File Management

FEATURE OVERVIEW AND CONFIGURATION GUIDE

Introduction

AlliedWare Plus™ needs to store a range of files: software releases, configuration files, licenses, scripts, debug captures and so on.

The files can be stored on various different media—internal flash, internal battery-backed RAM, external USB storage devices, external SD cards. Files can be copied to and from servers, and can be copied between different internal/external storage locations. Also, files can be viewed, edited, deleted, and renamed.

This guide provides an explanation of the file storage options that AlliedWare Plus support, and describes the commands that are available for managing files.

Topics include:

- "USB Support" on page 3
- "SD Support" on page 3
- "NVS Support" on page 3
- "Working with Files" on page 3
- "Copying Files to and from Your Device" on page 9
- "The Autoboot Feature" on page 14
- A number of examples of actions that utilize external storage media are also provided.

AlliedWare Plus™
OPERATING SYSTEM

Products and software version that apply to this guide

This guide applies to all AlliedWare Plus™ products, running version **5.4.4** or later.

However, not all features in this guide are supported on all products. To see whether a product supports a particular feature or command, see the following documents:

■ The product's Datasheet

■ The product's Command Reference

These documents are available from the above links on our website at **alliedtelesis.com**. Feature support may change in later versions. For the latest information, see the above documents.

Content

USB Support

Some AlliedWare Plus products support USB storage devices. Those products support both standard and secure USB storage devices.

USB storage devices used as backup memory can be easily pulled out of a switch. You can use Secure USB storage devices to protect this data in the event that it is mislaid or in unauthorized hands. Secure USB devices provide password (PIN)-protected encryption to the data they store.

Note that if the switch reboots, the Secure USB key will be locked.

After a VCStack failover, when a stack member recovers, the Secure USB device cannot be accessed until it is unlocked.

SD Support

Some AlliedWare Plus products support SD cards. Those products support both SD and SDHC cards.

NVS Support

Most AlliedWare Plus products include NVS memory (Non Volatile Storage). On most products, files in NVS persist over a power cycle.

NVS on the IE200-6 Series switches is a RAM-based file system. Files in NVS persist over a device restart but do not persist over a power cycle. On the IE200-6 Series, if you need to store a file permanently, do not store it in NVS.

Working with Files

The AlliedWare Plus™ OS lets you create directory trees for file storage. This section shows:

- "Listing files" on page 4—listing files and seeing how much free space you have

- "Displaying the contents of configuration and text files" on page 5

- "Navigating through the file system" on page 6—identifying the current directory, changing directories, and creating and deleting directories

- "Using the editor" on page 8

Listing files

To list files, enter Privileged Exec mode and enter the command:

`awplus# dir`

The output lists files and directories in order of modification date, descending. It looks like this:

```
-rw-      534 Jul 12 2011 17:52:50  stp.cfg
-rw-      534 Jul 12 2011 17:12:50  example.cfg
-rw- 12429011 Jul 12 2011 16:26:06  x510-5.4.4-3.5.rel
```

Listing files including hidden system files

The **dir** command does not list all files—it hides system files and directories because users generally do not need to create or edit them. To list all files including system files, enter Privileged Exec mode and enter the command:

`awplus# dir all`

The output looks like this:

```
drwx        0 Jul 12 2011 17:16:32  ./
-rw-      401 Jul 12 2011 17:16:32  example.cfg
-rw-      534 Jul 12 2011 17:52:50  stp.cfg
-rw- 12429011 Jul 12 2011 16:26:06  x510-5.4.4-3.5.rel
drwx      216 Jul  9 2011 11:31:18  ../
drwx        0 Jun 13 2011 04:31:51  .configs/
-rw-       17 Jun 13 2011 04:27:27  .release
drwx        0 Jul 10 2011 23:40:00  .ssh/
```

The hidden files and directories begin with a dot.

Seeing information about the filesystem

To display information about the different memory types on the switch, enter Privileged Exec mode and enter the command:

`awplus# show file systems`

The output includes the amount of free memory and the prefix you type to access that memory type, and looks like this:

```
awplus#show file systems
  Size(b)   Free(b)   Type      Flags  Prefixes   S/D/V    Lcl/Ntwk  Avail
  ----------------------------------------------------------------------
    63.0M     12.5M    flash      rw    flash:     static   local       Y
        -         -    system     rw    system:    virtual  local       -
    10.0M      9.9M    debug      rw    debug:     static   local       Y
   499.0K    452.0K    nvs        rw    nvs:       static   local       Y
        -         -    usbstick   rw    usb:       dynamic  local       N
        -         -    tftp       rw    tftp:      -        network     -
        -         -    scp        rw    scp:       -        network     -
        -         -    sftp       ro    sftp:      -        network     -
        -         -    http       ro    http:      -        network     -
        -         -    rsync      rw    rsync:     -        network     -
```

Listing files in a subdirectory

To list the contents of a directory, enter Privileged Exec mode and enter the command:

```
awplus# dir <directory-name>
```

Tip   You can specify the directory with or without a / after the directory name.

Example   To display the contents of a directory called "example", enter the command:

```
awplus# dir example
```

Listing files in NVS memory, on an SD (or SDHC) card or on a USB storage device

To list the contents of a directory in NVS, enter Privileged Exec mode and enter the command:

```
awplus# dir nvs:<directory-name>
```

To list the contents of a directory on an SD card, enter the command:

```
awplus# dir card:<directory-name>
```

To list the contents of a directory on a USB storage device, enter the command:

```
awplus# dir usb:<directory-name>
```

Example   To display the contents of a directory in NVS called "example", enter the command:

```
awplus# dir nvs:example
```

Displaying the contents of configuration and text files

To display the contents of a file, enter Privileged Exec mode and enter the command:

```
awplus# show file <filename>
```

Example   To display the contents of the file called "example.cfg", enter the command:

```
awplus# show file example.cfg
```

Navigating through the file system

Showing the current directory

To see which directory you are currently in, enter Privileged Exec mode and enter the command:

```
awplus# pwd
```

For the top-level directory, the output looks like this:

```
flash:/
```

Changing directories

To change to another directory, enter Privileged Exec mode and enter the command:

```
awplus# cd <directory-name>
```

To go to a directory one level higher in the directory tree, enter the command:

```
awplus# cd ..
```

Example
To change to a directory called "example", enter the command:

```
awplus# cd example
```

To go up one level, which returns you to the top level directory, enter the command:

```
awplus# cd ..
```

Changing to a directory in NVS memory, on an SD card or on a USB storage device

To change to the top-level directory in the NVS memory filesystem, enter Privileged Exec mode and enter the command:

```
awplus# cd nvs:
```

To change to the top-level directory on an SD card, enter the command:

```
awplus# cd card:/
```

Note that the prefix for the SD card is **card** not "sdcard".

To change to the top-level directory on a USB storage device, enter the command:

```
awplus# cd usb:/
```

Next, you can change to other directories by entering the command:

```
awplus# cd <directory-name>
```

Alternatively, you can go straight from Flash to a subdirectory in the alternative file system, by entering one of the commands:

```
awplus# cd nvs:<directory-name>
awplus# cd card:/<directory-name>
awplus# cd usb:/<directory-name>
```

To return to the Flash file system, enter the command:

```
awplus# cd flash:/
```

Example   To change to the directory within NVS called "example", enter the command:

```
awplus# cd nvs:example
```

To go up one level, which returns you to the top-level directory of NVS memory, enter the command:

```
awplus# cd ..
```

Creating new directories

To create a directory, enter Privileged Exec mode and enter the command:

```
awplus# mkdir <directory-name>
```

Example   To make a directory called "example" within the Flash file system, enter the command:

```
awplus# mkdir example
```

Deleting directories

To delete an empty directory, enter Privileged Exec mode and enter the command:

```
awplus# rmdir <directory-name>
```

To delete a directory and all its contents, enter Privileged Exec mode and enter the command:

```
awplus# delete recursive <directory-name>
```

The switch prompts you for confirmation.

Example   To delete an empty directory called "example" from within the Flash file system, enter the command:

```
awplus# rmdir example
```

Using the editor

The inbuilt editor is JOE (Joe's Own Editor). JOE is a powerful ASCII-text screen editor.

To edit an existing file, enter Privileged Exec mode and enter the command:

```
awplus# edit <filename>
```

To open the editor with an empty file, enter the command:

```
awplus# edit
```

When you save the new file, you may need to specify the file system to store it on. For Flash, use **flash:/<filename>**.

Using JOE   To format and manipulate text in JOE, you use control-character sequences. The following table summarizes a few useful sequences—for more details, see:

http://joe-editor.sourceforge.net/manpage.html

Table 1: JOE short cut keys

FUNCTION	CONTROL-CHARACTER SEQUENCE
Access the help	Ctrl-K-H
Save the file without exiting (for new files, this prompts for a filename)	Ctrl-K-D
Save the file and exit (this prompts for a filename)	Ctrl-K-X
Exit without saving the file	Ctrl-C
Go to the beginning of the file	Ctrl-K-U
Go to the end of the file	Ctrl-K-V
Go up one full screen of text in the file	Ctrl-U
Go down one full screen of text in the file	Ctrl-V
Select a block of text:	
- Mark the beginning of the block	Ctrl-K-B
- Mark the end of the block	Ctrl-K-K
Copy and paste a selected block of text	Place cursor at destination then enter: Ctrl-K-C
Move a selected block of text	Place cursor at destination then enter: Ctrl-K-M
Delete a selected block of text	Ctrl-K-Y

Copying Files to and from Your Device

This section provides instructions on:

Filename syntax

Many of the file management commands use the placeholder "file" to represent the name and location of the file that you want to act on. The following table explains the syntax of this filename for each different type of file location.

Table 2: File management syntax descriptions

WHEN YOU COPY A FILE...	USE THIS SYNTAX:	EXAMPLE:
Copying in local Flash memory	`flash:[/][<directory>/]<filename>`	To specify a file in the configs directory in Flash: `flash:configs/example.cfg`
Copying to or from an SD (or SDHC) card	`card:[/][<directory>/]<filename>`	To specify a file in the top-level directory of the SD card: `card:example.cfg`
Copying to or from a USB storage device	`usb:[/][<directory>/]<filename>`	To specify a file in the top-level directory of the USB stick: `usb:example.cfg`
Copying with Hypertext Transfer Protocol (HTTP)	`http:// [[<username>:<password>]@] {<hostname>|<host-ip>}[/<filepath>]/ <filename>`	To specify a file in the configs directory on the server: `http://www.company.com/configs/ example.cfg`
Copying with Trivial File Transfer Protocol (TFTP)	`tftp://[[<location>]/<directory>]/ <filename>`	To specify a file in the top-level directory of the server: `tftp://172.1.1.1/example.cfg`
Copying with Secure Copy (SCP)	`scp://<username>@<location>[/ <directory>][/<filename>]`	To specify a file in the configs directory on the server, logging on as user "bob": `e.g. scp://bob@10.10.0.12/ configs/example.cfg`
Copying with SSH File Transfer Protocol (SFTP)	`sftp://[[<location>]/<directory>]/ <filename>`	To specify a file in the top-level directory of the server: `sftp://10.0.0.5/example.cfg`
Copying to or from stack member Flash	`<hostname>-<stack_ID>/flash:[/ ][<directory>/] <stack_member_filename>`	To specify a file in the configs directory on member 2 of a stack named vcstack: `vcstack-2/flash:/configs/ example.cfg`
Copying to or from a line card or control card Flash	`<hostname>-<stack_ID>.<card-ID>/ flash:[/][<directory>/] <filename>`	To specify a file in the configs directory on line card 2: `awplus-1.2/flash:/configs/ example.cfg` Note: On an SBx81CFC400 card, the stack-ID is always 1.

The filename and path can include characters from up to four categories. The categories are:

1. upper-case letters: A to Z

2. lower-case letters: a to z

3. digits: 0 to 9

4. special symbols: most printable ASCII characters not included in the previous three categories. Including the following characters:

```
- / . - @ " ` * : ~ ?
```

Do not use spaces, parentheses or the + symbol within filenames. Use hyphens or underscores instead.

Copying files

To copy files, use the **copy** commands. These commands allow you to copy files:

- between different memory types attached to your device. Use the command:

    awplus# `copy <local-source> <local-destination> <filename>`

    See "Copying within a filesystem" for further details.

- across a serial connection using ZMODEM. Use the command:

    awplus# `copy zmodem`

    See "Copying with ZMODEM" for further details.

- from your device onto a remote device, or to your device from a remote device. To copy a file across an interface with IP configured, use the command:

    awplus# `copy <source> <destination>`

    To copy files across these interfaces you can use the following protocols:

    - "Copying with Hypertext Transfer Protocol (HTTP)"

    - "Copying with Trivial File Transfer Protocol (TFTP)"

    - "Copying with Secure Copy (SCP)"

    - "Copying with SSH File Transfer Protocol (SFTP)"

Copying within a filesystem

Within a directory   To copy a file within the same directory, enter Privileged Exec mode and enter the command:

awplus# `copy <source-filename> <destination-filename>`

If the file already exists, the switch asks whether to overwrite it, with a message like this:

```
Overwrite flash:/example.cfg? (y/n)[n]:
```

To overwrite, press the **y** key then the **Enter** key.

Between directories   To copy a file to another directory within the same filesystem, enter the command:

```
awplus# copy <source-filename> <directory-name>/
```

The / after the directory name is required. Otherwise the switch displays an error ("37: Destination file is a directory").

The switch then prompts you for the destination filename. To give the copy a new name, type the name at the prompt. You can include directory names in the path.

To use the same filename as the original, press the **Enter** key (do **not** press the "y" key—that names the copy "y").

Example   To put a copy of example.cfg into the example directory, enter the command:

```
awplus# copy example.cfg example/
```

The prompt and messages look like this:

```
Enter destination file name [example.cfg]:
Copying from source file, please wait...
Copying to destination file, please wait...
0: Successful operation
```

Copying to and from NVS, an SD (or SDHC) card or a USB storage device

To copy between file systems, you need to specify the file system **prefix**:

- **nvs:**

- **card:**

- **usb:**

For example, to copy from Flash to the USB storage device when your current directory is the top-level Flash directory, enter Privileged Exec mode and enter the command:

```
awplus# copy <source-filename> usb:
```

The switch prompts you for the filename, as described in the previous section.

To copy from NVS to Flash when your current directory is the top-level Flash directory, enter the command:

```
awplus# copy nvs:<source-filename> <destination-filename>
```

Example   To copy the file "example.txt" from the directory called "example" in NVS, to the top level of Flash, enter the command:

```
awplus# copy nvs:example/example.txt example.txt
```

In a stacked environment you can only access **flash** and **nvs** using the stack member file path. To access an SD card or a USB storage device on a backup stack member, use the **remote-login** command.

NVS on the IE200-6 Series switches is a RAM-based file system. Files in NVS persist over a device restart but do not persist over a power cycle. If you need to store a file permanently, do not store it in NVS.

Copying with ZMODEM

ZMODEM allows you to copy files from a network host over an asynchronous port. Use the command:

```
awplus# copy zmodem
```

to open Minicom and transfer a file. Alternatively you can specify the file name within the command:

```
awplus# copy <source> zmodem
```

For example, to copy the file "july.cfg" from Flash memory using ZMODEM, use the command:

```
awplus# copy flash:/july.cfg zmodem
```

Copying with Hypertext Transfer Protocol (HTTP)

You device has a built-in HTTP client. The HTTP client enables the device to act as a browser by sending HTTP "get" or "post" requests to an HTTP server. The client is enabled by default.

For example, to load the file "bob.cfg" onto Flash from the config directory on the web server at www.company.com, use the command:

```
awplus# copy http://www.company.com/config/bob.cfg flash:/bob.cfg
```

Copying with Trivial File Transfer Protocol (TFTP)

TFTP runs over User Datagram Protocol (UDP). It is simpler and faster than FTP but has minimal capability, such as no provisions for user authentication.

To copy a file from a TFTP server to Flash memory, enter Privileged Exec mode and enter the command:

```
awplus# copy tftp flash
```

Note: You can specify the server and filename in the command instead of waiting for prompts. Use a format like the following: copy tftp://172.1.1.1/example.cfg flash

The switch prompts you for the:

- TFTP server hostname (you can enter its IP address instead)
- source filename on the TFTP server
- destination filename in Flash on the switch

To copy a file from Flash to a TFTP server, enter the command:

```
awplus# copy flash tftp
```

Follow the prompts for source filename, server, and destination filename. If the file is not in the top level of the TFTP server, include the path as part of the filename.

Example   To copy example.cfg to the TFTP server at 172.1.1.1, enter the command:

```
awplus# copy flash tftp
```

The prompts, responses, and messages look like this:

```
Enter source file name []:example.cfg
Enter destination host name []:172.1.1.1
Enter destination file name [example.cfg]:
Copying from source file, please wait...
Copying to destination file, please wait...
0: Successful operation
```

To load the file "bob.key" from a TFTP server, where the file is in the folder "security", use the command:

```
awplus# copy tftp://security/bob.key flash:/bob.key
```

Copying with Secure Copy (SCP)

Secure Copy (SCP) provides a secure way to copy files to and from a remote device using SSH. The AlliedWare Plus™ OS includes both a SSH server and a SSH client. You must enable the SSH server before your device accepts connections from SCP clients. See the SSH Feature Overview and Configuration Guide for more information.

For example, to load the file "beth.key" onto Flash from the key directory on a remote SSH server at 10.10.0.12, using the username "bob", use the command:

```
awplus# copy scp://bob@10.10.0.12/key/beth.key flash:/beth.key
```

Copying with SSH File Transfer Protocol (SFTP)

SSH File Transfer Protocol (SFTP) provides a secure way to copy files onto your device from a remote device. The AlliedWare Plus™ OS includes both a SSH server and a SSH client. SFTP provides additional features from SCP, such as allowing you to manipulate the remote files, and halt or resume file transfers without closing the session.

For example, to load the file "rei.cfg" onto Flash memory from the remote server at 10.0.0.5, use the command:

```
awplus# copy sftp://10.0.0.5/rei.cfg flash:/rei.cfg
```

Copying from a server to running configuration

Use the **copy tftp** variant of the **copy running-config** command to load a configuration file from a server to the running configuration of the switch. The configuration will be added to the running configuration as if the commands were typed in the command line interface.

The resulting configuration file will be a combination of the previous running configuration and the loaded configuration file. The loaded configuration file has precedence.

The Autoboot Feature

The Autoboot feature enables the switch to automatically load a specific release file and/or configuration file from external media, such as SD card or USB device, into Flash memory, providing there is enough free space available.

If there is not enough free space, the Autoboot feature will exit and booting will revert to what was previously set by the CLI. This feature is enabled only the first time the device is powered up in the field. Subsequently, the Autoboot feature is disabled by default.

The Autoboot feature minimizes network downtime by avoiding the need for manual configuration of a replacement device.

If you use prepared external media for the first time boot, the Autoboot feature gives you the ability to easily ensure the device boots with your desired release and configuration files. You must prepare the external media for this purpose using an initiation file, **autoboot.txt**, and accompanying release and configuration files.

Use the **create autoboot** command to create an **autoboot.txt** file on external media. This command will automatically ensure that the keys and values that are expected in this file are correct. After the file is created the command will copy the current release and configuration files across to the external media. The **autoboot.txt** file is read/writable by any desktop operating system currently supported by the AlliedWare Plus™ Operating System. Note that the external media file system is not case sensitive.

When the Autoboot feature is enabled, the device on boot-up:

- checks for a special file called **autoboot.txt** on external media, and if this file exists,

- checks in the file for the "key=value" pair "**Copy_from_external_media_enabled=yes**", and if this enable flag is set,

- loads the release file and/or configuration   file from external media.

An example of a valid **autoboot.txt** file is shown in Figure 3 below.

Figure 3: Example autoboot.txt **file**

```
;Autoboot Creation, Local Time Fri, 30 December 2014 00:08:06
;

[AlliedWare Plus]
Copy_from_external_media_enabled=yes
Boot_Release=x510-5.4.4-3.5.rel
Boot_Config=test.cfg
```

If external media is not present, cannot be read, or the internal enable flag is not set to **yes** in the switch, the switch will boot as normal. Incompatible release files are prevented from loading onto the switch, even if the enable flag is set on the switch. If there is an incompatible release file then the configuration file referenced in the **autoboot.txt** file is also not loaded onto the switch.

We recommend that no directories are present on external media used to hold the **autoboot.txt** file. In addition, large numbers of files on external media may slow the booting process.

Note: The Autoboot feature is not supported in a stacked configuration.

- Do not remove external media part way through the copy process as this may leave the device in an unstable state.

- Configuration files placed on external media reduce security. Therefore, ensure adequate security precautions are taken with external media holding configuration files.

- Configuration commands that rely on the presence of a feature license will fail when executed in the replacement switch if the replacement switch does not have the same feature license present.

Note: The bootloader version on the device must be 1.1.6 or greater to support external media. An **autoboot.txt** file on external memory will not be detected on a device with a bootloader version less than 1.1.6

Restoring a switch using autoboot from external media

The example below describes the sequence of events when a switch in the field fails and is restored using this feature:

1.   Using the **create autoboot** command, a network engineer has previously manually created a restore external media device, such as a USB storage device. The external media device contains the following components:

     - An **autoboot.txt** file with required contents

     - An appropriate release file

     - A configuration file

2.   A switch fails in the field.

3.   A replacement switch of same model is installed.

Note: This replacement switch must already have a 5.4.2-2.6 or later release or bootloader version 1.1.6 or later pre-installed to be able to detect and interpret the **autoboot.txt** file.

4.   The previously created external media device is placed into the replacement switch.

5.   The switch powers up using its pre-installed release if present. It automatically checks the external media device for the **autoboot.txt** file.

6.   The switch finds a valid **autoboot.txt** file on the external media device, with the value "Copy_from_external_media_enabled" set. The release file and configuration file both exist on the external media device.

7. The MD5sum of pre-installed Flash release file is compared to the MD5sum of the release file stored in the external media device. If they do not match, because the release file in the replacement switch is either missing or different, then the release is restored from the external media device. If the release files already match, then the release file is not copied from the external media device.

8. The MD5sum of the Flash configuration file **default.cfg** (if pre-installed in the replacement switch) is compared to the MD5sum of the configuration file stored in the external media device. If they do not match, because the configuration file in the replacement switch is either missing or different, then the configuration file is restored from the external media device. If the configuration files already match, then the configuration file is not copied from the external media device.

9. The memory space available in the switch Flash is checked to ensure the release and configuration files stored in the external media device will fit. If there is not enough space the Autoboot feature will exit.

10. The release file and configuration files are automatically copied from the external media device to switch Flash memory. The switch release and configuration files are updated to contain the appropriate names.

11. The switch is automatically rebooted.

12. The replacement switch is now running the restored release and configuration files. Subsequent reboots are based on the restored release and configuration files stored in the switch Flash memory.

13. If you want to Autoboot from external media on this specific switch in the future, you must now manually enable the Autoboot feature in the configuration menu via the **autoboot enable** command. This command resets the enable flag stored internally in the switch NVS memory.

Configuring autoboot

This section describes the commands used to configure the Autoboot feature.

Table 4: Configuration procedures for the Autoboot feature

Step 1. **Create an Autoboot file (autoboot.txt)**	
`awplus#` `create autoboot [card]`	Create an **autoboot.txt** file on external media.
Step 2. **Enable the Autoboot feature**	
`awplus#` `configure terminal`	Enter Global Configuration mode.
`awplus(config)#` `autoboot enable`	The Autoboot feature is enabled by default the first time the device is powered up in the field. Use this command to enable the feature subsequently.
Step 3. **Disable the Autoboot feature**	
`awplus(config)#` `no autoboot enable`	Use this command to disable the Autoboot feature.
Step 4. **Display Autoboot configuration and status**	
`awplus#` `show autoboot`	Display detailed information about the current Autoboot configuration and status.
`awplus#` `show boot`	Display the status of the Autoboot feature; either enabled or disabled.

Step-by-Step Instructions for Auto-booting from an SD Card

Step 1. **Create an autoboot SD card**

First you need to configure the autoboot files on an SD card. To do this:

1. Insert the SD card into an existing switch.

The switch must be running the release and configuration that you want to load onto the new switch.

2. Enter the **create autoboot** command.

This automatically copies the files required to clone the switch onto the SD card, and creates the boot file **autoboot.txt**.

Example The create autoboot card command creates autoboot.txt on the SD card. It also copies the current release, in this case r1-5.4.1-2.7.rel, and configuration file, in this case x900-1-19.cfg:

```
awplus#create autoboot card
```

```
% Created restore file autoboot.txt on card:
awplus#cd card
awplus#dir
174 -rwx Sep 19 2011 09:17:46 autoboot.txt
18885434 -rwx Sep 19 2011 09:15:48 r1-5.4.1-2.7.rel
14533 -rwx Sep 15 2011 18:27:48 x900-1-19.cfg
```

You can now use this SD card to automatically set up another switch with these exact software release and configuration files. This new switch can then replace the original switch in the network.

3. Enable autoboot on the new switch.

The new switch must have autoboot enabled. By default, a switch has autoboot enabled the first time it is powered up. However, after the first boot you must enable autoboot in the configuration. To do this, use the autoboot enable command:

```
awplus(config)#autoboot enable
```

4. Insert the newly configured SD card into the new switch, and boot it up (or reboot).

As the new switch boots up, it detects the SD card you have installed and searches for the file autoboot.txt on the SD card. When it finds the file, it sets itself up with the specified release and configuration details.

5. Enter the show system command to see the switch system status prior to autoboot:

```
awplus#show system
```

```
Switch System Status Sun Sep 18 18:24:43 2011
Board ID Bay Board Name Rev Serial number
--------------------------------------------------------------------
Base 287 x900-12XT/S X2-0 M1NB77002
--------------------------------------------------------------------
RAM: Total: 512988 kB Free: 314540 kB
Flash: 63.0MB Used: 36.9MB Available: 26.1MB
--------------------------------------------------------------------
Environment Status : Normal
Uptime : 0 days 00:07:29
Bootloader version : 1.1.6
Current software : r1-5.4.1-2.6.rel
Software version : 5.4.1-2.6
Build date : Wed Sep 7 19:42:04 NZST 2011
Current boot config: flash:/test.cfg (file exists
```

6. Enter the show autoboot command to see the current autoboot status:

awplus#showboot

```
Autoboot configuration
--------------------------------------------------------------------
Autoboot status : enabled
SD card file autoboot.txt exists : yes
Restore information on SD card
Autoboot enable in autoboot.txt : yes
Restore release file : r1-5.4.1-2.7.rel (file exists)
Restore configuration file : x900-1-19.cfg (file exists)
```

7. Reload the switch. The following output is shown as the switch reboots.

```
Received event network.configured
22:14:14 x900-1 Autoboot: autoboot.txt file detected
```

The r1-5.4.1-2.7.rel file is now automatically copied from the SD card to the Flash on the replacement switch, as is the configuration file x900-1-19.cfg:

```
22:38:47 awplus Autoboot: Restoring release from card:/ r1-5.4.1-
2.7.rel to flash: r1-5.4.1-2.7.rel. This may take several minutes to
complete.
22:38:47 awplus Autoboot: Please wait until the device reboots.
22:41:13 awplus Autoboot: Release successfully restored
22:41:13 awplus Autoboot: Restoring configuration from card:/x900-1-
19.cfg to flash:x900-1-19.cfg, Please wait ..
22:41:13 awplus Autoboot: Configuration successfully restored
22:41:13 awplus Autoboot: Autoboot restore successful, rebooting
device.
```

The switch now reboots itself using r1-5.4.1-2.7.rel and x900-1-19.cfg. The switch sees that autoboot is enabled, as shown below:

```
Received event network.configured
22:26:58 awplus Autoboot: autoboot.txt file detected
```

8. The switch now checks to see if the release and configuration files specified in autoboot.txt are the same as those it has already loaded. In this case, they are the same:

The switch is now running the release and configuration file configured in autoboot. You can verify this with the show system command:

awplus#show sys

```
Switch System Status Sun Sep 18 22:31:09 2011
Board ID Bay Board Name Rev Serial number
-----------------------------------------------------------------
Base 287 x900-12XT/S X2-0 M1NB77002
-----------------------------------------------------------------
RAM: Total: 512684 kB Free: 293252 kB
Flash: 63.0MB Used: 38.2MB Available: 24.8MB
-----------------------------------------------------------------
Environment Status : Normal
Uptime : 0 days 00:03:22
Bootloader version : 1.1.6
Current software : r1-5.4.1-2.7.rel.rel
Software version : 5.4.1-2.7
Build date : Sat Sep 17 20:27:36 NZST 2011
Current boot config: flash:/x900-1-19.cfg (file exists)
```

Note: Some commands in the configuration file from the SD card may need the appropriate feature license on the replacement switch to execute successfully. The bootloader version on the switch must be 1.1.6 or greater to support booting from external media.

Step 2. **Change the configuration file and/or release file on the SD card.**

You may wish to have several configuration and/or release files on the autoboot SD card, so that you can choose which one to use at any given time.

You can edit **autoboot.txt** to modify the name of the configuration file and/or release file. To do this, enter the edit autoboot.txt command:

awplus#`edit autoboot.txt`

```
; Autoboot Creation Time Thu, 15 Sep 2011 18:27:48
[AlliedWare Plus]
Copy_from_external_media_enabled = yes
Boot_Release = r1-5.4.1-2.7.rel
Boot_Config = x900-1-19.cfg
```

You can now change the configuration file by modifying the **Boot_Config** parameter. You can change the release file by modifying the **Boot_Release** parameter.

Example   In this example, we will copy a new configuration file onto the SD card called **x900-1-20.cfg**, and modify the Boot-Config parameter with this filename:

awplus#`copy x900-1-20.cfg`

```
; Autoboot Creation Time Thu, 15 Sep 2011 18:27:48
[AlliedWare Plus]
Copy_from_external_media_enabled = yes
Boot_Release = r1-5.4.1-2.7.rel
Boot_Config = x900-1-20.cfg
```

Now, if you use this card to autoboot upgrade a replacement switch, this switch will have
x900-1-20.cfg loaded:

```
00:44:26 awplus Autoboot: Restoring configuration from card:/x900-1-
20.cfg to flash:x900-1-20.cfg, Please wait ..
00:44:27 awplus Autoboot: Configuration successfully restored
00:44:27 awplus Autoboot: Autoboot restore successful, rebooting
device.
```

Booting from an SD Card

As well as the ability to autoboot from an SD card, AlliedWare Plus provides the ability to
configure the switch to permanently boot using release and/or configuration files located on
the SD card, rather than the internal Flash.

Note: This functionality is only supported if the bootloader in the switch is at least version
1.1.6.

1. Enter the following commands:

awplus(config)#boot system card:r1-5.4.1-2.6.rel

awplus(config)#boot config-file card:x900-1-19.cfg

2. Reload the switch.

```
Reading filesystem...
Loading card:r1-5.4.1-2.6.rel...
Verifying release... OK
Loading configuration file card:/x900-1-19.cfg, please wait.
```

Send Information from the Switch to the SD Card

You can configure a script to periodically execute a command, and write the output to a file
on the SD card.

The following example demonstrates how to configure the switch to automatically execute
the **show ip route** command every 10 minutes, and write the output each time to the
routes.txt file on the SD card.

Example   This example shows you how to create a script called routes.sh. This script outputs the time
and the current IP routes every 600 seconds (10 minutes) for 1 hour (6 times). These
outputs are then added to the routes.txt file, which is automatically created on the SD card.

1. Enter the edit command.

awplus#edit routes.sh

2. Enter the following into the script file.

```
c=1
while [ $c -le 7 ]
do
echo -e "enable\nterminal length 0\nshow clock\nshow ip route"
| imish | tee -a /mnt/card/routes.txt
sleep 600
c=$(( $c + 1))
done
```

3. To activate this script, enter the activate command:

awplus#`activate routes.sh`

Once the script has finished running, you can view the contents of routes.txt on the SD card.

4. Enter the show file card command.

awplus#`show file card:routes.txt`

You will see the following output:

```
UTC Time: Tue, 20 Mar 2012 21:33:27 +0000
Timezone: UTC
Timezone Offset: +00:00
Summer time zone: None
AlliedWare Plus (TM) 0.0.0 03/20/12 20:48:18
Codes: C - connected, S - static, R - RIP, B - BGP
O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
* - candidate default
S 10.0.0.0/8 [1/0] via 192.168.1.254, vlan1
S 20.0.0.0/8 [1/0] via 192.168.1.253, vlan1
S 30.0.0.0/8 [1/0] via 192.168.1.252, vlan1
C 192.168.1.0/24 is directly connected, vlan1
UTC Time: Tue, 20 Mar 2012 21:43:28 +0000
Timezone: UTC
Timezone Offset: +00:00
Summer time zone: None
AlliedWare Plus (TM) 0.0.0 03/20/12 20:48:18
Codes: C - connected, S - static, R - RIP, B - BGP
O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
* - candidate default
S 10.0.0.0/8 [1/0] via 192.168.1.254, vlan1
S 20.0.0.0/8 [1/0] via 192.168.1.253, vlan1
S 30.0.0.0/8 [1/0] via 192.168.1.252, vlan1
C 192.168.1.0/24 is directly connected, vlan1
```

Perform a tcpdump and write the Output to a File on the SD card

The following example shows you how to run tcpdump and output the capture to a file on the SD card called capture.txt.

Note: The tcpdump command only captures control plane traffic (packets sent from the switch fabric to the CPU). It does not capture normal data traffic (packets that are being switched in the switch fabric).

Example   You can do this in one of two ways:

1. Enter the following:

```
tcpdump -i any -w /mnt/card/test6.pcap
x900#dir card:*.pcap
3028 -rwx Oct 2 2011 17:47:22 card:/test6.pcap
```

2. Or, you can enter the following:

```
x900#cd card
x900#tcpdump -i any -w test7.pcap
43 packets captured
86 packets received by filter
0 packets dropped by kernel
x900#dir *.pcap
4600 -rwx Oct 2 2011 17:48:24 card:/test7.pcap
3028 -rwx Oct 2 2011 17:47:22 card:/test6.pcap
```

Output the show tech-support Command to an SD Card

Example   This example shows you how to run the show tech-support command, and instruct it to write the output to the SD card instead of Flash.

Enter the following command:

awplus#show tech-support outfile card:tech-support.txt.gz

You will see the following output:

```
Generating output to card:tech-support.txt.gz: ......
done.
awplus#cd card
awplus#dir
63582 -rwx Sep 27 2011 21:48:48 tech-support.txt.gz
```

Use an SD Card Script to Enable a License on Multiple Switches

When you want to enable feature licenses, the strings you need to enter can be lengthy. You can automate this and thus avoid typing the string multiple times. An SD card provides a convenient way to do this.

You can create a script on an SD card, then use that card to execute the script on all the switches in a stack, or on a standalone switch.

Example   The following example takes a stack of four x600 switches, and adds a license to all of them by running a script on the SD card.

Note: The quantity in the license must match the number of switches in the stack, in this case four.

Enter the following:

```
awplus#cd card
awplus#edit install.scp
enable
awplus#license RADIUS 3Z5Skt/6PqcYN3GSNAwP6DzXI7MPPApAtoBomVbCDcFI5Un/
X/
rFQg== member all
```

When you run this script on the SD card, it automatically installs the license on all four switches in the stack, as shown below:

awplus#`activate card:install.scp`

You can also use this script to load the license on to a standalone switch, as shown below:

awplus#`activate card:install.scp`

```
AlliedWare Plus (TM) 5.4.1 09/23/11 00:08:25
awplus>enable
awplus#license RADIUS 3Z5Skt/6PqcYN3GSNAwP6DzXI7MPPApAtoBomVbCDcFI5Un/
X/
rFQg== member all
Stack Member 1: Operation succeeded.
License "RADIUS": Allowed installations 4, total just completed 1.
```

Back up the User Database for the Local RADIUS Server

The user database in a switch's local RADIUS server contains valuable data that should be backed up. You can easily back this up to an SD card, creating secure storage.

Example

In this example, a switch has the following users configured in its local RADIUS Server database:

```
radius-server local
nas 127.0.0.1 key awplus-local-radius-server
user user1 encrypted password xCM/
aNzjYJNkw1BuDuBPHqzuQ53v6sWxPNHmv5TLASQ=
user user2 encrypted password
FXuvxDT7o9m4SumdjesILIhbWuq8uSUpsJP6bQ4zlWc=
user user3 encrypted password
w1A2ilwyYCXTIwZqtKjEHgyrwYe1xYed9LRxQbYprQs=
```

You can save these users to a file on the SD card by entering the following command:

awplus#`copy local-radius-user-db card:users`

The next section, "Restore the local RADIUS Server User Database" shows how you can now use the file created by the backup process to restore the local RADIUS server database.

Restore the local RADIUS Server User Database

This example shows a new switch (running the default configuration) on which you can use the backup file created in the previous section, "Back up the User Database for the Local RADIUS Server", to configure the local RADIUS server database. This saves you having to manually configure each user via the CLI.

Example

```
awplus(config)#radius-server local
awplus(config-radsrv)#
awplus#copy card:users local-radius-user-db
Copying..
AlliedWare Plus (TM) 5.4.1 09/23/11 00:08:25
Successful operation
radius-server local
nas 127.0.0.1 key awplus-local-radius-server
user user1 encrypted password xCM/
aNzjYJNkw1BuDuBPHqzuQ53v6sWxPNHmv5TLASQ=
user user2 encrypted password
FXuvxDT7o9m4SumdjesILIhbWuq8uSUpsJP6bQ4zlWc=
user user3 encrypted password
w1A2ilwyYCXTIwZqtKjEHgyrwYe1xYed9LRxQbYprQs=
```

DHCP Snooping Database Backup on the SD Card

You can configure the switch to check the DHCP Snooping database at 2 second intervals, and write the file to an SD card installed in the switch if the database has changed.

Enter the following commands:

awplus(config)#service dhcp-snooping

awplus(config)#ip dhcp snooping database card

Manage the USB file on the SBx8100 switch

The SBx8100 switch supports USB external media as well as the SD card. USB drives have the same functionality as an SD card.

You can boot from the USB drive (the bootloader should be at least version 2.0.7) as well as saving files on to it.

Example   To access the USB drive, enter the following command:

awplus#copy 8100-34.cfg usb

```
Copying..
Successful operation
awplus#cd usb
awplus#dir
8120 -rwx Sep 28 2011 09:09:56 8100-34.cfg
```

Note: You do not have to enter any command before removing the USB drive. The switch automatically dismounts the USB drive 2 seconds after it has finished writing to it.

Wiping all Data from the Device, and Restoring from External Media

You can completely wipe all data from a switch's Flash, if required.

Note: When the switch is powered down, all the contents of the switch memory are lost, except for Flash memory.

Example To do this, you need to enter the Diagnostics Menu.

1. When the 'Press <Ctrl+B> for the Boot Menu' message appears, as below, press Ctrl+D to enter the Diagnostics Menu instead:

```
awplus#reload
reboot system? (y/n): y
URGENT: broadcast message:
System going down IMMEDIATELY!
... Rebooting at user request ...
Flushing file system buffers...
Unmounting any rRestarting system.
Initialising ECC Memory... Done
Bootloader 1.1.4 loaded
Press <Ctrl+B> for the Boot Menu
```

Press Ctrl+D to enter the Diagnostics Menu here. The switch now enters its Diagnostics Menu, as shown below:

```
Bootup Stage 1 Diagnostics Menu:
0. Restart
1. Full RAM test
2. Quick RAM test
3. Battery backed RAM (NVS) test
4. Bootloader ROM checksum test
---------------------------------
7. Bootup stage 2 diagnostics menu
---------------------------------
8. Quit to U-Boot shell
9. Quit and continue booting
```

2. Choose option 7. —Bootup stage 2 diagnostics menu.

The switch now shows you a second level Diagnostics Menu:

```
Bootup Stage 2 Diagnostics Menu:
0. Restart
2. Test FLASH (Filesystem only)
4. Erase FLASH (Filesystem only)
5. Card slot test
---------------------------------
8. Quit to U-Boot shell
9. Quit and continue booting
```

3. Choose option 4.—Erase FLASH (Filesystem only).

Warning: Here the switch gives you a warning. Press **Y** to proceed. This removes everything on the switch's Flash, including any software release files.

```
WARNING: This option will destroy the contents of the FLASH file system.
Press Y to proceed, or any other key to return to the previous menu
==> y
Erasing flash:
[=================================================]
```

It takes several minutes to complete this step.

Once the Flash has been erased, the following message is displayed:

```
Bootup Stage 2 Diagnostics Menu:
0. Restart
2. Test FLASH (Filesystem only)
4. Erase FLASH (Filesystem only)
5. Card slot test
---------------------------------
8. Quit to U-Boot shell
9. Quit and continue booting
```

4. You can restart the switch by choosing option 0.—Restart.

```
Initialising ECC Memory... Done
Bootloader 1.1.4 loaded
```

5. Press Ctrl+B for the Boot Menu:

```
Boot Menu:
--------------------------------------------------------
B. Boot backup software
--------------------------------------------------------
0. Restart
1. Perform one-off boot from alternate source
2. Change the default boot source (for advanced users)
3. Update Bootloader
4. Adjust the console baud rate
5. Special boot options
6. System information
7. Restore Bootloader factory settings
--------------------------------------------------------
9. Quit and continue booting
```

As there are no software release files on the switch now, you must either copy a release file onto to the switch via TFTP or load a release file from the SD card.

6. Choose option 1.—Perform one-off boot from alternate source:

```
Enter selection ==> 1
```

The switch now lists all of the files it finds on the SD card:

```
Select device:
0. Return to previous menu
----------------------------------------------------
1. Flash (flash:)
2. SD Card (card:)
3. TFTP (tftp://)
4. YMODEM (ymodem:)
```

7. Choose option 2.—SD Card (card:):

```
Reading filesystem...
Listing of usable files (root directory only)
1. card:r1-5.4.1-20120128-1.rel
2. card:r1-main-20120127-1.rel
3. card:r1-5.4.1-1.5.rel
4. card:r1-5.4.1-2.10-rc3.rel
5. card:r6-5.4.1-2.10-rc3.rel
```

8. Select the appropriate release file for your switch from the list:

The switch now boots up from the selected file, in this case r6-5.4.1-2.10-rc3.rel.

Note: As the switch is booting from the SD card, it may be slower to boot up.

```
Reading card:r6-5.4.1-2.10-rc3.rel...
Loading default configuration
Warning: flash:/default.cfg does not exist, loading factory defaults.
.
done!
Received event network.configured
awplus login: manager
Password:
The system has been booted using the one off boot/recovery mechanism.
Bootup has successfully completed.
```

Once you have logged in, you are prompted to save the release file you booted from to Flash:

```
Write this release to flash? (y/n): y
Enter filename [r6-5.4.1-2.10-rc3.rel]:
Setting the system to boot flash:r6-5.4.1-2.10-rc3.rel
AlliedWare Plus (TM) 5.4.1 02/15/12 15:44:53
awplus>enable
awplus#dir
17568430 -rw- Mar 20 2012 01:02:11 r6-5.4.1-2.10-rc3.rel
awplus#
```