Use Microwave ACM Signaling on ASR 920

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Introduction

This document describes how to use Microwave ACM signaling on ASR 920.

Keywords

Microwave ACM, EEM, configuration, signal degradation, ASR 920

Background Information

Microwave adaptive coding modulation (ACM) is an ethernet connectivity fault management feature that allows monitoring the behavior of microwave links [1]. When used together with EEM scripts, ACM allows the router to dynamically change microwave configurations to:

- Optimize routing.
- Control congestions.
- Enable loss protections.

Suppose there is an active snowstorm and signal strength gets reduced. When ACM detects signal degradation on a microwave link, an EEM script configured on the IP/MPLS access node can trigger these actions [2]:

- Adjust the IGP metric of the microwave link to reflect the new (degraded) capacity.
- Change the QoS policies on the interface towards the microwave link to ensure expedited forwarding (EF) traffic is sent.
- Remove the degraded link from routing, consequently forcing a path recalculation for loss protection.

Prerequisites

For ACM signaling to work, some key prerequisites to meet are:

- ASR 920 is running Cisco IOS® XE 3S, 16 or 17.
- The microwave transceiver in the network topology must support adaptive bandwidth modulation.
- The microwave transceiver must support the Ethernet CFM extension for microwave devices as defined by Cisco.
- All devices connected directly to the microwave transceiver must support signal degradation (SD)

functions.

A full list of prerequisites can be found in section Microwave ACM Signaling Configuration and EEM Integration within [2].

How to Configure ACM Signaling

ACM signaling is configured in two parts. The first part is a set of global configuration commands, and the second part is configured per service instance.

The service instance to be used with ACM signaling is configured within a physical interface or a port-channel.

Use these commands to configure the ACM. Replace bold text with custom values or names.

```
ASR920(config)#ethernet cfm ieee

ASR920(config)#ethernet cfm global

ASR920(config)#ethernet cfm domain MyCfmDomain level 3

ASR920(config-ecfm)#service MyCustomerServiceInstance evc MyEvc vlan
123 direction down

ASR920(config-ecfm-srv)#continuity-check

ASR920(config-ecfm-srv)#continuity-check interval 10s → Only predefined
options available. Use ? to see available options. This command is optional.

ASR920(config-ecfm-srv)#exit

ASR920(config-ecfm)#exit

ASR920(config)#ethernet evc MyEvc

ASR920(config-evc)#exit

ASR920(config)#int gig 0/0/0

ASR920(config-if)#no ip address

ASR920(config-if)#no shutdown

ASR920(config-if)#service instance 123 ethernet MyEvc

ASR920(config-if-srv)#encapsulation dot1q 123

ASR920(config-if-srv)#rewrite ingress tag pop 1 symmetric

ASR920(config-if-srv)#bridge-domain 123

ASR920(config-if-srv)#cfm mep domain MyCfmDomain mpid 100

ASR920(config-if-srv)#end
```

Refer to [2] and [3] for descriptions of the purpose of each command.

For link degradation to trigger an event, hold-off timer, loss threshold, and wait-to-restore (WTR) timers can be configured. These parameters are optional settings, and are configured at the interface (physical or logical) level with these commands:

```
ASR920(config)#int gig 0/0/0
ASR920(config-if)#ethernet event microwave hold-off 10
ASR920(config-if)#ethernet event microwave loss-threshold 15
ASR920(config-if)#ethernet event microwave wtr 16
ASR920(config-if)#end
```

Hold off timer refers to how long the microwave link must be in a degraded state before declaring it as degraded. The default value is 0 seconds.

Loss threshold refers to the number of bandwidth notification messages that must be received by the ASR 920 from the transceiver to declare the link as degraded. The default value is 3 messages.

WTR timer refers to the time the router has to wait before announcing that the signal has recovered from the degraded state. This prevents flapping due to intermittent recovery events. The default value is 10 seconds.

A detailed explanation of the timers can be found at [2] and [3].

Verify ACM Signaling Is Working

Use these commands to verify if ACM is working:

```
ASR920#show ethernet event microwave status [interface gig 0/0/0]
ASR920#show ethernet event microwave statistic
```

A sample output of the status command is shown here. This output is for ACM configured on three different service instances within a port-channel.

```
ASR920#show ethernet event microwave status
Microwave Bandwidth Status for Port-channel10
  State:                    SIGNAL_DEGRADED
  Hold Time:                10 seconds
  Restore Time:             10 seconds
  Loss Threshold:           2
  Total VSM Receive Count:  64
  Total VSM Drop Count:     0
  Total BNM Receive Count:  0
  Total BNM Drop Count:     0
```

```
Sender Address 3c4c.d0c8.4705
  State:                            SIGNAL_DEGRADED
  Elapsed time in this state:       00:04:11
  Nominal Bandwidth:                598 Mbps
  Current Bandwidth:                114 Mbps
  Lowest Bandwidth:                 114 Mbps
  Last VSM Received:                Thu Jan 27 21:36:19.992
  VSM Receive Count:                27
  VSM Drop Count:                   0
  VSM Period:                       10 second
  Last BNM Received:                Never
  BNM Receive Count:                0
  BNM Drop Count:                   0
  BNM Period:                       10 seconds
  Hold Timer:                       Not running
  Wait-to-Restore Timer:            Not running
  Periodic Timer:                   23 seconds remaining
  Transitions into degraded state: 1
Sender Address 3c4c.d0c8.f2c5
  State:                            SIGNAL_DEGRADED
  Elapsed time in this state:       00:02:53
  Nominal Bandwidth:                598 Mbps
  Current Bandwidth:                114 Mbps
  Lowest Bandwidth:                 114 Mbps
  Last VSM Received:                Thu Jan 27 21:36:18.548
  VSM Receive Count:                19
  VSM Drop Count:                   0
  VSM Period:                       10 second
  Last BNM Received:                Never
```

```
    BNM Receive Count:               0
    BNM Drop Count:                  0
    BNM Period:                      10 seconds
    Hold Timer:                      Not running
    Wait-to-Restore Timer:           Not running
    Periodic Timer:                  21 seconds remaining
    Transitions into degraded state: 1
  Sender Address 3c4c.d0c8.f2c6
    State:                           SIGNAL_DEGRADED
    Elapsed time in this state:      00:02:43
    Nominal Bandwidth:               598 Mbps
    Current Bandwidth:               114 Mbps
    Lowest Bandwidth:                114 Mbps
    Last VSM Received:               Thu Jan 27 21:36:18.596
    VSM Receive Count:               18
    VSM Drop Count:                  0
    VSM Period:                      10 second
    Last BNM Received:               Never
    BNM Receive Count:               0
    BNM Drop Count:                  0
    BNM Period:                      10 seconds
    Hold Timer:                      Not running
    Wait-to-Restore Timer:           Not running
    Periodic Timer:                  21 seconds remaining
    Transitions into degraded state: 1
```

How to Configure an EEM Script for ACM Events

When EEM scripts are used with ACM signaling, the script is triggered by two events, a signal degraded (sd) event, or a clear signal degraded (clear-sd) event.

For the signal-degraded event, a bandwidth threshold must be configured. This threshold in the EEM script

is set to the nominal bandwidth value. If this value is unknown, the Cisco configuration guide recommends a value of 1000.

There must be one SVI/BD per physical link. Also, one EEM script is required per physical link.

This is an example of an EEM script that triggers when the signal is degraded (sd):

```
ASR920(config)#event manager applet MyEemScript_SignalDegraded

ASR920(config-applet)#event ethernet microwave sd interface
gigabitethernet 0/0/0 threshold 400

ASR920(config-applet)#action 1 syslog msg "Any desired action to be
implemented"

ASR920(config-applet)#action 2 syslog msg "for example, adjust BW,
QoS policies, shut link"

ASR920(config-applet)#end
```

This is an example of an EEM script that triggers when signal degraded state gets cleared (clear-sd):

```
ASR920(config)#event manager applet MyEemScript_ClearedSignalDegraded

ASR920(config-applet)#event ethernet microwave clear-sd interface
gigabitethernet 0/0/0

ASR920(config-applet)#action 1 syslog msg "Any desired action to be
implemented"

ASR920(config-applet)#action 2 syslog msg "for example, restore to
original configuration"

ASR920(config-applet)#end
```

For additional examples refer to sample configurations on [2] and [3].