Integrated IS-IS · Part 1

Protocol Header

4			8	12	16
IRPD				Packet Length	
Version/Protocol ID Extension				ID Length	
R	R	R	PDU Type	Version	
Reserved				Maximum Area Addresses	
Type				Length	
Value ...					
Additional TLVs ...					

NSAP Addressing

Relevance	Interdomain Part		Domain Specific Part		
NSAP	AFI	IDI	HODSP	System ID	SEL
Example	47	0005.80ff.f800.0000	0001	0000.0c00.1234	00
Condensed	Area			System ID	SEL

Interdomain Part (IDP) · Portion of the address used in routing between autonomous systems; assigned by ISO

Domain Specific Part (DSP) · Portion of the address relevant only within the local AS

Authority and Format Identifier (AFI) · Identifies the authority which dictates the format of the address

Initial Domain Identifier (IDI) · An organization belonging to the AFI

High Order DSP (HODSP) · The area within the AS

System ID · Unique router identifier; six bytes for Cisco devices; often taken from a MAC address

NSAP Selector (SEL) · Identifies a network layer service; always 0x00 in a NET address

Network Types

	Broadcast	Point-to-Point	Other
DIS Elected	Yes	No	*Must be configured as broadcast or point-to-point*
Neighbor Discovery	Yes	Yes	
Hello/Dead Timers	10/30	10/30	

Troubleshooting

`show ip route`	`show isis spf-log`
`show ip protocols`	`debug isis spf-events`
`show clns|isis neighbor`	`debug isis adjacencies-packets`
`show clns|isis interface`	`debug isis spf-statistics`
`show isis database`	`debug isis update-packets`

Attributes

Type	Link-State
Algorithm	Dijkstra
Metric	Default (10)
AD	115
Standard	ISO 10589
Protocols	IP, CLNS
Transport	CLNP
Authentication	Plaintext, MD5

Routing Levels

Level 0	Used to locate end systems
Level 1	Routing within an area
Level 2	Backbone between areas
Level 3	Inter-AS routing

Terminology

Type-Length-Value (TLV) · Variable length modular datasets

Link State PDU (LSP) · Carry TLVs describing link state information

Sequence Number Packet (SNP) · Used to request and advertise LSPs; can be complete (CSNP) or partial (PSNP)

Hello Packet · Establish and maintain neighbor adjacencies

Designated Intermediate System (DIS) · A pseudonode responsible for emulating point-to-point links across a multiaccess segment

Adjacency Requirements

· Interface MTUs must match

· Levels must match

· Areas must match (if level 1)

· System IDs must be unique

· Authentication must succeed

DIS Election

· Highest interface priority elected

· Highest SNPA (MAC/DLCI) breaks tie

· Highest system ID breaks SNPA tie

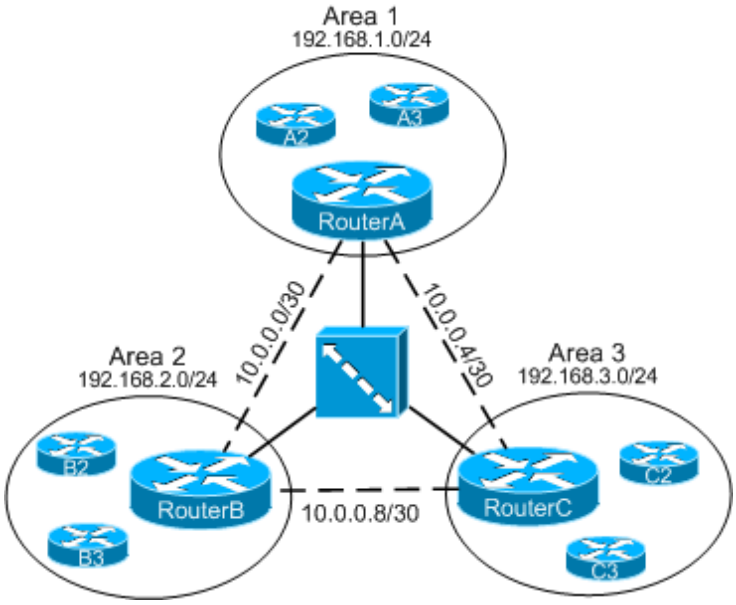
· Default interface priority is 64

· Current DIS may preempted

TLV Types

	Name	Use		Name	Use		Name	Use
1	Area Addresses	Hello, LSP	**6**	IS Neighbors	Hello	**128**	IP Internal Reachability	LSP
2	IS Neighbors	LSP	**8**	Padding	Hello	**129**	Protocols Supported	Hello
3	ES Neighbors	L1 LSP	**9**	LSP Entries	SNP	**131**	IDRP	L2 LSP
5	Prefix Neighbors	L2 LSP	**10**	Authentication	Hello, LSP, SNP	**132**	IP Interface Address	Hello, LSP

Configuration Example



RouterA2

```
interface FastEthernet0/0
 description Area 1
 ip address 192.168.1.2 255.255.255.0
 ip router isis
 isis circuit-type level-1
!
router isis
 net 49.0001.0000.0000.00a2.00
!
```

RouterB2

```
interface FastEthernet0/0
 description Area 2
 ip address 192.168.2.2 255.255.255.0
 ip router isis
 isis circuit-type level-1
!
router isis
 net 49.0002.0000.0000.00b2.00
!
```

RouterA1

```
interface FastEthernet0/0
 description Area 1
 ip address 192.168.1.1 255.255.255.0
 ip router isis
 isis circuit-type level-1
!
interface Serial1/0
 no ip address
 encapsulation frame-relay
!
interface Serial1/0.1 point-to-point
 description To Area 2
 ip address 10.0.0.1 255.255.255.252
 ip router isis
 isis circuit-type level-2-only
! MD5 authentication (keychain not shown)
 isis authentication mode md5
 isis authentication key-chain keychain
 frame-relay interface-dlci 101
!
interface Serial1/0.2 point-to-point
 description To Area 3
 ip address 10.0.0.5 255.255.255.252
 ip router isis
 isis circuit-type level-2-only
 frame-relay interface-dlci 102
!
router isis
 net 49.0001.0000.0000.00a1.00
```

RouterB1

```
interface FastEthernet0/0
 description Area 2
 ip address 192.168.2.1 255.255.255.0
 ip router isis
 isis circuit-type level-1
!
interface Serial1/0
 no ip address
 encapsulation frame-relay
!
interface Serial1/0.1 point-to-point
 description To Area 1
 ip address 10.0.0.2 255.255.255.252
 ip router isis
 isis circuit-type level-2-only
! MD5 authentication (keychain not shown)
 isis authentication mode md5
 isis authentication key-chain keychain
 frame-relay interface-dlci 101
!
interface Serial1/0.2 point-to-point
 description To Area 3
 ip address 10.0.0.9 255.255.255.252
 ip router isis
 isis circuit-type level-2-only
 frame-relay interface-dlci 103
!
router isis
 net 49.0002.0000.0000.00b1.00
```