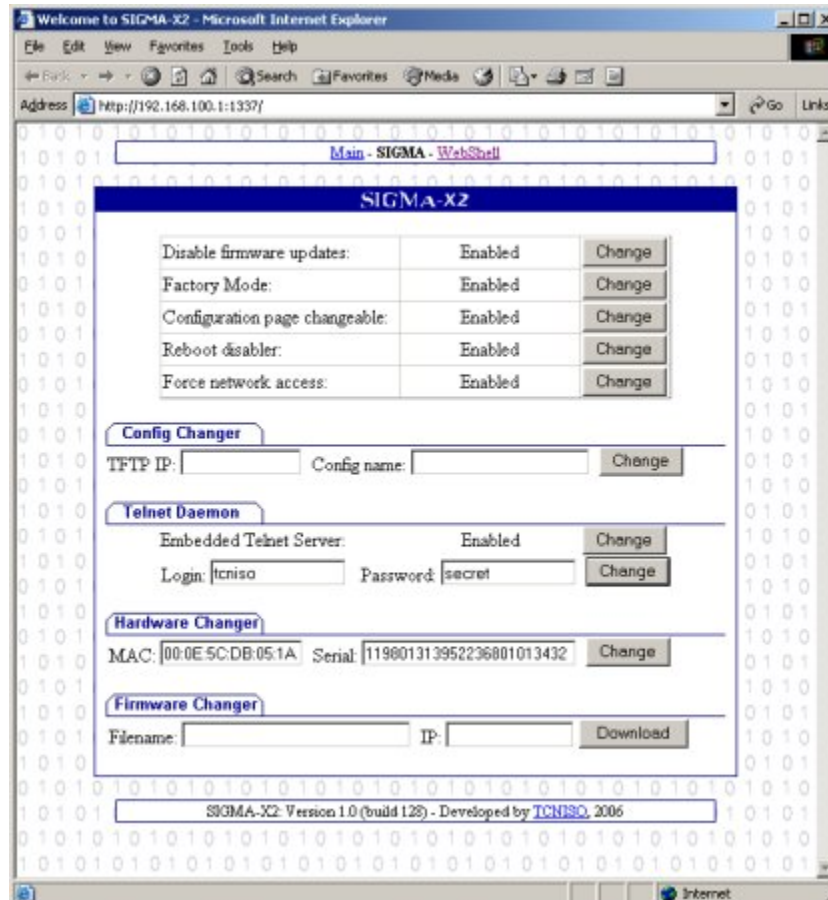


SIGMA-X2

Welcome to SIGMA-X2, a firmware modification for the SB5100 cable modem. Built on the stable SIGMA core, X2 takes advantage of many of the features of a SB5100, such as DOCSIS 2.0 support. With SIGMA-X2 installed, your cable modem will be enhanced to allow you to control and interact with your modem as you desire.

Features



The following features are available in SIGMA-X2 (build 128):

Sigma HTTPD (shown above)

To interact with SIGMA, you can use the built in web server (which is different than the normal one that you may be used to). To do so, you can connect to the SIGMA web server at this address: <http://192.168.100.1:1337/>

CatTel

CatTel is TCNISO's own Telnet server that allows you to use a Telnet client to connect and administer commands via an easy to use shell prompt. This feature also includes a login and password security feature (which can be set on the web page). To use CatTel, type "Telnet 192.168.100.1" from the console prompt, and type in the login and password you set on the web page.

WebShell

Using the built in WebShell, you can execute single commands that require no input. After you execute a shell command, the page will refresh and display the result.

Embedded Symbol Table

SIGMA-X2 was built on a symbol table of over 1700 entries. Over 200 of these defined functions have been hand picked and embedded into the core operating system of the firmware. This allows you to interface with the modem using VxWorks commands that you may already be familiar with. In this release, we have also included a list of the 271 functions that are embedded.

Intelligent Config Changer

SIGMA-X2 has the ability to change the modem's registration by incorporating a feature known as the config changer. Using this feature you can change the configuration file name and/or TFTP IP that the modem will use when attempting to register with the CMTS. If you do not specify either a TFTP IP or configuration name, then SIGMA-X2 will use the default one provided by the CMTS.

Media Access Control (MAC) Changer

Using this feature, you can change both the HFC MAC address (used to identify and provision your cable modem) and serial number of your cable modem. To change the MAC address (also known as the HFC MAC), type your new MAC into the box with the following format: 00:01:02:03:04:05. To change the serial number, type in a 15-digit numeric number.

Integrated Firmware Changer

SIGMA-X2 includes a very useful feature that allows you to upgrade to any non-signed firmware image (this is usually signified by the firmware name ending with ".bin"). To use this feature, start a TFTP server with the firmware image you want to upload in the base directory and then type the TFTP IP (of your server) and firmware filename into the text boxes on the SIGMA web interface. Finally, click the "download" button to begin the upgrade process.

Disable Firmware Updates

Many times, service providers will want to force all cable modems connected to them to have a specific firmware version. Using SIGMA-X2, you can prevent them from doing this by changing this feature to: "Enabled". This will block updates that are initiated via startup configuration file and SNMP, but will not affect the integrated firmware changer.

Factory Mode

This feature allows you to enable/disable the Surfboard Factory Mode, a feature that allows you to modify many of the cable modems parameters using SNMP. More information about this feature is discussed in Chapter 21 of "Hacking the Cable Modem".

Configuration Page Changeable

This feature allows you to make the configuration page (<http://192.168.100.1/config.html>) changeable, allowing you to change the downstream frequency, channel ID, and frequency plan (allows you to use SIGMA-X2 on a EuroDOCSIS network).

Reboot Disabler

When this feature is enabled, the modem's reset function will quit instead of resetting the modem. This feature can come in very handy.

Force Network Access

This popular feature from SIGMA-X has now been included in SIGMA-X2. The purpose of this feature is to gain network access without authorization.

Many features of SIGMA-X2 that are not visible on the SIGMA webpage are available using the Shell API. The Shell API is a programming object in SIGMA-X2 that allows you to communicate with your modem using a list of commands. These commands can be executed from the console shell, Telnet shell, or WebShell, with the exception that some commands (those that need input) can not be executed from the WebShell. Some commands can be executed "as-is", while others will require specific parameters (input).

The following is a short list of the commands in the Shell API. The command is listed, along with the usage (think syntax), availability (where and when it can be executed), and description.

Command: download

Usage: download();

Availability: console (type shell)/Telnet

Description: Prompts user for a TFTP IP address, and filename then begins a firmware update. After the update is complete, you will need to reboot your modem, either with the reboot command or by manually unplugging your modem.

Command: FlashFromTftp

Usage: FlashFromTftp(FirmwareName as string, TftpIp as string);

Availability: console (type shell)/Telnet/WebShell

Description: Begins a firmware update from specific parameters. This command is similar to the download command except you need to specify the firmware settings. An example of this command is: FlashFromTftp("Firmware.bin","192.168.100.10");

Command: exec

Usage: exec(command as string);

Availability: console (type shell)/Telnet/WebShell

Description: Executes a command from a string. This command is only useful while programming as you can execute any command string from any shell interface.

Command: ShowHfcMac

Usage: ShowHfcMac();

Availability: console (type shell)/Telnet/WebShell

Description: Prints the current HFC MAC address.

Command: ShowSerial

Usage: ShowSerial();

Availability: console (type shell)/Telnet/WebShell

Description: Prints the current serial number of the modem.

Command: addSym

Usage: addSym(SymName as string, SymLocation as HexAddress);

Availability: console (type shell)/Telnet/WebShell

Description: Adds a symbolic name (such as a function) to the symbol table with the execution type. For example, the command:

AddSym("GetSoftwareName",0x801BE2B8);

will add the symbol GetSoftwareName, thus when you enter GetSoftwareName(); at the command line it will execute the function located at the address: 0x801BE2B8.

Command: reboot

Usage: reboot();

Availability: console (type shell)/Telnet/WebShell

Description: Immediately reboots the modem. To do this command in the native console, type "reset". However, this function will be useless if you disable the resets on the web page.

Command: ShowSigmaCfg

Usage: ShowSigmaCfg();

Availability: console (type shell)/Telnet/WebShell

Description: Will print the settings from the SIGMA configuration settings. This information includes the TFTP IP, TFTP CFG, and configuration flags.

Command: d

Usage: d(Address as HexAddress, optional HalfWords as integer);

Availability: console (type shell)/Telnet/WebShell

Description: Will display the memory at a given address. For example, the command:

d(0x80010000,4); will display 8 bytes (4 half words) at the DRAM address: 0x80010000.

***Tip:** To stop the scanning process, connect to the Broadcom shell (via Telnet/console) and type "cd docsis_ctl", then "scan_stop".*

More commands and definitions will be available in the next release. Stay tuned!

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