Introduction

This guide provides information about the Trigger facility on AlliedWare Plus™ switches.

The Trigger facility provides a powerful mechanism for automatic and timed management of your device by automating the execution of commands in response to certain events. For example, you can use triggers to deactivate a service during the weekends, or to collect diagnostic information when the CPU usage is high.

A trigger is an ordered sequence of scripts that is executed when a certain event occurs. A script is a sequence of commands stored as a plain text file on a file subsystem accessible to the device, such as Flash memory. Each trigger may reference multiple scripts and any script may be used by any trigger. When an event activates a trigger, the trigger executes the scripts associated with it in sequence. One script is executed completely before the next script begins. Various types of triggers are supported, each activated in a different way.

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, support for individual triggers varies between products. To see whether your product supports an individual trigger, see the following documents:

- The product’s Command Reference
- The product’s Datasheet
- The AlliedWare Plus Datasheet

These documents are available from the above links on our website at alliedtelesis.com.

Feature support may change in later software versions. For the latest information, see the above documents.
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Configuring a Trigger

The following describes the general steps to configure a trigger. For specific configuration examples, see “Triggers Configuration” on page 6.

Step 1: Create a command script

- Create a command script with the commands you would like executed when the trigger conditions are met. To create the command script using the CLI, use the command:

  `awplus# edit [<filename>]`

- Alternatively, you can create a script on a PC then load it onto your device using the copy (URL) command.

Step 2: Enter the trigger configuration mode

- You must be in the Global Configuration mode to reach the Trigger Configuration mode, use the command:

  `awplus# configure terminal`

- To create a trigger, and enter its configuration mode, use the command:

  `awplus(config)# trigger <1-250>`

Step 3: Set the trigger type

The trigger type determines how the trigger is activated. To set the trigger to activate:

- when a Secure Digital (SD) or Secure Digital High Capacity (SDHC) card is either inserted or removed, use the command:

  `awplus(config-trigger)# type card {in|out}`

- when CPU usage reaches a certain level, use the command:

  `awplus(config-trigger)# type cpu <1-100> [up|down|any]`

- when the link status of a particular interface changes, use the command:

  `awplus(config-trigger)# type interface <interface> [up|down|any]`

- when the RAM usage reaches a certain level, use the command:

  `awplus(config-trigger)# type memory <1-100> [up|down|any]`

- periodically after a set number of minutes, use the command:

  `awplus(config-trigger)# type periodic <1-1440>`

- when a ping poll identifies that connectivity to a target device has changed, use the command:

  `awplus(config-trigger)# type ping-poll <1-100> {up|down}`

- if your device reboots, use the command:

  `awplus(config-trigger)# type reboot`

- when a stacking link goes up or down, use the command:

  `awplus(config-trigger)# type stack link (up|down)`
- at a specific time of the day, use the command:

```
awplus(config-trigger)# type time <hh:mm>
```

Note that a combined limit of 10 triggers of the type periodic and type time can be configured. If you attempt to add more than 10 triggers the following error message is displayed:

```
% Cannot configure more than 10 triggers with the type time or periodic
```

**Step 4: Set the time and days that the trigger can activate on**

By default triggers can activate at any time of the day, on all days. If you want your trigger to activate only during a specific time of the day, use the command:

```
awplus(config-trigger)# time {[after <hh:mm:ss>][before <hh:mm:ss>]}
```

- If you want your trigger to activate only on a specific date, use the command:

```
awplus(config-trigger)# day <1-31> <month> <2000-2035>
```

- If you want the trigger to activate only on specific days of the week, use the command:

```
awplus(config-trigger)# day <weekday>
```

Note that you can set either a specific date, or specific weekdays, but not both.

**Step 5: Specify how often the trigger can activate**

- By default, triggers can activate an unlimited number of times, as long as the trigger conditions are met. To set a limit on the number of times a trigger can activate, use the command:

```
awplus(config-trigger)# repeat {forever|no|once|yes|<1-4294967294>}
```

- Your device maintains two counters that track the number of times a trigger has activated. One counts the total number of times the trigger is activated and is only reset if the device restarts, or when the trigger is destroyed. The other counter tracks the permitted number of repetitions. To reset this counter, use the `repeat` command.

**Step 6: Add the scripts to the trigger**

- You can add up to five scripts to the trigger. When a trigger is activated, it executes the scripts in sequence, with the lowest numbered script activated first. The first script runs to completion before the next script begins. To add a script, use the command:

```
awplus(config-trigger)# script <1-5> {<filename>}
```

Note that a script activated from an SD card trigger cannot be located on the SD or SDHC card. It must be located in Flash memory.

**Step 7: Specify a description for the trigger**

- Specify a description for the trigger, so that you can easily identify the trigger in show commands and log output. Use the command:

```
awplus(config-trigger)# description <description>
```
Step 8: Verify the trigger’s configuration

- To check the configuration of the trigger, use the command:
  
  ```
  awplus(config-trigger)# show trigger [<1-250>/counter/full]
  ```

Troubleshooting Triggers

You can use the trigger diagnostic mode and trigger debugging to test your triggers and troubleshoot any issues.

Diagnostic mode is set per trigger. In this mode the trigger activates if its trigger conditions are met, but does not run any of its scripts. Your device generates a log message to indicate that the trigger was activated.

- To place a trigger in diagnostic mode, enter the trigger’s configuration mode and use the command:
  
  ```
  awplus(config-trigger)# test
  ```

- To start debugging for triggers, use the command:
  
  ```
  awplus(config-trigger)# debug trigger
  ```

  This generates detailed messages about how your device is processing the trigger commands and activating the triggers.

Enabling and Disabling

Triggers are enabled by default. This allows the trigger to activate as soon as its trigger conditions are met. If you need to disable a trigger but do not want to delete the trigger, use the command:

```
awplus(config-trigger)# no active
```

- To enable the trigger again, use the command:
  
  ```
  awplus(config-trigger)# active
  ```

- To delete the trigger, use the command
  
  ```
  awplus(config-trigger)# no trigger <1-250>
  ```
Triggers Configuration

The section describes how to configure triggers to:

- "Restrict Internet Access" on page 6
- "Capture Unusual CPU and RAM Activity" on page 7
- "See Daily Statistics" on page 9
- "Turn off Power to Port LEDs" on page 10

Restrict Internet Access

In the following configuration the ACME company wants to restrict its employees from accessing popular video sharing websites as this is causing bandwidth problems during work hours. The ACME company is happy for workers to access the site after work hours.

Employee PCs at ACME are on vlan2. Two triggers with associated scripts are needed:

- Trigger 1 activates at 8.30am and runs a script called `shutdown.scp`. This script adds commands to restrict access to the specified sites.
- Trigger 2 activates at 5.30pm and runs the script called `open.scp`. This script removes the configuration specified by `shutdown.scp`.

1. Create the `shutdown.scp` script
   - Create a configuration script using Access Control List commands to restrict users on vlan2 from accessing the specific sites.

2. Create the `open.scp` script
   - Create a script to remove the ACL configuration specified in the `shutdown.scp` file.

3. Configure trigger 1
   - To create trigger 1, use the commands:
     ```
     awplus# configure terminal
     awplus(config)# trigger 1
     ```
   - Set the trigger to activate at 8:30am, by using the command:
     ```
     awplus(config-trigger)# type time 08:30
     ```
   - Set the trigger to activate on Monday, Tuesday, Wednesday, Thursday and Friday:
     ```
     awplus(config-trigger)# day mon tue wed thur fri
     ```
   - Add the script `shutdown.scp` to the trigger:
     ```
     awplus(config-trigger)# script 1 shutdown.scp
     ```
   - Specify a helpful description, such as **Stops access to video sharing sites**. Use the command:
     ```
     awplus(config-trigger)# description Stops access to video sharing sites
     ```
Capture Unusual CPU and RAM Activity

The following configuration allows you to troubleshoot high CPU or RAM usage by the device. It uses two triggers to capture show output, and places this output in a file.

- Trigger 3 activates the script cpu-usage.scp when CPU usage is over 90% and can activate up to 5 times
- Trigger 4 activates the script ram-usage.scp when RAM usage is over 95%, and can activate up to 10 times

1. Create the cpu-usage.scp configuration script
   - Create a script with the appropriate show command:
     ```
     awplus# show cpu | redirect showcpu.txt
     ```
   The output of the `show cpu` command has been redirected into a file. It is not possible to display trigger script output on the terminal. Redirecting the command output to a file means it is available for later inspection.
Note that the files may grow large accumulating data and consume available Flash memory.

2. Create the ram-usage.scp configuration script
   - Create a script with the appropriate show command:
     ```
     awplus# show memory | redirect showmem.txt
     ```
   The output of the `show memory` command has been redirected into a file. It is not possible to display trigger script output on the terminal. Redirecting the command output to a file means it is available for later inspection.

3. Configure trigger 3:
   - To create trigger 3, use the commands:
     ```
     awplus# configure terminal
     awplus(config)# trigger 3
     ```
   - Set the trigger to activate when CPU usage exceeds 80%
     ```
     awplus(config-trigger)# type cpu 90 up
     ```
   - Add the script `cpu-usage.scp` to the trigger:
     ```
     awplus(config-trigger)# script 1 cpu-usage.scp
     ```
   - Return to Global Configuration mode:
     ```
     awplus(config-trigger)# exit
     ```

4. Configure trigger 4:
   - To create trigger 4, use the command:
     ```
     awplus(config)# trigger 4
     ```
   - Set the trigger to activate when RAM usage exceeds 95%
     ```
     awplus(config-trigger)# type cpu 95 up
     ```
   - Add the script `cpu-usage.scp` to the trigger:
     ```
     awplus(config-trigger)# script 1 ram-usage.scp
     ```

5. Verify the configuration:
   - To check the configuration of the triggers, use the command:
     ```
     awplus# show trigger 3
     awplus# show trigger 4
     ```
See Daily Statistics

The ACME company has recently set up QoS on its traffic to give traffic different priorities to the ISP. ACME wants to assess how much traffic is dropped with the QoS bandwidths set over the next week. To do this, they want to generate an hourly report on QoS traffic on the first day that this is implemented.

- Trigger 5 activates the script `qos-stats.scp` every 60 minutes.
  - The trigger is set to only activate during work hours.

1. Create the `qos-stats.scp` script
   - Create a configuration script with the appropriate show commands. You can either create the configuration script using the CLI with the `edit` command or create a script on a PC then load it onto your device using the `copy (URL)` command.

2. Configure trigger 5
   - To create trigger 5, use the commands:
     ```
     awplus(config)#configure terminal
     awplus(config)#trigger
     ```
   - Set the trigger to activate periodically every 60 minutes:
     ```
     awplus(config-trigger)#type periodic 60
     ```
   - Set the trigger to activate only during the hours of 8:00am and 6:00pm:
     ```
     awplus(config-trigger)#time after 8:00 before 18:00
     ```
   - Add the script `qos-stats.scp` to the trigger:
     ```
     awplus(config-trigger)#script 1 qos-stats.scp
     ```

3. Verify the configuration:
   - To check the configuration of the trigger, use the command:
     ```
     awplus(config)#show trigger
     ```
Turn off Power to Port LEDs

The following configuration allows you to conserve power by using the eco-friendly LED (Light Emitting Diode) feature to turn off power to the port LEDs during non-work hours.

- Trigger 6 activates at 5.30pm and runs a script called LEDoff.scp. This script adds commands to turn off power to all the port LEDs.
- Trigger 7 activates at 8.30am and runs the script called LEDon.scp. This script removes the configuration specified by LEDoff.scp.

1. Create the LEDoff.scp script

Create a configuration script with the commands that are executed when the trigger conditions are met. You can either create the configuration script using the CLI with the edit command or create a script on a PC then load it onto your device using the copy (URL) command. The configuration script for this example is:

```
! enable
configure terminal
ecofriendly led
exit
exit
```

2. Create the LEDon.scp script

Create a script to remove the configuration specified in the LEDoff.scp file. The configuration script for this example is:

```
! enable
configure terminal
no ecofriendly led
exit
exit
```

3. Configure trigger 6

- To create trigger 6, use the commands:
  
  ```
  awplus(config)#configure terminal
  awplus(config)#trigger 6
  ```

- Set the trigger to activate at 5:30pm, by using the command
  
  ```
  awplus(config-trigger)#type time 17:30
  ```

- Set the trigger to activate on Monday, Tuesday, Wednesday, Thursday and Friday:
  
  ```
  awplus(config-trigger)#day mon tue wed thur fri
  ```

- Add the script LEDoff.scp to the trigger:
  
  ```
  awplus(config-trigger)#script 1 LEDoff.scp
  ```

- Specify a helpful description, such as **Shutdown power to LEDs**. Use the command:
  
  ```
  awplus(config-trigger)#description Shutdown power to LEDs
  ```
4. Configure trigger 7:

- To create trigger 7, use the command:
  ```
  awplus(config)# trigger 7
  ```
- Set the trigger to activate at 8.30am:
  ```
  awplus(config-trigger)# type time 08:30
  ```
- Set the trigger to activate on Monday, Tuesday, Wednesday, Thursday and Friday:
  ```
  awplus(config-trigger)# day mon tue wed thur fri
  ```
- Add the script `LEDon.scp` to the trigger:
  ```
  awplus(config-trigger)# script 1 LEDon.scp
  ```
- Specify a helpful description, such as **Turn on power to LEDs**. Use the command:
  ```
  awplus(config-trigger)# description Turn on power to LEDs
  ```

5. Verify the configuration:

- To check the configuration of the triggers, use the commands:
  ```
  awplus(config)# show trigger 6
  awplus(config)# show trigger 7
  ```