



CCIE Service Provider v4 Advanced Technologies Class

IS-IS

IS-IS Overview

» Intermediate System to Intermediate System

- “Router to Router” communication
- Link-State IGP similar to OSPF

» Used in core of SP networks

- Simple flat network design
- Highly scalable
- Supports both IPv4 and IPv6 routing

» Not an IP protocol - Part of the CLNS stack

- Integrated IS-IS: IP extensions to IS-IS

IS-IS NET Addressing

» Network Entity Title

- Essentially CLNS Router-ID

» Uses ISO NSAP Addressing Format

- Maximum 20 bytes
- Minimum 8 bytes

» NET format

- AA.AAAA.AAAA.AAAA.AAAA.AAAA.AAAA.SSSS.SSSS.SSSS.NN
- Area – not link-state area like OSPF
- System-ID - Router-ID inside the area
- N-Selector - always zero

IS-IS Adjacency Levels

» IS-IS uses two “levels” of adjacency

- Level 2 (L2)
- Level 1 (L1)

IS-IS Level 2

» Inter or intra area adjacency

» Like area 0 in OSPF

- Must be contiguous
- Cisco IOS does not support IS-IS virtual links

IS-IS Level 1

- » Intra area adjacency only
- » Like a not so totally stubby area in OSPF
 - Intra area routes
 - Default route out
 - Redistribution allowed

Level 1 / Level 2 Routing

» Level 1 / Level 2 (L1/L2) Router

- Like ABR in OSPF
- Used as exit point from L1 to L2

» Injects default route into level-1

- Sets the “attached” bit

IS-IS Level Manipulation

» Process & interfaces default to Level-1-2

- Forms both L1 and L2
- Separate LSP databases
- Double the overhead

» Level can be defined...

- Global under the process
 - Affects all interfaces
- Under the interface
 - Affects only that interface

IS-IS Network Type

» Only two network types

» Broadcast

- Default on multipoint interfaces
- Uses DIS instead of DR / BDR

» Point-to-point

- Default on point-to-point interfaces

DIS Election

- » Designated Intermediate System
- » Like OSPF DR / BDR
 - No backup DIS
- » Election is dynamic, preemption can occur
 - Separate election for L1 and L2
 - Occurs by
 - Highest priority
 - Highest SNPA (MAC) address

Forming IS-IS Adjacency

» Ensure transport first

- CLNS resolution on multipoint NBMA
- IP in IP tunnels

» Level of adjacency must match

- Area must match if L1 adjacency

» Network type

- Broadcast
- Point-to-Point

IS-IS Path Selection

» All links default to cost of 10

- Can be manually modified

» Neighbors must agree on metric *style*

- Narrow
 - Default
- Wide
 - Needed for MPLS TE and IPv6
- Transition

» Level 1 paths preferred over Level 2 paths

- Like OSPF Intra-Area over Inter-Area

IS-IS Route Leaking

- » Level 2 domain knows all prefixes
- » Level 1 domain only knows L1 prefixes
- » Route leaking can be used to selectively...
 - Pass L2 routes into L1
 - Deny L1 routes from passing into L2

Multi Topology IS-IS

- » IS-IS supports routing for both IPv4 and IPv6
- » IPv6 routing can be either...
 - Single topology
 - Shares path calculation with IPv4
 - Requires 1:1 correlation of IPv4 and IPv6 interfaces
 - Multi topology
 - Independent path calculation from IPv4
 - IPv4 & IPv6 configuration completely independent

Q&A