# **MultiConnect™ Adapter**

Serial-to-Serial Adapter with IP

# **User Guide**



### MultiConnect™ Adapter User Guide Serial-to-Serial Adapter (MTS2SA-T & MTS2SA-T-R)

#### PN S000354A, Version A

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#### **Patents**

This device is covered by one or more of the following patents: 6,031,867; 6,012,113; 5,628,030; 5,450,425. Other patents pending.

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# Chapter 1 – Product Description & Specifications

# **Product Description**

The MultiConnect serial-to-serial adapter enables installed serial devices to connect to the Internet for remote monitoring, control and configuration.

**Internet-Enable Any Device.** The MultiConnect adapter provides the powerful ability to IP-enable serial devices allowing more options for data acquisition, device management, and industrial control than would otherwise be available.

Simply install the MultiConnect between a serial device and an analog, ISDN, or wireless modem to send and receive data over the Internet. It can also serve as a single Web page in response to a Web browser request.

**Reduces Development Time.** MultiConnect can make your existing and next generation serial device IP-ready without requiring hardware changes to its design. MultiConnect actually provides faster time-to-market because it relieves the burden and expense of writing and maintaining Internet applications. The complete, ready-to-integrate MultiConnect adapter allows you to enhance your product while you focus on developing its core features.

**Management and Configuration.** MultiConnect has several means of management and configuration built into the design. It supports remote configuration, which means you can have central site setup and control of the remote adapters via the command line interface or telnet.

# Applications

The MultiConnect adapters will IP-enable any device to provide remote monitoring, control and configuration of any system. The solution is ideal for the following applications:

- Appliances
- ATM terminals
- Credit card and check verification systems
- Data collection
- Gas pumps
- Industrial and medical remote monitoring systems
- Point-of-sale terminals
- Remote diagnostics
- Remote metering
- Security systems
- Ticketing machines
- Vending/gaming machines
- And more.....

# **Types of Adapters Available**

Product	Adapter Description	Region
MTS2SA-T	Serial-to-Serial + IP (External Power)	Global
MTS2SA-T-R	Serial-to-Serial + IP (RS-232 Power)	Global
Note: The RS-232	2-powered adapters are powered through t	the DSR pin of the
RS-232 cable.		

## **Package Contents**

- One MultiConnect Adapter
- One universal power supply with power cord included with the externally powered adapters
- One RS-232 cable included with the RS-232 Serial-to-Serial Adapter
- Two mounting brackets
- Four adhesive-backed rubber feet (table-top mounting)
- One Quick Start Guide
- One MultiConnect CD

# **Handling Precautions**

All devices must be handled with certain precautions to avoid damage due to the accumulation of static charge. Although input protection circuitry has been incorporated into the devices to minimize the effect of this static buildup, proper precautions should be taken to avoid exposure to electrostatic discharge during handling and mounting.

# Specifications

Category	Description	
Memory	8 MEG	
Flash Memory	2 MEG	
Protocols Supported	ARP, DHCP, FTP, HTTP, ICMP, IP, POP3, PPP, SMTP, TCP, Telnet, TFTP, and UDP	
Serial Interface	Standard DCE serial	
Data Formats	Serial, binary, asynchronous	
Data Rates	300; 1200; 2400; 4800; 9600; 19200; 38400; 57600; 115200; 230400 bps	
Flow Control	RTS/CTS (hardware)	
Management	Serial; Telnet	
Security	Username and password authentication using local database	
System Software	Flash ROM standard: downloadable from a TCP/IP host (TFTP) or Xmodem via Serial	
LEDs	ACT (Activity) and STS (Status)	
Ethernet	IEEE 802.3	
Power Requirements	With External Power (MTS2SA-T) Power Consumption	
-	@ 9V DC: Typical 240mA Maximum 250mA	
	With RS-232 Power (MTS2SA-T-R) Power Consumption	
	@ 5V DC: Typical 95mA Maximum 105mA	
	@ 10V DC: I ypical 50mA Maximum 60mA	
	@ 15V DC: Typical 35mA Maximum 45mA	
	@ 25V DC: Typical 24mA Maximum 34mA	
Operating Temperature	32° to +120°F (0° to 50°C); humidity range 25-85% (non-condensing)	
Storage Temperature	-40°C to +85°C	
Physical Dimensions	3.5" w x 2.1" h x 0.98" d; 3.4 oz.	
	8.8 cm x 5.3 cm x 6 cm; 96 g	
Certifications	Safety Certifications:	
	UL60950	
	cUL60950	
	EN60950	
	ACA TS001 / AS 3260	
	EMC Safety Approvals:	
	FCC Part 15 Class A EN55022	
	EN55022 EN55024	
	CE Marked	

Category	Description
Intelligent Features	High performance 10/100BaseT Ethernet bridge
	Half duplex or full duplex support on the WAN interface
	256 frame buffer
	Stores 10,000 MAC addresses Automatically learns MAC addresses
	Serial interface supports DTE speeds to 230K bps
	External and RS-232 power options
	High performance processor runs ARP, DHCP, FTP, HTTP, ICMP, IP,
	POP3, PPP, SMTP, SNMP, SNMP, TCP, Telnet, TFTP, UDP protocols
	Command line interface
	Flash memory to update firmware with the latest enhancements
	Flexible IP protocol stack Compact, rugged industrial chassis design
	Desktop or panel mounting
	Two-year warranty
Software Features	Internet Applications
	DHCP Client:
	Request IP address for Ethernet Interfaces
	Telnet Server: Command Line Configuration
	Auto Dial-out Feature
	Command line via custom port (other than standard port 23)
	Telnet Client:
	Connect to remote Telnet Server
	Serial Auto Dial-in Feature Terminal Server:
	Network to Serial Connectivity
	Serial to Network Connectivity
	TFTP Server:
	Flash Upgrade
	SMTP Client: The email client embedded in the MultiConnect sends email to the
	configured recipients.
	POP3 Client:
	The email client embedded in the MultiConnect receives email
	from the POP3 Server. This feature is useful for field upgrades.
	Firmware upgrades can be sent as attachments. HTTP Server:
	To host Web pages on behalf of the serial device for monitoring
	and configuration of the serial device.
	Functional Features
	Command Line Configuration over Serial or Ethernet Serial - TTY
	Ethernet - Telnet
	Username and Password Authentication Using Local Database
	The Username and Password can be created using commands.
	The User database authenticates the Users before access to
	command mode of the MultiConnect adapter is enabled.
	Remote Transparent Bridging Ethernet to Serial Bridging
	Point-to-Point Protocol (PPP)
	Negotiations Bridging Control Protocol
	- 802.3 MAC Type
	CCP Compression

Name	Description
ACT	Activity – Lit when data is being transmitted or received.
STS	Status – Blinks to indicate that the unit is functioning.

# **LED Indicators**

## **RS-232 9-Pin Connector Pinout**



## Pins for the Serial-to-Serial Adapter when Power Is Supplied Externally

Pin	Description
1	DCD
2	RX Data
3	TX Data
4	DTR
5	Ground
6	DSR
7	RTS
8	CTS
9	RI

## Pins for the Serial-to-Serial Adapter when Power Is Supplied Through the RS-232 Pin

Pin	Description
1	DCD
2	RX Data
3	TX Data
4	DTR
5	Ground
6	Power
7	RTS
8	CTS
9	RI

# **Chapter 2 - Installation**

## Attaching the MultiConnect to a Fixed Location

The MultiConnect adapter is design to be used on the desktop or to be panel-mounted. To attach the bracket for panel-mounting, following these steps:

1. Typically, the MultiConnect adapter is mounted against a flat surface with two mounting screws. Drill the mounting holes at the desired location. The mounting holes must separated by 4 -7/16 inches center-to-center.



2. To attach the brackets to the MultiConnect, slide the mounting brackets into the corresponding slots on the back of the MultiConnect chassis.



3. Attach the adapter to the surface with two screws.

# **Serial-to-Serial Adapter Installation**



## **Connecting the Cables**



## **Connecting the Power**

The adapters are powered in one of two ways:

- Through the DSR Pin of the RS-232 Cable Adapters powered this way are shipped with an RS-232 cable that has a power pin instead of a DSR pin.
- Through an External Power Supply

Adapters powered this way are shipped with a universal power supply and its accompanying power cord and an RS-232 cable that has a DSR pin instead of a power pin.

### **Connecting the External Power**

- 1. Plug the power supply cable with attached transformer block into the power connector on the back of the MultiConnect adapter.
- 2. Plug the AC cord receptacle into the transformer block. Plug the other end into a power outlet.



# Chapter 3 – Managing and Configuring the MultiConnect Adapter

## **Two Ways to Login**

## **Login Using TTY**

• Use TTY to configure your MultiConnect IP for the first time. Configure the host serial port using the defaults listed below:

Baud: 115.2K Data: 8 Parity: N Stop: 1 Flow-Control: None

- Press the Enter key three times to get to the Login prompt or send three carriage returns.
- At the Login prompt, type *admin*. At the Password prompt, type *admin*.

**Important:** The user name and password are case sensitive. They must be typed in lowercase letters.

## Login Using Telnet through the PPP Interface

- Open the PPP interface on the modem port.
- Upon successful establishment of a Telnet session, the MultiConnect IP displays the Login prompt.

At the Login prompt, type *admin*. At the Password prompt, type *admin*.

• After a successful login, the MultiConnect IP enters **Command Mode**. In Command Mode, the MultiConnect IP can be configured and managed using the Command Line Interface (CLI) command set.

# **About Command Mode and Data Mode**

- In **Command Mode**, a # sign designates the prompt. If you type the word **Help** at the command prompt, a complete list of commands displays.
- If you type the word Usage at the command prompt, a list of the command semantics displays.
- In **Data Mode**, the # sign is not displayed.
- To leave Command Mode, exit your terminal or Telnet session or type the word Exit at the command prompt.

Note: See the Restore command and IP Escape String command.

# Chapter 4 – Command Line Interface (CLI)

The MultiConnect commands are grouped based on the functionality.

- General Setup Commands
- IP Setup Commands
- Serial Setup Commands
- PPP Setup Commands
- HTTP Setup Commands
- SMTP Setup Commands
- POP3 Setup Commands
- FTP Client Setup Commands
- SNTP Client Setup Commands

## **General Notes**

- Required command parameters are indicated between < >.
- Optional command parameters are indicated between [ ].
- Parameter choices are delineated by /.
- Upon successful execution of a command, the "OK" string is echoed to the client.
- When an unsuccessful command is executed, an appropriate error message is displayed followed by an "ERROR" string.
- All the commands are case sensitive (they must be typed in lower case).
- PPP is enabled on the modem interface S1.
- All serial-related applications such as dial-in and dial-out are with respect to the serial interface S0.
- The PPP interface is the modem interface S1.

## **General Setup Commands**

General setup of a MultiConnect IP is port-independent (physical S0, S1 etc.). The following command set is used to set the global configuration of MultiConnect IP.

Command Syntax	dialout serial s0
Description	Manual Telnet dialout (Internet-to-serial connectivity).
	Invoked from the command shell.
Default Value	NA
Success	ОК
Error	1. Too few arguments
	"Usage: dialout serial <serial port=""></serial>
	Type 'dialout ?' for more information"
	2. Invalid argument
	Possible argument(s) are: Serial
	1. When invoked from Serial Shell
	This command is not supported through serial dial-in

Command Syntax	Exit
Description	Exits the command parser, unlocks the configurations, terminates session.
Default Value	NA
Success	ОК

Command Syntax	Help
Description	Provides the first level of commands in MultiConnect IP.
Default Value	NA
Success	ОК

Command Syntax	restore default-config			
Description	Restores the factory defaults.			
	Note: All previous configurations will be lost upon invoking this command.			
	The changes are made permanent only if save config is invoked.			
Default Value	NA			
Success	ОК			
Error	1. Too few arguments			
	"Possible arguments are default-config and session			
	2. Invalid argument			
	Invalid argument "invalid string"			
	Valid arguments are default-config and session			

Command Syntax	restore session				
Description	On Telnet dialout, the control is transferred to the command parser passing				
	the escape sequence "+++ inet". Invoking "restore session" would resume				
	the Telnet dialout exiting the command parser.				
Default Value	NA				
Success	OK				
Error	1. Too few arguments				
	Possible arguments are <i>default-config</i> and <i>session</i>				
	2. ERROR: Session not opened				

Command Syntax	reset modem
Description	At will, reset the built-in modem.
Default Value	NA
Success	OK
Error	1. Too few arguments Possible argument(s) are modem

Command Syntax	save
Description	Command to Save the configuration to the flash and reboot.
Default Value	NA
Success	ОК

Command Syntax	telnet <dial-ip-addr> [<port>]</port></dial-ip-addr>		
Description	Manual serial dial-in (device port to modem port connectivity).		
	Invoked from the command shell.		
Default Value	NA		
Success	ОК		
Error	1. Too few arguments		
	2. Invalid IP address/Port		
	"(Error: hostp = "configured host". Error: hostp="configured IP address"		
	3. When invoked from Command shell connected through Telnet		
	This command is not supported through Telnet		

Command Syntax	Usage
Description	Provides the command semantics for all the commands.
Default Value	NA
Success	OK

Command Syntax	user add <user-name> [<passwd>]</passwd></user-name>					
Description	Add the user name and the password to the group.					
-	Notes: Default Groups: admin, users					
	Default Users: admin, ipmodule					
	Only Admin can configure the MultiConnect IP					
Default Value	NA					
Success	OK					
Error	1. Too few arguments					
	"Too few arguments. Possible value(s) are username followed by					
	password"					
	2. Unable to add the user name: "user 'username' exists"					

Command Syntax	user delete <user-name></user-name>			
Description	Delete the user name from the group.			
Default Value	NA			
Success	ОК			
Error	1. Too few arguments			
	"Too few arguments. Possible value(s) are username followed by			
	password"			
	<ol><li>Unable to delete the user name: "user 'username' does not exist"</li></ol>			

Command Syntax	user password <username> <new password=""></new></username>			
Description	Change the password for a user.			
Default Value	NA			
Success	ОК			
Error	<ol> <li>Too few arguments         "Too few arguments. Possible value(s) are username followed by password"         Unable to change the password         "Password does not match Unable to change user <username> password"     </username></li> </ol>			

Command Syntax	set operation-mode <modem ipmodule=""></modem>				
Description	modem - In the modem mode, the target functions like a modem				
	<i>ipmodule</i> - In the ipmodule mode, all the functional features of				
	MultiConnect IP can be achieved.				
Default Value	Ipmodule				
Success	ОК				
Error	1. Too few arguments				
	"Too few arguments. Possible argument(s) are modem and ipmodule				
	2. Invalid string				
	"Invalid argument "string"				
	Valid argument(s) are <i>modem</i> and <i>ipmodule</i>				

Command Syntax	set boot-messages <enable disable=""></enable>			
Description	enable - Prints the boot-messages during module boot-up.			
	disable - Suppresses the boot-messages during module boot-up.			
Default Value	Enable			
Success	ОК			
Error	1. Too few arguments			
	"Too few arguments. Possible argument(s) are disable and enable			
	2. Invalid string			
	"Invalid argument "string"			
	Valid argument(s) are <i>disable</i> and <i>enable</i>			

Command Syntax	set date <dd mm="" yyyy=""></dd>				
Description	Sets the system date.				
Default Value	Jan 1 1970				
Success	ОК				
Error	1. Too few arguments				
	Usage: set date DD/MM/YYYY				
	Type 'set date ?' for more information				
	Error: Date in DD/MM/YYYY format				
	Too few arguments. Possible argument(s) are				
	ip	ppp	date		
	serial	login	time		

Command Syntax	set login		
Description	Prompts the Login for the command shell when enabled, and doesn't when		
-	disabled.		
Default Value	Enable		
Success	ОК		
Error	1. Too few arguments		
	"Usage: set login <enable disable=""></enable>		
	Type 'set login ?' for more information"		
	2. Invalid string		
	"error: set login <enable disable="">"</enable>		

Command Syntax	set login auto-dialout-login <enable disable=""></enable>		
Description	Enables/Disables authentication for Telnet auto-dialout.		
Default Value	Disable		
Success	OK		
Error	<ol> <li>Too few arguments         "Usage: set login auto-dialout-login <enable disable="">         Type 'set login auto-dialout-login ?' for more information"         Invalid string         "error: set login auto-dialout-login <enable disable="">"         </enable></enable></li> </ol>		

Command Syntax	set time <hh:mm:ss></hh:mm:ss>
Description	Sets the system time.
Default Value	00:00:00
Success	OK
Error	1. Too few arguments Usage: set date HH:MM:SS Type 'set date ?' for more information Error: Time in HH:MM:SS format Too few arguments. Possible argument(s) are ip login serial date ppp time

Command Syntax	set watchdog <enable disable=""></enable>		
Description	Enables/Disables the watchdog timer.		
_	The timer value is set to 6.5 seconds. This is the upper threshold value.		
	Note: Watchdog timer comes into effect only after reboot. Hence,		
	invoking this command calls for a reboot on save.		
Default Value	Enable		
Success	ОК		
Error	<ol> <li>Too few arguments         "Usage: set watchdog <enable disable=""> </enable></li> </ol>		
	Type 'set watchdog <enable disable=""> ?' for more information" 2. Invalid string</enable>		
	"error: set watchdog <enable disable="">"</enable>		

Command Syntax	show buildrun				
Description	Command Line Config	Command Line Configuration - History.			
	Upon invoking any comr	nand, either	through Telnet	or Serial TTY, the	
	command is added to the <i>buildrun</i> file. This is very useful in case of				
	version updates.				
Default Value	NA				
Success	OK				
Error	1. Too few arguments				
	"Too few arguments. Possible argument(s) are				
	serial	date	statistics	users	
	buildrun	ip	sys-info		
	configuration	ррр	time		
	2. Invalid argument				
	Invalid argument "string". Valid arguments are				
	serial	date	statistics	users	
	buildrun	ip	sys-info		
	configuration	ррр	time		

### **General Commands – Show**

Command Syntax	show configuration
Description	Displays the MultiConnect IP configuration.
Default Value	NA
Success	ОК
Error	1. Too few arguments
	"Too few arguments. Possible argument(s) are:
	serial ppp sys-info device-parameter configuration recv-mail time date http users buildrun statistics send-mail
	2. Invalid argument Valid arguments are: serial ppp sys-info device-parameter configuration recv-mail time date http users buildrun statistics send-mail

Command Syntax	ow date	
Description	ows the system date.	
Default Value	· · · · · · · · · · · · · · · · · · ·	
Success		
Error	Too few arguments	
	Too few arguments. Possible argument(s) are:	
	ip statistics users	
	configuration ppp sys-info	
	date serial time	
	Invalid argument	
	Invalid argument "Invalid string". Valid arguments are	
	ip statistics users	
	configuration ppp sys-info	
	date serial time	

## General Commands – Show

Command Syntax	show statistics
Description	Displays MultiConnect IP statistics.
Default Value	NA
Success	OK
Error	1. Too few arguments
	"Too few arguments. Possible argument(s) are:
	ip statistics users
	configuration ppp sys-info
	date serial time
	2. Invalid argument
	Valid arguments are:
	ip statistics users
	configuration ppp sys-info
	date serial time

Command Syntax	sh	ow sys-info			
Description	Dis	plays the system rela	ated informat	ion.	
	•	Hardware informat	ion		
	•	System Uptime			
		Memory Utilization			
		Flash Memory Mar			
Default Value	NA		,		
Success	OK				
Error			<b>.</b>		
Enor	<sup>1</sup> .	Too few arguments			
		Too few arguments.	-		
		ip	statistics	users	
		configuration	ррр	sys-info	
		date	serial	time	
	2.	Invalid argument			
	Invalid argument "Invalid string". Valid arguments are:				
		ip		users	
		configuration	ррр	sys-info	
		date	serial	time	

Command Syntax	sh	ow time			
Description	Dis	plays the system time.			
Default Value	NA				
Success	OK				
Error	1.	Too few arguments			
		Too few arguments. F	ossible argume	ent(s) are	
		serial	ip	sys-info	
		configuration	ррр	time	
		date	statistics	users	
	2.	Invalid argument			
		Invalid argument "Inva	alid string"		
		Valid arguments are:			
		serial	ip	sys-info	
		configuration	ррр	time	
		date	statistics	users	

## General Commands – Show

Command Syntax	show users			
Description	Displays the configured u	Displays the configured users.		
Default Value	NA			
Success	ОК			
Error	1. Too few arguments			
	"Too few arguments. F	Possible argum	ent(s) are:	
	serial	ip	sys-info	
	configuration	ррр	time	
	date	statistics	users	
	2. Invalid argument			
	Valid arguments are:			
	serial	ip	sys-info	
	configuration	ррр	time	
	date	statistics	users	

# **IP Setup Commands**

Command Syntax	set ip dns <enable disable=""></enable>		
Description	Enables/disables the DNS client.		
Default Value	Enabled		
Success	OK		
Error	1. Too few arguments "Usage: set ip dns <enable disable=""></enable>		
	Type 'set ip dns ?' for more information"		
	2. Invalid string		
	Type 'set ip dns ?' for more information"		

Command Syntax	set ip hostname <hostname></hostname>
Description	Sets the host name of the MultiConnect IP.
Default Value	"MultiConnectIP"
Success	ОК
Error	1. Too few arguments
	"Usage: set ip hostname <hostname></hostname>
	Type 'set ip hostname ?' for more information"

Command Syntax	set ip pri-dns <ip addr=""></ip>
Description	Sets the primary DNS IP address to 0.0.0.0.
Default Value	0.0.0.0
Success	ОК
Error	<ol> <li>Too few arguments         "Usage: set ip pri-dns <ip addr="">         Type 'set ip pri-dns ?' for more information"         Invalid IP Address         "error: Invalid IP address         Type 'set ip pri-dns ?' for more information"         </ip></li> </ol>

Command Syntax	set ip sec-dns <ip addr=""></ip>
Description	Sets the secondary DNS IP address to 0.0.0.0.
Default Value	0.0.0.0
Success	ОК
Error	<ol> <li>Too few arguments         "Usage: set ip sec-dns <ip addr="">         Type 'set ip sec-dns ?' for more information"</ip></li> <li>Invalid IP Address         "error: Invalid IP address         Type 'set ip sec-dns ?' for more information"</li> </ol>

Command Syntax	set ip syslogd <enable disable=""></enable>
Description	Enables/Disables syslogd.
Default Value	Disable
Success	OK
Error	<ol> <li>Too few arguments</li> <li>"Usage: set ip syslogd <enable disable=""></enable></li> <li>Type 'set ip syslogd ?' for more information"</li> </ol>

Command Syntax	set ip syslogd-server <ip addr=""></ip>
Description	Sets the remote syslog server's IP address.
Default Value	0.0.0.0
Success	ОК
Error	<ol> <li>Too few arguments         "Usage: set ip syslogd-server <ip_addr>         Type 'set ip syslogd-server ?' for more information"</ip_addr></li> <li>Invalid IP address         "error: Invalid IP address         Type 'set ip syslogd-server ?' for more information"</li> </ol>

Command Syntax	set ip tcp-keepalive <t mins=""></t>
Description	Sets the TCP keep-alive timeout for the MultiConnect IP.
-	't' : range from 3-120 minutes
Default Value	3 minutes
Success	ОК
Error	1. Too few arguments
	"Usage: set ip tcp-keepalive <t mins=""></t>
	Type 'set ip tcp-keepalive ?' for more information"
	2. Invalid IP address
	"error: Invalid value, rante [3-120] mins
	Type 'set ip tcp-keepalive ?' for more information"

Command Syntax	set ip telnet <enable disable=""></enable>
Description	Enables/disables the Telnet Server. This is a global setting, which will enable/disable the Telnet Server in the MultiConnect IP. <b>Note:</b> Upon disabling Telnet server, the administrator cannot configure the MultiConnect IP over the built-in Modem interface (wherein PPP has acquired IP Address). The only option is to connect through a terminal application over the Serial port.
Default Value	Enabled
Success	OK
Error	<ol> <li>Too few arguments         Too few arguments. Possible argument(s) are         set ip telnet<enable disable="">         Type : set ip telnet ? for more information)</enable></li> <li>Multiple matches         telnet         tennet         tenn</li></ol>

Command Syntax	set ip telnet auto-dialout <enable disable=""></enable>
Description	Enables Telnet connectivity between the MultiConnect IP and the remote
	device.
	This flag enables/disables the Telnet Auto dialout globally.
Default Value	Enabled
Success	ОК
Error	1. Too few arguments
	"Usage: set ip telnet auto-dialout <enable disable=""></enable>
	Type 'set ip telnet auto-dialout ?' for more information"
	2. Invalid String
	Type 'set ip telnet auto-dialout ?' for more information"

Command Syntax	set ip telnet escape-string <string></string>
Description	The Telnet Server scans for this escape sequence and transfers the control
	to the command parser.
	By default, the Telnet Server scans for "+++inet".
Default Value	+++ inet
Success	ОК
Error	<ol> <li>Too few arguments         "Usage: set ip telnet escape-string <string>         Type 'set ip telnet escape-string ?' for more information"         Multiple matches         escape-monitor         escape-string         </string></li> </ol>

Command Syntax	set ip telnet escape-monitor <enable disable=""></enable>
Description	Enables/disables the "monitor" flag that scans for the escape sequence.
Default Value	Enabled
Success	ОК
Error	<ol> <li>Too few arguments         "Usage: set ip telnet escape-monitor <enable disable="">         Type 'set ip telnet escape-monitor ?' for more information"         Multiple matches             escape-monitor             escape-string         Invalid String         Type 'set ip telnet escape-monitor ?' for more information"         </enable></li> </ol>

Command Syntax	set ip telnet inactivity <enable disable=""></enable>
Description	Enables/disables the inactivity functionality.
Default Value	Disable
Success	OK
Error	<ol> <li>Too few arguments         "Usage: set ip telnet inactivity <enable disable="">         Type 'set ip telnet inactivity ?' for more information"         Multiple matches             inactivity             inactivity-timeout         J. Invalid String         Type 'set ip telnet inactivity ?' for more information"         </enable></li> </ol>

Command Syntax	set ip telnet inactivity-timeout <t secs=""></t>
Description	If the Telnet session is inactive for 't' secs, the connection is terminated.
	This functionality is applicable only if "set telnet inactivity" is enabled. (Refer
	to 'set ip telnet inactivity' command).
Default Value	5 min
Success	ОК
Error	1. Too few arguments
	"Usage: set ip telnet inactivity-timeout <t secs=""></t>
	Type 'set ip telnet inactivity-timeout ?' for more information"
	2. Multiple matches
	inactivity and inactivity-timeout
	3. Invalid timeout value
	"error: 't secs range : 0 – 300
	Type 'set ip telnet inactivity-timeout ?' for more information"

Command Syntax	set ip telnet-port <port_num></port_num>
Description	This Telnet-port corresponds to the port number that the MultiConnect IP will wait on for configuring the box. Default port number is TCP 23. You have the option to change this number. <b>Note:</b> Invoking this command terminates the current Telnet session.
Default Value	23
Success	ОК
Error	<ol> <li>Too few arguments         "Usage: set ip telnet-port <port-num>         Type 'set ip telnet-port ?' for more information"</port-num></li> <li>Invalid port-num         "error: Invalid port number         Type 'set ip telnet-port ?' for more information"</li> </ol>

Command Syntax	set ip telnet raw-mode <enable disable=""></enable>
Description	This is a global setting of raw-mode for the Telnet application. This setting is
	applicable for both Telnet auto-dialout, serial auto-dial-in.
Default Value	Disabled
Success	OK
Error	1. Too few arguments
	"Usage: set ip telnet raw-mode <enable disable=""></enable>
	Type 'set ip telnet raw-mode ?' for more information"
	2. Invalid String
	ERROR

Command Syntax	set ip tftp <enable disable=""></enable>	
Description	Enables/disables the TFTP Server. When the TFTP Server is enabled, the	
	network administrator can upload the firmware to the flash.	
Default Value	Enabled	
Success	ОК	
Error	1. Too few arguments	
	"Usage: set ip tftp <enable disable=""></enable>	
	Type 'set ip tftp ?' for more information"	
	2. Invalid string	
	error: Invalid string	
	Type 'set ip tftp ?' for more information"	

# **Serial Setup Commands**

Command Syntax	set serial auto-telnet <enable disable=""></enable>	
Description	This command globally enables serial auto dial-in support.	
	Notes:	
	This feature provides a Telnet session to the serial device connected to S0	
	through the IP-enabled modem port (S1)	
	Also, Telnet can be used only after PPP is up and has acquired an IP	
	address on the modem's (S1) port.	
Default Value	Disabled	
Success	OK	
Error	1. Too few arguments	
	"Usage: set serial auto-telnet <enable disable=""></enable>	
	Type 'set serial auto-telnet ?' for more information"	
	2. Invalid string	
	error: Invalid string	
	Type 'set serial auto-telnet ?' for more information	

Command Syntax	set serial <serial-interface> escape-monitor <enable disable=""></enable></serial-interface>
Description	Sets a "monitor" flag that enables/disables the scanning of escape
	sequence.
Default Value	Enable
Success	OK
Error	<ol> <li>Too few arguments         "Usage: set serial s0/s1 escape-monitor <enable disable="">         Type 'set serial s0/s1escape-monitor ?' for more information"         . Multiple matches             escape-monitor             escape-string         . Invalid string         error: Invalid string         Type 'set serial s0/s1 escape-monitor ?' for more information"        </enable></li></ol>

Command Syntax	set serial <serial-interface> escape-string <string></string></serial-interface>
Description	The Telnet client scans for this escape sequence and transfers the control to
	the command parser.
	By default, the Telnet client scans for "+++inet".
Default Value	+++ inet <serial-interface></serial-interface>
Success	ОК
Error	1. Too few arguments
	"Usage: set serial s0/s1 escape-string <string></string>
	Type 'set serial s0/s1 escape-string ?' for more information"
	2. Multiple matches
	escape-monitor
	escape-string

Command Syntax	hangup [serial interface] Valid serial interface – Modem port S1
Description	When this command is issued, the established live link is brought down. This command is only valid only for <i>modem port (S1)</i>
Default Value	•
Success	If physical link is brought down, <b>OK</b> and
	Physical link is successfully brought down messages are given
Error	<ol> <li>Too few arguments         "Usage: hangup [S1]         Type 'hangup [S1] ?' for more information"</li> <li>"error: Link could not be brought down"         message is given when link could not be brought down</li> </ol>

Command Syntax	linkup [serial interface]
	Valid serial interface – Modem port S1
Description	Establishes a physical link and PPP on the modem port. This command is relevant only when the serial interface is a dialing end with dialing-trig-mode configured as "command"
Default Value	-
Success	If physical link is established
	OK and CONNECT 14400 LAPM COMPRESSED
	(i.e., CONNECT message from the modem) are given
Error	<ol> <li>Too few arguments         "Usage: linkup [S1]         Type 'linkup [S1]' for more information"</li> <li>"error: Link cannot be brought up"         message is given when dialing-trig-mode is not "command"</li> <li>"error: Link is not established"         message is given when link is not established (in case PPP fails to get the         logical link up)</li> <li>"error: Link is already up"         message is given when link is established and this command will not         tear down and bring up the link</li> <li>"error: NO CARRIER / NO DIALTONE / NO ANSWER"         or any error return code from the modem</li> </ol>

Command Syntax	set serial [s0] auto-dialin <enab< th=""><th>le/disable&gt;</th><th></th></enab<>	le/disable>	
Description	Enables/disables the device port to Internet connectivity for the serial port		
	S0. This command is valid only for device port S0		
Default Value	Disabled		
Success	ОК		
Error	1. Too few arguments		
	"Usage: set serial s0 auto-diali	n <enable disable=""></enable>	
	Type 'set serial s0 auto-dialin ? for more information"		
	2. Multiple matches		
	auto-dialin aut	o-dialin-protocol	auto-dialout-protocol
	auto-dialin-ipaddress aut	o-dialout	
	auto-dialin-port aut	o-dialout-port	
	3. Invalid string		
	"error: Invalid string		
	Type 'set serial so auto-dial-in ? for more information"		
	4. If "set serial s1 auto-dialin <enable disable="">" is given</enable>		
	"error: Command not supported	d on the modem port	t s1"

Command Syntax	set serial [s0] auto-dialin-ip	address <ipaddr></ipaddr>		
Description	Specifies the auto dial-in IP address.			
-	Note: When a connection is e	established from serial,	a session is	
	established to the IP address	mentioned above.		
	This command is valid only for	or device port S0.		
Default Value	NULL			
Success	OK			
Error	1. Too few arguments			
	"Usage: set serial s0 auto-	"Usage: set serial s0 auto-dialin-ipaddress <ipaddr></ipaddr>		
	Type 'set serial s0 auto-dialin-ipaddress ? for more information"			
	2. Multiple matches			
	auto-dialin	auto-dialin-protocol	auto-dialout-protocol	
	auto-dialin-ipaddress	auto-dialout		
	auto-dialin-port	auto-dialout-port		
	3. Invalid IP Address			
	"error: Invalid IP address			
	Type 'show serial s0 auto-dialin-ipaddress ? for more information"			
	4. If "set serial s1 auto-dialin-ipaddress 192.168.2.2" is given			
	"error: Command not supp	orted on the modem po	rt s1"	

Command Syntax	set serial [s0] auto-dialin-port [port_num]	
Description	Command to specify the auto dial-in port number.	
	Note: [port_num] is optional here. If port_num is not specified, the standard	
	port 23 of the Telnet protocol shall be used.	
	This command is valid only for device port S0	
Default Value	23	
Success	ОК	
Error	1. Too few arguments	
	"Usage: set serial s0 auto-dialin-port [port_num]	
	Type 'set serial s0 auto-dialin-port ? for more information"	
	2. Multiple matches	
	auto-dialin auto-dialin-protocol auto-dialout-protocol	
	auto-dialin-ipaddress auto-dialout	
	auto-dialin-port auto-dialout-port	
	3. Invalid port	
	"error: Invalid port number	
	Type 'set serial s0 auto-dialin-port ? for more information"	
	4. If "set serial s1 auto-dialin-port 23" is given	
	"error: Command not supported on modem port s1"	

Command Syntax	set serial [s0] auto-dialin-protocol <telnet></telnet>	
Description	By default, Telnet is the protocol used to establish the serial-to-Internet connectivity.	
	Note: This syntax provides for future extensibility (SSH Client, etc.)	
	This command is valid only for device port S0 <ftp is="" not="" protocol="" setting="" yet<br="">implemented&gt;</ftp>	
Default Value	Telnet	
Success	OK	
Error	<ol> <li>Too few arguments         "Usage: set serial s0 auto-dialin-protocol <telnet ftp="">         Type 'set serial s0 auto-dialin-protocol ? for more information"</telnet></li> <li>Multiple matches         auto-dialin         auto-dialin-protocol         auto-dialin-ipaddress         auto-dialout         auto-dialin-port         auto-dialin-port         auto-dialin-port         auto-dialin-port         auto-dialout-port         auto-dialin-protocol ? for more information"         auto-dialin-port         auto-dialout         auto-dialin-port         auto-dialout-port         auto-dialin-port         auto-dialin-protocol ? for more information"         Invalid protocol selected         "error: Selected protocol not supported         Type 'set serial s0 auto-dialin-protocol ? for more information"         If "set serial s1 auto-dialin-protocol telnet" is given         "error: Command not supported on modem port s1"     </li> </ol>	

Command Syntax	set serial [s0] auto-dialout-port <port_num></port_num>	
Description	If auto-dialout is enabled, specifies the auto dialout-port on which the client	
	can connect.	
	Default is 5000.	
	Note: The port number should be other than standard TCP ports.	
	This command is valid only for device port S0.	
Default Value	5000	
Success	ОК	
Error	1. Too few arguments	
	"Usage: set serial s0 auto-dialout-port <port_num></port_num>	
	Type 'set serial s0 auto-dialout-port ? for more information"	
	2. Multiple matches	
	auto-dialin auto-dialin-protocol auto-dialout-protocol	
	auto-dialin-ipaddress auto-dialout	
	auto-dialin-port auto-dialout-port	
	3. Invalid Port Number	
	"error: Invalid port number	
	Type 'set serial s0 auto-dialout-port ? for more information"	
	4. If "set serial s1 auto-dialout-port 5000" is given	
	"error: Command not supported on modem port s1"	

set serial [s0] auto-dialout-p	rotocol <telnet></telnet>	
Note:		
		<ssh etc="" server,="">.</ssh>
This command is valid only for	<sup>r</sup> device port S0.	
Telnet		
ОК		
1. Too few arguments		
"Usage: set serial s0 auto-d	lialout-protocol <telnet <="" th=""><th>&gt;</th></telnet>	>
Type 'set serial s0 auto-dialout-protocol ?' for more information"		
auto-dialin	auto-dialin-protocol	auto-dialout-protocol
auto-dialin-ipaddress	auto-dialout	
•	auto-dialout-port	
3. Invalid string		
error: Invalid parameter		
Type 'set serial s0 auto-dial	lout-protocol ?' for more	e information"
	Note:         This syntax gives a provision f         This command is valid only for         Telnet         OK         1. Too few arguments         "Usage: set serial s0 auto-or         Type 'set serial s0 auto-dial         2. Multiple matches         auto-dialin         auto-dialin-ipaddress         auto-dialin-port         3. Invalid string         error: Invalid parameter         Type 'set serial s0 auto-dial         4. If "set serial s1 auto-dialout-	This syntax gives a provision for future extensibility. This command is valid only for device port S0. Telnet OK <b>1. Too few arguments</b> "Usage: set serial s0 auto-dialout-protocol <telnet <br="">Type 'set serial s0 auto-dialout-protocol ?' for more <b>2. Multiple matches</b> auto-dialin auto-dialin-protocol auto-dialin-port auto-dialout-port <b>3. Invalid string</b></telnet>

Command Syntax	set serial [s0/s1] baud-rate <baud></baud>
Description	Sets the serial baud rate.
Default Value	115200
Success	OK
Error	<ol> <li>Too few arguments         <ul> <li>"Usage: set serial s0/s1 baud-rate <baud></baud></li> <li>Type 'set serial s0/s1 baud-rate ?' for more information"</li> </ul> </li> <li>Invalid baud-rate         <ul> <li>"error: baud-rate range : [300,]</li> <li>Type 'set serial s0/s1 baud-rate ?' for more information"</li> </ul> </li> </ol>

Command Syntax	set serial [s0/s1] buffer-datasize <0/d bytes>
Description	This command primarily buffers the data.
Default Value	0 – No buffering.
Success	ОК
Error	1. Too few arguments
	"Usage: set serial s0/s1 buffer-datasize <0/d bytes>
	Type 'set serial s0/s1 buffer-datasize ?' for more information"
	2. Multiple matches
	buffer-datasize
	buffer-time
	3. Datasize range
	"error: Buffer data-size range : [1 - 1500] bytes
	Type 'set serial s0/s1 buffer-datasize ?' for more information"

Command Syntax	set serial [s0/s1] buffer-time <0/t secs>
Description	This command is related to the 'set serial s0/s1 buffer-datasize' command.
	The buffering of data shall either wait for datasize configured (in the previous
	command) or time t secs.
	Example: <i>SI</i>
	Si Buffer-datasize
	Buffer-time (secs)
	Descriptions
	0 - Default 0 - Default
	No buffering. Passes the data to the serial application on the reception of a
	character on the serial application.
	2
	10
	0
	<b>Buffer</b> till it reaches buffer-datasize (10); then passes it to the serial application.
	3
	0
	10 <b>No buffering.</b> Pass the data to the serial application on the reception of a
	character on the serial.
	4
	10
	10
	Buffer the characters till it reaches the buffer-datasize (10)
	(OR)
	wait for the buffer-time (10Secs). The data is passed on to the serial application depending on which condition is
	satisfied first.
Default Value	0 – No buffering
Success	OK
Error	1. Too few arguments
	"Usage: set serial s0/s1 buffer-time <0/t secs>
	Type 'set serial s0/s1 buffer-time ?' for more information"
	2. Multiple matches buffer-datasize
	buffer-time
	3. Time limit
	"error: Time limit supported : <1 – 60 secs>
	Type 'set serial s0/s1 buffer-time ?' for more information"

Command Syntax	set serial [s0/s1] chat-script <line-num> <expect-string> <send-string></send-string></expect-string></line-num>	
Description	Sets <i>expect</i> and <i>send</i> strings for the chat script to act on the modem.	
	Triggers for a reboot upon save. Important Note: Use double quotes if more than one word is used in the	
	<pre><expect-string>/<send-string>.</send-string></expect-string></pre>	
Default Value	NA	
Success	ОК	
Error	1. Too few arguments "Usage: set serial s0/s1 chat-script <line-num> <expect-string> <send-string> Type 'set serial s0/s1 chat-script ?' for more information"</send-string></expect-string></line-num>	

Command Syntax	Set serial [s0/s1] connect-type <direct modem=""></direct>
Description	Sets the connect type of the serial port to direct/modem connect.
-	Note: Modem port (S1) will always have connect-type as modem since it is a
	built-in modem
Default Value	Direct
Success	ОК
Error	1. Too few arguments
	"Usage: set serial s0/s1 connect-type <direct modem=""></direct>
	Type 'set serial s0/s1 connect-type ?' for more information"
	2. Invalid string
	"error: Invalid string
	Type 'set serial s0/s1 connect-type ?' for more information"
	3. If "set serial s1 connect-type direct" is given
	error: modem port s1 is a built-in modem interface; it cannot be set to direct

Command Syntax	set serial [s0/s1] connect-state <answering both="" dialing=""></answering>
Description	Sets the connect state of the serial port to <i>answering/dialing/both</i> state.
Default Value	Both
Success	ОК
Error	<ol> <li>Too few arguments         <ul> <li>"Usage: set serial s0/s1 connect-state <answering both="" dialing=""> Type 'set serial s0/s1 connect-state ?' for more information"</answering></li> </ul> </li> <li>Invalid string         <ul> <li>"error: Invalid string</li> <li>Type 'set serial s0/s1 connect-state ?' for more information"</li> </ul> </li> </ol>

Command Syntax	set serial [s0/s1] data-bits <7/8>
Description	Set the data-bits.
Default Value	8
Success	OK
Error	<ol> <li>Too few arguments         "Usage: set serial s0/s1 data-bits &lt;7/8&gt;         Type 'set serial s0/s1 data-bits ?' for more information"</li> <li>Invalid data-bit setting         "error: Data-bits range supported: [7/8]         Type 'set serial s0/s1 data-bits ?' for more information"</li> </ol>

Command Syntax	Set serial [s0/s1] flow-control <none rts-cts=""></none>
Description	Set the flow-control of the serial port. By default flow-control is disabled on
	the serial port.
Default Value	rts-cts
Success	ОК
Error	1. Too few arguments
	"Usage: set serial s0/s1 flow-control <none rts-cts=""></none>
	Type 'set serial s0/s1 flow-control ?' for more information"
	2. Invalid flow-control setting
	"error: flow-control supported: [none/rts-cts]
	Type 'set serial s0/s1 flow-control ?' for more information"

Command Syntax	set serial [s0] host-interaction-mode <enable disable=""></enable>
Description	This parameter is set by the host to enable the host-interactive-mode. When this mode is set, the host/serial device can use SMTP client, POP3 client, and HTTP server. Host interaction mode is valid only for device port S0. <b>Note:</b> Telnet Auto-Dialout and PPP cannot be enabled when this mode is enabled.
Default Value	Disable
Success	ОК
Error	<ol> <li>Too few arguments         "Usage: set serial s0 host-interaction-mode <enable disable="">         Type set serial s0 host-interaction-mode ?"         Invalid string         Type set serial s0 host-interaction-mode ?"         Port used by Auto-dialout         "ERROR: Port used by Auto-dialout"         4. "set serial s1 host-interaction-mode s1" is given         "error: Command not supported on modem port s1"     </enable></li> </ol>

Command Syntax	set serial [s0/s1] modem connect-string <connect-str></connect-str>
Description	Sets the Modem Connect string.
	Triggers for a reboot upon save.
	Note: The configured modem strings takes precedence over the MODEM.CNF
Default Value	CONNECT
Success	ОК
Error	1. Too few arguments "Usage: set serial s0/s1 modem connect-string <connect-str> Type 'set serial s0/s1 modem connect-string ?' for more information"</connect-str>

Command Syntax	set serial [s0/s1] modem dial-number <phone-num></phone-num>
Description	Sets the dial-number to be dialed.
Default Value	NA
Success	OK
Error	<ol> <li>Too few arguments         "Usage: set serial s0/s1 modem dial-number <phone-num>         Type 'set serial s0/s1 modem dial-number ?' for more information"     </phone-num></li> </ol>

Command Syntax	set serial [s0/s1] modem dial-prefix <dialprefix></dialprefix>
Description	Sets the Modem Dial-Prefix.
_	Triggers for a reboot upon save.
	Note: The configured modem strings takes precedence over the
	MODEM.CNF
Default Value	ATDT
Success	OK
Error	1. Too few arguments
	"Usage: set serial s0/s1 modem dial-prefix <dialprefix></dialprefix>
	Type 'set serial s0/s1 modem dial-prefix ?' for more information"

Command Syntax	Set serial [s0/s1] modem dial-suffix <dialsuffix></dialsuffix>
Description	Sets the Modem Dial-suffix. Triggers for a reboot upon save.
	Note: The configured modem strings takes precedence over the
	MODEM.CNF
Default Value	^M
Success	ОК
Error	1. Too few arguments
	"Usage: set serial s0/s1 modem dial-suffix <dialsuffix></dialsuffix>
	Type 'set serial s0/s1 modem dial-suffix ?' for more information"

Command Syntax	Set serial [s0/s1] modem dialing-method <configuration chat-script=""></configuration>
Description	Sets the modem dialing method.
	<ol> <li>Configuration method: The user shall provide only the dial-number to reach.</li> </ol>
	<ol><li>Choosing the 'chat' as the dialing-method, the user can write his/her own script by providing an Expect and a Send sequence.</li></ol>
	Refer to: 'set serial s0/s1 chat-script ?' for providing an "Expect" and a "Send" sequence.
	Triggers for a reboot upon save.
Default Value	Configuration
Success	OK
Error	1. Too few arguments
	"Usage: set serial s0/s1 modem dialing-method <configuration chat-<="" th=""></configuration>
	script>
	Type 'set serial s0/s1 modem dialing-method ?' for more information"
Command Syntax	set serial [s1] modem dialing-trig-mode <none command="" dtr=""></none>
----------------	--
Description	Sets the dialing trigger mode for the modem port S1.
-	If dialing trig mode is none:
	The serial interface will initialize the modem and dial as per the configured parameters.
	If dialing trig mode is dtr:
	As soon as a serial device is connected to <b>S0 (DTR</b> goes high), the S1 serial interface will initialize the modem and dial as per the configured parameters.
	If dialing trig mode is command:
	The serial interface will dial only on demand. The possible commands that can trigger the link are:
	<ul> <li>"linkup s1" command is issued</li> </ul>
	<ul> <li>Application trigger (SMTP, POP3 Client, etc)</li> </ul>
	Note: This command triggers a reboot upon save.
Default Value	Command
Success	ОК
Error	1. Too few arguments
	"Usage: set serial s1 modem dialing-trig-mode <none command="" dtr=""></none>
	Type 'set serial s1 modem dialing-trig-mode ?' for more information"
	2. Invalid string
	"error: Invalid string
	Type 'set serial s1 modem dialing-trig-mode ?' for more information"

Command Syntax	set serial s1 modem country-code <value></value>
Description	Sets the modem country code value to <value>.</value>
	This command is valid only for port S1.
Default Value	-
Success	OK
Error	1. Too few arguments
	"Usage: set serial s1 modem country-code value <value></value>
	Type 'set serial s1 modem country-code value ?' for more information"

Command Syntax	set serial [s0/s1] modem hangup-string <hangup-str></hangup-str>
Description	Sets the Modem hang-up string.
	Triggers for a reboot upon save.
Default Value	+++ATH0
Success	ОК
Error	1. Too few arguments
	"Usage: set serial s0/s1 modem hangup-string <hang-str></hang-str>
	Type 'set serial s0/s1 modem hangup-string ?' for more information"

#### Serial Commands – Setup

Command Syntax	set serial [s0/s1] modem init-string <init-num> <init-str></init-str></init-num>
Description	Configures the modem initial strings.
-	Init-num can range from 1-5.
	Triggers for a reboot upon save.
	Example: Set serial s0 modem init-string 1 ATZ
	Set serial s0 modem init-string 1 "ATZ AT&F"
	Important Note:
	Use double quotes if more than one word is used in the <init-str>. Refer to</init-str>
	example 2 above. This holds true for all the following commands that need
	a string as a parameter.
Default Value	Init-string 1 is set to 'ATZ'
	Init-string 2 is set to ' '
	Init-string 3 is set to ' '
	Init-string 4 is set to ' '
	Init-string 5 is set to ' '
Success	ОК
Error	1. Too few arguments
	"Usage: set serial s0/s1 modem init-string <init-num> <init-str></init-str></init-num>
	Type 'set serial s0/s1 modem init-string ?' for more information"
	Invalid init-num
	"ERROR: init-num range supported : [1-5]"

Command Syntax	set serial [s0/s1] modem ok-string <ok-str></ok-str>
Description	Sets the modem OK string.
	Triggers for a reboot upon save.
Default Value	OK
Success	OK
Error	<ol> <li>Too few arguments         "Usage: set serial s0/s1 modem ok-string <ok-str>         Type 'set serial s0/s1 modem ok-string ?' for more information"     </ok-str></li> </ol>

Command Syntax	set serial [s0/s1] modem ring-string <ring-str></ring-str>
Description	Sets the modem ring string. Triggers for a reboot upon save.
Default Value	RING
Success	OK
Error	<ol> <li>Too few arguments         "Usage: set serial s0/s1 modem ring-string <ring-str>         Type 'set serial s0/s1 modem ring-string ?' for more information"     </ring-str></li> </ol>

Command Syntax	set serial [s0/s1] parity <even none="" odd=""></even>
Description	Sets parity to even/odd/none.
Default Value	None
Success	ОК
Error	<ol> <li>Too few arguments         <ul> <li>"Usage: set serial s0/s1 parity <even none="" odd="">             Type 'set serial s0/s1 parity ?' for more information"</even></li> </ul> </li> <li>Invalid parity setting         <ul> <li>"error: parity supported: [even/odd/none]</li> <li>Type 'set serial s0/s1 parity ?' for more information"</li> </ul> </li> </ol>

# Serial Commands – Setup

Command Syntax	set serial [s0] login-string <login-string></login-string>
Description	Sets a login-string to the serial port. This command is valid only for port S0. The Login string can be of length maximum 8 characters. Upon module boot-up, Login is displayed on the console only if the characters entered match the login-string configured. <b>Note:</b> This is applicable only if the " <i>set serial s0 auto-dialin trig-mode</i> " is char
Default Value	NN
Success	ОК
Error	<ol> <li>Too few arguments         <ul> <li>"Usage: set serial s0 login-string <login-string>             Type 'set serial s0 login-string ? for more information"</login-string></li> </ul> </li> <li>Invalid string         <ul> <li>"ERROR: Invalid string</li> <li>Type 'set serial s0 login-string ? for more information"</li> </ul> </li> <li>If 'set serial s1 login-string <login-string>' is given             <ul> <li>"error: Command not supported on modem port s1"</li> </ul> </login-string></li> </ol>

Command Syntax	set serial [s0] raw-dialin <enable disable=""></enable>
Description	Enables/disables raw mode support for serial auto dial-in on the device port
	S0.
Default Value	Disabled
Success	ОК
Error	1. Too few arguments
	"Usage: set serial s0 raw-dialin <enable disable=""></enable>
	Type 'set serial s0 raw-dialin ? for more information"
	2. Multiple matches
	raw-dialin
	raw-dialout
	3. Invalid string
	"ERROR: Invalid string
	Type 'set serial s0 raw-dialin ? for more information"
	If 'set serial s1 raw-dialin <enable disable="">' is given</enable>
	"error: Command not supported on modem port s1"

Command Syntax	set serial [s0] raw-dialout <enable disable=""></enable>
Description	Enables/disables raw mode support for auto dialout on the device port S0.
Default Value	Disabled
Success	ОК
Error	1. Too few arguments
	"Usage: set serial s0/s1 raw-dialout <enable disable=""></enable>
	Type 'set serial s0/s1 raw-dialout ? for more information"
	2. Multiple matches
	raw-dialin
	raw-dialout
	3. Invalid string
	"error: Invalid string
	Type 'set serial s0/s1 raw-dialout ? for more information"
	<ol> <li>If 'set serial s1 raw-dialout <enable disable="">' is given</enable></li> </ol>
	"error: Command not supported on modem port s1"

#### Serial Commands – Setup

Command Syntax	set serial [s0/s1] stop-bits <1/1.5/2>
Description	Sets the stop bits.
Default Value	1
Success	ОК
Error	1. Too few arguments
	"Usage: set serial s0/s1 stop-bits <1/1.5/2>
	Type 'set serial s0/s1 stop-bits ?' for more information"
	2. Invalid stop-bit setting
	"ERROR: Stop-bit supported : [1, 1.5, 2]
	Type 'set serial s0/s1 stop-bits ?' for more information"

# Serial Commands – Show

Command Syntax	show serial [s0/s1] chat-script
Description	Displays the <b>Expect</b> and <b>Send</b> sequence for the serial port S0 or S1.
Default Value	NA
Success	ОК
Error	1. Too few arguments Possible value(s) are statistics modem-configuration configuration chat-script

Command Syntax	show serial [s0/s1] configuration
Description	Displays serial S0/S1 configuration.
Default Value	-
Success	ОК
Error	<b>1. Too few arguments</b> Possible value(s) are         statistics       modem-configuration         configuration       chat-script

Command Syntax	show serial [s0/s1] modem-configuration
Description	Displays the modem-related configuration for serial port S0 or S1.
Default Value	NA
Success	ОК
Error	<b>1. Too few arguments</b> Possible value(s) are         statistics       modem-configuration         configuration       chat-script

## Serial Commands – Show

Command Syntax	show serial [s0/s1] statistics
Description	<ul> <li>Displays Serial Statistics.</li> <li>Status (If serial is used by any application)</li> <li>Rx Bytes</li> <li>Rx Errors</li> <li>Tx Bytes</li> <li>Tx Errors</li> <li>Status of EIA signals (CTS, DSR, DCD, RTS, DTR).</li> </ul> Important Note: Serial statistics are only for the current session. Rx Bytes, Tx Bytes will be reset for every session opened on the serial.
Default Value	-
Success	OK
Error	<b>1. Too few arguments</b> Possible value(s) are         statistics       modem-configuration         configuration       chat-script

Command Syntax	show serial modem country code This command is supported on S1 only.
Description	Displays the supported country codes for this product.
Default Value	·
Success	ОК
Error	1. Too few arguments Possible value(s) are statistics modem-configuration chat-script configuration country-code

# **PPP Setup Commands**

Note: All PPP Commands use the ppp0 interface, which corresponds to the modem port S1.

Command Syntax	set ppp <interface> authentication <enable disable=""></enable></interface>
Description	Enables/disables PPP Authentication.
Default Value	Disabled
Success	ОК
Error	<ol> <li>Too few arguments         Possible argument(s) are <i>disable</i> and <i>enable</i> </li> <li>Invalid string         Invalid argument.         Valid argument(s) are <i>disable</i> and <i>enable</i> </li> <li>Multiple matches: <i>auth-type</i> and <i>authentication</i></li> </ol>

Command Syntax	set ppp <interface> auth-type <pap chap="" pap-chap=""></pap></interface>
Description	Sets the protocol to authenticate the remote peer: PAP/CHAP/PAP-CHAP
Default Value	PAP
Success	ОК
Error	1. Too few arguments
	Too few argument(s). Possible argument(s) are:
	chap, pap, and pap-chap
	2. Invalid authentication type
	Invalid argument. Valid argument(s) are
	chap, pap, and pap-chap
	3. Multiple matches: auth-type and authentication

Command Syntax	set ppp <interface> compression <enable disable=""></enable></interface>
Description	Enables/disables CCP compression.
Default Value	Disabled
Success	ОК
Error	1. Too few arguments
	Possible argument(s) are disable and enable
	2. Invalid string
	Invalid argument. Valid argument(s) are disable and enable

Command Syntax	set ppp <interface> comp-type <both bsd="" deflate=""></both></interface>
Description	Sets the compression type to BSD, DEFLATE or BOTH.
	In the case of NON-RAWMODE: When <b>both</b> is configured as the compression type, the module tries to negotiate DEFLATE first. In the event of failure, the BSD is negotiated.
	In case of RAW-MODE: Compress-type <b>both</b> is not supported in RAW-MODE, since there are no negotiations between MultiConnect IP Modules.
Default Value	Deflate
Success	OK
Error	<ol> <li>Too few arguments         Too few argument(s). Possible argument(s) are both, bsd, deflate     </li> <li>Invalid string         Invalid argument "string"         Valid argument(s) are both, bsd, deflate     </li> </ol>

# PPP Commands – Setup

Command Syntax	set ppp <interface> dialing-max-retries &lt;0-100&gt;</interface>
Description	Configures the maximum number of dialing retries.
-	Maximum dialing retry is 100
Default Value	5
Success	ОК
Error	1. Too few arguments
	"Usage: set ppp ppp0 dialing-max-retires [0-100](times)
	Type 'set ppp ppp0 dialing-max-retries ?' for more information"
	2. Multiple matches
	dialing-max-retries and dialing-retry-interval
	3. Retry range
	"error: dialing-max-retries range : [0 - 100]
	Type 'set ppp ppp0 dialing-retry-interval ?' for more information"

Command Syntax	set ppp <interface> dialing-retry-interval &lt;0-300&gt;</interface>
Description	Configures the interval for the port to retry dialing.
	Maximum dialing retry is 300.
Default Value	15
Success	OK
Error	1. Too few arguments
	"Usage: set ppp ppp0 dialing-retry-interval [0-300](secs)
	Type 'set ppp ppp0 dialing-retry-interval ?' for more information"
	2. Multiple matches
	dialing-max-retries and dialing-retry-interval
	3. Retry range
	"error: dialing-retry-interval range : [0 - 300]
	Type 'set ppp ppp0 dialing-retry-interval ?' for more information"

Command Syntax	set ppp <interface> idle-timeout &lt;0-900&gt;</interface>
Description	Configures the dial-on-demand idle timeout value . <b>Maximum</b> dialing retry is <b>900 secs</b>
Default Value	600 secs
Success	ОК
Error	1. Too few arguments
	"Usage: set ppp ppp0 idle-timeout <0-900>
	Type set ppp ppp0 idle-timeout ?' for more information"
	2 Idle timeout range
	"error: dod-idle-timeout range : [0 - 900]
	Type 'set ppp ppp0 idle-timeout ?' for more information"

Command Syntax	set ppp <interface> ipcp-mode <client-only client-or-lan=""></client-only></interface>
Description	Sets the IPCP mode-to-client-only or client or LAN.
Default Value	client-only
Success	ОК
Error	1. Too few arguments
	Possible argument(s) are <i>client-only</i> and <i>client-or-lan</i>
	2. Invalid string
	Invalid argument.
	Valid argument(s) are <i>client-only</i> and <i>client-or-lan</i>

## PPP Commands – Setup

Command Syntax	set ppp <interface> local-ip-addr <ipaddr> mask <ipmask></ipmask></ipaddr></interface>
Description	During IPCP negotiations, the configured IP address is sent for the local
	interface. In the case where the peer is requested to provide the IP
	address, it can be configured as 0.0.0.0
Default Value	0.0.0.0
	255.255.255.0
Success	OK
Error	1. Too few arguments
	Possible arguments are IP Address and Mask
	2. Invalid IP address/Mask
	Invalid argument

Command Syntax	set ppp <interface> password <password></password></interface>
Description	Sets the password that remote peers will use for authentication.
Default Value	Ipmodule
Success	ОК
Error	1. Password Length Password should have minimum of 8 characters

Command Syntax	set ppp <interface> remote-ip-addr <ipaddr> mask <ipmask></ipmask></ipaddr></interface>
Description	During IPCP negotiations, this configured IP address is sent for the remote
	interface. In the case of the peer being requested to provide the IP address,
	it can be configured as 0.0.0.0
Default Value	0.0.0.0
	255.255.255.0
Success	ОК
Error	1. Too few arguments
	Possible arguments are IP Address and Mask
	2. Invalid IP address/Mask
	Invalid argument

Command Syntax	set ppp <interface> username <username></username></interface>
Description	Sets the user name that the remote peer will use for authentication.
Default Value	Ipmodule
Success	ОК
Error	1. Too few arguments
	Possible value(s) are valid user name

PPP Commands – Show

Command Syntax	show ppp ppp0 configuration
Description	Displays: PPP Status (enabled/disabled) Authentication status Authentication type Username and password for authentication Compression status Compression type IPCP Mode Local IP Address Remote IP Address
Default Value	NA
Success	ОК
Error	<ol> <li>Too few arguments         Possible argument(s) are             configuration ip-addr             statistics link-status     </li> <li>Invalid argument         Invalid argument(s) are             configuration ip-addr             statistics link-status     </li> </ol>

Command Syntax	show ppp <interface> ip-addr</interface>
Description	Displays: Local IP Address
	Remote IP Address
Default Value	NA
Success	OK
Error	<ol> <li>Too few arguments         Possible argument(s) are             configuration ip-addr             statistics link-status     </li> <li>Invalid argument         Valid argument(s) are         configuration ip-addr     </li> </ol>
	configuration ip-addr statistics link-status

Command Syntax	show ppp <interface> link-status</interface>
Description	Displays the link status on ppp interface.
Default Value	-
Success	OK Up / Down
Error	1. Too few arguments Possible argument(s) are configuration ip-addr statistics link-status         2. Invalid argument Invalid argument Valid argument(s) are configuration ip-addr statistics link-status

## **PPP Commands – Show**

Command Syntax	show ppp <interface> statistics</interface>
Description	Displays PPP Statistics.
Default Value	•
Success	OK
Error	<ol> <li>Too few arguments         Possible argument(s) are configuration ip-addr statistics link-status         Invalid argument Invalid argument Valid argument(s) are: configuration ip-addr statistics link-status     </li> </ol>

#### HTTP Server Commands – Setup

# **HTTP Server Commands**

The commands in this section are listed in the order in which they might be used.

Command Syntax	set ip http-page <default serial=""></default>
Description	This parameter is used by the http server to host the default HTML index or host-defined http-serial-S0 HTML page.
Default Value	Default
Success	ОК
Error	1. Too few arguments
	"Usage: set ip http-page <default serial=""></default>
	Type set ip http-page ?"
	2. Invalid string
	Type "set ip http-page ?"

Command Syntax	set ip http <enable disable=""></enable>
Description	This enables the http server on the MultiConnect IP to listen on Port 80.
Default Value	Disable
Success	ОК
Error	<ol> <li>Too few arguments         "Usage: set "ip http <enable disable="">         Type 'set ip http ?' for more information"         Invalid string         "ERROR: Invalid string         Type 'set ip http ?' for more information"</enable></li> </ol>

Command Syntax	set ip http-port <port></port>
Description	Sets the HTTP server to listen on the specified port.
Default Value	80
Success	OK
Error	<ol> <li>Too few arguments         "Usage: set ip http-port <port>         Type set 'ip http-port ?' for more information"         Invalid port number         "ERROR: Invalid port number</port></li> </ol>
	Type set 'ip http-port ?' for more information"

Command Syntax	set device-parameter P <n> <value> where n = 0 to 99.</value></n>
Description	Sets the value of the parameter from the host/serial device.
Default Value	Value in the default parameter list file uploaded through TFTP.
Success	OK
Error	1. Too few arguments
	"Usage: set device P <n> <value></value></n>
	Type 'set device P <n> ?' for more information"</n>
	2. Invalid string
	"ERROR: Invalid string
	Type 'set device P <n> ?' for more information"</n>

# HTTP Server Commands – Setup

Command Syntax	save param
Description	Invoking this command will save the host parameters into the flash. The "/var/apps" directory is gun zipped to apps.tar.gz and written into flash. (APPS _SECTOR)
Default Value	-
Success	ОК
Error	1. Too few arguments "ERROR: Too few arguments Type 'save ?' for more information"

# HTTP Server Commands – Show

Command Syntax	show http configuration
Description	Displays the HTTP related configurations.
Default Value	-
Success	OK
Error	<ol> <li>Too few arguments</li> <li>"ERROR: Too few arguments</li> <li>Type 'show http configuration ?' for more information"</li> </ol>

Command Syntax	show device-parameter P <n> where n = 0 to 99.</n>
Description	Displays the value of the requested parameter from MultiConnect IP.
Default Value	-
Success	ОК
Error	1. Too few arguments "ERROR: Too few arguments Type 'show device-parameter ?' for more information"

Command Syntax	show device-parameter modified
Description	Displays the status of the host parameters; for example, whether they are changed by the browser. Returns "Device parameters changed" when values are changed by the remote browser. Returns "Device parameters not changed" when values are not changed.
Default Value	-
Success	ОК
Error	<ol> <li>Too few arguments</li> <li>"ERROR: Too few arguments Type 'show device-parameter ?' for more information"</li> </ol>

#### SMTP Client Commands – Setup

# **SMTP Client Commands**

The commands in this section are listed in the order in which they might be used.

Command Syntax	set send-mail smtp-server-name <name ip-address=""></name>
Description	Sets the SMTP server name or IP address. Server names must be such that they can be resolved by the DNS.
Default Value	NULL
Success	ОК
Error	<ol> <li>Too few arguments         "Usage: set send-mail smtp-server-name <name ip-address="">         Type 'set send-mail smtp-server-name ?' for more information"         Linvalid name/IP address         "ERROR: Invalid SMTP Server Name/IP Address"     </name></li> </ol>

Command Syntax	set send-mail smtp-server-port <port></port>
Description	Sets the SMTP Server port.
Default Value	25
Success	ОК
Error	1. Too few arguments
	"Usage: set send-mail smtp-server-port <port></port>
	Type 'set send-mail smtp-server-port ?' for more information"

Command Syntax	set send-mail host-name <host name=""></host>
Description	Sets the SMTP Client host name.
Default Value	NULL
Success	ОК
Error	1. Too few arguments
	"Usage: set send-mail host-name <host name=""></host>
	Type 'set send-mail host-name ?' for more information"

Command Syntax	set send-mail from-address-identity <name></name>
Description	Sets the 'From:' description in the email header as <name>.</name>
Default Value	NULL
Success	ОК
Error	1. Too few arguments
	"Usage: set send-mail from-address-identity <name></name>
	Type 'set send-mail from-address-identity ?' for more information"

Command Syntax	set send-mail from-address <email-address></email-address>
Description	Sets the email-address as the Default From address information.
Default Value	NULL
Success	ОК
Error	1. Too few arguments
	"Usage: set send-mail from-address <email-address></email-address>
	Type 'set send-mail from-address ?' for more information"

SMTP Client Commands – Setup

Command Syntax	set send-mail to-address <n> <email-address> where n = 1 to 5.</email-address></n>	
Description	Sets the email-address as one of the primary addressee. This is the default	
	email address to which email messages are sent.	
Default Value	NULL	
Success	OK	
Error	1. Too few arguments	
	"Usage: set send-mail to-address <n> <email-address></email-address></n>	
	Type 'set send-mail to-address <n> ?' for more information"</n>	
	2. Invalid to-address number	
	"ERROR: to-address numbers supported: [1 to 5]	
	Type 'set send-mail to-address <n> ?' for more information"</n>	

Command Syntax	set send-mail cc-address <n> <email-address> where n = 1 to 5.</email-address></n>
Description	Sets the email-address as the alternate addressee (carbon copy). This is
	the default email address that the primary addressee's email messages are
	copied.
Default Value	NULL
ort <b>e</b> l: [ 1 to ]e	9
Typ 'set sed-maildr	(e)575(ss )6( <n)575(> ' for more inform)5.2(ation" )]T ET0 0 0.5 rg75.724</n)575(>

## SMTP Client Commands – Setup

Command Syntax	send-mail [-b]	
	[-t <email-address1, email-address2,="">]</email-address1,>	
	[-c <email-address1, email-address2,="">]</email-address1,>	
	[-s <data>]</data>	
	[-d <msg body="">]</msg>	
Description	Triggers the SMTP Client application. The application enters the interactive mode or sends the mail according to the command arguments.	
	Notes:	
	All the arguments are optional. This implies that an email can be sent by specifying the parameter(s) in the command line (or) entering them in the order prompted by MultiConnect IP.	
	Usage:	
	-b : binary mode {default is text mode}	
	-t : To addresses	
	-c : CC addresses	
	-s : Subject Data	
	-d : Message Body	
Default Value	•	
Success	Email Sent Successfully	
	OK	
Error	1. Too few arguments	
	Usage: send-mail [<-b>] [ -t <email-address,>] [-c <email-address,< th=""></email-address,<></email-address,>	
	>] [-s <data>] [-d <msg body="">]</msg></data>	
	Type 'send-mail ?' for more information"	

Command Syntax	show send-mail configuration
Description	Displays the SMTP configuration.
Default Value	•
Success	ОК
Error	1. Too few arguments "Usage: show send-mail configuration
	Type 'show send-mail ?' for more information"

## POP3 Client Commands – Setup

# **POP3 Client Commands**

Command Syntax	set recv-mail server-name <server-name></server-name>
Description	This parameter is set by the host to establish the POP3 connection for receiving the email from the remote server. This also needs DNS to be enabled on the MultiConnect IP.
Default Value	None
Success	ОК
Error	<ol> <li>Too few arguments         Usage: set recv-mail server-name <server-name>         Type 'set recv-mail server-name ?' for more information         </server-name></li> <li>Invalid string         Type 'set recv-mail server-name ?' for more information</li> </ol>

Command Syntax	set recv-mail server-port <server-port></server-port>
Description	This parameter is set by the host to establish the POP3 connection for receiving email from the remote server.
Default Value	110
Success	ОК
Error	<ol> <li>Too few arguments         Usage: set recv-mail server-port <server-port>         Type 'set recv-mail server-port ?' for more information</server-port></li> <li>Invalid string         Type 'set recv-mail server-port ?' for more information</li> </ol>

Command Syntax	set recv-mail mailbox-name <mailbox-name></mailbox-name>
Description	Sets the mail box user name for POP3 server authentication.
Default Value	None
Success	ОК
Error	1. Too few arguments
	Usage: set recv-mail mailbox-name <mailbox-name></mailbox-name>
	Type 'set recv-mail mailbox-name ?' for more information
	2. Invalid string
	Type 'set recv-mail mailbox-name ?' for more information

Command Syntax	set recv-mail mailbox-password <mailbox-password></mailbox-password>
Description	Sets the mail box password for POP3 server authentication.
Default Value	None
Success	OK
Error	<ol> <li>Too few arguments         Usage: set recv-mail mailbox-password <mailbox-password>         Type 'set recv-mail mailbox-password ?' for more information</mailbox-password></li> <li>Invalid string         Type 'set recv-mail mailbox-password ?' for more information</li> </ol>

# POP3 Client Commands – Setup

Command Syntax	set recv-mail leave-on-server <enable disable=""></enable>
Description	Set the variable "leave a copy of message on server" flag, which tells the
	POP3 server not to delete the emails from it once the emails are received.
Default Value	Disable
Success	ОК
Error	1. Too few arguments

Command Syntax	recv-mail list [index]
Description	This command retrieves list of emails from the mailbox.
_	Displays the list of emails in the order below:
	<index mail="" of="" the=""> <size bytes="" in=""></size></index>
	or
	Mailbox is empty
Default Value	-
Success	ОК
Error	1. Too few arguments
	Usage: recv-mail list [index]
	Type 'recv-mail ?' for more information

Command Syntax	recv-mail header [index]
Description	This command receives the header information of all the emails present in the mailbox if index is not issued. If index is issued, the mail header corresponding to the index is retrieved.
Default Value	-
Success	ОК
Error	1. Too few arguments Usage: recv-mail header [index] Type 'recv-mail ?' for more information

Command Syntax	recv-mail mail [index]
Description	This command retrieves all the pending emails present in the mailbox if index is not given. If index is issued, the email corresponding to the index is
	retrieved.
Default Value	-
Success	ОК
Error	1. Too few arguments
	Usage: recv-mail mail [index]
	Type 'recv-mail ?' for more information

Command Syntax	recv-mail delete <index></index>
Description	Deletes the email corresponding to the index. The emails will not be deleted until the " <b>recv-mail quit</b> " command is executed.
Default Value	-
Success	OK
Error	1. Too few arguments Usage: recv-mail delete <index> Type 'recv-mail ?' for more information</index>

# POP3 Client Commands – Setup

Command Syntax	recv-mail top <index> <n></n></index>
Description	Displays the first <n> lines of the mail corresponding to index. If n is greater the email size then the whole message is displayed.</n>
Default Value	•
Success	ОК
Error	1. Too few arguments Usage: recv-mail top [index] Type 'recv-mail top' for more information

# POP3 Client Commands – Show

Command Syntax	recv-mail unique-id-listing [index]
Description	Displays the unique ID listing from the server in the order below: <index of<="" th=""></index>
	the mail> <unique id="">.</unique>
	If index is specified, only the corresponding unique ID is displayed.
	If index is not specified, all unique IDs in the mail box are displayed.
Default Value	-
Success	ОК
Error	1. Too few arguments
	Usage: recv-mail unique-id-listing [index]
	Type 'recv-mail ?' for more information

Command Syntax	recv-mail stat [index]
Description	Displays the statistics of an email or emails for a given index.
Default Value	-
Success	ОК
Error	1. Too few arguments Usage: recv-mail stat [index] Type 'recv-mail ?' for more information

Command Syntax	show recv-mail configuration
Description	Displays the recv-mail related configuration.
Default Value	-
Success	ОК
Error	1. Too few arguments
	Possible value(s) are configuration

# **FTP Client Commands**

Command Syntax       set ftp device <default host-name="" ip-address="">         login <username>       [password <password> [account <account password="">]         Description       Sets/clears the device login name, password and account password detail that will be used by FTP for automatic authentication.         The Password is an optional parameter and can be configured along with the machine and login names only       The Account Password is an optional parameter and can be configured along with device login name and password only.         The IP module prompts for login name and password if these details are NULL.       Note:         "set ftp machine" resets all these parameters to NULL</account></password></username></default>	;
DescriptionSets/clears the device login name, password and account password detail that will be used by FTP for automatic authentication. The Password is an optional parameter and can be configured along with the machine and login names only The Account Password is an optional parameter and can be configured along with device login name and password only. The IP module prompts for login name and password if these details are NULL. Note:	;
<ul> <li>that will be used by FTP for automatic authentication.</li> <li>The Password is an optional parameter and can be configured along with the machine and login names only</li> <li>The Account Password is an optional parameter and can be configured along with device login name and password only.</li> <li>The IP module prompts for login name and password if these details are NULL.</li> <li>Note:</li> </ul>	;
the machine and login names only The Account Password is an optional parameter and can be configured along with device login name and password only. The IP module prompts for login name and password if these details are NULL. <b>Note:</b>	
along with device login name and password only. The IP module prompts for login name and password if these details are NULL. <b>Note:</b>	
NULL. Note:	
"set fin machine" resets all these parameters to NULL	
<b>Juliu nuonine</b> resets an trese parameters to NULL	
Default Value NULL	
Success OK	
Error 1. Invalid arguments	
"error: Login name cannot be null	
Type set ftp ? for more information"	
2. Invalid arguments	
error: Password cannot be null	
Type set ftp ? for more information"	
3. Invalid arguments	
error: Account Password cannot be null	
Type set ftp ? for more information"	
4. Invalid arguments	
error: Invalid usage Type set ftp ? for more information"	
5. Too few arguments	
"Usage: set ftp machine <default (1-40)="" hostname="" ip-address=""> login</default>	
<ul> <li><ul> <li><ul></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul></li></ul>	_ I
password (1-20)>]	
Type set ftp ? for more information"	

Command Syntax	ftp <ftp server-ip-addr=""></ftp>
Description	The FTP client on board connects to the remote FTP server. Upon
	successful connection, the Send and Receive commands of the FTP can
	be used to perform the required operation.
Default Value	NA
Success	OK
Error	1. Too few arguments
	Possible argument(s) are:
	IP-address
	2. Invalid IP address
	error: invalid ipaddress.
	3. When invoked from Command shell connected through TELNET
	This command is not supported through Telnet

# FTP Client Commands – Setup

ftp < [-I] [-t] [-r] > [-p] <ip-address host-name=""></ip-address>
Triggers the FTP client to establish the FTP session with the remote server and to perform the required action according to the specified option.
<ul> <li>-p: Opens the Data connection in Passive mode. (If this option is not given, the data connection will be opened in Active mode by default).</li> </ul>
<ul> <li>-I : Requests for the directory and lists the contents of the specified directory in the server.</li> </ul>
-t : Requests for the filename and filesize to the transmitted and reads the data from the host device and transmits to the server.
-r : Requests for the remote filename to be received. It informs the host device about the size of the file and retrieves the data from the server when serial device is ready.
Note:
1. FTP session can be aborted by issuing <b>Ctrl+C</b> at any given time.
NULL
OK
1. Invalid arguments
ftp < [-I] [-t] [-r] > [-p] <ip-address hostname=""></ip-address>
Type set ftp ? for more information"
2. Too few arguments
"Usage: ftp < [-I] [-t] [-r] > [-p] <ip-address hostname=""> Type set ftp ? for more information"</ip-address>

# FTP Client Commands – Show

Command Syntax	show ftp configuration
Description	Displays the FTP profile configured in the MultiConnect IP.
Default Value	NULL
Success	OK
Error	1. Too few arguments
	Possible value(s) are configured.

# **SNTP Client Commands**

Command Syntax	set sntp client <enable disable=""></enable>
Description	Starts the SNTP Client to contact the configured server on UDP port 123 and set the local time.
Default Value	Disable
Success	ОК
Error	<ol> <li>Too few arguments         <ul> <li>"Usage: set sntp-client <enable disable=""></enable></li> <li>Type set sntp-client ? for more information"</li> </ul> </li> </ol>

Command Syntax	set sntp-client ntp-server-name <ip-address></ip-address>
Description	Sets the NTP server IP address to which the SNTP Client has to contact to update the time.
Default Value	0.0.0.0
Success	OK
Error	<ol> <li>Invalid arguments         <ul> <li>"error: Invalid IP address"</li> <li>Type set sntp-client ? for more information"</li> </ul> </li> <li>Too few arguments         <ul> <li>"Usage: set sntp-client ntp-server-name <ip-address></ip-address></li> <li>Type set sntp-client ntp-server-name ? for more information"</li> </ul> </li> </ol>

Command Syntax	set sntp-client time-zone <string (0-3)=""></string>
Description	Sets the time zone.
Default Value	UTC
Success	ОК
Error	<ol> <li>Invalid arguments         "error: Invalid Time Zone"</li> <li>Too few arguments         "Usage: set sntp-client time-zone <string (0-3)="">         Type set sntp-client time-zone ? for more information"</string></li> </ol>

Command Syntax	set sntp-client time-zone-offset <+/-hh:mm> where hh = 00 to 23 mm = 00 to 59
Description	Sets the offset time from UTC.
Default Value	+00:00
Success	ОК
Error	<ol> <li>Invalid arguments         "error: Invalid Offset"</li> <li>Too few arguments         "Usage: set sntp-client time-zone-offset &lt;+/-hh:mm&gt;         Type set sntp-client time-zone-offset ? for more information"</li> </ol>

# SNTP Client Commands – Setup

Command Syntax	set sntp-client polling-time <value></value>
	where
	value = 2 to 1440
Description	Sets the polling time at which SNTP client requests the server to update the
	time.
Default Value	300
Success	ОК
Error	1. Invalid arguments
	"error: Invalid Polling time"
	2. Too few arguments
	"Usage: set sntp-client polling-time <value></value>
	Type set sntp-client polling-time ? for more information"

Command Syntax	set sntp-client daylight-saving <enable disable=""></enable>
Description	Enables/Disables the Day Light Saving Mode.
Default Value	Enable
Success	OK
Error	1. Invalid arguments
	"error: Invalid parameter"
	2. Too few arguments
	"Usage: set sntp-client daylight-saving <enable disable=""></enable>
	Type set sntp-client daylight-saving ? for more information"

Command Syntax	set sntp-client daylight-saving offset <+/-value> where value = 0 to 120 minutes	
Description	Sets the offset to use during the Day Light Saving Mode.	
Default Value	60	
Success	ОК	
Error	1. Invalid arguments "error: Invalid offset value"	
	<ol> <li>Too few arguments</li> <li>"Usage: set sntp-client daylight-saving offset <value></value></li> <li>Type set sntp-client daylight-saving offset ? for more information"</li> </ol>	

Command Syntax	set sntp-client daylight-saving start-ordinal <string></string>	
	where string = first/second/third/forth/last	
Description	Sets the start ordinal to use during the Day Light Saving Mode.	
Default Value	First	
Success	ОК	
Error	1. Invalid arguments "error: Invalid start ordinal"	
	<ul> <li>Too few arguments</li> <li>"Usage: set sntp-client daylight-saving start-ordinal <string></string></li> <li>Type set sntp-client daylight-saving start-ordinal ? for more information"</li> </ul>	

# SNTP Client Commands – Setup

Command Syntax	set sntp-client daylight-saving start-weekday <dayofweek> where dayofweek = sunday, monday Saturday</dayofweek>	
Description	Sets the start weekday to use during the Day Light Saving Mode.	
Default Value	Sunday	
Success	OK	
Error	<ol> <li>Invalid arguments         "error: Invalid start day of the week"</li> <li>Too few arguments         "Usage: set sntp-client daylight-saving start-weekday <dayofweek>         Type set sntp-client daylight-saving start-weekday ? for more         information"</dayofweek></li> </ol>	

Command Syntax	set sntp-client daylight-saving start-month <month> where month = january, february December</month>	
Description	Sets the start month to use during the Day Light Saving Mode.	
Default Value	April	
Success	OK	
Error	<ol> <li>Invalid arguments         "error: Invalid start month"</li> <li>Too few arguments         "Usage: set sntp-client daylight-saving start-month <month>         Type set sntp-client daylight-saving start-month ? for more information"</month></li> </ol>	

Command Syntax	set sntp-client daylight-saving start-time <hh:mm> where hh = 00 to 23 mm = 00 to 59</hh:mm>	
Description	Sets the start time to use during the Day Light Saving Mode.	
Default Value	02:00	
Success	ОК	
Error	<ol> <li>Invalid arguments         "error: Invalid start time"</li> <li>Too few arguments         "Usage: set sntp-client daylight-saving start-time <hh:mm>         Type set sntp-client daylight-saving start-time ? for more information"</hh:mm></li> </ol>	

Command Syntax	set sntp-client daylight-saving end-ordinal <string> where string = first/second/third/forth/last</string>	
Description	Sets the end ordinal to use during the Day Light Saving Mode.	
Default Value	Last	
Success	OK	
Error	<ol> <li>Invalid arguments         "error: Invalid end ordinal"</li> <li>Too few arguments         "Usage: set sntp-client daylight-saving end-ordinal <string>         Type set sntp-client daylight-saving end-ordinal ? for more information"</string></li> </ol>	

# SNTP Client Commands – Setup

Command Syntax	set sntp-client daylight-saving end-weekday <dayofweek> where</dayofweek>		
	dayofweek = Sunday, Monday Saturday		
Description	Sets the end weekday to use during the Day Light Saving Mode.		
Default Value	Sunday		
Success	OK		
Error	<ul> <li>2. Invalid arguments "error: Invalid end day of the week"</li> <li>2. Too few arguments "Usage: set sntp-client daylight-saving end-weekday <dayofweek> Type set sntp-client daylight-saving end-weekday ? for more information"</dayofweek></li> </ul>		

Command Syntax	set sntp-client daylight-saving end-month <month> where month = january,december</month>	
Description	Sets the end month to use during the Day Light Saving Mode.	
Default Value	October	
Success	OK	
Error	2. Invalid arguments "error: Invalid end month"	
	<ul> <li>Too few arguments</li> <li>"Usage: set sntp-client daylight-saving end-month <month></month></li> <li>Type set sntp-client daylight-saving end-month ? for more information"</li> </ul>	

Command Syntax	set sntp-client daylight-saving end-time <hh:mm> where hh = 00 to 23 mm = 00 to 59</hh:mm>	
Description	Sets the end time to use during the Day Light Saving Mode.	
Default Value	02:00	
Success	ОК	
Error	<ol> <li>Invalid arguments "error: Invalid end time"</li> <li>Too few arguments "Usage: set sntp-client daylight-saving end-time <hh:mm> Type set sntp-client daylight-saving end-time ? for more information"</hh:mm></li> </ol>	

## SNTP Client Commands – Show

Command Syntax	show sntp configuration	
Description	Displays the SNTP configuration	
Default Value	NA	
Success	ОК	
Error	1. Too few arguments	
	Possible value(s) are configuration	

# Chapter 5 – Setting Country or Region Codes Using the CLI

# The Default Country or Region Code is B5.

If You Want to Change the Country or Region Code, Use the Command Line Interface:

Command Syntax	set serial s1 modem country-code value <value></value>	
Description	Sets the modem country code value to <value>. This command is valid only for port S1. Applicable only if the country-code type is set to <b>code.</b></value>	
Default Value	-	
Success	ОК	
Error	<ol> <li>Too few arguments         "Usage: set serial s1 modem country-code value <value>         Type 'set serial s1 modem country-code value ?' for more information"         Notes: There is no validation on the country code value.</value></li> </ol>	

## To View Country or Region Code:

Command Syntax	show serial modem country code This command is supported on S1 only.	
Description	Displays the supported country codes for this product.	
Default Value	•	
Success	ОК	
Error	1. Too few arguments Possible value(s) are statistics configuration modem-configuration	country-code chat-script

**Country or Region Codes** – The list below is an example of the country or region code settings for the countries or regions that Multi-Tech currently supports. For your country or region code, please check with Multi-Tech Technical Support

Country/Region	Value (Country Code)	Cou	untry/Region	Value (Country Code)
Argentina	07		taly	FD
Australia	09		Japan	00
Austria	FD		Korea	B5
Belgium	FD		Liechtenstein	FD
Brazil	16		Luxembourg	FD
Canada	B5		Vexico	B5
China	B5		Netherlands	FD
Cyprus	FD		New Zealand	7E
Czech Republic			Norway	FD
Denmark	FD		Philippines	B5
Finland	FD		Portugal	FD
France	FD		Slovak Republic	FD
Germany	FD		Spain	FD
Greece	FD		Sweden	FD
Hong Kong	99		Switzerland	FD
Hungary	FD		Taiwan	FE
Iceland	FD		United Kingdom	FD
Indonesia	99		United States	B5
Ireland	FD			

# Chapter 6 - Prerequisite Configurations

This chapter covers prerequisite tasks, those tasks or configurations that must be completed before you can set up certain operating scenarios.

Other prerequisite tasks related to specific operating scenarios are described throughout the rest of this document.

## 1. MultiConnect IP Communication Interfaces and Conventions

The Serial Interface ports, S0 and S1, correspond to **Device Port** and **Modem Port** respectively. This convention is used throughout this document.



#### **Serial Ports**

- 1. S0 Device Port RS-232 port connects to the Host/Serial device.
- 2. S1 Modem Port RJ-11 phone jack port dials the Service Provider, obtains an IP Address, and provides the IP ability to reach the Host/Serial devices connected over the device port.

## 2. MultiConnect IP Modes of Operation

The MultiConnect IP can function in two modes:

#### • Transparent Mode

When the MultiConnect IP is configured to function in the *modem* operation mode, it functions as a modem. The Host/Serial device connected on the *device port* can use the MultiConnect IP as a modem in transparent mode.

Refer to **Chapter 9** for application examples that use Transparent Mode.

#### • IP Mode

When the MultiConnect IP is configured to function in the IP operation mode, it provides an IP ability to reach the Hosts/Serial devices connected over the device port. Application such as SMTP Client, POP3 Client, Telnet Client, Telnet Server, FTP Client, etc. provide this IP ability to reach the Host/Serial devices.

The figure below depicts the two modes of operation. The modes can be configured through the Command Line Interface (CLI). By default the MultiConnect IP is set to operate in the **IP Mode**.







## 3. Physical Link Established over the Modem Port

For any application such as SMTP Client, HTTP Server, POP3 Client, etc. to function, the PPP link must be opened up on the modem port.

MultiConnect IP implementation provides three mechanisms for establishing the physical link over the modem port:

- Dialing-trig-mode NONE
- Dialing-trig-mode DTR
- Dialing-trig-mode Command

Choose the method you desire by configuring the physical link through the Command Line Interface (CLI). Use the following command to configure the **Physical Link Establishment Method**:

Note: The modem port is set to modem-answering by default.

The command dialing-trig-mode can be used to set the modem port to dial.

Dialing-trig-mode	Functionality		
None	Upon boot-up, the modem starts dialing using the set of configured parameters.		
DTR	Upon boot-up, the modem is set to the answering state by default. When the <b>DTR</b> goes high on the device port S0, the modem starts to dial on the modem port.		
Command	Link establishment and link termination is at your discretion. Command to establish the physical link: # linkup [serial-interface]		
	<ul> <li>Notes:</li> <li>This command is valid only for modem port S1 and is invalid for device port S0.</li> <li>This command can be issued only when the dialing-trig-mode is command.</li> </ul>		
	Examples: # linkup s1 ERROR: 'dialing-trig-mode is not set to command.		
	# linkup s1 OK: 'CONNECT 14400 LAPM COMPRESSED'		
	# linkup s1 ERROR: 'NO DIALTONE'		
	# linkup s1 ERROR: 'NO CARRIER'		
	# linkup s1 ERROR: 'NO ANSWER'		
	Command to terminate the physical link: # hangup [serial-interface]		
	<ul> <li>Notes:</li> <li>This command is valid only for modem port S1 and is invalid for device port S0</li> <li>This command can be issued only when the dialing-trig-mode is command.</li> </ul>		
	Example: # hangup s1 OK This hangs up the physical link		

# Chapter 7 – Telnet Dialout

# Introduction

# **Telnet Dialout Feature**

The Telnet feature allows you to access the serial port and establish two-way traffic between the Telnet/RAW-TCP client and the serial device.

This chapter provides examples of a Telnet client on an IP network (over the modem port) connecting to a remote serial device. The MultiConnect IP acts as a Terminal Server using the Telnet dialout feature.

# **Features**

The MultiConnect IP, acting as a Terminal Server, accommodates the following features:

- Authenticates the serial port.
- Monitors and waits for activity on the standard Telnet port (23) or user-defined RAW-Socket.
- Opens the serial port from the command prompt (manual dialout) .
- Opens the serial port directly (auto dialout) using a TCP Client according to the configured port-number.
- Switches between the command prompt and a dial-out session when the session is in Telnet mode.

# **Prerequisites**

## Mandatory Configuration Settings

The following items must be configured in order to use the dial-out feature:

- Disable the Host Interaction Mode to restrict Telnet-Dial-Out and PPP. # set serial s0 host-interaction-mode disable
- Enable Auto dial-out globally on all the serial ports.
   # set ip telnet auto-dialout enable
- Enable Auto dial-out on the serial port S0.
   # set serial s0 auto-dialout enable
- Set the Auto dialout port for the serial port S0.
   # set serial s0 auto-dialout-port <port\_number>
- Set the Auto dialout protocol for the serial port SO. # set serial s0 auto-dialout-protocol telnet

An ERROR message displays if any of the above details are not configured or are not valid.

# **Optional Configuration Commands**

(Return to Scenario 1 - Setup Manual Dialout <u>Notes:</u>) (Return to Scenario 2 - Auto Dialout <u>Prerequisites</u>) (Return to Scenario 3 - Auto Dial-out in RAW-Mode <u>Notes:</u>)

#### The following commands can be used for optional configurations:

- Enable/Disable the Authentication for Dial-out session
   # set login auto-dialout-login <enable/disable>
- Enable/Disable the Switching-between-Dialout & Command Prompt feature
   # set ip telnet escape-monitor <enable/disable>
- Set the Escape-Monitor-String to switch between Dialout and Command Prompt sessions.
   # set ip telnet escape-string "+++inet"
- Enable/Disable the RAW mode globally for all Dial-out sessions.
   # set ip telnet raw-mode <enable/disable>
- Enable/Disable the RAW mode for the serial port S0.
   # set serial s0 raw-dialout <enable/disable>
- Set the Baud rate for the serial port S0 to be taken for a Dialout session.
   # set serial s0 baud-rate <Baud-rate>
- Set the Flow control for the serial port S0 to be taken for a Dialout session. # set serial s0 flow-control <rts-cts/none>
- Set the Parity for the serial port S0 to be taken for a Dialout session.
   # set serial s0 parity <even/odd/none>
- Set the Data bits for the serial port SO to be taken for a Dialout session. # set serial s0 data-bits <7/8>
- Set the Stop bits for the serial port S0 to be taken for a Dialout session. # set serial s0 stop-bits <1/1.5/2>
- Set the Flow control for the serial port S1 to be taken for a PPP session # set serial s1 flow-control <rts-cts/none>
- Set the Parity for the serial port S1 to be taken for a PPP session # set serial s1 parity <even/odd/none>
- Set the Data bits for the serial port S1 to be taken for a PPP session # set serial s1 data-bits <7/8>
- Set the Stop bits for the serial port S1 to be taken for a PPP session # set serial s1 stop-bits <1/1.5/2>

# Scenario 1 - Manual Dialout

Connect to the MultiConnect IP using a Telnet Client on port 23 (configuration port).

At the command prompt, invoke **# dialout serial s0**. Once the session is opened successfully, there can be two-way traffic between the Telnet client and the serial device.

- You can switch from Command Prompt to Dialout session using the **restore session** command.
- You can switch from Dialout session to Command Prompt using <escape-monitor-string>.



Manual Dialout Feature Through the Command Shell

#### MultiConnect IP Manual Dialout Setup Commands

```
# set serial s0 stop-bits 1
# set serial s0 baud-rate 115200
# set serial s0 data-bits 8
# set serial s0 parity none
# set serial s0 flow-control rts-cts
# set serial s1 stop-bits 1
# set serial s1 baud-rate 115200
# set serial s1 data-bits 8
# set serial s1 parity none
# set serial s1 flow-control rts-cts
# set serial s1 connect-type modem
# set serial s1 modem dial-number 123
# set serial s1 modem dialing-trig-mode none
(Refer to Chapter 6 - Prerequisite Configurations - Physical Link Established over the Modem
Port for more details)
# set ppp ppp0 ipcp-mode client-only
# set ppp ppp0 username "MultiConnect"
```

```
# set ppp ppp0 username "MultiConnect"
# set ppp ppp0 password "MultiConnect"
# save
```

#### Enable Authentication for PPP Commands

# set ppp ppp0 authentication enable
# set ppp ppp0 authentication-type <pap/chap/pap-chap>

#### Enable PPP Compression (on both the PPP peers) Commands

```
# set ppp ppp0 compression enable
# set ppp ppp0 comp-type <both/bsd/deflate>
```

The Authentication and Compression variations can be used while bringing up the PPP logical link in all the scenarios (except for Transparent Mode)

Once the physical link is up and PPP interface has acquired an IP address, the MultiConnect IP is ready to accept a Dial-Out connection.

Use a remote Telnet client and connect to 202.54.39.95 on port 23 (refer to the figure above). On successful login, at the MultiConnect IP command prompt, invoke

```
# dial-out serial s0
```

(The serial port now opens for use.)

#### Notes:

- 1. Only one dialout session can be open at a time.
- 2. The Dialout session is closed when the Telnet session is closed, thereby releasing the serial port.
- When the Dialout session authentication is enabled as specified in the <u>Optional Configuration</u> <u>Commands</u> list, the session prompts for the user name and password before opening the session successfully. (Enabled by default).
- 4. The serial port is opened with the current serial configuration.
- 5. When escape-monitor is enabled, care should be taken during file transfer that the escapemonitor-string is not part of the data.

# Scenario 2 - Auto Dialout

In this scenario, the Auto Dialout session in Telnet mode is opened using a Telnet client.

#### **Prerequisites**

RAW mode (global and each port) **MUST BE DISABLED** using the <u>Optional Configuration</u> <u>Commands</u>.

A Telnet client can open an auto Dialout session by specifying the configured auto-dialout port.

• Once the session is opened successfully, there can be two-way traffic between the Telnet session and the remote serial device.



Auto Dialout Feature in Telnet Mode

#### MultiConnect IP Auto Dialout in Telnet Mode Setup Commands

# set ip telnet auto-dialout enable # set serial s0 auto-dialout enable # set serial s0 auto-dialout-port 5000 # set serial s0 auto-dialout-protocol telnet # set serial s0 baud-rate 115200 # set serial s0 data-bits 8 # set serial s0 parity none # set serial s0 stop-bits 1 # set serial s0 flow-control rts-cts # set serial s1 baud-rate 115200 # set serial s1 data-bits 8 # set serial s1 parity none # set serial s1 stop-bits 1 # set serial s1 flow-control rts-cts # set serial s1 connect-type modem # set serial s1 modem dial-number 123 # set serial s1 modem dialing-trig-mode none (Refer to Chapter 6 – Prerequisite Configurations - Physical Link Established over the Modem Port for more details) # set ppp ppp0 ipcp-mode client-or-lan # set ppp ppp0 authentication enable # set ppp ppp0 auth-type pap # set ppp ppp0 username "MultiConnect" # set ppp ppp0 password "MultiConnect" # set ppp ppp0 local-ip-addr 202.54.39.95 mask 255.255.255.255 # set ppp ppp0 remote-ip-addr 202.54.39.96 mask 255.255.255.255 # save

Once the physical link is up and PPP interface has acquired an IP address the MultiConnect IP is ready to accept an auto-dialout connection.

Use a Telnet client and connect to 202.54.39.95 on port 5000. This eventually establishes a Telnet auto-dialout session between the MultiConnect IP and the serial device. Closing the Telnet client closes the serial port in use.

#### Notes:

- 1. Only one dialout session to the same port can be opened at one time.
- 2. When a dialout session authentication is enabled as specified in the optional commands, the session prompts for a user name and password before opening the session successfully. (Enabled by default).
- 3. The serial port is opened with the current serial configuration.

# Scenario 3 - Auto Dialout in RAW Mode

In this scenario, the Auto-Dialout session in RAW mode is opened using a RAW-TCP client.

# **Prerequisites**

RAW mode (Global and each port) **MUST BE ENABLED** using the <u>Optional Configuration</u> <u>Commands</u>.

The Auto Dialout session can be opened by a RAW-TCP client by specifying the auto-dialout configured port. Once the session is opened successfully, there can be two-way traffic between the Telnet session and the remote serial device.

#### Important

You cannot switch between the Command Prompt and the Dialout session in RAW-mode.



#### Auto Dialout Feature in RAW Mode

#### Commands to Setup Auto Dial-out in RAW-Mode for MultiConnect IP

```
# set ip telnet auto-dialout enable
# set ip telnet raw-mode enable
# set serial s0 stop-bits 1
# set serial s0 baud-rate 115200
# set serial s0 data-bits 8
# set serial s0 parity none
# set serial s0 flow-control rts-cts
# set serial s0 auto-dialout enable
# set serial s0 raw-dialout enable
# set serial s0 auto-dialout-port 5000
# set serial s0 auto-dialout-protocol telnet
# set serial s1 stop-bits 1
# set serial s1 baud-rate 115200
# set serial s1 data-bits 8
# set serial s1 parity none
# set serial s1 flow-control rts-cts
# set serial s1 connect-type modem
# set serial s1 modem dial-number 123
# set serial s1 modem dialing-trig-mode none
```

```
(Refer to Chapter 6 – Prerequisite Configurations - Physical Link Established over the Modem Port for more details)
```

```
# set ppp ppp0 ipcp-mode client-only
# set ppp ppp0 username "MultiConnect"
# set ppp ppp0 password "MultiConnect"
# save
```

Once the physical link is up and PPP interface has acquired an IP address the

MultiConnect IP is ready to accept Auto dialout connection.

Use a Telnet client and connect to 202.54.39.95 on port 5000 (RAW TCP socket). This eventually establishes a Telnet auto-dial-out session (In RAWMODE) with the MultiConnect IP, thereby opening the serial port for use.

Closing the Telnet client closes the serial port in use.

#### Notes:

- 1. You cannot open more than one dialout session to the same port.
- When the Dialout session authentication is enabled as specified in the <u>Optional Configuration</u> <u>Commands</u>, the session prompts for a user name and password before opening the session successfully.
- 3. The serial port is opened with the current serial configuration.
# Chapter 8 – Auto Dial-in Feature

## Introduction

The auto dial-in feature enables the MultiConnect IP to act as a Telnet client thus facilitating the serial device to access any Telnet/terminal servers on the IP network (over the built-in modem interface). Once the session (Serial Client to Server) is opened successfully, it allows two-way traffic between the serial device and the remote server.

The MultiConnect IP, acting as a Telnet/RAW-TCP client, accommodates the following features when configured:

- Support to open the session using Telnet client (residing in the MultiConnect IP) in Telnet Mode or RAW Mode.
- Support to open the session to the specified port from a Serial Command prompt (Manual Dial-in).
- Switching between a Command prompt and a Dial-in session when the session is in Telnet mode.
- Support to open the session to the configured port directly (Serial Auto Dial-in) whenever the serial port is free.

## Prerequisites

### Mandatory Configuration Settings

The following items must be configured in order to use the dial-in feature:

- Enable Auto dial-in globally on all the serial ports. # set serial auto-telnet enable
- Enable Auto dial-in on the serial port S0.
   # set serial s0 auto-dial-in enable
- Set the Auto dial-in protocol.
  - # set serial s0 auto-dialin-protocol telnet
- Set the Auto dial-in Server IP Address.
   # set serial s0 auto-dialin-ipaddress <ipaddress>
- Set the port to the one, which the Telnet client will be connected.
   # set serial s0 auto-dialin-port <port\_number>

An ERROR message will display if any of the above details are not configured or not valid.

### **Optional Configuration Settings**

The following commands can be used for optional configurations:

- Enable/Disable Switching-between-Dial-in and the Command Prompt feature.
   # set serial escape-monitor <enable/disable>
- Set the Escape-Monitor-String to switch between Dial-in and Command Prompt sessions.
   # set serial escape-string "+++inet"
- Set the Serial Dial-in Trigger mode. It dictates the criterion for establishing a connection. The options provided are on reception of <char/ dtr/ dtr-char/ none>. Refer to the command line configuration section for details about this command.
  - # set serial s0 auto-dialin trig-mode <char/dtr/dtr-char/none>
  - Enable/Disable the **RAW mode globally** for all Auto-Dial-in sessions. # set ip telnet raw-mode <enable/disable>
- Enable/Disable the **RAW mode for Auto-Dial-in** session on serial port S0. # set serial s0 raw-dial-in <enable/disable>

# Scenario 1 – Manual Serial Dial-in

Login to the Command prchat-scriptompt from the serial side.

Invoke **# telnet** <ip-address> <port> at the command prompt. Once the session is opened successfully, there can be two-way traffic between the serial device and the remote server.

- You can switch from Command Prompt to Dial-in session using the restore session command.
- You can switch from Dial-in session to Command Prompt using <escape-monitor-string>.



Manual Dial-in Feature through the Command Shell

### MultiConnect IP Manual Dial-In Setup Commands

# set serial s0 baud-rate 115200
# set serial s0 data-bits 8
# set serial s0 parity none
# set serial s0 stop-bits 1
# set serial s0 flow-control rts-cts
# set serial s1 baud-rate 115200
# set serial s1 data-bits 8
# set serial s1 parity none
# set serial s1 stop-bits 1
# set serial s1 flow-control rts-cts
# set serial s1 connect-type modem
# set serial s1 modem dial-number 123

# set serial s1 modem dialing-trig-mode none
(Refer to the Chapter 6 Prerequisite Configurations - Physical Link Established over the
Modem Port for more details)

# set ppp ppp0 ipcp-mode client-or-lan
# set ppp ppp0 authentication enable
# set ppp ppp0 auth-type pap
# set ppp ppp0 username "MultiConnect"
# set ppp ppp0 password "MultiConnect"
# set ppp ppp0 local-ip-addr 202.54.39.95 mask 255.255.255.255
# set ppp ppp0 remote-ip-addr 202.54.39.96 mask 255.255.255.255
# save

Once the physical link is up and the PPP interface has acquired an IP address, the MultiConnect IP is ready to use.

Login to the module through the serial port. At the command shell invoke:

# telnet 202.54.39.96 23

The Telnet client on board in the MultiConnect IP establishes a virtual serial tunnel between the serial device and the Telnet Server.

#### Notes:

- You cannot open more than one dial-in session.
- The dial-in session is closed when the Telnet session is closed.
- When escape-monitor is enabled, care should be taken during file transfer that the escapemonitor-string is not part of the data.

# Scenario 2 - Serial Auto Dial-in in Telnet Mode

This example shows how to setup a serial auto dial-in session in Telnet mode. The auto dial-in session is opened by Telnet client embedded in the MultiConnect IP to the configured server on a configured port.

Once the session is opened successfully, there can be two-way traffic between the serial device and the remote server.

- You can switch from Command Prompt to Dial-in session using the **restore session** command.
- You can switch from Dial-in session to Command Prompt using <escape-monitor-string>.

### **Prerequisites**

• RAW mode (Global and each port) **MUST BE DISABLED** using the following command:

Enable/Disable the **RAW mode globally** for all Auto-Dial-in sessions:

# set ip telnet raw-mode <enable/disable>



Auto Dial-in Feature in Telnet Mode

#### MultiConnect IP Auto Dial-In Setup in Telnet Mode Commands

```
# set serial auto-telnet enable
# set serial s0 auto-dialin enable
# set serial s0 auto-dialin trig-mode dtr-char
# set serial s0 auto-dialin-ipaddress 202.54.39.96
# set serial s0 auto-dialin-port 5000
# set serial s0 auto-dialin-protocol telnet
# set serial s0 stop-bits 1
# set serial s0 baud-rate 115200
# set serial s0 data-bits 8
# set serial s0 parity none
# set serial s0 flow-control rts-cts
# set serial s1 stop-bits 1
# set serial s1 baud-rate 115200
# set serial s1 data-bits 8
# set serial s1 parity none
# set serial s1 flow-control rts-cts
# set serial s1 connect-type modem
# set serial s1 modem dial-number 123
```

# set serial s1 modem dialing-trig-mode none (Refer to the Chapter 6 Prerequisite Configurations - Physical Link Established over the Modem Port for more details)

```
# set ppp ppp0 ipcp-mode client-only
# set ppp ppp0 username "MultiConnect"
# set ppp ppp0 password "MultiConnect"
# save
```

Once the PPP link is up with an IP address, the auto dial-in session can be probed. When detecting either a DTR signal or when any character is received from the serial device connected to the RS-232 serial port of MultiConnect IP, the Telnet client on board in the MultiConnect IP establishes a Telnet session to 202.54.39.96 on port 23.

The serial tunnel between the serial device and the Telnet Server terminates in one of the following conditions.

- The connection is broken between the serial device and the serial port of the MultiConnect IP.
- The Telnet Client on board is terminated.
- The Telnet Server terminates the session.

#### Notes:

- 1. You cannot open more than one Dial-in session.
- 2. The Dial-in session is closed when the configuration session is closed (if opened).
- When escape-monitor is enabled, care should be taken during file transfer that the escapemonitor-string is not part of the data.

### Scenario 3 - Auto Dial-in Session in RAW Mode

This scenario shows how to configure an auto dial-in session in RAW mode. The auto dial-in session is opened by Telnet client (embedded in the MultiConnect IP) in **RAW-mode** to the configured server on a configured port number. Once the PPP link is up with an IP address, the auto dial-in session can be probed as in the Auto Dial-In scenario below.

### **Prerequisites**

RAW mode (Global and each port) **MUST BE ENABLED** using the following command: Enable/Disable the **RAW mode globally** for all Auto-Dial-in sessions: # set ip telnet raw-mode <enable/disable>

*Important* – You cannot switch between the Command Prompt and a Dial-in session in RAW-mode. Also, you cannot open more than one Dial-in session.



Auto Dial-in Feature in RAW Mode

### MultiConnect IP Auto Dial-In in RAW Mode Setup Commands

# set ip telnet raw-mode enable # set serial auto-telnet enable # set serial s0 auto-dialin enable # set serial s0 raw-dialin enable # set serial s0 auto-dialin trig-mode dtr-char # set serial s0 auto-dialin-ipaddress 202.54.39.96 # set serial s0 auto-dialin-port 5000 # set serial s0 auto-dialin-protocol telnet # set serial s0 stop-bits 1 # set serial s0 baud-rate 115200 # set serial s0 data-bits 8 # set serial s0 parity none # set serial s0 flow-control rts-cts # set serial s1 stop-bits 1 # set serial s1 baud-rate 115200 # set serial s1 data-bits 8 # set serial s1 parity none # set serial s1 flow-control rts-cts # set serial s1 connect-type modem # set serial s1 modem dial-number 123 # set serial s1 modem dialing-trig-mode none (Refer to Chapter 6 - Prerequisite Configurations - Physical Link Established over the Modem Port) # set ppp ppp0 ipcp-mode client-only # set ppp ppp0 username "MultiConnect" # set ppp ppp0 password "MultiConnect" # save

# Scenario 4 - Serial Tunneling Mode

The scenario shows a serial tunnel established between two serial devices (Serial Device-1, Serial Device-2) using two MultiConnect IP modules, which are located apart geographically. Once the PPP link is up with an IP address on S1, the dial-in session can occur.

The Serial Devices then communicate to each other across the MultiConnect IP modules.



Serial Tunneling

#### Commands for Serial Tunneling Setup Using Two MultiConnect IP Modules Commands for MultiConnect IP Module 1 (Configure for Serial Auto Dial-in)

```
# set ip telnet raw-mode enable
# set serial auto-telnet enable
# set serial s0 auto-dialin enable
# set serial s0 raw-dialin enable
# set serial s0 auto-dialin trig-mode dtr-char
# set serial s0 auto-dialin-ipaddress 202.54.39.96
# set serial s0 auto-dialin-port 5000
# set serial s0 auto-dialin-protocol telnet
# set serial s0 stop-bits 1
# set serial s0 baud-rate 115200
# set serial s0 data-bits 8
# set serial s0 parity none
# set serial s0 flow-control rts-cts
# set serial s1 stop-bits 1
# set serial s1 baud-rate 115200
# set serial s1 data-bits 8
# set serial s1 parity none
# set serial s1 flow-control rts-cts
# set serial s1 connect-type modem
# set serial s1 modem dial-number 123
# set serial s1 modem dialing-trig-mode none
(Refer to Chapter 6 - Prerequisite Configurations - Physical Link Established over the Modem Port)
# set ppp ppp0 enable
# set ppp ppp0 ipcp-mode client-or-lan
# set ppp ppp0 authentication enable
# set ppp ppp0 auth-type pap
# set ppp ppp0 username "MultiConnect"
# set ppp ppp0 password "MultiConnect"
# set ppp ppp0 local-ip-addr 202.54.39.95 mask 255.255.255.255
# set ppp ppp0 remote-ip-addr 202.54.39.96 mask 255.255.255.255
# save
```

#### Commands for MultiConnect IP Module 2 (Configure for Telnet Auto Dial-out)

```
# set ip telnet auto-dialout enable
# set ip telnet raw-mode enable
# set serial s0 auto-dialout enable
# set serial s0 auto-dialout-port 5000
# set serial s0 auto-dialout-protocol telnet
# set serial s0 raw-dialout enable
# set serial s0 baud-rate 115200
# set serial s0 data-bits 8
# set serial s0 parity none
# set serial s0 stop-bits 1
# set serial s0 flow-control rts-cts
# set serial s1 baud-rate 115200
# set serial s1 data-bits 8
# set serial s1 parity none
# set serial s1 stop-bits 1
# set serial s1 flow-control rts-cts
# set serial s1 connect-type modem
# set serial s1 modem dialing-trig-mode command
(The default mode is answering. This command changes the mode to answering.)
# set ppp ppp0 enable
# set ppp ppp0 ipcp-mode client-or-lan
# set ppp ppp0 authentication enable
# set ppp ppp0 auth-type pap
# set ppp ppp0 username "MultiConnect"
# set ppp ppp0 password "MultiConnect"
# set ppp ppp0 local-ip-addr 202.54.39.96 mask 255.255.255.255
# set ppp ppp0 remote-ip-addr 202.54.39.95 mask 255.255.255.255
# save
```

# Chapter 9 – Modem (Transparent) Mode

# Introduction

In the modem mode (also called transparent mode), raw data is communicated between serial ports 1 and 2. This means that:

- Data received on serial port S0 is transmitted on serial port S1
- Data received on serial port S1 is transmitted on serial port S0

Transparent mode can be used in the following applications:

- The MultiConnect IP is used as a Modem
- Serial Tunneling

### **Prerequisites**

- Transparent Mode must be enabled # set operation-mode modem
- Host Interaction mode must be disabled # set serial s0 host-interaction-mode disable
- Enable Switching-between Data mode and Command mode # set serial s0 escape-monitor enable
- Set the Escape-Monitor-String to switch between Data mode and Command mode # set serial s0 escape-string "+++inets0"

# Scenario 1 - MultiConnect IP as a Modem

In this scenario, once the physical link is up on the built-in modem interface; i.e., by dialing or answering,

## Scenario 2 – Serial Tunneling in Transparent Mode

In this scenario, two MultiConnect IP modules in transparent mode aid in the communication between two serial devices that are connected to the RS-232 interface (S0) of the MultiConnect IP modules. Serial tunneling is achieved in the transparent mode where raw data is communicated.



Serial Tunneling in Transparent Mode

#### Commands for MultiConnect IP - 1 (Dialing End)

```
# set operation-mode modem
# set serial s0 escape-monitor enable
# set serial s0 escape-string "+++inets0"
# set serial s0 stop-bits 1
# set serial s0 baud-rate 115200
# set serial s0 data-bits 8
# set serial s0 flow-control rts-cts
# set serial s1 stop-bits 1
# set serial s1 baud-rate 115200
# set serial s1 baud-rate 115200
# set serial s1 data-bits 8
# set serial s1 parity none
# set serial s1 flow-control rts-cts
# save
```

#### Commands for MultiConnect IP - 2 (Answering End)

```
# set operation-mode modem
# set serial s0 escape-monitor enable
# set serial s0 baud-rate 115200
# set serial s0 data-bits 8
# set serial s0 parity none
# set serial s0 stop-bits 1
# set serial s0 flow-control rts-cts
# set serial s1 data-bits 8
# set serial s1 parity none
# set serial s1 stop-bits 1
# set serial s1 stop-bits 1
# set serial s1 flow-control rts-cts
# save
```

#### Steps for Establishing a Physical Link in Transparent Mode

- 1. Complete the configuration listed above.
- 2. At the dialing end, invoke the following commands:
  - atz at&f
    - atdt <dial no>
- Once the physical connection is up, the data channel between the two MultiConnect IP modules is established.
   Note: Only row data is forwarded between the MultiConnect IP modules, and no data.

**Note:** Only raw data is forwarded between the MultiConnect IP modules, and no data integrity check is provided.

4. Type +++ followed by **ATH0** to hangup the modem.

#### Notes

- You can switch from Data mode to Command mode using the escape-monitor-string command. The Command mode transfers control to the Command Shell of MultiConnect IP.
- You can switch from Command mode to Data mode using the restore session command.
- The data session is dropped if the physical link goes down.

# Chapter 10 – Modem Mode AT Commands, S-Registers, Result Codes

This chapter covers the V.22bis, V.32, V.34, and V.92 commands, S-Registers, and Result Codes. The AT commands are used to control the operation of your modem. They are called *AT* commands because the characters *AT* must precede each command to get the *AT*tention of the modem.

*AT* commands can be issued only when the modem is in command mode or online command mode. The modem is in *command mode* whenever it is not connected to another modem. The modem is in *data mode* whenever it is connected to another modem and ready to exchange data. *Online command mode* is a temporary state in which you can issue commands to the modem while connected to another modem. To put the modem into online command mode from data mode, you must issue an *escape sequence* (+++) followed immediately by the *AT* characters and the command, e.g., +++ to hang up the modem. To return to data mode from online command mode, you must issue the command **ATO**.

To send AT commands to the modem you must use a communications program, such as the HyperTerminal applet in Windows, or some other available terminal program. You can issue commands to the modem either directly, by typing them in the terminal window of the communications program, or indirectly, by configuring the operating system or communications program to send the commands automatically. Fortunately, communications programs make daily operation of modems effortless by hiding the commands from the user. Most users, therefore, need to use AT commands only when reconfiguring the modem, e.g., to turn autoanswer on or off.

The format for entering an AT command is **AT***Xn*, where *X* is the command and *n* is the specific value for the command, sometimes called the command *parameter*. The value is always a number. If the value is zero, you can omit it from the command; thus, **AT&B** is equivalent to **AT&B0**. Most commands have a *default* value, which is the value that is set at the factory.

You must press ENTER (depending on the terminal program it could be some other key) to send the command to the modem. Any time the modem receives a command, it sends a response known as a *result code*. The most common result codes are *OK*, *ERROR*, and the *CONNECT* messages that the modem sends to the computer when it is connecting to another modem. For a table of valid result codes, see "Result Codes" at the end of this chapter.

You can issue several commands in one line, in what is called a command *string*. The command string begins with **AT** and ends when you press ENTER. Spaces to separate the commands are optional; the command interpreter ignores them. The most familiar command string is the *initialization string*, which is used to configure the modem when it is turned on or reset, or when your communications software calls another modem.

# Escape Code Sequence +++

When the modem has established a connection and has entered online data mode, it is possible to break into the data transmission in order to issue further commands to the modem in an online command mode. This is achieved by the DTE sending to the modem a sequence of three ASCII characters specified by S-Register S2. The default character is '+'. The maximum time allowed between receipt of the last character of the three-escape character sequence (+++) from the DTE and sending of the OK result code to the DTE is controlled by the S12 register.

### **Command Organization**

The commands in this chapter are listed in the following order:

- First, the commands that begin with letters are listed in alphabetical order
- Then the commands that begin with symbols are listed in this order &, \, -, %, +, #, +++
- Fast Connect Commands
- V.92 Commands

# **Command Types**

The following list should help if you are looking for a particular type of command. This list categorizes AT Commands by function.

### **Generic Modem Control Commands**

Z	Soft Reset and Restore Profile
+VCID	Caller ID
+VRID	Report Retrieved Caller ID
\ <b>N</b>	Operating Mode – Error Control
Ι	Identification
+GMI	Request Manufacturer Identification
+GMM	Request Model Identification
+GMR	Request Revision Identification
+GCAP	Request Complete Capabilities List
+GCI	Country of Installation
&F	Restore Factory Configuration (Profile)
&T	Local Analog Loopback Test
&Y	Designate a Default Profile
&W	Store Current Configuration
&Zn=x	Store Telephone Number

### **DTE–Modem Interface Commands**

E	Command Echo
Q	Quiet Result Code Control
V	Result Code Form
W	Connect Message Control
Х	Extended Result Codes
&C	RLSD (DCD) Option
&D	Data Terminal Ready (DTR) Option
&K	Flow Control
&R	RTS/CTS Option
&S	DSR Override
+IPR	Fixed DTE Rate
+IFC	DTE-Modem Local Flow Control
+ILRR	DTE-Modem Local Rate Reporting

### **Call Control Commands**

D	Dial
Т	Set Tone Dial Default
Р	Set Pulse Dial Default
Α	Answer
Н	Disconnect (Hang-up)
0	Return to Online Data Mode
L	Speaker Volume
Μ	Speaker Control
&G	Select Guard Tone
&P	Select Pulse Dial Make/Break Ratio
&V	Display Current Configuration and Stored Profiles
&V1	Display Last Connection Statistics
١V	Single Line Connect Message Enable
%L	Report Line Signal Level
%Q	Report Line Signal Quality
-STE	Set Telephony Extension

+MS	Modulation Selection
+MR	Modulation Reporting Control
%E	Enable/Disable Line Quality Monitor and Auto-Retrain
%U	Select µ-Law or A-Law Codec Type
В	Communication Standard – CCITT or Bell

### **Call Control Commands**

### **Error Control Commands**

+ES	Error Control
+EB	Break Handling in Error Control Operation
+ESR	Selective Repeat
+EFCS	32-bit Frame Check Sequence
+ER	Error Control Reporting
+ER <type></type>	Report the Current Error Control
+ETBM	Call Termination Buffer Management
\B	Transmit Break to Remote
١K	Break Control
-K	MNP Extended Services

### **Data Compression Commands**

+DS	Data Compression
+DR	Data Compression Reporting
%C	Enable/Disable Data Compression

### V.8/V.8bis Commands

+A8E	V.8 and V.8bis Operation Controls
+A8I	CI Signal Indication

# **Command Detail**

Command:	АТ	Attention Code
Values: Description:		n/a The attention code precedes all command lines except for escape sequences.
Command:		ENTER Key
Values: Description:		n/a Press the Enter (Return) key to execute most commands.
Command: Values:	Α	Answer n/a
Description:		Answer call before final ring. The modem will go off-hook and attempt to answer an incoming call if correct conditions are met. Upon successful completion of answer handshake, the modem will go on-line in answer mode. This command may be affected by the state of Line Current Sense, if enabled. (Most countries do not require Line Current Sense.) Operation is also dependent upon country-specific requirements.
		The modem will enter the connect state after exchanging carrier with the remote modem.
		If no carrier is detected within a period specified in register S7, the modem hangs up.
		Any character entered during the connect sequence will abort the connection attempt.
Command: Values: Description:	<b>A</b> /	<b>Repeat Last Command</b> n/a Repeats the last command string. Do not precede this command with AT. Do not press Enter to execute.
Command: Values:	Bn	Communication Standard Setting – ITU-T or Bell $n = 0, 1$
Default: Description:		<ul> <li>0</li> <li>When the modem is configured to allow either option, the modem will select Bell or ITU-T modulation for a line speed connection of 300 or 1200 bps. Any other line speed will use an ITU-T modulation standard. The parameter value, if valid, is written to S27 bit 6.</li> <li>B0 Selects ITU-T operation at 300 or 1200 bps during Call Establishment and a subsequent connection.</li> </ul>
		B1 Selects Bell operation at 300 or 1200 bps during Call Establishment and a subsequent connection.
		<ul> <li>B2 Selects V.23 half-duplex operation at 1200 bps during Call Establishment and a subsequent connection. (V.22bis only).</li> </ul>
		B3 Disables V.23 half-duplex operation. (V.22bis only).
Command: Values: Default: Description:	Ds	<ul> <li>Dial</li> <li>s = dial string (phone number and dial modifiers)</li> <li>none</li> <li>This command directs the modem to go on-line, dial according to the string entered and attempt to establish a connection. If no dial string is supplied, the modem will go on-line and</li> </ul>
		attempt the handshake in originate mode.
		<b>Note:</b> If the ATD command is issued before the S1 register has cleared, the modem will respond with the NO CARRIER result code.
		Dial Modifiers 0-9 DTMF digits 0 to 9.
		<ul> <li>0-9 DTMF digits 0 to 9.</li> <li>* The 'star' digit (tone dialing only).</li> <li># The 'gate' digit (tone dialing only).</li> <li>A-D Some countries may prohibit sending of these digits during dialing (tone dialing only)</li> </ul>
		L Redial last number. (Must be placed immediately after ATD.)

- **P** Select pulse dialing: pulse dial the numbers that follow until a "T" is encountered. Affects current and subsequent dialing. Some countries prevent changing dialing modes after the first digit is dialed.
- T Select tone dialing: tone dial the numbers that follow until a "P" is encountered. Affects current and subsequent dialing. Some countries prevent changing dialing modes after the first digit is dialed.
- **R** This command will be accepted, but not acted on.
- **S=n** Dial the number stored in the directory (n = 0 to 3). (See &Z.) (S=n is not available with V.22bis).
- ! Flash: the modem will go on-hook for a time defined by the value of S29. Country requirements may limit the time imposed.
- W Wait for dial tone: the modem will wait for dial tone before dialing the digits following "W". If dial tone is not detected within the time specified by S7 (US) or S6 (W-class), the modem will abort the rest of the sequence, return on-hook, and generate an error message.
- Wait for silence: the modem will wait for at least 5 seconds of silence in the call progress frequency band before continuing with the next dial string parameter. If the modem does not detect these 5 seconds of silence before the expiration of the call abort timer (S7), the modem will terminate the call attempt with a NO ANSWER message. If busy detection is enabled, the modem may terminate the call with the BUSY result code. If answer tone arrives during execution of this parameter, the modem handshakes.
- & Wait for credit card dialing tone before continuing with the dial string. If the tone is not detected within the time specified by S7 (US models) or S6 (W-class models), the moder will abort the rest of the sequence, return on-hook, and generate an error message.
- Dial pause: the modem will pause for a time specified by S8 before dialing the digits following ",".
- ; Return to command state. Added to the end of a dial string, this causes the modem to return to the command state after it processes the portion of the dial string preceding the ";". This allows the user to issue additional AT commands while remaining off-hook. The additional AT commands may be placed in the original command line following the ";" and/or may be entered on subsequent command lines. The modem will enter call progress only after an additional dial command is issued without the ";" terminator. Use "H" to abort the dial in progress, and go back on-hook.
- Toggles calling tone enable/disable: applicable to current dial attempt only.
- () Ignored: may be used to format the dial string.
- Ignored: may be used to format the dial string.
- **<space>** Ignored: may be used to format the dial string.
- <i> Invalid character: will be ignored.
- If enabled by country specific parameter, the modem will generate a grounding pulse on the EARTH relay output.

Command: Values: Default: Description:	En	Echo Command n = 0 or 1 1 The modem enables or disables the echo of characters to the DTE. The valid parameter value is written to S14 bit 1. E0 Disables echo command. E1 Enables echo command.
Command: Values: Default: Description:	Ηn	<ul> <li>Disconnect (Hang Up)</li> <li>n = 0 or 1</li> <li>None</li> <li>This command may not be available in some countries due to PTT restrictions.</li> <li>H0 The modem will release the line if the modem is currently online and will terminate any test (AT&amp;T) that is in progress. Country specific, modulation specific, and error correction protocol specific (S38) processing is handled outside of the H0 command.</li> <li>H1 If on-hook, the modem will go off-hook and enter command mode. For US models, the modem will remain off-hook. For global models, the modem will return on-hook after a period of time determined by S7.</li> </ul>

Command:	In	<b>Identification</b> (for V.22bis) This command causes the modem to reports the requested result according to the command parameter.	
Values: Default:		<ul> <li>command parameter.</li> <li>n = 0-7</li> <li>None</li> <li>Reports product code, e.g., "2400".</li> <li>Reports the least significant byte of the stored checksum in decimal. Reports 255 if the prestored checksum value is FFh.</li> <li>Check ROM and verify the checksum, displaying <i>OK</i> or <i>ERROR</i>.</li> <li>Reports ROM Code Revision-Modulation (e.g., 2109-V90). Revision, Modulation, and Model.</li> <li>Reports OEM defined identifier string.</li> <li>Reports Country Code parameter (see +GCI).</li> <li>Reports Modem data pump and internal code revision.</li> <li>Reports OK.</li> </ul>	
Command: Values: Default: Description:	Ln	Monitor Speaker Volume $n = 0, 1, 2, \text{ or } 3$ 2This command sets the speaker volume control. The parameter value, if valid, is written toS22 bits 0 and 1.L0Select low volume.L1Select low volume.L2Select medium volume.L3Select high volume.	
Command: Values: Default: Description:	Mn	<ul> <li>Monitor Speaker Mode</li> <li>n = 0, 1, 2, or 3</li> <li>This command selects when the speaker will be on or off. The parameter value, if valid, is written to S22 bits 2 and 3.</li> <li>M0 Speaker always off.</li> <li>M1 Speaker on until carrier signal detected.</li> <li>M2 Speaker always on when modem is off-hook.</li> <li>M3 Speaker on until carrier is detected, except while dialing, but on during answering.</li> </ul>	
Command: Values: Default: Description:	On	<ul> <li>Return to Online Data Mode <ol> <li>4, 5</li> </ol> </li> <li>None This command determines how the modem will enter the on-line data mode. If in the on-line command mode, the modem enters the on-line data mode with or without a retrain. If in the off-line command mode (no connection), the modem reports ERROR. </li> <li>Enters on-line data mode without a retrain. Handling is determined by the Call Establishment task. Generally, if a connection exists, this command connects the DTE back to the remote modem after an escape (+++). </li> <li>Enters on-line data mode with a retrain before returning to on-line data mode. Fast retrain without speed change (used for diagnostic purpose only). (Not in V.22bis) </li> <li>Fast retrain without speed change (used for diagnostic purpose only).</li> <li>Renegotiate rate without speed change (used for diagnostic purpose only). (Not in V.22bis) </li> <li>Renegotiate rate down one speed (used for diagnostic purpose only). (Not in V.22bis)</li> <li>Renegotiate rate up one speed (used for diagnostic purpose only). (Not in V.22bis)</li> </ul>	

Command: Values: Default: Description:	Ρ	Set Pulse Dial Default P, T T This command forces pulse dialing until the next T dial modifier of T command is received. As soon as a dial command is executed which specifies the dialing mode for that particular call (e.g., ATDT), this command is overridden so that all future dialing will be tone dialed. (See T command). This command may not be permitted in some countries.
Command: Values: Default: Description:	Qn	Quiet Result Codes Enable/Disable n = 0 or 1 0 The command enables or disables the sending of result codes to the DTE. The parameter value, if valid, is written to S14 bit 2. Q0 Enables result codes to the DTE. Q1 Disables result codes to the DTE.
Command: Values: Default: Description:	т	Set Tone Dial Default P, T T This command forces DTMF dialing until the next <b>P</b> dial modifier or <b>P</b> command is received. The modem will set an S-Parameter bit to indicate that all subsequent dialing should be conducted in tone mode. The <b>DP</b> command will override this command. This command may not be permitted in some countries.
Command: Values: Default: Description:	Vn	<ul> <li>Result Code Form (Not available in V.22bis)</li> <li>n = 0 or 1</li> <li>This command selects the sending of short-form or long-form result codes to the DTE.</li> <li>V0 Enables short-form (terse) result codes. Line feed is not issued before a short-form result code.</li> <li>V1 Enables long-form (verbose) result codes.</li> </ul>
Command: Values: Default: Description:	Wn	<ul> <li>Connect Message Control <ul> <li>n = 0, 1, or 2</li> <li>This command, in conjunction with S95 bits 0, 2, 3, and 5 (bits 2, 3, and 5 can be written directly by the host or by the +MR, +ER, and +DR commands, respectively), control the format of CONNECT messages. The actual result code messages reported reflect the W command setting and the S95 bit settings. (Also see +MR, +ER, and +DR commands.)</li> <li>The W parameter value, if valid, is written to S31 bits 2 and 3.</li> <li>W0 Upon connection, the modem reports only the DTE speed (e.g., CONNECT 19200). Subsequent responses are disabled.</li> <li>W1 Upon connection, the modem reports the modulation, line speed, the error correction protocol, and the DTE speed, respectively. Subsequent responses are disabled.</li> <li>W2 Upon connection, the modem reports the DCE speed (e.g., CONNECT 14400). Subsequent responses are disabled.</li> </ul> </li> </ul>

Command: Values: Default: Description:	Xn	<ul> <li>Extended Result Codes and Call Progress Information <ul> <li>n = 0-4</li> <li>This command selects the subset of the result code messages used by the modem to inform the DTE of the results of commands. See Extended Results Code Chart in the Results Code section of this chapter.</li> </ul> </li> <li>X0 Disables reporting of busy tones unless forced otherwise by country requirements; send only OK, CONNECT, RING, NO CARRIER, ERROR, and NO ANSWER result codes. Blind dialing is enabled/disabled by country parameters. If busy tone detection is enforced and busy tone is detected, NO CARRIER will be reported. If dial tone detection is enforced or selected and dial tone is not detected, NO CARRIER will be reported instead of NO DIAL TONE. The value 000b is written to S22 bits 6, 5, and 4, respectively.</li> <li>X1 Disables reporting of busy tones unless forced otherwise by country requirements; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO ANSWER, and CONNECT XXXX (XXXX = rate). Blind dialing enabled/disabled by country parameters. If busy tone detection is enforced and busy tone is detected, NO CARRIER will be reported instead of BUSY. If dial tone detection is enforced or selected and dial tone is not detected, NO CARRIER will be reported instead of BUSY. If dial tone detection is enforced or selected and dial tone is not detected, NO CARRIER will be reported instead of NO DIAL TONE. The value 100b is written to S22 bits 6, 5, and 4, respectively.</li> <li>X2 Disables reporting of busy tones unless forced otherwise by country requirements; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO DIAL TONE, NO ANSWER, and CONNECT XXX. If busy tone detection is enforced and busy tone is detected, NO CARRIER will be reported instead of BUSY. If dial tone detection is enforced or selected and dial tone is not detected, NO CARRIER will be reported instead of BUSY. If dial tone detection is enforced and busy tone is detected, NO CARRIER will be reported instead of NO CARRIER, ERROR, NO DIAL TONE, NO ANSWER, and CONN</li></ul>
		respectively. X4 Enables reporting of busy tones; send all messages. The value 111b is written to S22 bits 6, 5, and 4, respectively. (Default.)
Command: Values: Default: Description:	Zn	Soft Reset and Restore Profile $n = 0 \text{ or } 1$ NoneCauses the modem to perform a soft reset and restore (recall) of the factory defaultconfiguration profile.Z0Z0Soft reset and restore stored profile 0.Z1Soft reset and restore stored profile 1. (Not available in V.22bis except for compatibility).
Command: Values: Default: Description:	&Cn	RLSD (DCD) Option n = 0 or 1 1 The modem controls the RLSD output in accordance with the parameter supplied. The parameter value, if valid, is written to S21 bit 5. &C0 RLSD remains ON at all times. &C1 RLSD follows the state of the carrier.
Command: Values: Default: Description:	&Dn	<ul> <li>Data Terminal Ready (DTR) Option <ul> <li>n = 0, 1, 2, or 3</li> <li>This command interprets the ON to OFF transition of the DTR signal from the DTE in accordance with the parameter supplied. The parameter value, if valid, is written to S21 bits 3 and 4. Also, see 25.</li> <li>&amp;D0 - Allows operation with DTEs which do not provide DTR.</li> <li>&amp;D1 - DTR drop is interpreted as if the escape sequence had been entered. The modem returns to the command state without disconnecting.</li> <li>&amp;D2 - DTR drop causes the modem to hang up. Auto-answer is inhibited. (Default.)</li> <li>&amp;D3 - DTR drop causes the modem to perform a soft reset as if the Z command were received. The &amp;Y setting determines which profile is loaded.</li> </ul> </li> </ul>

Command: Values: Default: Description:	&F <i>n</i>	Restore Factory Configuration (Profile) n = 0 None The modem loads the factory default configuration (profile). The factory defaults are identified for each command and in the S-Register descriptions. A configuration (profile) consists of a subset of S-Registers. &F0 Restore factory configuration 0. &F1 Restore factory configuration 1. (Not available in V.22bis).
Command: Values: Default: Description:	&Gn	Select Guard Tone n = 0, 1, or 2 0 This command causes the modem to generate the guard tone selected by this command (DPSK modulation modes only). This command may not be permitted in some countries. &G0 Disables guard tone. &G1 Disables guard tone. &G2 Set guard tone to 1800 Hz.
Command: Values: Defaults: Description:	&Kn	Flow Control n = 0, 3, 4, 5 3 This command defines the DTE/DCE (terminal/modem) flow control mechanism. The parameter value, if valid, is written to S39 bits 0, 1, and 2. &K0 Disables flow control. &K3 Enables RTS/ CTS flow control. &K4 Enables XON/XOFF flow control. &K5 Enables transparent XON/XOFF flow control.
Command: Values: Default: Description:	&Pn	Select Pulse Dial Make/Break Ratio n = 0, 1, 2, 3 Country-Dependent This command determines the make/break ratio used during pulse dialing. It is only effective if the appropriate bit to enable this command is set through the country profile. The default is country-dependent. The parameter value, if valid, is written to S28 bits 3 and 4. &P0 Selects 39%-61% make/break ratio at 10 pulses per second. (Default in V.22bis)) &P1 Selects 33%-67% make/break ratio at 20 pulses per second. &P2 Selects 33%-67% make/break ratio at 20 pulses per second. &P3 Selects 33%-67% make/break ratio at 20 pulses per second.
Command: Values: Default: Description:	&R	<ul> <li>RTS/CTS Option</li> <li>0, 1</li> <li>None</li> <li>This selects how the modem controls CTS. The CTS operation is modified if hardware flow control is selected (see &amp;K command). The parameter value, if valid, is written to S21 bit 2.</li> <li>&amp;R0 In sync mode, CTS tracks the state of RTS; the RTS-to-CTS delay is defined by S26. In async mode, CTS is normally ON and will turn OFF only if required by flow control.</li> <li>&amp;R1 In sync mode, CTS is always ON (RTS transitions are ignored), tracks the state of RTS; In async mode, CTS is normally ON and will turn OFF only if required by flow control.</li> </ul>
Command: Values: Default: Description:	&Sn	<ul> <li>DSR Override (&amp;S has no functionality in V.22bis)</li> <li>n = 0, 1</li> <li>0</li> <li>Selects how the modem will control DSR. The parameter value, if valid, is written to S21 bit 6.</li> <li>&amp;S0 DSR is always high (ON).</li> <li>&amp;S1 DSR goes high (ON) only during a connection.</li> </ul>

Command: Values: Default: Description:	&T <i>n</i>	<ul> <li>Local Analog Loopback Test <ul> <li>n = 0, 1,</li> <li>None</li> </ul> </li> <li>The modem can perform the local analog loopback test if &amp;T1 is selected. The test can be run only when the modem is operating in asynchronous mode with non-error-correction (normal). To terminate a test in progress, the escape sequence (+++) must be entered first.</li> <li>&amp;T0 Stops any test in progress. Clears S16.</li> <li>&amp;T1 Starts a local analog loopback, V.54 Loop 3, test. If a connection exists when this command is issued, the modem hangs up. When the test starts, a CONNECT message is displayed.</li> </ul>
Command: Values: Description:	&V	Display Current Configuration and Stored Profiles n/a           Displays the active configuration and the stored user profiles.           Note: Only the Active Profile is available in V.22bis.           Example:           ACTIVE PROFILE:           B1 E1 L1 M1 N0 QO T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5 &R1 &S0 &T5 &X0 S00:000 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:050 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000 S25:005 S26:001 S36:007 S38:020 S46:138 S48:007 S95:000           STORED PROFILE 0:           B1 E1 L1 M1 N0 QO T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5 &R1 &S0 &T5 &X0 S00:000 S02:043 S06:002 S07:050 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000 S36:007 S40:104 S41:195 S46:138 S95:000           STORED PROFILE 1:           B1 E1 L1 M1 N0 QO T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5 &R1 &S0 &T5 &X0 S00:000 S02:043 S06:002 S07:050 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000 S36:007 S40:104 S41:195 S46:138 S95:000           STORED PROFILE 1:           B1 E1 L1 M1 N0 QO T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5 &R1 &S0 &T5 &X0 S00:000 S02:043 S06:002 S07:050 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000 S36:007 S40:104 S41:195 S46:138 S95:000

Command: Values: Default:	&V1	<b>Display Last Connection Statistics</b> (&V1 has no functionality in V.22bis) n = 1 1
Description:		Displays the last connections in the following format (shown with typical results):
		TERMINATION REASON
		Flex 9481814347C4 <b>RBS Pattern</b> : Shows which bits are being robbed in the least significant 6 bytes, e.g., 03 indicates 2 robbed bits in bit positions 0 and 1. <b>Digital Loss</b> : Shows if a pad is encountered and if so, what is the digital loss. 2000 means 0dB. <b>Flex</b> : Shows V.8bis information as follows: <b>First byte</b> : Octet 13 (second byte of manufacturer id, 94 = K56flex) <b>Second byte</b> : Octet 14 (Licensee code: 81 = Conexant) <b>Third byte</b> : Octet 15 (manufacturer's product capabilities) <b>Fourth byte</b> : Octet 16 (K56flex version number) <b>Fifth byte</b> : Octet 17 (Conexant pump code version number) <b>Sixth byte</b> : Octet 18 (x-law and controller version number) <b>Bit</b> 6 Forced/Not forced A-Law/ $\mu$ -Law 0 = Forced A-Law/ $\mu$ -Law 1 = Not forced A-Law/ $\mu$ -Law 0 = Select A-Law 1 = Not forced A-Law 1 = Select $\mu$ -Law 1 = Select $\mu$ -Law 1 = Select $\mu$ -Law 1 = Select $\mu$ -Law 1 = Select $\mu$ -Law
Command: Values: Default: Description:	&Wn	<ul> <li>Store Current Configuration Settings (Not available in V.22bis)</li> <li>n = 0, 1</li> <li>Saves the current (active) configuration (profile), including S-Parameters, in one of the two user profiles in NVRAM as denoted by the parameter value. The current configuration is comprised of a list of storable parameters illustrated in the &amp;V command. These settings are restored to the active configuration upon receiving a Z command or at power up (see &amp;Y command).</li> <li>&amp;W0 Store the current configuration as profile 0.</li> <li>&amp;W1 Store the current configuration as profile 1.</li> </ul>
Command: Values: Default: Description:	&Y	Designate a Default Reset Profile (No available in V.22bis) 0, 1 None This command selects which user profile will be used after a hard reset. &Y0 The modem will use profile 0. &Y1 The modem will use profile 1.

Command: Values: Default: Description:	&Zy=x	Store Telephone Number (Not available in V.22bis) y = 0-3 x = Dialing command None Stores up to four telephone numbers and each telephone number dial string can contain up to 31 digits (requires 256-byte NVRAM installed).		
Command: Values: Default: Description:	\B <i>n</i>	<b>Transmit Break to Remote</b> n = 0-9 in 100 ms units 3 In non-error correction mode, the modem will transmit a break signal to the remote modem with a length in multiples of 100 ms according to parameter specified. If a number in excess of 9 is entered, 9 is used. The command works in conjunction with the \K command. In error correction mode, the modem will signal a break through the active error correction protocol, giving no indication of the length.		
Command: Values: Default: Description:	\Kn	<ul> <li>Break Control n = 0-5 5 Controls the response of the modem to a break received from the computer, the remote modem, or the VB command. The response is different for each of three different states. The parameter value, if valid, is written to S40 bits 3, 4, and 5.</li> <li>Data Mode. The modem receives a break from the computer: <ul> <li>K0</li> <li>Enter online command mode, no break sent to the remote modem.</li> <li>K1</li> <li>Clear data buffers and send break to the remote modem.</li> </ul> </li> <li>K2 Same as IKO.</li> <li>K3 Send break immediately to the remote modem.</li> <li>K4 Same as IKO.</li> <li>K5 Send break to the remote modem in sequence with the transmitted data.</li> <li>Data Mode. The modem receives a break from the remote modem:</li> <li>K4 Same as IKO.</li> <li>K5 Send break immediately to the computer.</li> <li>K4 Same as IKO.</li> <li>K5 Send break to the computer in sequence with the received data.</li> <li>K5 Same as IK4.</li> </ul> Online Command Mode. The modem receives a IBn command from the computer: <ul> <li>K0</li> <li>K2 Same as IK4.</li> <li>K4 Same as IK0.</li> <li>K4 Same as IK2.</li> <li>K4 Send break to the remote modem.</li> <li>K4 Same as IK2.</li> <li>K4 Send break to the remote modem.</li> <li>K5 Same as IK2.</li> <li>K4 Send break to the remote modem.</li> <li>K5 Same as IK2.</li> <li>K4 Send break immediately to the remote modem.</li> <li>K5 Same as IK2.</li> <li>K4 Send break to the remote modem.</li> <li>K5 Same as IK2.</li> <li>K4 Send break to the remote modem.</li> <li>K5 Same as IK2.</li> <li>K4 Send break to the remote modem.</li> <li>K5 Same as IK2.</li> <li>K4 Send break to the remote modem.</li> <li>K5 Same as IK2.</li> <li>K4 Send break to the remote modem.</li> <li>K5 Same as IK2.</li> <li>K4 Send break to the remote modem.</li> <li>K5 Same as IK4.</li> </ul>		

Command: Values: Default:	\N <i>n</i>	<b>Operating Mode – Error Correction</b> n = 0-5 5 Controls the preferred error-correcting mode to be negotiated in a subsequent data connection.					
Description:							
		<ul> <li>N0 Selects normal speed buffered mode (disables error-correction mode).</li> <li>N1 Serial interface selected - Selects direct mode and is equivalent to &amp;M0 mode of operation.</li> </ul>					
		<ul> <li>N2 Selects reliable (error-correction) mode. The modem will first attempt a LAPM connection and then an MNP connection. Failure to make a reliable connection results in the modem hanging up. (Forces S36=4 and S48=7.)</li> </ul>					
		<ul> <li>\N3 Selects auto-reliable mode. This operates the same as \N2 except failure to make a reliable connection results in the modem falling back to the speed buffered normal mode. (Forces S36=7 and S48=7.)</li> </ul>					
		<ul> <li>\N4 Selects LAPM error-correction mode. Failure to make an LAPM error-correction connection results in the modem hanging up. (Forces S48=0.)</li> </ul>					
		<ul> <li>Selects MNP error-correction mode. Failure to make an MNP error-correction connection results in the modem hanging up. (Forces S36=4 and S48=128.)</li> </ul>					
Command: Values:	\V <i>n</i>	Single Line Connect Message Enable (Not available in V.22bis) n = 0, 1					
Default:		1					
Description:		V0 Connect messages are controlled by the command settings X, W, and S95.					
		V1 Connect messages are displayed in the single line format described below subject to					
		the command settings V (Verbose) and Q (Quiet). In Non-Verbose mode (V0), single line connect messages are disabled and a single numeric result code is generated for CONNECT DTE.					
		When single line connect messages are enabled, there are no CARRIER, PROTOCOL (+ER:), or COMPRESSION (+DR:) messages apart from the fields described below.					
		The single line connect message format is: CONNECT <dte speed="">/<modulation>/<protocol>/<compression>/<line< td=""></line<></compression></protocol></modulation></dte>					
		Speed>/ <voice and="" data=""> Where:</voice>					
		DTE Speed = DTE speed, e.g., 57600. Modulation = "V90" for V.90 modulation.					
		"K56" for K56flex modulation.					
		"V34" for V.34 modulation.					
		"V32" for V.32 or V.32bis modulation.					
		<b>Note:</b> Modulation is omitted for all other modulations.					
		Protocol = "NONE" for no protocol. "ALT" for Microcom Network Protocol.					
		"LAPM" for LAP-M protocol.					
		Compression = "ALT" for Microcom MNP5 compression.					
		"V42B" for V.42bis compression.					
		Note: Compression is omitted if protocol is NONE.					
		Line Speed = Asymmetric rates display as /rate:TX/rate:RX; e.g., /1200 TX/75 RX. Symmetric rates display as a single DCE rate, e.g., 14400.					
		Voice and Data = Blank for Data mode only. "SVD" for AudioSpan analog simultaneous audio/voice and data.					
		"DSVD" for digital simultaneous voice and data.					
		"V70" for G.729A digital simultaneous voice and data.					

"V70" for G.729A digital simultaneous voice and data.

Command: Values: Default: Description:	–Kn	<ul> <li>MNP Extended Services (Not available in V.22bis)</li> <li>n = 0, 1, 2.</li> <li>0</li> <li>Enables or disables conversion of a V.42 LAPM connection to an MNP 10 connection.</li> <li>The parameter value, if valid, is written to S40 bits 0 and 1.</li> <li>-K0 Disables V.42 LAPM to MNP 10 conversion. (Default.)</li> <li>-K1 Enables V.42 LAPM to MNP 10 conversion.</li> <li>-K2 Enables V.42 LAPM to MNP 10 conversion; inhibits MNP Extended Services initiation during V.42 LAPM answer mode detection phase.</li> </ul>					
Command: Values: Default: Description:	–STEn	<ul> <li>Set Telephony Extension <ul> <li>n = 0 or 1</li> </ul> </li> <li>The -STE command enables/disables Line-In-Use, Extension Pickup, and Remote Hangup detection features.</li> <li>Note: This command is supported only if enabled through firmware configuration.</li> <li>Defined Values: <value> Decimal number corresponding to the selected bit-mapped options. The bit field are defined as follows:</value></li> <li>Bit 0 = Line-In-Use detection enable/disable.</li> <li>Bit 1 = Extension Pickup detection enable/disable.</li> <li>Bit 2 = Remote Hangup detection enable/disable.</li> </ul>					
			<value></value>	Remote	Extension	Line-in-Use	
			(Dec.)	Hangup	Pickup		
			0 (default)	Disabled	Disabled	Disabled	
			1	Disabled	Disabled	Enabled	
			2	Disabled	Enabled	Disabled	
			3	Disabled	Enabled	Enabled	
			4	Enabled	Disabled	Disabled	
			5	Enabled	Disabled	Enabled	
			6	Enabled	Enabled	Disabled	
			7	Enabled	Enabled	Enabled	
		Reporting Current or Selected Values         Command:       -STE?         Response:       -STE: <value>         Example:       -STE: 4 Remote Hangup enabled, Extension Pickup disabled, and Line-In-Use disabled         Reporting Supported Range of Parameter Values         Command:       -STE:? Show available options         Response:       -STE: 0-7</value>					
		F	Result Codes:	OK <value> = 0-</value>	7; ERROR otherw	vise.	
		When and wi When moden defined remote If the la discon	Il return with th off-hook and ei n will drop the o d for #UD). Th e server will be ocal handset is nect, flash the int, the user dia	line is in use and e message LINE- ither an extensior connection. The e user must flash retraining. picked up while	-IN-USE. I is picked up or a disconnect reaso the hook in orde the modem is off- onds, then connect	a line reversal is in in register S86 r to get a dial tor hook, the moder ct the local hand	S=25 (this is also ne due because the m will do a link- set to the line. At
		Line-lı		d by AT-STE=1,		STE=5, or AT-S	ſE=7)
		lf te to	an ATDT, ATD lephone line is the DTE witho		ed while Line-In- m will immediate , and then return	ly return the mes to command mo	enabled and the ssage LINE-IN-USE de.

**Case 2: Telephone Line is in Use But Disconnected** If an ATDT, ATDP or ATDL is issued while Line-In-Use detection is enabled and the telephone line is NOT in use, the modem will go off-hook after a short pause, then respond with CONNECT or NO CARRIER message.

#### Case 3: Telephone Line is Not Connected to Modem

If an ATDT, ATDP or ATDL is issued while Line-In-Use detection is enabled and the telephone line is not connected, the modern will go off-hook momentarily, go back on-hook, then respond with NO DIAL TONE message.

		<ul> <li>Extension Pick-up (Enabled by AT-STE=2, AT-STE=3, AT-STE=6, or AT-STE=7): Case 1: Modem off-hook, Local Handset Goes Off-Hook If the local handset goes off-hook while the modem is in a data connection, the local handset will be muted. The modem will then send a GSTN Cleardown to the remote modem and then go on-hook. The modem will then send a NO CARRIER message to the DTE. A result code of 25 will be left in S86 register. After 2 seconds, the local handset will be connected to the telephone line so the user hears the dial tone.</li> <li>Case 2: Modem off-hook, Extension Pick-up If the modem is connected and another extension goes off-hook, the modem will send a GSTN Cleardown to the remote modem and then immediately hang-up. Due to the noise possibly being added to the line when a telephone extension is picked-up, a GSTN Cleardown may or may not successfully be received by the remote mode. If the GSTN Cleardown is not received successfully by the remote modem, the remote modem may attempt a retrain until the retrain fails and the remote modem drops the line. In any case, the modem will send a NO CARRIER message to the DTE immediately after sending the GSTN Cleardown. Result code 25 will be left in the S86 register. Because the extension is off-hook, the modem cannot flash the hook for the central office to generate a dial tone. In this case, the user must flash the extension handset to obtain a dial tone.</li> <li>Remote Hang-up (enabled by AT-STE=4, AT-STE=5, AT-STE=6, or AT-STE=7): Case 1: Modem off-hook, Remote Hang-up</li> </ul>
		If the modem is connected (off-hook) and the remote modem/server goes hangs up, the central office may issue a line polarity reversal. If a line polarity reversal is detected, the modem will drop the call and respond with NO CARRIER. The reason for hang-up can be determined by #UD or by S86=25. A line reversal can also be simulated by simply pulling out the telephone line during a connection.
Command: Values: Default: Description:	%Cn	<ul> <li>Enable/Disable Data Compression Control (Not available in V.22 bis)</li> <li>n = 0, 1, 2, 3</li> <li>Enables or disables data compression negotiation. The modem can only perform data compression on an error-corrected link. The parameter value, if valid, is written to S41 bits 0 and 1.</li> <li>%C0 Disables data compression. Resets S46 bit 1.</li> <li>%C1 Enables MNP 5 data compression negotiation. Resets S46 bit 1.</li> <li>%C2 Enables V.42 bis data compression. Sets S46 bit 1.</li> <li>%C3 Enables both V.42 bis and MNP 5 data compression. Sets S46 bit 1. (Default.)</li> </ul>
Command: Values: Default: Description:	%En	<ul> <li>Enable/Disable Line Quality Monitor and Auto-Retrain n = 0, 1, 2</li> <li>2 (default is 1 in V.22bis)</li> <li>Controls whether or not the modem will automatically monitor the line quality and request a retrain (%E1) or fall back when line quality is insufficient or fall forward when line quality is sufficient (%E2). The parameter value, if valid, is written to S41 bits 2 and 6. If enabled, the modern attempts to retrain for a maximum of 30 seconds.</li> <li>%E0 Disable line quality monitor and auto-retrain (disable fallback and fall forward).</li> <li>%E1 Enable line quality monitor and auto-retrain (enable fallback, disable fall forward).</li> <li>%E2 Enable line quality monitor and fallback/fall forward (enable fallback and fall forward). (%E2 is not available in V.22bis)</li> <li>Fallback/Fall Forward. When %E2 is active, the modem monitors the line quality (EQM).</li> <li>When line quality is insufficient, the modem will initiate a rate renegotiation to a lower speed within the V.34/V.32 bis/V.32 (RC336) modulation speeds. The modern will keep falling back within the current modulation if necessary until the speed reaches 2400 bps (V.34) or 4800 bps (V.32). Below this rate, the modern will only do retrains if EQM thresholds are exceeded. If the EQM is sufficient for at least one minute, the modern will initiate a rate renegotiation to a higher speed within the current modulation speeds. The rate renegotiations will be done without a retrain if a V.32bis connection is established.</li> <li>Speeds attempted during fallback/fall forward are those shown to be available in the rate sequences exchanged during the initial connection. Fallback/fall forward is available in error correction and normal modes, but not in direct mode or synchronous mode with external clocks</li> </ul>

clocks.

Command:	%L <i>n</i>	<b>Line Signal Level Report</b> Returns a value, which indicates the received signal level. The value returned is a direct indication (DAA dependent) of the receive level at the MDP, not at the telephone line connector. For example, $009 = -9$ dBm, $043 = -43$ dBm, and so on.		
Command:	%Qn	Line Signal Quality Report Reports the line signal quality (DAA dependent). Returns the higher order byte of the EQM value. Based on the EQM value, retrain or fallback/fall forward may be initiated if enabled by %E1 or %E2. Example: AT%Q 015		
Command: Values: Default: Description	%U <i>n</i>	<ul> <li>Select μ-Law or A-Law Codec Type (Not available in V.22bis)</li> <li>0, 1</li> <li>Country-specific</li> <li>This command selects μ-Law or A-Law codec type for V.90 and K56flex modulation. This command also stores the selected setting directly to NVRAM. The default value is country specific.</li> <li>%U0 Selects μ-Law.</li> <li>%U1 Selects A-Law.</li> </ul>		
Command: Values: Default: Description:	+A8E	<ul> <li>V.8 and V.8bis Operation Controls (Not available in V.22bis) <ol> <li>1,6</li> <li>This command is defined for two conditions: as a parameter while the modem is on-hook, and as an action command while the modem is off-hook. If enabled, V.8 negotiation does not preclude simultaneous implementation of other negotiation means (e.g., V.8bis, V.18, V.32bis Annex A).</li> </ol> </li> <li>On-Hook If issued while the modem is on-hook, used to precondition V.8 and V.8bis originating and answering operation. It is issued by the DTE before the Dial (D) or Answer (A) command. Off-Hook If issued while the modem is off-hook, to (re)start V.8 or V.8bis negotiation. For example, if initial V.8 negotiation failed, but subsequent T.30 negotiation indicated V.8 capability, this command may be used to initiate V.8 negotiation. <b>evolution evolution evolution evolution evolution evolution evolution or or</b>&lt;</li></ul>		
		Reporting Supported Range of Parameter Values Command: +A8E=?		

Command:	+A8I	<b>CI Signal Indication</b> (Not available in V.22bis) This indication is issued by an answering modem, if +A8E, <v8a> does not equal 0, to indicate detection of a V.8 CI signal, and report the recovered Call Function octet(s). Indication Syntax: +A8I:<v8cf><cr> Example +A8I:0 The modem timed out waiting for CI. +A8I:X YYY</cr></v8cf></v8a>		
Command: Values: Default: Description:	+DR	Data Compression Report (Not available in V.22bis)         0, 1         1         This extended-format numeric parameter controls whether or not the extended-format DR: intermediate result code is transmitted from the modem to the DTE.         S95 bit 5 is reset to 0 for +DR=0 and is set to a 1 for +DR=1. The more recent setting of +DR or S95 bit 5, and the W command setting, determines the actual data compression result code reporting (see S95 Parameter and W Command).         +DR O       Data compression reporting disabled (no +DR result code transmitted).         +DR1       Data compression reporting enabled (+DR result code transmitted).         +DR1       Data compression reporting enabled (+DR result code transmitted).         Reporting Current or Selected Values       Command:+DR?         Reporting Supported Range of Parameter Values       Command:+DR?         The +DR: <type> Intermediate Result Code       The +DR: <type> reported represents the current (negotiated or renegotiated) modem-modem data compression type. If enabled, the intermediate result code is transmitted at the point after error control negotiation (handshaking) at which the modem has determined which data compression technique will be used (if any) and the direction of operation. The +DR intermediate result code (i, fenabled, is issued after the Error Control Report (+ER) and before the final result code (e, g., CONNECT).</type></type>		
Command: Values: Default: Description:	+DS	Data Compression (Not available in V.22bis)         0, 3         3         This extended-format compound parameter controls the V.42bis data compression function if provided in the modem. It accepts four numeric subparameters: <direction>       Specifies the desired direction(s) of operation of the data compression function from the DTE point of view.         +DS0       Negotiated; no compression (V.42bis P0=0).         +DS3       Both directions, accept any direction (V.42bis P0=11).         <compr_neg>       Specifies whether or not the modem should continue to operate if the desired result is not obtained.         +DS0       Do not disconnect if V.42bis is not negotiated by the remote modem as specified in <direction>.         <max_dict>       Specifies the maximum number of dictionary entries (2048 entries) which should be negotiated (may be used by the DTE to limit the code word size transmitted).         <max_string>       Specifies the maximum string length (32 bytes) to be negotiated (V.42bis P2).         Reporting Current or Selected Values       Command: +DS?         Reporting Supported Range of Parameter Values       Command: +DS=?</max_string></max_dict></direction></compr_neg></direction>		

Command: Values: Description:	+EB	Break Handling in Error Control Operation (Not available in V.22bis)         n/a         This extended-format compound parameter controls the break handling in V.42 operation. It accepts three numeric subparameters:  	
Command: Values: Description:	+EFCS	Command: +EB=? <b>32-bit Frame Check Sequence</b> (Not available in V.22bis) n/a This extended-format numeric parameter controls the use of the 16-bit or 32-bit frame check sequence (FCS) option in V.42. <b>Reporting Current or Selected Values</b> Command:+EFCS? <b>Reporting Supported Range of Parameter Values</b> Command:+EFCS=?	
Command: Values: Default: Description:	+ER +ER	Error Control Report (Not available in V.22bis) 0, 1 0 This extended-format numeric parameter controls whether or not the extended-format +ER: intermediate result code is transmitted from the modem to the DTE. S95 bit 3 is reset to 0 for +ER=0 and is set to a 1 for +ER=1. The more recent setting of +EF or S95 bit 3, and the W command setting, determines the actual error control result code reporting (see S95 Parameter and W Command). +ER0 = Error control reporting disabled (no +ER intermediate result code transmitted). +ER1 = Error control reporting enabled (+ER intermediate result code transmitted). <b>Reporting Current or Selected Values</b> Command: +ER? <b>Reporting Supported Range of Parameter Values</b> Command: +ER=? <b>Ctype&gt;</b> The +ER <type> reported represents the current (negotiated or renegotiated) modem- modem error control type. If enabled, the intermediate result code is transmitted at the point during error control negotiation (handshaking) at which the modem has determined which error control protocol will be used (if any), before the final result code (e.g., CONNECT) is transmitted.</type>	

Command: +ES	Error Control Selection				
Description:	This extended-format command specifies the initial requested mode of operation when the				
	modem is operating as the originator, optionally specifies the acceptable fallback mode of				
	operation when the modem is operating as the originator, and optionally specifies the				
	acceptable fallback mode of operation when the modem is operating as the answerer. It				
	accepts three numeric subparameters:				
Defined Values:	<orig_rqst> Decimal number which specifies the initial requested mode of operation when</orig_rqst>				
	the modem is operating as the originator. The options are:				
	0 Initiate call with Direct Mode.				
	1 Initiate call with Normal Mode (also referred to as Buffered Mode) only.				
	2 Initiate V.42 without Detection Phase. If V.8 is in use, disable V.42 Detection				
	Phase.				
	3 Initiate V.42 with Detection Phase. (Default.)				
	4 Initiate MNP.				
	7 Initiate Frame Tunneling Mode when connection is complete and Data Mode				
	is entered.				
	orig_fbk> Decimal number which specifies the acceptable fallback mode of operation				
	when the modem is operating as the originator.				
	0 LAPM, MNP, or Normal Mode error control optional. (Default.)				
	1 LAPM, MNP, or Direct Mode error control optional.				
	2 LAPM or MNP error control required; disconnect if error control is not				
	established.				
	3 LAPM error control required; disconnect if error control is not established.				
	4 MNP error control required; disconnect if error control is not established.				
	<ans_fbk> Decimal number which specifies the acceptable fallback mode of operation</ans_fbk>				
	when the modem is operating as the answerer.				
	0 Direct Mode.				
	1 Error control disabled, use Normal Mode.				
	2 LAPM, MNP, or Normal Mode error control optional. (Default.)				
	3 LAPM, MNP, or Direct Mode error control optional.				
	4 LAPM or MNP error control required; disconnect if error control is not				
	established.				
	5 LAPM error control required; disconnect if error control is not established.				
	6 MNP error control required; disconnect if error control is not established.				
	Reporting Current or Selected Values:				
	Command: +ES?				
	Reporting Supported Range of Parameter Values:				
	Command: +ES=?				
Command: +ESR	Selective Reject				
Values:	n/a				
Description:	This extended-format numeric parameter controls the use of the selective reject (SREJ)				
	option in V.42.				
	Pencerting Current or Selected Values				

option in V.42. **Reporting Current or Selected Values:** Command:+ESR? **Reporting Supported Range of Parameter Values:** Command:+ESR=?

Command: Values:	+ETBM		Buffer Management			
Description:		n/a This extended-format compound parameter controls the handling of data remaining in modem buffers upon call termination. It accepts three numeric subparameters: Syntax: +ETBM=[ <pending_td>[,<pending_rd>[,<timer>]]] Defined Values:</timer></pending_rd></pending_td>				
		k c	Decimal number 0 specifying that disconnect will occur immediately and all buffered transmit data will be discarded when the local DTE requests call disconnection.			
		k c	Decimal number 0 specifying that disconnect will occur immediately and all ouffered receive data will be discarded when the local DTE requests call disconnection.			
		k	Decimal number 0 specifying that the modem will not attempt to deliver the ouffered data before abandoning the attempt and discarding remaining data.			
		Reporting Curren Command: +ET	nt or Selected Values			
			orted Range of Parameter Values			
Command: Values:	+GCAP	<b>Complete Capa</b> n/a	bilities List Request (Not available in V.22bis)			
Description:		This extended-for information text lis permit the user to implements a part and if that modern the + <names>(s) +GCAP command Sample Respons +GCAP: +MS, +E +MS +Mo +ES +E c</names>				
Command: Description:	+GMI		entification Request (Not available in V.22bis) em product manufacturer.			
Command: Description:	+GMM		tion Request (Not available in V.22bis) em product model.			
Command: Description:	+GMR		<b>cation Request</b> (Not available in V.22bis) em version, revision level, or date. This is the same as the <b>I3</b> command.			

Command: Values:	+IFC	DTE-Modem Local Flow Control
values.		<ul> <li>0, 1</li> <li>Values defined by <modem_by_dte> Specifies the method to be used by the DTE to control the flow of received data from the modem.</modem_by_dte></li> <li>+IFC0 None</li> <li>+IFC1 XON/XOFF on transmitted data (XON/XOFF on transmit data); do not pass XON/XOFF characters to the remote modem.</li> <li>+IFC2 Circuit 133 (Ready for Receiving).</li> <li>+IFC3 DC1/DC3 on circuit 103 (Transmitted Data) with DC1/DC3 characters being passed through to the remote DCE in addition local flow control applied.</li> <li>Values defined by <dte_by_modem> Specifies the method to be used by the modem to control the flow of transmitted data from the DTE.</dte_by_modem></li> <li>+IFC1 XON/XOFF on received data.</li> <li>+IFC2 CTS/RTS.</li> <li>Reporting Current or Selected Values Command: +IFC?</li> <li>Reporting Supported Range of Parameter Values Command: +IFC=?</li> </ul>
Command: Values:	+ILRR	<b>DTE-Modem Local Rate Control</b> (Not available in V.22bis) 0, 1
Default: Description:		<ul> <li>This extended-format numeric parameter controls whether or not the extended-format +ILRR:<rrate> information text is transmitted from the modem to the DTE.</rrate></li> <li>+ILRR0 Disables reporting of local port rate (+ILRR: is not transmitted).</li> <li>+ILR1 Enables reporting of local port rate (+ILRR: is transmitted).</li> <li>Reporting Current or Selected Values         Command: +ILRR?</li> <li>Reporting Supported Range of Parameter Values         Command: +ILRR=?</li> <li>Reported Rate</li> <li>The <rrate> reported represents the current (negotiated or renegotiated) DTE-modem rate. If         enabled, the intermediate result code is transmitted after any modulation, error control or         data compression reports are transmitted, and before any final result code (e.g., CONNECT)         is transmitted. The <rrate> is applied after the final result code is transmitted.</rrate></rrate></li> <li>The DTE-modem port rate will change only if neither buffered mode nor error controlled         means are enabled (+ES=x,0) and if the negotiated carrier rate (+MRR) does not match the         current DTE-modem port rate (auto-detected from the previous command line).</li> <li>Defined Values:         <ul> <li><a href="mailto:state"></a> (auto-detected from the previous command line).</li> </ul> </li> <li>Outing and the representing the current (negotiated or renegotiated) DTE-modem         rate: 0, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, or 230400</li> <li><a href="mailto:state"></a> (state=&gt; Decimal value representing the current (negotiated or renegotiated) DTE-modem         rate: 0, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, or 230400</li> </ul>
Command:	+IPR	Fixed DTE Rate (Not available in V.22bis)
Values: Description:		n/a This numeric extended-format parameter specifies the data rate at which the modem will accept commands during online operation. It may be used to select operation at rates at which the modem is not capable of automatically detecting the data rate being used by the DTE. Specifying a value of 0 disables the function and allows operation only at rates automatically detectable by the modem. The specified rate takes effect following the issuance of any result code(s) associated with the current command line. The <b><rate></rate></b> specified does not apply in Online Data State if Normal Mode (Direct Mode) of operation is selected. <b>Defined Values:</b> <b><rate></rate></b> Specifies the DTE-modem interface operation rate in bits/s. The available rates are: 0, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, or 230400 If unspecified or set to 0, automatic detection is selected and the character format is also forced to auto-detect, +ICF=0. If the rate specified is not supported by the modem, an ERROR result code will be returned. <b>Reporting Current or Selected Values</b> Command: +IPR? <b>Reporting Supported Range of Parameter Values</b> Command: +IPR=?

Command:	+MR	Modulation Reporting Control (Not available in V.22bis)					
Values:		0, 1, 2					
Default:		0					
Description:		This extended-format numeric parameter controls whether or not the extended-format +MCR: <carrier> and +MRR:<rate> intermediate result codes are transmitted from the modem to the DTE. If enabled, +MCR:<carrier> and +MRR:<rate> intermediate result codes represent the current (negotiated or renegotiated) modulation <carrier> and <rate> that are transmitted at the point during connect negotiation (handshaking) at which the modem has determined which modulation and rate will be used, i.e., before any Error Control or Data Compression reports are transmitted, and before any final result code (e.g., CONNECT) is transmitted.</rate></carrier></rate></carrier></rate></carrier>					
		S95 bit 2 is reset to 0 for +MR=0 and is set to a 1 for +MR=1 or +MR=2. The more recent setting of +MR or S95 bit 2, and the W command setting, determines modulation result code reporting (see S95 Parameter and W Command).					
		+MR0 Disables reporting of modulation connection (+MCR: and +MRR: are not transmitted).					
		+MR1 Enables reporting of modulation connection (+MCR: and +MRR: are transmitted with tx rate, rx rate).					
		+MR2 Enables reporting of modulation connection (+MCR: and +MRR: are transmitted with rx rate only).					
		Reporting Current or Selected Values Command: +MR?					
		Reporting Supported Range of Parameter Values Command: +MR=?					
		Report Syntax +MCR Response: +MCR: <carrier></carrier>					
		<carrier> Alphanumeric code corresponding to the reported carrier. Defined values are:</carrier>					
		B103 For Bell 103					
		B212 For Bell 212					
		V21 For V.21 V22 For V.22					
		V22 For V.22bis					
		V22D For V.22D					
		V32 For V.32					
	V32B For V.32bis						
		V34 For V.34					
		V90 For V.90					
		K56 For K56flex					
		Report Syntax +MRR					
		Response: +MRR: <tx_rate>,<rx_rate></rx_rate></tx_rate>					
		<tx_rate> Decimal transmit rate in bits/s.</tx_rate>					
		<pre><rx_rate> Decimal receive rate in bits/s.</rx_rate></pre>					

Example: +MRR: 28800, 48000

#### **Modulation Selection** Command: +MS

Description:

This extended-format compound parameter controls the manner of operation of the modulation capabilities in the modem. It accepts six subparameters.

### Table 8-1. +MS Command Supported Rates

		Commanu	Supported Rates				
	Modulation	<carrier></carrier>	Possible ( <min_rx_rate>, <min_rx_rate>, (<min_tx_rate>), and <max_tx_rate>) Rates (bps)</max_tx_rate></min_tx_rate></min_rx_rate></min_rx_rate>				
	Bell 103	B103	300				
	Bell 212	B212	1200 Rx/75 Tx or 75 Rx/1200 Tx				
	V.21	V21	300				
	V.22	V22	1200				
	V.22 bis	V22B	2400 or 1200				
	V.23	V23C	1200				
	V.32	V32	9600 or 4800				
	V.32 bis	V32B	14400, 12000, 9600, 7200, or 4800				
	V.34	V34	33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, or 2400				
	56K	K56	56000, 54000, 52000, 50000, 48000, 46000, 44000, 42000, 40000, 38000, 36000, 34000, 32000				
	V.90	V90	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000				
	V.92 downstream	V92	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000				
	V.92 upstream	V92	48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000, 26667, 25333, 24000				
			ues may not be supported by certain model models. For supporting V92 may not support K56.				
	<ul> <li>answering a connection. <carrier> values are strings of up to eight characters, consisting only of numeric digits and upper case letters.</carrier></li> <li><carrier> values for ITU standard modulations take the form: <letter>&lt;1-4 digits&gt;<other as="" letters="" needed="">. Defined values are listed in Table 8-1.</other></letter></carrier></li> <li><automode> A numeric value which enables or disables automatic modulation negotiation (ITU-T V.32bis Annex A or V.8).</automode></li> <li>0 = Automode disabled.</li> <li>1 = Automode enabled. (Default.)</li> </ul>						
	<min_rx_rate> and <max_rx_rate></max_rx_rate></min_rx_rate>						
		( <max_rx_ra connection. as distinct fr decimal end are listed in correspondi during opera (<max_rx_ra< td=""><td>lues which specify the lowest (<min_rx_rate>) and highest ate&gt;) rate at which the modem may establish a receive May be used to condition distinct limits for the receive direction rom the transmit direction. Values for this subparameter are coded, in units of bit/s. The possible values for each modulation Table 8-1. Actual values will be limited to possible values ng to the entered <carrier> and fall-back <carrier> as determined ation. (Default = lowest (<min_rx_rate>) and highest ate&gt;) rate supported by the selected carrier.)</min_rx_rate></carrier></carrier></min_rx_rate></td></max_rx_ra<></max_rx_ra 	lues which specify the lowest ( <min_rx_rate>) and highest ate&gt;) rate at which the modem may establish a receive May be used to condition distinct limits for the receive direction rom the transmit direction. Values for this subparameter are coded, in units of bit/s. The possible values for each modulation Table 8-1. Actual values will be limited to possible values ng to the entered <carrier> and fall-back <carrier> as determined ation. (Default = lowest (<min_rx_rate>) and highest ate&gt;) rate supported by the selected carrier.)</min_rx_rate></carrier></carrier></min_rx_rate>				
	<min_tx_rate> and <max_tx_rate></max_tx_rate></min_tx_rate>						
	<b>Reporting C</b> Command:	( <max_tx_ra connection. units of bit/s Actual value <carrier> ar lowest (<min selected car</min </carrier></max_tx_ra 	lues which specify the lowest ( <min_tx_rate>) and highest ate&gt;) rate at which the modem may establish a transmit Non-zero values for this subparameter are decimal encoded, in s. The possible values for each modulation are listed in Table 8-3. es will be limited to possible values corresponding to the entered and fall-back <carrier> as determined during operation. (Default = n_tx_rate&gt;) and highest (<max_tx_rate>) rate supported by the rrier.)</max_tx_rate></carrier></min_tx_rate>				
Popult Code:	Reporting S Command:	upported Ra +MS=?	ange of Parameter Values				
Result Code:	OK - Valid su Otherwise Ef		sung				

Command: <b>+VCID</b> Description:	<b>Caller ID (CID)</b> Controls the reporting and presentation of data associated with the Caller ID services in the Incoming Call Line ID (ICLID) data format for the next call. (U.S. only)			
Default:	0			
Defined Values:	<ul> <li>+VCID0 Disable Caller ID reporting.</li> <li>+VCID1 Enables Caller ID with formatted presentation to the DTE. The modem presents the data items in a <tag><value> pair format. The expected pairs are date, time, name, and caller code (telephone number).</value></tag></li> </ul>			
Report Commands:	<ul> <li>+VCID2 Enables Caller ID with unformatted presentation to the DTE.</li> <li>+VCID? Reports the Mode</li> <li>+VCID=? Reports Range of Parameters</li> </ul>			
Command: +VRID	Report Retrieved Caller ID (CID)			
Description:	Reports the data associated with the Caller ID services in the Incoming Caller Line (ICLID) data format for the last received call. U.S. only			
Default:	None			
Defined Values:	<ul> <li>+VRID0 Reports Caller ID with formatted presentation to the DTE. The modem presents the data items in a <tag><value> pair format. The expected pairs are date, time, name, and caller code (telephone number).</value></tag></li> <li>+VRID1 Reports Caller ID with unformatted presentation to the DTE.</li> </ul>			
Report Commands:	+VRID? Reports the Mode			
Command: #UD

Description:

## Last Call Status Report (Not available in V.22bis)

#UD is an action command requesting logged operation events reporting. It does not take parameters and must be the last command in the command line.

The modem logs aspects of their operation for each call, and saves these results until cleared by one of the following events:

Power off.

Hard reset (e.g., negate DTR with &D3 set; reset button).

Soft reset = ATZ or AT&F.

ATD command issued.

ATA command issued.

Automatic answer (e.g., set register S0>0 and ring detected).

These results are NOT cleared by changing DTR, V.24 circuit 108.2, if &D0, &D1 or &D2. Data Call State Model:

For purposes of this command, there are four data call states, and associated status issues: 1. Call Setup

- -Calling DCE: get dial tone, generate dial digits, and detect call progress signals. -Answering DCE: detect ringing, detect Caller ID, etc.
- 2. Negotiation

-V.25 calling tone/answer tone exchanges

- -V.8 or V.8bis call function negotiations
- -V-series modem carrier detection and training
- -Modem-to-modem protocols (e.g., V.42, V.42bis).
- 3. Data Transfer

-Bit-error rates, for each direction

- -Rate renegotiation
- -Retraining
- 4. Call Termination

-protocol disconnect signals -carrier disconnect signals -loss of carrier -excessive error rates

#### Command Syntax:

In response to this command, the modern will report one or more lines of information text as defined below. Information text format conforms to V.250; each line is preceded by a <CR><LF> pair, and terminated by <CR><LF>. (CR and LF characters may be changed by writing new values to the contents of registers S3 and S4, respectively.)

The modem may generate a single line or multiple lines, followed by OK result code. For example, if call setup failed, only that result is useful. Each information text line is formatted as follows, including one or more key=value pairs:

Response: DIAG <token key=value [[key=value] [key=value]] ...>

Defined Values: DIAG 5 hexadecimal characters (44h, 49h, 41h, 47h, 20h)

<	Left angle bracket (less than sign) (3Ch) token Unique 32-bit hexadecimal
	string 2A4D3263(32h, 4h1, 34h, 44h, 33h, 32h, 36h, 33h)
space	space character (20h)
Key	One- or two-digit hexadecimal number (see Key in Table 8-2)
=	Equal sign (3Dh)
Value	Any string as defined below (Table 8-2 - Table 8-7 as appropriate)

Right angle bracket (greater than sign) (3Eh) >

Unless otherwise noted, all values are hexadecimal numbers. Any numeric values from tables in ITU V.58 are converted to hexadecimal. Multi-digit values are reported MSD first. Leading 0's may be deleted. See examples in Table 4-13.

#### Monitoring an Active Connection

This command is intended for use after call termination. However, codes are defined so that a modem can respond before the first call is placed, and during a call for live monitoring purposes. For example, key 60, call termination, has value 1 defined, indicating that the call is still in progress.

There are at least two ways to do this. First, the DTE could switch the modem to online command state, issue the command, capture the responses, and then issue an ATO command. For smoother online monitoring, in-band means defined in ITU V.80 are recommended if available in the modem. If V.80 methods are used, each response line shall be a separate extended in-band message.

#### Notes for AT#UD Tables

- The modem may insert a delay (e.g., 10 ms) between information text lines. 1.
- 2. The code tables include values for data and fax calls. Some of the codes are applicable only to data calls (e.g., data compression), some to call origination (e.g., busy, answering signal detection), and some to the answering modem (e.g., calling signal detection).
- callCleared codes from 3.6.4/V.58-1994 callCleared: indicates that the DCE has gone on-3. hook and that the previously existing network connection has been cleared. These values are hex values, converted from decimal in V.58. callCleared codes are described in Table 8-10.

#### Table 8-2. AT#UD Last Call Status Report Format

Key	Value(s)	Definition
-		
0	2 digits Table 8-3	Diagnostic Command Specification revision number, digit.digit
1		Call Setup Result code
2	Table 8-4	Multi-media mode
3	Table 8-5	DTE-DCE interface mode
4	String	V.8 CM octet string, same format as V.250, in quotes
5	String	V.8 JM octet string, same format as V.250, in quotes
10	0-2F	Received signal power level, in –dBm (0-43)
11	0-1F	Transmit signal power level, in –dBm (e.g., 0-17)
12	0-64	Estimated noise level, in –dBm (e.g., 10-90)
17	0-FFF	Round Trip delay, in units of ms
18	Table 8-6	V.34 INFO bit map
20	Table 8-7	Transmit Carrier Negotiation Result
21	Table 8-7	Receive Carrier Negotiation Result
22	0-1F40	Transmit Carrier symbol rate (0-8000) in symbol/s
23	0-1F40	Receive Carrier symbol rate (0-8000) in symbol/s
24	0-FA0	Transmit Carrier frequency (0-4000) in Hz
25	0-FA0	Receive Carrier frequency (0-4000) in Hz
26	0-FA00	Initial transmit carrier data rate (0-64000) in bit/s
27	0-FA00	Initial receive carrier data rate (0-64000) in bit/s
30	0-FF	Temporary carrier loss event count
31	0-FF	Carrier Rate re-negotiation event count
32	0-FF	Carrier Retrains requested
33	0-FF	Carrier Retrain requests granted
34	0-FA00	Final transmit carrier data rate in bit/s
35	0-FA00	Final receive carrier data rate in bit/s
40	Table 8-8	Protocol Negotiation Result
41	0-400	Error Control frame size in bytes
42	0-400 0-FF	Error control link timeouts in transmission
43	0-FF Error	control link NAKs received
43 44	Table 8-9	Compression Negotiation Result
44 50	0-2	Transmit flow control: 0=off; 1=DC1/DC3; 2=V.24 circuit 106/133
50 51	0-2	
		Receive flow control: 0=off; 1=DC1/DC3; 2=V.24 circuit 106/133
52	0-FFFFFFFF	Transmit characters sent from DTE
53	0-FFFFFFFF	Received characters sent to DTE
54	0-FFFF	Transmit characters lost (data overrun errors from DTE)
55	0-FFFF	Received characters lost (data overrun errors to DTE)
56	0-FFFFFFFF	Transmit I- Frame count, if error control protocol running
57	0-FFFFFFFF	Received I-Frame count, if error control protocol running
58	0-FFFF	Transmit I-Frame error count, if error control protocol running
59	0-FFFF	Received I- Frame error count, if error control protocol running
60	Table 8-10	Termination Cause
61	0-FF Call	Waiting event count

#### Table 8-3. Call Setup Result Codes

Code Definition

7

- 0 No previous call (modem log has been cleared since any previous calls)
- 1 No dial tone detected
- 2 Reorder signal detected, network busy
- 3 Busy signal detected
- 4 No recognized signal detected (e.g., no signal, or nothing recognizable) 5
  - Voice detected \* if this is a voice modem (V.253) in voice mode
  - Data Answering signal detected (e.g., V.25 ANS, V.8 ANSam)
- 8 Data Calling signal detected (e.g., V.25 CT, V.8 CI)
- 9 Fax Answering signal detected (e.g., T.30 CED, DIS)
- Fax Calling signal detected (e.g., T.30 CNG) А
- V.8bis signal detected В

#### Table 8-4. Multimedia Modes

- Code Definition
- 0 Data Only
- 1 Fax Only
- 2 Voice
- 9 Video-telephony, H.324
- A Other V.80 call

#### Table 8-5. DTE-DCE modes

- Code Definition
- 0 Async data
- 1 V.80 transparent synchronous mode
- 2 V.80 framed synchronous mode

## Table 8-6. V.34 INFO bit report

Bits Source bits	Definition
31-30	INFO0 bit 20; 0
20-29	INFOc bits 79-88
16-19	INFOc bits 26-29 or 35-38 or 44- 47 or 53-56- or 62-65 or 71-74
Pre-emphasis field, s	elected by the symbol rate chosen
12-15	INFOa bits 26-29
10-11	MP bit 50; 0
0-9	INFOa bits 40-49

## Table 8-7. gstnModulationSchemeActive from 3.7.2/V.58

Value	Description
0	V.17 (G3 Fax call)
1	V.21
2	V.22
3	V.22bis
4	V.23 Constant Carrier (1200/75)
8	V.27ter (G3 Fax call)
9	V.29 HD (G3 Fax call)
А	V.32
В	V.32bis
С	V.34
E	V.90 and V.92
81	56K
84	Bell 212A
85	Bell 103

#### Table 8-8. errorControl Active from 3.5.2/V.58

- Value Description
- 0 Disable/none
- 1 V.42 LAPM
- 2 V.42 Alternative protocol (MNP<sup>™</sup>)
- 80 MNP10™

#### Table 8-9. compressionActive from 3.2.2/V.58

- Value Description
- 0 None
- 1 V.42bis and V.44
- 80 MNP5™

Table 8-1	0. callCleared codes from 3.6.4/	V.58-1994
Value	Description	Notes
0	CauseUnidentified	Call setup issues
1	No Previous call	Not in V.58
2	Call is still in progress	Not in V.58
3	Call Waiting signal detected	Not in V.58, only if modem can detect it
4	Delayed	Same as value 2A, CallAttemptsLimitExceeded
19	InactivityTimerExpired	, I
1F	cct108isOffInhibitsDial	DTR low
20	cct108turnedOff	DTR drop
29	BlacklistedNumber	
2A	CallAttemptsLimitExceeded	Same as "Delayed", see ETS 300 001
2B	ExtensionPhoneOff-hook	If extension detection supported
2C	CallSetupFailTimerExpired	e.g., S7 timeout
2D	IncomingCallDetected	If incoming call while sending dial command.
2E	LoopCurrentInterrupted	
2F	NoDial tone	
31	ReorderTone	Fast busy
33	EngagedTone	Busy
34	LongSpaceDisconnect	And if modem program to abort on long space
3C	CarrierLost	Signal Converter
3D	TrainingFailed	
3E	NoModulationinCommon	
3F	RetrainFailed	
40	RetrainAttemptCountExceeded	
41	GstnCleardownReceived	
42	FaxDetected	If this was not a fax call attempt
46	InTestMode	Test
50	AnyKeyAbort	Call Control
51	DteHangupCommand	If ATH was used to terminate the previous call.
52	DteResetCommand	If ATZ was used to terminate the previous call.
5A	FrameReject	Error Control
5B	NoErrorControlEstablished	Error control was required
5C	ProtocolViolation	
5D	n400exceeded LAPM retransmi	ssion Count Timer
5E	NegotiationFailed	
5F	DisconnectFrameReceived	
60	SahmaEramaBaaaiyad	

- SabmeFrameReceived 60 64
- LossOfSynchronization

Data Compression

## **Example Modem Response and Usage**

Example #UD commend response are shown in Table 8-11.

#### Table 8-11. Completed Data Call, with some errors and rate retrain during the call

Modem Response Line	Description
DIAG <2A4D3263 0=09>	This is version 0.9
DIAG <2A4D3263 1=06 2=0 3=0>	Data Answer signal detected; Data only;
	Character async
DIAG <2A4D3263 5="C14513902A"	V.8 Call Menu indicates:
6="A145">	V.8 Joint Menu selects:
DIAG <2A4D3263 10=1F 11=0C 12=52>	Receive level = -31 dBm; transmit level = -12 dBm;
	noise level = -82 dBm
DIAG <2A4D3263 14=03 15=05 16=10>	Far end echo delay in milliseconds;
	Far end echo loss in dB;
	Near end echo loss = 16 dB
DIAG <2A4D3263 20=C 22=780 24=0C80	Transmitter: V.34 training completed;
26=79E0>	V.34 carrier frequency = 1920; V.34
	symbol rate = 3200; initial transmit rate is 31200 bit/s
DIAG <2A4D3263 21=D 25=1F40 27=DAC0>	Receiver: V.90 training completed;
	V.90 symbol rate = 8000;
	initial receive rate is 56000 bit/s
DIAG <2A4D3263 30=00 31=03 32=01	No carrier loss events, 3 carrier rate renegotiations
33=01>	attempted;
	1 carrier retrain requested;
	1 carrier retrain granted
DIAG <2A4D3263 34=7080 35=CB20>	Final transmit rate is 28800 bit/s;
	final receive rate is 52000 bit/s
DIAG <2A4D3263 40=1 41=100>	LAPM negotiation completed; frame size = 256
DIAG <2A4D3263 42=0 43=0>	No error control timeout or link NAKs
DIAG <2A4D3263 44=1 45=400>	V.42bis data compression used;
	dictionary size = 1024
DIAG <2A4D3263 50=2 51=2>	Hardware transmit and receive flow control
DIAG <2A4D3263 52=343CC 54=0>	213964 DTE characters transmitted, w/o underrun
DIAG <2A4D3263 53=7230E6 55=47>	7483622 DTE characters received, 71 characters lost
	due to receive data overrun
DIAG <2A4D3263 56=29D 58=0001>	597 (decimal) frames transmitted, with 1 frame error
DIAG <2A4D3263 58=2A4B 59=0004>	10827 (decimal) frames received, with 4 frame errors
DIAG <2A4D3263 60=51>	Local PC initiated hangup

Command: Values: Description:

#### +++<CR> Escape Sequence

n/a When the modem has established a connection and has entered online data mode, it is possible to break into the data transmission in order to issue further commands to the modem in an online command mode. This is achieved by the DTE sending to the modem a sequence of three ASCII characters specified by register S2. The default character is +. The maximum time allowed between receipt of the last character of the three escape character sequence from the DTE and sending of the OK result code to the DTE is controlled by the S12 register.

# **FastConnect Commands**

Command: Description:	\$F	<b>FastConnect Control</b> Allows configuring of the client modem to connect to a central site modem that supports non-standard V.22 and V.22 bis FastConnect protocols. Specifies the initial requested mode of operation when the modem is operating as the originator. The options are:		
Defined Values:		<ul> <li>\$F0 Normal connection (Default)</li> <li>\$F1 FastConnect without answer tone</li> <li>\$F2 Reserved</li> <li>\$F3 FastConnect with answer tone</li> </ul>		

# V.92 Commands (+P and -Q Commands)

This section describes the +P (PCM DCE) and –Q commands and parameters used to control the V.92 Mode operation.

Command: Description:	+PCW	Call Waiting Enable Controls the operation of the modem in the presence of call waiting.
Defined Values:		+PCW0 Request modem-on-hold if enabled by +PMH and collect caller ID information if enabled by +VRID. Toggle V.24 circuit 125. (Default.) +PCW1 Hang-up.
Result Codes:		+PCW2 Ignore call waiting. OK
Report Comman	ds:	ERROR +PCW? Reports Selected Value(s).
		+PCW=? Reports Supported Range of Parameter Values
Command: Description:	+PMH	Modem-on-Hold Enable Controls the selection of modem-on-hold in the modem. The action of the modem
Description.		in response to modem-on-hold events is determined by the state of this command as well as the state of a negotiated handshake with a V.92-compliant server in V.92
Defined Values:		Mode. +PMH0 Modem-on-hold enabled in V.92 Mode. (Default.)
Result Codes:		+PMH1 Disabled modem-on-hold. OK 0 or 1 in V.92 Mode (see the +MS command) ERROR
Report Comman	ds:	+PMH? Reports Current or Selected Value.
		+PMH=? Reports Supported Range of Parameter Values.
Command:	+PMHR	Initiate Modem-on-Hold
Description:		Requests the modem to initiate or to confirm a modem-on-hold procedure. The modem will return ERROR if modem-on-hold is not enabled or if the modem is in an idle condition. The modem will return the string response +PMHR: <value> where <value> is a decimal value corresponding to the status of the modem's hold exchange procedure as defined below. This response may be delayed depending upon the context under which the +PMHR command is made, i.e., if the +PMHR is</value></value>
Descent		in response to an incoming modem-on-hold or if it is initiating a request. <b>Note:</b> If modem-on-hold is enabled but the remote server does not support V.92 then the modem will always report 0 to show that the hold request is denied.
Response:		+PMHR: <value> The value corresponds to the maximum hold time the server or hold-granting</value>
		modem will allow. +PMHR0 V.92 MOH request denied or not available.
		+PMHR1 MOH with 10-second timeout Granted.
		+PMHR2 MOH with 20-second timeout Granted. +PMHR3 MOH with 30-second timeout Granted.
		+PMHR4 MOH with 40-second timeout Granted.
		+PMHR5 MOH with 1-minute timeout Granted.
		+PMHR6 MOH with 2-minute timeout Granted.
		+PMHR7 MOH with 3-minute timeout Granted.
		+PMHR8 MOH with 4-minute timeout Granted +PMHR9 MOH with 6-minute timeout Granted.
		+PMHR10 MOH with 8-minute timeout Granted.
		+PMHR11 MOH with 12-minute timeout Granted.
		+PMHR12 MOH with 16-minute timeout Granted.
Popult Codes:		+PMHR13 MOH with indefinite timeout Granted.
Result Codes:		OK 0-13 in V.92 Mode (+MS=V92) ERROR

Command: Description:	+PMHT	<b>Modem-on-Hold Timer</b> Controls whether or not the modem will grant or deny a modem-on-hold (MOH)		
Description: Defined Values:		<ul> <li>request as well as setting the MOH Timeout value.</li> <li>+PMHT0 Deny V.92 modem-on-hold Request (Default.)</li> <li>+PMHT1 Grant MOH with 10-second timeout</li> <li>+PMHT2 Grant MOH with 20-second timeout</li> <li>+PMHT3 Grant MOH with 30-second timeout</li> <li>+PMHT4 Grant MOH with 40-second timeout</li> <li>+PMHT5 Grant MOH with 40-second timeout</li> <li>+PMHT5 Grant MOH with 1 minute timeout</li> <li>+PMHT6 Grant MOH with 2 minute timeout</li> <li>+PMHT7 Grant MOH with 3 minute timeout</li> <li>+PMHT8 Grant MOH with 6 minute timeout</li> <li>+PMHT9 Grant MOH with 8 minute timeout</li> <li>+PMHT10 Grant MOH with 12 minute timeout</li> <li>+PMHT11 Grant MOH with 16 minute timeout</li> <li>+PMHT12 Grant MOH with 16 minute timeout</li> <li>+PMHT13 Grant MOH with 16 minute timeout</li> </ul>		
Result Codes:		OK 0-13 in V.92 Mode (+MS=V92) ERROR		
Report Commands:		+PMHT? Reports Current or Selected Values. +PMHT=? Reports Supported Range of Parameter Values.		
Command: Description:	+PIG	<b>PCM Upstream Ignore</b> Controls the selection of PCM upstream in the modem. The actual state of PCM upstream is determined by the state of this command as well as the state of a negotiated handshake with a V.92-compliant server in V.92 Mode.		
Defined Values:		+PIG0 Enable PCM upstream negotiation. +PIG1 Disable PCM upstream negotiation.		
Result Codes:		OK 0 or 1 in V.92 Mode (+MS=V.92) ERROR		
Report Commands:		+PIG? Reports Selected Value(s). +PIG=? Reports Supported Range of Parameter Values.		
Command: <b>+PMHF</b> Description:		<b>V.92 Modem-on-Hold Hook Flash</b> Causes the modem to initiate the flash hook sequence when in the modem-on- hold procedure. This enables switching to the second call (incoming or outgoing). This command applies only to V.92 modem-on-hold. There are no parameters associated with this command.		
Result Code:		OK When the modem completes the flash hook sequence. ERROR If this command is initiated and the modem is not on hold.		
Command: Description:	+PQC	V.92 Phase 1 and Phase 2 Control Controls the global enabling or disabling of the V.92 shortened Phase 1 and Phase 2 startup procedures. This command is used in conjunction with the +PSS command.		
Defined Values:		<ul> <li>+PQC0 Enable Short Phase 1 and Short Phase 2. (Default.)</li> <li>+PQC1 Enable Short Phase 1 only.</li> <li>+PQC2 Not supported.</li> <li>+PQC3 Disable Short Phase 1 and Short Phase 2.</li> </ul>		
Result Codes:		OK 0, 1, or 3 in V.92 Mode (+MS=V.92) ERROR		
Report Commands:		+PQC? Reports Selected Values. +PQC=? Reports Supported Range of Parameter Values.		

Command: Description: Defined Values:	+PSS	defined by t +PSS0 +PSS1 +PSS2	alling modem to force either a V.92 short or full startup sequence as he +PQC command on the next and subsequent connections. The modems decide whether or not to use the short startup procedures. The short startup procedures can only be used if enabled by the +PQC command. (Default.) Reserved. Forces the use of the full startup procedures on the next and subsequent connections independent of the setting of the +PQC command.	
Result Codes:		OK 0 - 2 in \ ERROR	V.92 Mode (+MS=V.92)	
Report Commands:		+PSS? +PSS=?	Reports Selected Values. Reporting Supported Range of Parameter Values	
Command: Description: Result Code:	-QCPC	Causes the regardless of select the st startup proc will also be	Startup Procedure on Next Connection modem to use full startup procedures on the next connection attempt of the setting of the +PQC command. After this attempt, the modem will tartup procedure as defined by the +PQC command. If a shortened redure is enabled by the +PQC command, then the quick connect profile updated on the next connection attempt. Mode (+MS=V.92)	
Command: Description:	-QCPS		ck Connect Profile Save and controls whether or not the modem will save the generated quick file.	
Defined Values:		-QCPS0 -QCPS1	Do not allow the quick connect profile to be saved. Allow the quick connect profile to be saved. (Default.)	
Result Codes:		OK in V.92 Mode (+MS=V.92) and quick connect is enabled (+PSS = 0) ERROR		
Report Commands:		-QCPS? -QCPS=?	Reports Selected Value(s). Reports Supported Range of Parameter Values.	

# **S-Registers**

This section covers S-Register descriptions and their default values (which may be loaded at any time by using the Z command). Registers or register fields quoted as "reserved" are reserved for current or future use by the firmware, or are permanently overridden by PTT limitations.

All bit-mapped registers are read-only. The appropriate AT command, which controls the relevant bits in the S-Register, should be used to change the value.

#### S - Read/Write S-Register

The modem selects an S-Register, performs an S-Register read or write function, or reports the value of an S-Register.

*n* Establishes S-Register *n* as the last register accessed.

*n***=v** Sets S-Register n to the value v.

*n*? Reports the value of S-Register *n*.

The parameter n can be omitted, in which case the last S-Register accessed will be assumed. The S can be omitted for AT= and AT?, in which case the last S-Register accessed will be assumed. For example:

ATS7 establishes S7 as the last accessed register.

AT=40 sets the contents of the last register accessed to 40.

ATS=20 sets the contents of the last register accessed to 20.

If the number **n** is outside the range of the S-Register available, the modem will return the ERROR message. If the value v is outside the range permitted for a given S-Register, the modem will return the ERROR message. Input and output are always in decimal format. Note that some S-Registers are read-only.

In some cases, writing to the S-Register will appear to be accepted but the value will not actually be written. Due to country restrictions, some commands will be accepted, but the value may be limited and replaced by a maximum or minimum value.

Minimum, maximum, and default values for S-Parameters may be altered by inserting a country profile using patch code.

Certain modem values are stored in memory locations called S-Registers. Use the **S** command to read or to alter the contents of S-Registers (see previous section).

<u>Register</u>	<u>Unit</u>	<u>Range</u>	<u>Default</u>	Description
S0	1 <i>ring</i>	0–255	0	Number of Rings to Auto-Answer: Sets the number of rings until the modem answers. ATS0=0 disables autoanswer completely. *
S1	1 ring	0–255	0	<b>Ring Counter.</b> Counts the rings that have occurred. S1 is cleared if no rings occur over eight-second intervals.
S2	decimal	0–255	43 (+)	<b>Escape Character.</b> Holds the decimal value of the ASCII character used as the escape character. The default value corresponds to an ASCII '+'. A value over 127 disables the escape process, e.g., no escape character will be recognized.*
S3	decimal	0–127	13 (^M)	<b>Carriage Return Character.</b> Sets the command line and result code terminator character. Pertains to asynchronous operation only.
S4	decimal	0–127	10 (^J)	<b>Line Feed Character.</b> Sets the character recognized as a line feed. Pertains to asynchronous operation only. The Line Feed control character is output after the Carriage Return control character if verbose result codes are used.
S5	decimal	0–255	8 (^H)	<b>Backspace Character.</b> Sets the character recognized as a backspace. Pertains to asynchronous operation only. The modem will not recognize the Backspace character if it is set to a value that is greater than 32 ASCII. This character can be used to edit a command line. When the echo command is enabled, the modem echoes back to the local DTE the Backspace character; an ASCII space character and a second Backspace character; this means a total of three characters are transmitted each time the modem processes the Backspace character.

#### **Table of S-Registers**

<u>Register</u>	<u>Unit</u>	<u>Range</u>	<u>Default</u>	<u>Description</u>
S6	seconds	2–255	2	<ul> <li>Wait Time Before Blind Dialing or for Dial Tone.</li> <li>1. Sets the length of time, in seconds, that the modem will wait before starting to dial after going off-hook when blind dialing. This operation, however, may be affected by some ATX options according to country restrictions. The "Wait for Dial Tone" call progress feature (W dial modifier in the dial string) will override the value in register S6. (When configured for US).</li> <li>2. Sets the length of time, in seconds, that the modem will wait for dial tone when encountering a "W" dial modifier before returning NO DIAL TONE result code. (W class). Default is country-dependent. The modem always pauses for a minimum of 2 seconds, even if the value of S6 is less than 2 seconds.*</li> </ul>
S7	seconds	1–255*	50	<ul> <li>Wait Time for Carrier, Silence, or Dial Tone.</li> <li>1. Sets the length of time, in seconds, that the modem will wait for carrier before hanging up. The timer is started when the modem finishes dialing (originate), or 2 seconds after going off-hook (answer). In originate mode, the timer is reset upon detection of answer tone if allowed by country restrictions.</li> <li>2. Sets the length of time, in seconds, that modem will wait for silence when encountering the @ dial modifier before continuing with the next dial string parameter.</li> <li>3. Sets the length of time, in seconds, that the modem will wait for dial tone when encountering a "W" dial modifier before continuing with the next dial string parameter. (US model.) The default is country dependent. *</li> </ul>
S8	seconds	2–255	2	<b>Pause Time for Dial Delay.</b> Sets the time, in seconds, that the modem must pause when the "," dial modifier is encountered in the dial string. *
S9	0.1 s	1–255	6	<b>Carrier Detect Response Time.</b> Supported for backward compatibility only. No value can be written. Responds with default value. *
S10	0.1 s	1–255	14	<b>Lost Carrier to Hang Up Delay.</b> Sets the length of time, in tenths of a second, that the modem waits before hanging up after a loss of carrier. This allows for a temporary carrier loss without causing the local modem to disconnect. When register S10 is set to 255, the modem functions as if a carrier is always present. *
				The actual interval the modem waits before disconnecting is the value in register S10 minus the value in register S9. Therefore, the S10 value must be greater than the S9 value or else the modem disconnects before it recognizes the carrier.
				<b>Note:</b> For Call Waiting detection, if the modem is set to US country code and S10 >=16, then the modem will detect the Call Waiting tone and hang-up the line. If S10 <16, the modem will not detect Call Waiting tone.
S11	0.001 s	50–255	95	<ul> <li>DTMF Tone Duration. 1. For US models, S11 sets the duration of tones in DTMF dialing (has no effect on pulse dialing).</li> <li>2. For other countries, S11 is a country parameter. The default is country dependent. *</li> </ul>
S12	0.02 s	0–255	50	<b>Escape Prompt Delay (EPD).</b> Defines the maximum period, in fiftieths of a second, allowed between receipt of the last character of the three escape character sequence from the DTE and sending of the OK result code to the DTE. If any characters are detected during this time, the OK will not be sent. Sending of the OK result code does not affect entry into command mode. *

<u>Register</u> <u>Unit</u>	<u>Range</u>	<u>Default</u>	<u>Description</u>
S14		138 (8Ah)	General Bit-Mapped Options Status. Indicates the status of command options.
			Bit 0 This bit is ignored. Bit 1 Command echo (En) 0 = Disabled (E0) 1 = Enabled (E1) (Default.) Bit 2 Quiet mode (Qn) 0 = Send result codes (Q0) (Default.) 1 = Do not send result codes (Q1) Bit 3 Result codes (Vn) 0 = Numeric (V0) 1 = Verbose (V1) (Default.) Bit 4 Reserved Bit 5 Tone (T)/Pulse (P) 0 = Tone (T) (Default.) 1 = Pulse (P) Bit 6 Reserved Bit 7 Originate/Answer 0 = Answer 1 = Originate (Default.)
S16		0	Test Mode Bit-Mapped Options Status. Indicates the test in progress status.         Bit 0       Local analog loopback         0 =       Disabled (Default.)         1 =       Enabled (&T1)         Bits 1-7       Not used
S19 and S20			Reserved
S21		52 (34h)	<b>V.24/General Bit-Mapped Options Status.</b> Indicates the status of command options. Bits 0 - 1 Reserved (0) Bit 2 CTS behavior (&Rn) 0 = CTS tracks RTS (&R0) 1 = CTS always on (&R1) (Default.) Bits 3-4 DTR behavior (&Dn) 0 = &D0 selected 1 = &D1 selected 2 = &D2 selected (Default.) 3 = &D3 selected Bit 5 RLSD (DCD) behavior (&Cn) 0 = &C0 selected 1 = &C1 selected (Default.) Bit 6 DSR behavior (&Sn) 0 = &S0 selected (Default.) 1 = &S1 selected Bit 7 Long space disconnect (Yn) 0 = Y0 (Default.) 1 = Y1

<u>Register</u>	r <u>Unit</u>	<u>Range</u>	<u>Default</u>	Description
S22			117 (75h)	Speaker/Results Bit-Mapped Options Status. Indicates the status of command options.Default:117 (75h) (01110101b)Bits 0-1Speaker volume (Ln) $0 =$ Off (L0) $1 =$ Low (L1) (Default.) $2 =$ Medium (L2) $3 =$ High (L3)Bits 2-3Speaker control (Mn) $0 =$ Disabled (M0) $1 =$ Off on carrier (M1) (Default.) $2 =$ Always on (M2) $3 =$ On during handshake (M3)Bits 4-6Limit result codes (Xn) $0 =$ X0 $4 =$ X1 $5 =$ X2 $6 =$ X3 $7 =$ X4 (Default.)Bit 7Reserved
S23			0	General Bit-Mapped Options Status. Indicates the status of command options.Bits 0-6Not usedBits 6-7Guard tone (&Gn) $0 =$ None (&G0) (Default.) $1 =$ None (&G1) $2 =$ 1800 Hz (&G2)
S24	seconds	0–255	0	<b>Sleep Inactivity Timer.</b> Sets the length of time, in seconds, that the modem will operate in normal mode with no detected telephone line or DTE line activity before entering low-power sleep mode. The timer is reset upon any DTE line or telephone line activity. If the S24 value is zero, neither DTE line nor telephone inactivity will cause the modem to enter the sleep mode.
S25	0.01 s	0–255	5	<b>Delay to DTR OFF.</b> Sets the length of time that the modem will ignore DTR for taking the action specified by &Dn. Its units are seconds for synchronous modes and one hundredths of a second for other modes.
S26	0.01 s	0–255	1	<b>RTS-to-CTS Delay.</b> Sets the time delay, in hundredths of a second, before the modem turns CTS ON after detecting an OFF-to-ON transition on RTS when &R0 is commanded. Pertains to synchronous operation only.

<u>Register</u>	<u>r Unit</u>	<u>Range</u>	<u>Default</u>	Description
S27			73 (49Ah)	General Bit-Mapped Options Status. Indicates the status of command options.Default:73 (49h) (01001001b)Bit 2Leased line control (&Ln) $0 =$ $0 =$ Dial up line (&L0) (Default.)Bits 4 - 5Internal clock select (&Xn) $0 =$ $0 =$ Internal clock (&X0) (Default.) $1 =$ External clock (&X1) $2 =$ $2 =$ Slave clock (&X2)Bit 6CCITT/Bell mode select (Bn) $0 =$ $0 =$ CCITT mode (B0) $1 =$ $1 =$ Bell mode (B1) (Default.)
S28			0	General Bit-Mapped Options Status. Indicates bit mapped options status. Default: 0 Bits 0 - 1 Reserved Bit 2 Reserved (always 0). Bits 3 - 4 Pulse dialing (&Pn) 0 = 39%-61% make/break ratio at 10 pulses per second (&P0) 1 = 33%-67% make/break ratio at 10 pulses per second (&P1) 2 = 39%-61% make/break ratio at 20 pulses per second (&P2) 3 = 33%-67% make/break ratio at 20 pulses per second (&P3) Bit 5-7 Reserved
S29	10 ms	0–255	70	<b>Flash Dial Modifier Timer.</b> Sets the length of time, in units of 10 ms, that the modem will go on-hook when it encounters the flash (!) dial modifier in the dial string. S29 is a country dependent parameter. The S29 value cannot be changed using S29=XX. Default: 70 (700 ms) for U.S.
S30	10 s	0–255	0	<b>Disconnect Inactivity Timer.</b> Sets the length of time, in tens of seconds, that the modem will stay online before disconnecting when no data is sent or received. In error-correction mode, any data transmitted or received will reset the timer. In other modes, any data transmitted will reset the timer. The timer is inoperative in synchronous mode.
S31			192 (C0h)	General Bit-Mapped Options Status. Indicates bit mapped options status.
				$\begin{array}{llllllllllllllllllllllllllllllllllll$

<u>Register</u> <u>Unit</u>	<u>Range</u>	<u>Default</u>	<u>Description</u>
\$36		7	<ul> <li>LAPM Failure Control. This value indicates what should happen upon a LAPM failure. These fallback options are initiated immediately upon connection if S48=128. If an invalid number is entered, the number is accepted into the register, but S36 will act as if the default value has been entered. *</li> <li>Default: 7 (00000111b)</li> <li>Bits 0-2 <ul> <li>0 = Modem disconnects.</li> <li>1 = Modem stays on-line and a Direct mode connection is established.</li> <li>2 = Reserved.</li> <li>3 = Modem stays on-line and a Normal mode connection is established.</li> <li>4 = An MNP connection is attempted and if it fails, the modem disconnects.</li> <li>5 = An MNP connection is attempted and if it fails, a Direct mode connection is established.</li> <li>6 = Reserved.</li> <li>7 = An MNP connection is attempted and if it fails, a Normal mode connection is established.</li> </ul> </li> <li>8 Baserved.</li> <li>7 = An MNP connection is attempted and if it fails, a Normal mode connection is established.</li> <li>6 = Reserved.</li> <li>7 = An MNP connection is attempted and if it fails, a Normal mode connection is established.</li> </ul>
S37 (V.22bis only)		0	<ul> <li>Specifies Desired Line Connection Speed.</li> <li>Bits 0-3 Desired line connection speed. This is linked with the Fn command. If an invalid number is entered, the number is accepted into the register, but S37 will act as if the default value has been entered.</li> <li>0 = Attempt automode connection (F0). (Default.)</li> <li>1-3 = Attempt to connect at 300 bps (F1).</li> <li>4 = Reserved.</li> <li>5 = Attempt to connect at V.22 1200 bps (F4).</li> <li>6 = Attempt to connect at V.22bis 2400 bps (F5).</li> <li>7 = Attempt to connect at V.23 (F3).</li> <li>Bits 4-7 Reserved</li> </ul>
<b>\$38</b> seconds	0–255	20	<b>Delay Before Forced Hang Up.</b> Specifies the delay between the modem's receipt of the H command to disconnect (or ON-to-OFF transition of DTR if the modem is programmed to follow the signal), and the disconnect operation. Applicable to error-correction connection only. This parameter can be used to ensure that data in the modem buffer is sent before the modem disconnects. If S38 is set to a value between 0 and 254, the modem will wait that number of seconds for the remote modem to acknowledge all data in the modem buffer before disconnecting. If time expires before all data is sent, the NO CARRIER result code will be issued to indicate that data has been lost. If all data is transmitted prior to time-out, the response to the H0 command will be OK. If S38 is set to 255, the modem does not time-out and continues to attempt to deliver data in the buffer until the connection is lost or the data is delivered.
S39		3	Flow Control Bit-Mapped Options Status.Default:3 (0000011b)Bits 0-2Status of command options0 =No flow control3 =RTS/CTS (&K3) (Default.)4 =XON/XOFF (&K4)5 =Transparent XON (&K5)6 =Both methods (&K6)Bits 3-7Reserved

<u>Register</u> <u>Unit</u>	<u>Range</u>	<u>Default</u>	<u>Description</u>	<u>n</u>				
S40	nunge	<u>Deruun</u> 104 (68h)	General Bit-	- Mapped Optic tions. 04 (68h) (0110 MNP Exten Disable exte Enable exte Enable exte	1000b) ded Service ended servic ended servic ended servic	ces (-K0) (Default.) ces (-K1)		
S41S	4	h5.2(ndl)-6	6.6(in)-5. <b>1</b>	fB)	D36 <b>S</b>	Twit-Mapped	4OptioOpns	Status <b>1</b>

<u>Register</u> <u>U</u>	<u>Init</u>	<u>Range</u>	<u>Default</u>	Description
S82 (V.22bis only	у)	3, 7, or 128	128	<ul> <li>Break Handling Options</li> <li>Break Signals provide a way for the user to get the attention of the remote modem. The break type depends on the speed application.</li> <li>LAPM specifies three methods of break signal handling; in sequence, expedited, and destructive. If an invalid number is entered, it is accepted into the S-Register, but S82 will act as if the default value has been entered.</li> <li>S82 = 3 Expedited: Modem sends a break immediately; data integrity is maintained both ahead of and after the break.</li> <li>S82 = 7 Destructive: Modem sends a break immediately; data being processed by each modem at the time of the break is destroyed.</li> <li>S82 =128 In sequence: Modem sends a break in sequence with any transmitted data; data integrity is maintained both ahead of and after the break in and after the break (default)</li> </ul>
\$86		0–26	21	Call Failure Indication. When the modem issues a NO CARRIER result code, a value is written to S86 Register to help determine the reason for the failed connection. S86 records the first event that contributes to a NO CARRIER message. 
S91	dBm	0–15	10	<b>PSTN Transmit Attenuation Level.</b> In non-PCM modes (V.90 or K56flex are PCM modes), S91 sets the transmit attenuation level from 0 to 15 dBm for the PSTN mode, resulting in a transmit level from 0 to -15 dBm. In some countries, the transmit level may not be changed and there are checks to prevent transmit attenuation level change. The default is country dependent.

<u>Register</u> <u>Unit</u>	<u>Range</u>	<u>Default</u>	<u>Description</u>
S95		0	<b>Extended Result Codes Control.</b> A bit set to a 1 in this parameter, in conjunction with the W command, will enable the corresponding extended result code. *
			<ul> <li>The +MR, +ER, and +DR settings also control S95 bits 2, 3, and 5, respectively. The more recent settings of +MR, +ER, and +DR, or host writing of S95 bits 2, 3, and 5, along with the W command setting, determine the corresponding actual result code reporting (see +MR, +ER, DR, and W commands).</li> <li>Bit 0 CONNECT result code indicates DCE speed instead of DTE speed.</li> <li>Bit 1 Append/ARQ to CONNECT XXXX result code in error-correction mode (XXXX = rate).</li> <li>Bit 2 Enable +MCR: XXXX result code (XXXX = modulation) and +MRR: XXXX result code (XXXX = rate). (Also see +MR.)</li> <li>Bit 3 Enable +ER: XXXX result code (XXXX = protocol identifier).</li> <li>Bit 4 Reserved.</li> <li>Bit 5 Enable +DR: XXXX result code (XXXX = compression type).</li> <li>Bits 6-7 Reserved.</li> </ul>
			Note: Bits 2-5 are reserved in V.22bis.
S210	0–255	13 (0Dh)	<b>V.34 Symbol Rate.</b> The bits in this parameter control V.34 symbols rates and enable/disable V.34 asymmetric rates. This parameter is used for diagnostic purposes only. Default: 13 (0Dh) (00001101b) Bits 0 -2 Selects the range of allowed V.34 symbol rates. $\frac{2}{0}$ $\frac{1}{0}$ $\frac{0}{0}$ Symbol Rates (baud) 0 $0$ $1$ 2400 only 0 $1$ 2400 only (no 2734) 0 $1$ $0$ 2400, 2800 0 $1$ $1$ 2400, 2800, 3000 1 $0$ $0$ 2400, 2800, 3000 1 $0$ $1$ 2400, 2800, 3000, 3200 1 $0$ $1$ 2400, 2800, 3000, 3429 (Default.) Bit 3 Enable/disable V.34 asymmetric rates.
			0 = Disable asymmetric rates 1 = Enable asymmetric rates (Default.) Bits 4-7 Reserved.
			ExamplesS210=13Enable asymmetric rates with all symbol rates available (Default.).S210=5Disable asymmetric rates with all symbol rates
			available. S210=8 Enable asymmetric rates with only 2400 baud available. S210=11 Enable asymmetric rates with 2400 to 3000 baud available.

\* Register value may be stored on one of two user profiles with the **&W** command in all except V.22bis.

# **Result Codes**

The modem responds to commands from the DTE and to activity on the line by signaling to the DTE in the form of result codes.

Two forms of each result code are available:

- Short-form a data-like numeric response (included in parentheses following the long-form). The short-form is terminated by < CR> only with no preceding sequence.
- Long-form a "verbose" response, preceded and terminated by the sequence < CR> < LF>.

If result messages are suppressed, nothing is returned to the DTE.

The long-form result codes can be modified by the OEM through the .INF file.

The Verbose response may differ in some instances. Some modems may use V.90 terminology and some may use V.92 terminology; however, the meaning of the message is the same:

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V.92 Terminology	V.90 Terminology
+MRR	Carrier
+DR	Compression
+ER	Protocol
+MCR	Connect

Note: An asterisk (\*) in the Short Form column means that this Result Code is not active in V.22bis modems.

# Table of Result Codes

Short Form	Long Form	Description
+F4 *	+FCERROR	<b>Fax data speed.</b> High speed fax data (V.27, V.29, V.33, or V.17) is expected but a V.21 signan6 lcegn

Short Form	Long Form	Description
11	CONNECT 4800	<b>Connected at 4800 bps and speed reporting enabled.</b> The modem has connected to the line, the DTE speed is 4800 bps and DTE speed reporting is enabled.
12	CONNECT 9600	<b>Connected at 9600 bps and speed reporting enabled.</b> The modem has connected to the line, the DTE speed is 9600 bps and DTE speed reporting is enabled.
13	CONNECT 7200	<b>Connected at 7200 bps and speed reporting enabled.</b> The modem has connected to the line, the DTE speed is 7200 bps and DTE speed reporting is enabled.
14	CONNECT 12000	<b>Connected at 12000 bps and speed reporting enabled.</b> The modem has connected to the line the DTE speed is 12000 bps and DTE speed reporting is enabled.
15	CONNECT 14400	<b>Connected at 14400 bps and speed reporting enabled.</b> The modem has connected to the line, the DTE speed is 14400 bps and DTE speed reporting is enabled.
16	CONNECT 19200	<b>Connected at 19200 bps and speed reporting enabled.</b> The modem has connected to the line, the DTE speed is 19200 bps and DTE speed reporting is enabled.
17 *	CONNECT 38400	<b>Connected at 38400 bps and speed reporting enabled.</b> The modem has connected to the line, the DTE speed is 38400 bps and DTE speed reporting is enabled.
18 *	CONNECT 57600	<b>Connected at 57600 bps and speed reporting enabled.</b> The modem has connected to the line, the DTE speed is 57600 bps and DTE speed reporting is enabled.
19 *	CONNECT 115200	<b>Connected at 115200 bps and speed reporting enabled.</b> The modem has connected to the line, the DTE speed is 115200 bps and DTE speed reporting is enabled.
20 *	CONNECT 230400	<b>Connected at 230400 bps and speed reporting enabled.</b> The modern has connected to the line, the DTE speed is 230400 bps and DTE speed reporting is enabled.
22	CONNECT 75TX/1200RX	<ul> <li>V.23 connection and line speed reporting enabled. The modem has established a</li> <li>V.23 originate connection and line speed reporting is enabled.</li> </ul>
23	CONNECT 1200TX/75RX	V.23 connection and line speed reporting enabled. The modem has established a
24	DELAYED	V.23 answer connection and line speed reporting is enabled. <b>Delay is in effect for the dialed number.</b> For X4, sent when a call fails to connect and the number dialed is considered ideleved, due to country blacklisting requirements.
32	BLACKLISTED	the number dialed is considered 'delayed' due to country blacklisting requirements. <b>Dialed number is blacklisted.</b> For X4, sent when a call fails to connect and the number dialed is considered 'blacklisted'.
33 *	FAX	<b>Connected in fax mode.</b> Modem connection is established in a facsimile mode.
35 *	DATA	Connected in data mode. Modem connection is established in a data mode.
40 *	+MRR: 300	<b>Connected at 300 bps and carrier reporting enabled.</b> Modem connects to the line at 300 bps and carrier reporting is enabled. (See S95 and Xn.)
44 *	+MRR: 1200/75	<b>V.23 backward channel.</b> V.23 backward channel carrier is detected; carrier reporting is enabled. (See S95, Xn.)
45 *	+MRR: 75/1200	<b>V.23 forward channel.</b> V.23 forward channel carrier is detected; carrier reporting is enabled. (See S95, Xn.)
46 *	+MRR: 1200	<b>Connected at 1200 bps and carrier reporting enabled.</b> Modem connects to the line at 1200 bps and carrier reporting is enabled. (See S95, Xn.)
47 *	+MRR: 2400	<b>Connected at 2400 bps and carrier reporting enabled.</b> Modem connects to the line at 2400 bps and carrier reporting is enabled. (See S95, Xn.)
48 *	+MRR: 4800	<b>Connected at 4800 bps and carrier reporting enabled.</b> Modem connects to the line at 4800 bps and carrier reporting is enabled. (See S95, Xn.)
49 *	+MRR: 7200	<b>Connected at 7200 bps and carrier reporting enabled.</b> Modem connects to the line at 7200 bps and carrier reporting is enabled. (See S95, Xn.)
50 *	+MRR: 9600	<b>Connected at 9600 bps and carrier reporting enabled.</b> Modem connects to the line at 9600 bps and carrier reporting is enabled. (See S95, Xn.)
51 *	+MRR: 12000	<b>Connected at 12000 bps and carrier reporting enabled.</b> Modem connects to the line at12000 bps; carrier reporting is enabled. (See S95, Xn.)
52 *	+MRR: 14400	<b>Connected at 14400 bps and carrier reporting enabled.</b> Modem connects to the line at 14400 bps; carrier reporting is enabled. (See S95, Xn.)
53 *	+MRR: 16800	<b>Connected at 16800 bps and carrier reporting enabled.</b> Modem connects to the line at 16800 bps; carrier reporting is enabled. (See S95, Xn.)
54 *	+MRR: 19200	<b>Connected at 19200 bps and carrier reporting enabled.</b> Modem connects to the line at 19200 bps; carrier reporting is enabled. (See S95, Xn.)
55 *	+MRR: 21600	<b>Connected at 21600 bps and carrier reporting enabled.</b> Modem connects to the line at 21600 bps; carrier reporting is enabled. (See S95, Xn.)
56 *	+MRR: 24000	<b>Connected at 24000 bps and carrier reporting enabled.</b> (See S95, Xn.) at 24000 bps; carrier reporting is enabled. (See S95, Xn.)
57 *	+MRR: 26400	<b>Connected at 26400 bps and carrier reporting enabled.</b> (See S95, Xii.) at 26400 bps; carrier reporting is enabled. (See S95, Xii.)
58 *	+MRR: 28800	<b>Connected at 28800 bps and carrier reporting enabled.</b> (See S95, Xn.) at 28800 bps; carrier reporting is enabled. (See S95, Xn.)

Short Form	Long Form	Description
59	CONNECT 16800	<b>Connected at 16800 bps and DTE speed reporting enabled.</b> The modem has connected to the line, the DTE speed is 16800 bps and DTE speed reporting is enabled.
60 61	CONNECT 21600	Connected at 21600 bps and DTE speed reporting enabled. 60 is the Result Code is V.92, V.34, and V.32: 61 is the Result Code in V.22bis for: The modem has connected to the line, the DTE speed is 21600 bps and DTE speed reporting is enabled.
62	CONNECT 24000	<b>Connected at 24000 bps and DTE speed reporting enabled.</b> The modem has connected to the line, the DTE speed is 24000 bps and DTE speed reporting is enabled.
63	CONNECT 26400	<b>Connected at 26400 bps and DTE speed reporting enabled.</b> The modem has connected to the line, the DTE speed is 26400 bps and DTE speed reporting is enabled.
64	CONNECT 28800	<b>Connected at 28800 bps and line speed reporting enabled.</b> The modem has connected to the line, the DTE speed is 28800 bps and DTE speed reporting is enabled.
66 *	+DR: A LT	Connected in MNP Class 5 data compression. Modem connects to the line in MNP Class 5 and +DR: message reporting is enabled. (See S95, Wn, Xn.)
67 *	+DR: V 42B	<b>Connected in V.42 bis data compression.</b> Modem connects to the line in V.42 bis and +DR: message reporting is enabled. (See S95, Wn, Xn.)
69 *	+DR: NONE	<b>Connected without data compression.</b> Modem connects to the line without data compression and +DR: message reporting is enabled. (See S95, Wn, Xn.)
70 *	+ER: NONE	<b>Connected without any protocol.</b> Modem connects to the line without any form of error correction and +ER: message reporting is enabled. (See S95, Wn, Xn.)
77 *	+ER: L APM	<b>Connected in V.42 LAPM mode.</b> Modem connects to the line in V.42 LAPM error correction mode. +ER: message reporting is enabled. (See S95, Wn, Xn.)
78 *	+MRR: 31200	<b>Connected at 31200 bps; carrier reporting enabled.</b> Modem connects to the line at 31200 bps and carrier reporting is enabled. (See S95, Xn.)
79 *	+MRR: 33600	<b>Connected at 33600 bps; carrier reporting enabled.</b> Modem connects to the line at 33600 bps and carrier reporting is enabled. (See S95, Xn.)
80 *	+ER: A LT	<b>Connected in MNP mode.</b> Sent when the modem connects in MNP mode of error correction. +ER: message reporting has been enabled. (See S95, Wn, Xn.)
83	LINE-IN-USE	Line in use. The modem attempted to go off-hook when an extension was already occupying the line.
84	CONNECT 33600	<b>Connected at 33600 bps.</b> The modem has connected to the line, the DTE speed is 33600 bps and the DTE speed reporting is enabled.
91	CONNECT 31200	<b>Connected at 31200 bps.</b> The modem has connected to the line DTE speed is 31200 bps and the modem is to report the DTE speed upon connecting.
134 *	+MCR: B 103	<b>Connected with Bell 103 modulation.</b> Modem connects to the line with Bell 103 modulation and modulation reporting is enabled. (See +MR, S95, Xn.)
135 *	+MCR: B 212	<b>Connected with Bell 212 modulation.</b> Modem connects to the line with Bell 212 modulation and modulation reporting is enabled. (See +MR, S95, Xn.)
136 *	+MCR: V 21	<b>Connected with ITU-T V.21.</b> Modem connects to the line with ITU-T V.21 modulation and modulation reporting is enabled. (See +MR, S95, Xn.)
137 *	+MCR: V 22	<b>Connected with ITU-T V.22.</b> Modem connects to the line with ITU-T V.22 modulation and modulation reporting is enabled. (See +MR, S95, Xn.)
138 *	+MCR: V 22B	<b>Connected with ITU-T V.22B.</b> Modem connects to the line with ITU-T V.22B modulation and modulation reporting is enabled. (See +MR, S95, Xn.)
139 *	+MCR: V 23	<b>Connected with ITU-T V.23.</b> Modem connects to the line with ITU-T V.23 modulation and modulation reporting is enabled. (See +MR, S95, Xn.)
140 *	+MCR: V 32	<b>Connected with ITU-T V.32.</b> Modem connects to the line with ITU-T V.32 modulation and modulation reporting is enabled. (See +MR, S95, Xn.)
141 *	+MCR: V 32B	Connected with ITU-T V.32B. Modem connects to the line with ITU-T V.32B modulation and modulation reporting is enabled. (See +MR, S95, Xn.)
142 *	+MCR: V 34	<b>Connected with ITU-T V.34.</b> Modem connects to the line with ITU-T V.34 modulation and modulation reporting is enabled. (See +MR, S95, Xn.)
144 *	+MCR: K 56	
145 *	+MCR: V 90	<b>Connected with ITU-T V.90.</b> Modem connects to the line with ITU-T V.90 modulation and modulation reporting is enabled. (See +MR, S95, Xn.)
150 *	+MRR: 32000	<b>Connected at 32000 bps.</b> Modem connects to the line at 32000 bps and carrier reporting is enabled. (See S95, Xn.)
151 *	+MRR: 34000	<b>Connected at 34000 bps.</b> Modem connects to the line at 34000 bps and carrier reporting is enabled.(See S95, Xn.)
152 *	+MRR: 36000	<b>Connected at 36000 bps.</b> Modem connects to the line at 36000 bps and carrier reporting is enabled.(See S95, Xn.)

Short Form	Long Form	Description
153 *	+MRR: 38000	<b>Connected at 38000 bps.</b> Modem connects to the line at 38000 bps and carrier reporting is enabled. (See S95, Xn.)
154 *	+MRR: 40000	<b>Connected at 40000 bps.</b> Modem connects to the line at 40000 bps and carrier reporting is enabled. (See S95, Xn.)
155 *	+MRR: 42000	<b>Connected at 42000 bps.</b> Modem connects to the line at 42000 bps and carrier reporting is enabled. (See S95, Xn.)
156 *	+MRR: 44000	<b>Connected at 44000 bps.</b> Modem connects to the line at 44000 bps and carrier reporting is enabled. (See S95, Xn.)
157 *	+MRR: 46000	<b>Connected at 46000 bps.</b> Modem connects to the line at 46000 bps and carrier reporting is enabled. (See S95, Xn.)
158 *	+MRR: 48000	<b>Connected at 48000 bps.</b> Modem connects to the line at 48000 bps and carrier reporting is enabled.(See S95, Xn.)
159 *	+MRR: 50000	<b>Connected at 50000 bps.</b> Modem connects to the line at 50000 bps and carrier reporting is enabled.(See S95, Xn.)
160 *	+MRR: 52000	<b>Connected at 52000 bps.</b> Modem connects to the line at 52000 bps and carrier reporting is enabled.(See S95, Xn.)
161 *	+MRR: 54000	<b>Connected at 54000 bps.</b> Modem connects to the line at 54000 bps and carrier reporting is enabled.(See S95, Xn.)
162 *	+MRR: 56000	<b>Connected at 56000 bps.</b> Modem connects to the line at 56000 bps and carrier reporting is enabled.(See S95, Xn.)
165 *	CONNECT 32000	<b>Connected at 32000 bps.</b> Modem connects to the line at 32000 bps and DCE SPEED reporting is enabled.
166 *	CONNECT 34000	<b>Connected at 34000 bps.</b> Modem connects to the line at 34000 bps and DCE SPEED reporting is enabled.
167 *	CONNECT 36000	<b>Connected at 36000 bps.</b> Modem connects to the line at 36000 bps and DCE SPEED reporting is enabled.
168 *	CONNECT 38000	<b>Connected at 38000 bps.</b> Modem connects to the line at 38000 bps and DCE SPEED reporting is enabled.
169 *	CONNECT 40000	<b>Connected at 40000 bps.</b> Modem connects to the line at 40000 bps and DCE SPEED reporting is enabled.
170 *	CONNECT 42000	<b>Connected at 42000 bps.</b> Modem connects to the line at 42000 bps and DCE SPEED reporting is enabled.
171 *	CONNECT 44000	<b>Connected at 44000 bps.</b> Modem connects to the line at 44000 bps and DCE SPEED reporting is enabled.
172 *	CONNECT 46000	<b>Connected at 46000 bps.</b> Modem connects to the line at 46000 bps and DCE SPEED reporting is enabled.
173 *	CONNECT 48000	<b>Connected at 48000 bps.</b> Modem connects to the line at 48000 bps and DCE SPEED reporting is enabled.
174 *	CONNECT 50000	<b>Connected at 50000 bps.</b> Modem connects to the line at 50000 bps and DCE SPEED reporting is enabled.
175 *	CONNECT 52000	<b>Connected at 52000 bps.</b> Modem connects to the line at 52000 bps and DCE SPEED reporting is enabled.
176 *	CONNECT 54000	<b>Connected at 54000 bps.</b> Modem connects to the line at 54000 bps and DCE SPEED reporting is enabled.
177 *	CONNECT 56000	<b>Connected at 56000 bps.</b> Modem connects to the line at 56000 bps and DCE SPEED reporting is enabled.
178 *	CONNECT 230400	<b>Connected at 230400 bps.</b> Modem connects to the line; the DTE speed is 230400 bps, and DTE SPEED reporting is enabled.
180 *	CONNECT 28000	<b>Connected at 28000 bps.</b> Modem connects to the line at 28000 and DCE SPEED reporting is enabled.
181 *	CONNECT 29333	<b>Connected at 29333 bps.</b> Modem connects to the line at 29333 and DCE SPEED reporting is enabled.
182 *	CONNECT 30667	<b>Connected at 30667 bps.</b> Modem connects to the line at 30667 bps and DCE SPEED reporting is enabled.
183 *	CONNECT 33333	<b>Connected at 48000 bps.</b> Modem connects to the line at 33333 bps and DCE SPEED reporting is enabled.
184 *	CONNECT 34667	<b>Connected at 34667 bps.</b> Modem connects to the line at 34667 bps and DCE SPEED reporting is enabled.
185 *	CONNECT 37333	<b>Connected at 37333 bps.</b> Modem connects to the line at 37333 bps and DCE SPEED reporting is enabled.
186 *	CONNECT 38667	<b>Connected at 38667 bps.</b> Modem connects to the line at 38667 bps and DCE SPEED reporting is enabled.

Short Form	Long Form	Description
187 *	CONNECT 41333	<b>Connected at 41333 bps.</b> Modem connects to the line at 41333 bps and DCE SPEED reporting is enabled.
188 *	CONNECT 42667	<b>Connected at 42667 bps.</b> Modem connects to the line at 42667 bps and DCE SPEED reporting is enabled.
189 *	CONNECT 45333	<b>Connected at 45333 bps.</b> Modem connects to the line at 45333 bps and DCE SPEED reporting is enabled.
190 *	CONNECT 46667	<b>Connected at 46667 bps.</b> Modem connects to the line at 46667 bps and DCE SPEED reporting is enabled.
191 *	CONNECT 49333	<b>Connected at 49333 bps.</b> Modem connects to the line at 49333 bps and DCE SPEED reporting is enabled.
192 *	CONNECT 50667	<b>Connected at 50667 bps.</b> Modem connects to the line at 50667 bps and DCE SPEED reporting is enabled.
193 *	CONNECT 53333	<b>Connected at 53333 bps.</b> Modem connects to the line at 53333 bps and DCE SPEED reporting is enabled.
194 *	CONNECT 54667	<b>Connected at 54667 bps.</b> Modem connects to the line at 54667 bps and DCE SPEED reporting is enabled.
195 *	+MRR: 28000	<b>Connected at 28000 bps.</b> Modem connects to the line at 28000 bps and carrier reporting is enabled. (See S95, Xn)
196 *	+MRR: 29333	<b>Connected at 29333 bps.</b> Modem connects to the line at 29333 bps and carrier reporting is enabled. (See S95, Xn)
197 *	+MRR: 30667	<b>Connected at 30667 bps.</b> Modem connects to the line at 30667 bps and carrier reporting is enabled. ((See S95, Xn)
198 *	+MRR: 33333	<b>Connected at 33333 bps.</b> Modem connects to the line at 33333 bps and carrier reporting is enabled. (See S95, Xn)
199 *	+MRR: 34667	<b>Connected at 34667 bps.</b> Modem connects to the line at 34667 bps and carrier reporting is enabled. (See S95, Xn)
200 *	+MRR: 37333	<b>Connected at 37333 bps.</b> Modem connects to the line at 37333 bps and carrier reporting is enabled. (See S95, Xn)
201 *	+MRR: 38667	<b>Connected at 38667 bps.</b> Modem connects to the line at 38667 bps and carrier reporting is enabled. (See S95, Xn)
202 *	+MRR: 41333	<b>Connected at 41333 bps.</b> Modem connects to the line at 41333 bps and carrier reporting is enabled. (See S95, Xn)
203 *	+MRR: 42667	<b>Connected at 42667 bps.</b> Modem connects to the line at 42667 bps and carrier reporting is enabled. (See S95, Xn)
204 *	+MRR: 45333	<b>Connected at 45333 bps.</b> Modem connects to the line at 45333 bps and carrier reporting is enabled. (See S95, Xn)
205 *	+MRR: 46667	<b>Connected at 46667 bps.</b> Modem connects to the line at 46667 bps and carrier reporting is enabled. (See S95, Xn)
206 *	+MRR: 49333	<b>Connected at 49333 bps.</b> Modem connects to the line at 49333 bps and carrier reporting is enabled. (See S95, Xn)
207 *	+MRR: 50667	<b>Connected at 50667 bps.</b> Modem connects to the line at 50667 bps and carrier reporting is enabled. (See S95, Xn)
208 *	+MRR: 53333	<b>Connected at 53333 bps.</b> Modem connects to the line at 53333 bps and carrier reporting is enabled. (See S95, Xn)
209 *	+MRR: 54667	<b>Connected at 54667 bps.</b> The modem has connected to the line at 54667 bps and carrier reporting is enabled. (See S95, Xn)

Note: An asterisk (\*) in the Short Form column means that this Result Code is not active in V.22bis modems.

# **Chapter 11 – Point-to-Point Protocol**

# Introduction

**Point-to-Point Protocol (PPP)** is the Internet Standard for transmission of IP packets over serial links. This protocol is commonly used in serial links (asynchronous or synchronous) to transfer packets between two endpoints. These links provide full-duplex simultaneous bi-directional operation and are assumed to deliver packets in order. It is intended that **PPP** provide a common solution for easy connection of a wide variety of hosts, bridges, and routers.

The advantage of **PPP** is that it allows for inter-operability between endpoints (for example, routers) using **PPP** for their serial communication.

# **Components of PPP**

- A method for encapsulating multi-protocol data grams.
- A Link Control Protocol (LCP) for establishing, configuring, and testing the data-link connection. The LCP is used to automatically agree upon the encapsulation format options, handle varying limits on sizes of packets, detect a looped-back link and other common configuration errors, and terminate the link.
- A family of **Network Control Protocols** (NCPs) for establishing and configuring different network-layer protocols. In the MultiConnect IP, IPCP will be negotiated

# **Prerequisites for Establishing a PPP Session**

- Before establishing a PPP session, users should be added to the user database. The user name and password supplied by the remote peer will be authenticated using the local database.
- The following sections describe the commands to add / delete user names and passwords to the local database.

## Adding Users and Passwords

Upon successful execution of this command, the MultiConnect IP will return an OK or an error message.

```
Command:

# user add <username> [password]

Example:

# user add user1 user1

OK

(Or)

# user add user1

OK
```

## Setting Passwords

Upon successful execution of this command, the MultiConnect IP will return an OK or an error message.

Command:

```
# user password <username> <password>
Example:
    # user password user1 user1
    OK
```

# **Deleting Users**

Upon successful execution of this command, the MultiConnect IP will return an OK or an error message.

```
Command:

    # user delete <username>

Example:

    # user delete user1

    OK
```

## *Notes*

- PPP is enabled on the modem port
- PPP interface is the IP-enabled interface in MultiConnect IP
- All IP-enabled services can be used only after the PPP link is up with an IP Address
- In the event of a PPP link down, SMTP and POP3 requests can trigger the PPP link establishment and termination

# **PPP Configuration**

## **PPP Interface Related Parameters**

- Enable PPP
- Enable/Disable Authentication and Authentication Type
- Configure user name/password for remote peer to authenticate
- Configure IPCP mode
- Configure local and remote IP addresses
- Enabling/Disabling compression
- Configure the compression algorithm

## **Serial Interface Related Parameters**

- Configure the Connect Type
- Configure the modem settings
- Configure the dialing trigger mode

# **PPP Interface Related Parameters**

# **Enabling/Disabling Authentication**

This command enables or disables a PPP Authentication session . If Authentication is enabled, then the authentication protocol, the user name, and password should also be set.

Command:

```
# set ppp [interface] authentication <enable/disable>
Example:
    # set ppp ppp0 authentication enable
    OK
```

## Authentication Type - Protocol

This command sets the Authentication type.

Command: # set ppp [interface] auth-type <pap/chap/pap-chap> Example: #set ppp ppp0 auth-type pap OK

## **User Name & Password for Remote Peer Authentication**

This command sets the user name with which the remote server will authenticate. If authentication is disabled, this need not be configured.

Command:

# set ppp [interface] username
# set ppp [interface] password
Example:
# set ppp ppp0 username user1
OK
# set ppp ppp0 password user1
OK

# **IPCP Mode**

This command sets the IPCP mode.

Command:

# set ppp [interface] ipcp-mode <client-only/client-or-lan>
Examples:

#set ppp ppp0 ipcp-mode client-only

OK

When ipcp-mode is set to client-only, the local and remote ip addresses are set to 0.0.0.0 automatically

#set ppp ppp0 ipcp-mode client-or-lan

OK 📑

When ipcp-mode is set to client-or-lan, the local and remote ip addresses have to be configured

## Show Commands

This command allows you to view the PPP configuration settings. **Command:** #show ppp ppp0 configuration This command allows you to view the PPP logical link status **Command:** # show ppp [interface] link-status Example: #show ppp ppp0 link-status Up / Down ΟK This command allows you to view the PPP link IP address Command: # show ppp [interface] ip-addr Example: #show ppp ppp0 ip-addr local: 192.168.2.1 remote: 192.168.2.2 OK

# **Serial Interface Related Parameters**

## Connect Type

This command sets the connection type. A connection type can be either a direct connection or a connection through a modem. In case of a modem connection, the modem settings also have to be configured as described in the following sections.

Command: # set serial [serial-interface] connect-type <direct/modem> Example: #set serial s0 connect-type direct OK (Or) #set serial s0 connect-type modem OK #set serial s1 connect-type direct "Modem port s1 is an inbuilt modem interface and cannot be set to direct" ERROR #set serial s1 connect-type modem OK

# Modem Settings - For Modem Connection Only

This command sets the initialization string of the modem. Command: # set serial [serial-interface] modem init-string <line-no> <init string> Example: #set serial s1 modem init-string 1 ATS0=1 OK This command sets the hangup string of the modem. Command: # set serial [serial-interface] modem hangup-string <hangup string> Example: #set serial s1 modem hangup-string +++ATH0 OK This command sets the dial-prefix string of the modem. Command: # set serial [serial-interface] modem dial-prefix <dial-prefix string> Example: #set serial s1 modem dial-prefix ATDT ОК This command is used to set the dial number on the dialing end. **Command:** # set serial [serial-interface] modem dial-number <phone no> Example: #set serial s1 modem dial-number 224824 OK This command is used to set the dialing trigger mode Command: # set serial [serial-interface] modem dialing-trig-mode <none/dtr/command> Note: By default, the modem on modem port S1 is in the answering state. This command is valid only for the modem port S1. Examples: #set serial s0 modem dialing-trig-mode <none/dtr/command> ERROR : 'Command not supported on device port s0' #set serial s1 modem dialing-trig-mode <none/dtr/command> OK **none:** When the dialing-trig-mode is configured none, the modem dials immediately once the target boots up. When the dialing-trig-mode is configured dtr, the modem dials as soon dtr: as the TR goes high on the device port S0; i.e., when the serial device is connected to S0. command: When the dialing-trig-mode is configured as command, the serial device can control the physical link establishment and link termination with the aid of the commands linkup s1 and hangup s1 respectively.

# **Chapter 12 - HTTP Server**

# Introduction

The HTTP Server on the MultiConnect IP supports hosting of embedded Web pages on behalf of the host. The host-defined embedded pages support live host parameter monitoring and configuration update through a remote browser.

In addition to serving HTML Web pages, the HTTP Server also features:

- Dual configuration modes
  - Host Device Configuration
    - Remote configuration of the Host Device using a Web browser
    - Monitoring of the Host Device remotely
    - Supports live parameter updates on the Web browser.
  - MultiConnect IP Configuration
    - MultiConnect IP configuration
- Flexibility to design embedded home pages by the OEMs using normal ASCII text HTML code.
- Supports downloading of a home page using TFTP.
- Access Authentication.
- Support for configuring either Default or Serial Page display.

The MultiConnect IP acts as a proxy between the Host-Serial Device and the Web Browser.



#### Typical Functions Supported by the HTTP Server

## **Important Notes:**

- This application is applicable only in the MultiConnect IP's non-transparent mode.
- This application can be used only after the **PPP link is UP** with an IP Address on the modem port.

# **Setup and Configuration**

# Prerequisite for Enabling the HTTP Server

Before being able to access the MultiConnect IP or the serial host through the Web browser, the HTTP support on the MultiConnect IP needs to be enabled and configured.

The following configuration is mandatory and can be configured using CLI either through serial or through Telnet.

# Mandatory Setup for HTTP Server

## set ip http enable

Successful execution of this command starts the HTTP daemon thus enabling the HTTP server.

## set ip http port <port-number>

By default the HTTP server listens on port 80. However, the default port number can be changed.

## set ip http-page <default/serial>

This command basically decides the Web page that will be displayed when the MultiConnect IP is accessed through the browser.

Note: The default Index.htm is displayed when

- The http-page is set to *default* and
- The MultiConnect IP is accessed through the Web.

The default HTML page contains two links, one for the host configuration and another for the MultiConnect IP configuration. Both these modes are described in subsequent sections.

center>Configuration of IP Module - Netscope 📃 🗗 🗵						
Gle Edit View Go Communicator Help						
Back Forward Reload Home Search	🚵 🍜 💕 🔕 📳	N				
📲 Bookanarka 🤱 Go to: [http://192.168.2.1/w	des.htni	💌 🌍 What's Related				
	Socket Ethernet IP M	lodule				
	Host Configuration	click here				
	IP Module Configuration	click here				
	<u></u>					

Index.htm (Default Index Page)

In the event that the http-page is set to **serial**, the **http-s0.HTML** Web page will display upon accessing the MultiConnect IP through the browser. (The Index.htm will not be accessible).

The **http-s0.HTML** Web page can be replaced by the OEM's Home Page specific to the product. More details regarding design conventions, procedure for uploading, and hosting this page are explained later in this chapter.

# **Configuration Modes**

The embedded HTTP Server on the MultiConnect IP supports two configuration modes. This option is available when the http-page is set to *serial* (see Mandatory Setup instructions).

- Host Configuration Mode
- MultiConnect IP Configuration Mode (not supported at this point of time)

In the **Host Configuration Mode**, the OEM's embedded home page is sent to the remote browser. The page serves as a means of monitoring the host parameters live remotely. Further, the host parameters can be updated or configured through the browser.

The **MultiConnect IP Configuration Mode** enables the configuration of the MultiConnect IP remotely through any standard Web browser. All parameters can be configured or their status can be viewed remotely through the interactive GUI provided. Further, vital statistics of the MultiConnect IP can be viewed remotely.

# **Host Configuration Mode**

The **Host Configuration Mode** provides the OEM flexibility to design and implement a product-specific embedded Web page, which is stored, managed, and hosted by the MultiConnect IP module's HTTP server on behalf of the host device.

The OEM can design the Web page to contain the host parameters that will display live values for monitoring and for providing options for setting and configuring the host parameters remotely. The three essential components of host configuration are the:

- Parameter List
- HTML Page
- CGI Scripts

**Note:** Certain **File naming and size** conventions are to be strictly adhered to and followed by the Web developer. See details later in this chapter.

## The Parameter List

The OEM's customized host HTML page, which is uploaded, may contain parameters (for Configuration or for Monitoring). All these parameters must be available in the **Serial Device Parameter List**, which must be loaded onto the MultiConnect IP. The format of the Serial device parameter list is shown here:

## P<n>:Description:Type:Minimum:Maximum:<Data>

n ranges from 0 to 99

**Description** = Name of the parameter

Type = I: Integer

S: String

**Minimum** = If the **Type** is integer, corresponds to Minimum value.

If the **Type** is String, corresponds to Minimum no of characters.

## Maximum = If the Type

## Example:

#### P0:temperature:l:1:65535:100 P1:username:S:8:50:MultiConnect IP

Here, *P0* and *P1* are two *parameters*, which correspond to the names like *Temperature* & *username* specified in the HTML page.

*I/S* represents *Integer* and *String* respectively. *1* is the *minimum value* for the parameter P0 *65535* is the *maximum value* for the parameter P0.

8 is the *minimum* number of *characters* for the parameter P1.50 is the *maximum* number of *characters* for the parameter P1.

*100*: in P0 is an *integer Data MultiConnect IP*: in P1 is a *string Data*.

The serial device parameter list file (http-host-param) for the demo Web page, which is included with the default setup, (see Figure 3) uses the following parameters and values:

P0:UPSstatus:S:0:5:ON P1:Efficiency:I:0:100:90 P2:NoiseLevel:I:0:100:5 P3:OverloadCapacity:I:0:100:89 P4:Tolerance:I:0:100:90 P5:InputCurrent:I:0:100:78 P6:InputLineVoltage:I:0:100:90 P7:OutputVoltage:I:0:100:78 P8:BatteryVoltage:I:0:100:78 P9:Load:S:0:100:90 P10:Alarm:S:0:10:silence

# The Embedded HTML Page

The **embedded Web page** stored on the MultiConnect IP consists of normal ASCII text HTML code, which can be generated using any HTML editing tool. The page can include scripts, links to remote Web sites, graphic images, text files, etc.

A maximum 30 KB (uncompressed) of flash space for the OEM's Home Page and an additional 10 KB maximum memory is reserved for the device parameter list.

The OEM Web page must contain the **Parameter Tags**, which are the placeholders in HTML files. These tags are replaced on the fly with real-time values when the page is sent to the browser. The value of the parameter tags also can be changed through the browser in order to configure the host through the MultiConnect IP.

The developer should ensure that the parameter values, which are to be replaced, are qualified with **%P<n>%**.

Example:
<html></html>
-
-
-
-
Efficiency <input name="P1" type="text" value="%P1%"/>
-

In the above sample code segment, when the browser requests a page, the **%P1%** is replaced with Parameter P1's value. This value is extracted from the serial device parameter file.

# CGI Scripts

- **Post-Query** is a built-in CGI script that will parse the new values set by the browser and replace them in the **http-host-param** file. See the section entitled Parameters Manipulation from the Browser for more technical information about the **Post-Query** CGI script.
- The MultiConnect IP supports a user-defined CGI script, which performs host-specific processing to the parameters configured by the remote Web browser.

**Important:** The user-defined CGI-script <u>MUST</u> be a shell script.

# File Naming and File Size Conventions

The following file naming conventions and file size constraints must be followed by the OEM Web page developer.

File Name(s)	Description			
http-s0.HTML	Serial Device Main Page			
http-host-param	Default Serial Device Parameter List			
http-*.HTML	Any HTML file, should have the filename prefixed with "http-"			
cgi-*	Any cgi script should have the filename prefixed with "cgi-"			
Constraints				
The HTML file size cannot exceed 30KB Max.				
The Parameter list file cannot exceed 10KB Max.				
The Parameter tags <p1, p2,=""> should be contained in the parameter list.</p1,>				
The URL for <i>Host Configuration</i> is http-s0.HTML. Therefore, the main page must have the filename				
http-s0.HTML when the host device's HTML page is uploaded to the MultiConnect IP.				

# Uploading the Web Page and Parameter List

The Host Device Files (.HTML, default parameter List....) can be uploaded to the MultiConnect IP using TFTP CLIENT.

It is possible to upload these files in two different ways. In either case, file naming and file size conventions described previously must be followed.

- **Compressed** and **Zipped** formats (tar.gz) or
- Uncompressed individual files.

## Uploading Compressed and Zipped Files (http.tar.gz)

In order to load files in the compressed (http.tar.gz) format, the following directory structure has to be strictly followed.

#### http/

HTML/ http-s0.HTML http-host-param http-\*.HTML

cgi-bin/

- cgi-\* (Supports only Shell scripts)
- Place the HTML files and the default serial device parameter list in the **/http/HTML** directory. All the HTML file-names should be prefixed with **http-**.
- Place the CGI scripts in the **/http/cgi-bin** directory. All the CGI scripts should be prefixed with **cgi-**.
- Create an http.tar.gz from the source directory (http/). This file should be in the GZIP format only.
- Upload http.tar.gz using any TFTP Client with binary mode set.
- Use the following commands to upload http.tar.gz to the MultiConnect IP.
  - [root@admin /root]# tftp 192.168.2.1 (Address of the MultiConnect IP) tftp>trace tftp>binary tftp>verbose tftp>put http.tar.gz tftp>quit

## **Upload Uncompressed Files Individually**

- Use TFTP client with binary mode set.
- Upload HTML files, the default serial device parameter list, and the CGI bin files individually using the following commands:
  - tftp 192.168.2.92 (IP-Address of the MultiConnect IP) tftp>verbose tftp>binary tftp>trace tftp>put http-host-param tftp>put http-s0.HTML.
  - Upload all the files using the similar command.

# Monitoring and Configuring the Host through a Browser

If you have successfully completed the preceding configuration sections and completed the uploading, you are now ready to View, Monitor, and Configure the Host through the Web browser.

In order to view the device home page, enter the IP Address of the MultiConnect IP into the URL Address bar.

Example: <u>http://192.168.2.1</u>

The IP address 192.168.2.1 corresponds to the IP address of MultiConnect IP.

Depending upon the configuration selected under **set ip http-page <default/serial>**, the appropriate page is displayed.

- If the http-page is set to default, the index.HTML page displays or
- If the http-page is set to serial, the OEM's customized Web page http-s0.HTML displays.

# **Technical Information**

This section describes additional details and implementation suggestions related to the MultiConnect IP.

# Parameter Value Display on the Fly

The HTML file can be any valid HTML file. However, it should be ensured that the parameter values, which are to be replaced, are qualified with **%P<n>%**.

Example:

```
<HTML>
------
Efficiency <input type="text" name = "P1" value = "%P1%">
-------
</HTML>
```

In the above code segment, when the browser requests a page, the **%P1%** is replaced with Parameter P1's value. This value is extracted from the serial device parameter file (http-host-param).

# Parameter Value Manipulation from the Browser

To update a parameter from the browser, key in the new values and click the **Submit** button.

The **Submit** button in turn invokes the **POST** command as shown below.

#### <form method = "POST" name= "formUPS" ACTION="/cgi-bin/post-query">

**Post-Query** is a built-in CGI script that will parse the new values set by the browser and replace them in the **http-host-param** file.

Should you need to update the newly set parameters in the **http-host-param** file, include the **/cgi-bin/post-query** path in the **ACTION** field of your HTML file. The rest is set by the Post-Query script.

## Serial Device Parameter Updating Process

The serial device probes/polls the MultiConnect IP for newly configured parameter values from the browser.

# Chapter 13 - SMTP Client

# Introduction

SMTP Client is used to establish a TCP session on an SMTP server running on port 25.

SMTP Client supports sending ASCII text or MIME-encoded binary attachment emails with different media types and subtypes from the host/serial device through commands to the MultiConnect IP.

SMTP Client supports the following methods for sending emails:

- To the hosts/email addresses specified in the command prompt.
- To the hosts/email addresses pre-configured.
- To the hosts/email addresses entered in **interactive mode**.

## Command:

send-mail [-b]

[-t "<Email-Id#1, Email-Id#2..>"]

[-c "<Email-Id#3, Email-Id#4..>"]

[-s "<subject>"]

[-d "<message-body>"]

**Note:** All of these commands are optional. The **send-mail** command prompts for the details required if they are neither given as options nor pre-configured. Various scenarios are covered later in this chapter.

## **Important Notes:**

- This application is applicable only in the MultiConnect IP in non-transparent mode.
- This application can be used only after the **PPP link is UP** with an IP Address on the modem port. (Refer to Chapter 6 Prerequisite Configurations *Physical Link Established over the Modem Port* for more details)
- In the event of PPP link DOWN, the SMTP request triggers PPP link establishment.

# **Setup and Configuration Prerequisites**

The following details are **mandatory** for configuration and have to be validated before sending an email:

- Host Interaction Mode enabled to restrict Telnet-Dialout and PPP. Command: **set serial <s0> host-interaction-mode enable**
- Set SMTP server name or IP address of maximum length 64 characters. Command: set send-mail smtp-server-name <ipaddress/servername>
- Set SMTP server port.
   Command: set send-mail smtp-server-port <25>
- Set Host name of maximum length 64 characters. Command: set send-mail host-name <hostname>
- Set From address identity of maximum length 64 characters.
   Command: set send-mail from-address-identity <hostnameidentity>
- Set From address of maximum length 64 characters. Command: set send-mail from-address <email-Id>
- Notes: 1. The **send-mail** command prompts for the ERROR message if any of the above details are not configured or not valid.
  - 2. The following configuration suggestions are optional:
    - Set reply-to address of maximum length 64 characters. By default the server takes the **from address** as the reply-to-address.
    - If this is configured, this address is taken as the reply to address.
       set send-mail reply-to-address <email-ID>
### Scenario 1 – Sending a Text Email from the Command Prompt

Issue the following command:

send-mail

- -t "<email #1>, <email #2>"
- -c "<email #3>, <email #4>"
- -s "subject data"
- -d "Messagebody"

A message is then given as shown in the figure below and the email is sent only to the **to-addresses** (if any) and the **cc-addresses** (if any) entered from the command prompt. The **subject** and **message body** are also taken from the command prompt.

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•	Se	end "	'exit<	enter	>"	• C	II BBS	from H	Host	Directory	, ,	a Launc	h Note	epad.ex	e	Aun	Minih	ost Sci	ript							
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- 1. The email is **not** sent to addresses pre-configured using set commands.
- 2. At least one address, either the **to-address** or the **cc-address**, should be given as an alternative for sending email directly from command prompt.
- 3. If the **subject** option is not specified and is not pre-configured using set commands, SMNP enters into interactive mode and requests a subject to be entered.
- 4. Type **Ctrl+C** to quit the email at any given time.

### Scenario 2 – Sending a Text Email from the Interactive Mode

### Message body is entered in interactive mode

Issue the following command:

#### send-mail

-t "<email #1>, <email #2>" -c "<email #3>, <email #4>"

-c "<email #3>, <email #4>

-s "subject data"

The SMTP session then enters into interactive mode and requests that the **message body** be entered (see the figure below). After typing the message, type **Ctrl+D** to end the message.

The email is sent only to the **to-addresses** (if any) and the **cc-addresses** (if any) entered from the command prompt. The **subject** is taken from the command prompt.



- 1. The email is **not** sent to addresses pre-configured using set commands.
- 2. At least one address, either the **to-address** or the **cc-address**, should be given as an alternative to sending email directly from the command prompt.
- 3. If the **subject** option is not specified and is not pre-configured using set command, SNMP enters into interactive mode and requests a subject to be entered.
- 4. Type **Ctrl+C** to quit the email at any given time.

### Scenario 3 – Sending a Text Email Using Configuration and Interactive Mode

- The to-addresses, cc-addresses, and subject taken from the configuration and
- The message body is entered in interactive mode.

To support this scenario, you must configure the following details in addition to the mandatory configuration

- Set subject data of maximum length 255 characters. Command: set send-mail subject subject data
- Set to-addresses of maximum length 64 characters. Command: set send-mail to-address 1 <email-id #1> set send-mail to-address 2 <email-Id#2>
- Set cc-addresses of maximum length 64 characters. Command: set send-mail cc-address 1 <email-ID#3> set send-mail cc-address 2 <email-ID#4>

Issue the following command at the serial command prompt: **#send-mail** 

The SMTP session then enters into interactive mode and requests that the **message body** be entered as shown in the figure below. After completing the message, type **Ctrl+D** to end the message.

Elle Edit View Logging Transfer Script Options Help
<mark>;;≥≥⇒≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥≥</mark>
Send "exit centers"      Call BBS from Host Directory      Launch Notepad.exe     Run Minihost Script
# set send-mail to-address 1 mtss@multitech.tzo.com
# set send-mail cc-address 1 mtss@multitech.tzo.com
OK # set send-mail cc-address 1 mtss@multitech.tzo.com OK # set send-mail subject "Subject: Scenario 3" OK # send-mail
# send-mail Message body: Enter Ctrl+D to end mail, Ctrl+C to quit mail
Message body for scenario 3 AD
OK: Mail sent
#

The email is sent only to pre-configured recipients. The subject is also taken from the configuration. **Notes:** 

- 1. The email is sent to addresses pre-configured using set commands.
- 2. At least one address, either the **to-address** or the **cc-address**, should be configured using set commands; otherwise, the SMTP session enters into interactive mode prompting you to enter the required details.
- 3. If the **subject** option is not specified or is not pre-configured using set commands, SNMP enters into interactive mode and requests a subject to be entered.
- 4. Type **Ctrl+C** to quit the email at any given time.

### Scenario 4 – Sending a Text Email Using No Configuration

#### The to-address, cc-address, and subject are NOT configured in this example.

Issue the following command:

send-mail

The SMTP session then enters into interactive mode requesting the **to-address**, **cc-address**, **subject** and the **message body** to be entered. After entering a message, type **Ctrl+D** to end the message.

The email is sent only to the entered **to-addresses** (if any) and **cc-addresses** (if any). The **subject** and **message body** are taken as given in the interactive mode.



- 1. The email is sent only to addresses entered in interactive mode.
- 2. If the **subject** is already configured using set command, it will be taken as the subject for the email.
- 3. Type **Ctrl+C** to quit the email at any given time.

### Scenario 5 - Sending a Mime Encoded Binary Attachment Using Command Prompt

#### The email addresses, subject, and message body are taken from the command prompt.

Issue the following command:

- send-mail
  - -b
  - -t "<email-id #1>, <email-id #2>"
  - -c "<email-id #3>, <email-id #4>"
  - -s "subject data"
  - -d "Message body"

The SMTP session then enters into interactive mode requesting media-type, media-subtype, filename, filesize, and the attachment body as shown in this figure.

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Send "extremes"      Call BBS from Host Directory	Launch Notepart	5.exe 🔹 Run Minihost Script	
# send-mail -b -t "mtss@multi il for scenario 5"	itech.tzo.c	om" -s "Subject: Scen	ario 5" -d "Test ma
Attachment #1	Transfer Ascii	File	×
media-type: image media-subtype: jpeg filename: test.jpeg filesize: 17564 File size not given 17564	Filename. Filesize: Bytes sent.	C:\Phogram Files\20C\upload\lest.jpg 17554 17136	Cancel
Binary mode: Enter Ctrl+C to	quit mail		
Continue with one more attach	ment? (y/n	): n	
OK: Mail sent			
#			

When the attachment body reaches the filesize, another message is displayed asking whether to continue with one more attachment as shown in figure. Type **n** for **No**. The email with its attachment is sent only to the **to-addresses** (if any) and **cc-addresses** (if any) entered from the command prompt. The **subject** and **message body** are also taken from the command prompt.

- 1. The email is not sent to addresses pre-configured using set commands.
- 2. At least one address, either the **to-address** or the **cc-address**, should be given as an alternative to sending email directly from command prompt.
- 3. If the **subject** option is not specified and is not configured using set commands, SMTP enters into interactive mode requesting the **subject** to be entered.
- 4. Type **Ctrl+C** to quit the email at any given time.
- 5. If the host wants to quit the email while sending the binary attachment body, type **Ctrl+C** and wait for 3 seconds without entering any character to quit the email.

### Scenario 6 - Sending a Mime Encoded Binary Attachment Using the Command Prompt

The *to-address*, *cc-address*, and *subject* are entered through the command prompt
The message body is entered in the Interactive Mode

Issue the following command:

- send-mail
  - -b
  - -t "<email-id#1>, <email-id#2>"
  - -c "<email-id#3>, <email-id#4>"

-s "subject data"

The SMTP session then enters into interactive mode requesting the **message body** as shown in the figure to be entered. After entering the message, type **Ctrl+D** to end the message.

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Send "exit <enter>"  Call BBS from Host Directory</enter>	Launch Notepad.ex	e 🔹 Run Minihast Script										
<pre># send-mail -bt "mtss@multi ct: Scenario "" Message body: Enter Ctrl+D to This mail contains an attachm AD</pre>	end mail, c	Ctrl+C to quit mail	:om" -s "Subje									
Attachment #1	Transfer Ascii File 🔀											
media-type: image media-subtype: jpeg filename: test.jpeg filesize: 17564 File size not given 17564	Filename:     C:\Program Files\Z0C\upload\test.pg     Cancel       Filesize:     17564       Bytes sent     17136											
Binary mode: Enter Ctrl+C to Continue with one more attach		n										
OK: Mail sent			-									

The SMTP session then enters into interactive mode requesting media-type, media-subtype, filename, filesize, and the attachment body as shown in the figure.

When the attachment body reaches the filesize, another message displays asking whether to continue with one more attachment as shown in the figure. Type **n** for **No**. The email with its attachment is sent only to the **to-addresses** (if any) and **cc-addresses** (if any) entered from the command prompt. The **subject** is taken from the command prompt.

- 1. The email is **not** sent to addresses pre-configured using set commands.
- 2. At least one address, either **to-address** or **cc-address**, should be given as an option to the command prompt.
- 3. If the **subject** option is not specified and is not configured using set commands, SMTP enters into interactive mode and requests the subject to be entered.
- 4. Type Ctrl+C to quit the email at any given time.
- 5. If the host wants to quit the email while sending the binary attachment body, type **Ctrl+C** and wait for 3 seconds without entering any character to quit the email.

### Scenario 7 – Sending a Mime Encoded Binary Attachment Using Configuration and Interactive Mode

- The to-address, cc-address, and subject are pre-configured.
- The message body is entered in the Interactive Mode.

Configure the following details apart from the mandatory configuration:

- Set subject data of maximum length 255 characters. Command: set send-mail subject "subject data"
- Set to-addresses of maximum length 64 characters. Command: set send-mail to-address 1 email-id#1 set send-mail to-address 2 email-id#2
- Set cc-addresses of maximum length 64 characters. Command: set send-mail cc-address 1 email-id#3 set send-mail cc-address 2 email-id#4

Issue the following command: # send-mail -b

The SMTP session then enters into interactive mode requesting the message body to be entered as shown in this figure. After entering the message, type **Ctrl+D** to end the message. When the attachment body reaches the file size, you will be asked whether to continue with one more attachment. Type **n** for **No**. The email with its attachment is sent only to the pre-configured **to-addresses** and **cc-addresses**, if any. The **subject** is also taken from the configuration.

Elle Edit View Logging Transfer Script Options Help							
17 12 14 14 1 <i>8 1</i> <b>8 1 8 1 8 8 8</b>	4 of 11	> 🛐 🗃 🖬 🖬 🖬 🕫 🛠	e 🖩 🕆				
Send "exit center>"     Gall BBS from Host Directory	Launch Notepad ex	e 🛛 Run Minihost Script					
# send-mail -b Message body: Enter Ctrl+D to (	end mail, C	trl+C to quit mail	*				
This mail has an attachment <sup>A</sup> D	(Scenario 7	7)					
Attachment #1	Transfer Ascii F	ile	×				
media-type: image media-subtype: jpeg filename: test.jpeg filesize: 17564 File size not given 17564	C:VProgram Files\ZOC\uploadVest.jpg 17564 17136	Cancel					
Binary mode: Enter Ctrl+C to q	uit mail						
Continue with one more attachment? (y/n): n OK: Mail sent							

- 1. The email is sent to addresses pre-configured using set commands.
- At least one address, either the to-address or the cc-address, should be configured using set commands; otherwise, the SMTP session will enter into interactive mode prompting for the required details to be entered.
- 3. If the **subject** is not configured using commands, SMTP will request the subject to be entered.
- 4. Type **Ctrl+C** to quit the email at any given time.
- 5. If the host wants to quit the email while sending the binary attachment body, type **Ctrl+C** and wait for 3 seconds without entering any character.

### Scenario 8 - Sending a Mime Encoded Binary Email with Attachment Using Interactive Mode

Issue the following command: send-mail -b

The SMTP session then enters into interactive mode requesting the **to-address**, the **cc-address**, **subject**, and **message body** to be entered. After completion of the message, type **Ctrl+D** to end the message.

The SMTP session in interactive mode requests media-type, media-subtype, filename, filesize, and the attachment body as shown in the figure.

When the attachment body reaches the filesize, another message is displayed asking whether to continue with one more attachment. Type **n** for **No**. The email with its attachment is sent only to the entered **to-addresses** (if any) and **cc-addresses** (if any). The **subject** and **message body** are used as entered in the interactive mode.



- 1. The email is sent only to addresses entered in interactive mode.
- 2. If the subject is pre-configured using set com80.5 -1.159(eit willbe eusd a)s

# Chapter 14 - POP3 Client

### Introduction

The MultiConnect IP can be configured as a POP3 client to retrieve emails from a POP3 server. The POP3 client, available in MultiConnect IP, can do the following:

- List the number of messages and message sizes
- Retrieve the header information of messages
- Retrieve the complete email
- Retrieve the top 'n' lines of a message
- Delete an email on the server
- Retrieve the unique email ID listing

#### **Important Notes:**

- This application is applicable only in the non-transparent mode.
- This application can be used only after the **PPP link is UP** with an IP Address on the modem port. (Refer to Chapter 6 Prerequisite Configurations *Physical Link Established Over the Modem Port* for more details)
- In the event of PPP link DOWN, the POP3 request triggers PPP link establishment.

### **Setup and Configuration Prerequisites**

To fulfill the prerequisites for receiving/retrieving emails from the email server, configure the following parameters:

- pop3 server name/ip address
   Command: set recv-mail server-name < server-name>
- pop3 port number
   Command: set recv-mail server-port <port-number>
- pop3 account/user name
   Command: set recv-mail mailbox-name <account/user name>
- pop3 account/user password
   Command: set recv-mail mailbox-password <account/user password>

These commands need to be executed only to set the initial configuration. However, they must be executed whenever a parameter is changed.

#### Example

Assuming that the POP3 server is **192.168.2.10**, POP3 port is **110**, account/user name is **mtss**, and the account/user password is **mtsspass**, execute the following commands to configure the MultiConnect IP to retrieve emails.

set recv-mail server-name 192.168.2.10 OK set recv-mail server-port 110 OK set recv-mail mailbox-name mtss OK set recv-mail mailbox-password mtsspass OK

#### Example of the show recv-mail configuration

Use the **show recv-mail** configuration to check the configuration.

+   pop3 c	configuration	Ι
server-name   server-port   mailbox-name   mailbox-password +	: 192.168.2.10   : 110 : mtss   : mtsspass	

If any of the above fields are missing, then the email cannot be retrieved.

# *Optional Configuration for Deleting Emails from the Server*

An optional parameter that can be configured is:

#### # recv-mail leave-mail-on-server disable OK

The command **recv-mail leave mail on server <enable/disable>** is used to indicate that email retrieved from the POP3 server should be deleted.

If **leave mail on server** is **disabled**, then an email retrieved from the POP3 server using the commands **recv-mail mail** or **recv-mail mail <n>**, where **n** is the message number, is deleted from the POP3 server. The default value is **enable**.

### Scenario 1 - Retrieving Emails

The command **recv-mail mail** can be used to retrieve all the emails from a POP3 server. This command will retrieve all the email with headers, message body, and attachments.

The command **recv-mail mail <n>**, where **n** is the message number, can be used to retrieve the **n**th message.



### Scenario 2 – Retrieving the Number of Emails and the Total Email Size

Use the command **recv-mail stat** to retrieve the number of emails and the total email size in octets. The output is single line.



### Scenario 3 - Retrieving the Email List

Use the command **recv-mail list** to retrieve the email list containing the message number and the size of the individual messages (in octets). The output is multi-lined.

Use the command **recv-mail list <n>** to retrieve the message size of the **n**th message. The output is multi-lined.



### Scenario 4 - Retrieving Emails Headers

Use the command **recv-mail header** to retrieve the message header of all emails. The output is multilined.

Use the command **recv-mail header** <**n**> to retrieve the message header of the **n**th email. The output is multi-lined.



### Scenario 5 - Retrieving First t Lines

To retrieve the first few lines of an email, use the command **recv-mail top** <**n**> <**t**>, where **n** is the message number and **t** is the number of lines to be retrieved. This command shows the message headers and the first **t** number of lines. The output is multi-lined.



### Scenario 6 - Deleting an Email on the Server

Use the command **recv-mail delete** <**n**>, where **n** is the message number of the email that should be deleted from the server.

# recv-mail delete 1 OK

### Scenario 7 - Retrieving the Unique Email ID

Use this command to retrieve the unique email ID of a message. The unique message ID is used to identify the message with a unique string.

-					•				•														
Eile	Edit	View	Logg	ing	Trans	sfer	Script	<u>Options</u>	Help														
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OK 1 97 2 34 5 6 7 8 9 0 11 12 13 11 13	uid SK! Nd! E+! SBN" S9! S9! S9! S9! S9! S9! S9! A"+	1 c !k>" !FF !-# !D4 !)h !/1 !3b !!5 "!5		and n]' #Pk bG] [] [] [] [] [] [] [] [] [] [] [] [] []	1 a.c ##!( 0112 (110 (110 (110 (110 (110) (	cce GX- /1_ 0WI :XS J;9 K_C bi[ !\4 !. ! ! ! ! ! !	pte -!!! 5"!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!	listi d.	ng														

### Error Messages

• ERROR Invalid parameters. Check POP3 parameters

This error message is displayed if the POP3 parameters are not configured correctly. See prerequisites for POP3.

• ERROR: Set up failed

This error occurs if the server is not accessible or the POP3 client is not able to connect to the POP3 server on the configured port.

• ERROR: Unable to login

This error occurs if the POP3 client could not authenticate to the POP3 server. This could happen when the username or password is not valid.

• Other errors

Other errors might occur due to timeout, none availability of resources, etc.

### Scenario 8 – Sending a Mime Encoded Binary Email Using Interactive Mode

Issue the following command: send-mail -b

The SMTP session then enters into interactive mode requesting the **to-address**, the **cc-address**, **subject**, and **message body** to be entered. After completion of the message, type **Ctrl+D** to end the message.

nd "exit <enter>"  <ul> <li>Call BBS from Host Directory</li> </ul></enter>	<ul> <li>Launch Notepa</li> </ul>	d exe 🔹 Run Minihost Script	
<pre># send-mail -b To: mtss@multitech.tzo.com To: To address not given Cc: Cc address not given subject: Scenario 8 Message body: Enter Ctrl+D This mail has an attachmer AD</pre>		, Ctrl+C to quit mail	
Attachment #1 media-type: image media-subtype: jpeg filename: test.jpeg filesize: 17564 File size not given 17564 Binary mode: Enter Ctrl+C 1	Transfer Ascii Filename: Filesize: Bytes sent: to quit mail	File C:\Program Files\20C\upkad\test.pg 17564 17136	Cancel

The SMTP session enters into interactive mode requesting media-type, media-subtype, filename, filesize, and the attachment body as shown in the figure.

When the attachment body reaches the filesize, another message is displayed asking whether to continue with one more attachment. Type **n** for **No**. The email with its attachment is sent only to the entered **to-addresses** (if any) and **cc-addresses** (if any). The **subject** and **message body** are used as entered in the interactive mode.

- 1. The email is sent only to addresses entered in interactive mode.
- 2. If the subject is pre-configured using set commands, it will be used as the subject for the email.
- 3. Type Ctrl+C to quit the email at any given time.
- 4. If the host wants to quit the email while sending the binary attachment body, type **Ctrl+C** and wait for 3 seconds without entering any character to quit the email.

# **Chapter 15 - FTP Client**

### Introduction

The FTP Client is used to establish a TCP session to the FTP server running on port 21. This chapter covers the FTP Client Features and provides you with ten FTP Client Scenarios.

### FTP Client Features

- Supports automatic authentication to the FTP server depending on the configuration.
- Supports listing the contents of the specified directory of the FTP server
- Supports active and passive modes of data transfer.
- Supports sending files from the host/serial device to the FTP server.
- Supports receiving files from the FTP server to the host/serial device.

### *Command to List Directory Contents or to Send/Receive Files*

The host/serial device can use the following command to list the contents of the directory or to send/ receive text/binary files to/from a remote server depending upon the requirement.

#### ftp < [-I] [-t] [-r] > [-p] <ip-address/host-name>

The FTP command will prompt for the details required if these details were not configured previously.

#### Important:

- 1. The user must have access permission to perform the above functionality.
- 2. FTP client cannot be accessed through a Telnet session.
- **3.** By default, the data connection is in active mode. This can be optionally changed to passive mode by using **-p** option in the command.
- **4.** By default, the Format control is set to NON\_PRINT, the structure type is set to FILE, and the Transmission mode is set to STREAM mode in the client.
- 5. The file transfer can be done only if the server supports BINARY/IMAGE data type.
- 6. The file can be received only if the server supports SIZE command.

### **Prerequisites**

The host/serial device must ensure the validity of the following details before using FTP client:

- 1. If the host device wants to use domain names instead of an IP address for a remote server, then the following parameters must be set:
  - Default Gateway should be configured to a valid IP address.
    - # set ip def-gway <ip-address>
  - DNS should be enabled.
    - # set ip dns <enable>
  - DNS address should be configured to a valid ip-address. # set ip pri-dns <ip-address>
- 2. If you want the host device to use automatic authentication to a particular FTP server, then set the following parameters:
  - Mandatory: The device name should be configured to a valid the IP address/hostname. The login name should be set to a valid user name.
     #set ftp machine <ip-address/host-name/default> login
     <user-name>
  - **Optional:** The password can be optionally configured as the password corresponding to the user name.

# set ftp machine <ip-address/host-name/default>
login <user-name> password <passwd>

- **Optional:** The account password can be optionally configured as the password corresponding to the user name. This is an extra authentication that can be used when an FTP server asks for an account password.
  - # set ftp machine <ip-address/host-name/default>
  - login <user-name> password <passwd> account <passwd>

#### ERROR Messages

An ERROR message displays if any of the above details are not configured or are not valid.

#### How to Delete a Previous Configuration

The previous configuration can be deleted by specifying the following command: "set ftp machine" without any arguments.

- If a value is configured as the default, the FTP client tries to authenticate for every FTP server.
- If the above mandatory fields are not configured or if the configured device and the server specified in the command line are different, MultiConnect IP prompts the user to enter login name and password.

### **Scenario 1 - Listing Directory Contents**

This scenario describes how to list the contents of the specified directory of the FTP server without Automatic Authentication (default) and the data connection in ACTIVE mode.

Description	The MultiConnect IP establishes the control connection to the specified FTP server and prompts the host device to enter the login name, password: Name (ip-address:admin): mtss <cr> Password: **** <cr></cr></cr>
	If successfully logged in, MultiConnect IP sends a message and prompts the host device to enter the <i>remote directory, the</i> contents of which will then be displayed. Connected
	Remote directory: <cr> or <directory-path></directory-path></cr>
	If the Host simply enters <cr> without specifying the directory, then the contents of the present working directory are listed. If the complete path of the directory is given, then the contents of that directory are listed.</cr>
	By default the data connection is in active mode. The client sets the data transfer mode as 'ASCII' to receive the list of contents of the directory.
Configuration	None
Command	ftp -l ip-address
Result Response	OK: FTP session closed

### **Scenario 2 - Listing Directory Contents**

This scenario describes how to list the contents of the specified directory of the FTP server without Automatic Authentication (default) and the data connection in PASSIVE mode.

Description	The MultiConnect IP establishes the control connection to the specified FTP server and prompts the host device to enter the login name, password: Name (ip-address:admin): mtss <cr> Password: **** <cr></cr></cr>
	If successfully logged in, MultiConnect IP sends a message and prompts the host device to enter the <i>remote directory, the</i> contents of which will then be displayed. Connected Remote directory: <cr> or <directory-path></directory-path></cr>
	If the Host simply enters <cr> without specifying the directory, then the contents of the present working directory are listed. If the complete path of the directory is given, then the contents of that directory are listed.</cr>
	The data connection is in passive mode due to the <b>'-p'</b> option. The client sets the data transfer mode as 'ASCII' to receive the list of contents of the directory.
Configuration	None
Command	ftp -l -p ip-address
Result Response	OK: FTP session closed

### **Scenario 3 - Listing Directory Contents**

This scenario describes how to list the contents of the specified directory of the FTP server

- a) With Automatic Authentication enabled by specifying all authentication details: IP address of the device, valid login name, valid password, and valid account password.
- b) Data connection in ACTIVE mode.

Description	The MultiConnect IP establishes a control connection, automatically checks for the configured values, and logs into the FTP server. If successfully logged in, it sends a message and prompts the host device to enter the <i>remote directory</i> , the contents of which are then displayed as follows: Connected Remote directory: <cr> or <directory-path></directory-path></cr>
	If the Host simply enters <cr> without specifying the directory, then the contents of the present working directory are listed. If the complete path of the directory is given, then the contents of that directory are listed.</cr>
	By default the data connection is in active mode. The client sets the data transfer mode as 'ASCII' to receive the list of contents of the directory.
	<b>Note:</b> If the <b>'-p'</b> option is specified in the command, the data connection will be in passive mode
Configuration	<pre>set FTP device <ip-address host-name=""> login <user-name> password <passwd> account <passwd></passwd></passwd></user-name></ip-address></pre>
Command	ftp -l [-p] ip-address
Result Response	OK: FTP session closed

### **Scenario 4 - Listing Directory Contents**

This scenario describes how to list the contents of the specified directory of the FTP server

- a) With Automatic Authentication enabled by specifying a few authentication details: IP address of the device and a valid login name.
- b) Data connection in ACTIVE mode.

Description	The MultiConnect IP establishes a control connection, automatically checks for the configured values, and logs into the FTP server. If the user is a valid user, the host device is prompted to enter Password as shown here: Password: *** <cr></cr>
	If successfully logged in, the MultiConnect IP sends a message and prompts the host device to enter the <i>remote directory</i> , the contents of which are then displayed as follows: Connected Remote directory: <cr> or <directory-path></directory-path></cr>
	If the Host simply enters <cr> without specifying the directory, then the contents of the present working directory are listed. If the complete path of the directory is given, then the contents of that directory are listed.</cr>
	By default the data connection is in active mode. The client sets the data transfer mode as 'ASCII' to receive the list of contents of the directory.
	<b>Note:</b> If the '-p' option is specified in the command, the data connection will be in passive mode
Configuration	<pre>set ftp machine <ip-address host-name=""> login <user-name></user-name></ip-address></pre>
Command	ftp -l [-p] ip-address
Result Response	OK: FTP session closed

### Scenario 5 - Sending a File to the FTP Server

This scenario describes how to send a file to the FTP server:

- a) Without Automatic Authentication (default).
- b) Data connection in ACTIVE mode.

Description	The MultiConnect IP establishes a control connection to the specified FTP server and prompts the host device to enter the login name and password as shown here: Name (ip-address:admin): mtss <cr> Password: **** <cr></cr></cr>
	If successfully logged in, the MultiConnect IP sends a message and prompts the host device to enter <b>Filename</b> and <b>Filesize</b> and sends a message as shown here: Connected Filename: filename <cr> Filesize: filesize <cr> Enter data. To terminate press Ctrl + C with 3 seconds delay.  File Transfer</cr></cr>
	When the specified filesize is reached, the FTP session responds with the OK message.
	By default the data connection is in active mode. The client sets the data transfer mode as 'BINARY/IMAGE' during the file transfer.
	Note: If the '-p' option is specified in the command, the data connection will be in passive mode
Configuration	None
Command	ftp -t [-p] ip-address
Result Response	OK: FTP session closed

### Scenario 6 - Sending a File to the FTP Server

This scenario describes how to send a file to the FTP server:

- a) With Automatic Authentication enabled by specifying all authentication details: IP address of the device, valid login name, valid password, and valid account password.
- b) Data connection in ACTIVE mode.

Description	The MultiConnect IP establishes a control connection, automatically checks for the configured values, and logs into the FTP server. If successfully logged in, it sends a message and prompts the host device to enter Filename, Filesize, and then it sends a message as shown here: Connected Filename: filename <cr> Filesize: filesize <cr> Enter data. To terminate press Ctrl + C with 3 seconds delay  File Transfer</cr></cr>
	When the specified filesize is reached, the FTP session responds with the OK message.
	By default the data connection is in active mode. The client sets the data transfer mode as 'BINARY/IMAGE' during the file transfer.
	Note: If the '-p' option is specified in the command, the data connection will be in passive mode
Configuration	set ftp machine <ip-address host-name=""> login <user-name> password <passwd></passwd></user-name></ip-address>
	account <passwd></passwd>
Command	ftp -t [-p] ip-address
Result Response	OK: FTP session closed

### Scenario 7 - Sending a File to the FTP Server

This scenario describes how to send a file to the FTP server:

- a) With Automatic Authentication enabled by specifying a few authentication details: IP address of the device and valid login name.
- b) Data connection in ACTIVE mode.

-,	
Description	The MultiConnect IP establishes the control connection to the specified FTP server, automatically checks for the configured values, and logs into the FTP server. If the user is valid, the MultiConnect IP prompts the host device to enter the Password as below: Password: **** <cr></cr>
	If successfully logged in, the MultiConnect IP sends a message and prompts the host device to enter <b>Filename</b> and <b>Filesize</b> and sends a message as shown here: Connected Filename: filename <cr> Filesize: filesize <cr> Enter data. To terminate press Ctrl + C with 3 seconds delay.  File Transfer</cr></cr>
	When the specified filesize is reached, the FTP session responds with the OK message.
	By default the data connection is in active mode. The client sets the data transfer mode as 'BINARY/IMAGE' during the file transfer.
	Note: If the '-p' option is specified in the command, the data connection will be in passive mode
Configuration	set ftp machine <ip-address host-name=""> login <user-name></user-name></ip-address>
Command	ftp -t [-p] ip-address
Result Response	OK: FTP session closed

### Scenario 8 - Receiving a File from the FTP Server

This scenario describes the receiving of a file from the FTP server:

- a) Without Automatic Authentication (default).
- b) Data connection in ACTIVE mode.

Description	The MultiConnect IP establishes a control connection to the specified FTP server
	and prompts the host device to enter the login name and password as shown here: Name (ip-address:admin): mtss <cr> Password: **** <cr></cr></cr>
	If successfully logged in, the MultiConnect IP sends a message and prompts the host device to enter <b>Filename</b> and sends a message as shown here: Connected
	Filename: filename <cr></cr>
	size = <filesize from="" server=""></filesize>
	Press <cr> to receive file</cr>
	<cr></cr>
	File Transfer
	When the complete file is received, the FTP session responds with OK. By default the data connection is in active mode. The client sets the data transfer mode as 'BINARY/IMAGE' during the file transfer.
	<b>Note:</b> If the '-p' option is specified in the command, the data connection will be in passive mode
Configuration	None
Command	ftp -r [-p] ip-address
Result Response	OK: FTP session closed

### Scenario 9 - Receiving a File from the FTP Server

This scenario describes the receiving of a file from the FTP server:

- a) With Automatic Authentication enabled by specifying all authentication details: IP address of the device, valid login name, valid password, and valid account password.
- b) Data connection in ACTIVE mode.

Description	The MultiConnect IP establishes a control connection, automatically checks for the configured values, and logs into the FTP server. If successfully logged in, the MultiConnect IP sends a message and prompts the host device to enter the Filename, and then it sends a message as shown here: Connected Filename: filename <cr> size = <filesize from="" server=""> Press <cr> to receive file <cr>  File Transfer</cr></cr></filesize></cr>
	When the complete file is received, the FTP session responds with OK.
	By default the data connection is in active mode. The client sets the data transfer mode as 'BINARY/IMAGE' during the file transfer.
	Note: If the '-p' option is specified in the command, the data connection will be in passive mode
Configuration	set ftp machine <ip-address host-name=""> login <user-name> password <passwd> account <passwd></passwd></passwd></user-name></ip-address>
Command	ftp -r [-p] ip-address
Result Response	OK: FTP session closed

### Scenario 10 - Receiving a File from the FTP Server

This scenario describes the receiving of a file from the FTP server:

- a) With Automatic Authentication enabled by specifying a few authentication details: IP address of the device and a valid login name
- b) Data connection in ACTIVE mode.

Description	The MultiConnect IP establishes a control connection to the specified FTP server, automatically checks for the configured values, and logs into the FTP server. If the user is a valid user, the MultiConnect IP prompts the host device to enter the Password shown here: Password: **** <cr> If successfully logged in, the MultiConnect IP sends a message and prompts the host device to enter a Filename, and then it sends a message as below: Connected</cr>
	Filename: filename <cr> size = <filesize from="" server=""> Press <cr> to receive file <cr></cr></cr></filesize></cr>
	File Transfer
	When the complete file is received, the FTP session responds with OK.
	By default the data connection is in active mode. The client sets the data transfer mode as 'BINARY/IMAGE' during the file transfer.
	<b>Note:</b> If the '-p' option is specified in the command, the data connection will be in passive mode
Configuration	set ftp machine <ip-address host-name=""> login <user-name></user-name></ip-address>
Command	ftp -r [-p] ip-address
Result Response	OK: FTP session closed

#### How to Close or Abort the FTP Session

The host can abort the FTP session by issuing "Ctrl+C" at any given time.

#### How to Abort a File Transfer Session

The host can abort the file transfer by issuing "Ctrl+C" with a delay of 3 seconds. The file into which data was written will be deleted by the client, and the data connection will be closed.

#### **Note About Read and Store**

The serial device has to read and store the data received. It has to implement timeout mechanisms to come out in cases where the network is prone to errors.

# Chapter 16 - SNTP Client

### Introduction

SNTP Client is used to synchronize timekeeping among a set of distributed time servers and clients. It is built on the IP and UDP, which provide a connectionless transport mechanism.

### *Features*

- Supports SNTP client built on UDP (port 123) to update the local time after booting and at periodic intervals.
- Supports to set Standard Name of Time Zone.
- Supports to set offset from UTC.
- Supports Daylight savings feature.
- Supports the configuration of Offset During Daylight Savings, Start of Daylight Savings Time, and End of Daylight Savings Time.

#### Command to Enable/Disable SNTP Client

The host/serial device can the use the command below to enable/disable the SNTP client.

# set sntp-client <enable/disable>

### **Prerequisites**

**Mandatory Prerequisites:** The following details are **mandatory** configuration and have to be validated before starting SNTP client:

- Set NTP server name or IP address.
   # set sntp-client ntp-server-name <ipaddress>
- Set the time-zone (Default is UTC).
   # set sntp-client time-zone <UTC>
- Set the time zone offset to be added
   # set sntp-client time-zone-offset <+00:00>
- Set the polling time.
   # set sntp-client polling-time <300>

#### ERROR Message

The *send-mail* command prompts for the ERROR message if any of the above details are not configured or not valid.

**Optional Prerequisites:** The following configurations are **optional** and can be used when you want the host device to enable daylight savings mode.

- Enable the Daylight Savings Mode
   # set sntp-client daylight-saving <enable>
- Set the Daylight Savings Offset value
   # set sntp-client daylight-saving offset <+60>
- Set the Start Ordinal/week for Daylight Savings.
   # set sntp-client daylight-saving start-ordinal <First>
- Set the Start Weekday for Daylight Savings.
   # set sntp-client daylight-saving start-weekday <sunday>
- Set the Start Month for Daylight Savings.
   # set sntp-client daylight-saving start-month <april>
- Set the Start Time for Daylight Savings.
   # set sntp-client daylight-saving start-time <10:00>
- Set the End Ordinal/ week for Daylight Savings.
   # set sntp-client daylight-saving end-ordinal <Last</li>
- Set the End Weekday for Daylight Savings
   # set sntp-client daylight-saving end-weekday <sunday>
- Set the End Month for Daylight Savings.
   # set sntp-client daylight-saving end-month <october>
- Set the End Time for Daylight Savings.
  - # set sntp-client daylight-saving end-time <10:00>

### Scenario 1 - Updating Time from the NTP Server

This scenario describes the updating of time from the NTP server with Daylight Savings Mode **disabled**.

Description	The MultiConnect IP time and date are updated with the time specified by the server and with the time-zone offset added to the time.
	SNTP client should send periodic requests to the server for the time update function depending on the polling time.
Configuration	1. Mandatory configuration.
Command	set sntp-client enable
Result Responses	Use "show date" or "show time" commands to check.
	Time and Date should be synchronized with the server.
	OK

### Scenario 2 - Updating Time from the NTP Server

This scenario describes the updating of time from the NTP server with Daylight Savings Mode enabled.

Description	The MultiConnect IP time and date are updated with the time specified by the server and with the daylight offset added to the time if the time falls between start and end configuration.
	SNTP client should send periodic requests to the server for the time update function depending on the polling time.
Configuration	<ol> <li>Mandatory configuration.</li> <li>Optional configuration.</li> </ol>
Command	set sntp-client enable
Result Responses	Use "show date" or "show time" commands to check. Time and Date should be synchronized with the server. OK

#### Note:

When the server cannot be reach or is not running, the SNTP client tries to reach the server every 10 seconds for 6 times and waits for the polling time, and then it tries again to reach the server as before.

# Appendix A – Flash Upgrade

### Introduction

The MultiConnect Adapter contains a 2 MB flash wherein the boot image, the firmware and configuration files are stored in a compressed format. The flash can easily be upgraded both locally as well as remotely.

Local Upgrade

The flash of the MultiConnect can be upgraded locally through serial port using the upload feature of serial applications.

• **Remote Upgrade** The flash can be upgraded remotely through the Ethernet using TFTP.

The MultiConnect Adapter flash contains two main files, which are required for an upgrade.

- Binary File
  - The binary file contains the firmware of the Adapter
     The name of this binary file would be in the following format
     MTXCSEM-TFTP-v<version>w-<date in ddMmmyyyy format>
- Gun-zipped .tar File
  - This contains the HTML pages of the serial device and other files related to it, such as http-host-param (http page configuration file)
  - The name of this tar file would always be http.tar.gz

### **Prerequisites**

### Prerequisite 1 - Required Tool (TFTP Client)

A Trivial File Transfer Protocol (TFTP) client must be installed on your PC in order to execute the flash upload procedure.

#### **TFTP for Windows**

Though Windows 98 and ME do not come with a TFTP client, the file can be copied from a PC operating Windows NT or 2000 (not XP):

- On a PC operating Windows NT or Windows 2000, locate the TFTP file at C:\WINNT\SYSTEM32\tftp.exe.
- Copy the this file to C:\WINDOWS on your Windows 98 or ME PC.

#### **Downloading TFTP from the Internet**

If your operating system does not include a TFTP client program, a TFTP client program is available for Windows users from the Internet. Walusoft's TFTP Suite Pro is recommended. The URL is:

http://www.walusoft.co.uk/download.htm

### Prerequisite 2 - Serial Port Configuration

The default serial port parameters should be:

- Data length 8 bits
- Parity None
- Stop bits 1
- **Baud-rate of the serial port** to which the MultiConnect Adapter is connected should be set to 115200 bps for proper operation.

### Prerequisite 3 - Enabling TFTP Server

Enable TFTP server on MultiConnect Adapter by issuing the following command: # set ip tftp enable OK

### Serial Flash Upgrade Scenario

Following steps explain the procedure to upgrade a flash using the serial COM port (serial flash upgrade).

Connect the MultiConnect Adapter to a PC COM Port.

- Open an application through which we can access the serial device(e.g., Meterm, zoc, hyperterm).
- Reboot the MultiConnect Adapter.
- Wait for the boot message and prompt "press d to download" to appear.
- Press **d** when prompted.
- Select the **XMODEM** Protocol from the Terminal application.
- Choose a file (MTXCSEM-TFTP-...) file to be uploaded.
- Perform a file upload.



The MultiConnect Adapter reboots and will be up after a few seconds (10-15 secs).

The MultiConnect Adapter reboots after it has been successfully upgraded.

## Appendix B – Regulatory Information

### **Regulatory Information**

#### FCC Part 15 Regulation

This equipment has been tested and found to comply with the limits for a **Class A** digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Plug the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC rules. Operation of this device is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference that may cause undesired operation.

WARNING – Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

#### Industry Canada

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations. Cet appareil numérique de la classe B respecte toutes les exigences du Reglement Canadien sur le matériel brouilleur.

# CE

#### EMC, Safety, and Directive Compliance

The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of Member States relating to electromagnetic compatibility;

and

Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.

# **Appendix C - Warranty and Service**

### Multi-Tech Warranty Statement

Multi-Tech Systems, Inc., (hereafter "MTS") warrants that its products will be free from defects in material or workmanship for a period of two, five, or ten years (depending on model) from date of purchase, or if proof of purchase is not provided, two, five, or ten years (depending on model) from date of shipment.

MTS MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

This warranty does not apply to any products which have been damaged by lightning storms, water, or power surges or which have

### **Repair Procedures for International Distributors**

International distributors should contact their MTS International sales representative for information about the repairs for their Multi-Tech product.

Please direct your questions regarding technical matters, product configuration, verification that the product is defective, etc., to our International Technical Support department at +(763)717-5863. When calling the U.S., please direct your questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at +(763) 717-5631 in the U.S.A. or email mtsrepair@multitech.com.

Repairs for damages caused by lightning storms, water, power surges, incorrect installation, physical abuse, or user-caused damages are billed on a time-plus-materials basis.

### **Replacement Parts**

SupplyNet, Inc., can supply you with replacement power supplies, cables and connectors for selected Multi-Tech products. You can place an order with SupplyNet via mail, phone, fax or the Internet at the following addresses:

Mail:	SupplyNet, Inc.
	614 Corporate Way
	Valley Cottage, NY 10989
Phone:	800 826-0279
Fax:	914 267-2420
Email:	info@thesupplynet.com
Internet:	http://www.thesupplynet.com

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