LU Pooling and Response Time MIB

Feature Summary

Cisco IOS Release 11.2(18)BC contains several TN3270 server configuration enhancements, which are described in this document:

- LU Pooling

- Response-Time Collection

- Specification of LU Names of DDDLUs

- LU Termination

- LU Deletion

- TN3270 Configuration Modes

LU Pooling

The TN3270 server enhancements in Cisco IOS Release 11.2(18)BC support the ASSOCIATE request through LU pooling. The LU pooling feature enables the TN3270 server to identify the relationships between screen and printer LUs.

The LU pool configuration is an option to the LU nailing feature that allows clients to be nailed to LUs. The LU pooling feature allows you to configure clients in the router and nail clients into groups of LUs. These groups of LUs are called clusters. Each cluster is given a unique pool name. An LU pool consists of one or more LU clusters that are related to each other. This allows logically related clients to connect to LUs that have the same logical relationship with the host. A cluster can contain screen LUs and their associated printer LUs. The pool name can be used instead of a device name on a CONNECT request.

LU nailing is supported for LU pools.

Figure 1 provides an overview of clusters configured within PUs.

Figure 1   **LU Pooling**
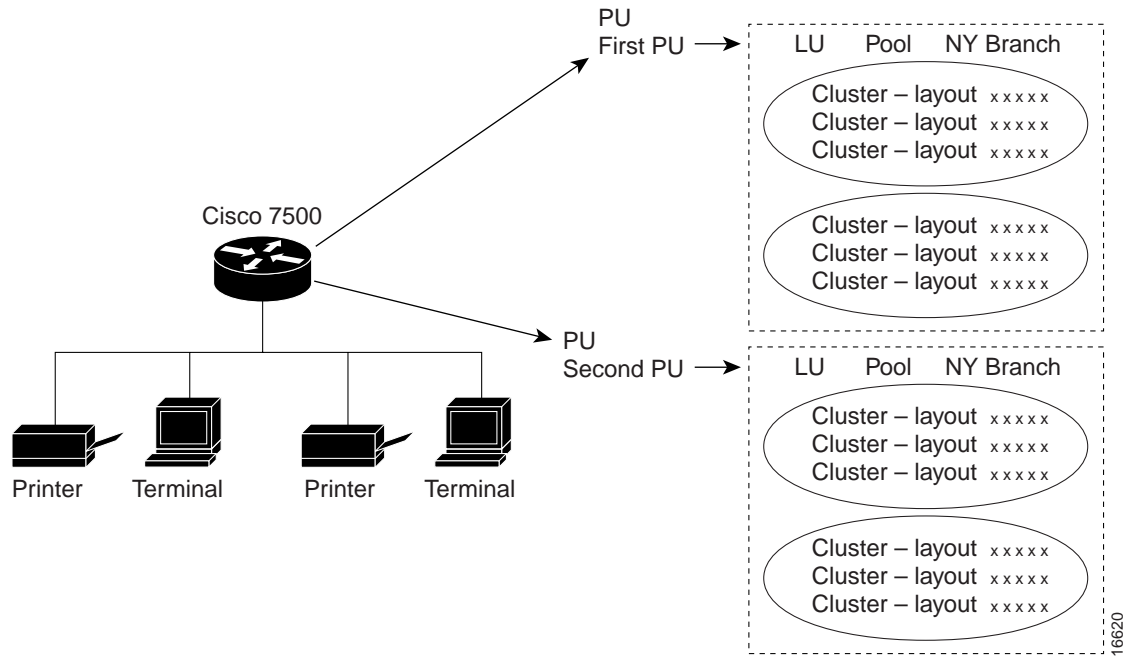
Support for the ASSOCIATE request enables you to define a partner printer in the TN3270 server for a given terminal LU pool or single terminal. As a result, the TN3270 server maintains a knowledge of printer and terminal relationships. The client does not need to know the LU name of the partner printer in advance. Typically, a client can request a pool name, a specific LU, or a resource without citing a pool name or LU name.

If the client sends an ASSOCIATE request for a resource name to the TN3270 server, the server provides the client with a resource LU name.

In Figure 2, the client requests an LU from *unixpool* and is granted an LU from the specified pool. The client then initiates a new process by requesting the printer device associated with the given resource LU name.

The client requests a printer LU associated with *termabc* and the server grants the printer LU associated with *termabc*. Based on the configuration in the router that specifies the clusters of printer and screen LUs for pools, the TN3270 server assigns and allows the client to use the printer LU associated with its terminal LU.

Figure 2   **Client Request for LU from a Specific Pool and Printer LU Association**

TN3270 server
running on
Cisco 7500

Server and client negotiate
TN3270E support

Device type request for IBM-3278-2
Connect to *unixpool*

Request an
LU from pool
unixpool

Device type is IBM-3278-2
Connect *termabc*

<User requests a printer LU>

TN3270 server
running on
Cisco 7500

Server and client negotiate
TN3270E support

Device type request for IBM-3287-1
associate *termabc*

Request for
a printer LU
associated
with *termabc*

Device type is IBM-3287-1
Printer LU associated with *termabc* is granted
Connect *termabc's* printer
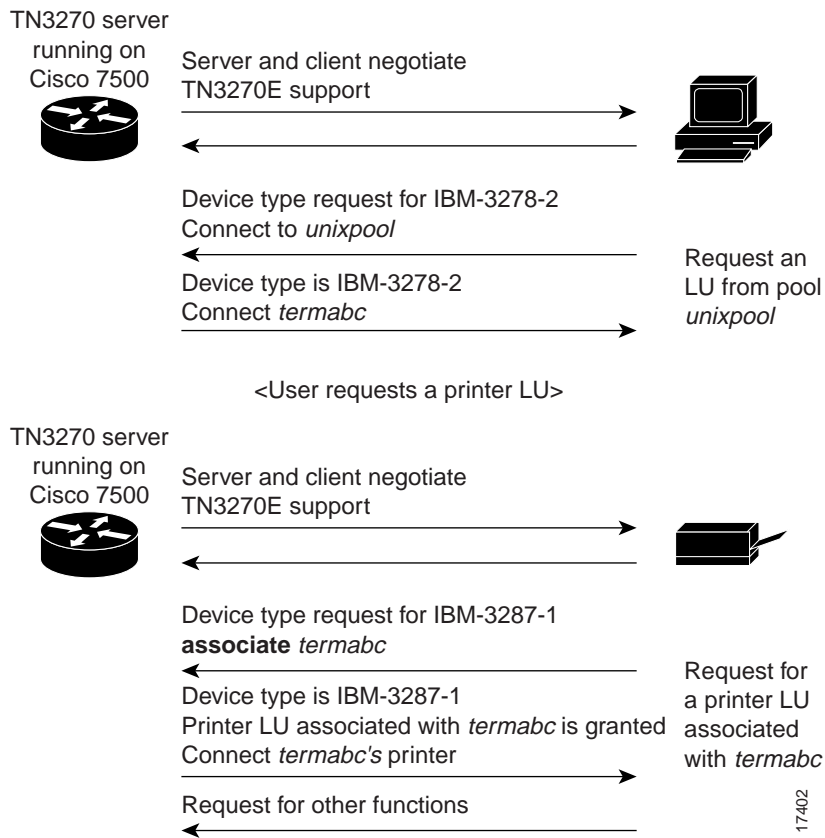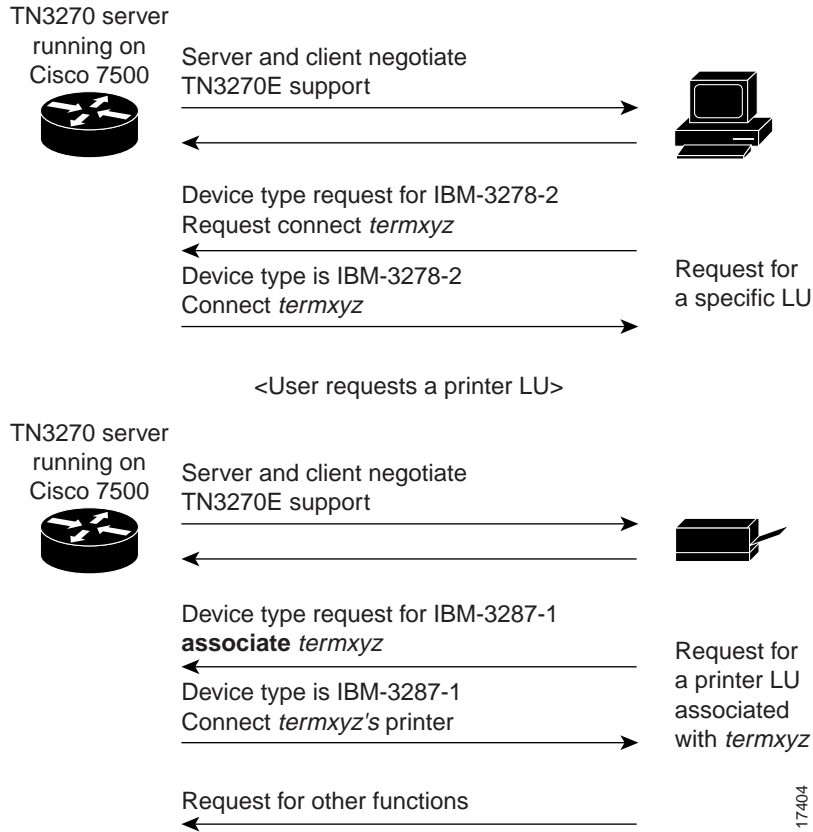
Request for other functions

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Figure 3 shows the client request for a specific LU *termxyz* and then a request for a printer LU associated with the LU *termxyz*. The TN3270 server grants the screen LU and connects the printer associated with *termxyz*.

Figure 3   Client Request for a Specific LU and Printer LU Association

TN3270 server
running on
Cisco 7500

Server and client negotiate
TN3270E support

Device type request for IBM-3278-2
Request connect *termxyz*

Device type is IBM-3278-2
Connect *termxyz*

Request for
a specific LU

<User requests a printer LU>

TN3270 server
running on
Cisco 7500

Server and client negotiate
TN3270E support

Device type request for IBM-3287-1
associate *termxyz*

Device type is IBM-3287-1
Connect *termxyz's* printer

Request for
a printer LU
associated
with *termxyz*

Request for other functions

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Response-Time Collection

Response-time MIB support enables you to capture response-time statistics for either individual sessions and clients or for groups of sessions and clients.

If SNMP is enabled on the router, an NMS system or users can use well-known and router-configured client group names to obtain response-time statistics. Response-time data collection is always enabled for all in-session clients. Table 1 shows the types of client groups that are monitored:

Table 1   Client Types and Client Group Names

Type	Description	Client Group Name
Client Subnet	All clients belonging to one or more IP subnets, where the IP subnets and client group name are configured on the router.	User defined.
Other	All clients not belonging to an IP subnet configured for a Client Subnet-type group.	CLIENT SUBNET OTHER
Global	All in-session clients.	CLIENT GLOBAL
Application	All clients in session with a specific VTAM APPL ID.	APPL *VTAM-application-name*
Host Link	All clients using a specific host link in use by a PU configured on the router.	DIRECT LINK *pu-name* DLUR LINK *link-name*
Listening Point	All clients connected to a specific listening point configured on the router.	LP *ip-address*: *tcp-port*

In the Cisco IOS 11.2(18)BC release, traps are not generated by the MIB.

Response-time data is collected using the following methods:

- Sliding-window Average Response Times
- Response-Time Buckets

Sliding-window Average Response Times

The sliding-window response-time method uses a moving average. It reflects the most recent response time and discounts the old response times. When there is no activity, this method preserves the old response times. The algorithm used for the sliding-window method is similar to the moving-average method. For detailed information about sliding-window average times, refer to the TN3270E-RT-MIB.

Response-Time Buckets

Response-time buckets contain counts of transactions with total response times that fall into a set of specified ranges. Response-time data gathered into a set of five buckets is suitable for verifying service-level agreements or for identifying performance problems through a network management application. The total response times collected in the buckets is governed by whether IP network transit times are included in the totals.

In Figure 4, four bucket boundaries are specified for a response-time collection, which results in five buckets.

Figure 4   Response-Time Boundaries
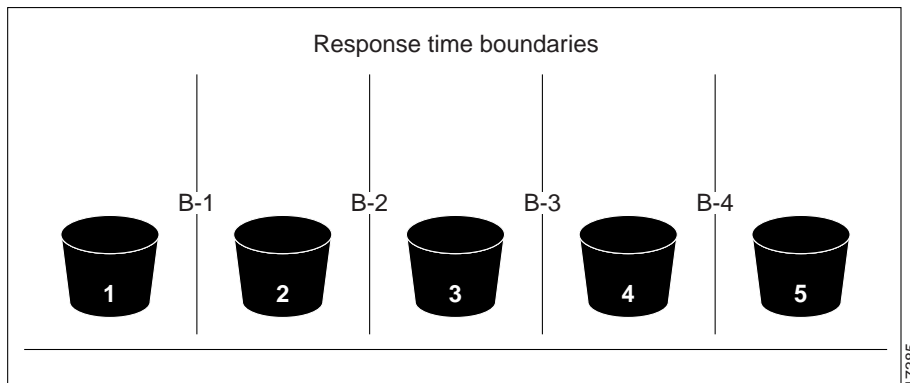
The first response-time bucket counts transactions with total response times that are less than or equal to boundary 1 (B-1), the second bucket counts transactions with response times greater than B-1 but less than or equal to B-2, and so on. The fifth bucket is unbounded, and it counts all transactions with response times greater than boundary 4.

The four bucket boundaries have default values of 1 second, 2 seconds, 5 seconds, and 10 seconds, respectively.

For a detailed explanation of response-time buckets, refer to the TN3270E-RT-MIB.

Specification of LU Names of DDDLUs

LU name requests to be fulfilled by DDDLUs for PUs configured with the **generic-pool deny** command are supported. The CMCC adapter sends a REPLY-PSID poweroff for these LUs unless the **lu deletion never** command or **lu deletion non-generic** command is configured.

LU Termination

The **lu termination** command has been added to support SNA TERMSELF RU. The *termself* argument for the **lu termination** command orders termination of all sessions and session requests associated with an LU when users turn off their device or disconnect from the server. This is an important feature for applications such as CICS.

If you use an UNBIND request for session termination with CICS, VTAM security problems can arise. When CICS terminates a session from an UNBIND request, the application may reestablish a previous user's session with a new user, who is now assigned to the same freed LU.

LU Deletion

The **lu deletion** command specifies whether the TN3270 server sends a REPLY-PSID poweroff request to VTAM when a client disconnects. This command is recommended in host environments running VTAM version 4.4.1. Previous versions of VTAM are not compatible with NMVT REPLY-PSID.
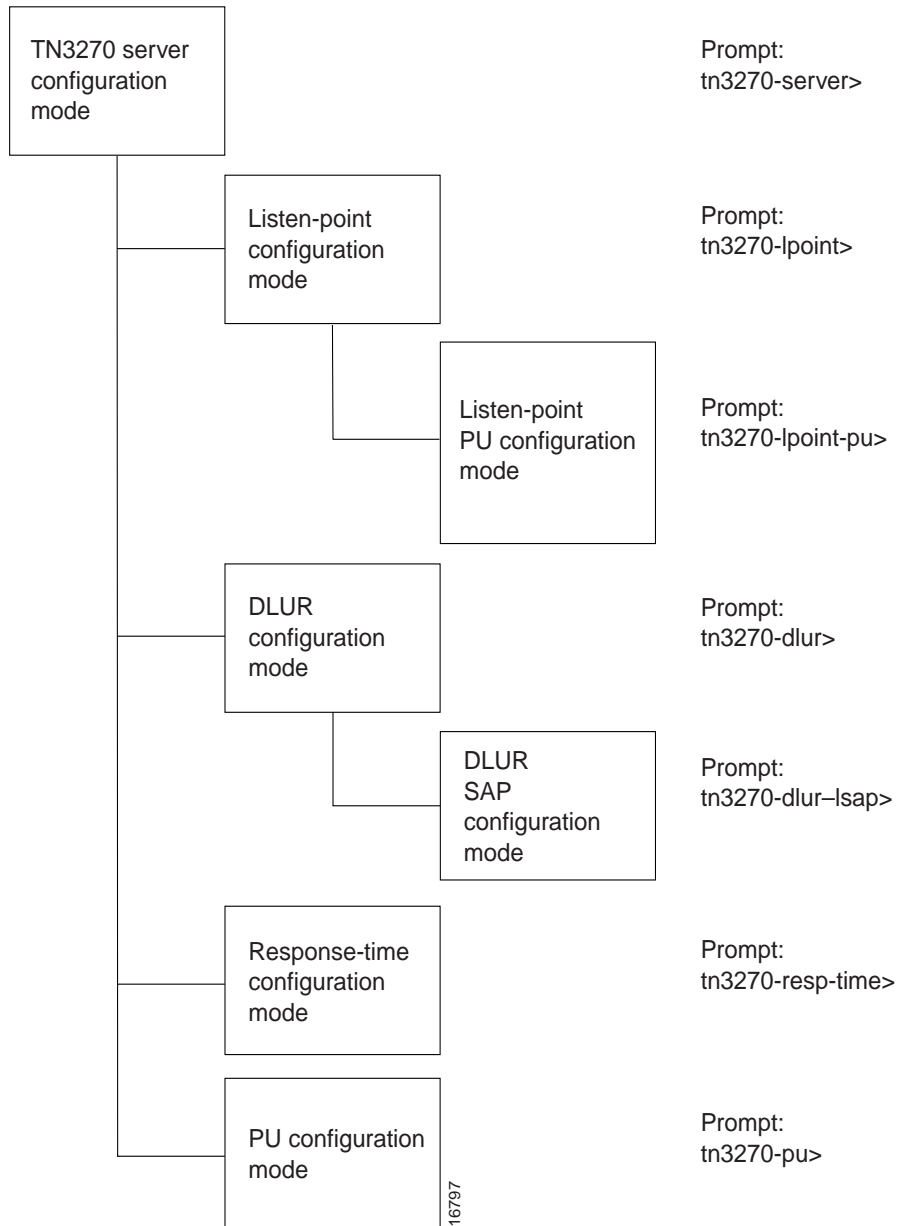
TN3270 Configuration Modes

TN3270 configuration modes supported in the Cisco IOS Release 11.2(18)BC are:

- TN3270 Server Configuration Mode
- Listen-Point Configuration Mode
- Listen-Point PU Configuration Mode
- DLUR Configuration Mode
- DLUR SAP Configuration Mode
- Response-Time Configuration Mode
- PU Configuration Mode

Figure 5 shows TN3270 configuration modes supported in the Cisco IOS Release 11.2(18)BC.

Figure 5   TN3270 Configuration Modes

TN3270 server configuration mode	Prompt: tn3270-server>
Listen-point configuration mode	Prompt: tn3270-lpoint>
Listen-point PU configuration mode	Prompt: tn3270-lpoint-pu>
DLUR configuration mode	Prompt: tn3270-dlur>
DLUR SAP configuration mode	Prompt: tn3270-dlur–lsap>
Response-time configuration mode	Prompt: tn3270-resp-time>
PU configuration mode	Prompt: tn3270-pu>

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Note   The DLUR, DLUR SAP, and PU configuration modes existed in Cisco IOS Releases prior to 11.2(18)BC.

TN3270 Server Configuration Mode

From interface configuration mode, **tn3270-server** command puts you in TN3270 server configuration mode. The following prompt appears:

```
tn3270-server>
```

Listen-Point Configuration Mode

From the TN3270 server configuration mode, the **listen-point** command puts you in listen-point configuration mode. The following prompt appears:

```
tn3270-lpoint>
```

Listen-Point PU Configuration Mode

From the listen-point configuration mode, the **pu** command puts you in the listen-point PU configuration mode and creates a new PU:

pu *pu-name idblk-idnum type adapno lsap* [**rmac** *rmac*] [**rsap** *rsap*] [**lu-seed** *lu-name-stem*]

The following prompt appears when the PU is configured:

```
tn3270-lpoint-pu>
```

From listen-point configuration mode, the **pu** command to create a new PU for DLUR is:

pu *pu-name idblk-idnum dlur*

The **pu** command puts you in the PU configuration mode and the following prompt appears:

```
tn3270-lpoint-pu>
```

DLUR Configuration Mode

From TN3270 server configuration mode, the **dlur** command puts you in DLUR configuration mode. The following prompt appears:

```
tn3270-dlur>
```

DLUR SAP Configuration Mode

From DLUR server configuration mode, the **lsap** command puts you in DLUR SAP configuration mode. The following prompt appears:

```
tn3270-dlur-lsap>
```

Response-Time Configuration Mode

From the TN3270 server configuration mode, the **response-time group** command puts you in response-time configuration mode. The following prompt appears:

```
tn3270-resp-time>
```

PU Configuration Mode

From the TN3270 server configuration mode, the **pu** command puts you in PU configuration mode. The following prompt appears:

```
tn3270-pu>
```

Benefits

This section describes the benefits of the TN3270 Server features introduced in Cisco IOS Release 11.2(18)BC:

- Clients using the ASSOCIATE request are supported.

- When an association is defined between LU resources, the TN3270 server on the router maintains a knowledge of printer and terminal relationships.

- By grouping LUs in clusters, you enable clients acquire a terminal LU and its associated printer without desktop configuration to specific LUs.

- Response-time MIB support enables you to capture response-time statistics for individual sessions and clients or for groups of sessions and clients.

- Specify LU names of DDDLUs.

- Control how keepalives are generated and keepalive responses are handled by the CMCC adapter.

- Prevent VTAM security problem when the UNBIND request is used with CICS.

- Delete LUs automatically on session termination.

List of Terms

ASSOCIATE request—A feature of the TN3270 server that allows a client to connect to a printer LU that is attached to a terminal LU pool or a single terminal LU.

Cluster—Logical grouping of screens and printers of a defined layout in an LU pool.

DDDLU—Dynamic Definition of Dependent LU. A feature of VTAM that allows LUs to be created as needed and not be predefined under a switched PU. The CIP TN3270 Server supports DDDLU.

Direct PU—A PU 2 that has its own LLC2 link to the owning VTAM. Several direct PUs can share a local SAP, but each must have a unique local/remote MAC/SAP quadruple.

DLUR—Dependent LU Requester. A feature of APPN that allows traditional 3270 traffic to be routed over the APPN network. The DLUR feature in the CIP creates an LU 6.2 session (pipe) with DLUS (Dependent LU Server) in VTAM (VTAM version 4R2 or higher). DLUR is defined as a separate switched PU to VTAM. All 3270 session control traffic (SSCP-to-PU and SSCP-to-LU) flows over this DLUR-DLUS pipe. Session data traffic, however, can be routed directly from LU to LU using APPN routing. The CIP DLUR is implemented as an APPN end node (EN).

DLUR PU—A PU 2 that uses the DLUR-DLUS pipe to send and receive all session control traffic. It does not use its own source SAP because it uses the DLUR SAP. Similarly, it does not have its own LLC session to the mainframe gateway because it rides on top of the DLUR LLC link.

LU deletion—A feature of the TN3270 server in Cisco IOS Release 11.2(18)BC that allows you to specify whether the TN3270 server sends a REPLY-PSID poweroff request to VTAM to delete an LU when a client disconnects.

LU nailing—A method by which you can associate a client's connection request with a specific LU. In Cisco IOS Release 11.2(18)BC, LU nailing is extended to support association of LU pools with a particular client IP address.

LU pool—A group of LUs that can contain logical clusters to establish relationships between screen and printer LUs.

LU termination—A feature of the TN3270 server in Cisco IOS Release 11.2(18)BC that supports SNA's TERMSELF RU, which allows the TN3270 server to order termination of all sessions and session requests associated with an LU when users turn off their device or disconnect from the server.

NMVT—Network Management Vector Transport. An SNA message consisting of a series of vectors conveying network management information.

REPLY-PSID—Request sent to VTAM for a particular product-set identification (PSID). The PSID is used in SNA to identify the hardware and software products that implement a network component.

Siftdown command—Command with values that are applied down through several levels of configuration and are optionally altered at each configuration level.

TERMSELF RU—An SNA request/response unit that forces termination of all sessions and session requests associated with an LU.

Restrictions

The TN3270 server enhancement features in Cisco IOS Release 11.2(18)BC are supported only on the CIP installed in either Cisco 7500 or Cisco 7000 series router with an RSP. The Cisco IOS Release 11.2(18)BC features are not supported on the Cisco 7200 series router.

Platforms

The TN3270 Server enhancement features are supported on the following platforms using the Cisco IOS Release 11.2(18)BC:

- Cisco 7500

Prerequisites

Before configuring the TN3270 server with LU pooling or response-time client groups, host connectivity must be configured using one of the following methods:

- Configure CSNA support
- Configure Token Ring Attachment to an FEP

For details on the host server configuration and optional commands used with TN3270 server, refer to the Cisco IOS *IBM Networking and Configuration Guide* and the *TN3270 Design and Implementation Guide*.

To use the response-time MIB, SNMP must be enabled on the router. For details on the SNMP configuration, refer to the Cisco IOS *Configuration Fundamentals Guide.*

Supported MIBs and RFCs

This feature supports the response-time MIB and RFC 2355. For descriptions of supported MIBs and how to use MIBs, see Cisco's MIB website on CCO at http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml.

Configuration Tasks

The following sections describe how to configure LU pooling and response-time client groups, and use the other new or modified TN3270 server configuration commands:

- Configure the TN3270 Server and LU Pooling for Non-APPN Environment
- Configure the TN3270 Server and LU Pooling for APPN Environment
- Configure Client Subnet Response-Time Groups
- Monitor LU Pooling and Response Time

Refer to the "Configuration Examples" section for examples.

Note You can use DLUR to reach a mix of APPN and non-APPN hosts. The host owning the PUs must be an APPN network node that also supports the subarea (an interchange node). When an SLU starts a session with any of the APPN hosts, it uses session switching to reach that host directly. When it starts a session with a non-APPN host, the traffic is routed through the owning host.

Configure the TN3270 Server and LU Pooling for Non-APPN Environment

The following sections describe how to configure the TN3270 server and LU pooling for a non-APPN environment:

- Guidelines for LU Pool Configuration
- Configure TN3270
- Configure Listen-Point
- Configure Listen-Point PU

Guidelines for LU Pool Configuration

To configure LU pools on the TN3270 server on a CMCC adapter, perform the following steps:

- Define a pool.
- Allocate specific LOCADDRs or LUs to the pool
- Nail clients to the pool (optional)

When configured, the pool becomes one of the several criteria used by the TN3270 server to assign an LU to a client. When a client requests a connection, the TN3270 server determines the authorized capabilities of the client. For example, the TN3270 server attempts to determine whether LU nailing definitions exist for the client.

Client preferences are taken into consideration. Examples of client preferences are:

- Device name on CONNECT request (TN3270E)
- LU name on **TERMINAL-TYPE** command (RFC 1576)
- Model type

When the client criteria is processed, the TN3270 server assigns the first available LU in the group to the client. If an appropriate LU is not found, the TN3270 connection is closed.

The first client in a cluster is given an LU in a cluster that currently has no LUs assigned to clients. Subsequent clients in the cluster are given suitable LUs from within the cluster.

Configure TN3270

To establish a TN3270 server on the internal LAN interface on the CMCC adapter and configure LU pooling, use the following commands beginning in global configuration mode:

Step	Command	Purpose
1	**interface channel** *slot*/*port*	Selects the channel attach internal LAN interface and enter interface configuration mode.
2	**tn3270-server**	Specifies a TN3270 server on the internal LAN interface and enter TN3270 server configuration mode.
3	**pool** *poolname* [**cluster layout** [*layout-spec-string*]]	Enters pool configuration mode. Define clusters of LUs, and allocate LOCADDRs.
4	**idle-time** *num-of-seconds*	(Optional) Specifies the idle time for server disconnect. This command is also available in listen-point configuration mode.
5	**keepalive** *num-of-seconds*	(Optional) Specifies the maximum time allowed between keepalive marks before the server disconnects. This command is also available in listen-point configuration mode.
6	**ip precedence** {**screen** | **printer**} *value*	(Optional) Specifies the precedence level for IP traffic in the TN3270 server. This command is also available in listen-point configuration mode.
7	**ip tos** {**screen** | **printer**} *value*	(Optional) Specifies the TOS level for IP traffic in the TN3270 server. This command is also available in listen-point configuration mode.
8	**unbind-action** {**keep** | **disconnect**}	(Optional) Specifies whether the TN3270 session will disconnect when an UNBIND request is received. This command is also available in listen-point configuration mode.
9	**generic-pool** {**permit** | **deny**}	(Optional) Selects whether "left-over" LUs can be used from a generic LU pool. This command is also available in listen-point configuration mode.

Step	Command	Purpose
10	**lu termination** {*termself* | *unbind*}	(Optional) Specifies the type of termination request that is sent by the TN3270 server when a client turns off his device or disconnects. This command is also available in listen-point configuration mode.
11	**lu deletion** {*always* | *normal* | *non-generic* | *never*}	(Optional) Specifies whether the TN3270 server sends a REPLY-PSID poweroff request to VTAM to delete the corresponding LU when a client disconnects. This command is also available in listen-point configuration mode.

Configure Listen-Point

To configure listen point on the internal LAN interface on the CMCC adapter and configure LU pooling, use the following commands beginning in TN3270 server configuration mode:

Step	Command	Purpose
1	**listen-point** *ip-address* [**tcp-port** [*number*]]	Specifies the IP address and TCP port number to create a listen point. The default TCP port number is 23. This command changes the configuration mode from TN3270 to listen-point.
2	**client ip** *ip-address* [*mask*] **pool** *poolname*	(Optional) Nails clients to pools.
3	**idle-time** *num-of-seconds*	(Optional) Specifies the idle time for server disconnect. This command is also available in TN3270 server configuration mode.
4	**keepalive** *num-of-seconds*	(Optional) Specifies the maximum time allowed between keepalive marks before the server disconnects. This command is also available in TN3270 server configuration mode.
5	**ip precedence** {**screen** | **printer**} *value*	(Optional) Specifies the precedence level for IP traffic in the TN3270 server. This command is also available in TN3270 server configuration mode.
6	**ip tos** {**screen** | **printer**} *value*	(Optional) Specifies the TOS level for IP traffic in the TN3270 server. This command is also available in TN3270 server configuration mode.
7	**unbind-action** {**keep** | **disconnect**}	(Optional) Specifies whether the TN3270 session will disconnect when an UNBIND request is received. This command is also available in TN3270 server configuration mode.
8	**generic-pool** {**permit** | **deny**}	(Optional) Selects whether "left-over" LUs can be used from a generic LU pool. This command is also available in TN3270 server configuration mode.

Step	Command	Purpose
9	**lu termination** {*termself* | *unbind*}	(Optional) Specifies the type of termination request that is sent by the TN3270 server when a client turns off his device or disconnects. This command is also available in TN3270 server configuration mode.
10	**lu deletion** {*always* | *normal* | *non-generic* | *never*}	(Optional) Specifies whether the TN3270 server sends a REPLY-PSID poweroff request to VTAM to delete the corresponding LU when a client disconnects. This command is also available in TN3270 server configuration mode.

When you use the **listen-point** command, you enter listen-point configuration mode and can use all other commands in this task list. Values that you enter for siftdown commands in listen-point configuration mode will override values that you previously entered in TN3270 server configuration mode.

Configure Listen-Point PU

To configure listen point PU on the internal LAN interface on the CMCC adapter and configure LU pooling, use the following commands beginning in listen-point configuration mode:

Step	Command	Purpose
1	**pu** *pu-name idblk-idnum*	Creates a PU. This command changes the configuration mode from listen-point to listen-point PU.
2	**allocate lu** *address* **pool** *poolname* **clusters** *count*	(Optional) Assigns LUs to the pool.
3	**idle-time** *num-of-seconds*	(Optional) Specifies the idle time for server disconnect. This command is also available in listen-point configuration mode.
4	**keepalive** *num-of-seconds*	(Optional) Specifies the maximum time allowed between keepalive marks before the server disconnects. This command is also available in listen-point configuration mode.
5	**unbind-action** {**keep** | **disconnect**}	(Optional) Specifies whether the TN3270 session will disconnect when an UNBIND request is received. This command is also available in listen-point configuration mode.
6	**generic-pool** {**permit** | **deny**}	(Optional) Selects whether "left-over" LUs can be used from a generic LU pool. This command is also available in listen-point configuration mode.

Step	Command	Purpose
7	**lu termination** {*termself*	*unbind*}	(Optional) Specifies the type of termination request that is sent by the TN3270 server when a client turns off his device or disconnects. This command is also available in listen-point configuration mode.
8	**lu deletion** {*always*	*normal*	*non-generic*	*never*}	(Optional) Specifies whether the TN3270 server sends a REPLY-PSID poweroff request to VTAM to delete the corresponding LU when a client disconnects. This command is also available in listen-point configuration mode.

When you use the **pu** command, you enter listen-point PU configuration mode and can use all other commands in this task list. Values that you enter for siftdown commands in listen-point PU configuration mode will override values that you previously entered in listen-point configuration mode.

Configure the TN3270 Server and LU Pooling for APPN Environment

This section provides the following procedures:

- Configure TN3270
- Configure Listen-Point
- Configure Listen-Point PU

Configure TN3270

To establish a TN3270 server on the internal LAN interface on the CMCC adapter and configure LU pooling, use the following commands beginning in global configuration mode:

Step	Command	Purpose
1	**interface channel** *slot*/*port*	Selects the channel attach internal LAN interface and enter interface configuration mode.
2	**tn3270-server**	Specifies a TN3270 server on the internal LAN interface and enter TN3270 server configuration mode.
3	**pool** *poolname* [**cluster layout** [*layout-spec-string*]]	(Optional) Defines clusters of LUs and allocate LOCADDRs.
4	**dlur** *fq-cpname fq-dlusname*	Creates a DLUR function in the TN3270 server and enter DLUR configuration mode.
5	**lsap** *type adapno* [*lsap*]	Creates a SAP function under DLUR and enter DLUR SAP configuration mode.
6	**idle-time** *num-of-seconds*	(Optional) Specifies the idle time for server disconnect. This command is also available in listen-point configuration mode.

Step	Command	Purpose
7	**keepalive** *num-of-seconds*	(Optional) Specifies the maximum time allowed between keepalive marks before the server disconnects. This command is also available in listen-point configuration mode.
8	**ip precedence** {**screen** | **printer**} *value*	(Optional) Specifies the precedence level for IP traffic in the TN3270 server. This command is also available in listen-point configuration mode.
9	**ip tos** {**screen** | **printer**} *value*	(Optional) Specifies the TOS level for IP traffic in the TN3270 server. This command is also available in listen-point configuration mode.
10	**unbind-action** {**keep** | **disconnect**}	(Optional) Specifies whether the TN3270 session will disconnect when an UNBIND request is received. This command is also available in listen-point configuration mode.
11	**generic-pool** {**permit** | **deny**}	(Optional) Selects whether "left-over" LUs can be used from a generic LU pool. This command is also available in listen-point configuration mode.
12	**lu termination** {*termself* | *unbind*}	(Optional) Specifies the type of termination request that is sent by the TN3270 server when a client turns off his device or disconnects. This command is also available in listen-point configuration mode.
13	**lu deletion** {*always* | *normal* | *non-generic* | *never*}	(Optional) Specifies whether the TN3270 server sends a REPLY-PSID poweroff request to VTAM to delete the corresponding LU when a client disconnects. This command is also available in listen-point configuration mode.

When you use the **tn3270-server** command, you enter TN3270 server configuration mode and can use all other commands in the task list.

Configure Listen-Point

To configure listen point on the internal LAN interface on the CMCC adapter and configure LU pooling, use the following commands beginning in TN3270 server configuration mode:

Step	Command	Purpose
1	**listen-point** *ip-address* [**tcp-port** [*number*]]	Specifies the IP address and the TCP port number to create a listen point. The default TCP port number is 23. This command changes the configuration mode from TN3270 to listen-point.
2	**client ip** *ip-address* [*mask*] **pool** *poolname*	(Optional) Nails clients to pools.

Step	Command	Purpose
3	**idle-time** *num-of-seconds*	(Optional) Specifies the idle time for server disconnect. This command is also available in TN3270 server configuration mode.
4	**keepalive** *num-of-seconds*	(Optional) Specifies the maximum time allowed between keepalive marks before the server disconnects. This command is also available in TN3270 server configuration mode.
5	**ip precedence** {**screen** | **printer**} *value*	(Optional) Specifies the precedence level for IP traffic in the TN3270 server. This command is also available in TN3270 server configuration mode.
6	**ip tos** {**screen** | **printer**} *value*	(Optional) Specifies the TOS level for IP traffic in the TN3270 server. This command is also available in TN3270 server configuration mode.
7	**unbind-action** {**keep** | **disconnect**}	(Optional) Specifies whether the TN3270 session will disconnect when an UNBIND request is received. This command is also available in TN3270 server configuration mode.
8	**generic-pool** {**permit** | **deny**}	(Optional) Selects whether "left-over" LUs can be used from a generic LU pool. This command is also available in TN3270 server configuration mode.
9	**lu termination** {*termself* | *unbind*}	(Optional) Specifies the type of termination request that is sent by the TN3270 server when a client turns off his device or disconnects. This command is also available in TN3270 server configuration mode.
10	**lu deletion** {*always* | *normal* | *non-generic* | *never*}	(Optional) Specifies whether the TN3270 server sends a REPLY-PSID poweroff request to VTAM to delete the corresponding LU when a client disconnects. This command is also available in TN3270 server configuration mode.

When you use the **listen-point** command, you enter listen-point configuration mode and can use all other commands in this task list. Values that you enter for siftdown commands in listen-point configuration mode will override values that you previously entered in TN3270 server configuration mode.

Configure Listen-Point PU

To configure listen-point PU on the internal LAN interface on the CMCC adapter and configure LU pooling, use the following commands beginning in listen-point configuration mode:

Step	Command	Purpose
1	**pu** *pu-name idblk-idnum dlur*	Enters listen-point PU configuration mode and create a PU. This task is required when configuring PUs that use DLUR.
2	**allocate lu** *address* **pool** *poolname* **clusters** *count*	(Optional) Assigns LUs to the pool.
3	**idle-time** *num-of-seconds*	(Optional) Specifies the idle time for server disconnect. This command is also available in listen-point configuration mode.
4	**keepalive** *num-of-seconds*	(Optional) Specifies the maximum time allowed between keepalive marks before the server disconnects. This command is also available in listen-point configuration mode.
5	**unbind-action** {**keep**	**disconnect**}	(Optional) Specifies whether the TN3270 session will disconnect when an UNBIND request is received. This command is also available in listen-point configuration mode.
6	**generic-pool** {**permit**	**deny**}	(Optional) Selects whether "left-over" LUs can be used from a generic LU pool. This command is also available in listen-point configuration mode.
7	**lu termination** {*termself*	*unbind*}	(Optional) Specifies the type of termination request that is sent by the TN3270 server when a client turns off his device or disconnects. This command is also available in listen-point configuration mode.
8	**lu deletion** {*always*	*normal*	*non-generic*	*never*}	(Optional) Specifies whether the TN3270 server sends a REPLY-PSID poweroff request to VTAM to delete the corresponding LU when a client disconnects. This command is also available in listen-point configuration mode.

When you use the **pu** command, you enter listen-point PU configuration mode and can use all other commands in this task list. Values that you enter for siftdown commands in listen-point PU configuration mode will override values that you previously entered in listen-point configuration mode.

Configure Client Subnet Response-Time Groups

To configure client subnet response-time groups, use the following commands in response-time configuration mode:

Command	Purpose
response-time group *name* [**bucket boundaries** *t1 t2 t3 t4*] [**multiplier** *m*]	Configures the client subnet response-time group.
client ip *ip-address* [*ip-mask*]	Specifies the IP address of the subnet being added to this client group.

Monitor LU Pooling and Response Time

Use the following commands in privileged EXEC mode to monitor the TN3270 server:

Command	Purpose
show extended channel *slot/virtual channel* **tn3270 pu** *pu-name* [**cluster**]	Displays information about the client LUs associated with a specified PU including the cluster layout and pool name.
show extended channel *slot/virtual channel* **tn3270 response-time application** [*appl-name* [**detail**]]	Displays information about each client group application for the specified VTAM appl name. List each member of the client group with its individual response-time statistics.
show extended channel *slot/virtual channel* **tn3270 response-time global**	Displays information about the global client groups.
show extended channel *slot/virtual channel* **tn3270 response-time link** [*link-name*]	Displays information about the specified per-host-link client group.
show extended channel *slot/virtual channel* **tn3270 response-time listen-point**	Displays information about listen-point type client groups.
show extended channel *slot/virtual channel* **tn3270 response-time subnet** [*ip-mask* [**detail**]]	Displays information about the specified client group.

Configuration Examples

This section provides examples of how router configurations change with the implementation of new commands in this release. It also lists LU pooling configuration examples with DLUR and with direct PU:

- Basic LU Pooling Configuration
- Listen-Point Direct PU
- Listen-Point DLUR PU
- TN3270 Server Using LU Pooling

Note   The first three configuration examples in this section apply only to users who are already using TN3270.

Basic LU Pooling Configuration

The following example shows a router with an existing TN3270 server configuration and PU specification:

```
tn3270-server
 pu PU1 94223456 10.10.10.1 tok 1 08
  tcp-port 40
  keepalive 10
```

The following example shows the same router with TN3270 server configuration that replaces the existing configuration and uses the **listen-point** command to accomplish LU pooling. The **listen-point** command was first introduced in Cisco IOS 11.2(18)BC.

```
tn3270-server
 listen-point 10.10.10.1 tcp-port 40
   pu PU1 94223456 tok 1 08
    keepalive 10
```

Note that in the new configuration, the IP address is not configured in the PU. Instead, the IP address is configured as a listen point and the PU is configured within the scope of the listen point. The **tcp-port** command is not configured within the scope of the PU, instead it is specified with the **listen-point** command.

Listen-Point Direct PU

The following example shows a router with an existing configuration that contains different PUs configured with the same IP addresses:

```
tn3270-server
 pu PU1 94201231 10.10.10.2 tok 1 10
 pu PU2 94201232 10.10.10.3 tok 1 12
 pu PU3 94201234 10.10.10.3 tok 1 14
 pu PU4 94201235 10.10.10.4 tok 1 16
  tcp-port 40
 pu PU5 94201236 10.10.10.4 tok 2 08
```

The following example shows the same router replaced with a configuration that uses the **listen-point** command introduced in Cisco IOS 11.2(18)BC:

```
tn3270-server
 listen-point 10.10.10.2
  pu PU1 94201231  tok 1 10
 listen-point 10.10.10.3
  pu PU2 94201232  tok 1 12
  pu PU3 94201234  tok 1 14
 listen-point 10.10.10.4
  pu PU5 94201236  tok 2 08
 listen-point 10.10.10.4 tcp-port 40
  pu PU4 94201235  tok 1 16
```

In this example, PU2 and PU3 are grouped into one listen point because they have the same IP address. Note that even though PU4's IP address is identical to PU5's IP address, they are not configured within the same listen point because the listen point indicates a unique IP address and TCP port pair. If you do not specify the TCP port, the default port value is 23.

Listen-Point DLUR PU

The following example shows a router with an existing configuration for DLUR:

```
tn3270-server
 dlur NETA.RTR1 NETA.HOST
  dlus-backup NETA.HOST
  lsap token-adapter 15 08
  link MVS2TN   rmac 4000.b0ca.0016
  pu PU1 017ABCDE 10.10.10.6
```

The following example shows the same router replaced with a configuration that uses the new **listen-point** command introduced in Cisco IOS 11.2(18)BC:

```
tn3270-server
 dlur NETA.RTR1 NETA.HOST
  dlus-backup NETA.HOST
  lsap token-adapter 15 08
  link MVS2TN   rmac 4000.b0ca.0016
 listen-point 10.10.10.6
  pu PU1 017ABCDE dlur
```

In this example, the PU is not configured within the scope of DLUR. Instead the PU is configured within the listen-point scope. The keyword **dlur** differentiates the listen-point direct PU from the listen-point DLUR PU. Note that the DLUR configuration must be completed before PU1 is configured.

Any siftdown commands configured within the scope of listen point are automatically inherited by the PUs that are configured within the scope of that listen point. To override the siftdown configurations, you can explicitly configure the siftdown configuration commands within the scope of the listen-point PU.

TN3270 Server Using LU Pooling

Figure 6 shows a router running the TN3270 server (with DLUR and direct PU) and its LU pooling configuration.

Figure 6   TN3270 Server Using LU Pooling
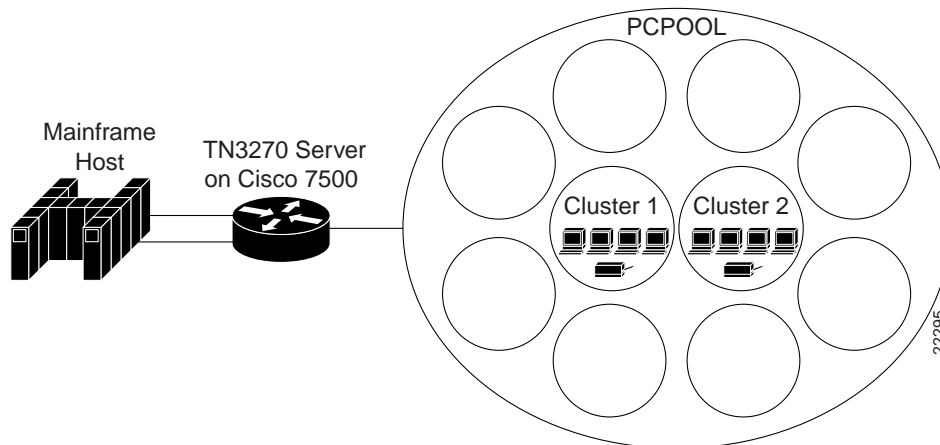
The following router configuration shows an example of commands used to define the TN3270
server with LU pools.

Router Configuration

```
interface Channel6/1
 no ip address
 no keepalive
 csna E160 40
!
interface Channel6/2
 ip address 172.18.4.17 255.255.255.248
 no keepalive
 lan TokenRing 15
  source-bridge 15 1 500
  adapter 15 4000.b0ca.0015
 lan TokenRing 16
  source-bridge 16 1 500
  adapter 16 4000.b0ca.0016
 tn3270-server
  pool NEREGION cluster layout 1a
  pool PCPOOL   cluster layout 4s1p
  pool UNIXPOOL cluster layout 49s1p
  dlur NETA.SHEK NETA.MVSD
   lsap token-adapter 15 04
    link SHE1     rmac 4000.b0ca.0016
  listen-point 172.18.4.18
   client ip 10.20.20.30 pool UNIXPOOL
   client ip 10.20.40.0 255.255.255.0 pool PCPOOL
   client ip 10.20.30.0 255.255.255.128 pool NEREGION
   pu PU1      91903315 dlur
    allocate lu 1 pool PCPOOL   clusters 10
    allocate lu 51 pool UNIXPOOL clusters 2
    allocate lu 200 pool NEREGION clusters 50
  listen-point 172.18.4.19
   client ip 20.30.40.40 pool UNIXPOOL
   client ip 20.40.34.0 255.255.255.0 pool PCPOOL
   client ip 20.40.50.0 255.255.255.128 pool NEREGION
   pu PU2      91913315 dlur
    allocate lu 1 pool UNIXPOOL clusters 2
    allocate lu 101 pool NEREGION clusters 100
    allocate lu 201 pool PCPOOL   clusters 10
```

Figure 7 shows cluster layouts for PU1 in the TN3270 server.

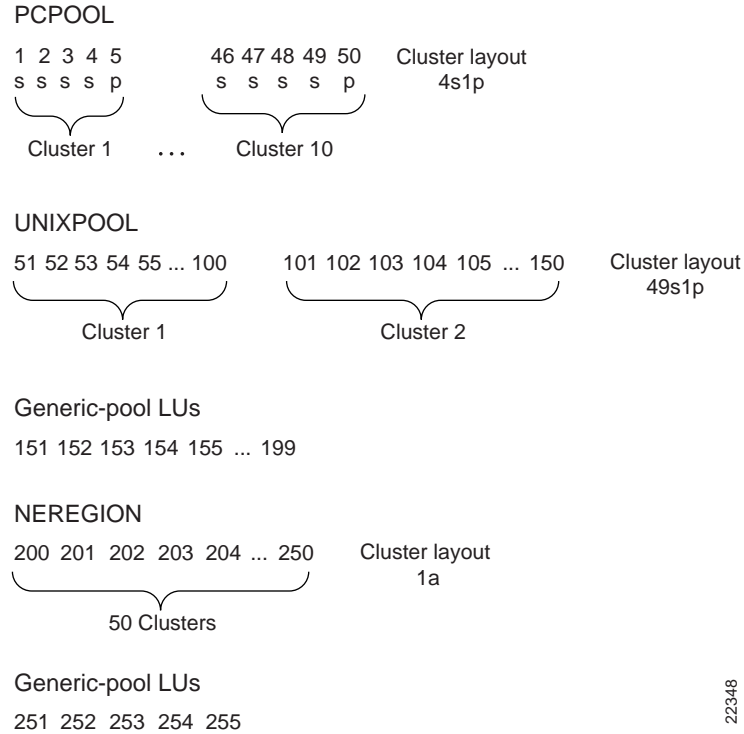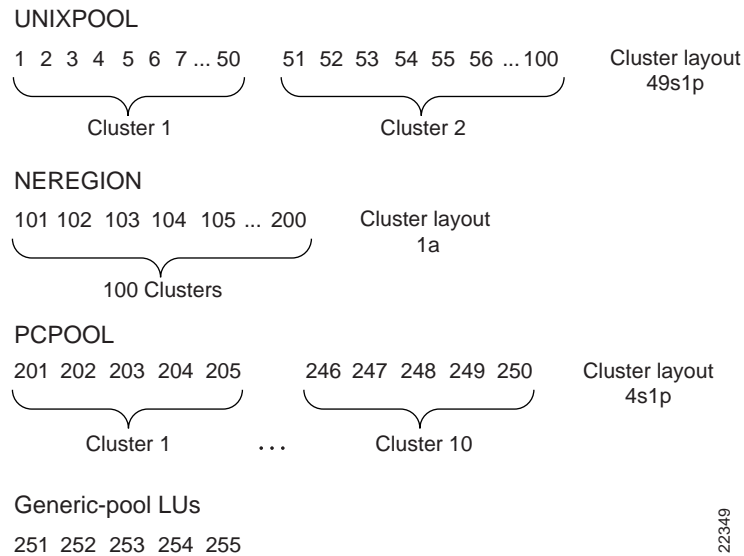**Figure 7   Cluster Layouts for PU1 in the TN3270 Server**

PCPOOL

```
1  2  3  4  5        46 47 48 49 50      Cluster layout
s  s  s  s  p         s  s  s  s  p          4s1p
```

Cluster 1   . . .   Cluster 10

UNIXPOOL

```
51 52 53 54 55 ... 100      101 102 103 104 105 ... 150      Cluster layout
                                                                  49s1p
```

Cluster 1   Cluster 2

Generic-pool LUs

151 152 153 154 155 ... 199

NEREGION

```
200 201 202 203 204 ... 250      Cluster layout
                                     1a
```

50 Clusters

Generic-pool LUs

251 252 253 254 255

22348

Figure 8 shows cluster layouts for PU2 in the TN3270 server.

Figure 8   Cluster Layouts for PU2 in the TN3270 Server

UNIXPOOL

```
1  2  3  4  5  6  7 ... 50      51 52 53 54 55 56 ... 100      Cluster layout
                                                                   49s1p
```

Cluster 1   Cluster 2

NEREGION

```
101 102 103 104 105 ... 200      Cluster layout
                                     1a
```

100 Clusters

PCPOOL

```
201 202 203 204 205        246 247 248 249 250      Cluster layout
                                                          4s1p
```

Cluster 1   . . .   Cluster 10

Generic-pool LUs

251 252 253 254 255

22349

Command Reference

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 11.2 *IBM Networking Command Reference*.

- **allocate lu**
- **client ip**
- **client ip pool**
- **listen-point**
- **lu deletion**
- **lu termination**
- **pool**
- **pu dlur (listen-point)**
- **pu (listen-point)**
- **response-time group**
- **show extended channel tn3270-server pu**
- **show extended channel tn3270-server response-time application**
- **show extended channel tn3270-server response-time global**
- **show extended channel tn3270-server response-time link**
- **show extended channel tn3270-server response-time listen-point**
- **show extended channel tn3270-server response-time subnet**

allocate lu

Use the **allocate lu** listen-point PU configuration command to assign LUs to a pool. Use the **no** form of this command to remove LUs assigned to a pool.

>**allocate lu** *lu-address* **pool** *poolname* **clusters** *count*
>**no allocate lu** *lu-address* **pool** *poolname* **clusters** *count*

Syntax Description

lu-address	Starting number of the LOCADDR to which a cluster of LUs are to be allocated.
poolname	Pool name to which you want to allocate LUs. The pool name cannot exceed 8 characters.
count	Range of LUs in a cluster that are allocated to the specified pool. For example, if the **lu** keyword specifies the beginning of the LOCADDR number, the **cluster** keyword specifies the number of clusters to be included in the pool.

Default

This command has no defaults.

Command Mode

Listen-point PU configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2(18)BC. The following guidelines apply to the **allocate lu** command:

- The LUs assigned to a pool constitute a cluster. When multiple pools are configured, the LU ranges for different pools on the same PU must not overlap.

- A maximum of 255 LOCADDRs can be allocated to a pool. Configurations with invalid LOCADDRs are deleted. Overlapping LU ranges between different pools are invalid.

- The LOCADDR ranges must not overlap for multiple allocation statements and with existing ranges specified for client nailing statements.

- When LUs are allocated while LUs are in use, existing clients are allowed to complete their sessions unaffected.

Example

In the following example, the starting LOCADDR is 10. Each cluster has 10 LOCADDRs, therefore 50 LOCADDRs are allocated to the pool name LOT1.

```
interface channel 0/2
 tn3270-server
  pool LOT1 cluster layout 4s1p
  listen-point 10.20.30.40
   pu PU1
     allocate lu 10 pool LOT1 clusters 5
```

As a result of this configuration, the following LOCADDRs are created in each cluster:

Cluster 1

LOCADDR 10—Screen
LOCADDR 11—Screen
LOCADDR 12—Screen
LOCADDR 13—Screen
LOCADDR 14—Printer

Cluster 2

LOCADDR 15—Screen
LOCADDR 16—Screen
LOCADDR 17—Screen
LOCADDR 18—Screen
LOCADDR 19—Printer

All of the LUs in these clusters are allocated to pool LOT1.

Related Commands

pool
tn3270
pu (listen-point)
pu dlur (listen-point)

client ip

Use the **client ip** response-time configuration command to add an IP subnet to a client subnet response-time group. Use the **no** form of this command to remove an IP subnet from a client subnet response-time group.

client ip *ip-address* [*ip-mask*]
no client ip *ip-address* [*ip-mask*]

Syntax Description

ip-address	IP subnet being added to the response-time group.
ip-mask	(Optional) Mask applied to a client IP address to determine the client's membership in a client subnet group. When the mask is applied to a connecting client's IP address and the resulting address is equal to the defined IP address, the client becomes a member of the client group. The default mask is 255.255.255.255.

Default

This command has no defaults.

Command Mode

Response-time configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2(18)BC.

Example

Following is an example of the **client ip** command:

```
tn3270-server
response-time group acctg
 client ip 10.1.2.3 255.0.0.0
```

Related Commands

response-time group
show extended channel tn3270-server response-time application
show extended channel tn3270-server response-time global
show extended channel tn3270-server response-time link
show extended channel tn3270-server response-time listen-point
show extended channel tn3270-server response-time subnet
tn3270

client ip pool

Use the **client ip pool** listen-point configuration command to nail clients to pools. Use the **no** form of this command to remove clients from pools.

client ip *ip-address* [*ip-mask*] **pool** *poolname*
no client ip *ip-address* [*ip-mask*] **pool** *poolname*

Syntax Description

ip-address	Remote client IP address.
ip-mask	(Optional) Mask applied to the remote device address. The mask is part of the matching function that determines whether a client is governed by the nailing statement. The default is 255.255.255.255. Multiple client IP addresses in the same subnet can be nailed to the same range of LOCADDRS.
poolname	Specify a unique pool name. The pool name cannot exceed 8 characters.

Default

This command has no defaults.

Command Mode

Listen-point configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2(18)BC.

If the pool is configured while LUs are in use, existing clients are allowed to complete their sessions. A pool name can be identical to an LU name. When assigning an LU, the TN3270 server searches the LU name space first for specific requests, such as connections that specify a device name on CONNECT or LU name in the terminal type negotiation. The request is assumed to be directed to the specific LU rather than to the pool. Make sure the name spaces do not clash.

Example

The following is an example of the **client ip pool** command that nails the client at IP address 10.1.2.3 with an IP mask of 255.255.255.0 to the pool named OMAHA:

```
tn3270-server
 pool OMAHA cluster layout 10s1p
 listen-point 172.18.4.18
  client ip 10.1.2.3 255.255.255.0 pool OMAHA
```

Related Commands

listen-point
pool
pu dlur (listen-point)
pu (listen-point)
tn3270

listen-point

Use the **listen-point** TN3270configuration command to define an IP address for the TN3270 server. Use the **no** form of this command to remove a listen point for the TN3270 server.

> **listen-point** *ip-address* [**tcp-port** *number*]
> **no listen-point** *ip-address* [**tcp-port** *number*]

Syntax Description

ip-address	IP address that the clients should use as the host IP address to map to LU sessions under this PU and listen point.
tcp-port *number*	(Optional) Port number used for the listen operation. The default value is 23.

Default

This command has no defaults.

Command Mode

TN3270 server configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2(18)BC.

Use the **listen-point** command to create a unique listen point for every IP address and TCP-port pair. In this mode, the IP address and the TCP port are no longer configured in the PU. Configure the PUs under the appropriate listen point. The other siftdown configuration commands remain the same.

For example, in the old configuration the following statements were used to configure the IP address and TCP port in the PU:

```
tn3270-server
  pu PU1 94223456 10.10.10.1 tok 1 08
   tcp-port 40
   keepalive 10
```

In the new listen-point configuration, the following statements are used to configure the IP address and TCP port at the listen point:

```
tn3270-server
  listen-point 10.10.10.1 tcp-port 40
   pu PU1 94223456 tok 1 08
    keepalive 10
```

You can also use the listen-point configuration to assign the same IP address to multiple PUs. In the old configuration the following statements were used:

```
tn3270-server
  pu PU1 94201231 10.10.10.2 tok 1 10
  pu PU2 94201232 10.10.10.3 tok 1 12
  pu PU3 94201234 10.10.10.3 tok 1 14
  pu PU4 94201235 10.10.10.4 tok 1 16
   tcp-port 40
  pu PU5 94201236 10.10.10.4 tok 2 08
```

In the new listen point configuration, the old statements are replaced by the following configuration commands. In this example, PU2 and PU3 are grouped into one listen point because they have the same IP address. Note that even though PU4's IP address is identical to PU5's IP address, they are not configured within the same listen point because the listen point indicates a unique IP address and TCP port pair. If you do not specify the TCP port, the default port value is 23.

```
tn3270-server
 listen-point 10.10.10.2
  pu PU1 94201231 tok 1 10
 listen-point 10.10.10.3
  pu PU2 94201232 tok 1 12
  pu PU3 94201234 tok 1 14
 listen-point 10.10.10.4
  pu PU5 94201236 tok 2 08
 listen-point 10.10.10.4 tcp-port 40
  pu PU4 94201235 tok 1 16
```

The next example shows how the configuration changes for a DLUR PU. In this mode, the DLUR PU is no longer configured under DLUR, but is configured in the listen point.

In the old configuration, the following statements were used:

```
tn3270-server
 dlur NETA.RTR1 NETA.HOST
  dlus-backup NETA.HOST
  lsap token-adapter 15 08
   link MVS2TN rmac 4000.b0ca.0016
  pu PU1 017ABCDE 10.10.10.6
```

These statements are replaced by the following statements in the new listen-point configuration. The keyword **dlur** differentiates the listen-point direct PU from the listen point DLUR PU. The DLUR configuration must be completed before configuring the PU in the listen-point. Any siftdown commands configured within the scope of the listen point are automatically inherited by the PUs that are configured within the scope of that listen point. To override the siftdown configurations, you can explicitly configure the siftdown configuration commands within the scope of the listen-point PU.

```
tn3270-server
 dlur NETA.RTR1 NETA.HOST
  dlus-backup NETA.HOST
  lsap token-adapter 15 08
   link MVS2TN rmac 4000.b0ca.0016
 listen-point 10.10.10.6
  pu PU1 017ABCDE dlur
```

Example

Following is an example of the **listen-point** command showing PU7 grouped into the listen point at IP address 10.10.10.1 and TCP port 40:

```
tn3270-server
listen-point 10.10.10.1 tcp-port 40
 pu PU7 94201237 tok 1 17
```

Related Commands

tn3270
unbind-action keep
pu dlur (listen-point)
pu (listen-point)

lu deletion

Use the **lu deletion** configuration command to specify whether the TN3270 server sends a REPLY-PSID poweroff request to VTAM to delete the corresponding LU when a client disconnects. Use the **no** form of this command to remove LU deletion from the current configuration scope.

> **lu deletion** {*always* | *normal* | *non-generic* | *never*}
> **no lu deletion**

Syntax Description

always	Always delete dynamic LUs upon disconnect.
normal	Delete screen LUs only upon disconnect.
non-generic	Delete only specified LUs upon disconnect.
never	Never delete LUs upon disconnect.

Default

The default keyword is *never*.

Command Mode

TN3270 server configuration—The **lu deletion** command at this level applies to all PUs supported by the TN3270 server.

Listen-point configuration—The **lu deletion** command at this level applies to all PUs defined at the listen point.

Listen-point PU configuration—The **lu deletion** command at this level applies only to the specified PU.

PU configuration—The **lu deletion** command at this level applies only to the specified PU.

Note   The **lu deletion** command is a siftdown command, so it can be used at any of the configuration command modes shown. The most recent **lu deletion** command in the PU configuration takes precedence.

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2(18)BC.

Use the *always* mode of LU deletion when you have only screen LUs, but they are all of different sizes. This prevents screen LUs from attaching to a previously used LU with an incompatible screen size designated by a previous session.

Use the *normal* mode of LU deletion when you have both screen and printer LUs. This is important because printers are acquired by the host application and are not logged on manually. If VTAM deletes the LU, then there is nothing for a host application (such as CICS) to acquire.

You can use the *non-generic* mode of LU deletion if VTAM can support deletion of specifically-named LUs. (The support of this mode is not currently available in VTAM, as of VTAM version 4.4.1.)

Use the *never* mode of LU deletion when you have only screen LUs and they all use the same screen size.

Example

Following is an example of the **lu deletion** command specifying that the TN3270 server sends a REPLY-PSID request to delete only screen LUs upon session disconnect for any PUs supported by the TN3270 server:

```
tn3270-server
 lu deletion normal
```

lu termination

Use the **lu termination** configuration command to specify whether a TERMSELF or UNBIND RU is sent by the TN3270 server when a client turns off his device or disconnects. Use the **no** form of this command to remove LU termination from the current configuration scope.

> **lu termination** {*termself* | *unbind*}
> **no lu termination**

Syntax Description

termself	Orders termination of all sessions and session requests associated with an LU upon disconnect.
unbind	Requests termination of the session by the application upon LU disconnect.

Default

Unbind is the default.

Command Mode

TN3270 server configuration—The **lu termination** command at this level applies to all PUs supported by the TN3270 server.

Listen-point configuration—The **lu termination** command at this level applies to all PUs defined at the listen point.

Listen-point PU configuration—The **lu termination** command at this level applies only to the specified PU.

PU configuration—The **lu termination** command at this level applies only to the specified PU.

> **Note** The **lu termination** command is a siftdown command, so it can be used at any of the configuration command modes shown. The most recent **lu termination** command in the PU configuration takes precedence.

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2(18)BC.

Use the *termself* argument when you want to be sure that the application terminates the session when the LU disconnects. This is important for certain applications such as CICS.

If you use the *unbind* argument for session termination with applications such as CICS, VTAM security problems can arise. When CICS terminates a session from an UNBIND request, the application may reestablish a previous user's session with a new user, who is now assigned to the same freed LU.

Example

Following is an example of the **lu termination** configuration command to force termination of the session when an LU disconnects for any PUs supported by the TN3270 server:

```
tn3270-server
 lu termination termself
```

pool

Use the **pool** TN3270 server configuration command to define pool names for the TN3270 server and specify the number of screens and printers in each logical cluster. Use the **no** form of this command to remove a client IP pool.

pool *poolname* [**cluster layout** *layout-spec-string*]
no pool *poolname*

Syntax Description

poolname	Unique pool name which cannot exceed 8 characters.
cluster layout *layout-spec-string*	(Optional) Name for the cluster and to indicate a cluster of LUs such as printers. The sum of the numbers must be less than or equal to 255. No spaces are used between the entries in the *layout-spec-string*.

Default

The default value is "1a" for the *layout-spec-string*.

Command Mode

TN3270 server configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2(18)BC.

The **pool** and **allocate lu** commands enable the TN3270 server to know the relationships between screen and printer LUs. These commands are an alternative to the LU nailing feature that allows clients to be nailed to LUs.

The **pool** command is configured in the TN3270 scope. The **pool** command provides the pool names and the definitions of the number of screens and printers in one logical cluster. Each pool statement must have a unique pool name.

When using a **pool** command to create a cluster, a combination of the following values is used in the *layout-spec-string*:

- s (screen)
- p (printer)
- a (any, or wildcard) [Refers to a printer or a screen]

Use the following format to define the *layout-spec-string*, where *decimal_num* is a decimal number between 1 and 255:

```
pool poolname cluster layout {decimal_nums}{decimal_nump}{decimal_numa}
```

The total sum of the numbers must be less than or equal to 255. No spaces are used between the entries in the *layout-spec-string*. The default is 1a, which defines 1 screen or 1 printer. A screen, printer, or a wildcard definition cannot be followed by a definition of the same type. A screen definition can only be followed by a printer or wildcard. Similarly, a printer definition can be followed only by a wildcard or a screen definition.

The following are examples of invalid *layout-spec-string* values, and the corresponding corrected specification:

- A *layout-spec-string* of 3s6s is invalid. The correct specification is 9s.

- A *layout-spec-string* of 3s6p7a8a is invalid. The correct specification is 3s6p15a.

- A *layout-spec-string* of 255s10p is invalid. Although the decimal number for any portion of the *layout-spec-string* can be between 1 and 255, the total number across all parameters cannot exceed 255. To correct this example, you can reduce the screens to 245 as 245s10p.

The combination of a screen, printer, and wildcard constitute a group. The *layout-spec-string* can support a maximum of 4 groups.

Consider the following example:

```
pool CISCO cluster layout 2s3p4a5s6a7s8p9s
```

There are 4 groups in this definition: 2s3p4a, 5s6a, 7s8p and 9s.

Pools must be defined before any pool references under the listening points are defined. Also, pools must be defined before they are referenced by other statements in the configuration. Failure to define the pool before it is referenced will cause the referencing configuration to be rejected.

Pools that are deleted (using the **no** form of the command) will cause all statements referencing the pool to be deleted.

The following criteria apply to the creation of pool names and LOCADDRs:

- Pool and LU names must be unique; they cannot be identical.

- LOCADDR ranges for pools must not overlap.

- LOCADDR ranges for LU pools must not overlap with the existing client nailing configuration.

- Pool configurations made while LUs are in use do not affect the current LU configuration.

Example

The following example uses the **pool** command to create two pools, *pcpool* and *unixpool*:

```
tn3270-server
 pool pcpool cluster layout 4s1p
 pool unixpool cluster layout 49s1p
listen-point 10.20.30.40
 client ip 10.10.10.2 pool pcpool
 pu PU1 91903315 dlur
  allocate lu 1 pool pcpool clusters 50
 pu PU2 91903345 dlur
  allocate lu 1 pool unixpool clusters 5
```

In this example, the *pcpool* contains a cluster of 4 screens and 1 printer per cluster. The total number of devices in a cluster cannot exceed 255, therefore the pcpool contains a total of 50 clusters with each cluster containing 5 LUs. Note that the remaining 5 LUs automatically go to the generic pool.

The *unixpool* contains 49 screens and 1 printer per cluster. The total number of devices in a cluster cannot exceed 255, therefore the unixpool contains a total of 5 clusters with each cluster containing 50 LUs. Again, note that the last 5 LUs automatically go to the generic pool.

Related Commands

tn3270

pu dlur (listen-point)

Use the **pu dlur** listen point configuration command to create a PU entity that has no direct link to a host or to enter listen-point PU configuration mode. Use the **no** form of this command to remove the PU entity.

pu *pu-name idblk-idnum* **dlur**
no pu *pu-name*

Syntax Description

pu-name	Name that uniquely identifies this PU.
idblk-idnum	Value that must match the *idblk-idnum* value defined at the host. The value must be unique within the subarea; however, the TN3270 server generally cannot tell which remote hosts are in which subareas, so the server only enforces uniqueness within the set of DLUR PUs.

Default

No PU is defined.

Command Mode

Listen-point configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

If the PU is already created, the **pu dlur** command without any arguments starts listen-point PU configuration mode. In this mode you can modify an existing listen-point DLUR PU entity.

You should define the DLUR before you configure the listen-point DLUR PU.

A typical usage for the IP address is to reserve an IP address for each application. For example, clients wanting to connect to TSO specify an IP address that is defined with PUs that have LOGAPPL=TSO.

Example

The following example defines three PUs in the listen point with an IP address of 172.18.4.18:

```
tn3270-server
listen-point 172.18.4.18
 pu p0  05D99001 dlur
 pu p1  05D99002 dlur
 pu p2  05D99003 dlur
```

Related Commands

dlur
listen-point

pu (listen-point)

Use the **pu** listen-point configuration command to create a PU entity that has a direct link to a host or to enter listen-point PU configuration mode. Use the **no** form of this command to remove the PU entity.

> **pu***pu-nameidblk-idnumtypeadapter-numberlsap*[**rmac***rmac*][**rsap** *rsap*][**lu-seed** *lu-name-stem*]
> **no pu** *pu-name*

Syntax Description

pu-name	Name that uniquely identifies this PU.
idblk-idnum	Value that matches the IDBLK-IDNUM value defined at the host. The value must be unique within the subarea; however, the TN3270 server cannot tell which remote hosts are in which subareas and does not enforce the unique value requirement.
type	Internal adapter type on the CIP card, which corresponds to the value specified in the **lan** internal LAN configuration command. The currently supported type is **token-adapter**.
adapter-number	Internal adapter interface on the CIP card, which is the same value specified in the **adapter** internal LAN configuration command.
lsap	Local SAP number in hexadecimal, ranging from 04 to DE. The value must be even, and must be unique within the internal adapter so that no other 802.2 clients of that adapter, in the router or in a host, are allocated the same SAP. Other direct links from TN3270 server direct PUs may use the same value on the internal adapter as long as the remote MAC or SAP is different.
rmac *rmac*	(Optional) Remote MAC address. The remote MAC address in the form *xxxx.xxxx.xxxx* hexadecimal, specifying the MAC address of the remote host. If not specified, a loopback link to another SAP on the same internal LAN adapter is assumed.
rsap *rsap*	(Optional) Remote SAP address. The remote SAP address is a one- or two-character hexadecimal string, ranging from 04 to FC, that specifies the SAP address of the remote host. The default is 04.
lu-seed *lu-name-stem*	(Optional) LU name that the client uses when a specific LU name request is needed. The format is *x...x##* or *x...x###* where *x...x* is an alphanumeric string. When ## is specified, it is replaced with the LU LOCADDR in hexadecimal digits to form the complete LU name. When ### is specified, decimal digits are used, padded with leading zeroes to make three characters. The first *x* must be alphabetic and the entire string, including the # symbols, must not exceed 8 characters.

Defaults

The default remote SAP address is 04 (hexadecimal).

Command Mode

Listen-point configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

The **pu** *pu-name* command is valid only on the virtual channel interface. If the PU is already created, the **pu** *pu-name* command with no arguments puts you in listen-point PU configuration mode, where you can modify an existing PU entity.

The **pu** listen-point command uses values that are defined in two other commands: the **lan** internal LAN configuration command and the **adapter** internal LAN configuration command. The **lan** *type* and **adapter** *adapter-number* values configured on the CIP internal LAN interface are used in the **pu** command.

For a link via a channel on this CMCC adapter, the TN3270 server and the hosts should open different adapters. Using different adapters avoids contention for SAP numbers and is also necessary if you configure duplicate MAC addresses for fallback CSNA access to the host.

Examples

The following example configures the TN3270 server to be active and has one PU, CAPPU1, trying to connect. An LU seed using hexadecimal digits is defined.

```
tn3270-server
pu CAPPU1 05D18101 token-adapter 3 04 rmac 4000.0501.0001 lu-seed CAP01L##
```

The following example shows different adapter numbers configured on the same internal LAN to avoid SAP contention. The host uses SAP 4 on Token Ring adapter 0.

```
lan tokenring 0
 adapter 0 4000.0000.0001
 adapter 1 4000.0000.0002
tn3270-server
 listen-point 10.20.30.40
  pu PU1 05d00001 token-adapter 1 8 rmac 4000.0000.0001 rsap 4
```

Related Commands

adapter
lan
listen-point
show extended channel tn3270-server

response-time group

Use the **response-time group** TN3270 configuration command to configure a client subnet group for response-time measurements. Use the **no** form of this command to remove a client subnet group from response-time measurements.

response-time group *name* [**bucket boundaries** *t1 t2 t3 t4...*] [**multiplier** *m*]
no response-time group *name*

Syntax Description

name	Alphanumeric string for the response-time group name. The maximum length of the name is 24 characters. Lower or uppercase letters can be used.
bucket boundaries *t1 t2 t3 t4*	Unsigned 32-bit quantity that defines a bucket boundary in tenths of seconds. For other types of client groups, the bucket boundaries and multiplier values are fixed to the following defaults: • Bucket boundaries—10, 20, 50, 100 • Multiplier—30
multiplier *m*	Number in the range of 1 to 5760, which when multiplied by the sample interval of 20 seconds, determines the collection interval.

Default

Bucket boundaries and the multiplier value are fixed to the following defaults:

- Bucket boundaries—10, 20, 50, 100
- Multiplier—30

Command Mode

TN3270 server configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2(18)BC.

Multiple response-time groups can be configured within the scope of available memory. When using this command, up to 1024 IP subnets can be defined per response-time group with the **client ip** command. All TN3270 clients belonging to subnets configured within a specific response-time group are added to the response-time group when they connect as clients.

If the IP address and mask combination already exists within any response-time group, the following error message is displayed:

```
Subnet 10.1.1.0 255.255.255.248 already exists in client group MYSUBNET
```

Example

In the following example, the response-time group MYSUBNET is configured:

```
tn3270-server
response-time group MYSUBNET bucket boundaries 15 25 60 120 multiplier 35
 client ip 10.1.1.0 255.255.255.248
 client ip 10.1.2.0 255.255.255.248
```

Related Commands

client ip
show extended channel tn3270-server response-time application
show extended channel tn3270-server response-time global
show extended channel tn3270-server response-time link
show extended channel tn3270-server response-time listen-point
show extended channel tn3270-server response-time subnet

show extended channel tn3270-server pu

Use the **show extended channel tn3270-server pu** privileged EXEC command to display configuration parameters for a PU and all the LUs currently attached to the PU, including the LU cluster layout and pool name.

> **show extended channel** *slot/virtual channel* **tn3270-server pu** *pu-name* [**cluster**]

Syntax Description

slot	Slot number.
virtual channel	Virtual channel number.
pu-name	PU name.
cluster	(Optional) Display cluster information for the LUs within the pool.

Default

This command has no defaults.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

The output for the **show extended channel tn3270-server pu** command varies by whether you are using the optional **cluster** keyword. Without the **cluster** keyword, the output column headings for the LU information appear as "model," "frames in out," and "idle for."

When you use the **cluster** keyword, the output column headings for the LU information appear as "cluster," "pool," and "count." The cluster heading lists the specific cluster within the pool to which the LU belongs along with the specific cluster layout after the slash.

The pool heading identifies the corresponding pool name, and the count heading identifies the cluster number out of the total number of clusters in the pool.

Example

This example shows a sample router configuration and the corresponding output using the **show extended channel tn3270-server pu** command.

Router Configuration

```
interface Channel6/1
 no ip address
 no keepalive
 csna E160 40
!
interface Channel6/2
 ip address 172.18.4.17 255.255.255.248
 no keepalive
 lan TokenRing 15
  source-bridge 15 1 500
  adapter 15 4000.b0ca.0015
 lan TokenRing 16
  source-bridge 16 1 500
  adapter 16 4000.b0ca.0016
 tn3270-server
  pool PCPOOL   cluster layout 4s1p
  pool SIMPLE   cluster layout 1a
  pool UNIXPOOL cluster layout 49s1p
  dlur NETA.SHEK NETA.MVSD
   lsap token-adapter 15 04
    link SHE1     rmac 4000.b0ca.0016
  listen-point 172.18.4.18 tcp-port 23
   pu PU1      91903315 dlur
     allocate lu 1 pool PCPOOL   clusters 10
     allocate lu 51 pool UNIXPOOL clusters 2
     allocate lu 200 pool SIMPLE   clusters 50
  listen-point 172.18.4.19 tcp-port 2023
   pu PU2      91913315 token-adapter 16 08
     allocate lu 1 pool UNIXPOOL clusters 2
     allocate lu 101 pool SIMPLE   clusters 100
     allocate lu 201 pool PCPOOL   clusters 10
```

Following is an example of output for the **show extended channel tn3270-server pu** command without the cluster keyword for a PU named PU1:

```
Router#show extended channel 6/2 tn3270-server pu pu1

name(index)    ip:tcp              xid     state     link   destination
r-lsap
PU1(1)        172.18.4.18:23      91903315 ACTIVE    dlur   NETA.SHPU1

idle-time   0      keepalive 1800     unbind-act discon   generic-pool
perm
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer
0
bytes 27019 in, 73751 out; frames 1144 in, 869 out; NegRsp 0 in, 0 out
actlus 5, dactlus 0, binds 5
Note: if state is ACT/NA then the client is disconnected

lu   name    client-ip:tcp       nail state     model    frames in out
idle for
1   SHED1001 161.44.100.162:1538   N   ACT/SESS 3278S2E   228      172
0:0:2
51  SHED1051 161.44.100.162:1539   N   ACT/SESS 3278S2E   240      181
0:0:2
151 SHED1151 161.44.100.162:1536   N   ACT/SESS 327802E   212      160
0:0:5
152 SHED1152 161.44.100.162:1537   N   ACT/SESS 3278S2E   220      166
0:0:4
200 SHED1200 161.44.100.162:1557   N   ACT/SESS 3278S2E   244      184
0:0:2
```

Following is an example of output for the **show extended channel tn3270-server pu** command with the **cluster** keyword for a PU named PU1. In the example below, 1/1a identifies cluster 1 with a layout of 1a, which contains 1 LU of any type.

```
Router#show extended channel 6/2 tn3270-server pu pu1 cluster

name(index)    ip:tcp                 xid     state     link    destination
r-lsap
PU1(1)         172.18.4.18:23      91903315 ACTIVE    dlur    NETA.SHPU1

idle-time    0       keepalive 1800     unbind-act discon   generic-pool
perm
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer
0
bytes 27489 in, 74761 out; frames 1164 in, 884 out; NegRsp 0 in, 0 out
actlus 5, dactlus 0, binds 5
Note: if state is ACT/NA then the client is disconnected

lu    name    client-ip:tcp      nail state      cluster   pool   count
1    SHED1001 161.44.100.162:1538   N   ACT/SESS 1/4s1p  PCPOOL    1/5
51   SHED1051 161.44.100.162:1539   N   ACT/SESS 1/49s1p UNIXPOOL 1/50
151 SHED1151 161.44.100.162:1536   N   ACT/SESS 1/1a    :GENERIC 1/1
152 SHED1152 161.44.100.162:1537   N   ACT/SESS 1/1a    :GENERIC 1/1
200 SHED1200 161.44.100.162:1557   N   ACT/SESS 1/1a     SIMPLE   1/1
```

Note   If the cluster layout is very long, only the first 8 bytes are displayed under the cluster column. The pool called :GENERIC is shown for all LUs that are not allocated to any specific pool name.

Related Commands

allocate lu

show extended channel tn3270-server response-time application

Use the **show extended channel tn3270-server response-time application** privileged EXEC command to display information for application client groups.

> **show extended channel** *slot/virtual channel* **tn3270-server response-time application** [*appl-name* [**detail**]]

Syntax Description

slot	Slot number.
virtual channel	Virtual channel number.
appl-name	Display only the client group corresponding to the VTAM application name.
detail	List client members and their response-time statistics following the client group entry.

Default

This command has no defaults.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2(18)BC.

If optional keywords are not used for the **show extended channel tn3270-server response-time application** command, a complete list of currently existing per-application client groups is displayed along with their collection control parameters. If you specify the *appl-name* keyword, only the client group corresponding to that application is displayed. If you specify the **detail** keyword, the client group entry is followed by a list of its client members and their response-time statistics.

Example

Following is an example of output for the **show extended channel tn3270-server response-time application**:

```
Router#show extended channel 3/2 tn3270-server response-time application MYAPPL
group APPL MYAPPL
  aggregate NO excludeip NO dynamic definite response NO
  sample period multiplier 30
  bucket boundaries 10 20 50 100
```

Related Commands

response-time group
show extended channel tn3270-server response-time global
show extended channel tn3270-server response-time link
show extended channel tn3270-server response-time listen-point
show extended channel tn3270-server response-time subnet

show extended channel tn3270-server response-time global

Use the **show extended channel tn3270-server response-time global** privileged EXEC command to display information about the global client group.

show extended channel *slot/virtual channel* **tn3270-server response-time global**

Syntax Description

slot	Slot number.
virtual channel	Virtual channel number.

Default

This command has no defaults.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2(18)BC.

The **show extended channel tn3270-server response-time global** command displays collection control parameters for the global client group.

Example

Following is an example of output for the **show extended channel tn3270-server response-time global** command:

```
Router# show extended channel 3/2 tn3270-server response-time global
group CLIENT GLOBAL
  aggregate YES excludeip NO dynamic definite response NO
  sample period multiplier 30
  bucket boundaries 10 20 50 100
  buckets 105 118 211 109 104
  average total response time 33 average IP response time 24
  number of transactions 647
```

Related Commands

response-time group
show extended channel tn3270-server response-time application
show extended channel tn3270-server response-time link
show extended channel tn3270-server response-time listen-point
show extended channel tn3270-server response-time subnet

show extended channel tn3270-server response-time link

Use the **show extended channel tn3270-server response-time link** privileged EXEC command to display information about host link client groups.

> **show extended channel** *slot/virtual channel* **tn3270-server response-time link** [*link-name*]

Syntax Description

slot	Slot number.
virtual channel	Port number.
link-name	PU name for a direct PU or link name for a DLUR PU.

Default

This command has no defaults.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2(18)BC.

This command displays information clients groups by host link. If no optional keywords are specified, a complete list of currently existing client groups by host link is displayed along with their collection control parameters and aggregate response-time statistics. If *link-name* is specified, only the client group corresponding to that link is displayed.

Example

Following is an example of the output for the **show extended channel tn3270-server response-time link** command without optional keywords, which shows all current client groups by host link:

```
Router# show extended channel 3/2 tn3270-server response-time link
group DIRECT LINK MYLINK
  aggregate YES excludeip YES dynamic definite response NO
  sample period multiplier 30
  bucket boundaries 10 20 50 100
  buckets 10 18 21 10 10
  average total response time 37 average IP response time 23
  number of transactions 69
group DLUR LINK HISLINK
  aggregate YES excludeip YES dynamic definite response NO
  sample period multiplier 30
  bucket boundaries 10 20 50 100
  buckets 14 31 15 3 1
  average total response time 19 average IP response time 8
  number of transactions 64
```

Following is an example of the output for the **show extended channel tn3270-server response-time link** command for the link named DIRECT LINK MYLINK:

```
Router# show extended channel 3/2 tn3270-server response-time link direct link mylink
group DIRECT LINK MYLINK
  aggregate YES excludeip YES dynamic definite response NO
  sample period multiplier 30
  bucket boundaries 10 20 50 100
  buckets 10 18 21 10 10
  average total response time 37 average IP response time 23
  number of transactions 69
```

Related Commands

response-time group
show extended channel tn3270-server response-time application
show extended channel tn3270-server response-time global
show extended channel tn3270-server response-time listen-point
show extended channel tn3270-server response-time subnet

show extended channel tn3270-server response-time listen-point

Use the **show extended channel tn3270-server response-time listen-point** privileged EXEC command to display information about listen-point client groups.

> **show extended channel** *slot/virtual channel* **tn3270-server listen-point**

Syntax Description

slot	Slot number.
virtual channel	Virtual channel number.

Default

This command has no defaults.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2(18)BC.

The **show extended channel tn3270-server response-time listen-point** command displays information about groups of clients summarized by listen point. A complete list of currently existing listen-point client groups is displayed along with their collection control parameters and aggregate response-time statistics.

Example

Following is an example of the output for the **show extended channel tn3270-server listen-point** command:

```
Router# show extended channel 3/2 tn3270-server response-time listen-point
group LP 10.20.30.40:23
  aggregate YES excludeip NO dynamic definite response NO
  sample period multiplier 30
  bucket boundaries 10 20 50 100
  buckets 10 18 21 10 10
  average total response time 37 average IP response time 23
  number of transactions 69
group LP 50.60.70.80:23
  aggregate YES excludeip NO dynamic definite response NO
  sample period multiplier 30
  bucket boundaries 10 20 50 100
  buckets 310 418 521 510 210
  average total response time 27 average IP response time 20
  number of transactions 1969
```

Related Commands

response-time group
show extended channel tn3270-server response-time application
show extended channel tn3270-server response-time global
show extended channel tn3270-server response-time link
show extended channel tn3270-server response-time subnet

show extended channel tn3270-server response-time subnet

Use the **show extended channel tn3270-server response-time subnet** privileged EXEC command to display information about subnet client groups.

> **show extended channel** *slot/virtual channel* **tn3270 response-time subnet** [*ip-address ip-mask* [**detail**]]

Syntax Description

slot	Slot number.
virtual channel	Virtual channel number.
ip-address	Subnet IP address.
ip-mask	Subnet mask.
detail	Each client group entry is followed by a list of its client members and their respective response-time statistics.

Default

This command has no defaults.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2(18)BC.

This command shows information about client subnet client groups. This includes all configured groups plus the CLIENT SUBNET OTHER group. If no optional parameters are specified, a complete list of client subnet client groups is displayed along with their collection control parameters. If you specify the *ip-address* and *ip-mask*, only client groups containing that subnet are displayed. If you specify the **detail** keyword, each client group entry is followed by a list of its client members and their response-time statistics.

Example

Following is an example of the output for all configured client groups using the **show extended channel tn3270-server response-time subnet** command:

```
Router# show extended channel 3/2 tn3270-server response-time subnet
group SUBNETGROUP1
  subnet 10.10.10.0 255.255.255.192
  aggregate NO excludeip NO dynamic definite response NO
  sample period multiplier 30
  bucket boundaries 10 20 50 100
group SUBNETGROUP2
  subnet 10.10.10.128 255.255.255.192
  subnet 10.10.10.192 255.255.255.192
  aggregate NO exclude ip NO dynamic definite response NO
  sample period multiplier 40
  bucket boundaries 20 30 60 120
group CLIENT SUBNET OTHER
  aggregate NO exclude ip NO dynamic definite response NO
  sample period multiplier 30
  bucket boundaries 10 20 50 100

Router# show extended channel 3/2 tn3270-server response-time subnet
10.10.10.0 255.255.255.192 detail

group SUBNETGROUP1
  subnet 10.10.10.0 255.255.255.192
  aggregate NO excludeip NO dynamic definite response NO
  sample period multiplier 30
  bucket boundaries 10 20 50 100
  client 10.10.10.129:23
    buckets 5 8 11 9 4
    average total response time 33 average IP response time 24
    number of transactions 37
  client 10.10.10.130:23
    buckets 6 9 10 10 2
    average total response time 32 average IP response time 25
    number of transactions 37
  client 10.10.10.131:23
    buckets 11 14 10 8 7
    average total response time 27 average IP response time 19
    number of transactions 50
```

Related Commands

response-time group
show extended channel tn3270-server response-time application
show extended channel tn3270-server response-time global
show extended channel tn3270-server response-time link
show extended channel tn3270-server response-time listen-point