factor used to calculate the initial send rate of each network connection. This value is applied against the maximum rate for the connection, as specified in the PAM, NRB, or by the 'defstartkbitspersec' parameter. During the course of the connection, the actual send rate may be adjusted, based on network activity. The value specified represents a percentage multiplied by a factor of 10.

Notes:

- The “device2” entry above ('UDP-6950-0000UUSS') is not a default value for that particular NetEx/IP parameter. If NetEx/IP will be run over IP, the user **must** add this parameter to their ntx_default file.
- The additional IP parameters listed above may not be included in the sample ntx_default file. It is the responsibility of the user to enter these values into that file.
- If this product is to be run over IP only, the user may replace the “device1” default value with the appropriate device name for the IP interface as shown in “device2”.
- If you are performing an upgrade from an HP-UX 9.x to an HP-UX 10.x or HP-UX 11.x system, you can copy the file /usr/nsc/netex/site/ntx_default to /etc/opt/netex/ntx_default. You will also need to modify the following parameter values:

<u>Parameter</u>	<u>Old Value</u>	<u>New Value</u>
mbxname	/usr/nsc/netex/nsc_netexserver	/var/opt/netex/netexserver
pamfile	/usr/nsc/netex/site/ntx_pam	/etc/opt/netex/ntx_pam
ntxlogname	/usr/nsc/netex/site/ntxlog	/var/opt/netex/ntxlog

Or, if you wish, delete those lines so that the software will default to the new locations.

Step 4: Build an NCT

You must customize the Network Configuration Table (NCT) for your system and network. As distributed, H320IP does not provide an NCT for your site. You must create the file locally on the HP9000 and transfer the file to NetEx/IP in order to access the network configuration.

To generate the NCT, perform the following tasks:

1. Move to the conf directory by entering the following commands:

```
# cd /opt/netex/conf
```

2. Use the system editor to build a network configuration description file. The network configuration describes the topology of the network. The text file consists of configuration statements describing the network. Refer to the *C Configuration Manager and NETEX Alternate Path Retry (APR) User Guide* for information on creating this file.

Several sample files (*.conf) are provided with H320IP in the conf directory.

3. Invoke the Configuration Manager (CM) to process the configuration file.

There are two major components to CM: the NCT preprocessor and the PAM file generator. The NCT preprocessor reads the configuration text file and transforms this file into an internal data structure called the NCT. The second component creates a binary file (the PAM file) based on user commands and the NCT. The data in the PAM file must then be transferred to NetEx/IP so it can be used by the NetEx/IP routing facility while NetEx/IP applications are being run.

The CM utility is interactive and various commands may be invoked to generate the configuration that the user desires. Refer to the *C Configuration Manager and NETEX Alternate Path Retry (APR) User Guide* for more information on using this utility. A CM HELP command is also available to assist in the operation of this utility.

The following sample command sequence shows how to create a PAM file:

```
# cm
Config>
Config> nct sample.conf
Config> select *
Config> makepam local_hostname /etc/opt/netex/ntx_pam
Config> exit
```

Step 5a: Edit the CONF file

Note: This portion of the installation is only required if NetEx/IP is to be run over a **HYPERchannel** network.

The file */etc/opt/hcmd/newconfig/conf* is included with the distribution and contains unit definitions and parameter defaults for the NetEx/IP HYPERchannel Media daemon (HCMD). (The NetEx/IP daemon supports the low-level protocol in the STREAMS environment that interfaces with the StorageTek DXUs).

To specify the unit definitions and default parameter values, you must obtain the following information from your StorageTek engineer:

- DOMAIN address for your site. Normally the DOMAIN address is 01.

- NETWORK address for your site. Normally the NETWORK address is 01.
- UNIT name and address for each FDDI. The first unit name is usually defined as /dev/hcm1, the second UNIT name is usually defined as /dev/hcm2, and so on. Unit addresses must be unique within the network.

Once you have obtained the domain, network, and unit information, edit file */etc/opt/hcmd/newconfig/conf* to define the unit names and addresses for your system. The CONF file contains a series of unit names and parameter defaults. Unit names must start in the first column; parameter keywords and corresponding values must be on the same line separated by one or more blanks or tab characters. For each unit, specify the unit name and then define the unit address using the ADAPTER_GNA parameter.

The following figure shows a sample CONF file for a two-FDDI interface system with assigned units of D0 and 14:

```
# Define unit /dev/hcm1 as unit D0
#
/dev/hcm1  adapter_gna      0101D000
#         input_buffer    25000
# Define unit /dev/hcm2 as unit 14 and
# specify an INPUT_BUFFER of 10K
#
/dev/hcm2  adapter_gna      01011400
          input_buffer    10000
```

Although you can specify other parameters and values for each unit, the default values are appropriate for most installations. The following table describes all the possible CONF parameters and default values:

CONF Parameter	Default	Definition
ADAPTER_GNA	none	A required parameter that specifies a 4-byte hexadecimal value to indicate the Global Network Address (GNA) of this logical DXU in the HYPERchannel network. The form of the address is as follows: DDNNUU00 where DD is the domain, NN is the network, UU is the unit, and 00 is 00. All are in hexadecimal. For example, statements for adapters D0 and 14 would be: ADAPTER_GNA 0101D000 ADAPTER_GNA 01011400

CONF Parameter	Default	Definition
NUCLEUS_GNA	nnnnnnFF	<p>Specifies a 4-byte hexadecimal number that identifies the common nucleus on a DXU with multiple FDDI interfaces. In a Solaris system, each FDDI looks like an independent DXU. To preserve as much network addressing space as possible, the NUCLEUS_GNA should have the same domain, network and unit as the ADAPTER_GNA.</p> <p>Unless there is a very good reason, always let this value use the default. The default is logical subchannel FF. For example, the NUCLEUS_GNA value for adapters D0 and 14 would be:</p> <pre>NUCLEUS_GNA 0101D0FF NUCLEUS_GNA 010114FF</pre>
ARP_TIME	30	Specifies the time interval in seconds at which this unit identifies itself to other units on the network. The default of 30 second is normally sufficient.
REASSEMBLY_TIME	5	Specifies the amount of time in seconds that a partially completed message is held waiting for the additional blocks. The default value of 5 seconds is normally sufficient.
INTERFACE	0	This value allows the binding of the address to a specific FDDI interface. Normally, the first defined unit is bound to the first interface and the next to the second, etc. This default behavior is normally what is wanted.
INPUT_BUFFER	0	Specifies the size of the input buffer in bytes available to hold messages arriving on a subchannel. Normally, NetEx/IP can keep up with the messages as they arrive. However, in certain high load situation or for driver level users, the buffering can be increased. This value is the amount of extra buffering in bytes. The default value is 0, and the maximum value is 2,500,000. NESi recommends that users set a value of 250,000.

Copy the edited 'conf' file to */etc/opt/hcmd/conf*.

Step 5b: Create NetEx/IP addressing information

Note: This portion of the installation is only required if NetEx/IP will be running over an IP network.

There are three methods of creating/updating the IP information on your system or network to allow for NETEX/IP to operate properly.

1. **Update DNS nameserver information.** This method requires that you update the relevant DNS lookup tables with the IP addresses and IP hostnames that will be associated with the HYPER-channel *toGNA* addresses. The IP hostnames **must** be in the following format:

```
NTX0000uus
```

Where *uu* is the NETADDR defined for the host in the NCT and *ss* is the SMGDREF.

2. **Update local host table.** This method requires that you update the local host table (usually located at `/etc/hosts`) with the IP address and IP hostname (same format as in #1).
3. **Use the *SET IPROUTE* command.** The third option is to update the NetEx/IP network information via the new NTXOPER command **SET IPROUTE**. Please refer to the updated ‘Operator Commands’ section (included in this documentation) for a description of the command.

Note: NESi recommends that customers use options #1 or #2 when updating the IP addressing. Updates made via option #3 are only valid for as long as NetEx/IP is running. IP routing information entered with the ‘set iproute’ command is lost upon recycle of NetEx/IP or dynamic reload of NCT via the ‘load nct’ NTXOPER command.

Dynamic mapping of GNA addresses to IP addresses is performed during NetEx/IP initialization (and when the LOAD NCT command is issued). The IP addresses that are returned from DNS are saved in an internal NetEx/IP table.

These addresses comprise the HYPERchannel *toGNA* addresses, as defined in the NetEx/IP NCT by the NETADDR (*uu*) and SMGDREF (*ss*) parameters.

Step 6: Create Code Conversion Table (OPTIONAL)

For those sites that require customization of the internal NetEx/IP code conversion table, that table can now be modified without a recompile.

Customers can execute the command “`/opt/netex/cmds/cctbld filename`” (where *filename* is a file location on the host) to create a text version of the code conversion table that they can edit. The default location for the file is `/etc/opt/netex/site/cctable`.

However, if the customer creates the file in an alternate location, they **must add** the variable “cctable” to the NTX_DEFAULT along with the fully qualified pathname of the file.

NetEx/IP checks for the existence of a code conversion file during startup. If an alternate code conversion table does not exist, NetEx/IP will use the built-in default table.

Step 7: Change the Maximum STREAMS Block Size

Using *sam*, change the STREAMS parameter STRMSGSZ from 4096 to 0. When you exit *sam*, the system reboots.

Step 8: Start the NetEx/IP Daemon

Note: This step is only required if the user will be running NetEx/IP over an **HYPERchannel** network.

Start the NetEx/IP daemon using the start command.

```
cd /opt/hcmd
./start [optional command line flags]
```

Warning: Please note the following information on the command line flags for the ‘start’ command. Failure to issue “start” with the correct flags may result in a system lockup that can only be resolved by a power cycle of the host.

-f /dev/<fdi-name>: This is primarily for SPARC systems and allows the user to restart an already installed and functioning HCMD when the FDDI device system name is

changed by Solaris. The default is “/dev/pf”. On non-SPARC systems, this parameter should not be used unless recommended by NESi.

- s <number>:** Where *number* is the number of bytes to strip off the end of the FDDI buffer. If the Sun FDDI driver is being used, this may be a required parameter. If the SUN FDDI device is “/dev/pf*”, HCMD will **require** that “-s 4” be supplied when the start command is issued.
- p <max-ppa-num>:** Pyramid systems, in particular, require this parameter as the ppa-num maps to the device num (i.e., the *dev-namexx* shown on a “netstat -rn” for the FDDI device). This should not be required for H320IP.

Step 9: Start NetEx/IP

Start NetEx/IP using the following command:

```
/opt/netex/ntx &
```

Step 10: Verify that ‘hcmd’ and ‘ntx’ Start Automatically On Reboot

A file ‘S980netex’ has been added to ‘/sbin/rc2.d’ to automatically start NetEx/IP after a system restart. It will not work until the ‘conf’, ‘ntx_default’, and ‘ntx_pam’ files have been properly set up and placed in the correct locations.

Update Summary

6.6.4-1

1. There are three new parameters available in the NTX_DEFAULT file:

ROPCLASS (Remote Operator Class) – Maybe be set to A or G. “A” will allow privileged instructions such as SET, HALT, etc. to be issued via the remote operator facility. “G” only allows non-privileged operator commands (DISPLAY, etc.). The default setting is “G”.

NODNS – When set to 1 (true), NetEx/IP will skip DNS lookups when the PAMFILE is read. The default is 0 (false). This is only useful if the user intends to ONLY use the “SET IPRROUTE” command to manually map toGNA addresses to toIP addresses.

PREFPROT – Defines the default preferred protocol type to use when connecting to hosts that support multiple NetEx/IP protocol types. Valid values are 2 or 4. Default is 4.

2. There are three new NetEx/IP operator commands:

HALT Adapter <uuss> - Command to halt local or remote adapters.

STart Adapter <uuss> - The operator may start an adapter that is halted to NetEx/IP.

Display HALTED - The operator may display a list of halted adapters.

3. The driver initialization has been changed to properly keep track of whether or not the software is in local loopback mode.
4. The code conversion table handling has been corrected for problems seen at some customer sites.
5. A correction has been made to speed up the processing of batched operator commands.

6.0-6.6.0

1. Correct transport disconnects, to prevent sessions hanging for deadtime.
2. Protocol 4 corrections.

6.0-6.5.8

1. Driver fixes - properly handle both output & input completions.
2. Allow multiple local/remote adapters with same netaddr.
3. Numerous NetEx/IP operator command additions.
4. Corrected APR logic to use proper segment sizes talking with hosts with non-standard word sizes (Unisys).
5. Protocol 4 corrections.

6.0

1. Added NetEx/IP protocol 4 support.

2. Added software licensing code.

5.0 N2

The primary difference is that the 'hcm' driver has been modified and recompiled to run in a 64-bit kernel.

Five additional changes were made to fix minor problems.

1. Fixed copy of ntxlog to /tmp/ntxlog upon a reboot.
2. Modified HCMD to handle more than 4 network devices.
3. Modified ntx to use the POSIX default locations.
4. Corrected test programs to output correct transfer rates.
5. Corrected the 64-byte ODATA limitation to now allow MAXUSERODATA as specified in the "netex.h" file.

5.0 N1

NetEx/IP release 5.0 provides support for communicating over standard IP networks. No changes are required to NetEx/IP applications, since the NetEx/IP Application Programming Interfaces (API's) have not been changed.

4.0 (9910)

The primary difference is that the 'hcm' driver has been modified and recompiled to run in a 64-bit kernel. Four additional changes were made to fix minor problems.

1. Fixed copy of ntxlog to /tmp/ntxlog upon a reboot.
2. Modified HCMD to handle more than 4 network devices.
3. Modified ntx to use the POSIX default locations.
4. Corrected test programs to output correct transfer rates.

H320FD 3.5 R1 M10

This is almost the same as M9. When HP released HP-UX 10.10, they changed the internal kernel structures. This release is basically just M9 recompiled for 10.10. In addition, the following changes were made:

1. Fixed the user interface so it didn't fail if the user issued an SWAIT before a SCONNECT or SOFFER.
2. Changed the kernel code to release /dev/hcm1 when an assignment failed. This caused a problem only when NetEx tried to open an incorrectly configured /dev/hcm1 interface over and over again.
3. There was a change in this release for DRIVER level users. The driver in the kernel has been made insensitive to messages returned from the lower levels. This doesn't hurt the driver level

user because the lower level indication of the FDDI ring being down occurs after about 30 seconds, and the HCMD level indication occurs after 1 to 5 seconds. Also, there were two HCMD daemons shipped with H320. The default daemon HCMD does not check the status of the LAN card. For driver level users, the HCMD_STATUS daemon is shipped. This is the same daemon that was used on H320 M6 and before (with one minor exception mentioned below). Driver level users should use this daemon as opposed to HCMD. There were times that HCMSTAT would not work. Unfortunately, they were the times that users wanted to use it the most. This release fixes that problem, but due to a restriction in the HP-UX operating system, we have to create new device nodes of the form /dev/hcm1_status and the same for hcm2 and hcm3. These are only used if HCMD_STATUS is used.

4. HCMSTAT has been modified to report three new pieces of information: partial packets, messages returned by the lower levels of the operating system, and addresses for multiple units claiming that they have to handle traffic for some adapter.
5. There are several new utilities shipped in /usr/nsc/hcmd. The 'hcmclear' utility clears the status table that the 'hcmstat' reports. Use it to clear the information after the 'More than one entity...' problem is corrected. The 'hdebug' utility can be used to turn on system traces without rebuilding the system.

H320FD 3.5 R1 M9

This is the same NetEx as the M8 release below except for minor changes for Version 10.

H320FD 3.5 R1 M8

This release has many minor and a few major fixes. We have not had a session manager hang in our test environment since making these changes.

1. NetEx or HCMD can be updated without updating the kernel (HCM) code. If you have more than one FDDI interface, you should update the kernel code also.
2. NetEx - Handle duplicated messages arriving during connections and confirmations. Previous to this, these messages could hang the session (normally the session manager).
3. NetEx - Fixed a session manager bug caused by remote console requests. These requests sometimes caused one or more other requests on the work queues to be lost (again, normally the session manager).
4. NetEx - Minor fix for exiting if the maximum number of session was detected at a funny time.
5. USER INTERFACE - The copying of host and application names was changed to allow callers to specify part of the NRB as the source of the data (BFX).
6. HCM DRIVER - If two or more FDDI interfaces were used, HCMD could hang during an attempt to kill HCMD or shutdown the system. This resulted in a CPU (processor) hanging.
7. NetEx - The number of requests that the session manager will queue was raised from 6 to 25 and made configurable.
8. HCMD - Fixed the 'interface' keyword implementation.
9. USER INTERFACE - Fixed a bug in part of the interface that is only used for DRIVER LEVEL services. This bug could result in driver users not being informed of arriving data and three bytes of data in user space being clobbered.

10. HCMD - Fixed HP status code to handle the FDDI ring going down and coming back up. This is now in the module HCMD_STATUS.
11. HCMD - The HP implementation was modified to support the changes to interface numbering on level 10.0.

H320FD 3.5 R1 M7

This change is mostly a file location and packaging change. In addition there are a few functional changes:

1. The session manager has been changed to recover better from timeout conditions.
2. All log entries (/var/opt/netex/ntxlog) are time stamped.
3. NetEx interface messages have been changed to contain NetEx in the message.

H320FD 3.5 R1 M6

This corrected the same problem that was fixed in M4 (see below). In addition, this changes the operator displays for DISPLAY SESSION and DISPLAY TRANSPORT.

H320FD 3.5 R1 M5

1. Added code to HCM to reject routing information from a different domain and network. This is in preparation for handling multiple DOMAIN/NETWORK values.
2. Fixed sessions hanging due to blocks arriving out of order. This problem occurs on some HP9000/700 hosts and with link adapters 701, 703, 751, and 753 after CDA 6.0. If you have this problem, the DX NetEx must also be upgraded to level '2.0.2'. Note that data was never corrupted, the session just hangs forever.
3. Fixed a problem in the session manager that left a session hung on an offer. If the remote NetEx failed to complete the initial exchange during session establishment, the user would hang. This would show up as the user now being offered, but an attempt to connect to the user would result in a BUSY (3501) status. Now the offer must complete within CONTO or the user will be given a READ_TIMEOUT.

H320FD 3.4 R1 M4

1. Fixed a minor problem in trunk mask handling. This problem only occurred if the same trunk was attached as one value (e.g. t3) on one adapter and a different value (e.g. t2) on another adapter.
2. Added code to support using the NetEx file descriptor in user SELECT calls.
3. Shortened the instruction path for SWAIT(0).

H320FD 3.4 R1 M3

Note: This was a directed release to one site and not a general release.

1. Added detection of FDDI ring down for driver level applications.

H320FD 3.4 R1 M2

1. Fixed an installation problem installing on top of an M0 system.
2. Increased the raw speed by about 2.4%.
3. Added session queuing to NetEx so that tests which start 50 offers and 50 connects will establish most of their connections. Extreme cases will not be able to complete all of the connections within CONTO. This has been tested to the maximum number of processes allowed in the test systems.

H320FD 3.4 R1 M1

1. Support for the HP700 was added in this release.
2. A very minor bug in multiple interfaces that was never seen in the field was fixed.