Avocent® ACS6000 Advanced Console Server

Installer/User Guide

Technical Support Site

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures. Visit https://www.VertivCo.com/en-us/support/ for additional assistance.

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1 INTRODUCTION

The Avocent® ACS6000 advanced console server is a 1U appliance that serves as a single point for access and administration of connected devices, such as target device consoles, modems and power devices. Console servers support secure remote data center management and out-of-band management of IT assets from any location worldwide.

NOTE: Unless noted, references to a console server refer to all models in the 60XX series.

Console servers provide secure local (console port) and remote (IP and dial-up) access. The console servers run the Linux® operating system with a persistent file system in Flash memory, and can be upgraded from either FTP or a DSView™ 4 management software server.

NOTE: Unless otherwise noted, all references to DSView software in this document refer to version 4 or greater.

Multiple administrators can be logged into the console server at the same time and can use the web manager, the Command Line Interface (CLI utility) or DSView software to access and configure the console server.

One USB port supports modem (V.92), storage devices and USB hubs. Two fast Ethernet ports support connections to more than one network or configuration of Ethernet bonding (failover) for redundancy and greater reliability. For dial-in and secure dial-back with Point-to-Point Protocol (PPP), optional internal modems can be factory installed, or you can use external modems.

1.1 Features and Benefits

1.1.1 Access options

Secure access is available through the following local (analog console port) and remote (digital IP and dial-up) options:

- LAN/WAN IP network connection.
- Dial-up to a factory-configured internal modem (optional), a modem connected either to a serial port or the AUX port (which is only possible when an internal modem is not installed) or in the USB port.
- Target device connection. An authorized user can make a Telnet, SSH v1, SSH v2 or Raw connection to a target device. For Telnet or SSH to be used for target device connections, the Telnet or SSH service must be configured in the Security Profile that is in effect.
- Console server console connection. An administrator can log in either from a local terminal or from a computer with a terminal emulation program that is connected to the console port and can use the CLI utility. The CLI utility prompt (--|- cli>) displays at login.

More than one administrator can log into the console server and have an active CLI or web manager session. All sessions receive the following warning message when the configuration is changed by another administrator or by the system: *The appliance configuration has been altered from outside of your session*. Upon receipt of this message, each administrator needs to verify that changes made during the session were saved.

1.1.2 Web manager

Users and administrators can perform most tasks through the web manager (accessed with HTTP or HTTPS). The web manager runs in Microsoft® Internet Explorer®, Mozilla®Firefox®, and Google® Chrome®

on any supported computer that has network access to the console server. The list of supported client browsers and their versions are available in the release notes.

1.1.3 IPv4 and IPv6 support

The console server supports dual stack IPv4 and IPv6 protocols. The administrator can use the web manager or CLI to configure support for IPv4 addresses only or for both IPv4 and IPv6 addresses. The following list describes the IPv6 support provided in the console server:

- DHCP
- Dial-in and dial-out sessions (PPP links)
- DSView software integration
- eth0 and eth1 Ethernet interfaces
- Firewall (IP tables)
- HTTP/HTTPs
- Linux kernel
- Remote authentication: Radius, Tacacs+ and LDAP servers
- SNMP
- SSH and Telnet access
- Syslog server

NOTE: Remote authentication NFS and IPSec are not supported with IPv6.

1.1.4 Flexible users and groups

An account can be defined for each user on the console server or on an authentication server. The admin and root users have accounts by default, and either can add and configure other user accounts. Access to ports can be optionally restricted based on authorizations an administrator can assign to custom user groups. For more information, see Users Accounts and User Groups on page 56.

1.1.5 Security

Security profiles determine which network services are enabled on the console server. Administrators can either allow all users to access enabled ports or allow the configuration of group authorizations to restrict access. You can also select a security profile, which defines which services (FTP, ICMP, IPSec, SNMP and Telnet) are enabled and SSH and HTTP/HTTPS access. The administrator can select either a preconfigured security profile or create a custom profile. For more information, see Security on page 20.

1.1.6 Authentication

Authentication can be performed locally, with One Time Passwords (OTP), a remote LDAP, RADIUS, TACACS+ authentication server or a DSView server. The console server also supports remote group authorizations for the LDAP, RADIUS and TACACS+ authentication methods. Fallback mechanisms are also available.

Any authentication method configured for the console server or the ports is used for authentication of any user who attempts to log in through Telnet, SSH or the web manager. For more information, see Authentication on page 54.

1.1.7 VPN based on IPSec

If IPSec is enabled in the selected security profile, an administrator can use the VPN feature to enable secure connections. IPSec encryption creates a secure tunnel for dedicated communications between the console server and other computers that have IPSec installed. ESP and AH authentication protocols, RSA Public Keys and Shared Secret are supported. For more information, see IPSec (VPN) on page 32.

1.1.8 Packet filtering

An administrator can configure a console server to filter packets like a firewall. Packet filtering is controlled by chains, which are named profiles with user-defined rules. The console server filter table contains a number of built-in chains that can be modified but not deleted. An administrator can also create and configure new chains.

1.1.9 SNMP

If SNMP is enabled in the selected security profile, an administrator can configure the Simple Network Management Protocol (SNMP) agent on the console server to answer requests sent by an SNMP management application.

The console server SNMP agent supports SNMP v1/v2 and v3, MIB-II and Enterprise MIB. For more information, see SNMP Configuration on page 39.

NOTE: The text files with the Enterprise MIB (ACS6000-MIB.asn) and the TRAP MIB (ACS6000-TRAP-MIB.asn) are available in the appliance under the /usr/local/mibs directory.

1.1.10 Data logging, notifications, alarms and data buffering

An administrator can set up data logging, notifications and alarms to alert administrators of problems with email, SMS, SNMP trap or DSView software notifications. An administrator can also store buffered data locally, remotely or with DSView management software. Messages about the console server and connected servers or devices can also be sent to syslog servers.

1.1.11 Power management

The console server enables users who are authorized for power management to turn power on, turn power off and reset devices plugged into a connected power distribution unit (PDU). The power devices can be connected to any serial port or to the AUX/Modem port (if an internal modem is not installed). For more information, see Power Management on page 66.

1.1.12 Auto discovery

An administrator can enable auto discovery to find the hostname of a target connected to a serial port. Auto discovery's default probe and answer strings have a broad range. An administrator can configure site-specific probe and answer strings. Auto discovery can also be configured through the DSView software.

1.1.13 FIPS module

The 140 series of Federal Information Processing Standards (FIPS) are U.S. government computer security standards that specify requirements for cryptography modules.

The console server uses an embedded cryptographic module that is based on the FIPS 140-2 validated cryptographic module(s) (certificate number 1747) running on a Linux PPC platform. For more information, see FIPS module on page 21.

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2 INSTALLATION

2.1 Getting Started

Before installing your ACS6000 console server, refer to the following list to ensure you have all items that shipped with it , as well as other items necessary for proper installation.

2.1.1 Supplied with the console server

- Quick Installation Guide (QIG)
- Power Cord
- RJ-45 to RJ-45 straight-through CAT 5 cable
- RJ-45 to DB-9F cross adaptor
- DB-25 loop-back plug
- RJ-45 to DB-25M cross adaptor
- RJ-45 to DB-25F cross adaptor
- RJ-45 to DM-25M straight-through cable
- Mounting brackets, screws and cord retention clips
- Keyhole mounting kit
- Software License Agreement
- Safety Sheet

2.1.2 Additional items needed

If you are configuring the console server in a standalone configuration, you will also need the following items:

- One or more RJ-45 to RJ-45 CAT 5 straight-through cables
- An RJ-45 to DB-9F straight-through adaptor
- A PC running a terminal emulation program

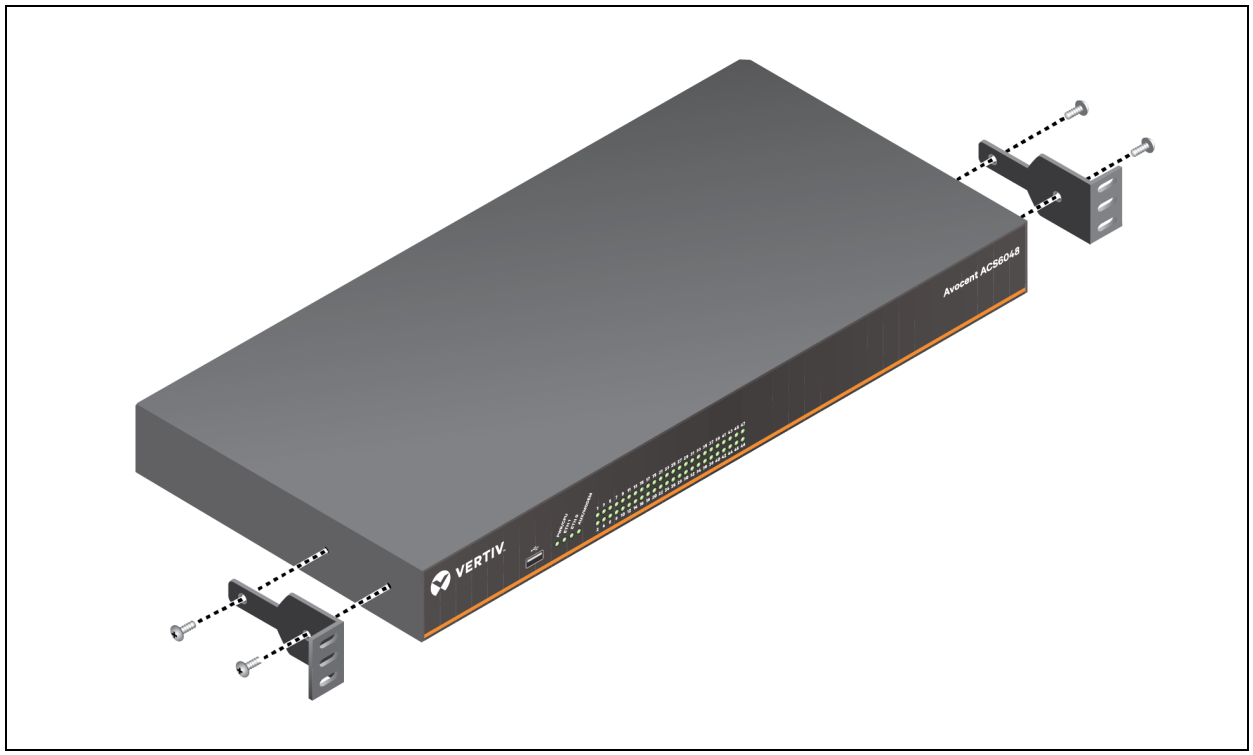
2.2 Rack Mounting

You can mount the console server in a rack or cabinet, or place it on a desktop or other flat surface. For rack or cabinet mounting, two mounting brackets are supplied.

To rack mount a console server:

1. Install the brackets at the front or back edges of the console server with the screws provided with the mounting kit.
2. Mount the console server in a secure position.

Figure 2.1 Bracket Connections for Front Mount Configuration



2.3 Connecting the Hardware

The following figure shows the connectors on the ACS6000 console server.

Figure 2.2 ACS6000 Advanced Console Server Configuration

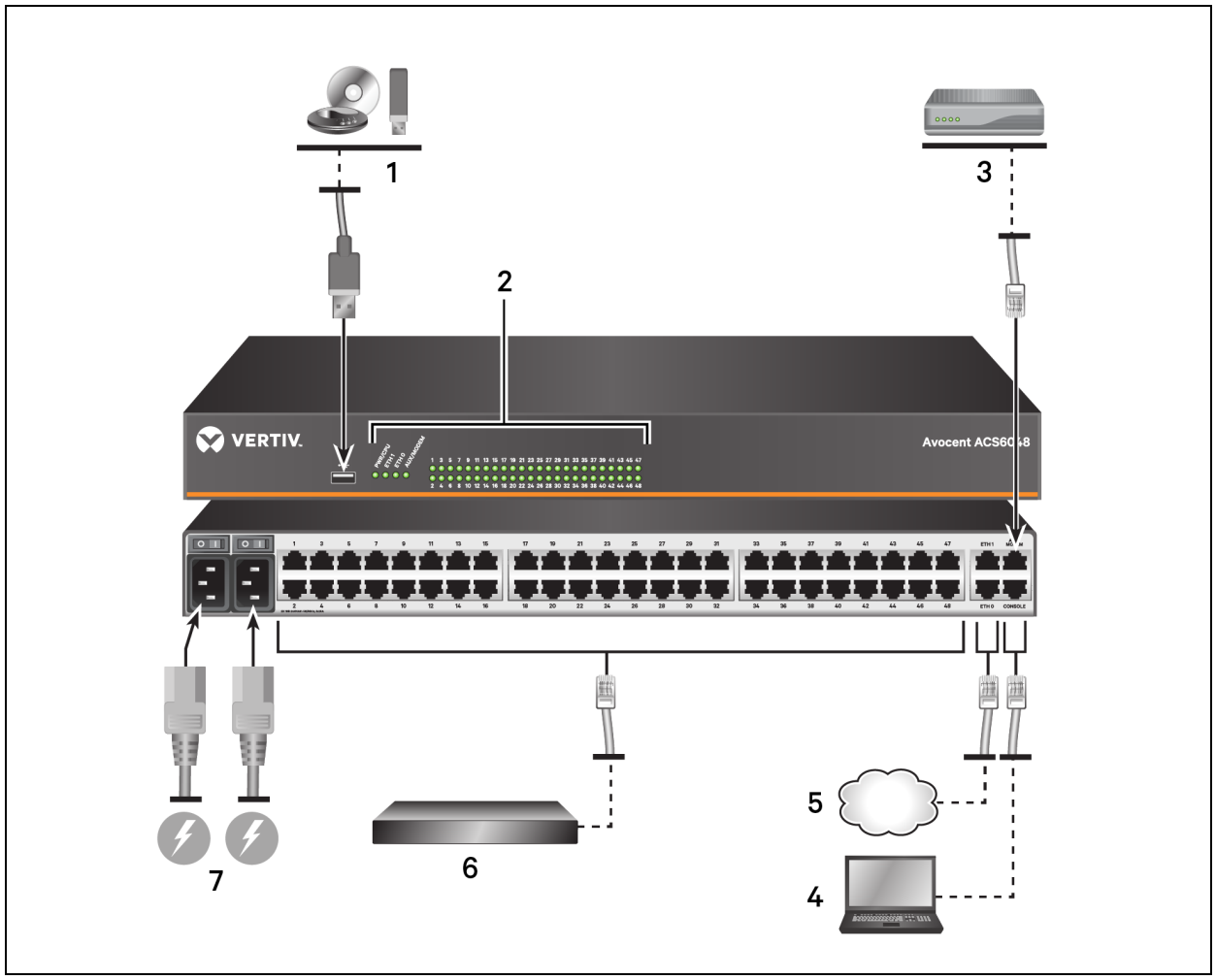


Table 2.1 ACS6000 Advanced Console Server Configuration Descriptions

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	USB connector.	5	ETH0/ETH1 ports. Two 10/100M/1G Ethernet ports used for remote IP access. The second port can be connected to a second network or used for failover.
2	LEDs. See the following table for individual LED descriptions.	6	Serial ports.
3	AUX/Modem port. If an optional internal modem is ordered, this port is defined as a V.92 modem at the factory; otherwise the port is factory-defined as RS-232 with an RJ45 ACS console server pinout and can be used to connect either an external modem or a power device.	7	Power supplies (dual AC shown).
4	CONSOLE port. Allows for local administration access to connected devices through a terminal or a computer with a terminal emulator.		

Table 2.2 LEDs on the Console Server Front

LABEL	DESCRIPTION
PWR/CPU	• Blue Blinks - During unit boot • Solid Blue - During operation • Off - Power is off
ETH 0/ETH 1	• Violet - Link at 10BaseT speed • Yellow - Link at 100BaseT speed • Green - Link at 1000BaseT speed • Off - No link/cable disconnected/Ethernet fault
AUX/MODEM	Dual LED: Yellow on top, green on bottom • Yellow - DTR/DCD activity • Green - TXD and RXD activity • Off - No activity
[One LED for each serial port]	• Amber - Data buffering is enabled and/or a Telnet or SSH session is active on the port. • Green - Activity on the port. • Off - No activity, connection or data buffering.

2.3.1 Connecting device consoles or modems to serial ports

Use CAT5 or greater cables and DB9 or DB25 console adaptors as needed to connect target device consoles or modems to the serial ports on the console server.

The console server supports the Cisco® serial port pinout configuration, which is disabled by default. If a Cisco cable is connected to a port, an administrator must enable the Cisco pinout for the port. An administrator can select *Expert - Ports - Serial Ports - (SetCAS or SetPower) - Physical* to open the Physical Settings screen, then check *Enable Cisco RJ Pin-Out*.

The following tables show serial port pinout information.

Table 2.3 ACS Console Server Serial Port Pinout

PIN NO.	SIGNAL NAME	INPUT/OUTPUT
1	RTS	OUT
2	DTR	OUT
3	TxD	OUT
4	GND	N/A
5	CTS	IN
6	RxD	IN
7	DCD/DSR	IN
8	Not Used	N/A

Table 2.4 Cisco Serial Port Pinout

PIN NO.	SIGNAL NAME	INPUT/OUTPUT
1	CTS	IN
2	DCD/DSR	IN
3	RxD	IN
4	GND	N/A
5	Not Used	N/A
6	TxD	OUT
7	DTR	OUT
8	RTS	OUT

To connect devices, modems and PDUs to serial ports:

Make sure the crossover cable used to connect a device has the same pinout type that is configured in the software for the port (either Cyclades or Cisco).

1. Make sure the devices to be connected are turned off.
2. Use CAT 5 or greater crossover cables to connect the devices to the console server, using an adaptor, if necessary.
3. To connect modems, use straight-through CAT 5 or greater cables, with an appropriate connector or adaptor (USB, DB-9 or DB-25) for the modem.

NOTE: To comply with EMC requirements, use shielded cables for all port connections.

WARNING! Do not turn on the power on the connected devices until after the console server is turned on.

To daisy chain PDUs to a console server:

This procedure assumes that you have one PDU connected to a serial port on a console server.

NOTE: Daisy chaining is not possible with SPC PDUs. ServerTech PDUs will allow only one level (Master and Slave) of daisy chaining.

1. Connect one end of a UTP cable with RJ-45 connectors to the OUT port of the connected PDU.
2. Connect the other end of the cable to the IN port of the chained PDU. Repeat both steps until you have connected the desired number of PDUs.

NOTE: For performance reasons, Avocent recommends connecting no more than 128 outlets per serial port.

2.4 Turning On the Console Server

The console server is supplied with single or dual AC or DC power supplies.

WARNING! Always execute the shutdown command through the web manager, CLI or DSView software under the Overview/Tools node before turning the console server off, then on again. This will ensure the reset doesn't occur while the file system in Flash is being accessed, and it helps avoiding Flash memory corruptions.

2.4.1 AC power

To turn on a console server with AC power:

1. Make sure the console server is turned off.
2. Plug the power cable into the console server and into a power source.
3. Turn the console server on.
4. Turn on the power switches of the connected devices.

NOTE: By default, dual power supply units require both supplies to be plugged in; otherwise an audible alarm will sound when the console server is turned on. This feature can be disabled from the web manager.

To disable the dual power supply audible alarm:

1. From the sidebar of the *Expert* tab, click *Events and Logs - Sensors*.
2. Use the drop-down menu to *Disable* the Dual Power Supply Fault Audible Alarm.

2.4.2 DC power

DC power is connected to DC-powered console servers by way of three wires: Return (RTN), Ground (GND) and -48 VDC.

WARNING! It is critical that the power source supports the DC power requirements of your console server. Make sure that your power source is the correct type and that your DC power cables are in good condition before proceeding. Failure to do so could result in personal injury or damage to the equipment.

The following diagram shows the connector configuration for DC power.

Figure 2.3 DC Power Connection Terminal Block

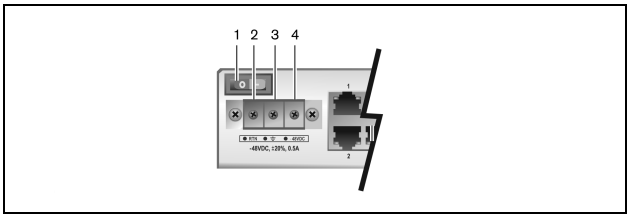


Table 2.5 DC Power Connection Details

NUMBER	DESCRIPTION	NUMBER	DESCRIPTION
1	Power switch	3	GND (Ground)
2	RTN (Return)	4	-48 VDC

To turn on a console server with DC power:

1. Make sure the console server is turned off.
2. Make sure DC power cables are not connected to a power source.
3. Remove the protective cover from the DC power block by sliding it to the left or right.
4. Loosen all three DC power connection terminal screws.

5. Connect your return lead to the RTN terminal, your ground lead to the GND terminal and your -48 VDC lead to the -48 VDC terminal and tighten the screws.
6. Slide the protective cover back into place over the DC terminal block.
7. If your console server has dual-input DC terminals, repeat steps 3-6 for the second terminal.
8. Connect the DC power cables to the DC power source and turn on the DC power source.
9. Turn on the console server.
10. Turn on the power switches of the connected devices.

2.5 Configuring a Console Server

A console server may be configured at the appliance level through the command line interface accessed through the CONSOLE or Ethernet port. All terminal commands are accessed through a terminal or PC running terminal emulation software.

NOTE: To configure using DSView software, see the DSView Software Installer/User Guide. To configure using the console server's web manager, see Chapter 3. To configure using Telnet or SSH, see the ACS6000 Command Reference Guide.

To connect a terminal to the console server:

1. Using a null modem cable, connect a terminal or a PC that is running terminal emulation software (such as HyperTerminal®) to the CONSOLE port on the back panel of the console server. An RJ-45 to DB9 (female) cross adaptor is provided.

   The terminal settings are 9600 bits per second (bps), 8 bits, 1 stop bit, no parity and no flow control.

2. Turn on the console server. When the console server completes initialization, the terminal will display the login banner plus the login prompt.

2.5.1 Using Telnet or SSH

An authorized user can use a Telnet or SSH client to make a connection directly to the console of a device if all of the following are true:

The Telnet or SSH:

- protocol is enabled in the selected security profile
- protocol is configured for the port
- client is available, and it is enabled on the computer from which the connection is made

To use Telnet to connect to a device through a serial port:

For this procedure, you need the username configured to access the serial port, the port name (for example, 14-35-60-p-1), device name (for example, ttyS1), TCP port alias (for example, 7001) or IP port alias (for example, 100.0.0.100) and the hostname of the console server or its IP address.

To use a Telnet client, enter the information in the dialog boxes of the client.

-or-

To use Telnet in a shell, enter the following command:

```
#telnet [hostname | IP address]
login: username:[portname | device name]
-or-
#telnet [hostname | IP address] TCP Port Alias
login: username
-or-
#telnet IP Port Alias
login: username
```

To close a Telnet session:

Enter the Telnet hotkey defined for the client. The default is **Ctrl]** + **q** to quit, or enter the text session hotkey for the CLI prompt and then enter **quit**.

To use SSH to connect to a device through a serial port:

For this procedure, you need the username configured to access the serial port, the port name (for example, 14-35-60-p-1), TCP port alias (for example, 7001), device name (for example, ttyS1), and the hostname of the console server, IP address or IP Port alias (for example, 100.0.0.100).

To use an SSH client, enter the information in the dialog boxes of the client.

-or-

To use SSH in a shell, enter the following command:

```
ssh -l username:port_name [hostname | IP_address]
-or-
ssh -l username:device_name [hostname | IP_address]
-or-
ssh -l username:TCP_Port_Alias [hostname | IP_address]
-or-
ssh -l username IP_Port_Alias
```

To close an SSH session:

At the beginning of a line, enter the hotkey defined for the SSH client followed by a period. The default is ~. Or, enter the text session hotkey for the CLI prompt and then enter **quit**.

3 ACCESSING THE CONSOLE SERVER VIA THE WEB MANAGER

Once you've connected your ACS6000 console server to a network, you can access the console server with its web manager. The web manager provides direct access to the console server via a graphical user interface instead of a command-based interface.

NOTE: For instructions on accessing the console server via the CLI or DSView software see the Cyclades ACS6000 Command Reference Guide or the DSView Software Installer/User Guide.

3.1 Web Manager Overview for Administrators

NOTE: For an overview of the web manager for regular users, see Web Manager Overview for Regular Users on page 70.

To log into the web manager:

1. Open a web browser and enter the console server IP address in the address field.
2. Log in as either **admin** with the password **avocent** or as **root** with the password **linux**.

The following figure shows a typical web manager screen for an administrator.

Figure 3.1 Administrator Web Manager Screen

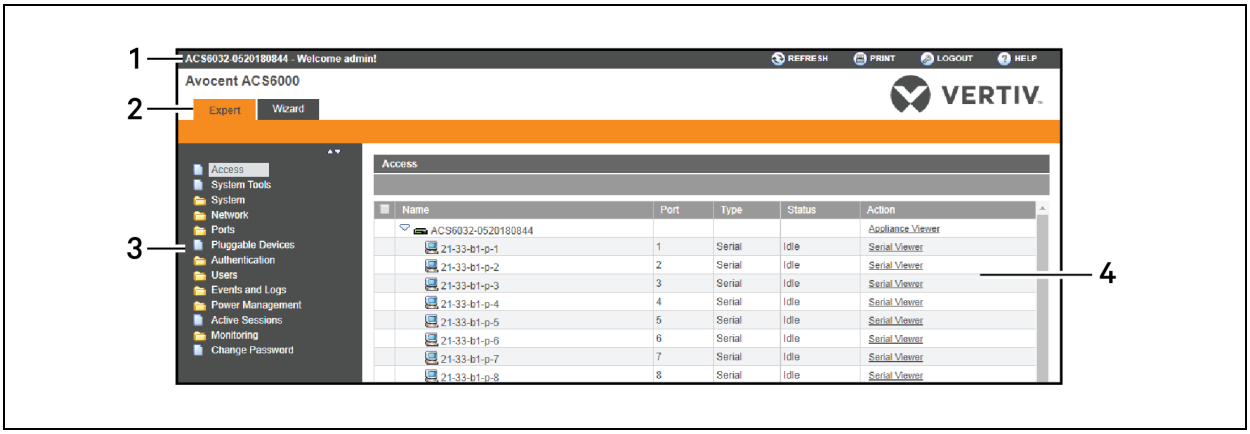


Table 3.1 Web Manager Screen Areas

NUMBER	DESCRIPTION
1	Top option bar. The name of the applianceand of the logged in user appear on the left side. Refresh, Print, Logout and Help buttons appear on the right.
2	Tab bar. Displays whether the admin is in Expert or Wizard mode.
3	Side navigation bar. Menu options for configuration, viewing of system information and access to devices. The options change based on user rights.
4	Content area. Contents change based on the options selected in the side navigation bar.

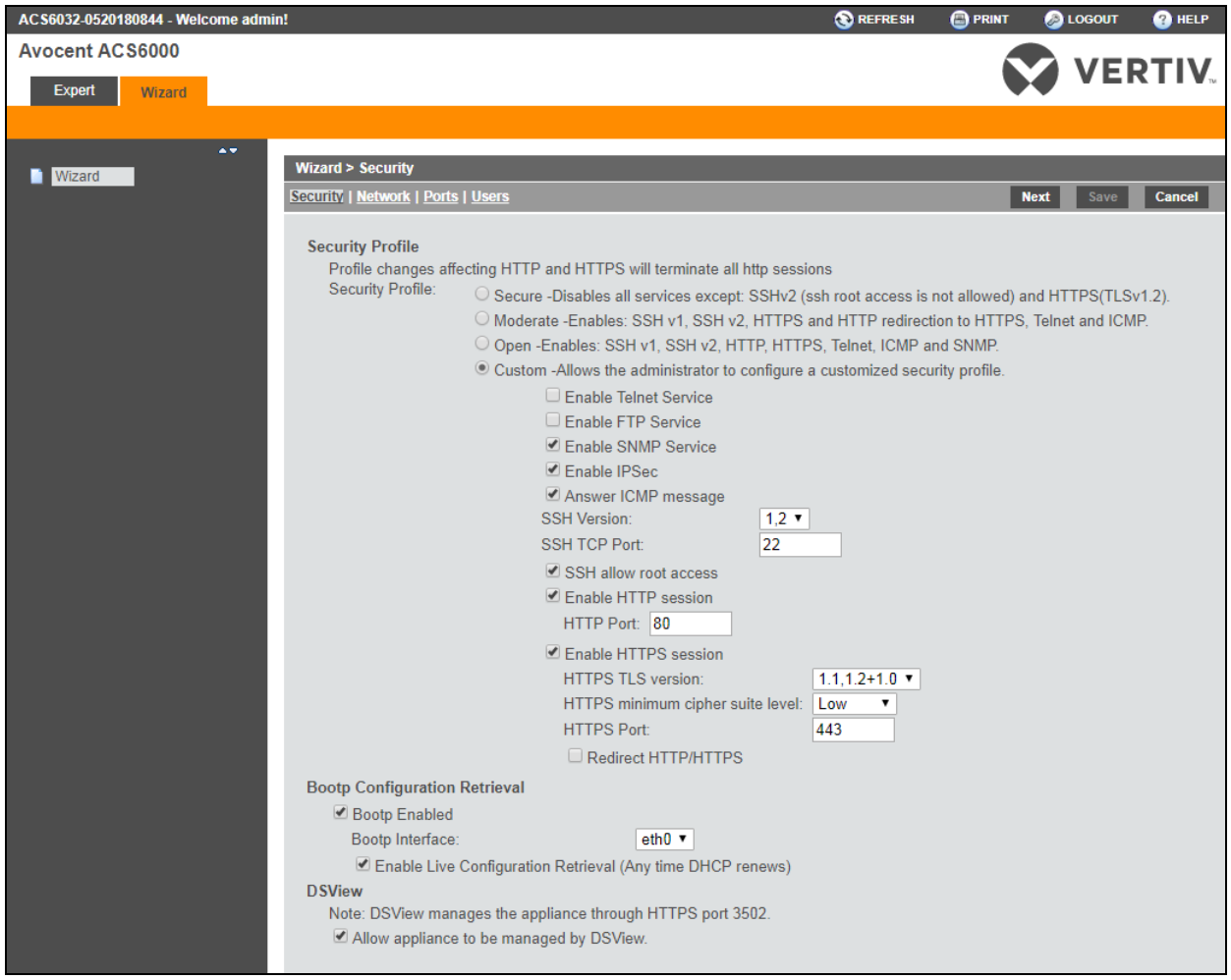
3.2 Wizard Mode

The Wizard mode is designed to simplify the setup and configuration process by guiding an administrator through the configuration steps. An administrator can configure all ports in the CAS Profile and set the Security Profile, Network and Users Settings using the Wizard.

By default, the first time an administrator accesses the console server through the web manager, the Wizard will be displayed. Subsequent log-ins will open in Expert mode, and once the console server has been configured, Expert mode becomes the default mode. An administrator can toggle between Expert and Wizard modes by clicking the tab bar on the web manager administrator screen.

The following image shows a typical screen when an administrator is in Wizard mode.

Figure 3.2 Wizard Screen



The following procedures describe how to configure the console server from the Wizard.

To configure security parameters and select a Security Profile:

1. Select the *Security* link in the content area.
2. Select the desired Security Profile. If using a Custom Security Profile, click the checkboxes and enter values as needed to configure the services, SSH and HTTP and HTTPS options to conform with your site security policy.
3. Under the Bootp Configuration Retrieval heading, uncheck the box(es) to disable Bootp configuration retrieval and/or live configuration retrieval.
4. If you are not using DSView software to manage the appliance, uncheck the *Allow Appliance to be Managed by DSView* box.
5. Click *Next* to configure the Network or click the *Network*, *Ports* or *Users* link to open the appropriate screen.

To configure network parameters:

1. Select the *Network* link in the content area.
2. Enter the Hostname, Primary DNS and Domain in the appropriate fields.

3. Select the IPv4 or IPv6 method for the eth0 interface. If using Static, enter the Address, Mask and Gateway in the appropriate fields.
4. Enable or disable IPv6 support.
5. Click *Next* to configure ports or click on the *Security*, *Ports* or *Users* link to open the appropriate screen.

To configure Ports:

1. Select the *Ports* link in the content area.
2. Check the box(es) to enable all ports and/or to enable Cisco RJ45 Pin-Out to change the pin-out when a Cisco cable is connected.
3. Use the appropriate drop-down menus to select the values for Speed, Parity, Data Bits, Stop Bits, Flow Control, Protocol, Authentication Type and Data Buffering Status.
4. Select the Data Buffering Type. If using NFS, enter the NFS Server and NFS Path information in the appropriate fields.
5. Click *Next* to configure users or click on the *Network*, *Security* or *Users* link to open the appropriate screen.

To configure users and change the default user passwords:

WARNING! For security reasons, it is recommended you change the default password for both root and admin users immediately.

1. Select the *Users* link in the content area.
2. Click a username (*admin* or *root*) and enter the new password in the Password and Confirm Password fields.
3. -or-
4. Click *Add* to add a user. Enter the new username and password in the appropriate fields.
5. (Optional) To force the user to change the default password, select the *User must change password at next logi*n checkbox.
6. Assign the user to one or more groups.
7. (Optional) Configure account expiration and password expiration.
8. Click *Next*.
9. Repeat steps 3-7 as needed to configure new user accounts and assign them to default groups.

NOTE: By default, all configured users can access all enabled ports. Additional configuration is needed if your site security policy requires you to restrict user access to ports.

10. Click *Save*, then click *Finish*.

3.3 Expert Mode

The following tabs are available in the side navigation bar of the web manager when an administrator is in Expert mode.

3.4 Access

Click *Access* to view all the devices connected to the console server.

To view and connect to devices using the web manager:

1. Select *Access* in the side navigation bar. The content area displays the name of the console server and a list of names or aliases for all installed and configured devices the user is authorized to access.
2. Select *Serial Viewer* from the Action column. A Java® applet viewer appears. In a gray area at the top of the viewer, the *Connected to* message shows the IP address of the console server followed by the default port number or alias.
3. Log in if prompted.

The following table describes the available buttons in the Java applet.

Table 3.2 Java Applet Buttons for Connecting to the Console Server

BUTTON	PURPOSE
SendBreak	To send a break to the terminal
Disconnect	To disconnect from the Java applet
	Select the left icon to reconnect to the server or device; or select the right icon to end the session and disconnect from the Java applet

3.5 System Tools

Clicking *System Tools* displays system icons that can be used to perform the following tasks:

- Reboot or shut down the console server.
- Upgrade or restore the console server's firmware.
- Upgrade the console server's bootcode.
- Restore the console server to its factory configuration.
- Save the current configuration.
- Generate an MD5 tag for configuration integrity.
- Generate or download a certificate.
- Download a PKCS12 file for IPSec.
- Open a terminal session with the console server.

3.5.1 Upgrading firmware

The console server supports the storage of two firmware images. As the firmware is upgraded, the oldest image will be overwritten with the new firmware. The latest firmware can be downloaded from the Avocent website and saved to an File Transfer Protocol (FTP), Secure File Transfer Protocol (SFTP) or Session Control Protocol (SCP) server. It can also be saved to the user's local machine.

To view the console server's current firmware version, from the sidebar of the Expert tab, click *System-Information*.

To upgrade a console server's firmware:

1. From http://www.vertivco.com, browse to the product updates section and find the firmware for your console server.

2. Save the new firmware to an FTP, SFTP or SCP server or to your desktop.
3. From the sidebar of the console server's web manager, click *System Tools*, then click *Upgrade Firmware*.
4. Download the file from the server you selected in step 2.
    a. Click the radio button next to Remote Server, then use the drop-down menu to select the protocol of the server where you saved the file.
    b. In the appropriate field, enter the IP address for the server where the firmware is saved.
    c. In the appropriate fields, enter the username and password for the server.
    d. In the appropriate fields, enter the file directory where the firmware is saved and the filename for the firmware.

    -or-

    Download the file from your desktop by selecting *My Computer*.

    a. Type the filename for the new firmware or click *Browse* to open a window and browse to the file.
5. Click *Download*. The console server will download the firmware from the specified site and will display a message when the download is complete.
6. Click *Install*.
7. Once the new firmware is installed, reboot the console server.

NOTE: If the page after installation displays empty or blank values, there was not enough memory to upgrade the firmware. Reboot the console server and upgrade the firmware again.

3.5.2 Upgrading the bootcode

NOTE: A loss of power during a bootcode upgrade could render the console server inoperable.

To upgrade a console server's bootcode:

1. From http://www.vertivco.com, browse to the product updates section and find the firmware for your console server.
2. Save the new bootcode to an FTP, SFTP or SCP server or to your desktop.
3. From the sidebar of the console server's web manager, click *System Tools*, then click *Upgrade Bootcode*.
4. Download the file from the server you selected in step 2.
    a. Click the radio button next to Remote Server, then use the drop-down menu to select the protocol of the server where you saved the file.
    b. In the appropriate field, enter the IP address for the server where the firmware is saved.
    c. In the appropriate fields, enter the username and password for the server.
    d. In the appropriate fields, enter the file directory where the bootcode is saved and the filename for the bootcode.

    -or-

    Download the file from your desktop by selecting *My Computer*.

    a. Type the filename for the new bootcode or click *Browse* to open a window and browse to the file.

5. Click *Download*. The console server will download the bootcode from the specified site and will display a message when the download is complete.
6. Click *Install*.
7. Once the new bootcode is installed, reboot the console server.

3.5.3 Configuration files

An administrator can create a backup image of the console server's configuration. During creation, no changes should be made to the configuration. Upon completion, the console server will reboot. The backup configuration will reside inside the console server but must be downloaded before it can be used. Configuration files can be saved as a compressed file, CLI script or XML file.

To save the current configuration file:

1. From the sidebar of the Expert tab, click *System Tools*.
2. Click *Save Configuration*.
3. Use the drop-down menu to select the file format.
4. Upload the file to a remote server.
    a. Click the radio button next to Remote Server, then use the drop-down menu to select the protocol of the server where you saved the file.
    b. Enter the IP address for the server where the flle is saved in the appropriate field.
    c. Enter the username and password for the server in the appropriate fields.
    d. Enter the file directory where the configuration file is saved and the filename in the appropriate fields.

    -or-

    Save the file locally.

    a. Click the radio button next to Local File, then enter the filename.

    -or-

    Save the file to your computer by clicking the radio button next to My Computer. The file will be saved in your Downloads folder.
5. Click *Save*.

To restore a previous configuration:

1. From the sidebar of the Expert tab, click *System Tools*.
2. Click *Restore Configuration*.

3.5.4 Configuration Integrity

In order to ensure configuration integrity, the console server permits an administrator to generate and verify a digital signature (MD5) of the console server's configuration. The console server compares its MD5 checksum value against a known MD5 checksum value to verify its configuration and keep it protected from corruption.

An administrator can specify a running configuration as trusted and instruct the console server to generate an MD5 tag for the trusted configuration. An administrator can also verify the configuration by comparing it to another known or trusted configuration. The console server will declare the configuration to either be Unchanged or Modified after the verification is complete.

Configuration integrity works with and relies on the console server's saved and restored configuration files. It's also dependent on the zero-touch provisioning feature.

NOTE: In order to use configuration integrity, you must save the configuration using the compressed file option. The compressed file format captures more configuration data to ensure the accuracy of the configuration integrity results. Saving the configuration in either the CLI script or XML file formats will produce invalid configuration integrity results.

The console server generates an event notification each time an MD5 tag is generated. For more information about events, see Event List on page 64.

To generate an MD5 tag:

1. From the sidebar of the console server's web manager, click *System Tools* and then click *Configuration Integrity*.
2. Click the Generate MD5 Tag for the Running Configuration radio button and click *Execute*.

To verify an MD5 tag:

1. From the sidebar of the console server's web manager, click *System Tools* and then click *Configuration Integrity*.
2. Click the Verify Running Configuration radio button.
3. Leave the MD5 field blank to verify the running configuration.

   -or-

   Enter an MD5 checksum string to verify a known configuration.
4. Click *Execute*.

3.6 System

Click *System* to display information about the console server and allow an administrator to configure the console server's system parameters. The following tabs are listed under System in the side navigation bar.

3.6.1 Security

Security Profile

A Security Profile determines which services are enabled on the console server.

During initial configuration, the console server administrator must configure security parameters to conform with the site security policy. The following security features can be configured either in the web manager, CLI or the DSView software:

- Configure the session idle time-out
- Enable or disable RPC
- Ability to configure serial port access for all users, or allow the configuration of group authorizations to restrict access
- Select a Security Profile, which defines:
  - Enabled services (FTP, ICMP, IPSec, SNMP and Telnet)
  - SSH and HTTP/HTTPS access
  - Enable or disable Bootp Configuration retrieval

The administrator can select either a preconfigured Security Profile or create a custom profile.

All the services and the SSH and HTTP/HTTPS configuration options that are enabled and disabled for each Security Profile are shown in the Wizard - Security and the System - Security - Security Profile pages.

To configure a Security Profile:

1. Select *System - Security - Security Profile*.
2. In the Idle Timeout field, enter the number of minutes before the console server times out open sessions.

NOTE: This value applies to any user session to the appliance via HTTP, HTTPS, SSH, Telnet or CONSOLE port. It will not overwrite the value configured for the user's authorization group. The new idle time-out will be applied to new sessions only.

3. Under the Enabled Services section, enable or disable the *RCP* checkbox.
4. Under the Serial Devices heading, select whether port access is controlled by user group authorization or configure port access settings to apply to all users.
5. Under Bootp Configuration retrieval, enable or disable the service.
6. Select the checkbox for *Custom*, *Moderate*, *Open* or *Secure* under the Security Profile heading.
7. Enable/disable SSH authentication via username/password.
8. Click *Save*.

DSView software security

You can also configure DSView software security settings. When the console server is managed by the DSView software, the DSView server will supply the certificate to the console server. Under normal conditions, the DSView software will manage the certificate to clear and replace it with a new certificate as needed. If communication with the DSView software is lost, the DSView server will be unable to clear the certificate and the console server cannot be used. Click the *Clear DSView Certificate* button to configure the console server in Trust All mode.

To configure DSView software security settings:

1. Select *System - Security - DSView*.
2. Click the *Allow appliance to be managed by DSView* checkbox and click *Save*.

FIPS module

The console server uses an embedded cryptographic module that is based on the FIPS 140-2 validated cryptographic module(s) (certificate number 1747) running on a Linux PPC platform.

If an administrator enables the FIPS module, the console server will use the FIPS Object Module to perform encryption operations. The FIPS module is disabled by default.

When the FIPS module is enabled, the Monitoring - FIPS mode page will show what service (SSHv2, HTTPS, SNMPv3 and ADSAP2) is in FIPS mode. All security functions and cryptographic algorithms used by the service are performed in FIPS 140-2 Approved mode.

To enable the FIPS module:

1. Select *System - Security - FIPS 140*.
2. Check the box to Enable the FIPS 140-2 Module and click *Save*.

The console server will automatically reboot. During the reboot, the console server will erase SSH keys, update the configuration of HTTPD, SSHD, ADSAP2d and SNMPD files and test the integrity of the FIPS Object Module. Once the reboot is complete, the console server will accept SSH and HTTPS connections using only FIPS-approved ciphers.

When FIPS is enabled the following restrictions apply:

For SSH sessions:

Protocol version 1 will be disabled.

Triple-DES CBS and AES 128/192/256 are the only encryption ciphers that will be accepted.

HMAC-SHA1 and HMAC-SHA1-96 are the only message integrity algorithms that will be accepted.

Only RSA keys 1024 to 16384 bits will be accepted.

HTTPS sessions will accept only the SSL v 3.1(TLSv1) protocol to establish the SSL tunnel with one of the following encryption ciphers:

AES-256-SHA

AES-128-SHA

Triple DES SHA (DES-CBC3-SHA)

SNMP version 3 requests will be accepted when authentication is SHA and the encryption cipher is AES.

3.6.2 HTTPS Certificate

You can generate a new self-signed certificate or download a signed certificate to the appliance from an FTP server or from your desktop.

To generate a new self-signed certificate:

1. From the sidebar of the Expert tab, click *System Tools*.
2. Click *Generate / Download Certificate*.
3. To generate a new certificate, click the radio button next to Generate Self-Signed Certificate and enter the desired information in the self-signed certificate fields: Country, State/Province, City/Locality, Organization, Organization Unit, Common Name, Email Address and Netscape Comment.

   -or-

   To download a signed certificate from an FTP server, click the radio button next to Remote Server and enter all information about the FTP server: IP Address, Username, Password, File Directory and File Name.

   -or-

   To download a certificate from your desktop, click the radio button next to Download Certificate From My Computer, click *Choose File*, browse to where the file is saved and click *Open*.
4. Click *Generate/Download*. The certificate's information will be displayed.
5. Click *Apply*. The message shows *Applying the new certificate will terminate all HTTP/HTTPS sessions. The restart of your browser is required. Are you sure you want to continue?*

6. Click *OK* to continue. The certificate will be saved and the browser will restart to use the new certificate.

NOTE: All http/https sessions will close, and the user will need to re-establish the connection.

3.6.3 Bootp Configuration Retrieval

You can set your console server to be reconfigured during boot or at IP renewal.

To generate configuration to be retrieved:

1. Click *System Tools - Save Configuration* and save the configuration to either an FTP site or locally.

   -or-

   Use the list_configuration command to get the CLI template scripts, edit the configuration of the console server and save it as a text file.

   -or-

   Edit a file with CLI commands and save it.

2. Transfer the saved file to a DHCP server.
3. Configure the DHCP server to transfer the configuration file to the console server.

To reconfigure a console server with bootp:

1. Click *System - Security - Security Profile*. Under the Bootp Configuration Retrieval heading, ensure the box next to Enabled is checked.
2. Uncheck the box next to Enable Live Configuration. The saved configuration will be retrieved and applied on the next reboot.

   -or-

   Ensure the box next to Enable Live Configuration is checked. The saved configuration will be retrieved and applied on the next IP renewal.

NOTE: You must configure your DHCP server in order to transfer the configuration file to your console server.

Local console access

An administrator can disable access to the console server from its console port. Disabling the console port also prevents downgrading the console server firmware, although upgrading the firmware is still possible.

NOTE: Disabling the console port may make the console server inaccessible. It is recommended only experienced administrators perform this operation for security reasons.

To disable the console port:

1. From the sidebar of the *Expert* tab, click *System - Security - Security Profile*.
2. Under the Local Console Access heading, check the *Disable Console Port* box.
3. Click *Save*, then confirm you want to disable the console port.

NOTE: If the bootcode is not upgraded to version 2.0.3.0, the boot messages and access to the U-boot prompt will still be enabled. For more information on upgrading the bootcode, see Upgrading the bootcode on page 18.

Console port access recovery

An administrator can re-enable console access by unchecking the *Disable Console Port* box. However, if the console port is disabled and network access is lost, preventing opening a web UI or CLI session, access to the console port can still be recovered.

After four partial reboots, a fifth reboot that is completed will reset the console server to its factory default configuration with the console port enabled.

NOTE: Restoring to the factory default state will delete all user configuration.

NOTE: Fully rebooting the console server before the fifth reboot will reset the counter and the console port will remain disabled.

To recover console port access:

1. Turn the console server off.
2. Turn the console server back on. Wait five seconds, then turn it off again.
3. Repeat steps 1 and 2 three more times.
4. After four partial reboots, allow the console server to fully reboot the fifth time.

CAUTION: During the fifth reboot, the console server will clear its flash and restore factory defaults. Turning the console server off during the fifth reboot may corrupt the flash and render the console server inoperable.

3.6.4 Date and Time

The console server provides two options for setting the date and time. It can retrieve the date and time from a network time protocol (NTP) server, or you can set the date and time manually so that the console server's internal clock is used to provide time and date information.

NOTE: The Current Time displayed in the Date & Time screen shows only the time when the screen was opened. It does not continue to update in real time.

To set the time and date using NTP:

1. Click *System - Date And Time*.
2. Select *Enable network time protocol*.
3. Enter the NTP server site of your choice and click *Save*.

To set the time and date manually:

1. Click *System - Date And Time*.
2. Select *Set manually*.
3. Using the drop-down menus, select the required date and time and click *Save*.

To set the time zone using a predefined time zone:

1. Click *System - Date And Time - Time Zone*.
2. Select *Predefined*.
3. Select the required time zone from the drop-down menu and click *Save*.

To define custom time zone settings:

1. Click *System- Date And Time - Time Zone*.

2. Select *Define Time Zone*.
3. Enter the Time Zone Name and Standard Time Acronym of your choice.
4. Enter the GMT Offset.
5. Select *Enable daylight savings time* if needed.
6. Select or enter the required values for daylight savings time settings and click *Save*.

3.6.5 Help and Language

Click *System - Help And Language* and use the drop-down menu to select the console server's language. Enter the full URL of the online help, ending in /index.html, on the local web server in the Online Help URL field. Click *Save*.

Online help

When the online help feature is configured for your console server, clicking the *Help* button from any form on the web manager opens a new window and redirects its content to the configured path for the online help product documentation.

NOTE: Using the online help feature from the Avocent/Cyclades server is not always possible due to firewall configurations, nor is it recommended. It is generally advisable for you to use the online help system provided with the product or download the online help .zip file and run it from a local server.

The system administrator can download the online help from Avocent. For more information on downloading the online help, contact Technical Support.

Once the online help file is obtained (in zip format), the files must be extracted and put in to a user-selected directory under the web server's root directory. The web server must be publicly accessible.

NOTE: The default URL for online help is http://global.avocent.com/us/olh/acs6000/v_3.1.0/en/index.html.

3.6.6 General

An administrator can configure a login banner to display when a user begins a SSHv2, Telnet, Console or web manager session.

To create a login banner:

1. *Click System - General* in the side navigation bar.
2. Check the box to enable the login banner.
3. Enter the text you want displayed upon login in the Login Banner field and click *Save*.

3.6.7 Boot Configuration

Boot configuration defines the location from which the console server loads the operating system. The console server can boot from its internal firmware or from the network. By default, the console server boots from Flash memory. Clicking *System- Boot Configuration* will display the Boot Configuration screen.

If you need to boot from the network, make sure the following prerequisites are met:

- A TFTP or BootP server must be available on the network
- An upgraded console server boot image file must be downloaded from Avocent and made available on the TFTP or BootP server
- The console server must be configured with a fixed IP address
- The boot filename and the IP address of the TFTP or BootP server is known

To configure boot configuration:

1. Click *System - Boot Configuration*.
2. Under Boot Mode, select *From Flash*, and select *Image 1* or *Image 2*.

   -or-

   Select *From Network* and enter the following information:

   - Appliance IP Address: Enter the fixed IP address or a DHCP assigned IP address to the console server.
   - TFTP Server IP: Enter the IP address of the TFTP boot server.
   - Filename: Enter the filename of the boot firmware.
3. Using the drop-down menu, select whether the Watchdog Timer is enabled. If the Watchdog Timer is enabled, the console server reboots if the software crashes.
4. Using the drop-down menu, select one of the following speeds for both Ethernet 0 Mode and Ethernet 1 Mode: 100BT full, 100BT half, 10BT full, 10BT half or Auto.
5. Using the drop-down menu, select the console port speed and click *Save*.

NOTE: Ethernet Mode will be affected after saving. The rest of the configuration will be applied after rebooting.

3.6.8 Information

Click *System - Information* to view the console server's identity, versions, power and CPU information.

3.6.9 Usage

Click *System - Usage* to view memory and Flash usage.

3.7 Network

Click *Network* to view and configure the Hostname, DNS, IPv6, Bonding, IPv4 and IPv6 static routes, Hosts, Firewall, IPSec (VPN) and SNMP network options.

3.7.1 Settings

Click *Network - Settings* to make changes to the configured network settings.

From this page, an administrator can configure the console server's hostname and DNS settings, which includes the primary and secondary DNS, domain and search addresses. An administrator can also enable IPv6 and configure it to get the DNS and/or domain from DHCPv6. Once the eth0 and eth1 ports are configured and enabled, an administrator can enable bonding to configure two networks, one for each interface (eth0 and eth1) with its own default gateway.

DHCP

DHCP is set as the default method for eth0 while Static is the default method for eth1. If a DHCP server is not present when the console server is first booted up, it will configure a default static IP address of 192.168.161.10.

The DCHP client on the console server was modified to enable it to automatically obtain an IP address from a DHCP server, whenever the DHCP server becomes available.

This DHCP enhancement permits configuration of the console server without the presence of a DHCP server or the need for console access. Also, when a DHCP server is present, you can determine the IP address assigned by the DHCP server to eth0 by using the default static IP address of eth1, without console access.

Routing type

The console server supports multiple routing tables for flexible policy routing. Multiple routing tables can not be enabled at the same time network failover is enabled.

To enable multiple routing tables:

1. Click *Network - Settings*.
2. Under Routing Type, click the Enable IPv4 Multiple Routing Tables radio button.

3.7.2 Link Layer Discovery Protocol

The Link Layer Discovery Protocol (LLDP) is a neighbor discovery protocol that enables network devices to advertise information about themselves to other devices on the network.

The Avocent® implements LLDP and utilizes it to transmit its configuration information to neighboring devices. This will enable customers to identify and correct any misconfiguration and discrepancies associated with the console server.

Configuration information is transmitted using LLDP Data Units (LLDPDUs). Each LLDPDU is a sequence of type-length-value (TLV) structures.

Operating modes

The LLDP agent operates in one of three modes:

- Transmit-only mode: The agent can only transmit the information about the capabilities and the current status of the local system.
- Receive-only mode: The agent can only receive information about the capabilities and the current status of the remote systems.
- Transmit and Receive mode: The agent can transmit the local system capabilities and status information and receive the remote system's capabilities and status information.

The console server implements an LLDP agent that operates in Transmit-only mode. When enabled, the LLDP agent only transmits the configuration information of the console server to its neighboring devices. It does not receive and process LLDP packets from other devices.

Through the LLDP agent, the console server can transmit the configuration information listed in the following table.

Table 3.3 LLDP Configuration Information

TYPE	DESCRIPTION
Mandatory TLVs	
Chassis Identifier	The Chassis ID TLV identifies the console server containing the transmitting LLDP agent. The MAC address of the device is used as a Chassis ID.
Port Identifier	The Port ID identifies the console server port from which the LLDP packets are sent. The MAC address of the device is used as a Port ID.
Time-to-Live	The Time-to-Live (TTL) value is the length of time the receiving device should keep the information acquired through LLDP in its MIB. The console server sets the TTL default value to 120 seconds (two minutes). This value is not configurable.
Optional TLVs	
System Name	The system name corresponds to the name defined with the Command Line Interface (CLI) command host name. By default, the system name is automatically advertised when LLDP is enabled. This value is not configurable.
System Description	The system description includes information about the underlying Kernel, host name, kernel distribution version and the date of the firmware build.
System Capabilities	The system capabilities TLV identifies the primary functions of the device and indicates whether these primary functions are enabled.
Port Description	The port description provides information about the port from which the LLDP packets were sent on the console server. The console server uses the port type interface and the interface number (eth0, eth1).
Management IP Address	The management IP address TLV lists the IP address of the console server port from which the LLDP packets were sent.

LLDP configuration

All LLDP parameters (TLVs) are set to their default values/settings on the console server. An administrator has the ability to modify only the LLDP admin state, which can be accomplished through the CLI or the Web User Interface (web UI) of the console server. This admin state indicates if the LLDP agent is enabled or disabled. When enabled, the LLDP agent on the console server is ready for transmission of LLDPDUs. No other configuration parameters can be modified.

To enable LLDP from the web UI:

1. From the *Wizard* tab, click *Network*.

   -or-

   From the *Expert* tab, click *Network-Settings*.

2. Check the Enable LLDP box and click *Save*.

To enable LLDP from the CLI:

1. Open a CLI session.
2. Enter the following commands:

```
--:--/cli-> cd network/settings/
--:--settings cli-> set enable_lldp=yes (to enable, or "no" to disable)
--:--settings cli-> commit
```

3.7.3 Network Failover

To ensure a console server can be relied upon to provide access to critical devices during a network outage, it should be configured for network failover. Failover can occur when a primary interface goes down or when a certain IP/gateway becomes inaccessible. Failover can be enabled using a secondary

network or PPP (dialout) connection. If dialout is configured, ppp0 will be available as a secondary interface but can not be used as the primary interface.

Using DSView software with a console server will ensure the console server can always be accessible when in a failover situation, because the console server will "phone home" and update its IP address within the DSView software.

From the Network-Settings page, an administrator can configure a secondary network interface to be used for failover. The primary interface sets the system default gateway while the secondary interface is used when the primary interface is not available. The eth0 or eth1 interface can be used as the primary or secondary interface. An administrator can also select one of four triggers that enable the failover:

- Primary Interface Down
- Unreachable Primary Default Gateway
- Unreachable DSView
- Unreachable IP Address

If the IPSec tunnel has been configured (see IPSec (VPN) on page 32), an administrator can configure the IPSec tunnel to be established over the secondary interface when it is up.

To enable Network Failover:

1. From the sidebar of the Expert tab, click *Network-Settings*.
2. Under the Network Failover heading, click the box to enable Network Failover.
3. Use the drop-down menus to select the primary and secondary interfaces as well as the VPN connection name.
4. Click the radio button next to the trigger you want to use to initiate the failover.
5. Click *Save*.

3.7.4 Devices

An administrator can select, enable and configure the IP addresses assigned to the network interfaces and view the MAC address.

To configure a network device:

1. Select *Network - Devices*. The Devices screen appears with a list of network interfaces and their status (enabled or disabled).
2. Click the name of the network device to configure.
3. Check the box if you want to set the network device as the primary interface. By default, eth0 is set as the primary interface.
4. Select the status (either *Enabled* or *Disabled*) from the drop-down menu.
5. Select one of the following IPv4 method options:
    - Select *DHCP* to have the IPv4 IP address set by the DHCP server.
    - Select *Static* to enter the IPv4 IP address, subnet mask and gateway address manually.
    - Select *IPv4 address unconfigured* to disable IPv4.
6. Select one of the following IPv6 method options:
    - Select *Stateless* if the link is restricted to the local IP address.
    - Select *DHCPv6* to have the IPv6 IP address set by the DHCP server.
    - Select *Static* to enter the IPv6 IP address and prefix length manually.

- Select *IPv6 address unconfigured* to disable IPv6.

7. Select the Ethernet Mode for the built-in interface (eth0 and eth1).

NOTE: The MAC Address for the device will be displayed after this option.

3.7.5 IPv4 and IPv6 static routes

To add static routes:

1. Select *Network - IPv4 Static Routes* or *IPv6 Static Routes*. Any existing static routes are listed with their Destination IP/Mask, Gateway, Interface and Metric values shown.
2. Click *Add*.
3. Select *Default* to configure the default route.

   -or-

   Select *Host IP Or Network* to enter custom settings for Destination IP/Mask.

   Enter the required Destination IP/Mask Bits with the syntax <destination IP>/<CIDR> in the Destination IP/Mask Bits field.
4. Enter the IP address of the gateway in the Gateway field.
5. Enter the interface name (eth0, eth1 or pppx) in the Interface field when the route is by interface.
6. Enter the number of hops to the destination in the Metric field, then click *Save*

3.7.6 Hosts

An administrator can configure a table of host names, IP addresses and host aliases for the local network.

To add a host:

1. Select *Network - Hosts*.
2. Click *Add* to add a new host.
3. Enter the IP address, hostname and alias of the host you want to add, then click *Save*.

To edit a host:

1. Select *Network - Hosts*.
2. Click on the IP address of the hostname you want to edit.
3. Enter a new hostname and alias, if applicable, then click *Save*.

3.7.7 Firewall

Administrators can configure the console server to act as a firewall. By default, three built-in chains accept all INPUT, FORWARD and OUTPUT packets. Select the *Add*, *Delete* or *Change Policy* buttons to add a user chain, delete user-added chains and to change the built-in chains policy. Default chains can have their policy changed (Change Policy) to accept or drop, but cannot be deleted. Clicking on the *Chain Name* allows you to configure rules for chains.

Firewall configuration is available by clicking on *Network - Firewall*. Separate but identical configuration screens are available from either the *IPv4 Filter Table* or *IPv6 Filter Table* menu options.

Only the policy can be edited for a default chain; default chain policy options are ACCEPT and DROP.

When a chain is added, only a named entry for the chain is created. One or more rules must be configured for a chain after it is added.

Configuring the firewall

For each rule, an action (either *ACCEPT*, *DROP*, *RETURN*, *LOG* or *REJECT*) must be selected from the Target pull-down menu. The selected action is performed on an IP packet that matches all the criteria specified in the rule.

If *LOG* is selected from the Target pull-down menu, the administrator can configure a Log Level, a Log Prefix and whether the TCP sequence, TCP options and IP options are logged in the Log Options Section.

If *REJECT* is selected from the Target pull-down menu, the administrator can select an option from the Reject with pull-down menu; the packet is dropped and a reply packet of the selected type is sent.

Protocol options

Different fields are activated for each option in the Protocol pull-down menu.

If *Numeric* is selected from the Protocol menu, enter a Protocol Number in the text field.

If *TCP* is selected from the Protocol menu, a TCP Options Section is activated for entering source and destination ports and TCP flags.

If *UDP* is selected from the Protocol menu, the UDP section is activated for entering source and destination ports.

Table 3.4 Firewall Configuration - TCP and UDP Options Fields

FIELD/MENU OPTION	DEFINITION
Source Port - or - Destination Port	A single IP address or a range of IP addresses.
TCP Flags	[TCP only] SYN (synchronize), ACK (acknowledge), FIN (finish), RST (reset), URG (urgent) and PSH (push). The conditions in the pull-down menu for each flag are: Any, Set or Unset.

If ICMP is selected from the Protocol menu, the ICMP Type pull-down menu is activated.

If an administrator enters the Ethernet interface (eth0 or eth1) in the input or output interface fields and selects an option (*2nd and further packets*, *All packets and fragments* or *Unfragmented packets and 1st packets)* from the Fragments pull-down menu, the target action is performed on packets from or to the specified interface if they meet the criteria in the selected Fragments menu option.

To add a chain:

1. Select *Network - Firewall*.
2. Select either *IPv4 Filter Table* or *IPv6 Filter Table* as needed.
3. Click *Add*.
4. Enter the name of the chain to be added.
5. Click *Save*.

NOTE: Spaces are not allowed in the chain name.

6. Add one or more rules to complete the chain configuration.

To change the policy for a default chain:

NOTE: User-defined chains cannot be edited. To rename a user-added chain, delete it and create a new one.

1. Select *Network - Firewall*.
2. Select either *IPv4 Filter Table* or *IPv6 Filter Table* as needed.
3. Select the checkbox next to the name of the chain you want to change (*FORWARD, INPUT, OUTPUT*).
4. Click *Change Policy* and select *Accept* or *Drop* from the drop-down menu.
5. Click *Save*.

To add a rule:

1. Select *Network - Firewall*.
2. Select either *IPv4 Filter Table* or *IPv6 Filter Table* as needed.
3. From the chain list, click the name of the chain you want to add a rule to.
4. Click *Add* and configure the rule as needed, then click *Save*.

To edit a rule:

1. Select *Network - Firewall*.
2. Select either *IPv4 Filter Table* or *IPv6 Filter Table* as needed.
3. From the chain list, click the name of the chain with the rule you want to edit.
4. Select the rule you want to edit and click *Edit*.
5. Modify the rule as needed and click *Save*.

3.7.8 IPSec (VPN)

A Virtual Private Network (VPN) enables a secure communication between the console server and a remote network by utilizing a gateway and creating a secured connection between the console server and the gateway. The IPSec protocol is used to construct the secure tunnel and provides encryption and authentication services at the IP level of the protocol stack.

NOTE: IPSec (VPN) is not supported with IPv6.

When *Network - IPSec(VPN)* is selected, the IPSec (VPN) screen is displayed.

You can add a new VPN connection by clicking *Add*, edit an existing connection by clicking on the connection or delete a connection by clicking *Delete*.

NOTE: To run IPSec (VPN), you must enable IPSec under the custom Security Profile.

The remote gateway is referred to as the remote or right host and the console server is referred to as the local or left host.

A fully qualified domain name may be indicated in the ID fields for both the local (left) host and the remote (right) host where the IPSec negotiation takes place, but is not required. The ID field can be any name or left blank.

The following table describes the fields and options on the *IPSec(VPN) - Add* screen. The information must match exactly on both ends for local and remote.

Table 3.5 Field and Menu Options for Configuring IPSec (VPN)

FIELD NAME	DEFINITION
Connection Name	Any descriptive name you wish to use to identify this connection.
IKE Version	The Internet Key Exchange (IKE) protocol version used to set up the security association. If you are using an RSA key, the version should be IKEv2. If you are using a pre-shared secret, the version should be IKEv1. The default is IKEv2.
Boot Action	The boot action configured for the host, either *Ignore* or *Start*.
Aggressive	Select *Yes* or *No* to enable or disable aggressive mode. If you are using IKEv2, aggressive mode must be disabled. The default is No.
Remote (Right) Side - and - Local (Left) Side	Enter the required address or text for each of the four fields for both Remote Side and Local Side: ID: This is the hostname that a local system and a remote system use for IPSec negotiation and authentication. It can be a fully qualified domain name preceded by @. For example: @hostname.xyz.com. It can also be any string or left blank. IP Address: The IP address of the host. Virtual IP: For the left side, enter the virtual IP address. If you are using dial-up mode, enter %config. The default is left blank. SubNet: The netmask of the subnetwork where the host resides. Use CIDR notation. The IP number followed by a slash and the number of 'one' bits in the binary notation of the netmask. For example, 192.168.0.0/24 indicates an IP address where the first 24 bits are used as the network address. This is the same as 255.255.255.0.
IPSec (VPN) Authentication	Authentication method used, either RSA Key or Secret.
RSA Key (If *RSA Key* is selected)	For IPSec(VPN) authentication, you need to generate a public key for the console server and find out the key used on the remote gateway. Then upload the key from the Systems page.
Pre-Shared Secret (If Secret is selected)	Pre-shared password between left and right users. Enter the key, XAuth username and XAuth password.

IPSec tunnels

Internet Protocol Security (IPSec) has been enhanced on the Avocent® ACS6000 Advanced Console Server. With a console server located on a separate network behind a router, it establishes an IPSec tunnel using a x.509 certificate to a Fortinet® firewall.

Creating a Certificate of Authority

To configure the Fortinet® Fortigate firewall, you need to create an internal Certificate of Authority (CA) server that generates RSA certificates the console server uses for authentication.

For information on creating a CA on a Ubuntu® server, see Creating a CA.

For information on configuring other types of firewalls, see the documentation for your firewall.

PKCS12 files

The x.509 certificate chain and its corresponding private key are stored in a PKCS12 file that can be downloaded to the console server. Multiple certificates may be stored in a PKCS12 file.

To download a PKCS12 file:

1. From the sidebar of the *Expert* tab, click *System Tools*.
2. In the content area, click *IPSec(PKCS12) Files*.
3. Click the Remote Server radio button and enter the protocol, IP address, username, password, file directory and filename of the server where the file is stored.

   -or-

   Click the My Computer radio button, browse to where the file is served on your local machine and click *Choose File*.
4. Click *Download*. The file will be checked to verify it is a PKCS12 formatted file.

To view or delete PKCS12 file certificates:

1. From the sidebar of the *Expert* tab, click *Network - IPSec(PKCS12)*.
2. Check the box next to the certificate you want to view or delete.
3. Click *Display Certificate* to view the selected certificate.

   -or-

   Click *Delete* to delete the selected certificate.

Creating a tunnel on the server

To create a tunnel on the server:

1. From the *System* tab of the Fortigate web UI, click *Certificates* and import the CA certificate and the SERVER certificate that was generated from the easy-rsa server.
2. From the *User & Device* tab, click *PKI* and create a new user named **user1** with a CA named **CA_Cert_1**. Then create a user group named **user_group1** and put user1 in that group.
3. From the *VPN* tab, click *IPSec - Tunnels* and create a new custom VPN tunnel with the following configuration, then click *OK*.

NOTE: The following table displays parameter examples for a dial-up tunnel configuration. Actual parameters will depend on your network environment.

Table 3.6 VPN Tunnel Configuration Parameters

PARAMETER	VALUE
Network	
Remote Gateway	Dialup User
Interface	wan1
Mode Config	Enabled
IP Version	IPv4
Client Address Range	10.77.20.100-10.77.20.110
Subnet Mask	255.255.255.0
Use System DNS	Enabled
Enable IPv4 Split Tunnel	Enabled
Accessible Networks	local_lan
NAT Traversal	Enabled
Keepalive Frequency	300
Dead Peer Detection	Enabled
Authentication	
Method	Signature
Certificate Name	server
IKE Version	2
Peer Options Accept Types	Peer Certificate Group
Peer Certificate Group	user_group1
Phase 1 Proposal	
Encryption	AES256
Authentication	SHA512
Diffie-Hellman Group	14
Key Lifetime (Seconds)	86400
Local ID	C=<country> S=<state> L=<city> O=<organization>
Edit Phase 2	
Name	<name>
Comments	<comments>
Local Address Subnet	0.0.0.0/0.0.0.0
Remote Address Subnet	0.0.0.0/0.0.0.0
Phase 2 Proposal	
Encyption	AES256
Authentication	SHA512
Enable Replay Detection	Enabled
Enable Perfect Forward Secrecy (PFS)	Enabled
Diffie-Hillman Group	14
Local Port All	Enabled
Remote Port All	Enabled
Protocol All	Enabled

PARAMETER	VALUE
Autokey Keep Alive	Enabled
Key Lifetime	Seconds
Seconds	43200

4. From the *Policy & Objects* tab, click *Objects - Addresses* to create a VPN range with the following settings, then click *OK*.

Table 3.7 VPN Range Configuration

PARAMETER	VALUE
Name	ipsec_vpn_range
Type	IP Range
Subnet / IP Range	10.77.20.100 - 10.77.20.110
Interface	Any
Show in Address List	Enabled
Comments	The IP address given to VPN clients that are connecting.

5. From the *Policy & Objects* tab, click *Objects - Addresses* to create a Local LAN range with the following settings, then click *OK*.

Table 3.8 Local LAN Range Configuration

PARAMETER	VALUE
Name	local_lan
Type	IP / Netmask
Subnet / IP Range	192.168.1.0 / 255.255.255.0
Interface	internal
Show in Address List	Enabled
Comments	Local Lan - inside network

6. From the *Policy & Objects* tab, click *Policy - IPv4* to create Firewall Policy 1 with the following settings, then click *OK*.

Table 3.9 Firewall Policy 1 Configuration

PARAMETER	VALUE
Incoming Interface	forti2acs
Source Address	ipsec_vpn_range
Outgoing Interface	internal
Destination Address	local_lan
Schedule	always
Service	ALL
Action	ACCEPT
Firewall / Network Options	
NAT	ON
Use Outgoing Interface Address	Enabled
Security Profiles	
Antivirus, Web Filter, Application Control, SSL Inspection	All OFF
Traffic Shaping	
Shared Shaper, Reverse Shaper, Per-IP Shaper	All OFF
Logging Options	
Log Allowed Traffic	ON
Security Events	Enabled
Comments	<Comments>
Enable this policy	Enabled

7. From the *Policy & Objects* tab, click *Policy - IPv4* to create Firewall Policy 2 with the following settings, then click *OK*.

Table 3.10 Firewall Policy 2 Configuration

PARAMETER	VALUE
Incoming Interface	internal
Source Address	local_lan
Outgoing Interface	forti2acs
Destination Address	ipsec_vpn_range
Schedule	always
Service	ALL
Action	ACCEPT
Firewall / Network Options	
NAT	ON
Use Outgoing Interface Address	Enabled
Security Profiles	
Antivirus, Web Filter, Application Control, SSL Inspection	All OFF
Traffic Shaping	
Shared Shaper, Reverse Shaper, Per-IP Shaper	All OFF
Logging Options	
Log Allowed Traffic	ON
Security Events	Enabled
Comments	<Comments>
Enable this policy	Enabled

8. From the *Policy & Objects* tab, click *Policy - IPv4* to create Firewall Policy 3 with the following settings, then click *OK*.

Table 3.11 Firewall Policy 3 Configuration

PARAMETER	VALUE
Incoming Interface	any
Source Address	all
Outgoing Interface	any
Destination Address	all
Action	DENY
Logging Options	
Log Violation Traffic	OFF

Creating a tunnel on the console server

To create a tunnel on the console server:

1. From the sidebar of the *Expert* tab, click *Network - IPSec(VPN)*, then click *Add*.
2. Enter a name for the connection.
3. Use the drop-down menus to select *IKEv2* for the IKE version, *Start* or *Ignore* for the Boot Action and *Yes* or *No* for Aggressive.
4. For the Remote (Right) Side, enter the following parameters:
    a. Enter the ID or leave the field blank.

b. Enter the IP address of the remote VPN in the IP Address field.
c. Enter the subnet the console server will use to connect through in the SubNet field.

5. For the Local (Left) Side, enter the following parameters:
   a. Enter the ID or leave the field blank.
   b. Enter the IP address of the primary interface in the IP Address field.
6. Click the RSA Key radio button and click *Choose File* to browse to the PKCS12 file.
7. Select the PKCS12 file and click *Save*.

Certificate fallback

Clicking *Enable Failover* under the IPSec(VPN) Authentication heading enables the console server to fall back to the previously configured certificate if the new certificate fails to establish the tunnel. If the tunnel is established with the new certificate, the fallback operation is canceled.

Fallback only applies to RSA configured tunnels. Both the previous and the new PKCS12 files must be present on the console server.

To enable IPSec on the console server:

1. From the sidebar of the *Expert* tab, click *System - Security - Security Profile*.
2. Click the Custom radio button under Security Profile.
3. Check the Enable IPSec box, then click *Save*.

Verification

Verification tests can be performed to ensure the IPSec configuration was successful.

To verify the IPSec status:

From the sidebar of the Expert tab, click *Monitoring - IPSec Tunnel Status*. A list of IPSec tunnels and their status display in the content area.

3.8 SNMP Configuration

An administrator can configure SNMP, which is needed if notifications are to be sent to an SNMP management application.

NOTE: The Avocent ACS6000 Enterprise MIB text file is available in the appliance at: /usr/local/mibs/ACS6000-MIB.asn. The Avocent ACS6000 Enterprise TRAP MIB text file is available in the appliance at: /usr/local/mibs/ACS6000-TRAP-MIB.asn. Both files are also available at www.avocent.com.

To configure SNMP:

1. Click *Network - SNMP*.
2. Click the *System* button.
   a. Enter the SysContact information (email address of the console server's administrator, for example, acs6000_admin@avocent.com).
   b. Enter the SysLocation information (physical location of the console server, for example, Cyclades_ACS6000), then click *Save* to go back to the SNMP screen.
3. Click *Add* to add a new community or v3 user.

4. Enter the community name for SNMP v1/v2 or the user name for SNMP v3 in the Name field and enter the OID.
5. Select the desired permission from the pull-down menu. Choices are *Read and Write* or *Read Only*.
6. If the required SNMP version is v1 or v2, click the *Version v1, v2* button, then enter the source (valid entry is the subnet address).

   -or-

   If the required SNMP version is v1 or v2 using an IPv6 network, click the *Version v1,v2 for IPv6 network* button, then enter the source (valid entry is the subnet address).

   -or-

   If the required SNMP version is v3, click the *Version v3* button, then select the Authentication Type (*MD5* or *SHA*), enter the authentication passphrase or password, select the Encryption Method (DES or AES), enter the privacy passphrase and select the Minimum Authentication Level (*NoAuthNoPriv*, *AuthNoPriv*, *AuthPriv*).

7. Click *Save*.

NOTE: For SNMP v1/v2c, the console server will allow an administrator to configure the same community name with different sources (filters) to have access to specific object identifiers (OIDs).

3.9 Ports

An administrator can enable and configure serial ports, auxiliary ports, the CAS Profile and the Dial-in Profile from the Ports tab in the side navigation bar. On the auxiliary ports screen, you can enable the auxiliary port and configure it based on the type of connected device.

The console server's serial ports may work in several different roles, depending on the profile configured for a port.

3.9.1 Serial ports

On the Serial Ports table, you can specify the connection profile (CAS, Dial-In, Power, Dial-Out or Socket Client) based on the type of connected device and you can clone the port, reset to factory defaults and enable/disable ports.

To enable or disable one or more serial ports:

1. Select *Ports - Serial Ports*.
2. Click the checkbox for each port you want to enable or disable.
3. Click the *Enabled* or *Disabled* button.

To configure or edit one or more serial ports with the CAS Profile:

1. Select *Ports - Serial Ports*.
2. Click the checkbox for each port you want to configure.
3. Click the *Set CAS* button.
   a. To change the default pinout when a Cisco cable is connected to the selected port(s), select the *Enable Cisco from the RJ-45 pinout* checkbox.
   b. Use the drop-down menus to enable or disable the port and set the speed, parity, data bits, stop bits and flow control.
4. Click *Next* or click the *CAS* link.

a. Enter the port name (when only one port was selected) or the port name prefix (when more than one port were selected). The port name will be <port name prefix>-p-<port number>.
b. Check the box to enable auto discovery. In this case, the port name will be used when auto discovery fails to discover the server name.
c. Check the box to enable speed auto detection.

NOTE: Auto speed detection requires additional configuration in the CAS Profile-Auto Discovery Settings screen.

d. Use the appropriate drop-down menus to set the protocol and authentication type.
e. Enter the text session hotkey and power session hotkey in the appropriate fields.
f. Enter the TCP port alias for each protocol type (Telnet, SSH and Raw Mode) in the appropriate field.
g. Enter the IPv4 or IPv6 alias and its interface in the appropriate field.
h. To allow a session only if DCD is on and to enable auto answer, check the appropriate boxes.
i. Use the drop-down menu to select the DTR mode and enter the DTR off interval.
j. Use the drop-down menus to enable or disable line feed suppression and NULL after CR suppression.
k. Enter the transmission interval, break sequence and break interval in the appropriate fields.
l. Use the drop-down menu to enable or disable the Multi-Session Menu. For more information, see Multi-Session Menu on page 46.
m. Use the drop-down menus to enable or disable log in/out multisession notification and informational message notification.

5. Click *Next* or click the *Data Buffering* link and use the drop-down menus to enable and configure data buffering.
6. Click *Next* or click the *Alerts* link.
   a. Click *Enable Alerts* to enable detection of alerts.
   b. Click *Add* to add an alert string. In the Alerts String field, enter the string. In the Script field, enter the shell script that will run when the match happens. Click *Next* to return to the Alerts screen.

NOTE: The console server allows an administrator to associate one shell script to the alert string. When there is a match with the alert string, the console server will call the script passing the port number and the line where the match occurs as arguments.

c. Check the box next to an existing alert and click *Delete* to delete the string.
d. Click *Delete Any* to delete all strings whether selected or not.

NOTE: Clicking *Delete Any* will delete all alert strings. Selecting all the alert strings and clicking *Delete* is not the same functon as it will not delete alert strings not shown in the table.

7. Click *Next* or click the *Power* link.
   a. Click *Add* to add a new outlet. Click *Selected PDU* and select a PDU from the list of detected PDUs. Enter the outlet(s) in the Outlets field, and click *Next*.
   b. Check the box next to an existing merged outlet and click *Delete* to delete it.

NOTE: Power is only available when a single serial port is selected.

8. Click *Save*.

Table 3.12 CAS Profile Parameters

PARAMETER	DESCRIPTION
Physical	
Enable Cisco RJ-45 Pin-Out	Defines the serial port pinout. Default: Disabled.
Status	Defines the status of the serial port as either enabled or disabled. Default: Disabled.
Speed	Defines the speed as 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 or 230400. Default: 9600.
Parity	Defines the parity as either Even, Odd or None. Default: None.
Data Bits	Defines the data bits as either 5, 6, 7 or 8. Default: 8.
Stop Bits	Defines the stop bits as either 1 or 2. Default: 1.
Flow Control	Defines the flow control as none, hardware, software, RxON software or TxON software. Default: None.
CAS	
Port Name	Name associated with the serial port (as an alias). Default: <appliance mac address>-p-<port number>.
Enable Auto Discovery	The target name will be discovered and will be associated with this serial port. If it fails, the Port Name will be used. Default: Disabled.
Enable Speed Auto Detection	Tries to discover the speed of the serial port. This feature requires additional configuration under the CAS Profile / Auto Discovery / Settings page. Default: Disabled.
Protocol	The protocol that will be used by authorized users to access the serial port/target. The console server accepts three protocols for connection to the target: Telnet for telnet connection, SSH for secure connection and Raw Mode for raw socket connection. An administrator can configure the port to accept one, two or all three types. **NOTE:** Raw protocol requires the configuration of the Raw Mode Port Alias. Default value: Telnet/SSH.
Authentication Type	Authentication type that will be used to authenticate the user during target session. Default: Local.
Text Session Hot Key	Hotkey to suspend the target session and go to the CLI prompt. Not available for Raw. Default: Ctrl-Z. Note: The default escape character for ts_menu is Ctrl-X.
Power Session Hot Key	Hotkey to suspend the target session and display Power Management Menu to control the outlets merged to the target. Not available for Raw. Default: Ctrl-P. **NOTE:** The default escape character for ts_menu is Ctrl-X.
TCP Port Alias	Telnet Port Alias: TCP port to connect directly to a serial port using Telnet protocol for the connection. SSH Port Alias: TCP port to connect directly to a serial port using SSH protocol for the connection/ Raw Mode Port Alias: TCP port to connect directly to a serial port using raw socket for the connection.
Port IPv4/IPv6 Alias	IPv4/IPv6 address used to connect directly to a serial port. Default: not configured (empty).
Port IPv4/IPv6 Alias Interface	Interface (eth0/eth1) associated with the IPv4/IPv6 alias. Default: eth0.
Allow Session Only if DCD is On	When the DCD is OFF, the appliance will deny access for this serial port. Default: Disabled (allow access if DCD is OFF).
Enable Auto Answer	When the input data matches one input string configured in Auto Answer, the output string will be transmitted to the serial port. Default: Disabled.
DTR Mode	DTR Mode can be set to the following: Always On. Normal - the DTR status will depend on the existence of a CAS session. Off Interval - when the a CAS session is closed, the DTR will stay down during this interval. Default: Normal.
DTR Off Interval	Interval in seconds used by DTR Mode Off Interval in milliseconds. Default: 100.
Line Feed Suppression	Enables the suppression of the LF character after the CR character. Default: Disabled.
Null After CR Suppression	Enables the suppression of the NULL character after the CR character. Default: Disabled.
Transmission Interval	The interval the port waits to send data to a remote client in milliseconds. Default: 20.
Break Sequence	An administrator can configure the control key as the break sequence, entering ^ before the letter. Not available for Raw. Default: ~break.
Break Interval	Interval for the break signal in milliseconds. Not available for Raw. Default: 500.
Log In/Out Multi Session Notification	Enables the notification to multi-session users when a new user logs in or a user logs out. Not available for Raw. Default: Disabled.
Informational Message Notification	Displays an information message when a target session is opened. Not available for Raw. Default: Enabled.

PARAMETER	DESCRIPTION
Data Buffering	
Status	Enables or disables data buffering. Default: Disabled.
Type	Displays the type of data buffering: Local - stores the data buffering file in the local file system. NFS - stores the data buffering file in the NFS server. Syslog - sends the data to the syslog server. DSView - sends the data to the DSView software. Default: Local.
Time Stamp	When enabled, adds the time stamp to the data buffering line for a Local or NFS database. Default: Disabled.
Log-in/out Message	Includes special notification for logins and logouts in data buffering. Default: Disabled.
Serial Session Logging	Enabled - stores data at all times. Disabled - stores data when a CAS session is not opened. Default: Enabled.
Alerts	
Status	A special event notification will be generated when input data matches one of the alert strings. Default: Disabled.
Alert Strings	Strings used to generate event notifications. Default: Empty.
Scripts	Name of shell script that will be called when there is match of the alert string in the line. The script will be called with two arguments: the port number and the line where the match happened.

To configure the Dial-in Profile for a serial port with a connected modem:

1. Select *Ports - Serial Ports*.
2. Click the checkbox for a serial port with a connected modem.
3. Click the *Set Dial* button and use the drop-down menus to configure the dial-in settings.
4. Configure the PPP parameters (address, authentication and so on) and click *Save*.

Table 3.13 Dial-in Parameters

PARAMETER	DESCRIPTION
Status	Enables or disables the port. Default: Disabled.
Speed	The speed that will be used by mgetty to configure the serial device. Default: 38400 bps.
Init Chat	Chat for modem initialization. Default: "" \d\d\d+++\d\d\dATZ OK.
PPP Address	Configures the local and the remote IP address for the the PPP link. If *Accept Configuration from Remote Peer* is selected, the remote peer should send both IP addresses (local and remote) during negotiation. Default: No Address.
Local IPv4/IPv6 Address	Configures the local IPv4/IPv6 address for this PPP connection.
Remote IPv4/IPv6 Address	Configures the remote IPv4/IPv6 address for this PPP connection.
PPP Authentication Protocol	Uses the radio button to select: none, PAP, CHAP or EAP. None - no authentication. • PAP - use PAP protocol and the authentication type configured in the PPP authentication type (it is configured in the Authentication / Unit Authentication page). • CHAP - use CHAP protocol. The configuration of the CHAP secrets should be done while editing the file /etc/ppp/chap-secrets. • EAP - use EAP protocol. Available authentications: CHAP, SRP-SHA1 and TLS. The configuration of the secrets for CHAP should be done while editing the file /etc/ppp/chap-secrets. The configuration of the secrets for SRP-SHA1 should be done while editing the file /etc/ppp/srp-secrets. Default: None.
CHAP	Configure the CHAP-interval, CHAP-max-challenge and CHAP-restart. Default values: • CHAP Interval = 0. • CHAP Max Challenge = 10. • CHAP Restart = 3.
PPP Idle Timeout	Number of seconds being idle before PPP times out. Default: 0 (no time-out).

To configure or to edit one or more serial ports with a connected PDU:

1. Select *Ports - Serial Ports*.
2. Click the checkbox for one or more serial ports with a connected PDU.
3. Click the *Set Power* button and use the drop-down menus to configure the physical settings.

4. Click *Next* or click the *Power* link.
    a. Use the drop-down menu to select the PDU type.
    b. Check the box to enable speed auto detection.
    c. Configure the polling rate.
    d. For Avocent/Cyclades PDUs, enter the power cycle interval and then use the drop-down menus to enable or disable Syslog, Buzzer and SW Overcurrent Protection.
5. Click *Save*.

Table 3.14 Power Parameters

PARAMETER	DESCRIPTION
Physical	
Enable Cisco RJ-45 Pin-Out	Defines the serial port pinout. Default: Disabled.
Status	Defines the status of the serial port as either enabled or disabled. Default: Disabled.
Speed	Defines the speed as 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200. Default: 9600.
Parity	Defines the parity as either Even, Odd or None. Default: None.
Data Bits	Defines the data bits as either 5, 6, 7 or 8. Default: 8.
Stop Bits	Defines the stop bits as either 1 or 2. Default: 1.
Flow Control	Defines the flow control as none, hardware, software, RxON software or TxON sofware. Default: None.
Power	
PDU Type	Defines the type or vendor of the PDU connected to the serial port. • Auto - the vendor will be detected. • Avocent-Cyclades - Avocent-Cyclades PM PDU family. • SPC - SPC power control device family. • Server Tech - Server Tech family. Default: Auto.
Enable Speed Auto Detection	When enabled, detects the speed of the port. Default: Disabled.
Pooling Rate	The interval in seconds to update information from the PDU. Default: 20.
For Avocent/Cyclades PDUs	
Power Cycle Interval	The interval in seconds between Off and On actions for the power cycle command. Default: 15.
Syslog	When enabled, the PDU will send syslog messages to the appliance. Default: Enabled.
Buzzer	Enables or disables the PDU's buzzer. Default: Enabled.
SW Overcurrent Protection	When enabled, the software's overcurrent protection is on. Default: Disabled.

To copy/clone the configuration of one port to other ports:

1. Select *Ports - Serial Ports*.
2. Click the checkbox for the serial port you want to clone.
3. Click the *Clone* button.
4. Enter the serial port(s) to be configured in the Copy Configuration To field and click *Save*.

NOTE: If the selected port is configured as a CAS Profile, the following parameters will not be copied: Port Name, TCP Port Alias, IPv4 Port Alias, IPv6 Port Alias and Power (merged outlets).

To reset one or more serial ports to their factory configuration:

1. Select *Ports - Serial Ports*.
2. Click the checkbox for one or more serial ports you want to reset to their factory configuration, then click the *Reset To Factory* button.

NOTE: Serial ports are set to the CAS Profile and disabled in the factory configuration.

3.9.2 Multi-Session Menu

An administrator can enable or disable the Multi-Session Menu. When enabled, users can access the menu from the web manager, CLI or the DSView software, and multiple users can connect simultaneously to a serial port. To connect to a port or start a shared session, the user must have permission to access the port. If more than one session to a serial port is being established, the console server displays the Multi-Session Menu. If the session being established is the first with the serial port, a normal session with the target opens. A first-session user can still access the Multi-Session Menu by typing the text hot key (Ctrl-Z by default).

To enable the Multi-Session Menu:

1. From the sidebar of the *Expert* tab, click *Ports-Serial Ports*.
2. Click the port for which you want to enable the Multi-Session Menu.
3. Click the *CAS* heading and near the bottom of the CAS Settings, use the drop-down menu to *Enable* Show Multi-Session Menu.
4. Click *Save*.

The Multi-Session Menu includes options that are dependent on the access rights of the user. If a user does not have rights to an option, that option is not displayed. For example, Options 0, 2 and 5 from the following table are displayed for a user who only has permission to open read-only sessions.

Table 3.15 Multi-Session Menu Options

NUMBER	OPTION	DESCRIPTION
0	Quit	Closes the client session.
1	Initiate a regular session	Opens a read/write session.
2	Initiate a sniff session	Opens a read-only session.
3	Send messages to another user	Sends a message to all users who are sharing the serial port.
4	Kill session(s)	Displays all sessions and asks to close one or more shared sessions.
5	List shared session(s)	Lists all other shared sessions.
6	Show Databuffering	Shows the content of the target data buffering file.
7	Clean Databuffering	Resets the content of the target data buffering file.

3.9.3 Auxiliary ports

On the Auxiliary Ports screen, you can enable the auxiliary port and configure it based on the type of connected device.

To configure or edit auxiliary port with connected PDU:

1. Select *Ports - Auxiliary Ports*.
2. Click the *Set Power* button and use the drop-down menus to configure the physical settings.
3. Click *Next* or click the *Power* link.
    a. Use the drop-down menu to select the PDU type.
    b. Check the box to enable speed auto detection.
    c. Configure the polling rate.
    d. For Avocent/Cyclades PDUs, enter the power cycle interval and then use the drop-down menus to enable or disable Syslog, Buzzer and SW Overcurrent Protection.
4. Click *Save*.

To configure or edit auxiliary port with a connected or internal modem:

1. Select *Ports - Auxiliary Ports*.
2. Click the *Set Dial-In* or *Set Dial-Out* button and use the drop-down menus to configure the Dial-in settings.
3. Configure the PPP parameters (address, authentication, and so on).
4. Click *Save*.

3.9.4 CAS Profile

The CAS (Console Access Server) Profile provides remote access to serial RS-323 console ports on your devices. Using a CAS Profile, you can configure authentication, port configuration (speed, flow control, etc.), port aliasing, target auto discovery, data buffering type, port alerts, power integration and so on.

An administrator can configure the CAS Profile by clicking *Ports-CAS Profile*.

Auto discovery

The auto discovery feature will discover the target name of the server connected to the serial port. This name will be used as the alias of the serial port.

When auto discovery is active for a certain serial device, upon target connection (DCD ON event), the appliance will send probe strings and start analyzing target device answers using regular expressions. There will be predefined probe and match strings as well as customer-defined ones.

For each probe string sent, all regular expressions defined by the match strings will be tested. After the last cycle, the sequence restarts. This procedure will run for a certain period (given by the auto discovery time-out parameter) or until the target is successfully detected. If auto discovery fails, the target name will be reset to the configured target name or to the corresponding unique default target name.

NOTE: The configured target name will be used only after the auto discovery process fails.

NOTE: The auto discovery process starts when there is variation in the DCD signal from OFF to ON (disconnect/connect the target's cable, turn off/on the target) and when the configuration of the serial port goes from disabled to enabled and there is a target connected in the port.

The probe strings will be used to stimulate the server (such as “\n”: a single newline).

The match strings are regular expressions where “%H” is a placeholder for the target name you want to detect, such as:

“ \\(.*\\)(%H)\\(.*\\)” or just “xxx%Hyyy”.

The first one will extract target name from things such as:

nanana(myTarget): à results: myTarget
jhdsgjhas(tg2)kjafja à results: tg2

And the second one from things such as:

hsagdfjhagfxxxTARGETyyyyyy à resulting: TARGET

To configure the strings for probe/match used by auto discovery:

Perform this procedure to change the default settings or the probe or match strings used in auto discovery.

1. Select *Ports - CAS Profile - Auto Discovery*. The Settings, Probe Strings and Match Strings options appear in the side navigation bar.
2. To change the default auto discovery time-out or probe time-out, perform the following steps.
   a. Select *Settings*.
   b. Enter a new value in the Auto Discovery Timeout and Probe Timeout fields.
   c. Select a speed from the Default Speed on Auto Discovery Failure drop-down menu and Probe Speed List.
   d. Click *Save*.
3. To add a new probe or match string or delete an existing string, perform the following steps.
   a. Select *Probe Strings* or *Match Strings*.
   b. To add a string, click *Add*, enter a new string in the New Probe String or New Match String field and click *Save*.
   c. To delete a string, select the checkbox for the string and click *Delete*.
4. Click *Save*.

To configure the input/output strings used by auto answer:

1. Select *Ports - CAS Profile - Auto Answer*.
2. To add an auto answer input and output string, click *Add*. Enter a new string in the Input String or Output String fields and click *Save*.

   -or-

   To delete an auto input and output string, select the checkbox next to the string you want to delete. Click *Delete*, then click *Save*.

Pool of Ports

An administrator can create a pool of serial ports where each serial port in the pool shares a pool name, Telnet Port Alias, SSH Port Alias, Raw Mode Port Alias, IPv4 Alias and IPv6 Alias. The first available port in the pool is used as the serial port for connection.

NOTE: The multiple session access right does not have any effect when using a pool of CAS ports. When all ports in the pool are taken, the connection to the pool is denied.

NOTE: All ports in the pool must share the same CAS protocol. The protocol is validated during the connection to the serial port. If the protocol does not match, the connection will be denied.

To configure a pool of CAS ports:

1. Click *Ports - Pool of Ports*.
2. To create a pool, click the *Add* button.

   - or -

   To edit an existing pool, click the name of the pool you want to edit.

   - or -

To delete a pool, check the box next to the pool you want to delete and click the *Delete* button.

3. Enter the parameters for the pool in the appropriate fields.
4. In the left side of the Pool Members field, select the ports to be added to the pool and click *Add*.

   - or -

   In the right side of the Pool Members field, select the ports to be removed from the pool and click *Remove*.

5. Click *Save*.

NOTE: A serial port can only belong to one pool at a time, but a user can create an empty pool and add ports to it later.

Table 3.16 Pool of CAS Ports Parameters

PARAMETER	DESCRIPTION
Pool Name	The name of the pool. The pool name is mandatory and should follow hostname guidelines, not exceed 64 characters and start with a letter.
Port Alias	The Port Alias where the pool responds for each protocol. • Telnet Port Alias for telnet protocol. It is optional. • SSH Port Alias for ssh protocol. It is optional. • Raw Mode Port Alias for raw mode protocol. • It is mandatory when Raw Mode is configured as protocol for the ports.
Pool IPv4 Alias	The IPv4 address used by the pool. This parameter is optional.
Pool IPv4 Alias Interface	The interface used by the IPv4 Alias. Default: eth0.
Pool IPv6 Alias	The IPv6 address used by the pool. This parameter is optional.
Pool IPv6 Alias Interface	The interface used by the IPv6 Alias. Default: eth0.

RESTful API

The console server supports a programmable RESTful API interface that provides access to resources and functionality of the console server with the ability to support full GET and POST operations on devices.

NOTE: URL options must be configured using either HTTP or HTTPS with the RESTful API menu.

To configure the RESTful API:

1. Click *Ports - CAS Profile - RESTful Settings*.
2. Enter the Action Name, URL, POST Data, Username and Password in the appropriate fields and use the drop-down menu to select GET or POST as the HTTP Method for each RESTful option. Click *Save* when finished.

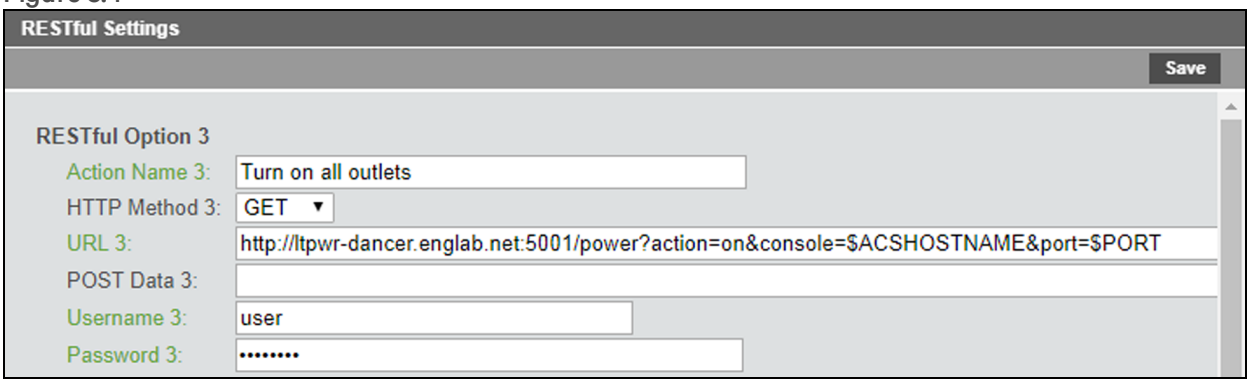
When configuring actions, the following context variables can be used.

Table 3.17 Context Variables Descriptions

CONTEXT VARIABLE	DESCRIPTION
$PORT	Identifies the serial port (1-48) when the menu is invoked.
$PORTNAME	The name of the port.
$IPPORTALIAS	The IPv4 alias of the port.
$TCPPORTALIAS	The TCP (Telnet port) alias of the port.
$ACSHOSTNAME	The host name of the console server.
$ACSIPADDR	The IP address of the console server.

Figure 3.3 RESTful API Configuration Example

Figure 3.4



NOTE: HTTP POSTs can sometimes use the HTTP request body to send appropriate information to servers, usually coded as XML or JSON.

To enable the RESTful API:

1. If port access applies to all users, from the side navigation bar of the *Expert* tab, click *System - Security - Security Profile*, then under Serial Devices, click the RESTful Menu checkbox and click *Save*.

   -or-

   If port access is controlled by authorization assigned to users groups, from the side navigation bar of the Expert tab, click *Users - Authorization - Groups*.

   a. Click the group for which you want to enable the RESTful API.
   b. From the side navigation bar, click *Access Rights - Serial*.
   c. Click the port for which you want to enable the RESTful menu. Under Target Access Rights, click the RESTful Menu box.
2. From the side navigation bar of the Expert tab, click *Ports - Serial Ports*.
3. Click the port for which you want to enable the RESTful menu and then click the CAS heading at the top of the window.
4. In the RESTful Hot Key field, enter the hotkey you want to use to initiate the RESTful API and click *Save*.

NOTE: The hotkey is not set by default.

Using the RESTful API interface

After opening a serial session, press the hot key to open the RESTful API interface for the current session. Enter the number of the RESTful API request you want to perform. By default, Exit and Help are the first two requests in the menu. You can configure up to eight additional requests from the web UI of the console server.

The following is an example of the RESTful menu from a serial session.

Figure 3.5 RESTful API Example

```
----------------------------------------
RESTful Management Utility
----------------------------------------
1 - Exit
2 - Help
3 - Turn On Outlet
4 - Turn Off Outlet
5 - Twist
6 - Twist On
7 -
8 -
9 -
10 -
Please choose an option:
```

3.9.5 Dial-in Profile

An administrator can configure secure dial-in settings such as OTP login, PPP connections, PPP/PAP authentication, callback and OTP users for PPP connections.

NOTE: If pluggable devices are being used for dial-out, dial-in should be disabled.

To configure secure dial-in settings for ports with the Dial-in Profile:

1. Select *Ports - Dial-In Profile - Settings*.
2. To enable logging in to the console server through the modem and select a condition for which logging in is allowed, perform the following steps.
   a. To allow callback connections only, select *Callback*.
   b. To allow any connection, select *Enable*.
3. To enable OTP authentication, select *Enable* from the OTP Login Authentication menu.
4. To enable and select a condition for PPP connections, perform the following steps.
   a. To allow PPP callback connections only, select *Callback*.
   b. To allow any connection, select *Enable*.
5. When the PAP authentication protocol is configured for the port, select the authentication type from the PPP/PAP Authentication menu.
6. Click *Save*.

To configure callback users and phone numbers for ports with the Dial-in Profile:

1. Select *Ports - Dial-In Profile - Secure Dial-In - Callback Users*.

2. Click *Add*.
3. Enter the name and phone number used to perform the callback in the appropriate fields and click *Save*.

To configure PPP OTP users for ports with the Dial-in Profile:

1. Select *Ports - Dial-In Profile - Secure Dial-In - PPP OTP Users*.
2. Click *Add*.
3. Enter the username and passphrase in the appropriate fields and click *Save*.

NOTE: This PPP OPT user will establish PPP connection after being successfully authenticated.

To configure EAP-TLS as PPP authentication for ports with the Dial-in Profile:

1. Select *Ports - Serial Ports*.

   -or-

   Select *Ports - Auxiliary Ports*.

2. Check the box next to the port where the modem is connected and click *Set Dial-In*.

NOTE: If using an auxiliary port, the modem can be internal.

3. Configure the PPP Address settings. For example, set the PPP Address to Local Configuration using 10.0.0.1 as the Local IPv4 Address and 10.0.0.2 as the Remote IPv4 Address.
4. For PPP Authenticaion, select the button next to By Appliance, and then select the button next to EAP for the protocol. Click Save.
5. Select *Ports - Dial-In Profile - Settings*.
6. Use the drop-down menu to enable the PPP Connection and click *Save*.
7. Copy the certificates and keys to the /etc/ppp/cert file. They must be named server.crt (the ACS6000 console server certificate), ca.crt (the Certificate Authority's certificate) and server.key (the ACS6000 console server asymmetric key).

3.9.6 Dial-out Profile

To configure the Dial-out Profile for a serial port with a connected modem:

1. Select *Ports – Serial Ports*.
2. Click the checkbox for a serial port with a connected modem.
3. Click the *Set Dial-out* button.
4. Use the drop-down to enable/disable the port.
5. Configure the phone number to dial on-demand in the field Phone No.
6. Use the drop-down to configure the modem speed.
7. Configure the initial chat with modem in the Init Chat field.
8. Configure the PPP parameters (address, authentication and so on) and click *Save*.

NOTE: The Dial-out profile will work only to establish PPP link on-demand. The administrator must configure static route to have packages routed to the PPP interface.

Table 3.18 Dial-out Parameters

PARAMETER	DESCRIPTION
Status	Enables or disables the port. Default: Disabled.
Phone No.	The phone number to dial to.
Speed	The speed that will be used to configure the serial device and communicate with the connected modem.
Init Chat	Chat for modem initialization.
Local IPv4/IPv6 Address	Configures the local IPv4/IPv6 address for this PPP connection. If empty, PPP will accept the address from the remote peer.
Remote IPv4/IPv6 Address	Configures the remote IPv4/IPv6 address for this PPP connection. If empty, PPP will accept the address from the remote peer.
PPP Authentication Protocol	
PPP Idle Timeout	Number of seconds being idle before PPP times out. Default: 0 (no time-out).
CHAP	

To configure the Socket Client Profile for a serial port with a connected device:

1. Select *Ports - Serial Ports*.
2. Click the checkbox for a serial port with a connected device.
3. Click *Set Socket Client* and use the drop-down menus to configure the physical settings.
4. Configure the Socket Client Settings (remote server address, TCP port and event trigger) and click *Save*.

Table 3.19 Socket Client Parameters

PARAMETER	DESCRIPTION
Enable Cisco RJ-45 Pin-Out	Defines the serial port pinout.
Status	Defines the status of the serial port as either enabled or disabled. Default: Disabled.
Speed	Defines the speed as 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 or 230400. Default: 9600.
Parity	Defines the parity as Even, Odd or None. Default: None.
Data Bits	Defines the data bits as 5, 6, 7 or 8. Default: 8.
Stop Bits	Defines the stop bits as 1 or 2. Default: 1.
Flow Control	Defines the flow control as none, hardware, software, RxON software or TxON software. Default: None.
Remote Server	IPv4 or IPv6 address of the remote server.
Remote TCP Port	TCP port to be used to establish a connection with a remote server.
Establish Connection	Configure the event that will trigger the establishment of the connection: DCD Regards or Always.

3.10 Pluggable Devices

The console server supports a variety of pluggable devices connected to its USB ports.

NOTE: When a pluggable device is not in the current list of supported pluggable devices, the console server may attempt to configure the device with standard settings, allowing it to work normally. Also, when a pluggable device is not listed in the internal database, the Device Info column may show no text at all or show different text based on the type of card. One example is Unknown device f024 (rev 01).

To install and detect a pluggable device:

1. From the side navigation bar, select *Pluggable Devices*.
2. Click *Enable Pluggable Device Detection* to detect connected pluggable devices.
3. Connect a device to a USB port on the console server.
4. The Pluggable Devices table displays all detected pluggable devices.

NOTE: To disable pluggable device detection, click *Disable Pluggable Device Detection*.

To eject or delete a pluggable device:

1. From the side navigation bar, select *Pluggable Devices*.
2. Select the checkbox next to the pluggable device you want to eject, rename or delete.
3. Click *Eject*, *Rename* or *Delete* as desired. If renaming a device, enter the new name in Rename field. Click *Save*.

NOTE: Always eject a pluggable device from the web manager. Any other method may cause a kernel panic.

3.10.1 Device configuration

Storage devices are automatically mounted and configured once detected by the console server. Ethernet cards and modems must be configured.

NOTE: Configuration of wireless devices takes effect only after the device is ejected and re-inserted.

To configure a pluggable device:

1. From the side navigation bar, click *Pluggable Devices*.
2. For a network device, click its name to configure its network parameters.
3. -or-
4. For a modem (V.92), click the box next to its name and then click either *Set Dial-In* or *Set Dial-Out* to configure its dial-in or dial-out parameters.

3.11 Authentication

Authentication can be performed locally, with OTP, or on a remote LDAP, Radius or TACACS+ authentication server. If the console server is managed by a DSView server, DSView authentication is also supported. The console server also supports remote group authorizations for the LDAP, Radius and TACACS+ authentication methods.

Fallback mechanisms of the following types are available:

Local authentication can be tried first, followed by remote, if the local authentication fails (Local/Remote_Method).

-or-

Remote authentication may be tried first, followed by local (Remote_Method/Local).

-or-

Local authentication may be tried only if a remote authentication server is down (Remote_Method_Down_Local).

An administrator can configure authentication using the CLI utility and the web manager. The default authentication method for the console server and the serial ports is Local. Any authentication method that is configured for the console server or the ports is used for authentication of any user who attempts to log in through Telnet, SSH or the web manager.

3.11.1 Appliance authentication

The console server authenticates for the console server and the ports, either in groups or individually.

NOTE: It is advised when using group authorization that you use the same authentication for both the console server and all serial ports, or use Single Sign-on Authentication to facilitate group authorization.

When Single Sign-on Authentication is disabled, the console server uses the individual configuration based in the destination of the access: the console server itself or each serial port. Users must use their password each time they access an individual port. If enabled, Single Sign-on Authentication will use the authentication server you choose from the pull-down menu for all access and no further authentication will be needed.

NOTE: Selecting *unconfigured* from the pull-down menu will allow the ports to continue to use individual authentication servers, and will require your password the first time you access any port. After that, the port will not require password authentication if Single Sign-on Authentication is enabled.

To set authentication for the console server:

1. Click *Authentication - Appliance Authentication*.
2. Select the desired authentication server from the Authentication Type drop-down menu.
3. Select *Enable fallback to Local type for root user in appliance console port* when the remote authentication fails and an administrator wants to access the appliance via console port as the root user.
4. Select *Enable single sign-on* to enable single sign-on authentication, and select the desired authentication server from the Authentication Type drop-down menu.
5. Click *Save*.

3.11.2 Authentication servers

When using an authentication server, you must configure its IP address and in most cases other parameters before it can be used. The following authentication servers require configuration: RADIUS, TACACS+, LDAP(S)|AD and DSView servers.

To configure a RADIUS authentication server:

1. Select *Authentication - Authentication Servers - RADIUS*.
2. Enter the IP addresses of the First Authentication Server and First Accounting Server.
3. If used, enter the IP addresses for the Second Authentication Server and Second Accounting Server.
4. Enter your secret word or passphrase in the Secret field (applies to both first and second authentication and accounting servers), then re-enter the secret word or passphrase in the Confirm Secret field.
5. Enter the desired number of seconds for server time-out in the Timeout field.
6. Enter the desired number of retries in the Retries field.

7. If you select the *Enable Service-Type attribute to specify the authorization group* checkbox, enter the authorization group name for each of the following Service Types: Login, Framed, Callback Login, Callback Framed, Outbound and Administrative.
8. Click *Save*.

To configure a TACACS+ authentication server:

1. Select *Authentication - Authentication Servers - TACACS+*.
2. Enter the IP addresses for the First Authentication Server and First Accounting Server.
3. If used, enter the IP addresses of the Second Authentication Server and Second Accounting Server.
4. Select the desired service (PPP or raccess) from the Service drop-down menu.
5. Enter your secret word or passphrase in the Secret field (applies to both first and second authentication and accounting servers), then re-enter the secret word or passphrase in the Confirm Secret field.
6. Enter the desired number of seconds for server time-out in the Timeout field.
7. Enter the desired number of retries in the Retries field.
8. If you select the *Enable User-Level attribute to specify the authorization group* checkbox, enter the authorization group name for up to 15 User-Levels.
9. Click *Save*.

To configure an LDAP(S)|AD authentication server:

1. Select *Authentication - Authentication Servers - LDAP(S)|AD*.
2. Enter the IP address of the server.
3. Enter the Base.
4. At the Secure drop-down menu, select *Off*, *On* or *Start_TLS*.
5. Enter the Database User Name.
6. Enter your Database Password, then re-type the database password in the Confirm Password field.
7. Enter your desired Login Attributes.
8. Click *Save*.

To configure a DSView authentication server:

1. Select *Authentication - Authentication Servers - DSView*.
2. Enter IP Address 1 - 4 for the DSView servers in the relevant fields.
3. Click *Save*.

3.12 Users Accounts and User Groups

Access to ports and other privileges can be managed, based on authorizations that an administrator can assign to custom user groups.

Groups can also be authorized to manage power while connected to devices. The console server has two default users (admin and root) and four pre-defined user groups: admin, appliance-admin, shell-login-profile and user.

A user account must be defined for each user on the console server or on an authentication server. The admin and root users have accounts by default, and either administrator can add and configure other user accounts. Each local user account is assigned to one or more of the user groups.

CAUTION: Change the default passwords for root and admin before you put the console server into operation.

By default, all users have access to all ports on the console server. In order to authorize access via user groups, an administrator must enable port access to be controlled by authorizations assigned to user groups.

To enable port access to be controlled by authorizations assigned to user groups:

1. From the expert tab of the side navigation bar, click *System - Security - Security Profile*.
2. Under the Serial Devices heading, click the button next to Controlled by authorizations assigned to user groups, then click *Save*.

3.12.1 Local accounts

The **admin** and **root** are equivalent users but named differently to address users familiar with either Avocent equipment or the Cyclades families of console servers. Regular users can be granted permissions by administrators at any time. The console server has two local user accounts by factory default.

- admin: Performs the initial network configuration. The factory default password for admin is **avocent**. The admin user is a member of the admin group and can configure the console server and ports as well as user and group authorizations.
- root: Has the same permissions as the admin user. The factory default password for root is **linux**. The root user is a member of the admin and shell-login-profile groups. When a root user logs in via the CONSOLE port, SSH or telnet, the session is pre-defined by the login profile to go directly to shell. The login profile can be customized so that it does not go directly to shell.

To add new users:

1. Click *Users - Local Accounts - User Names*. The User Names screen is displayed with a list of all users.
2. Click *Add*. The Local User Information screen is displayed.
3. Enter the new username and enter a password, then confirm the password.
4. Select or deselect *User must change password at the next login* checkbox.
5. To add the user to an available user group, select the user group name in the box on the left and click *Add* (user is the default group). You can remove a user group from the box at right by selecting it and clicking *Remove*.
6. Enter the desired parameters for Password Expiration.
    - Min Days: Enter the minimum number of days allowed between password changes. Password changes attempted sooner will be rejected. If not specified, -1 is the default which disables the restriction.
    - Max Days: Enter the maximum number of days a password is valid. After this period, a password change will be forced. If not specified, -1 is the default which disables the restriction.

- Warning Days: Enter the number of days that a warning is issued to the user prior to expiration. Entering 0 will cause the warning to be issued on the expiration day. A negative value or no value means that no warning will be issued.

7. Enter the desired Account Expiration date (YYYY-MM-DD).
8. Click *Save*.

To configure password rules:

1. Click *Users - Local Accounts - Password Rules*.
2. If password complexity is desired (recommended), make sure *Check Password Complexity* is selected.
3. If password complexity is enabled, enter the desired values for password complexity.
4. Enter the desired values for Default Expiration.
5. Click *Save*.

3.12.2 User Groups

User groups are given access and authorizations either by default or as assigned by an administrator. Administrators can alter the permissions and access rights of users belonging to the appliance-admin or user groups or create additional groups with custom permissions and access rights. Administrators can add, delete or modify permissions and access rights for users from any group at any time.

If an administrator configures the console server to restrict user access to ports, the administrator can assign users to groups that are authorized for port access. The administrator can also authorize groups for power management and data buffer management.

This document and the software refer to users whose accounts are configured on remote authentication servers as remote users. Remote users do not need local accounts.

Radius, TACACS+ and LDAP authentication services allow group configuration. If a remote user is configured as a member of a remote group, the authentication server provides the group name to the console server when it authenticates the user. A local group by the same name must also be configured on the console server. If an authentication server authenticates a remote user but does not return a group, then the remote user is, by default, assigned to the user group.

admin group

Members of the admin group have full administrative privileges that cannot be changed. They have the same access and configuration authorizations as the default admin user. Administrators can configure ports, add users and manage power devices connected to the console server.

To view admin Appliance Access Rights:

1. Click *Users - Authorization - Groups*. The Group Names screen is displayed, showing the three default user groups along with any groups that have been created.
2. Click on *admin* under the Group Name heading. The content area will display the Members screen listing all members belonging to the admin group (default members are admin and root users).

NOTE: When any Group Name is selected, both the content area and side navigation bar change. The side navigation bar will display specific menu options for Members and Access Rights (which include Serial, Power and Appliance rights).

3. In the side navigation bar, click *Access Rights - Serial* or *Access Rights - Power* to access the screens displaying the fixed access rights and permissions for members of the admin group pertaining to serial ports and power management.

NOTE: The Serial and Power screens are read-only and cannot be changed.

4. In the side navigation bar, click on *Access Rights - Appliance*. The Appliance Access Rights screen appears and lists all access rights available to a member belonging to the admin group. All appliance access rights are shown enabled (checked). Available appliance access rights are:
    - View Appliance Information
    - Disconnect Sessions
    - Reboot Appliance
    - Appliance Flash Upgrade and Reboot Appliance
    - Configure Appliance Settings
    - Configure User Accounts
    - Backup/Restore Configuration
    - Shell Access
    - Transfer Files

NOTE: The Appliance Access Rights screen for the admin and appliance-admin user groups is read-only and cannot be changed. Unchecking any box and clicking *Save* will result in an error message. The console server will maintain all rights selected.

appliance-admin group

Appliance-admin user group members have access to the serial ports and power management options, unless that access is restricted by the security profile. Members of the group also share all of the appliance access rights as admin except for Configure User Accounts and Shell Access, which are permanently disabled for this group.

user group

User group members have access to target devices, unless that access is restricted by an administrator. When a security profile restricts port access globally, an administrator may grant port access to members of the user group. User group members have no access rights for the console server.

Administrators can add appliance access rights and permissions. Administrators can also add users to custom user groups to add permissions and access rights as needed. By default, all selections on the Appliance Access Rights screen will be disabled.

NOTE: The Appliance Access Rights screen for the user group can be changed at any time by an administrator. This will change the access rights for all members of the console server's user group.

shell-login-profile

Members of the shell-login-profile group have access to the shell after logging in. By default, the root user belongs to this group. This is not a protected group and can be deleted.

Managing user groups

Administrators and members of the admin group can create custom user groups that contain any users.

To create a custom user group:

1. Click *Users - Authorization - Groups*. The Groups screen is displayed and contains a list of the three default user groups and any additional custom user groups that have been created.
2. Click *Add* in the content area.
3. Enter the name of the new user group you are creating.
4. Click *Save*.

To add members to a user group:

1. Click *Users - Authorization - Groups*.
2. Click the user group name.
3. Click *Add*. The Members Assignment screen is displayed showing a list of available users in the left box and an empty box on the right.
4. Move users from the Available Users box on the left to the box on the right by double-clicking on the username, or by selecting the name and clicking the *Add* button. You can remove any names from the box on the right by double-clicking on the name or by selecting the name and clicking the *Remove* button.
5. If you want to add remote users to the new user group (these must be valid names in your remote authentication server), add them in the New Remote Users field.
6. Click *Save*.

To remove members from a user group:

1. Click *Users - Authorization - Groups*.
2. Click the user group name.
3. Check the box(es) of the member(s) you want to remove. Click *Delete* to delete the selected members.

To configure a session idle time-out and/or login profile for a group:

1. Click *Users - Authorization - Groups*.
2. Click on the name of the group whose session idle time-out and/or login profile you want to set. In the side navigation bar, click *Login Profile*.
3. Select the radio button to use either the global settings for the Session Timeout or to use custom settings for the user group. If using custom settings, enter the custom session timeout (in seconds) in the field.
4. Check the *Enable Log-In Profile* box.
5. Click *ts_menu* to use the ts_menu application when a member of the selected user group opens a session in the console server. Enter the ts-menu options in the Options field.

   -or-

   Click *CLI* to use CLI when opening a session. Enter the CLI command in the CLI cmd field and check the box if you want to exit after executing the command.

6. Click *Save*.

NOTE: If the user belongs to multiple groups, the login profile used will be the first enabled login profile based on alphabetical order of the group.

Table 3.20 ts_menu Options

COMMAND	DESCRIPTION
-p	Displays TCP port
-i	Displays local IPv4 assigned to the serial port
-i6	Displays local IPv6 assigned to the serial port
-u <name>	Username to be used in the target session
-e <[^]char>	Escape character used to close the target session. Default value: Ctrl-X
-l	Sorted lists ports and exit
-ro	Read-Only mode
<portname>	Connect directly to a serial port
-t	Idle time-out in seconds to choose the target

To add access to serial ports for a user group:

1. Click *Users - Authorization - Groups*.
2. Click the new user group name.
3. In the side navigation bar, click *Access Rights*.
4. In the content area, click *Add*.
5. Move serial target devices from the Available Target box on the left to the box on the right by double-clicking on the serial target name, or by selecting the target and clicking the *Add* button. You can remove any targets from the box on the right by double-clicking on the target or by selecting the target and clicking the *Remove* button.
6. Select the desired access rights.
7. Click *Save*. The Serial screen will appear and show the serial target devices you have authorized for use by the user group with configured permission(s).
8. Edit the access rights by selecting the checkbox next to one or more of the target names in the list as needed and click *Edit*. The Target Access Rights screen is displayed with the access rights. Select the desired access rights and click *Save*.

To assign PDU access for a user group:

NOTE: Assigning PDU access to a user group gives them full access to all power management functions for that PDU. If you want the user group to have access to outlets only, use the procedure *To assign outlet access for a new custom user group* below.

1. Click on *Users - Authorization - Groups*.
2. Click on the user group name.
3. In the side navigation bar, click *Access Rights - Power*.
4. In the content area, click *Add*. The PDU Assignment screen appears with the list of available PDUs in the left box.
5. Move PDU devices from the Available PDU box on the left to the box on the right by double-clicking on the PDU name, or by selecting the PDU and clicking the *Add* button. You can remove any PDUs from the box on the right by double-clicking on the PDU name or by selecting the PDU and clicking the *Remove* button.
6. You can specify a custom PDU ID in the field at bottom and assign it a custom PDU ID.

NOTE: The custom PDU ID is for assigning user group authorization to manage PDUs that have not yet been connected to the console server.

7. Click *Save*.

To assign outlet access for a new custom user group:

NOTE: Assigning outlet access to user groups allows group members to turn outlets on or off, and enable locking and power cycle capabilities on compatible PDUs.

1. Click *Users - Authorization - Groups*.
2. Click on the new user group name.
3. In the side navigation bar, click *Access Rights - Power - Outlets*.
4. Click *Add*. The Add Outlet screen is displayed.
5. For connected PDUs, click the *Select PDU* button to activate the Connected PDUs and Outlets fields.
6. Select *Connected PDU* from the pull-down menu.
7. Enter the outlets assigned to the user group.

NOTE: Outlets can be specified individually, (for example 1,3,6,8) or as a range (for example 1-4) or a combination of both, (for example 1-4,6,8 which assigns access to outlets 1, 2, 3, 4, 6 and 8).

8. If a custom PDU ID has been created for future use, and you want to pre-assign outlets, click the *Custom* button to enter the custom PDU ID name and specify the outlets.
9. Click *Save*.

To assign appliance access rights for custom user groups:

1. Click *Users - Authorization - Groups*.
2. Click the new user group name.
3. In the side navigation bar, click *Access Rights - Appliance*.
4. Select the desired appliance access rights and click *Save*.

To configure a group in a TACACS+ authentication server:

1. On the server, add raccess service to the user configuration.
2. Define which group(s) the user belongs to in the raccess service following this syntax:

group_name = <Group1>[,<Group2,...,GroupN>];

For example:

In the console server, configure a new authorization group TACACS_1 , and configure the access rights for this group. In the TACACS+ server, configure the user regina with the following attribute: `raccess = group_name=TACACS_1;`

Then, configure the user special with the following attribute: `raccess = group_name=admin;`

During the authentication phase, the console server will receive the attribute raccess from the TACACS+ server. The user regina belongs to the authorization group TACACS_1 and the user special belongs to the authorization group admin.

To configure a group in a RADIUS authentication server:

Define which group(s) the user belongs to in the attribute FRAMED_FILTER_ID with the following syntax:

```
[:group_name=]<acs6000_group1>[,<acs6000_group2>];
```

NOTE: The group names should be separated by a comma and end with a semi-colon.

NOTE: The ACS6000 console server accepts multiple FRAMED_FILTER_ID attributes.

For example:

In the console server, configure new authorization groups RADIUS_1 and RADIUS_2, and configure the access rights for these groups. In the Radius server, configure the user regina with the following attribute:

```
FramedFilterID = group_name=RADIUS_1,RADIUS_2;
```

-or-

```
FramedFilterID = RADIUS_1,RADIUS_2;
```

-or-

```
FramedFilterID = RADIUS_1;
FramedFilterID += RADIUS_2;
```

Then, configure the user special with the following attribute:

```
FramedFilterID = group_name=admin;
```

During the authentication phase, the console server will receive the attribute FramedFilterID from the RADIUS server. The user regina belongs to authorization group RADIUS_1 and RADIUS_2. and the user special belongs to authorization group admin.

To configure group an LDAP authentication server:

On the LDAP server, edit the info attribute for the user and add the following syntax.

```
info: group_name=<Group1>[,<Group2>,...,<GroupN>];
```

3.12.3 DSView software access rights

An administrator can configure how the DSView software's viewer session rights will be mapped to the console server's access rights when a user accesses a target via the DSView software's serial viewer.

To configure the map of DSView software access rights to console server access rights:

1. Click *Users – Authorization – DSView Access Rights*.
2. Select the desired access rights and click *Save*.

3.13 Event Notifications

The console server will generate notifications for a variety of events. You can configure the console server to direct or store those event notifications to various destinations for immediate use or for analysis later.

3.13.1 Event List

The Event List screen lists console server events, each of which can be configured for SNMP Traps, Syslog, DSView software, Email and SMS.

To configure Events:

1. Click *Events and Logs - Events*.
2. Locate the events for which you want notification sent and select the checkbox(es) next to the event number(s).
3. Click *Edit*.
4. If you want an event notification sent for any configured event destination type, click its associated *Send* checkbox.
5. Click *Save*. The Events page appears with an X in the column below the destination type if the Send box was checked on the Events Settings screen.

3.13.2 Event Destinations

The console server will generate notifications for a variety of events. You can configure the console server to direct or store event notifications to various destinations for immediate use or for analysis later.

To configure Event Destinations:

1. Click on *Event and Logs - Event Destinations*.
2. Under the Syslog heading, use the drop-down menu to select the Facility.

   Select *Remote Server - IPv4* to enable syslog messages to be sent to one or more remote IPv4 syslog servers, and enter the IPv4 Address or Hostname and the UPD port for each remote syslog server.

   -or-

   Select *Remote Server - IPv6* to enable syslog messages to be sent to one or more remote IPv6 syslog servers, and enter the IPv6 Address or Hostname and the UPD port for each remote syslog server.

3. Select *Appliance Console* to send messages to the console server's console.
4. Select *Root Session* to send syslog messages to all sessions where you are logged in as root user.
5. Under the SNMP Trap heading, enter the name of the community defined in one or more of the SNMP trap servers in the Community field then enter the IP addresses of up to five servers in the server fields.
6. Under the SMS heading, enter the SMS Server, Port and Pager Number information in the appropriate fields.
7. Under the Email heading, enter the Server, Port and Destination Email information in the appropriate fields.
8. Under the DSView heading, enter the IP address of the DSView server where event notifications will be sent in the DSView server field. Enter the syslog server port number for the DSView server, the SSH information and the buffer warning information in the appropiate fields.
9. Click *Save*.

3.13.3 Trap Forward

The console server will receive SNMP traps and forward them to a remote SNMP trap server.

To add a SNMP trap server to forward traps:

1. Click *Events and Logs – Trap Forward*.
2. Click *Add*.
3. Enter the IP address of the remote server and the UDP port.
4. Enter the OID to filter traps to send to this server (optional).

To edit SNMP trap server configuration:

1. Click *Events and Logs – Trap Forward*.
2. Click the index of the server to be edited.
3. Update the UDP port and/or the OID and click *Save*.

3.13.4 Data Buffering

To configure Data Buffering:

1. Select *Events and Logs - Data Buffering*.
2. Enter the segment size in kilobytes and spare segments in the Local Data Buffering Settings section.
3. In the NFS Data Buffering Settings section, enter the following information: NFS Server, NFS Path, Segment Size (Kbytes) and Spare Segments.

NOTE: RPC service must be enabled in the Security Profile screen before configuring NFS Data Buffering Settings. NFS does not support IPv6.

4. To segment data buffering files every day based in hour, enter the time in the Close Log Files and Open New Ones at Time (HH:MM) field. This will be valid for local and NFS data buffering.
5. To configure data buffer storage on a syslog server in the Syslog Data Buffering Settings section; select a facility number from the drop-down menu: Log Local 0, Log Local 1, Log Local 2, Log Local 3, Log Local 4 or Log Local 5.
6. Click *Save*.

3.13.5 Appliance logging

To configure appliance logging:

1. Click *Enable appliance session data logging*.
    a. Select the destination for appliance session data logs from the pull-down menu. Choices are Local, NFS, Syslog and DSView.
    b. Enable or disable timestamping the appliance session data logs.
2. Click *Enable appliance session data logging alerts*.
3. Enter the desired alert strings (up to ten) in the fields provided.
4. Click *Save*.

3.13.6 Sensors

The console server has sensors that monitor the internal temperature. You can specify an operating range for the console server that fits its environment.

CAUTION: Do not use values that exceed the maximum and minimum temperatures. Appendices **on page 71.**

To configure the temperature sensors:

1. Click *Events and Logs - Sensors*.
2. In the Maximum Temperature field, enter the temperature in degrees Celsius that, if exceeded, will generate an event notification.
3. In the Maximum Temperature Threshold field, enter the temperature threshold in degrees Celsius below the maximum temperature.

NOTE: The Maximum Temperature Threshold field will define a region around the maximum temperature. When the temperature exceeds the Maximum Temperature plus Threshold, an event notification will be generated. When the temperature falls below the Maximum Temperature minus Threshold, an even notification that the console server has returned to normal operating temperature will be generated. This is also true for setting the minimum temperature threshold.

4. In the Minimum Temperature field, enter the temperature in degrees Celsius that, if the console server's temperature falls below, will generate an event notification.
5. In the Minimum Temperature Threshold field, enter the temperature threshold in degrees Celsius above the minimum temperature.
6. Click *Save*.

3.14 Power Management

Connected power devices can be used for remote power management. The console server enables users who are authorized for power management to turn power on, turn power off and reset devices that are plugged into a connected PDU.

The following types of power devices can be connected to any serial port or to the AUX/Modem port (if an internal modem is not installed):

- Vertiv™ MPH2 rack Power Distribution Units (PDUs) as well as MPX and MPH rack PDUs with RPC2 cards installed.
- Cyclades PM Intelligent Power Distribution Units (IPDUs) - With Cyclades PM IPDUs, up to 128 outlets can be daisy-chained and managed from a single serial port.
- Avocent SPC power control devices.
- Server Technology Sentry™ family of Switched Cabinet Power Distribution Units (CDUs), Smart Cabinet Power Distribution Units (Smart CDUs) and switched CDU Expansion Module (CW/CX) power devices. One additional level of power devices can be daisy-chained with ServerTech Expansion modules.
- Server Technology Sentry Power Tower XL™ (PTXL) and Power Tower Expansion Module (PTXM) power devices.

NOTE: The term PDU refers to any of these types of power devices.

The console server automatically recognizes and supports Liebert RPC2 cards, Cyclades PM PDUs or Avocent SPC devices when the corresponding serial port is configured for power management.

3.14.1 PDUs

To manage a PDU:

1. Select *Power Management - PDUs*.
2. Select the checkbox next to the PDU you want to manage.
3. Click *On, Off, Cycle, Reboot PDU, Reset HW Overcurrent Protection* or *Factory Defaults* if desired. A confirmation appears. Click *OK*.

NOTE: The power controls (On, Off and Cycle) will be applied to all outlets of the PDU.

4. To change the PDU ID, click *Rename* and enter the name in the New PDU ID field.
5. Click *Save*.

To upgrade firmware:

1. Select the checkbox next to the PDU you want to upgrade and click the *Upgrade Firmware* button.
2. Fill all fields with correct information and click *Download* to download the firmware to the console server.
3. When the download finishes, the Install PM Firmware screen appears. If the version information is correct, click *Upgrade Now* to start the upgrade of the firmware in the PDU.
4. When the upgrade finishes, the Finish Upgrade screen appears with the result of the upgrade action. Click *Finish*.

NOTE: You can upgrade the firmware for multiple PDUs at the same time for Avocent PM PDUs only.

To view a PDU's information and manage outlets:

1. Select *Power Management - PDUs*.
2. Click the name of the PDU you want to view or manage.
3. The Outlet Table with power controls window appears and the side navigation bar displays a list of options.
4. To manage outlets of PDU:
    a. Check the box(es) of the outlet number(s) you want to manage.
    b. Click *On*, *Off*, *Cycle*, *Lock* or *Unlock* to perform that function for the selected outlet(s).
5. Click *Information* in the side navigation bar to view a PDU's information.
6. Click *Overview* in the side navigation bar to view data monitoring information.
7. Click *Current, Voltage, Power Consumption, Energy Consumption* or *Environment* in the side navigation bar to view a table with appropriate information. Click *Reset Values* to clear Max, Min and Average values.

To configure a PDU:

1. Click *Settings* to expand the side navigation bar.
2. Click *Outlets*.
3. Click on an outlet number to change its settings. Click *Save,* then click *Close*.

    -or-

    Check two or more boxes next to the outlets for which you want to change settings. Click *Edit* to change the settings for the outlets you selected. Click *Save*.

4. Click *PDU* to view and configure PDU settings. Click *Save* when finished.
5. Click *Phases* or *Banks*.
    a. Click on the name of a phase or bank to change its settings, or click one or more boxes next to the phase(s) or bank(s) you want to change.
    b. Click *Save* to save the settings and click *Close* to return to the Phase screen.

NOTE: The PDU model defines available parameters in the Settings window.

3.14.2 Login

An administrator can change the login password for a supported PDU type. This password is used by the console server to communicate with the PDU. (Only one password is supported for all PDUs of the same type.)

To change a PDU password:

1. Select *Power Management - Login*.
2. To change the password for an Avocent or Cyclades PDU, an Avocent SPC power control device or a Server Tech PDU, enter the password in the appropriately labeled section.
3. Click *Save*.

3.14.3 Outlet Groups

By selecting the *Outlet Groups* tab, you can view status, outlet and power consumption for outlet groups, as well as configure them. You can also turn on, turn off or cycle selected outlet groups.

To manage outlet groups:

1. Select *Power Management - Outlet Groups*.
2. Check the box next to the name of the Outlet Group you want to manage.
3. Click the *On*, *Off* or *Cycle* radio button, if desired.

    -or-

4. Click *Add* to add an outlet group. The Add Group screen appears. Enter the name in the Group Name field.
5. Click *Save*.

To view and change outlet group information:

1. Select *Power Management - Outlet Groups*.
2. Click the name of the outlet group you want to view or manage.
3. To add outlets, click *Add* to add a new outlet to the group. Fill the fields and click *Save* to return to the Outlet Group Details table.
4. To delete outlets, check one or more boxes next to the outlet(s) you want to remove from the group. Click *Delete*, then click *Close* when finished.

3.14.4 Network PDUs

Power devices connected to the network with SNMP (read/write) enabled can be used for remote power management. The console server enables authorized users to turn power on and turn power off in devices that are plugged into the network PDU.

The following type of power devices are support via network connection:

- Vertiv™ MPH2 rack Power Distribution Units (PDUs) as well as MPX and MPH rack PDUs with RPC2 cards installed.
- Server Technology Sentry™ family of Switched Cabinet Power Distribution Units (CDUs) and switched CDU Expansion Module (CW/CX) power devices.

NOTE: SNMP needs to be enabled and have one community with write permission enabled in the PDU.

By selecting the *Network PDUs* node, an administrator can add new Network PDUs or edit configuration of current ones.

The following functionalities are supported for Network PDUs:Power Control (turn on, turn off and cycle/reboot) outlets, rename the PDU and rename the outlets

To add a network PDU

1. Select *Power Management – Network PDUs*.
2. Click *Add*.
3. Enter the IP address of the network PDU.
4. Select the PDU type: Net-ServerTech or Net-MPH/MPX.
5. Enter the interval to poll the PDU for the status of the outlets.
6. Enter the community name that has write permission in the PDU.

NOTE: The support for network PDUs is restricted to power operations (turn on, turn off, cycle outlets), rename PDU and rename outlets.

3.15 Active Sessions

The console server allows multiple users to log in and run sessions simultaneously. The Active Sessions feature allows you to view all active sessions and kill any unwanted sessions. Click *Active Sessions* to view all open sessions on the console server.

NOTE: If you start another session with the console server while viewing this screen, it will not be visible until you click *Refresh* at the top of the web manager window.

To kill an active session:

1. Click *Active Sessions*. The Active Sessions screen appears and lists all open sessions to the console server by the user's workstation IP.
2. Select the checkbox next to the session you want to kill, then click the *Kill* button. After a few seconds, the Active Session screen will redisplay the open sessions, minus the one you killed.

3.16 Monitoring

When you click *Monitoring*, a variety of network and console port information is available for viewing. The screens are only for viewing and have no interactivity with the user. The following table shows the types of information available.

Table 3.21 Monitoring Screens

SCREEN NAME	DEFINITION
Network - Devices	Shows Ethernet ports, Device Name, Status (enabled/disabled), IPv4 Address, IPv4 Mask and IPv6 Address (not available on all models).
Network - IPv4 Routing Table	Shows Destination, Gateway, Genmask, Flags, Metric, Ref, Use and Iface.
Network - IPv6 Routing Table	Shows Destination, NextHop, Flags, Metric, Ref, Use and Iface.
Serial Ports	Shows Device Name, Profile, Settings, Signals, TX Bytes, RX Bytes, Frame Error, Parity Error, Break and Overrun. The Reset Counter button allows administrators to reset the statistic counters for selected ports.
Fips Mode	Shows Service Name and Mode Indication.

3.17 Change Password

An administrator or user can change their own password from this screen.

To change your own password:

1. Select *Change Password*.
2. Enter the old password and new password in the appropriate fields.
3. Confirm the new password, then click *Save*.

3.18 Web Manager Overview for Regular Users

Table 3.22 Web Manager Options for Regular Users

MENU OPTION	DESCRIPTION
Access	Displays all the devices the user can access. Click on *Serial Viewer* in a device's Action column to launch a terminal session with that device.
Power Management PDUs Outlet Groups	Click *PDUs* to turn on, turn off, cycle, reboot, reset the HW overcurrent protection, returnt to factory defaults or rename PDUs connected to the console server. Click *Outlet Groups* to manage groups of outlets on connected PDUs.
Change Password	Change your own password.

4 APPENDICES

Appendix A: Technical Specifications

Table A.1 Technical Specifications for the ACS6000 Console Server Hardware

CATEGORY	VALUE
General Information	
CPU	PPC440EPx @ 533 MHz (PowerPC with Security Acceleration Engine)
Memory	256 MB DDR-2 / 128 MB NAND Flash (embedded ICs on motherboard)
Interfaces	2 Ethernet 10/100/1000BT on RJ-45 1 RS232 Console on RJ-45 1 AUX RS232 on RJ-45 or internal MODEM V.92 on RJ-45 (RJ11 compatible) RS232 Serial Ports on RJ-45 1 USB 2.0 Host on Type A connector
Power Information	
Power Supply	Internal 100-240 VAC, 50/60 HzOptional Dual entry, redundant power supplies-48 VDC option available
Power Consumption	Nominal voltage 120 VAC: Typical 0.17 A, 20 W Maximum 0.25 A, 30 W Nominal voltage 230 VAC: Typical 0.1 A, 23 W Maximum 0.15 A, 35 W Nominal voltage -48 VDC (20% tolerance) Typical 0.5 A
Ambient Atmospheric Condition Ratings	
Operating Temperature	32 °F to 122 °F (0° C to 50° C)
Storage Temperature	-4 °F to 158 °F (-20° C to 70° C)
Humidity	20% to 80% relative humidity (non-condensing) across the operating temperature range
Dimensions	
Height x Width x Depth	1.715 x 17.250 x 9.50 in (4.3561 x 43.815 x 24.13 cm)
Weight	6-7 pounds (2.722- 3.175 kg) depending on the model

Appendix B: Zero-touch provisioning

The zero-touch provisioning feature is an extension of the console server's BootP configuration retrieval and is a method for deploying many console servers into an environment. You will need a valid DHCP server and TFTP server to use zero-touch provisioning. You can configure your DHCP servers to instruct newly introduced console servers to download a template configuration and upgrade/downgrade firmware.

NOTE: Zero-touch provisioning is not supported for console servers running firmware versions prior to 3.1.x.

Setting up the DHCP/TFTP/configuration files should take only a few minutes and will potentially save hours of configuration time for console servers subsequently added to your network. After the provisioning step is completed, console servers can be accessed individually for any post-provision configuration desired (for example, assigning a static IP and a hostname).

With zero-touch provisioning, console servers can be automatically configured and upgraded after they are booted and initialized. This helps facilitate the introduction and installation of the console server into the existing network.

An administrator can view a log of zero-touch configurations by clicking *Monitoring-Zero-touch Log* from the sidebar of the Expert tab.

B.1 Zero-touch provisioning configuration file

In order to utilize the zero-touch provisioning feature, an administrator must first save a console server's configuration file on a remote server. The configuration file will be referenced by the setup file that will be created for zero-touch provisioning. For information on creating and saving a configuration file, see Configuration files on page 19.

NOTE: Parameters in the configuration file will apply to all console servers receiving the file. If you do not want a parameter to apply to all console servers, for example a host name, make sure you comment it out by entering a pound sign (#) in front of the parameter.

B.2 Setup file

Once the configuration file has been saved on a remote server and the DHCP server has been configured, an administrator needs to create a setup file. The setup file is used by the console server to identify configuration parameters and important provisioning information, such as the firmware image filename, configuration filename and the IP address for the remote server where the configuration file has been saved. Once the setup file has been created, it needs to be stored on a TFTP server. The IP address of the TFTP server will be sent in the DHCP offer message.

NOTE: It is recommended you store the setup file in the root folder if you're storing it on a TFTP server.

The following is an example of the setup file.

```
ONE_TIME_CONFIG=YES
FIRMWARE_VERSION=1.0.1
FIRMWARE_FILENAME=/var/tftp/acs6000/acs6000_1.0.1.bin
FIRMWARE_SERVER_IP=192.168.100.2
FIRMWARE_SERVER_USERNAME=<the required username>
FIRMWARE_SERVER_PASSWORD=<the required password>
FIRMWARE_SERVER_PROTOCOL=SFTP
```

```
CONFIG_FILENAME=/tftp/config-xml
CONFIG_SERVER_IP=192.168.100.2
CONFIG_SERVER_USERNAME=<the required username>
CONFIG_SERVER_PASSWORD=<the required password>
CONFIG_SERVER_PROTOCOL=SFTP
```

Table A.2 Setup File Descriptions

PARAMETER	DESCRIPTION
ONE_TIME_CONFIG	When the parameter is set to Yes, the configuration file is retrieved by the console server on the initial boot; it is not sent on subsequent boots. When set to No, the configuration file is retrieved by the console server each time it is booted.
FIRMWARE_VERSION	The version of the firmware to be sent to the appliance.
FIRMWARE_FILENAME	The path and file name of the firmware.
FIRMWARE_SERVER_IP	The IP address or hostname of the server hosting the firmware.
FIRMWARE_SERVER_USERNAME	If the firmware is hosted on a secure server, the credentials to access the server.
FIRMWARE_SERVER_PASSWORD	
FIRMWARE_SERVER_PROTOCOL	The protocol of the server used to host the firmware. Supported protocols include tftp, ftp, stfp, scp and wget.
CONFIG_FILENAME	The path and file name of the of the configuration file.
CONFIG_SERVER_IP	The IP address or hostname of the server hosting the configuration file.
CONFIG_SERVER_USERNAME	If the configuration file is hosted on a secure server, the credentials to access the server. In most cases, the credentials will be required. The username is plain text, however the password must be encrypted.
CONFIG_SERVER_PASSWORD	
CONFIG_SERVER_PROTOCOL	The protocol of the server used to host the configuration file. Supported protocols include ftp, stfp, scp and wget.

Password encryption

An encrypted hash of a password should be created for the FIRMWARE_SERVER_PASSWORD or CONFIG_SERVER_PASSWORD parameters. The hash needs to be generated from a Linux environment running openSSL. Enter the following commands at a Linux command prompt or on a console server's shell, as shown. Then enter the resulting hash password into the setup file for the defined server type.

```
echo ACS6000KEYAVOCENT> mykey
echo ACS6000KEYAVOCENT > mykey
echo "MyPassword" | openssl enc -base64 -salt -aes-256-cbc -pass file:./mykey
```

NOTE: In the preceding example, replace "MyPassword" with a valid password.

B.3 Copying the setup file to a server

After creating the setup file, it must be copied to a TFTP server. The following example shows what to enter in your system to copy the files to your server and then verify that the console server can download the file.

Copying the Setup File to a TFTP server:

```
Example: tftpd-hpa
Default TFTP root directory /var/lib/tftpboot
~$ sudo cp zerotouch.setup /var/lib/tftpboot
```

Copying the Setup file to an HTTP server:

```
Example: nginx (web server)
The default root directory is set via "/etc/nginx/sites-available/default".
For this example, the root directory is located at "/usr/share/nginx/html".
~$ sudo cp zerotouch.setup /usr/share/nginx/html
[root@ACS6048-1234567890 ~]# tftp -gr zerotouch.setup 10.207.24.18
[root@ACS6048-1234567890 ~]# ls
zerotouch.setup
```

B.4 Obtaining the setup file

After obtaining the IP addresses for both the console server and the TFTP server where you uploaded the setup file, the zero-touch provisioning process will attempt to download the setup file. Once the console server downloads the setup file, it will use the information contained in the file to obtain the image and/or process the configuration of the console server.

B.5 DHCP server configuration

During the boot process, the console server may issue a request, if needed, for an IP address assignment. During this process, the DHCP server will query the DNS server to get the location of the TFTP or HTTP server where the setup file resides. An administrator can, if desired, create an entry on the DHCP server that uniquely identifies a specific console server or range of console servers. This entry filters which console servers are provisioned.

An administrator needs to configure two options. Option 66 defines the hostname or IP address of the TFTP server where the setup file resides. Option 67 defines the name of the setup file (for example acszero.cfg).

To configure Options 66 and 67:

1. Using the Windows Server Manager or DHCP tools snap-in Microsoft Management Console (MMC), open your DHCP server console.
2. In the left panel of the DHCP server window, click *IPv4*.
3. Right-click on *Server Options* and click *Configure Options* to configure a global scope.

   -or-

   Right-click on *Scope Options* and click *Configure Options* to configure a single scope.

4. Click on Option *066* to enter the location of the server that will host the setup file.
5. Enter the host name for the TFTP server.
6. Click on Option *067* to enter the name of the setup file.

An administrator can use two additional DHCP options to filter zero-touch provisioning for select console servers. Option 60 defines the vendor class, Avocent_ACS[[[Undefined variable Variables.16 - Model Number]]]<serial number of the console server>. Option 61 defines the MAC address of the console server.

To create Options 60 and 61 (optional):

1. Using the Windows Server Manager or DHCP tools snap-in MMC, open your DHCP server console.
2. In the left panel of the DHCP window, click *IPv4*.
3. From the tab bar, click *Action*, then click *Set Predefined Options* from the pull-down menu.
4. Under the Options Class, select *DHCP Standard Options*, then click *Add*.
5. Enter a name for the option in the Name field, select *String* from the Data type drop-down menu, enter **060** in the Code field and enter a description for the option. Click *OK*.
6. Repeat step 5, entering **061** in the Code field.

DNS server

If the DNS scope option is not already defined on your DHCP server, and if the Option 66 entry is a hostname instead of an IP address, you can configure the DNS server.

To configure the DNS server:

1. Using the Windows Server Manager or DHCP tools snap-in MMC, open your DHCP server console.
2. In the left panel of the DHCP window, click *IPv4*.
3. Right-click on *Server Options* and click *Configure Options*.
4. Click Option *006* to define the DNS servers.
5. Enter the IP address in the appropriate field and click *Add*.

NOTE: If you enter the server name, the DNS server will resolve it.

Reservations

You can reserve IP addresses for each console server to be updated. A reservation is an IP address that will be always be issued to a specified console server when it renews its DHCP lease.

To reserve an IP address:

1. Using the Windows® Server Manager or DHCP tools snap-in Microsoft® Management Console (MMC), open your DHCP server console.
2. In the left panel of the DHCP window, click *IPv4*.
3. Right-click *Reservations*, then click *New Reservation*.
4. Enter a name for the reservation, the IP address to be assigned to the console server, the MAC address for the console server and a description in the appropriate fields.

NOTE: The console server's MAC address can be found on the bottom of console server.

5. Under Supported types, use the radio button to select either Both or DHCP only.
6. Click *Add*. The reserved IP address will be displayed in the Reserve table.

The following is an example of a Linux DHCP server configuration.

```
Example: ISC DHCP Server for Linux
Edit /etc/dhcp/dhcpd.conf ...
host acs6048 {
hardware ethernet 00:e0:86:12:34:56;
fixed-address 10.207.24.134;
filename "zerotouch.setup";
next-server 10.207.24.18;
```

B.6 Enabling zero-touch provisioning

An administrator can enable zero-touch provisioning from either the web UI or the CLI. Once zero-touch provisioning is enabled, you must clear the zero-touch provisioning log.

To enable zero-touch provisioning from the web UI:

1. From the sidebar of the web UI, click *System - Security - Security Profile*.
2. Under the Bootp Configuration Retrieval heading, check the boxes to enable Bootp and enable Live Configuration Retrieval.
3. Use the drop-down to select *eth0* as the Bootp Interface.
4. Click *Save*.
5. From the sidebar of the web UI, click *Monitoring - Zero-touch Log* then click *Clear Log*.

To enable zero-touch provisioning from the CLI:

1. Log in to the console server as the **root** user.
2. Type **cd system/security/security_profile/** to navigate to the security profile level.
3. Type set **bootp_enabled=yes**. and press **enter**.
4. Type set **bootp_interface=eth0**. and press **enter**.
5. Type set **enable_live_configuration_retrieval_(any_time_dhcp_renews)=yes** and press **enter**.
6. Type **commit** to save the configuration.
7. Type **cd /monitoring/zero-touch_log/** to navigate to the zero-touch log level.
8. Type **clear_log**. Type **Yes** when prompted if you want to clear the zero-touch provisioning log.

Appendix C: Recovering a Console Server's Password

To recover the console server's root password:

1. Connect directly to the console server's CONSOLE port.
2. Turn the console server off, then on again.
3. Press the **Spacebar** to access the uboot prompt.
4. Type **hw_boot single** and press **Enter**.
5. The console server will boot into single-user mode. Type **passwd** and press **Enter**.
6. Enter the new password and confirm.
7. Type **reboot** and let the console server boot normally.

Appendix D: Port Information for Communication with the DSView Software

The following ports on an ACS6000 advanced console server can accept connections from the DSView management software:

- TCP port 3502 (https)
- TCP port 3871 (adsap2)
- UDP port 3211 (aidp)
- TCP port 22 (sshd)

The following ports in the DSView software can accept connections from the ACS6000 advanced console server:

- TCP port 4122 (default: SSH server)
- TCP port 4514 (default: data logging or Syslog server)

Appendix E: Accessing a Console Server with a DSView Software Installation via Dial-up

When a DSView software user establishes a serial session, the following events occur:

- The user selects a serial port to access.
- A viewer is downloaded from the DSView server to the user's workstation.
- The DSView software passes information to the viewer, such as an authorization key, the IP address and serial port of the console server.
- The viewer then accesses the serial port of the console server through an SSH session by passing the authorization key obtained from the DSView server.
- The serial session begins.

To ensure constant connectivity, a DSView server can be configured with an out of band (OOB) “back door” that will allow it to call a console server via modem in the event of a network or Internet failure.

4.0.1 Installing DSView software with an OOB back door

The DSView server must be running on hardware that has a connected modem, and the console server must have a built-in modem or access to a modem via USB or serial port.

For this installation, the DSView server must be the central point of reception of both the packets leaving the downloaded viewer and the console server. To ensure this, Proxy mode must be configured within the DSView software. The viewer will then point to the DSView server (not the console server) to establish the SSH connection. The DSView server would then route the packets by changing both the source and destination IP addresses and act as a middle point of communication.

Under normal operating conditions, packets received from the Video Viewer would route through the DSView server via Ethernet. In an error state, the DSView server would detect that the normal path to the console server was interrupted and would dial out to the console server, pass authentication and establish a PPP connection. Packets that would normally pass via Ethernet would instead be routed via PPP.

Because of the speed differences between Ethernet and dial-up, performance would be notably slower, but still present. Multiuser connections would further degrade performance and are not recommended. For this reason, dial-up backup is recommended as an emergency backup feature only.

4.0.2 Configuring dial-up for a console server

To configure dial-up to a console server within the DSView software:

1. In a Units view window containing appliances, select the ACS6000 console server you want to configure. For dial-in with callback, you must first select *DSView Server - Properties - DSView Modem Sessions* under the System tab and enter the the phone number assigned to the DSView server in the Analog Phone Number field.
2. Select *DSView Settings - Dial-up,* and click *Enable Dial-up*.
3. Select *Modem Type - Analog*.
4. Enter the phone number for the console server you want to use.
5. Enter the PPP User and select the PPP Auth Protocol in the appropriate fields.
6. For dial-in with callback, enable the dial-back checkbox.
7. Select *DSView Settings - Dial-up - PPP Password*, then enter and confirm the password needed to access the ACS6000 console server.
8. Select *DSView Settings - Dial-up - IP Addresses*.

9. Click *Generate Automatically* to set the IP address automatically, or enter the PPP Local IP address and Appliance IP address manually.
10. Select DSView Settings - Dial-up and click Save.
11. To configure a console server to receive the dial-up connection within the DSView software:
12. In a Units view window containing appliances, select the ACS6000 console server you want to configure.
13. For a modem attached to a serial port, select *Ports - Serial Ports*, then select the port that contains the attached modem. Click *Set Dial-In*.

    -or-

    For a modem attached to an auxiliary port, select *Ports - Auxiliary Ports*, then select the port. Click *Set Dial-In*.

    -or-

    For an internal modem, select *Ports - Auxiliary Ports* and select the modem.

    -or-

    For a pluggable device modem, select *Pluggable Devices*, select the modem and click *Save*.
14. Select DSView Settings - Dial-up and click *Push Configuration*.

NOTE: The following step is only required if *CHAP* was selected in the PPP Auth Protocol field in the DSView software Settings Dial-up window.

15. Log in to the CLI of the console server and access the Linux shell. Edit the /etc/ppp/chap-secrets and add a line in the format, where the first column should have the PPP user and the third column should have the PPP password as is shown in the following example:

    pppuser * "ppppassword" *

Appendix F: Internal Modem

Some models of the ACS6000 console server come equipped with an internal modem. This modem is used to originate and answer phone calls and establish communication with other modems to transmit data.

Controlling the modem's functions is done by using the "AT" commands. These commands are used to instruct the modem to perform functions such as dialing or answering calls and are normally automatically issued by communication software. However, for some applications, custom software may have to be written due to the absence of a normal operating system.

The modem will automatically accept and process AT commands at most standard DTE (Data Terminal Equipment) speeds and parity settings. For each command issued, the modem will respond with a result code to inform you of the modem's status. The format of a basic AT command and result code is as follows:

AT<Command><CR>

OK

AT = Attention.

<Command> = any valid command

<CR> = Carriage Return or Enter key

OK = Result Code

Table A.3 Sample Command String

COMMAND	DESCRIPTION
ATDT7678900<CR>	Instructs the modem to dial the number 7678900 and attempt to connect to the remote device.
ATS0=2<CR>	Enables auto answer option. When the modem detects a ring, it will attempt to answer after two rings.

Table A.4 Basic AT Commands

COMMAND	DESCRIPTION
ATA/	Repeat the previous command.
ATA	Answer.
ATB0	CCITT operation at 300 or 1200 bps.
ATB1	Bell operation at 300 or 1200 bps (default).
ATD	Dial.
ATD0-9	Dial the DTMF digits 0 to 9.
ATDA-D	Dial the DTMF digits A, B, C and D.
ATDP	Select pulse dialing; effects current and subsequent dialing.
ATDT	Select tone dialing; effects current and subsequent dialing.
ATD!	Flash: go on-hook by time defined by S29.
ATDW	Wait for dial tone detection before dialing a number. If no dial tone is detected within the time specified by S7, the modem aborts the rest of the sequence, goes on-hook and generates an error message.
ATD@	Wait for five seconds of silence before proceeding with next dialing string and then complete handshake sequence.
ATD,	Pause. The modem pauses for a time specified by S8 before dialing the number. Most often used when dialing an outside line through a PBX.
ATD;	Return to the command mode after processing the command.
ATE0	Disables the command echo.
ATE1	Enables the command echo (default).
ATH0	Hang up.
ATH1	Forces the modem off-hook.
ATI0	Reports product code.
ATI2	Reports OK (for software compatibility).
ATI3	Reports the firmware version of the modem. Example: CX810801-V90.
ATL0	Sets the speaker volume off.
ATL1	Sets the speaker volume low (default).
ATL2	Sets the speaker volume medium.
ATL3	Sets the speaker volume high.
ATM0	Speaker is always off.
ATM1	Speaker is on during call establishment but goes off when carrier is detected (default).
ATM2	Speaker is always on.
ATM3	Speaker if off during dialing and when receiving carrier but on during answering.
ATQ0	Enables result codes to the DTE (default).
ATQ1	Disables result codes to the DTE.
ATSr	Establishes S-register “r” as the default register.
ATSr=n	Sets S-register “r” to the value “n.”
ATSr?	Reports the value of S-register “r.”
ATV0	Enables short-form result codes.
ATV1	Enables long-form result codes.
ATW0	Upon connection, the modem reports only the DTE speed (for example, CONNECT 9600). Subsequent responses are disabled (default).
ATW1	Upon connection, the modem reports the modulation type, line speed, the error correction protocol and the DTE speed. Subsequent responses are disabled.
ATW2	Upon connection, the modem reports DCE speed (for example, CONNECT 2400). Subsequent responses are disabled.
ATX0	Ignores dial and busy tone. Sends CONNECT message when a connection is established by blind dialing.
ATX1	Disables monitoring of busy tones. Sends only OK, CONNECT, RING, NO CARRIER and ERROR messages. 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 NO DIALTONE.
ATX2	Disables monitoring of busy tones. Sends only OK, CONNECT, RING, NO CARRIER, ERROR, NO DIALTONE and CONNECT XXXX. If busy tone detection is enforced and busy tone is detected, NO CARRIER, will be reported instead of BUSY. If dial tone detection is

COMMAND	DESCRIPTION
	enforced or selected and dial tone is not detected, NO CARRIER will be reported instead of NO DIAL TONE.
ATX3	Enables monitoring of busy tones. Sends only OK, CONNECT, RING, NO CARRIER, ERROR, NO DIAL TONE and CONNECT or CARRIER XXXX. If dial tone detection is enforced and dial tone is not detected, NO CARRIER will be reported.
ATX4	Enables monitoring of busy tones. Sends all messages (default).
ATZ0	Soft reset.
AT&C0	DCD remains on at all times.
AT&C1	DCD follows the state of the carrier (default).
AT&D0	Ignores DTR.
AT&D1	Enters the escape mode when ON-to-OFF transition is detected on DTR.
AT&D2	Hangs up, assumes command state and disables auto answer upon detecting ON-to-OFF transition of DTR (default).
AT&D3	ON-to-OFF transition causes the modem to perform a soft reset. It is the same as if an ATZ command is issued.
AT&F	Restores factory configuration.
AT&G0	Disables guard tone (default).
AT&G1	Enables 550-Hz guard tone.
AT&G2	Enables 1800-Hz guard tone.
AT&K0	Disables flow control.
AT&K3	Enables RTS/CTS flow control (default for data modes).
AT&K4	Enables XON/XOFF flow control.
AT&K5	Supports transparent XON/XOFF flow control.
AT&P0	39/61 make/break ratio at 10 pulses per second (default).
AT&P1	33/67 make/break ratio at 10 pulses per second.
AT&P2	39/61 make/break ratio at 20 pulses per second.
AT&P3	33/67 make/break ratio at 20 pulses per second.
AT&Q0	Selects direct asynchronous operation.
AT&Q5	Modem will try an error-corrected link.
AT&Q6	Selects asynchronous operation in normal mode (allows speed buffering and flow control but no error correction).
AT&V	Displays modem's current configuration. When this command is entered, the modem will display its current command and register settings.
AT%C0	Disables data compression.
AT%C1	Enables MNP 5 data compression.
AT%C2	Enables V.42 bis data compression (sets S46 bit 1).
AT%C3	Enables V.42 bis and MNP 5 data compression (default).
AT%E0	Disables line quality monitor and auto-retrain.
AT%E1	Enables line quality monitor and auto-retrain.
AT%E2	Enables line quality monitor and fallback/fall-forward (default).
AT%L	Line signal level. Returns a value that indicates the received signal level. Example, 009 = -9dBM.
AT%Q	Line signal quality. Reports line signal quality (DAA-dependent). Returns higher order byte of the EQM value. Based on EQM value, retrain or fallback/fall-forward may be iniated if enabled with AT%E1 or AT%E2 commands.
AT+MS	Select/force modulation.

4.0.3 AT+MS modulation selection

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

+MS=<carrier>, <automode>, <min_tx_rate>, <max_tx_rate>, <min_rx_rate), <max_rx_rate><CR>.

To read the current settings, enter AT+MS?<CR>

Table A.5 +MS Command Supported Rates

MODULATION	CARRIER	DESCRIPTION
Bell 103	B103	300
Bell 212	B212	1200
V.21	V21	300
V.22	V22	1200
V.22 bis	V22	2400 or 1200
V.23	V23C	1200rx/75tx or 75rx/1200tx
V.32	V32	9600 or 4800
V.32 bis	V32B	14400, 12000, 9600, 7200 or 4800
V.34	V34	33600, 31200, 28800, 26400, 19200, 16800, 14400, 12000, 9600, 7200, 4800 or 2400
V.90	V90	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 42667, 41333,, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000
K56flex	K56	56000, 54000, 52000, 50000, 48000, 46000, 44000, 42000, 40000, 38000, 36000, 34000, 32000
V92 downstream	V92	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 42667, 41333,, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000
V92 upstream	V92	48000, 46667, 45333, 42667, 41333,, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000, 26667, 25333, 24000

4.0.4 Set telephone extension option

This command enables/disables “line-in-use” and “extension pickup” options.

Table B.1 Set Telephone Extension Options

-STE=N VALUE	EXTENSION PICKUP	LINE-IN-USE
0 (default)	Disabled	Disabled
1	Disabled	Enabled
2	Enabled	Disabled
3	Enabled	Enabled

If the line is in use and the modem receives an ATDT command to dial out, the modem will not go off hook and will display the “LINE-IN-USE” result code. If the modem is off hook and the extension is picked up, the modem will drop the connection and display the “OFF-HOOK INTRUSION” result code.

4.0.5 AT S registers

The S registers use the following format: ATSr=n<CR> where the “r” is the S register number and “n” is the parameter to set it to. To read the current contents of an S register, issue an ATSr?<CR> command where “r” is the register in question. The modem will then display the value of the S register.

Table B.2 AT S Registers

REGISTER	RANGE	UNITS	DEFAULT	DESCRIPTION
S0	0-255	Rings	0	Ring to answer on. ATS0=1<CR> means answer call on first ring detected.
S1	0-255	Rings	0	Number of rings counted.
S2	0-127	ASCII	43	Escape code character.
S3	0-127	ASCII	13	Command terminator<CR>.
S4	0-127	ASCII	10	Line feed character.
S5	0-127	ASCII	8	Backspace character.
S6	2-255	Seconds	2	Wait time for dial-tone detection.
S7	1-255	Seconds	50	Wait time for carrier.
S8	0-255	Seconds	2	Pause time for coma in dial string.
S10	1-255	.1sec	14	Loss of carrier to hang up delay.
S11	50-255	.01sec	85	DTMF tone duration.
S12	0-127	1/50 sec	50	Escape code guard time.
S24	0-255	1sec	0	Sleep mode inactivity timer.
S29	0-255	10mS	70	Hook flash dial modifier time.
S30	0-255	10Sec	0	Inactivity disconnect timer.
S95			0	Result code control.

4.0.6 Basic modem result codes

There are basic codes the modem will issue in response to processing an AT command. Result codes may be displayed either in word (V1) or numeric (V0) format by using the Vn command. The Qn command controls if result codes are issued (Q0) or not issued (Q1). The Xn, Wn commands and register S95 determines which result code format the modem will display to indicate the type of connection established. There are more than 300 codes. The most commonly used are listed in the table below.

Table B.3 Basic Result Code Listing

NUMERIC	VERBOSE	DESCRIPTION
0	OK	The modem has received and acknowledged the command.
1	CONNECT	Connection made at 300bps or extended result codes are off (X0).
2	RING	An incoming ring signal has been detected.
3	NO CARRIER	This result code reflects either an intended disconnect or a failure to complete a connection.
4	ERROR	An invalid command was issued to the modem.
5	CONNECT 1200	Indicates a 1200bps line or DTE connection.
6	NO DIALTONE	
7	BUSY	The modem has detected a busy tone.
8	NO ANSWER	After S7 time has elapsed, the remote server never answered.
10	CONNECT 2400	Line speed or DTE connection at 2400bps.
12	CONNECT 9600	Line speed or DTE connection at 9600bps.
15	CONNECT 14400	Line speed or DTE connection at 14400bps.
16	CONNECT 19200	Line speed or DTE connection at 19200bps.
17	CONNECT 38400	Line speed or DTE connection at 38400bps.
18	CONNECT 57600	Line speed or DTE connection at 57600bps.

4.0.7 Digital line guard

The modem has an optional Digital Line Guard Circuit that automatically detects an over current situation on the Tip and Ring pins. When the modem goes off hook, it will immediately check the current on the Tip and Ring pins. If the current exceeds 150 mA, the modem will display the “DIGITAL LINE DETECTED” result code and then go back on hook. The modem will continue to display this result code until normal current is detected on the Tip and Ring pins during an off hook condition. The DLG feature will protect the modem in case it is accidentally connected to a Digital Telephone Line.

4.0.8 Sleep mode operation

The modem can be set to enter the low power sleep mode by setting ATS24=n. In this case, “n” is 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 or telephone line activity. If S24 is set to zero, the modem will never enter the low power sleep mode.

4.0.9 Disconnecting a call

There are several ways to disconnect a call. Below are the choices.

Resetting the modem’s power or toggling the Reset Line (Pin #12) will disconnect and put the modem back into the OFF line state.

An ON to OFF transition of the DTR signal (Pin #4) will also disconnect the modem. If you use this method, check to make sure that the DTR command is set to &D2 or &D3 and not forced (&D0).

The remote device can also cause the modem to disconnect. If the remote modem disconnects your modem will automatically sense the loss of the carrier signal and return to the OFF line state.

The ATH or ATZ commands can also be used to disconnect a call. In order to issue a command to the modem when it is On Line, the modem must be placed into the On Line Command State. This is accomplished by issuing a special escape sequence. The default value of this three digit escape sequence is the “+” character (see S2 to change). The “+++” is protected by a one-second delay before and after it is sent (see S12 to change the time) When the modem detects the escape sequence, the OK result Result

code will be displayed and the modem is in the On Line Command State. The ATH or ATZ command can now be issued to disconnect the call.

4.0.10 Selecting country codes

Setting the modem's country code is done by with the +GCI command. To change to one of the 30 available countries, issue the AT+GCI=n command where "n" is one of the two digit country codes. This command must be issued each the modem is turned on. It will not automatically store or save this setting. It should be part of the Initialization string.

Example: **AT+GCI=00<CR>** Meaning: Change country code to Japan.

OK Meaning: The modem has accepted the command and is

now configured to operate in Japan

AT+GCI?<CR> Meaning: Display current country code

+GCI:00 Meaning: (Japan is the current country selected).

OK

To view which countries are available in the modems firmware, enter AT+GCI=?<CR>.

The modem will display all of the possible two digit country codes available.

Table B.4 Country Codes List

COUNTRY	CODE	COUNTRY	CODE	COUNTRY	CODE
Australia	09	Hong Kong	50	Poland	8A
Austria	0A	India	53	Portugal	8B
Belgium	0F	Ireland	57	South Africa	9F
Brazil	16	Italy	59	Singapore	9C
China	26	Japan	00	Spain	A0
Denmark	31	Korea	61	Sweden	A5
Finland	3C	Mexico	73	Switzerland	A6
France	3D	Netherlands	7B	Taiwan	Fe
Germany	42	Norway	82	TBR21	FD
United States	B5	United Kingdom	B4		

4.0.11 Using caller ID

The modem can be used to display certain information about incoming telephone calls. The modem can inform you of the date, time, telephone number and name associated with incoming calls. When the CID option is enabled, information will be displayed between the first and second incoming "RING." In order for this feature to work properly, the telephone line connected to the modem must subscribe to caller ID service offered by the local telephone company. A sample of the displayed information is shown below:

RING

DATE = 0513

TIME = 1346

NMBR = 408 767 8900

NAME = RADICOM RESEARCH

RING

The CID information can either be presented formatted as shown previously or unformatted. The +VCID and +VRID commands control the modem CID option.

Table B.5 Caller ID Information

COMMAND	PARAMETER	DESCRIPTION
+VCID?	NA	Display current +VCID setting (0-2)
+VCID=	0	Disable caller ID reporting (default).
+VCID=	1	Enable caller ID with formatted presentation to the DTE.
+VCID+	2	Enable caller ID with unformatted presentation to the DTE.
+VRID=	0	Displays the formatted caller ID of the last received call.
+VRID+	1	Displays the unformatted caller ID of the last received call.

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