Configuring Microwave 1+1 Hot Standby Protocol on the Cisco ASR 903 Series Router

The following sections describe the Microwave 1+1 Hot Standby (HSBY) Protocol:

- Understanding Microwave 1+1 Hot Standby Protocol
- Configuring Microwave 1+1 Hot Standby Protocol
- Configuration Examples

Understanding Microwave 1+1 Hot Standby Protocol

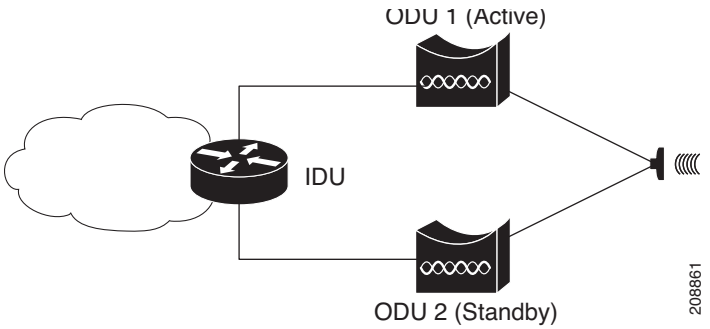
- Overview
- HSBY Maintenance Associations

Overview

Microwave 1+1 Hot Standby Protocol (HSBY) is a link protection protocol developed by Nokia Siemens Networks. HSBY extends the functionality of CFM Continuity Check messages to enable detection and handling of hardware failures in microwave devices in order to provide redundancy. HSBY provides link protection support for indoor units (IDUs) and outdoor units (ODUs).

Figure 1 shows a sample physical topology for HSBY using two ODUs (active and standby) and one IDU.

Figure 1 HSBY Link Protection Physical Topology



In this topology, the IDU is connected to an active and a standby ODU. While only the active ODU handles data traffic, both ODUs process CFM and management traffic at all times. The HSBY implementation of CFM detects connectivity failures between the IDU and each ODU and indicates which ODU is active and handling traffic. In the event of a failure, the standby ODU assumes the role of the active ODU.

Suspending Continuity Check Messages

Under some circumstances such as a software upgrade or a device reload, it is necessary to temporarily suspend continuity check messages between the ODU and IDU in order to prevent unnecessary link protection action such as a failover. In this case, the ODU sets a suspend flag within the continuity check messages sent to the IDU indicating the amount of time until continuity check messages resume. The IDU resumes exchanging continuity check messages with the ODU after the suspend interval has passed or after the ODU recovers sends a continuity check message.

Note While the Cisco ASR 903 Series Router processes continuity check suspend messages from the IDU, configuration of continuity check messages on the Cisco ASR 903 Series Router is not supported.

HSBY Maintenance Associations

HSBY protocol uses two types of CFM continuity check messages:

- E–CCM—An IDU-to-ODU continuity check message that functions at Ethernet CFM domain level 0. There are two active E–CCM sessions when HSBY is configured.
- P–CCM—An ODU-to-ODU continuity check message that functions at Ethernet CFM domain level 4.

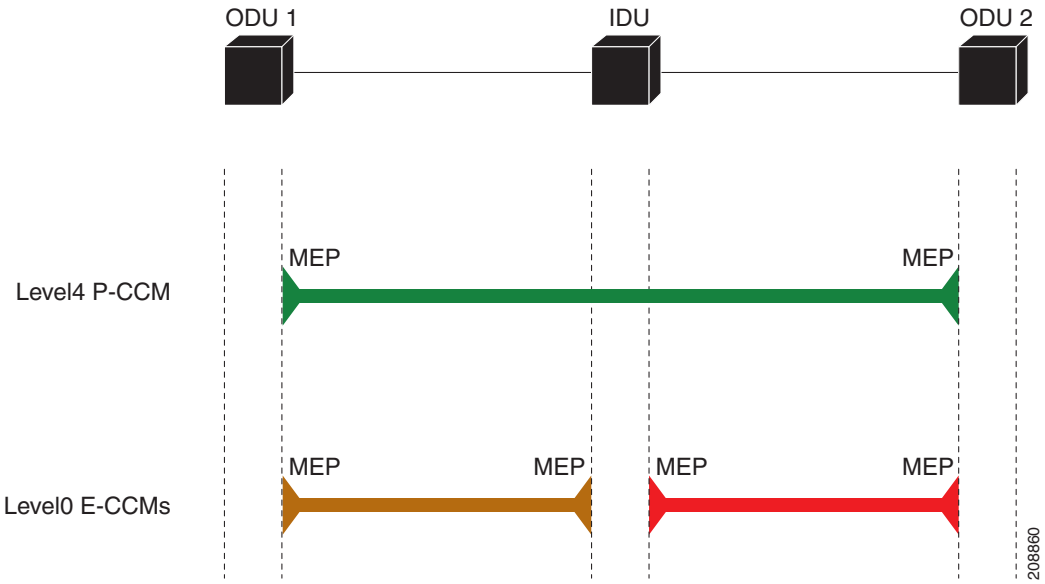
Note The IDU is only associated with the E–CCM sessions; it has outward-facing MEPs configured for each session.

Thus, the HSBY configuration shown in Figure 1 consists of five separate traffic flows:

- CFM traffic between the IDU and ODU 1
- CFM traffic between the IDU and the ODU 2
- CFM traffic between ODU 1 and ODU 2. This traffic passes through IDU.
- Data traffic between the WAN and ODU 1. This traffic passes through the IDU.

Figure 2 provides a logical view of the maintenance associations used in this HSBY topology.

Figure 2 HSBY Protocol CFM Maintenance Associations



Note To prevent switching loops on the management VLAN, we recommend that you enable RSTP on the management VLAN. For more information about how to configure RSTP, see "Understanding RSTP" section on page 10-8.

Configuring Microwave 1+1 Hot Standby Protocol

The following sections describe how to configure Microwave 1+1 Hot Standby Protocol (HSBY) on the Cisco ASR 903 Series Router.

- ODU Configuration Values
- IDU Configuration Values
- Configuring HSBY

ODU Configuration Values

HSBY protocol specifies that some values on the ODU are configurable while others utilize fixed values. Table 1 summarizes the permitted values for an ODU using HSBY protocol.

Table 1 HSBY ODU Configuration Parameters Summary

Parameter	Default Value	Permitted Values
Short MA Name	Learned	0–65535
MPID	2	Fixed
MA VLAN-ID (P-CCM)	None	16–50

IDU Configuration Values

HSBY protocol specifies that some values on the IDU are configurable while others utilize fixed values. Table 2 summarizes the permitted values for an IDU using HSBY protocol.

Table 2 HSBY IDU Configuration Parameters Summary

Parameter	Default Value	Permitted Values
CC Interval	100 ms	10 ms, 100 ms, and 1000 ms
Domain Level	0	Fixed
Domain Name	Null	Fixed
MA VLAN-ID (E-CCM)	None	1–15
MPID	1	Fixed
Short MA Name	None	0–65535
Suspend Interval	160 seconds	80 s, 160 s, 240 s, and 320 s

Configuring HSBY

Follow these steps to configure HSBY protocol on the Cisco ASR 903 Series Router.

Summary Steps

1. **enable**
2. **configure terminal**
3. **ethernet cfm global**
4. **link-protection enable**
5. **link-protection group management vlan** *vlan-id*
6. **link-protection suspend-interval interval** *interval*
7. **link-protection group** *group-number* **pccm vlan** *vlan-id*
8. **ethernet cfm domain** *domain-name* **level** *level-id* [**direction outward**]
9. **id** {*mac-address domain-number* | **dns** *dns-name* | **null**}
10. **service** {*ma-name* | *ma-num* | *vlan-id vlan-id* | *vpn-id vpn-id*} [**port** | **vlan** *vlan-id* [**direction down**]]
11. **mep mpid** *mpid*
12. **mep mpid** *mpid*
13. **continuity-check** [**interval** *time* | **loss-threshold** *threshold* | **static rmep**]
14. **exit**
15. **exit**
16. **ethernet cfm domain** *domain-name* **level** *level-id* [**direction outward**]
17. **id** {*mac-address domain-number* | **dns** *dns-name* | **null**}
18. **service** {*ma-name* | *ma-num* | *vlan-id vlan-id* | *vpn-id vpn-id*} [**port** | **vlan** *vlan-id* [**direction down**]]
19. **mep mpid** *mpid*

20. **mep mpid** *mpid*
21. **continuity-check** [**interval** *time* | **loss-threshold** *threshold* | **static rmep**]
22. **exit**
23. **exit**
24. **interface** *type slot* / *port*
25. **spanning-tree portfast** {**disable** | **trunk**}
26. **service instance** *id* **ethernet** *evc-name*
27. **encapsulation dot1q** *vlan-id* **second-dot1q** {**any** | *vlan-id*}
28. **bridge-domain** *bridge-id* [**split-horizon** [**group** *group-id*]]
29. **ethernet cfm mep domain** *domain-name* **mpid** *mpid* {**port** | **vlan vlan-id**}
30. **link-protection group** *group-number*
31. **exit**
32. **interface** *type slot* / *port*
33. **spanning-tree portfast** {**disable** | **trunk**}
34. **service instance** *id* **ethernet** *evc-name*
35. **encapsulation dot1q** *vlan-id* **second-dot1q** {**any** | *vlan-id*}
36. **bridge-domain** *bridge-id* [**split-horizon** [**group** *group-id*]]
37. **ethernet cfm mep domain** *domain-name* **mpid** *mpid* {**port** | **vlan vlan-id**}
38. **link-protection group** *group-number*
39. **exit**
40. **show ethernet cfm maintenance-points remote detail**

	Command	Purpose
Step 1	**enable** **Example:** Router> enable	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	**configure terminal** **Example:** Router# configure terminal	Enters global configuration mode.
Step 3	**ethernet cfm global** **Example:** Router(config)# ethernet cfm global	Enables Ethernet CFM globally.
Step 4	**link-protection enable** **Example:** Router(config)# link-protection enable	Enables link protection globally on the router.

	Command	Purpose
Step 5	**link-protection group management vlan** *vlan-id* **Example:** Router(config)# link-protection group management vlan 51	Defines the management VLAN used for link protection.
Step 6	**link-protection suspend-interval interval** *interval* **Example:** Router(config)# link-protection suspend-interval 320	Sets a link protection suspend interval.
Step 7	**link-protection group** *group-number* **pccm vlan** *vlan-id* **Example:** Router(config)# link-protection group 2 pccm vlan 16	Specifies an ODU-to-ODU continuity check message (P-CCM) VLAN.
Step 8	**ethernet cfm domain** *domain-name* **level** *level-id* [**direction outward**] **Example:** Router(config)# ethernet cfm domain eccm1 level 0	Configures the CFM domain for ODU 1 and enters Ethernet CFM configuration mode.
Step 9	**id** {*mac-address domain-number* | **dns** *dns-name* | **null**} **Example:** Router(config-ecfm)# id null	Configures a maintenance domain identifier (MDID).
Step 10	**service** {*ma-name* | *ma-num* | *vlan-id vlan-id* | *vpn-id vpn-id*} [**port** | **vlan** *vlan-id* [**direction down**]] **Example:** Router(config-ecfm)# service 1 vlan 14 direction down	Defines a maintenance association for ODU 1 and enters Ethernet CFM service instance configuration mode.
Step 11	**mep mpid** *mpid* **Example:** Router(config-ecfm-srv)# mep mpid 1	Defines the local MEP ID.
Step 12	**mep mpid** *mpid* **Example:** Router(config-ecfm-srv)# mep mpid 2	Defines the remote MEP ID.

	Command	Purpose
Step 13	**continuity-check** [**interval** *time* | **loss-threshold** *threshold* | **static rmep**] **Example:** Router(config-ecfm-srv)# continuity-check interval 100ms	Enables transmission of continuity check messages (CCMs) within the ODU 1 maintenance association and defines a continuity-check interval.
Step 14	**exit** **Example:** Router(config-ecfm-srv)# exit	Exits Ethernet CFM service instance configuration mode.
Step 15	**exit** **Example:** Router(config-ecfm)# exit	Exits Ethernet CFM configuration mode.
Step 16	**ethernet cfm domain** *domain-name* **level** *level-id* [**direction outward**] **Example:** Router(config)# ethernet cfm domain eccm2 level 0	Configures the CFM domain for ODU 2 and enters CFM configuration mode.
Step 17	**id** {*mac-address domain-number* | **dns** *dns-name* | **null**} **Example:** Router(config-ecfm)# id null	Configures a maintenance domain identifier (MDID).
Step 18	**service** {*ma-name* | *ma-num* | *vlan-id vlan-id* | *vpn-id vpn-id*} [**port** | **vlan** *vlan-id* [**direction down**]] **Example:** Router(config-ecfm)# service 2 vlan 15 direction down	Defines a maintenance association for ODU 2 and enters Ethernet CFM service configuration mode.
Step 19	**mep mpid** *mpid* **Example:** Router(config-ecfm-srv)# mep mpid 1	Defines the local MEP ID.
Step 20	**mep mpid** *mpid* **Example:** Router(config-ecfm-srv)# mep mpid 2	Defines the remote MEP ID.

	Command	Purpose
Step 21	**continuity-check** [**interval** *time* | **loss-threshold** *threshold* | **static rmep**] **Example:** Router(config-ecfm-srv)# continuity-check interval 100ms	Enables transmission of CCMs within the ODU 2 maintenance association and defines a continuity-check interval.
Step 22	**exit** **Example:** Router(config-ecfm-srv)# exit	Exits Ethernet CFM service instance configuration mode.
Step 23	**exit** **Example:** Router(config-ecfm)# exit	Exits Ethernet CFM configuration mode.
Step 24	**interface** *type slot / port* **Example:** Router(config)# interface gigabitethernet 1/1	Configures the interface to be connected to ODU 1 and enters interface configuration mode.
Step 25	**spanning-tree portfast** {**disable** | **trunk**} **Example:** Router(config-if)# spanning-tree portfast trunk	Enables PortFast on the interface when it is in trunk mode.
Step 26	**service instance** *id* **ethernet** *evc-name* **Example:** Router(config-if)# service instance 1 ethernet EVCODU1	Configures an Ethernet service instance on an interface and to enter Ethernet service configuration mode.
Step 27	**encapsulation dot1q** *vlan-id* **second-dot1q** {**any** | *vlan-id*} **Example:** Router(config-if)# encapsulation dot1q 10	Enables IEEE 802.1Q encapsulation of traffic on the EVC interface.
Step 28	**bridge-domain** *bridge-id* [**split-horizon** [**group** *group-id*]] **Example:** Router(config-if)# bridge-domain 10	Binds the service instance to a bridge domain instance.

	Command	Purpose
Step 29	**ethernet cfm mep domain** *domain-name* **mpid** *mpid* {**port** | **vlan** *vlan-id*} **Example:** Router(config-if)# ethernet cfm mep domain eccm1 mpid 1 vlan 14	Configures a CFM MEP domain for ODU 1.
Step 30	**link-protection group** *group-number* **Example:** Router(config-if)# link-protection group 1	Configures a link-protection group for ODU 2.
Step 31	**exit** **Example:** Router(config-if)# exit	Exits interface configuration mode.
Step 32	**interface** *type slot* / *port* **Example:** Router(config)# interface GigabitEthernet 3/2	Configures the interface to be connected to ODU 2 and enters interface configuration mode.
Step 33	**spanning-tree portfast** {**disable** | **trunk**} **Example:** Router(config-if)# spanning-tree portfast trunk	Enables PortFast on the interface when it is in trunk mode.
Step 34	**service instance** *id* **ethernet** *evc-name* **Example:** Router(config-if)# service instance 2 ethernet EVCODU2	Configures an Ethernet service instance on an interface and to enter Ethernet service configuration mode.
Step 35	**encapsulation dot1q** *vlan-id* **second-dot1q** {**any** | *vlan-id*} **Example:** Router(config-if)# encapsulation dot1q 10	Enables IEEE 802.1Q encapsulation of traffic on the EVC interface.
Step 36	**bridge-domain** *bridge-id* [**split-horizon** [**group** *group-id*]] **Example:** Router(config-if)# bridge-domain 10	Binds the service instance to a bridge domain instance.

	Command	Purpose
Step 37	**ethernet cfm mep domain** *domain-name* **mpid** *mpid* {**port** | **vlan** *vlan-id*} **Example:** Router(config-if)# ethernet cfm mep domain ECCM2 mpid 100 vlan 11	Configures a CFM MEP domain for ODU 2.
Step 38	**link-protection group** *group-number* **Example:** Router(config-if)# link-protection group 1	Configures a link-protection group for ODU 2.
Step 39	**exit** **Example:** Router(config-if)# exit	Returns the CLI to privileged EXEC mode.
Step 40	**show ethernet cfm maintenance-points remote detail** **Example:** Router# show ethernet cfm maintenance-points remote detail	(Optional) Displays remote maintenance endpoints in the continuity check database.

Configuration Examples

This section contains configuration examples for HSBY protocol.

HSBY Sample Configuration

The following configuration example shows how to configure HSBY. This example uses EVC interfaces, which are the only supported interfaces for HSBY on the Cisco ASR 903 Series Router.

```
!
link-protection enable
link-protection suspend-interval 320
link-protection group 1
link-protection management-vlan 500
!
ethernet cfm ieee
ethernet cfm global
!
ethernet cfm domain ECCM1 level 0
 id null
 service number 1 evc EVCODU1 vlan 10 direction down
  continuity-check
  continuity-check interval 10ms
!
ethernet cfm domain ECCM2 level 0
 id null
 service number 1 evc EVCODU2 vlan 11 direction down
```

```
  continuity-check
  continuity-check interval 10ms
!
!
interface GigabitEthernet0/0/1
spanning-tree portfast trunk
service instance 1 ethernet EVCODU1
description ODU1-ECCM-EVC
encapsulation dot1q 10
bridge-domain 10
ethernet cfm mep domain ECCM1 mpid 100 vlan 10
  link-protection group 1
!
service instance 2 ethernet
description ODU1-Management-Vlan
encapsulation dot1q 500
bridge-domain 500
!
service instance trunk 3 ethernet
description ODU1-Data-Vlan
encapsulation dot1q 100-200
bridge-domain from-encapsulation
!
!
interface GigabitEthernet0/0/2
spanning-tree portfast trunk
service instance 2 ethernet EVCODU2
description ODU2-ECCM-EVC
encapsulation dot1q 10
bridge-domain 10
ethernet cfm mep domain ECCM2 mpid 100 vlan 11
  link-protection group 1
!
service instance 2 ethernet
description ODU1-Management-Vlan
encapsulation dot1q 500
bridge-domain 500
!
service instance trunk 3 ethernet
description ODU1-Data-Vlan
encapsulation dot1q 100-200
rewrite ingress tag pop 1 symmetric
bridge-domain from-encapsulation
```