

X.3 PAD Parameters

A PAD is a packet assembler/disassembler, which is a device that collects data from a group of terminals and periodically outputs the data in packets (data organized in a special format). A PAD also does the reverse. That is, it can take data packets from a host and return them into a character stream that can be transmitted to the terminals. A PAD is defined by ITU-T Recommendations X.3, X.28, and X.29.

Note The ITU-T carries out the functions of the former Consultative Committee for International Telegraph and Telephone (CCITT).

ITU-T Recommendation X.3 specifies the parameters for terminal-handling functions such as baud rate, flow control, character echoing, and other functions, for a connection to an X.25 host. The X.3 parameters are similar in function to the Telnet options.

ITU-T Recommendation X.29 specifies a protocol for setting the X.3 parameters via a network connection. When a connection is established, the destination host can request that the PAD or terminal change its parameters using the X.29 protocol. A PAD can refuse to do this, in which case a terminal user can change the parameter later. A PAD cannot tell the destination host to change its X.3 parameters, but it can communicate that its own parameters were changed.

Along with Recommendations X.3 and X.29, the ITU-T also provides Recommendation X.28 to specify the user interface for locally controlling a PAD; however, the communication server is not a PAD and this recommendation is not supported.

This appendix discusses the X.3 PAD parameters. The chapter “Configuring the Cisco PAD Facility for X.25 Connections” in the *Dial Solutions Configuration Guide* explains how to make PAD connections and how to switch between connections.

X.3 PAD Parameters

Following are descriptions of the X.3 parameters. Default values are noted in the descriptions. The default value for any parameter not so noted is zero for outgoing connections or not set for incoming PAD connections. For incoming PAD connections, the communication server sends an X.29 SET PARAMETER packet to set the noted defaults.

Since the X.3 parameters describe the user’s terminal, which exists on only one side of the connection, the PAD protocols are not always symmetric.

Some of the commands described in this section require ASCII decimal values.

Parameter 1: Escape from Data Transfer

Parameter 1 determines whether or not the communication server will be allowed to escape from data transfer mode in order to send PAD command signals. Because the EXEC mode uses a two-character escape sequence, and there is no way to set the escape character on a Telnet connection, this parameter is refused on translation sessions.

Cisco's legacy PAD mode does not support this parameter. However, Cisco's X.28 standard user interface does support this parameter.

Parameter 2: Local Echo Mode

Parameter 2 determines whether or not PAD is required to perform local echo of characters. This parameter can be negotiated end-to-end on translation sessions. On incoming PAD connections, software turns local echo off on the remote PAD to support the Cisco- user interface. See Table 132 for local echo mode values and their descriptions.

Table 132 PAD Local Echo Mode Values

Value	Description
0	No local echo (incoming PAD connection default).
1	Local echo on (outgoing connection default).

Parameter 3: Data Forward Character

Parameter 3 sets up a packet forwarding mask; that is, it selects which character causes PAD to forward a packet either before expiration of the Idle Timer (see parameter 4) or when in local editing mode. See Table 133 for data forward character values and their descriptions.

Table 133 PAD Data Forward Character Values

Value	Description
0	None—full packet.
1	Forward packet upon receipt of an alphanumeric character.
2	Forward packet upon receipt of a RETURN (outgoing connection default).
4	Forward packet upon receipt of ESCAPE, BEL, ENQ, or ACK.
8	Forward packet upon receipt of DEL, CAN, OR DC2.
16	Forward packet upon receipt of ETX or EOT.
32	Forward packet upon receipt of HT, LT, VT, or FF.
64	All other characters in columns 0 and 1 of the ASCII chart not included above.

As X.3 supports a wider variety of dispatch characters than Telnet does, parameter changes to or from the default causes a translation session to negotiate in or out of line mode on the Telnet connection.

A forwarding mask can be statically set using the **terminal dispatch-character terminal parameter-setting EXEC** command. This command can set any character or characters as the forwarding mask, and overrides (when logical) any values set by parameter 3.

Parameter 4: Idle Timer

Parameter 4 controls the amount of time the software waits for new data before sending a packet in the absence of a data forwarding character. See Table 134 for PAD idle timer values and their descriptions.

Table 134 PAD Idle Timer Values

Value	Description
0	No timer.
1-255	Delay value in twentieths of a second (default for both connection types is 1).

Parameter 5: Device Control

Parameter 5 selects whether PAD can transmit flow control (ASCII XON/XOFF) characters during data transfer to the terminal to control the terminal and data flow. Flow control is not directly supported on communication servers because data must make network hops to travel to its final destination. However, depending on the type of incoming connection, setting this parameter can cause similar negotiations to be sent over the connection, thereby attempting to change the state of the flow control option at the device closest to the user.

Parameter 6: PAD Service Signals

Parameter 6 selects whether or not PAD is required to transmit service signals. Because the communication server does not use Recommendation X.28 for its user interface, this parameter is ignored.

Cisco's legacy PAD mode does not support this parameter. However, Cisco's X.28 standard user interface does support this parameter.

Parameter 7: Action Upon Receipt of a BREAK Signal

Parameter 7 defines the action of the PAD after receiving a BREAK signal from the terminal. See Table 135 for PAD BREAK signal values and their descriptions.

Table 135 PAD BREAK Signal Values

Value	Description
0	Ignore the BREAK signal.
1	Transmit an interrupt packet to notify the remote host or another PAD that the BREAK signal has been generated.
2	Transmit a Reset packet to reset the virtual circuit.
4	Transmit an X.29 Break indication to the remote host, or to a PAD (outgoing connection default).
8	Escape from data transfer mode.
16	Discard output to the terminal by setting parameter 8 to a value of 1.
21	Combination of values 1, 4 and 16 (incoming connection default).

The PAD protocols allow you to send a special X.29 Indication of Break packet, send an Interrupt packet, perform a reset operation, act as if the recall character had been typed, or begin discarding output to the user. Combinations of these options are also allowed, as long as they make sense. Common options are to begin discarding output and send both an X.25 Interrupt packet and an X.29 Indication of Break packet; these options are supported. All other options are not supported and are silently ignored.

Parameter 8: Discard Output

Parameter 8 indicates to the PAD whether to discard received packets rather than disassemble and transmit them. This parameter works in conjunction with parameter 7. If value 16 is chosen for parameter 7, all output is discarded after reception of the BREAK signal. Setting parameter 8 to zero restores normal data delivery to the terminal. See Table 136 for PAD discard output values and their descriptions.

Table 136 PAD Discard Output Values

Value	Description
0	Normal data delivery to the terminal (outgoing connection default).
1	Discard all output to the terminal. Set by parameter 7; see previous description.

This parameter can also be set and unset manually using the PAD **resume EXEC** command.

Parameter 9: Return Padding

Parameter 9 determines whether or not PAD can provide padding (insert filler characters) upon receipt of a Return character from the terminal.

Parameter 10: Line Folding (Not Supported)

Line folding means inserting a LINE FEED at a certain point that then places subsequent characters on the next line. Parameter 10 determines selection of this function and specification of the line length.

Neither Cisco's legacy PAD mode or Cisco's X.28 standard user interface supports this parameter.

Parameter 11: Baud Rate

Parameter 11 is a read-only value that determines the baud rate transmitted across the interface between PAD and the terminal. See Table 137 for PAD baud rate values and their descriptions.

Table 137 PAD Baud Rate Values

Value	Description (in bits per second)
10	50
5	75
9	100
0	110
1	134.5

Table 137 PAD Baud Rate Values (Continued)

Value	Description (in bits per second)
6	150
8	200
2	300
4	600
3	1200
7	1800
11	75/1200
12	2400
13	4800
14	9600
15	19200
16	48000
17	56000
18	64000

Parameter 12: Input Flow Control

Parameter 12 determines whether or not the terminal can transmit ASCII XON/XOFF (transmission on and off) characters to PAD during the data transfer mode. Flow control is not directly supported on communication servers because data must make network hops to travel to its final destination. However, depending on the type of incoming connection, setting this parameter can cause similar negotiations to be sent over the connection, thereby attempting to change the state of the flow control option at the device closest to the user.

Parameter 13: LINE FEED Insertion

Parameter 13 determines the procedure for inserting the LINE FEED character upon receipt of a Return character. The PAD also responds to a value that results from the addition of any of the values in Table 138.

Table 138 PAD LINE FEED Signal Values

Value	Description
0	Do not insert the LINE FEED character (outgoing connection default).
1	Insert a LINE FEED after transmitting RETURN to the terminal.
2	Insert a LINE FEED after echoing RETURN to the terminal.
4	Insert a LINE FEED after echoing RETURN to the remote host.

Parameter 14: LINE FEED Padding

Parameter 14 determines whether or not PAD can provide padding (insert filler characters) upon receipt of a LINE FEED character from the terminal. This function is generally provided by the end user's operating system.

Parameter 15: Local Editing

Parameter 15 enables or disables a PAD editing function for the terminal in data transfer mode. Enabling the editing function disables the Idle Timer (see parameter 4). The user at the terminal can make corrections and display the line buffer containing the characters to be transmitted when the forwarding character (see parameter 3) is received. See Table 139 for PAD local editing function values and their descriptions.

Table 139 PAD Local Editing Function

Value	Description
0	Disables editing capabilities in data transfer mode. Any characters entered become part of the data stream and are transmitted (default for both connection types).
1	Enables editing capabilities in the data transfer mode, which suspends the following PAD operations: 1) Full packet data forwarding until the edit buffer is full 2) Forwarding of DATA packets upon expiration of the Idle Timer

Parameters 16, 17, and 18 provide the editing functions.

Parameter 16: Character Delete

Parameter 16 allows you to select a character that will delete characters while in PAD editing mode. This character is valid only if parameter 15 is set to one. See Table 140 for PAD line display editing function values and their descriptions.

Table 140 PAD Line Display Editing Function

Value	Description
0-127	Select one character from the ASCII character set to represent the delete character. Default is character 18 (CTRL-R).

Parameter 17: Line Delete

Parameter 17 allows you to select a character that will delete a line while in PAD editing mode. This character is valid only if parameter 15 is set to one. See Table 141 for PAD line delete editing function values and their descriptions.

Table 141 PAD Line Delete Editing Function

Value	Description
0-127	Select one character from the ASCII character set to represent the delete character. Default is character 21 (CTRL-U).

Parameter 18: Line Display

Parameter 18 allows you to select a character that will display a line while in PAD editing mode. This character is valid only if parameter 15 is set to one. See Table 142 for PAD line display editing function values and their descriptions.

Table 142 PAD Line Display Editing Function

Value	Description
0-127	Select one character from the ASCII character set to represent the delete character. Default is character 18 (CTRL-R).

Parameter 19: Edit PAD Service Signals

Cisco's legacy PAD mode does not support this parameter. However, Cisco's X.28 standard user interface does support this parameter.

Parameter 20: Echo Mask

Cisco's legacy PAD mode does not support this parameter. However, Cisco's X.28 standard user interface does support this parameter.

Parameter 21: Parity treatment (Not Supported)

Neither Cisco's legacy PAD mode nor Cisco's X.28 user interface supports this parameter.

Parameter 22: Page Wait (Not Supported)

Neither Cisco's legacy PAD mode nor Cisco's X.28 user interface supports this parameter.

