WILLIAMSAV

TELNET COMMAND GUIDE

(WF T5C, FM T55C)

The WaveCAST C (WF T5C) and FM+ C (FM T55C) can both be controlled remotely using Telnet commands.

Using Telnet

Telnet Server

The FM_T55C Telnet server provides a single client connection on Port 23 to a Network Virtual Terminal (NVT), as implemented through the Telnet Protocol defined in RFC854.

The NVT sends and receives 8-bit characters with the most significant bit set to 0; the remaining codes are reserved for the Telnet command set.

End-of-line <EOL> is transmitted and expected to be received as the character sequence CR (0x0D) followed by LF (0x0A).

To conserve network bandwidth, the FM_T55C Telnet server does not echo received characters. Command replies typically use a single TCP/IP packet.

The server will automatically disconnect the client after 10 minutes of no port activity.

Telnet Clients

Although designed primarily as a machine-to-machine interface, the Telnet CLI may be accessed through one of several available Telnet terminal application programs. **PuTTY** is recommended as it can be easily configured for proper use. The Telnet terminal program provided by Microsoft Windows 10 is not recommended due to complications with configuration.

To configure PuTTY, create a session as follows:

- Set Host Name (or IP address) to match the IP address of the device.
- Set Port to '23'.
- Terminal Category:
    - ◊ Local Echo: Auto or Force on
    - ◊ Local Line Editing: Force on
- Connection Category:
    - ◊ Optionally set a keep-alive time.
      This prevents automatic disconnect when there is no port activity for more than 10 minutes.
    - ◊ Disable Nagle's algorithm.
    - ◊ Set Internet protocol version to IPv4.
- Connection/Telnet options:
    - ◊ Handling OLD_ENVIRON ambiguity: BSD
    - ◊ Telnet negotiation mode: Active
    - ◊ Return key sends Telnet New Line instead of ^M.

Telnet CLI Login

Once a client has established a connection with the Telnet Server, an identifying message is sent to the client along with a request for a username and password. By default, these are set to "admin", but may be changed once successfully logged in. Default credentials are restored when the unit is reset back to factory defaults.

The user is not given access to the Telnet Command Line Interface (CLI) until valid credentials have been received, insuring that no command is stored or executed otherwise.

The default username is **admin**. The default password is **admin**. Default credentials are restored when the unit is reset back to factory defaults.

If the login information is incorrect, the message **ERR:INVALID_LOGIN** is returned. After 3 unsuccessful attempts, the Telnet server disconnects the client.

A successful login is indicated by the return of a normal command prompt.

Command Format

All commands use the form **<command category> <subcommand> [<parameter 1> ...<parameter n>]**. These items must be separated by ASCII space characters (0x20).

Command Parameters

Parameters may use one of 4 forms:

- Signed, 32-bit integers, entered as a string of characters representing decimal (base 10) values or 2's complement hexadecimal values when prefixed by '0x'. These must be within a command's valid range to be accepted.
- Literal character strings that serve to select between options. These must match as specified to be accepted.
- Free-form character strings. These may contain spaces by surrounding them in double quotes, e.g., "A name with spaces".
- IPv4 Addresses comprised of 4 unsigned integer octet values separated (without spaces) by periods, e.g. '192.168.1.2' . IP Addresses must comply with this form to be accepted.

Command Execution

Together, <command category> and <subcommand> define a "command". Execution of a command occurs upon reception of ***<EOL>***.

For commands that can modify settings, including valid parameter(s) will change that setting. Omitting parameter(s) will return the current setting without modification. Example: ***server***

txmode fm<EOL> will change the mode to "fm", whereas ***server txmode***<EOL> simply returns the current audio transmitter mode.

Most read-only commands do not include parameters. Those that include parameters allow the user to specify an option for the returned value. Example: ***chan vu<EOL>*** returns the current VU value in a (default) front panel level format, whereas ***chan vu db<EOL>*** returns the current VU value in decibels.

Command Response

A command prompt, in the form of a chevron, e.g. '**>**' is sent to the client as soon as the CLI is ready to process a new command. The client should typically wait to receive this character before sending a new command.

The response to a command is as follows:

- If a command's format, syntax, or parameter range, etc. is incorrect, a corresponding error string is returned, terminated by an <EOL>.
- For valid commands that read a setting, the requested setting is returned, terminated by an <EOL>.
- For valid commands that change a setting, there is no reply. A new command prompt indicates acceptance.

It's technically possible for the client to send multiple commands in succession without waiting for each response, but each command must be terminated by an <EOL> to be recognized as an individual command. ***Warning: This should only be considered for small groups of commands. With this kind of use, as the CLI input buffer is 256 NVT characters in size, it is possible to overrun the CLI input buffer. See Error Response "ERR:LINE_BUF_OVERFLOW".***

Error Responses

Error	Meaning
ERR:INVALID_LOGIN	The credentials provided at login do not match the assigned credentials.
ERR:UNKNOWN_CMD	The command category or subcommand is not recognized.
ERR:INVALID_ARG	The parameter supplied with the command is not recognized.
ERR:MISSING_ARG	A parameter was not supplied to a command that requires a parameter.
ERR:ARG_RANGE	The value of a parameter is not within the allowed range for the command specified.
ERR:STRING_LEN	The length of a character string parameter exceeds the allowed size for the command specified.
ERR:SYNTAX	The format of the command was invalid, e.g. missing subcommand or too many parameters.
ERR:INVALID_KEY	A command that requires an access key was not provided a correct key value.
ERR:LINE_BUF_OVERFLOW	Too many NVT characters were received before an <EOL> or too many commands were sent by the client in succession without waiting for a command prompt. When this error occurs, the entire input buffer is flushed; any non-executed commands are lost. **Should never occur in normal use.**

Syntax Notation

Chevrons, i.e. "< >" surrounding an item denote it as a parameter. If the parameter is surrounded by brackets, i.e. "[ ]", the parameter is optional.

A vertical bar "|" between items signifies multiple parameter options.

A parameter option shown surrounded by single quotes denotes it as a literal character sequence. The parameter must match to be accepted.

A parameter that accepts a range of values is indicated by two values separated by an ellipsis, e.g. "2...25".

Commands

Command	Description	Parameters
?	Returns list of all command categories.	
<command category> ?	Returns list of all subcommands, syntax for specified command category.	

Command	Description	Parameters
<command category> <subcommand> ?	Returns syntax for a specific command.	
admin panellock [<0|1>]	Gets or sets the front panel lock-out setting.	**0**: Unlocked **1**: Locked
admin reboot 0x1F2E3D4C	Disconnects client and reboots unit. Ending integer is a hardcoded secure key.	
admin restore 0x08675309	Disconnects client, restores all settings to original factory values, and reboots the unit. Ending integer is a hardcoded secure key.	
admin screentime [<10m|30m|2h|off>]	Gets or sets the time the front panel display remains on without button activity.	**10m**: 10 minutes. **30m**: 30 minutes. **2h**: 2 hours. **off**: display timer disabled. Continuous display.
admin time [<unix|dt1|dt2>]	Gets unit's real-time clock time in specified format.	**unix (default)**: number of seconds since January 1st, 1970 (GMT+0000). **dt1**: YYYY/MM/DD HH:MM:SS (GMT+0000). **dt2**: YYYYMMDD_HHMMSS (GMT+0000).
chan gain [<-60...24>]	Gets or sets the audio input gain (positive value) or attenuation (negative value) in decibels.	
chan join [<join code>]	Gets or sets join code used by Unicast secure channel mode.	The join code may be no more than 6 digits in length.

Command	Description	Parameters
chan latency [<0,1,2...25>]	Gets or sets the value that audio clients should use for network latency compensation.	
chan mcaddr [<0.0.0.0 | 224.0.0.0 ... 239.167.255.255 | 239.169.0.0 ... 239.255.255.255>]	Gets or sets a custom Multicast IP address override. *NOTE: Setting a custom Multicast address will restart the audio transmitter.*	Only the specific IP address ranges shown are allowed. 0.0.0.0 cancels this override.
chan mcaddr_curr	Gets the currently assigned Multicast IP address.	
chan name [<name of channel/server>]	Gets or sets the name of the server and audio channel. Changing one changes both.	The name parameter is a free-form character string, no more than 47 characters in length.
chan preset [<music| voice| hearing>]	Gets or sets the filter and compression preset used by the audio processor.	For information on each preset, view the full user manual. Note: the custom preset may only be set through the web interface.
chan secure [<0|1>]	Gets or sets secure channel mode	**0**: not secured **1**: secured
chan source [<line |mic |phnt |dante |tone>]	Gets or sets the audio input configuration.	For information on each input type, view the full user manual.
chan vu [<level | db>]	Gets the current VU level in the specified format.	level (default): front panel VU meter level index. See 'VU Level Table' for details. db: value in decibels relative to the optimal 400 Hz Test Tone level (0dB).

Command	Description	Parameters
devinfo ipadr	Gets Internet Protocol address assigned to this unit.	Read Only. Returned Format: 4 integer octet values separated without spaces by periods, e.g. 192.168.1.2
devinfo mac	Gets unit-specific Media Access Control (MAC) address.	Read Only. Returned Format: 'XX-XX-XX-XX-XX-XX' where 'XX' is an uppercase 8-bit hexadecimal value, e.g. 'AB-CD-EF-01-32-A4'.
devinfo model	Gets product-specific model name character string.	
devinfo pkg	Gets software package version installed on this unit.	Read Only. Returned Format: <major version>.<minor version>
devinfo serial	Gets unit-specific serial number.	Read Only. Returned Format: 'XX-XX-XX-XX-XX-XX' where 'XX' is an uppercase 8-bit hexadecimal value, e.g. 'A2-CD-EF-01-32-A4'.
fm ch17mode [<0|1>]	**FM T55C Only** Gets or sets the FM transmitter channel selection range. **NOTE: Changing modes resets channel to 1.**	**0**: 8-channel mode **1**: 17-channel mode
fm chan [<1...8| 1...17>]	**FM T55C Only** Gets or sets the FM transmitter broadcast channel.	Range limited by the channel mode currently selected. See **fm ch17mode**.
fm onair	**FM T55C Only** Gets the current FM transmitter status.	**0**: not transmitting **1**: transmitting

Command	Description	Parameters
fm power [<low| med| full>]	**FM T55C Only** Gets or sets the FM transmitter power level. If FM transmitter is operating, change is immediate, else it takes effect once operation resumes.	For information on each power level, view the full user manual.
fm timer [<30m| 4h| off>]	**FM T55C Only** Gets or sets how long the FM transmitter continues to operate when audio is no longer present.	**30m**: 30 minutes. **4h**: 4 hours. **off**: continues to transmit regardless of audio level
netset dhcp [<0|1>]	Gets or sets Static IP vs DHCP mode.	**0**: use Static IP **1**: use DHCP server to assign IP address
netset static_gway [<#.#.#.#>]	Gets or sets Gateway IP Address used by Static IP mode.	#.#.#.# - Replace with IP Address. Only Class A, B, or C private address ranges are accepted.
netset static_ip [<#.#.#.#>]	Gets or sets IP Address used by Static IP mode.	#.#.#.# - Replace with IP Address. Only Class A, B, or C private address ranges are accepted.
netset static_mask [<#.#.#.#>]	Gets or sets IP Address Mask used by Static IP mode.	#..#.#.# - Replace with mask. Only masks that, when converted to binary, begin with a contiguous block of 1 bits and end in a contiguous block of 0 bits are accepted.
netset ttl [<1...31>]	Gets or sets the Time-To-Live (TTL) value for network transmission.	

Command	Description	Parameters
server incomp	Gets the IP address of the first incompatible audio server encountered. If none, '0.0.0.0' is returned.	
server name [<name of server/ channel>]	Gets or sets the name of the server and audio channel. Changing one changes both.	The name parameter is a free-form character string, no more than 47 characters in length.
server stack [<4| 8>]	Gets or sets the maximum number of audio servers, 4 or 8, that are supported by the network. **NOTE: All audio servers on the network MUST be set to the same number.**	**4**: 4 Audio Servers Max **8**: 8 Audio Servers Max
server txmode [<multi| uni| fm| multi_fm| uni_ fm>]	Gets or sets the audio transmitter operating mode.	**WF_T5C/FM_T55C** **multi**: multicast network transmission only **uni**: unicast network transmission only **FM_T55C ONLY** **fm**: fm broadcast only **multi_fm**: both multicast network transmission and fm broadcast. **uni_fm**: both unicast network transmission and fm broadcast.
telnet usrpwd <username> <password>	Sets new login credentials.	

Command	Description	Parameters
telnet ver	Gets the current version number of the Telnet CLI command set.	Read Only. Returned Format: <major version>.<minor version>.<revision>
telnet exit	Disconnects the client from the Telnet server.	

VU Level Table

The VU level correspond to specific decibel ranges, and may cause issues when set too low or too high. Use the table below to pick an appropriate range for your venue's audio.

VU Level	Decibel Range	Note
11	>= +12	Overrange – '!' appears above meter
10	+9 to < +12	
9	+6 to < +9	
8	+3 to < +6	
7	0 to < +3	Indicated by marks at sides of meter
6	-3 to < 0	
5	-6 to < -3	
4	-9 to < -6	
3	-12 to < -9	
2	-15 to < -12	
1	-18 to < -15	
0	< -18	All bars turned off

Remote Control is not working over the hardwired Ethernet network

Note: If you have a network system administrator, please contact them first before attempting to troubleshoot the network yourself. The following steps are things you can try on a small, non-managed network.

Check the entire signal path between the control device (laptop or desktop computer) and the FM+ C. You can save some time by pinging the router and FM+ C. Pinging allows you to verify the wiring path without physically having to trace the wires themselves.

Write down the IP address of the FM+ C and the router. You can find the IP address of the FM+ C on the front screen of the device.

Make sure the FM+ C, Router, and any other devices that may be needed (such as an Ethernet switch) are all connected and powered on. You can save time tracing wiring/hardware paths with these next three steps:

Open a CMD window on the computer. (For example, on Windows 10 computers, in the search box, type “CMD”. A black box should come up and the cursor will be blinking.)

Type “ping” followed by a space, followed by the IP address of the FM+ C, and hit Enter. If you see a “reply from…[IP address]” this means the hard-wired Ethernet path is OK. If you see “request timed-out”, there is most-likely a break in the wiring path between the computer and the FM+ C.

Try pinging the IP address of the router. If you can get a “reply from…” the router, but not the FM+ C, the problem is either in the wiring between the router and FM+ C, or the FM+ C itself could be malfunctioning.

Check all of the wiring between the computer and the FM+ C. Make sure every device in the signal path is plugged in, connected, and powered on. Unplug and plug back in firmly all Ethernet cables in the path between the computer and the FM+ C. If you find one that was loose, plug it in and test the device connection again. If none are loose, try to replace the Ethernet cables.

Note: When checking connections, make sure the FM+ C Ethernet cable is plugged into one of the LAN ports on the router, not the WAN port.

If no loose cables were found, try re-booting in this order

the router

the computer

the FM+ C (turn it off for 10 seconds then turn it back on)

Wait at least two full minutes for the FM+ C to re-establish itself on the network. Then try testing the connection again.

Once you have verified that you can ping the FM+ C from the computer, open an internet browser on the computer. Type the IP address of the FM+ C into the address bar of the internet browser.

Verify the connection by logging into the FM+ C through the internet browser. If you can log into the web page, you are now connected to the FM+ C.

If you can make changes to the FM+ C initially, but then get disconnected, you may have to look at deeper network issues such as IP address conflicts, power issues, or even settings in the router.

Double check the FM+ C's IP address. If the router has restarted, the IP address may have changed.

Restore the FM+ C to factory settings. This will clear out any changes and allow you to start clean.

Directly connecting the FM+ C’s Ethernet cable to a PC to verify that the FM+ C and Ethernet cable are operational.

If you have tried all of these steps and still can’t connect, call Williams AV for additional troubleshooting help. Note that Williams AV cannot help in all cases, as there are many variables within networks.

Remote Control is not working over Wi-Fi

Note: If you have a network system administrator, please contact them first before attempting to troubleshoot the network yourself. If you don’t have a system administrator, the following steps are things you can try on a small, non-managed network.

This situation is most often caused by the mobile device losing connection to the router when the Wi-Fi on the mobile device has been turned off (or the Wi-Fi reception is unstable).

In order to perform these steps you will need the SSID of the router, the router Wi-Fi connection password, and the IP address of the FM+ C.

Make sure the FM+ C and Router are both ON.

Make sure the Ethernet cable going to the FM+ C is plugged into one of the LAN ports on the router (not the WAN port).

Is the mobile device connected to the Wi-Fi network? On the mobile device, go into the Wi-Fi Settings, and make sure Wi-Fi is turned on or enabled. More than one network may show up in the list of possible connections, depending upon how many possible Wi-Fi networks are nearby. If you don't see the network that is connected to the FM+ C in the list, make sure the router is on and broadcasting it's SSID.

If you see the desired router SSID in the list, connect to it by clicking on it. Usually there is a check mark or some other indication of which router/SSID you are connected to. You may need to enter the Wi-Fi password/passkey to the router to connect to it.

Once you have verified that you have connected the mobile device to the Wi-Fi network, exit the Wi-Fi settings on the mobile device (without shutting off the Wi-Fi) and open an internet browser. Type the IP address of the FM+ C into the address bar of the internet browser and hit the enter key. You should see the FM+ C login web page come up.

Verify the connection by changing a setting on the FM+ C through the internet browser. If you can change settings and get feedback on the web page (or verify the change on the front display of the FM+ C), you are now connected to and controlling the FM+ C.

Try re-booting in this order

the router

the computer

the FM+ C (turn it off for 10 seconds then turn it back on).

Wait at least two full minutes for the FM+ C to re-establish itself on the network. Then try testing the connection again.

If you can make changes to the FM+ C initially, but then lose that ability (get disconnected), you may have to look at deeper network issues such as IP address conflicts, power issues, or even settings in the router.

If there is interference, or low Wi-Fi signal on the mobile device, try moving the router to a better location.

Some mobile devices have known issues with certain routers. To fix this, you can investigate updating the operating system on the mobile device. Or, try a different mobile device just to verify that ANY wireless device can connect. If you can get one device connected, but not another, chances are the device that cannot connect has issues. A different brand/model of router may also fix the problem with certain devices not connecting.

You can try connecting a computer directly to the FM+ C with a standard Ethernet cable to verify that the Ethernet connection on the FM+ C is working. Once this has been verified you can place the FM+ C back on the network and begin troubleshooting back to the mobile Wi-Fi device.

Try connecting to the FM+ C using Wi-Fi on a laptop, rather than a mobile device, to verify that the mobile device is/is not the problem. If you can connect with a laptop, check the Wi-Fi settings on the mobile device and make sure Wi-Fi is turned on.

You can try restoring the FM+ C to factory settings. This will clear out any changes and allow you to start clean.

If you have tried all of these steps and still can't connect, call Williams AV for additional troubleshooting help. Note that Williams AV cannot help in all cases, as there are many variables within networks.