



TCP MSS Adjustment

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The TCP MSS Adjustment feature enables the configuration of the maximum segment size (MSS) for transient packets that traverse a router, specifically TCP segments in the SYN bit set, when PPP over Ethernet (PPPoE) is being used in the network. PPPoE truncates the Ethernet maximum transmission unit (MTU) 1492, and if the effective MTU on the hosts (PCs) is not changed, the router in between the host and the server can terminate the TCP sessions. The **ip tcp adjust-mss** command specifies the MSS value on the intermediate router of the SYN packets to avoid truncation.

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the “[Feature Information for TCP MSS Adjustment](#)” section on page 9.

Finding Support Information for Platforms and Cisco IOS and Catalyst OS Software Images

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Contents

- [How to Configure TCP MSS Adjustment, page 2](#)
- [Configuration Examples for TCP MSS Adjustment, page 5](#)
- [Additional References, page 5](#)
- [Command Reference, page 6](#)
- [Feature Information for TCP MSS Adjustment, page 9](#)



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How to Configure TCP MSS Adjustment

This section contains the following procedures:

- [Setting the MTU on the Local Hosts, page 2](#) (required)
- [Verifying TCP MSS Adjustments, page 3](#) (optional)

Setting the MTU on the Local Hosts

Perform this task to set the MTU on the local hosts. Network Address Translation (NAT) does not have to be configured to specify the MTU.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ip tcp adjust-mss** *max-segment-size*
5. **ip mtu** *bytes*
6. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	interface <i>type number</i> Example: Router(config)# interface ethernet0/1	Configures an interface type and enters interface configuration mode.
Step 4	ip tcp adjust-mss <i>max-segment-size</i> Example: Router(config-if)# ip tcp adjust-mss 1452	Adjusts the MSS value of TCP SYN packets going through a router. The <i>max-segment-size</i> argument is the maximum segment size, in bytes. The range is from 500 to 1460.

	Command or Action	Purpose
Step 5	<code>ip mtu bytes</code> Example: Router(config-if) ip mtu 1491	Sets the MTU size of IP packets, in bytes, sent on an interface.
Step 6	<code>end</code> Example: Router(config-if) end	Exits to global configuration mode.

Verifying TCP MSS Adjustments

In the following examples, there are outputs that assist in verifying the TCP MSS adjustments.

Command Configured on Single Interface

Step 1 Configure the interface adjustment value.

```
interface ethernet1/1
 ip tcp adjust 500
```

Step 2 Telnet from router A to router C, with B having the MSS adjustment configured.

```
telnet
00:09:15:%SYS-5-CONFIG I: Configured from console by consolenet 10.0.1.3
Trying 10.0.1.3... Open
```

Step 3 Observe the debug output from router C.

```
*Mar 10 14:49:45.045: tcp0: I LISTEN 172.16.0.1:11001 10.0.1.3:23 seq 2012812244
      OPTS 4 SYN WIN 4128
*Mar 10 14:49:45.045: TCP0: state was LISTEN -> SYNRCVD [23 -> 172.16.0.1(11001)]
*Mar 10 14:49:45.045: TCP0: Connection to 172.16.0.1:11001, received MSS 500,
MSS is 500
*Mar 10 14:49:45.045: TCP: sending SYN, seq 1091096877, ack 2012812245
```

The MSS gets adjusted to 500 as configured.

Command Configured on Two Interfaces

Step 1 Configure the command on both the interfaces using different values.

```
interface Ethernet1/1
 ip address 172.17.0.2 255.0.0.0
 ip tcp adjust-mss 505
 duplex half

interface Ethernet1/3
 ip address 172.18.1.1 255.255.255.0
 ip tcp adjust-mss 500
 duplex half
```

Step 2 Telnet from router A to router C.

```
telnet 10.0.1.3
Trying 10.0.1.3... Open
```

Step 3 Observe the debug output from router A.

```
06:06:49: TCP: sending SYN, seq 979045471, ack 0
06:06:49: TCP0: Connection to 10.0.1.3:23, advertising MSS 536
```

Step 4 Observe the debug output from router C.

```
I LISTEN 172.16.0.1:11003 10.0.1.3:23 seq 979045471
OPTS 4 SYN WIN 4128
TCP0: state was LISTEN -> SYNRCVD [23 -> 172.16.0.1(11003)]
TCP0: Connection to 172.16.0.1:11003, received MSS 500, MSS is 500
```

The TCP MSS is successfully adjusted to 500.

Command Used with Process Switching**Step 1** Verify the configuration of the TCP MSS adjustment.

```
Router# show running-config interface ethernet1/1

Building configuration...

Current configuration: 95 bytes
!
interface ethernet1/1
 ip address 10.0.0.2 255.0.0.0
 ip tcp adjust-mss 505
 duplex half
```

Step 2 Telnet from router A to router C.

```
telnet 10.0.1.3
Trying 10.0.1.3...
TCP: sending SYN, seq 886170752, ack 0
TCP0: Connection to 10.0.1.3:23, advertising MSS 536
tcp0: O CLOSED 10.0.1.3:23 172.16.0.1:11008 seq 886170752
OPTS 4 SYN WIN 4128
```

Step 3 Observe the debug output on router C.

```
tcp0: I LISTEN 172.16.0.1:11008 10.0.1.3:23 seq 886170752
OPTS 4 SYN WIN 4128
TCP0: state was LISTEN -> SYNRCVD [23 -> 172.16.0.1(11008)]
TCP0: Connection to 172.16.0.1:11008, received MSS 505, MSS is 505
```

The TCP MSS value gets adjusted to the configured value of 505.

Configuration Examples for TCP MSS Adjustment

This section provides the following example:

- [TCP MSS Adjustment Configuration: Example, page 5](#)

TCP MSS Adjustment Configuration: Example

The following example shows how to configure one interface with CEF switching turned on:

```
interface ethernet1/1
 ip tcp adjust 500
```

The following example shows how to configure two interfaces:

```
interface ethernet1/1
 ip address 10.0.0.2 255.0.0.0
 ip tcp adjust-mss 505
 duplex half

interface ethernet1/3
 ip address 10.0.1.1 255.255.255.0
 ip tcp adjust-mss 500
 duplex half
```

Additional References

The following sections provide references related to TCP MSS Adjustment.

Related Documents

Related Topic	Document Title
WAN commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	Cisco IOS Wide-Area Networking Command Reference , Release 12.2SR
TCp configuration information: Configuring TCP Performance Parameters, TCP Window Scaling, TCP Congestion Avoidance, TCP Explicit Congestion Notification	TCP section of the Cisco IOS IP Application Services Configuration Guide , Release 12.4.

Standards

Standards	Title
None	—

MIBs

MIBs	MIBs Link
None	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFCs	Title
None	—

Technical Assistance

Description	Link
The Cisco Technical Support & Documentation website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport

Command Reference

This section documents one modified command only.

- [ip tcp adjust-mss](#)

ip tcp adjust-mss

To adjust the maximum segment size (MSS) value of TCP SYN packets going through a router, use the **ip tcp adjust-mss** command in interface configuration mode. To return the MSS value to the default setting, use the **no** form of this command.

ip tcp adjust-mss *max-segment-size*

no ip tcp adjust-mss *max-segment-size*

Syntax Description	<i>max-segment-size</i>	Maximum segment size, in bytes. The range is from 500 to 1460.
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Command Default	The MSS is determined by the originating host.
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Command Modes	Interface configuration
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Command History	Release	Modification
	12.2(4)T	This command was introduced.
	12.2(8)T	This command was changed from ip adjust-mss to ip tcp adjust-mss .
	12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
	12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines	<p>When a host (usually a PC) initiates a TCP session with a server, it negotiates the IP segment size by using the MSS option field in the TCP SYN packet. The value of the MSS field is determined by the maximum transmission unit (MTU) configuration on the host. The default MSS value for a PC is 1500 bytes.</p>
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The PPP over Ethernet (PPPoE) standard supports a MTU of only 1492 bytes. The disparity between the host and PPPoE MTU size can cause the router in between the host and the server to drop 1500-byte packets and terminate TCP sessions over the PPPoE network. Even if the path MTU (which detects the correct MTU across the path) is enabled on the host, sessions may be dropped because system administrators sometimes disable the ICMP error messages that must be relayed from the host in order for path MTU to work.

The **ip tcp adjust-mss** command helps prevent TCP sessions from being dropped by adjusting the MSS value of the TCP SYN packets.

The **ip tcp adjust-mss** command is effective only for TCP connections passing through the router.

In most cases, the optimum value for the *max-segment-size* argument is 1452 bytes. This value plus the 20-byte IP header, the 20-byte TCP header, and the 8-byte PPPoE header add up to a 1500-byte packet that matches the MTU size for the Ethernet link.

If you are configuring the **ip mtu** command on the same interface as the **ip tcp adjust-mss** command, it is recommended that you use the following commands and values:

- **ip tcp adjust-mss 1452**
- **ip mtu 1492**

Examples

The following example shows the configuration of a PPPoE client with the MSS value set to 1452:

```

vpdn enable
no vpdn logging
!
vpdn-group 1
request-dialin
protocol pppoe
!
interface Ethernet0
 ip address 192.168.100.1.255.255.255.0
 ip tcp adjust-mss 1452
 ip nat inside
!
interface ATM0
 no ip address
 no atm ilmi-keepalive
 pvc 8/35
  pppoe client dial-pool-number 1
!
dsl equipment-type CPE
dsl operating-mode GSHDSL symmetric annex B
dsl linerate AUTO
!
interface Dialer1
 ip address negotiated
 ip mtu 1492
 ip nat outside
 encapsulation ppp
 dialer pool 1
 dialer-group 1
 ppp authentication pap callin
 ppp pap sent-username sohodyn password 7 141B1309000528
!
 ip nat inside source list 101 Dialer1 overload
 ip route 0.0.0.0.0.0.0.0 Dialer1
 access-list permit ip 192.168.100.0.0.0.0.255 any

```

Related Commands

Command	Description
ip mtu	Sets the MTU size of IP packets sent on an interface.

Feature Information for TCP MSS Adjustment

Table 1 lists the release history for this feature.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

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Note

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

Table 1 Feature Information for TCP MSS Adjustment

Feature Name	Releases	Feature Information
TCP MSS Adjustment	12.2(4)T 12.2(8)T 12.2(28)SB 12.2(33)SRA	<p>The TCP MSS Adjustment feature enables the configuration of the maximum segment size (MSS) for transient packets that traverse a router, specifically TCP segments in the SYN bit set, when PPP over Ethernet (PPPoE) is being used in the network.</p> <p>In 12.2(4)T, this feature was introduced.</p> <p>In 12.2(8)T, the command that was introduced by this feature was changed from ip adjust-mss to ip tcp adjust-mss.</p> <p>In 12.2(28)SB and 12.2(33)SRA, this feature was enhanced to be configurable on subinterfaces.</p>

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