



PA-MC-2T3+ Phase-II (T3 subrate)

This feature module describes the availability of clear channel (T3 subrate) on the Two-Port Enhanced Multichannel T3+ Port Adapter (PA-MC-2T3+). It includes information on the benefits of this new feature, supported platforms, configuration examples, and a command reference.

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Feature Overview

The PA-MC-2T3+ is a single-width port adapter that provides two T3 interface connections. Each T3 interface can now be independently configured to be either channelized or unchannelized. A channelized T3 provides 28 T1 lines multiplexed into the T3. Each T1 line can be configured into one or more serial interface data channels.

Using the **no channelized** command, you can configure the T3 as a single, unchannelized serial interface data channel. You can configure this data channel to use all of the T3 bandwidth or a portion of it.

Benefits

The PA-MC-2T3+ now provides the following benefits:

- Two T3 ports each with integrated CSU/DSUs
- Two T3 ports on one single-wide port adapter
- Up to 256 logical, T1 Nx56K and Nx64K channels
- 28 T1 ports multiplexed into a single T3 connection
- Channelized T1, fractional T1, and full-rate T1 support

- Subrate and full rate T3 support
- Line and payload loopback capabilities
- Full bit error rate testing on any T1 or any unchannelized T3
- DSX-3 level interface
- Full duplex and connectivity at DS3 rate (44.736 Mbps)
- T3 Scrambling and subrate can be independently or simultaneously enabled in each DSU mode
- C-bit or M13 framing
- B3ZS line coding
- DS3 FEAC channel support
- Support for Frame Relay, PPP, HDLC, SMDS DXI, and X.25

Restrictions

The PA-MC-T3+ does not support the following:

- More than 128 channels per T3
- Use of unused channels of one T3 by the other T3

Related Features and Technologies

- PA-MC-T3
- PA-2T3+
- PA-MC-2T3+ Phase I

Related Documents

PA-MC-2T3+ Multichannel T3 Port Adapter Installation and Configuration

Supported Platforms

- Cisco 7200 series
- Cisco 7500 series

Supported Standards, MIBs, and RFCs

Standards

- ANSI T1.107
- ANSI T1.102
- ANSI T1.403

- ANSI T1.404
- AT&T 62411
- AT&T 54016
- AT&T 54014
- FCC Part 68
- AT&T TR-NWO-00499
- UL1950 3rd Edition/CSA C22.2, No. 950
- FCC Part 15, Class A

MIBs

No new or modified MIBs are supported by this feature.

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB web site on Cisco Connection Online (CCO) at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

RFCs

- RFC 1406, *Definitions of Managed Objects for the DS1 and E1 Interface Types*
- RFC 1407, *Definitions of Managed Objects for the DS3/E3 Interface Type*

Configuration Tasks


See the following sections for configuration tasks for the T3 subrate feature. Each task in the list is identified as either optional or required.

- Configuring the T3 Controller (Required)
- Configuring the Serial Interface (Required)
- Verifying the Configuration (Optional)

Configuring the T3 Controller

	Command	Purpose
Step 1	<pre>Router(config)# controller T3 interface-processor-slot/port-adapter-slot/T3-port Cisco 7500 series routers Router(config)# controller T3 chassis-slot/T3-port Cisco 7200 series routers</pre>	Select the T3 controller you want to configure.
Step 2	<pre>Router(config-controller)# no channelized</pre> <p>Change to subrate mode will cause cbus complex reset. Proceed? [yes/no]: Y</p>	<p>Configures unchannelized mode for the T3 controller.</p> <p>When the PA-MC-2T3+ is configured for unchannelized T3 mode, the default MTU size is set to 4470 for compatibility with other T3 equipment and port adapters.</p> <p>The change in MTU sizes will cause a memory recarve and CBus complex to occur, disrupting all traffic on the router for several minutes. (This occurs only on Cisco 7500 series routers.)</p> <p>Type Y for “yes” at the end of the warning. At the prompt, type ^Z to exit. You will exit configuration mode, and enter unchannelized mode.</p>

Command	Purpose
Step 3 Router(config-controller)# bert <i>pattern</i> <i>pattern</i> <i>interval</i> <i>time</i>	Sends a BERT pattern on the T3 line to test cable and signal problems in the field. <ul style="list-style-type: none"> • <i>pattern</i>: <ul style="list-style-type: none"> – 0s, repetitive test pattern of all zeros (00000) – 1s, repetitive test pattern of all ones (11111) – 2¹⁵, pseudorandom O.151 test pattern (32.768 bits long) – 2²⁰, pseudorandom O.151 test pattern (1.046,575 bits long) – 2²³, pseudorandom O.151 test pattern (8,388,607 bits long) – alt-0-1, repetitive alternating test pattern of zeros (0s) and ones (1s), (01010101) • <i>time</i>—1–14400 minutes

Command	Purpose
<p>Step 4</p> <pre>Router(config-controller)# mdl {transmit {path idle-signal test-signal} string {eic lic fic unit pfi port generator} string}</pre>	<p>Configures Maintenance Data Link (MDL) messages on the PA-MC-2T3+.</p> <hr/> <p> Note MDL messages are only supported when the T3 framing is set for c-bit.</p> <hr/> <ul style="list-style-type: none"> • transmit path—enables transmission of the MDL path message • transmit idle-signal—enables transmission of the MDL idle-signal message • eic—equipment identification code (up to 10 characters) • lic—location identification code (up to 11 characters) • fic—frame identification code (up to 10 characters) • unit—unit identification code (up to 6 characters) • pfi—facility identification code to send in the MDL path message (up to 38 characters) • port—equipment port, which initiates the idle signal, to send in the MDL idle signal message (up to 38 characters) • generator—generator number to send in the MDL test signal message (up to 38 characters) <p>Use the no form of this command to remove MDL messages. The default is that no MDL message is configured.</p>

Configuring the Serial Interface

	Command	Purpose
Step 1	Cisco 7500 series routers: <pre>Router# configuration terminal Router(config)# interface serial interface-processor-slot/port-adapter-slot/T3-port</pre> or Cisco 7200 series routers: <pre>Router# configuration terminal Router(config)# controller T3 chassis-slot/T3-port</pre>	Enables interface configuration mode and selects a serial interface to configure.
Step 2	<pre>Router(config-if)# framing {c-bit m13}</pre>	Specifies the T3 framing on the serial interface. <ul style="list-style-type: none"> • c-bit—C-bit parity DS3 framing • m13—M13 Multiplex DS3 framing The default is C-bit framing.
Step 3	<pre>Router(config-if)# cablelength feet</pre>	Specifies the cable length. <ul style="list-style-type: none"> • <i>feet</i>—a numeral from 0 to 450
Step 4	<pre>Router(config-if)# clock source {line internal}</pre>	Sets the clock source for the selected T3 interface. <ul style="list-style-type: none"> • line—selects a network clock source • internal—selects an internal clock source
Step 5	<pre>Router(config-if)# dsu mode [0 1 2 3 4]</pre>	Configures the PA-MC-2T3+ to emulate a proprietary DSU subrate scheme. <ul style="list-style-type: none"> • 0—Digital Link or Cisco—300-44210 Kbps • 1—ADC Kentrox T3/E3 IDSU—1500-35000, 44210 Kbps • 2—Larscom Access T45—3100-44210 Kbps • 3—Adtran T3SU 300—75-44210 Kbps • 4—Verilink HDM 2182—1500-44210 Kbps Default is 0 .
Step 6	<pre>Router(config-if)# dsu bandwidth bandwidth</pre>	Configures the bandwidth for an unchannelized subrate T3 interface. <ul style="list-style-type: none"> • <i>bandwidth</i>—a numeric value between 1 and 44210 The default bandwidth is 44210.

Verifying the Configuration

After configuring a new T3 controller, you can verify the configuration by using **show** commands. To display the status of any a new T3 controller or newly configured interface, complete any of the following tasks in EXEC mode:

- Step 1** Display the status of the T3 controller on a Cisco 7200 series router using the **show controllers t3 port-adapter/t3-port [brief | tabular]** command.

or

Display the status of the T3 controller on a Cisco 7500 series router using the **show controllers t3 slot/port-adapter/t3-port [brief | tabular]** command:

```
Router# show controllers t3 0/1/0 brief
T3 0/1/0 is up. Hardware is 2CT3+ single wide port adapter
  CT3 H/W Version: 0.1.1, CT3 ROM Version: 0.95, CT3 F/W Version: 2.4.0
  FREEDM version: 1, reset 0
  Applique type is Subrate T3
  No alarms detected.
  MDL transmission is disabled

  FEAC code received: No code is being received
  Framing is C-BIT Parity, Line Code is B3ZS, Clock Source is Line
  Rx throttle total 0, equipment customer loopback

Router# show controllers t3 0/1/0 tabular
T3 0/1/0 is up. Hardware is 2CT3+ single wide port adapter
  CT3 H/W Version: 0.1.1, CT3 ROM Version: 0.95, CT3 F/W Version: 2.4.0
  FREEDM version: 1, reset 0
  Applique type is Subrate T3
  No alarms detected.
  MDL transmission is disabled

  FEAC code received: No code is being received
  Framing is C-BIT Parity, Line Code is B3ZS, Clock Source is Line
  Rx throttle total 0, equipment customer loopback
INTERVAL      LCV  PCV  CCV  PES  PSES  SEFS  UAS  LES  CES  CSES
06:17-06:24   0    0    0    0    0    0    1    0    0    0
06:02-06:17   4    2    1    1    0    0    1    0    0    0
05:47-06:02   0    0    0    0    0    0    0    0    0    0
05:32-05:47   0    0    0    0    0    0    0    0    0    0
05:17-05:32   0    0    0    0    0    0    0    0    0    0
05:02-05:17   0    0    0    0    0    0    0    0    0    0
04:47-05:02   0    0    0    0    0    0    0    0    0    0
04:32-04:47   0    0    0    0    0    0    0    0    0    0
04:17-04:32   0    0    0    0    0    0    0    0    0    0
04:02-04:17   0    0    0    0    0    0    0    0    0    0
03:47-04:02   0    0    0    0    0    0    0    0    0    0
03:32-03:47   0    0    0    0    0    0    0    0    0    0
03:17-03:32   0    0    0    0    0    0    0    0    0    0
[additional command output omitted]
```


- Step 2** Display statistics about the serial interface for a specific T3 line on a Cisco 7500 series router using the **show interfaces serial slot/port-adapter/t3-port** command:

```
Router# show interfaces serial 1/0/0
Serial1/0/0 is up, line protocol is up
  Hardware is cyBus 2CT3+ Serial
  MTU 4470 bytes, BW 44210 Kbit, DLY 200 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, crc 16, loopback not set
  Keepalive set (10 sec)
  Last input 00:00:09, output 00:00:07, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 4 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    4 packets input, 402 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
      0 parity
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 1 abort
    5 packets output, 1008 bytes, 0 underruns
    0 output errors, 0 applique, 1 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
  DSU mode 0, bandwidth 44210, scramble 0
```

or

- Use the **show interfaces serial port-adapter/t3-port** command to display statistics about the serial interface for a specific T3 line on a Cisco 7200 series router:

```
Router# show interfaces serial 5/0
Serial5/0 is up, line protocol is down
  Hardware is PA-MC-2T3+
  MTU 4470 bytes, BW 44210 Kbit, DLY 200 usec,
    reliability 128/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, crc 16, loopback not set
  Keepalive set (10 sec)
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
      0 parity
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    5823 packets output, 140669 bytes, 0 underruns
    0 output errors, 0 applique, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    1 carrier transitions
  DSU mode 0, bandwidth 44210, scramble 0
```

Troubleshooting Tips

Set loopbacks to troubleshoot the PA-MC-2T3+.

Setting Loopbacks

You can configure the T3 controller for loopback modes using the serial interface **loopback** command. The default is no loopback. The three main loopback modes are: local, network, and remote. The T3 local loopback simultaneously loops the T3 port toward the router and loops the T3 link back toward the network.

The T3 network loopback loops the T3 line or payload back toward the network. A T3 remote loopback loops the T3 line at the remote end. Use T3 loopbacks to diagnose problems with cables between the port adapter and the central switching office at the T3 line level. You can also use the loopback modes with bit error rate (BER) tests.

To set a loopback on the T3 controller or T3 lines, perform the following optional tasks beginning in global configuration mode:

	Task	Command
Step 1	Select the T3 serial interface and enter interface configuration mode.	Router (config)# interface serial <i>slot/port-adapter/port</i> (Cisco 7500 series and Cisco 7000 series routers with RSP) Router (config)# interface serial <i>slot/port</i> (Cisco 7200 series)
Step 2	Set a loopback on the T3 controller.	Router (config-controller)# loopback { local network remote }

Monitoring and Maintaining the PA-MC-2T3+

Command	Purpose
Cisco 7500 series routers: Router# show controllers T3 <i>slot/port-adapter/t3-port</i> Cisco 7200 series routers: Router# show controllers T3 <i>slot/t3-port</i>	Displays the configuration, including the results of BER tests, for a specified T3 controller.
Cisco 7500 series routers: Router# show interface serial <i>slot/port-adapter/t3-port</i> Cisco 7200 series routers: Router# show interface serial <i>slot/t3-port</i>	Displays the interface configuration of a specified serial interface.

Configuration Examples

This section provides the following configuration examples:

- Configuring a T3 Controller
- Configuring a Full-Rate T3 Interface
- Configuring a Subrate T3 Interface

Configuring a T3 Controller

The following example configures the T3 controller of a PA-MC-2T3+ on a VIP2 or VIP4 in interface processor slot 1 on a Cisco 7500 series router:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller T3 1/0/0
Router(config-controller)# no channelized

Change to subrate mode will cause cbus complex reset. Proceed? [yes/no]:Y
Router(config-controller)# exit
Router(config)# interface serial 1/0/0
Router(config-if)# framing c-bit
Router(config-if)# cablelength 40
Router(config-if)# clock source line
Router(config-if)# mdl transmit path
```

The following example configures the T3 controller of a PA-MC-2T3+ in slot 1 of a Cisco 7200 series router:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# controller T3 1/0
Router(config-controller)# no channelized
Router(config-controller)# exit
Router(config)# interface serial 1/0/0
Router(config-if)# framing c-bit
Router(config-if)# cablelength 40
Router(config-if)# clock source line
Router(config-if)# mdl transmit path
```

Configuring a Full-Rate T3 Interface

The following example configures a full-rate T3 interface on a Cisco 7500 series router by using the **no channelized** command:

```
Router(config)# controller t3 2/0/0
Router(config-controller)# no channelized
Change to subrate mode will cause cbus complex reset. Proceed? [yes/no]: Y
Router(config-controller)# exit
Router(config)# interface serial 2/0/0
Router(config-if)# encapsulation ppp
Router(config-if)# ip address 10.10.10.10 255.255.255.255
Router(config-if)# no shutdown
```

Configuring a Subrate T3 Interface

In order to configure a subrate T3 interface, you must first configure the interface as a full-rate T3 using the **no channelized** configuration controller command. After the full-rate T3 interface is configured, use the **dsu bandwidth** command to create a subrate T3 interface. The following example configures a subrate T3 interface on a Cisco 7200 series router:

```
Router(config)# controller t3 2/0
Router(config-controller)# no channelized
Router(config-controller)# exit
Router(config)# interface serial 2/0
Router(config-if)# dsu bandwidth 16000
Router(config-if)# encapsulation frame-relay
Router(config-if)# ip address 10.10.10.10 255.255.255.255
Router(config-if)# no shutdown
```

Command Reference

This section documents the new command that configures the clear channel T3 subrate feature.

no channelized

To configure the T3 controller for unchannelized mode, use the **no channelized** configuration controller command. To configure channelized mode, use the **channelized** form of this command.

channelized

no channelized

Syntax Description This command has no arguments or keywords.

Defaults MTU size is set to 4470.

Command Modes Configuration controller

Release	Modification
12.0(14)S	This command was introduced.

Usage Guidelines Use the **no channelized** configuration controller command to configure the T3 controller for unchannelized mode. When you configure the PA-MC-2T3+ on a Cisco 7500 series router with the **no channelized** command, the MTU size is set to 4470. In channelized mode, the default MTU size is 1500. The change in MTU sizes will cause a memory recarve and CBus complex to occur, disrupting all traffic on the router for several minutes.

The following message will be displayed when switching between channelized and unchannelized modes on a Cisco 7500 series router:

```
Change to subrate mode will cause cbus complex reset. Proceed? [yes/no]: Y
```

Type **Y** for “yes” at the end of the warning. At the prompt, type **^Z** to exit. You will exit configuration mode and enter unchannelized mode.

Examples The following example configures unchannelized mode on a PA-MC-2T3+ in port adapter slot 1 of a VIP2 or VIP4 in a Cisco 7500 series router:

```
configure terminal
  controller T3 1/1/0
  no channelized
  Change to subrate mode will cause cbus complex reset. Proceed? [yes/no]: Y
  ^Z
```

■ no channelized