Topology Discovery and Communication

Topology discovery and communication using OSPF in NCS 1010 nodes

NCS 1010 nodes and their optical applications rely on OSPF (Open Shortest Path First) protocol to automatically discover and share network topology information. An enhanced version of OSPF is implemented to support the unique requirements of optical networks deployed on NCS 1010. This reference summarizes the key attributes and mechanisms of OSPF-based topology discovery and communication in this context.

Topology discovery

Optical applications on the NCS 1010 must identify both OLT-OLT link topology and adjacent nodes at the span-level. Link-level applications require a comprehensive view of the OLT-OLT link topology.

OSPF usage

NCS 1010 devices use OSPF to detect changes in topology, flood link-state updates to neighboring routers, and rapidly converge on an accurate network map. Each OSPF-enabled device updates its internal topology view in response to changes.

Enhanced OSPF

The version of OSPF used on NCS 1010 supports a new link-state advertisement attribute. This attribute advertises node type and optical spectral band, ensuring that applications can recognize node roles and the bands on which they operate.

These OSPF enhancements enable NCS 1010 nodes and their applications to maintain an up-to-date, detailed understanding of both optical connectivity and spectral allocation in the deployed network.

Configure OSPF on an NCS 1010 node

Use this task to include NCS 1010 in OSPF-enabled networks.

Important You must configure the router ID during OSPF configuration on NCS 1010 nodes.

See Implementing OSPF for description of the concepts and tasks necessary to implement OSPF on Cisco IOS XR.

Procedure

Step 1 Use these commands to configure OSPF on an NCS 1010 OLT node.

Example:

```
configure
router ospf process-name
router-id router-id
distribute link-state
nsf
network point-to-point
redistribute connected
area area-id
interface Loopback1
interface GigabitEthernet0/0/0/0
```

Step 2 Use these commands to configure OSPF on an NCS 1010 ILA node.

Example:

```
configure
router ospf process-name
router-id router-id
distribute link-state
nsf
network point-to-point
redistribute connected
area area-id
interface Loopback1
interface GigabitEthernet0/0/0/0
interface GigabitEthernet0/0/0/2
```

NCS 1010 nodes will participate in OSPF routing, which enables inter-node topology discovery and communication.

Configure OSPF cost

Use this task to identify the best route when there are two equal-cost routes to the same destination.

Table 1: Feature History

Feature Name	Release Information	Description
Configure OSPF cost	Cisco IOS XR Release 7.11.1	To identify the best route, OSPF path computation uses the link cost. The system calculates the cost based on the available interface bandwidth. From this release onwards, you can set a user-defined cost value using the **cost***variable* in the **router ospf** command. As a result, this feature enables you to set a specific route when there are two equal-cost routes to the same destination.

Cost is the metric used by OSPF. You can use the **cost** command to explicitly specify the network interface for OSPF path calculation.

Note The cost of the link is inversely proportional to the bandwidth of the link.

Procedure

Use these commands to configure OSPF cost.

Example:

```
configure
router ospf process-name
router-id router-id
area area-id
interface Loopback1
interface GigabitEthernet0/0/0/0
cost cost
```

See cost (OSPF) for different command modes and usage guidelines to implement **cost** OSPF on Cisco IOS XR software.

The interface cost used by OSPF for path calculation is explicitly specified.