



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.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the [“Feature Information for PA-MC-2T3+ Phase-II \(T3 subrate\)”](#) section on page 13.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.

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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 n x 56K and n x 64K 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-2T3+ 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

Supported Platforms

- Cisco 7200 series
- Cisco 7500 series

Determining Platform Support Through Cisco Feature Navigator

Cisco IOS software is packaged in feature sets that are supported on specific platforms. To get updated information regarding platform support for this feature, access Cisco Feature Navigator. Cisco Feature Navigator dynamically updates the list of supported platforms as new platform support is added for the feature.

Cisco Feature Navigator is a web-based tool that enables you to determine which Cisco IOS software images support a specific set of features and which features are supported in a specific Cisco IOS image. You can search by feature or release. Under the release section, you can compare releases side by side to display both the features unique to each software release and the features in common.

To access Cisco Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

<http://www.cisco.com/register>

Cisco Feature Navigator is updated regularly when major Cisco IOS software releases and technology releases occur. For the most current information, go to the Cisco Feature Navigator home page at the following URL:

<http://www.cisco.com/go/fn>

Availability of Cisco IOS Software Images

Platform support for particular Cisco IOS software releases is dependent on the availability of the software images for those platforms. Software images for some platforms may be deferred, delayed, or changed without prior notice. For updated information about platform support and availability of software images for each Cisco IOS software release, refer to the online release notes or, if supported, Cisco Feature Navigator.

Supported Standards, MIBs, and RFCs

Standards

- ANSI T1.102
- ANSI T1.107
- ANSI T1.403
- ANSI T1.404
- AT&T 62411
- AT&T 54016
- AT&T 54014
- AT&T TR-NWO-00499
- FCC Part 68

- FCC Part 15, Class A
- UL1950 3rd Edition/CSA C22.2, No. 950

MIBs

No new or modified MIBs are supported by this feature.

To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:

<http://tools.cisco.com/ITDIT/MIBS/servlet/index>

If Cisco MIB Locator does not support the MIB information that you need, you can also obtain a list of supported MIBs and download MIBs from the Cisco MIBs page at the following URL:

<http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>

To access Cisco MIB Locator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

<http://www.cisco.com/register>

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 required or optional.

- [Configuring the T3 Controller](#) (required)
- [Configuring the Serial Interface](#) (required)
- [Verifying the Configuration](#) (optional)

Configuring the T3 Controller

	Command	Purpose
Step 1	<pre>Cisco 7200 series routers Router(config)# controller T3 chassis-slot/T3-port Cisco 7500 series routers Router(config)# controller T3 interface-processor-slot/port-adapter-slot/T3-port</pre>	Select the T3 controller you want to configure.
Step 2	<pre>Router(config-controller)# no channelized Change to subrate mode will cause cbus complex reset. Proceed? [yes/no]: Y</pre>	<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 pattern <i>pattern</i> interval <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 0.151 test pattern (32,768 bits long) – 2²⁰, pseudorandom 0.151 test pattern (1,046,575 bits long) – 2²³, pseudorandom 0.151 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
Step 4 Router(config-controller)# mdl { transmit { path idle-signal test-signal } string { eic lic fic unit pfi port generator } string }	<p data-bbox="950 264 1511 323">Configures Maintenance Data Link (MDL) messages on the PA-MC-2T3+.</p> <p data-bbox="950 344 1511 457">  Note MDL messages are only supported when the T3 framing is set for C-bit. </p> <ul data-bbox="961 489 1503 1192" 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 data-bbox="950 1213 1503 1304">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 7200 series routers: <pre>Router# configuration terminal Router(config)# controller T3 chassis-slot/T3-port</pre> or Cisco 7500 series routers: <pre>Router# configuration terminal Router(config)# interface serial interface-processor-slot/port-adapter-slot/T3-port</pre>	Enables interface configuration mode and selects a serial interface to configure.
Step 2	Router(config-if)# framing { c-bit m13 }	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	Router(config-if)# cablelength <i>feet</i>	Specifies the cable length. <ul style="list-style-type: none"> <i>feet</i>—A numeral from 0 to 450
Step 4	Router(config-if)# clock source { line internal }	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	Router(config-if)# dsu mode [0 1 2 3 4]	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	Router(config-if)# dsu bandwidth <i>bandwidth</i>	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    1    0    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]
```

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

```

or

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

```

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:

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

Monitoring and Maintaining the PA-MC-2T3+

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

Configuration Examples

This section provides the following configuration examples:

- [Configuring a T3 Controller Example](#)
- [Configuring a Full-Rate T3 Interface Example](#)
- [Configuring a Subrate T3 Interface Example](#)

Configuring a T3 Controller Example

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
```

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
```

Configuring a Full-Rate T3 Interface Example

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 Example

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
```

Feature Information for PA-MC-2T3+ Phase-II (T3 subrate)

Table 1 lists the release history for this feature.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.



Note

Table 1 lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 1 Feature Information for <Phrase Based on Module Title>

Feature Name	Releases	Feature Information
PA-MC-2T3+ Phase-II (T3 subrate)	12.1(5a)E	This feature module describes the availability of clear channel (T3 subrate) on the two-port enhanced multichannel T3 port adapter (PA-MC-2T3+)
	12.2(13)T	This feature was integrated into Cisco IOS Release 12.2(13)T.
	12.2(14)S	This feature was integrated into Cisco IOS Release 12.2(14)S.

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