Interface Masters
TECHNOLOGIES
Innovative Network Solutions

ISS

CLI User Manual_Vol4

INTERFACE MASTERS: ISSCLIum_Vol4/20100930

Revision Number: 28.0

Interface Masters
TECHNOLOGIES
Innovative Network Solutions

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Chapter 32

IP

IP (Internet Protocol) is an identifier for a computer or device on a TCP/IP network. Networks using the TCP/IP protocol route messages based on the IP address of the destination. The format of an IP address is a 32-bit numeric address written as four numbers separated by periods. Each number can be zero to 255. Example: 10.5.25.180.

Every computer that communicates over the Internet is assigned an IP address that uniquely identifies the device and distinguishes it from other computers on the Internet. Within an isolated network, IP addresses can be assigned at random as long as each one is unique. However, to connect a private network to the Internet, the registered IP addresses must be used (called Internet addresses) to avoid duplicates. The four numbers in an IP address are used in different ways to identify a particular network and a host on that network.

Four regional Internet registries -- ARIN, RIPE NCC, LACNIC and APNIC -- assign Internet addresses from the following three classes.

- Class A - supports 16 million hosts on each of 126 networks
- Class B - supports 65,000 hosts on each of 16,000 networks
- Class C - supports 254 hosts on each of 2 million networks

The number of unassigned Internet addresses is running out, so a new classless scheme called CIDR (Classless Inter-Domain Routing) is gradually replacing the system based on classes A, B, and C and is tied to adoption of IPv6.

ICMP (Internet Control Message Protocol) is an extension to the IP defined by RFC 792. ICMP supports packets containing error, control, and informational messages. For example the **`ping`** command uses ICMP to test an Internet connection.

Interface Masters ISS provides the flexibility to use either the **Interface Masters IPv4** Module or the Linux IP. The IP commands under this section are therefore classified into:

32.1 Commands Specific for Interface Masters IP

This section describes the commands that are specific for **Interface Masters IP** alone. These commands are based on the Interface Masters Proprietary MIB.

The list of CLI commands for the configuration of Interface Masters IP is as follows:

- ip redirects
- ip unreachables
- ip mask-reply
- ip echo-reply
- maximum-paths
- ip rarp client request
- ip aggregate-route
- traffic-share
- ip path mtu discover
- ip path mtu
- ip rarp client
- ip directed-broadcast
- show ip rarp
- show ip pmtu

32.1.1 ip redirects

This command enables sending ICMP Redirect messages. The Redirect Message is an ICMP message which informs a host to update its routing information to send packets on an alternate route when a packet enters an IP interface and exits the same interface. The redirect message is sent to inform the host of the presence of alternative route.

The no form of this command disables sending ICMP Redirect messages.

```
ip redirects [vrf <vrf-name>]
```

```
no ip redirects [vrf <vrf-name>]
```

Syntax Description

vrf[1]	-	Name of the VRF instance. This value is a string of size 32.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults Sending of ICMP Redirect messages is enabled

vrf	-	default

Example

```
iss(config)# ip redirects
```

☞
- VRF instance should be created, before executing this command to configure ICMP redirect messages for the context.

Related Commands
- **ip vrf** - Creates VRF instance
- **show ip information** -– Displays IP configuration information

[1] This parameter is specific to Multiple Instance.

32.1.2 ip unreachables

This command enables the router to send an ICMP unreachable message to the source if the router receives a packet that has an unrecognized protocol or no route to the destination address. ICMP provides a mechanism that enables a router or destination host to report an error in data traffic processing to the original source of the packet. This informs the source that the packet is dropped.

The no form of this command disables sending ICMP unreachable messages.

```
ip unreachables [vrf <vrf-name>]
```

```
no ip unreachables [vrf <vrf-name>]
```

Syntax Description

vrf[1]	-	Name of the VRF instance. This value is a string of size 32.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults Sending of ICMP unreachable message is enabled

vrf	-	default

Example

```
iss(config)# ip unreachables
```

☞
- VRF instance should be created, before executing this command to configure the ICMP unreachable message for the context.

Related Commands
- **ip vrf** - Creates VRF instance
- **show ip information** -– Displays IP configuration information

32.1.3 ip mask-reply

This command enables sending ICMP Mask Reply messages. The IP mask reply is an ICMP message sent by the router to the host informing the subnet mask of the network. This reply is in correspondence to a request sent by the host seeking the subnet mask of the network. The no form of this command disables sending ICMP Mask Reply messages.

```
ip mask-reply [vrf <vrf-name>]
```

```
no ip mask-reply [vrf <vrf-name>]
```

Syntax Description

vrf[1]	-	Name of the VRF instance. This value is a string of size 32.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults Sending of ICMP Mask Reply messages is enabled

vrf	-	default

Example

```
iss(config)# ip mask-reply
```

☞
- VRF instance should be created, before executing this command to configure the ICMP mask reply messages for the context.

Related Commands
- **ip vrf** - Creates VRF instance
- **show ip information** -– Displays IP configuration information

32.1.4 ip echo-reply

This command enables sending ICMP Echo Reply messages. The ip echo reply is a message sent by a device, in response to a request sent by another device. This message is used to to check if device is able to communicate (send and receive data) with the destination device. The no form of this command disables sending ICMP Echo Reply messages.

```
ip echo-reply [vrf <vrf-name>]
```

```
no ip echo-reply [vrf <vrf-name>]
```

Syntax Description

vrf[1]	-	Name of the VRF instance. This value is a string of size 32.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults Sending of ICMP Echo Reply messages is enabled

vrf	-	default

Example

```
iss(config)# ip echo-reply
```

☞
- VRF instance should be created, before executing this command to configure the ICMP echo reply messages for the context.

Related Commands
- **ip vrf** - Creates VRF instance
- **show ip information** -– Displays IP configuration information

32.1.5 maximum-paths

This command sets the maximum number of paths that can be connected to a host. It provides multiple forwarding paths for data traffic and enables load balancing. It improves the overall network fault tolerance, as failure in one instance does not affect the other instances. The no form of this command sets the maximum number of paths to its default value.[2]

```
maximum-paths [vrf <vrf-name>] <value (1-16)>

no maximum-paths [vrf <vrf-name>]
```

Syntax Description	**vrf**[1]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Global Configuration Mode		
Package	Workgroup, Enterprise and Metro		
Defaults	Maximum number of multipaths is set as 2		
	vrf	-	default
Example	`iss(config)# maximum-paths 15`		

☞ • VRF instance should be created, before executing this command to configure the maximum number of multipaths for the context.

Related Commands
- **ip vrf** - Creates VRF instance
- **show ip information** -– Displays IP configuration information

[2] This command is currently not supported in **Interface Masters ISS** running on Broadcom chipsets.

32.1.6 ip rarp client request

This command sets the number of RARP client request retries or interval between requests. The ip rarp client request is sent from a newly set up machine in a network. The RARP client program requests the RARP server in the Router to send its IP address. The network administrator creates a table in the lan's gateway router. The router maps the MAC address of the client to an IP address that is sent to the client for future use. If the server didn't respond with an ip address, the client retries the request for configured number of times and the interval between each retry can also be set.

The no form of this command sets the RARP client request retries or interval between retries to the default values.

RARP requests are most commonly sent by diskless clients and JumpStart clients during bootup. The client uses the RARP protocol to broadcast the Ethernet address and asks for the corresponding IP address.

```
ip rarp client request {interval <timeout (30-3000)> | retries <retries (2-10)>}
```

```
no ip rarp client request { interval|retries }
```

Syntax Description

`interval <timeout (30-3000)>`	-	Configures the interval (in seconds) after which an unanswered RARP request is transmitted. The value ranges between 30 and 3000.
`retries <retries (2-10)>`	-	Sets the maximum number of retransmissions of RARP request packet after which request must not be sent. The value ranges between 2 and 10.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults

interval	-	100
retries	-	4

Example

```
iss(config)# ip rarp client request interval 30
```

Related Commands

- `show ip` **rarp** - Displays RARP configuration information

32.1.7 ip aggregate-route

This command sets the maximum number of aggregate routes. Aggregate Route-based IP switching is achieved by creating a virtual circuit along the network by selecting the forwarding paths used by routers that use OSPF and BGP(Border Gateway Protocol).The data is sent through these virtual circuit to the destination. The routing process is skipped along this circuit. The data is tagged with a label that is read by the switches and forwarded to the destination.

The no form of this command sets the maximum number of aggregate routes to its default value.

```
ip aggregate-route <value (5-4095>
```

```
no ip aggregate-route
```

Mode	Global Configuration Mode
Package	Workgroup, Enterprise and Metro
Defaults	10
Example	`iss(config)# ip aggregate-route 500`
Related Commands	• **`show ip information`** -– Displays IP configuration information

32.1.8 traffic-share

This command[3] enables traffic sharing (load sharing of IP packets).. Traffic sharing is the process by which the protocols select the route for traffic flow with regard to path cost calculation and load distribution. EIGRP (Enhanced Interior Gateway Routing Protocol) provides intelligent traffic sharing. Traffic sharing is controlled by selecting the mode of distribution. Traffic-share balanced distributes the traffic proportionately to the ratio of the metrics of different routes. The Traffic-share min distributes the traffic in the route which has minimal cost path even if different paths are available.

The no form of this command disables traffic sharing.

```
traffic-share [vrf <vrf-name>]
```

```
no traffic-share [vrf <vrf-name>]
```

Syntax Description	**vrf**[1]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Global Configuration Mode		
Package	Workgroup, Enterprise and Metro		
Defaults	Load Sharing is disabled		
	vrf	-	default
Example	`iss(config)# traffic-share`		

☞ • VRF instance should be created, before executing this command to configure the traffic sharing for the context.

Related Commands

- **ip vrf** - Creates VRF instance
- **show ip information** — Displays IP configuration information

[3] This command is currently not supported in **Interface Masters ISS** running on Broadcom chipsets.

32.1.9 ip path mtu discover

This command initiates path MTU (Maximum Transmission Unit) discovery.

The no form of this command sets path MTU discovery to its default value. When IP path MTU discover is set to be disabled, PMTU-D is not done even if the application requests to do so.

```
ip [vrf <vrf-name>] path mtu discover
```

```
no ip [vrf <vrf-name>] path mtu discover
```

Syntax Description

vrf[1]	-	Name of the VRF instance. This value is a string of size 32.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults Path MTU discovery is disabled

vrf	-	default

Example

```
iss(config)# ip path mtu discover
```

☞
- VRF instance should be created, before executing this command to configure the path MTU discovery for the context.

Related Commands
- **ip path mtu** - Sets the MTU for usage in PMTU Discovery
- **ip vrf** - Creates VRF instance
- **show ip information** -– Displays IP configuration information

32.1.10 ip path mtu

This command sets the MTU for usage in PMTU discovery. The transmission of packets from source to destination has many networks to pass through. Each network has its own Maximum transmission unit. The smallest MTU of all the links is the path MTU. This PMTU can be manually configured by the administrator.

The no form of this command removes MTU for usage in PMTU Discovery.

```
ip path mtu [vrf <vrf-name>] <dest ip> <tos> <mtu(68-65535)>
```

```
no ip path mtu [vrf <vrf-name>] <dest ip> <tos>
```

Syntax Description

vrf[1]	-	Name of the VRF instance. This value is a string of size 32.
dest ip	-	Sets the Destination IP Address. This is done to define the path between source and destination.
tos	-	Sets the Type of Service of the configured route
mtu	-	Sets the Maximum Transmission Unit for the path from source to the destination. This value ranges between 68 and 65535.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults

tos	-	0
vrf	-	default

Example

```
iss(config)# ip path mtu  10.0.0.1  0  1800
```

☞
- Path MTU discovery needs to be enabled to execute this command.
- VRF instance should be created, before executing this command to configure the MTU for the context.

Related Commands
- **ip vrf** - Creates VRF instance
- **ip path mtu discovery –** Enables path mtu (Maximum Transmission Unit) discovery
- **show ip pmtu –** Displays the configured PMTU Entries

32.1.11 ip rarp client

This command enables RARP (Reverse Address Resolution Protocol) client. The RARP resolves an IP address from a given hardware address. The client that requests for the IP is the RARP client. The IP address of the default interface is obtained through RARP, when the IP address configuration mode is dynamic. After RARP Max retries, IP is obtained through DHCP.

The no form of this command disables RARP client.

This command is currently not supported in the code.

`ip rarp client`

`no ip rarp client`

Mode Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults Enabled

Example

```
iss(config-if)# ip rarp client
```

☞ The RARP server must be disabled when the RARP client is enabled.

Related Commands

- **`show interfaces`** – Displays the interface status and configuration for all interfaces available in the switch.
- **`show ip rarp`** – Displays RARP configuration information.

32.1.12 ip directed-broadcast

This command enables forwarding of directed broadcasts. The IP directed broadcast is an IP packet whose destination is a valid IP subnet address, but the source is from a node outside the destination subnet. The routers from outside the subnet forwards the IP directed broadcast, like any other IP packet. When the directed packets reach a router in the destination subnet, the packet is exploded as a broadcast in the subnet. The header information on the broadcast packet is rewritten for the broadcast address in the subnet. The packet is sent as link-layer broadcast. The no form of this command disables forwarding of directed broadcasts.

`ip directed-broadcast`

`no ip directed-broadcast`

Mode Vlan Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults Disabled

Example

```
iss(config-if)# ip directed-broadcast
```

Related Commands

- **`show interfaces`** – Displays the interface status and configuration for all interfaces available in the switch.

32.1.13 show ip rarp

This command displays RARP configuration information. RARP Configurations such as Maximum number of RARP request retransmission retries and RARP request retransmission timeout. It also displays the number of responses discarded.

show ip rarp

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example

```
iss# show ip rarp

RARP Configurations:
--------------------
 Maximum number of RARP request retransmission retries is 4
 RARP request retransmission timeout is 100 seconds

RARP Statistics:
----------------
 0 responses discarded
```

Related Commands

- **ip rarp client request** – Sets the number of RARP client request retries
- **ip rarp client** – Enables RARP client

32.1.14 show ip pmtu

This command displays the configured PMTU entries. The details include Destination IP address, Type of Service and Path MTU.

show ip pmtu [vrf <vrf-name>]

Syntax Description

vrf[1]	-	Name of the VRF instance. This value is a string of size 32.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Defaults vrf - default

Example

```
iss# show ip pmtu

    Ip Path MTU Table
    -----------------

Vrf Name        Destination  TOS   PMTU
--------        -----------  ---   ----

default         15.0.0.20    0     1500

vr1             14.0.0.25    0     900

iss# sh ip pmtu vrf vr1

    Ip Path MTU Table
    -----------------

Vrf Name        Destination  TOS   PMTU
--------        -----------  ---   ----

vr1             14.0.0.25    0     900
```

Related Commands

- **ip path mtu** – Sets the MTU for usage in PMTU Discovery

32.2 Commands Common for Interface Masters and Linux IP

This section describes the commands that are common for **Interface Masters IP** and Linux IP. These commands are based on the standard MIB.

The list of CLI commands for the configuration of Interface Masters and Linux IP is as follows:

- ping
- ip route
- ip routing
- ip default-ttl
- arp timeout
- arp – ip address
- ip arp max-retries
- ip proxyarp-subnetoption
- ipv4 enable
- ip proxy-arp
- show ip traffic
- show ip information
- show ip route
- show ip arp
- show ip proxy-arp

32.2.1 ping

This command sends echo messages. The Packet Internet Groper (Ping) module is built based on the ICMP echo request and ICMP echo response messages. The network administrator uses this ping on a remote device to verify its presence. Ping involves sending ICMP echo messages repeated and measuring the time between transmission and reception of message. The output displays the time taken for each packet to be transmitted, number of packets transmitted, number of packets received and packet loss percentage.

```
ping [vrf <vrf-name>] [ip] destination-address [size packet_size (0-2080)]
[count packet_count (1-10)] [timeout time_out (1-100)]
```

Syntax Description

vrf[1]	-	Name of the VRF instance. This value is a string of size 32.
ip	-	Configures the IP address of the node to be pinged
size packet_size	-	Configures the size of the data portion of the PING PDU. This value ranges between 0 and 2080.
count packet_count	-	Configures the number of times the given node address is to be pinged.
timeout	-	Configures the time in seconds after which the entity waiting for the ping response times out. The value ranges between 1 and 100.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Defaults

size packet_size	-	500
count packet_count	-	3
timeout time_out	-	5
vrf	-	default

Example

```
iss# ping 10.0.0.2

  Reply Received From :10.0.0.2, TimeTaken : 20 msecs
  Reply Received From :10.0.0.2, TimeTaken : 10 msecs
  Reply Received From :10.0.0.2, TimeTaken : 10 msecs
     --- 10.0.0.2 Ping Statistics ---
```

```
3 Packets Transmitted, 3 Packets Received, 0% Packets Loss
```

- VRF instance should be created, before executing this command to send echo message for the context.

Related Commands

- **`ip vrf`** – Creates VRF instance

32.2.2 ip route

This command adds a static route. The Route defines the IP address or interface through which the destination can be reached. The no form of this command deletes a static route.

```
ip route [vrf <vrf-name>] <prefix> <mask> {<next-hop> | Vlan <vlan-id (1-4094)> [switch <switch-name>] | <interface-type> <interface-id> | Linuxvlan <interface-name> | Cpu0} [<distance (1-255)>] [ private ]
```

```
no ip route [vrf <vrf-name>] <prefix> <mask> { <next-hop> | Vlan <vlan-id(1-4094)> [switch <switch-name>] |<interface-type> <interface-id>|Linuxvlan <interface-name> | Cpu0} [private]
```

Syntax Description

vrf[1]	-	Name of the VRF instance. This value is a string of size 32.
<prefix>	-	Configures the number of high-order bits in the IP address. These bits are common among all hosts within a network.
<mask>	-	Configures the subnet mask for the IP address. This is a 32-bit number which is used to divide the IP address into network address and host address.
<next-hop>	-	Defines the IP address or IP alias of the next hop that can be used to reach that network.
Vlan	-	Sets the specified VLAN ID. This is a unique value that represents the specific VLAN created / to be created. This value ranges between 1 and 4094.
switch[4]	-	Name of the switch context. This value is a string of size 32.
<interface-type>	-	Sets the specified type of interface. The interface can be: fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. gigabitethernet – A version of LAN standard architecture

[4] The switch name can be only set as **default** in the Enterprise and Base packages, as the creation of multiple switches is supported only in the Metro package. This parameter is specific to Multiple Instance.

that supports data transfer upto 1 Gigabit per second.

extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links.

<interface-id>	-	Sets the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash. For example: 0/1 represents that the slot number is 0 and port number is 1.
Linuxvlan	-	Defines the Interface Name of the Linux VLAN Interface
Cpu0	-	Sets the Out of Band Management Interface for the route
<distance (1-255)>	-	Defines the Administrative distance as per the metrics. This value ranges between 1 and 255.
private	-	Sets the Private route

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults

distance	-	1
vrf	-	default

Example

```
iss(config)# ip route  30.0.0.2  255.255.255.255  Vlan 1
```

☞

- When the next-hop object is unknown or not relevant its value must be set to zero.
- Interface must be a router port.
- VRF instance should be created, before executing this command to add static route for the context.
- VRF instance should be mapped to the IPV4 / IPV6 interface, before executing this command to add the static routes for the context in the interface.

Related Commands

- **ip vrf –** Creates VRF instance
- **ip vrf forwarding –** Maps the IPV4 / IPV6 interface to the context
- **show ip route –** Displays the IP routing table
- **no switchport** – Configures the port as a router port

32.2.3 ip routing

This command enables IP routing. IP routing is the path defined by set of protocols for the data to follow across multiple networks from source to its destination. When an IP packet is to be forwarded, the router uses its forwarding table to determine the next hop address for the packet to reach its destination. The header in the IP packet consists of the next hop information.

The no form of this command disables IP routing.

```
ip routing [vrf <vrf-name>]
```

```
no ip routing [vrf <vrf-name>]
```

Syntax Description

vrf[1]	-	Name of the VRF instance. This value is a string of size 32.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults IP routing is enabled

vrf	-	default

Example

```
iss(config)# ip routing
```

☞ • VRF instance should be created, before executing this command to configure IP routing for the context.

Related Commands

- **ip vrf** –Creates VRF instance
- **show ip information** – Displays IP configuration information
- **show ip route** – Displays the IP routing table

32.2.4 ip default-ttl

This command sets the Time-To-Live (TTL) value. TTL is the time set for a unit of data (a packet) to remain in the network or computer before it could be discarded. The no form of this command sets the TTL to the default value.

```
ip default-ttl [vrf <vrf-name>] <value (1-255)>
```

```
no ip default-ttl [vrf <vrf-name>]
```

Syntax Description

vrf[1]	-	Name of the VRF instance. This value is a string of size 32.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults 64 seconds

vrf	-	default

Example

```
iss(config)# ip default-ttl 1
```

☞
- VRF instance should be created, before executing this command to configure TTL value for the context.

Related Commands
- **ip vrf** –Creates VRF instance
- **show ip information** Displays IP configuration information

32.2.5 arp timeout

This command sets the ARP (Address Resolution Protocol) cache timeout. The arp timeout defines the time period an arp entry remains in the cache. When a new timeout value is assigned, it only affects the new arp entries. All the older entries retain their old timeout values. The timeout values can be assigned to dynamic arp entries only. All static arp entries remain unaltered by the timeout value.

The no form of this command sets the ARP cache timeout to its default value.

```
arp [vrf <vrf-name>] timeout <seconds (30-86400)>
```

```
no arp [vrf <vrf-name>] timeout
```

Syntax Description	**vrf**[1]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Global Configuration Mode		
Package	Workgroup, Enterprise and Metro		
Defaults	7200		
	vrf	-	default
Example	`iss(config)# arp timeout 35`		

☞
- VRF instance should be created, before executing this command to configure ARP cache timeout for the context.

Related Command
- **ip vrf** – Creates VRF instance
- **show ip arp** – Displays IP ARP table for the given VLAN ID/IP Address of ARP entry/MAC Address of ARP entry/IP ARP summary table/ARP configuration information

32.2.6 arp – ip address

This command adds a static entry in the ARP cache. The ARP finds the hardware address of the client and stores them in arp cache. This arp entry can be configured manually by using this command. The entry is stored permanently in the arp cache as a static entry.

The no form of this command deletes a static entry from the ARP cache.

```
arp [vrf <vrf-name>] <ip address> <hardware address> {Vlan <vlan-id(1-4094)>
[switch switch-name] | <interface-type> <interface-id> | Linuxvlan <interface-
name>| Cpu0}
```

```
no arp [vrf <vrf-name>] <ip address>
```

Syntax Description

vrf[1]	-	Name of the VRF instance. This value is a string of size 32.
<ip address>	-	Defines the IP address or IP alias to map to the specified MAC address.
<hardware address>	-	Defines the MAC address to map to the specified IP address or IP alias.
Vlan	-	Sets the specified VLAN ID. This is a unique value that represents the specific VLAN created / to be created. This value ranges between 1 and 4094.
switch[1]	-	Name of the switch context. This value is a string of size 32.
<interface-type>	-	Sets the Interface Type ID. • fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second. • extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links. • i-lan – Internal LAN created on a bridge per IEEE 802.1ap.
<interface-id>	-	Sets-the Interface Id. This is a unique value that

represents the specific interface.

This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel.

For example: 0/1 represents that the slot number is 0 and port number is 1.

Only i-lan ID is provided, for interface types i-lan. For example:1 represents i-lan ID.

Linuxvlan	-	Sets the Linux VLAN Interface
Cpu0	-	Sets the Out of Band Management Interface for the route.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults vrf - default

Example

```
iss(config)#  arp 10.203.120.21  00:11:22:33:44:55 Vlan 1
```

☞

- Interface must be a router port.
- VRF instance should be created, before executing this command to add static entry for the context.
- VRF instance should be mapped to the IPV4 / IPV6 interface, before executing this command to add static entry for the context in the interface.

Related Commands

- **ip vrf** – Creates VRF instance
- **ip vrf information** – Maps the IPV4 / IPV6 interface to the context
- **show ip arp** – Displays IP ARP table for the given VLAN ID/IP Address of ARP entry/MAC Address of ARP entry/IP ARP summary table/ARP configuration information
- **no switchport** – Configures the port as a router port

32.2.7 ip arp max-retries

This command sets the maximum number of ARP request retries. The maximum number of ARP requests that the switch generates before deleting an un-resolved ARP entry is defined.

The no form of this command sets the maximum number of ARP request retries to its default value.

```
ip arp [vrf <vrf-name>] max-retries <value (2-10)>
```

```
no ip arp [vrf <vrf-name>] max-retries
```

Syntax Description

vrf[1]	-	Name of the VRF instance. This value is a string of size 32.

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults 3

vrf	-	default

Example

```
iss(config)# ip arp max-retries 2
```

☞

- VRF instance should be created, before executing this command to configure the maximum number of ARP request retries for the context.

Related Commands

- **ip vrf** – Creates VRF instance
- **show ip arp** – Displays IP ARP table for the given VLAN ID/IP Address of ARP entry/MAC Address of ARP entry/IP ARP summary table/ARP configuration information

32.2.8 ip proxyarp-subnetoption

This command enables proxy ARP subnet check. ISS acts as ARP proxy for target address in different subnet., when subnet check is enabled.

The no form of the command disables proxy ARP subnet check. ISS acts as ARP proxy for target address in same or different subnet that is used in IP-DSLAM (Digital Subscriber Line Access Multiplexer) case, when subnet check is disabled.

`ip proxy-arp-subnetoption`

`no ip proxy-arp-subnetoption`

Mode Global Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults Proxy ARP subnet check is enabled.

Example `iss(config)# ip proxy-arp disable`

32.2.9 ipv4 enable

This command enables IPv4 processing on the interface that has not been configured with an explicit IPv4 address. The no form of this command disables IPv4 processing on the interface.

`ipv4 enable`

`no ipv4 enable`

Mode Vlan Interface Configuration Mode

Package Workgroup, Enterprise and Metro

Defaults enable

Example

```
iss(config-if)# ipv4 enable
```

32.2.10 ip proxy-arp

This command enables proxy ARP for the interface. The no form of the command disables proxy ARP for the interface.

`ip proxy-arp`

`no ip proxy-arp`

Mode	Interface Configuration Mode
Package	Workgroup, Enterprise and Metro
Defaults	Proxy ARP is disabled.
Example	`iss(config-if)# ip proxy-arp`
Related Commands	• **`show ip proxy-`**arp **–** Displays the status of the proxy ARP for all the created interfaces

32.2.11 show ip traffic

This command displays the IP protocol statistics.

```
show ip traffic [vrf <vrf-name>] [ interface { Vlan <vlan-id (1-4094)> [switch
<switch-name>] | tunnel <tunnel-id (1-128)> | <interface-type> <interface-id>
| Linuxvlan <interface-name> } ] [hc]
```

Syntax Description

vrf[1]	-	Name of the VRF instance. This value is a string of size 32.
vlan-id	-	Displays the specified VLAN ID. This is a unique value that represents the specific VLAN created / to be created. This value ranges between 1 and 4094.
switch[4]	-	Name of the switch context. This value is a string of size 32.
tunnel	-	Displays the Tunnel identifier. The value ranges between 1 and 128.
<interface-type>	-	Sets-the interface type. The interface can be: • fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second. • extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links. • i-lan – Internal LAN created on a bridge per IEEE 802.1ap.
<interface-id>	-	Displays the interface id. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan ID is provided for interface types i-lan.

For example: 1 represents i-lan

Linuxvlan - Displays the Linux IP Vlan identifier

hc - Sets High counters

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Defaults vrf - default

Example

```
iss# show ip traffic

VRF Name:          default
----------------

IP Statistics
--------------------
 Rcvd:  0 total, 0 header error discards
        0 bad ip address discards, 0 unsupported protocol
discards
 Frags: 0 reassembled, 30 timeouts, 0 needs reassembly
        0 fragmented, 0 couldn't fragment
 Bcast:  Sent:  0 forwarded, 0 generated requests
 Drop:

    0   InDiscards          0   InDelivers          0
InMcastPkts

    0   InTruncated         0   InOctets            0
InNoRoutes

    0   ReasmFails          0   InMcast Octets      0
InBcastPkts

    0   OutDiscards         0   OutMcastPkts        0
OutFrgCreates

    0   OutForwDgrms        0   OutTrnsmits         0
OutFrgRqds

    0   OutOctets           0   OutMcstOctets       0
OutBcstPkts

    0   DiscntTime       1000   RefrshRate

ICMP Statistics:
----------------
 Rcvd:  0 total, 0 checksum errors,  0 unreachable, 0
redirects
        0 time exceeded, 0 param problems,  0 quench
```

```
        0 echo, 0 echo reply,  0 mask requests, 0 mask
replies,
        0 timestamp , 0 time stamp reply,
 Sent:  0 total, 0 checksum errors,  0 unreachable, 0
redirects
        0 time exceeded, 0 param problems,  0 quench
        0 echo, 0 echo reply,  0 mask requests, 0 mask
replies,
        0 timestamp , 0 time stamp reply,
VRF Name:          vr1
----------------

IP Statistics
--------------------
 Rcvd:  0 total, 0 header error discards
        0 bad ip address discards, 0 unsupported protocol
discards
 Frags: 0 reassembled, 30 timeouts, 0 needs reassembly
        0 fragmented, 0 couldn't fragment
 Bcast:  Sent:  0 forwarded, 0 generated requests
 Drop:

    0   InDiscards          0   InDelivers          0
InMcastPkts

    0   InTruncated         0   InOctets            0
InNoRoutes

    0   ReasmFails          0   InMcast Octets      0
InBcastPkts

    0   OutDiscards         0   OutMcastPkts        0
OutFrgCreates

    0   OutForwDgrms        0   OutTrnsmits         0
OutFrgRqds

    0   OutOctets           0   OutMcstOctets       0
OutBcstPkts

    0   DiscntTime       1000   RefrshRate

ICMP Statistics:
----------------
 Rcvd:  0 total, 0 checksum errors,  0 unreachable, 0
redirects
        0 time exceeded, 0 param problems,  0 quench
        0 echo, 0 echo reply,  0 mask requests, 0 mask
replies,
        0 timestamp , 0 time stamp reply,
 Sent:  0 total, 0 checksum errors,  0 unreachable, 0
redirects
        0 time exceeded, 0 param problems,  0 quench
        0 echo, 0 echo reply,  0 mask requests, 0 mask
replies,
        0 timestamp , 0 time stamp reply,
```

```
iss# sh ip traffic vrf vr1
VRF Name:          vr1
----------------

IP Statistics
--------------------
 Rcvd:  0 total, 0 header error discards
        0 bad ip address discards, 0 unsupported protocol
discards
 Frags: 0 reassembled, 30 timeouts, 0 needs reassembly
        0 fragmented, 0 couldn't fragment
 Bcast:  Sent:  0 forwarded, 0 generated requests
 Drop:

    0   InDiscards          0   InDelivers          0
InMcastPkts

    0   InTruncated         0   InOctets            0
InNoRoutes

    0   ReasmFails          0   InMcast Octets      0
InBcastPkts

    0   OutDiscards         0   OutMcastPkts        0
OutFrgCreates

    0   OutForwDgrms        0   OutTrnsmits         0
OutFrgRqds

    0   OutOctets           0   OutMcstOctets       0
OutBcstPkts

    0   DiscntTime       1000   RefrshRate

ICMP Statistics:
----------------
 Rcvd:  0 total, 0 checksum errors,  0 unreachable, 0
redirects
        0 time exceeded, 0 param problems,  0 quench
        0 echo, 0 echo reply,  0 mask requests, 0 mask
replies,
        0 timestamp , 0 time stamp reply,
 Sent:  0 total, 0 checksum errors,  0 unreachable, 0
redirects
        0 time exceeded, 0 param problems,  0 quench
        0 echo, 0 echo reply,  0 mask requests, 0 mask
replies,
        0 timestamp , 0 time stamp reply,
```

32.2.12 show ip information

This command displays IP configuration information, that is the default values of ip attributes.

show ip information [vrf <vrf-name>]

Syntax Description	**vrf**[1]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Workgroup, Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show ip information

VRF  Name:     default

Global IP Configuration:
------------------------
 IP routing is enabled
 Default TTL is 64
 ICMP redirects are always sent
 ICMP unreachables are always sent
 ICMP echo replies are always sent
 ICMP mask replies are always sent
 Number of aggregate routes is 50
 Number of multi-paths is 2
 Load sharing is disabled
 Path MTU discovery is disabled

VRF  Name:     vr1

Global IP Configuration:
------------------------
 IP routing is enabled
 Default TTL is 64
 ICMP redirects are always sent
 ICMP unreachables are always sent
 ICMP echo replies are always sent
 ICMP mask replies are always sent
 Number of aggregate routes is 50
 Number of multi-paths is 2
 Load sharing is disabled
 Path MTU discovery is disabled


iss# show ip information vrf vr1
```

```
VRF  Name:     vr1

Global IP Configuration:
------------------------
 IP routing is enabled
 Default TTL is 64
 ICMP redirects are always sent
 ICMP unreachables are always sent
 ICMP echo replies are always sent
 ICMP mask replies are always sent
 Number of aggregate routes is 50
 Number of multi-paths is 2
 Load sharing is disabled
 Path MTU discovery is disabled
```

☞ For Linux IP, this command displays only the IP Routing status and the default TTL value.

Related Commands

- **`ip redirects`** – Enables sending ICMP
- **`ip unreachable`** – Enables sending ICMP unreachable message
- **`ip mask-reply`** – Enables sending ICMP Mask Reply messages
- **`ip echo-reply`** – Enables sending ICMP Echo Reply messages
- **`maximum-paths`** – Sets the maximum number of multipaths
- **`ip aggregrate-route`** – Sets the maximum number of aggregate routes
- **`ip path mtu discover`** – Enables path mtu discovery
- **`traffic-share`** – Enables traffic sharing
- **`ip routing`** – Enables IP routing
- **`ip default-ttl`** – Sets the Time-To-Live (TTL) value.

32.2.13 show ip route

This command displays the IP routing table.

```
show ip route [vrf <vrf-name>] [ { <ip-address> [<mask>] | bgp | connected |
ospf | rip | static | summary } ]
```

Syntax Description

vrf[1]	-	Name of the VRF instance. This value is a string of size 32.
<ip-address>	-	Displays the destination IP Address.
<mask>	-	Displays the Prefix Mask for the destination.
bgp	-	Displays the Border Gateway Protocol if it is used by the table to get route information.
connected	-	Displays the Directly Connected Network Routes.
ospf	-	Displays the OSPF (Open Shortest Path First) protocol if it is used for getting route information.
rip	-	Displays the RIP (Routing Information Protocol) if it is used for getting route information.
static	-	Displays the Static Routes in the table.
summary	-	Displays the Summary of all routes.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Defaults vrf - default

Example

```
iss# show ip route

Vrf Name:          default
---------
C 12.0.0.0/8  is directly connected, vlan1
C 15.0.0.0/8  is directly connected, vlan2

Vrf Name:          vr1
```

```
---------
C 14.0.0.0/8  is directly connected, vlan3

iss# sh ip route vrf vr1

Vrf Name:          vr1
---------
C 14.0.0.0/8  is directly connected, vlan3
```

Related Commands

- **`ip route`** – Adds a static route
- **`ip routing`** – Enables IP routing

32.2.14 show ip arp

This command displays IP ARP table.

```
show ip arp [vrf <vrf-name>] [ { Vlan <vlan-id(1-4094)> [switch <switch-name>]
| <interface-type> <interface-id> |<ip-address> | <mac-address> | summary |
information }]
```

Syntax Description

`vrf`[1]	-	Name of the VRF instance. This value is a string of size 32.
`Vlan`	-	Displays the specified VLAN ID. This is a unique value that represents the specific VLAN created / to be created. This value ranges between 1 and 4094.
`switch`[4]	-	Name of the switch context. This value is a string of size 32.
`<interface-type>`	-	Displays specified type of interface. The interface can be: • fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second. • gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second. • extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links.
`<interface-id>`	-	Displays the specified interface identifier. This is a unique value that represents the specific interface. This value is a combination of slot number and port number separated by a slash, For example: 0/1 represents that the slot number is 0 and port number is 1.
`<ip-address>`	-	Displays the IP Address of ARP Entry
`<mac-address>`	-	Displays the MAC Address of ARP Entry
`summary`	-	Displays IP ARP Table summary
`information`	-	Displays the ARP Configuration information regarding maximum retries and ARP cache timeout.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Defaults vrf - default

Example

```
iss# show ip arp

VRF Id  : 0
VRF Name: default
Address          Hardware Address   Type  Interface  Mapping
-------          ----------------   ----  ---------  -------
12.0.0.100       00:1b:11:c2:94:f6  ARPA  vlan1      Dynamic
15.0.0.10        00:03:02:03:01:04  ARPA  vlan2      Static

VRF Id  : 1
VRF Name: vr1
Address          Hardware Address   Type  Interface  Mapping
-------          ----------------   ----  ---------  -------
14.0.0.10        00:04:02:03:01:04  ARPA  vlan3      Static

iss# sh ip arp vrf vr1

VRF Id  : 1
VRF Name: vr1
Address          Hardware Address   Type  Interface  Mapping
-------          ----------------   ----  ---------  -------
14.0.0.10        00:04:02:03:01:04  ARPA  vlan3      Static

iss# sh ip arp 12.100

Address     Hardware Address   Type  Interface  Mapping  VRF Name
-------     ----------------   ----  ---------  -------  --------
12.0.0.100  00:1b:11:c2:94:f6  ARPA  vlan1      Dynamic   default

iss# sh ip arp 00:04:02:03:01:04

Address     Hardware Address   Type  Interface  Mapping  VRF Name
-------     ----------------   ----  ---------  -------  --------
14.0.0.10   00:04:02:03:01:04  ARPA  vlan1      Static   default
14.0.0.10   00:04:02:03:01:04  ARPA  vlan3      Static   vr1


iss# sh ip arp summary

VRF Name:     default

3 IP ARP entries, with 0 of them incomplete


VRF Name:     vr1

1 IP ARP entries, with 0 of them incomplete
```

```
iss# sh ip arp vrf vr1 summary

VRF Name:     vr1

1 IP ARP entries, with 0 of them incomplete

iss# sh ip arp information

ARP Configurations:
-------------------
VRF Name:  default

 Maximum number of ARP request retries is 3
 ARP cache timeout is 300 seconds

VRF Name:  vr1

 Maximum number of ARP request retries is 3
 ARP cache timeout is 300 seconds

iss# sh ip arp vrf vr1 information

ARP Configurations:
-------------------
VRF Name:  vr1

 Maximum number of ARP request retries is 3
 ARP cache timeout is 300 seconds
```

Related Commands

- **`arp timeout`** – Sets the ARP (Address Resolution Protocol) cache timeout
- **`arp – ip address`** – Adds a static entry in the ARP cache
- **`ip arp max-retries`** – Sets the maximum number of ARP request retries

32.2.15 show ip proxy-arp

This command displays the status of the proxy ARP for all the created interfaces.

show ip proxy-arp [vrf <vrf-name>]

Syntax Description	**vrf**[1]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Workgroup, Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show ip proxy-arp

PROXY ARP Status
----------------
vlan1       : Disabled
vlan2       : Disabled
vlan3       : Disabled
---------------------

iss# show ip proxy-arp vrf default

PROXY ARP Status
----------------
vlan1       : Disabled
vlan2       : Disabled
---------------------
```

Related Commands

- **ip proxy-arp** - Enables proxy ARP for the interface

Chapter 33

IPv6

IPv6[5] is a new version of IP which is designed to be an evolutionary step from IPv4. It can be installed as a normal software upgrade in Internet devices and is interoperable with the current IPv4. It has expanded routing and addressing capabilities because of the 128 bit addressing as compared to the 32 bit addressing in IPv4. Its deployment strategy is designed to not have any flag days or other dependencies. IPv6 is designed to run well on high performance networks (e.g. Gigabit Ethernet, OC-12, ATM, etc.) and at the same time still be efficient for low bandwidth networks (e.g. wireless). In addition, it provides a platform for new Internet functionality that will be required in the near future.

IPv6 includes a transition mechanism, which is designed to allow users to adopt and deploy IPv6 in a highly diffuse fashion and to provide direct interoperability between IPv4 and IPv6 hosts. The IPv6 transition allows the users to upgrade their hosts to IPv6, and the network operators to deploy IPv6 in routers, with very little coordination between the two.

The changes from IPv4 to IPv6 fall primarily into the following categories

- Expanded Routing and Addressing Capabilities
- Usage of anycast address
- Header Format Simplification
- Improved Support for Options
- Quality-of-Service Capabilities
- Authentication and Privacy Capabilities

[5] Internet Protocol Version 6 is abbreviated to IPv6 (where the “6” refers to the assigned version number 6). The previous version of the Internet Protocol is version 4 (referred to as IPv4).

The list of CLI commands for the configuration of IPv6 is as follows:

- ipv6 enable
- ipv6 unicast-routing
- ipv6 address - prefix and prefix length
- ipv6 address - ipv6prefix/prefix_length
- ipv6 - link local address
- ipv6 - static routes
- ipv6 - neighbor
- ipv6 default – hop limit
- ipv6 nd suppress-ra
- ipv6 nd managed-config flag
- ipv6 nd other-config flag
- ipv6 hop-limit
- ipv6 nd ra-lifetime
- ipv6 nd dad attempts
- ipv6 nd reachable-time
- ipv6 nd ns - interval
- ipv6 nd ra mtu
- ipv6 nd ra-interval
- ipv6 nd prefix
- ping ipv6
- debug ipv6
- traceroute6
- clear ipv6 neighbors
- clear ipv6 traffic
- clear ipv6 route
- show ipv6 interface
- show ipv6 route
- show ipv6 route summary
- show ipv6 neighbors

33.1 ipv6 enable

This command enables IPv6 processing on an interface that has not been configured with an explicit IPv6 address. The no form of the command disables IPv6 processing on the interface that has not been configured with an explicit IPv6 address.

`ipv6 enable`

`no ipv6 enable`

Mode	Interface Configuration Mode
Package	Enterprise and Metro
Defaults	Disabled
Example	`iss(config-if)# ipv6 enable`
☞	IPv6 is enabled on the default VLAN interface.
Related Commands	• **`ipv6 address – prefix and prefix length –`** Configures IPv6 address on the interface • **`show ipv6 interface –`** Displays the IPv6 interfaces • **`ipv6 router rip / ipv6 router rip – name`** - Enables RIP6 and enters into the router configuration mode

33.2 ipv6 unicast-routing

This command enables unicast routing. The no form of the command disables unicast routing.

```
ipv6 unicast-routing [vrf <vrf-name>]
```

```
no ipv6 unicast-routing [vrf <vrf-name>]
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Global Configuration Mode		
Package	Enterprise and Metro		
Defaults	Enabled		
	vrf	-	default
Example	`iss(config)# ipv6 unicast-routing`		
☞	VRF instance should be created, before executing this command to configure the unicast routing in the context.		
Related Commands	• **ipv6 router rip / ipv6 router rip – name** - Enables RIP6 and enters into the router configuration mode • **ip vrf** - Creates VRF instance		

[6] This parameter is specific to Multiple Instance.

33.3 ipv6 address - prefix and prefix length

This command configures IPv6 address on the interface. The no form of the command deletes the configured IPv6 address.

```
ipv6 address <prefix> <prefix Len> [{unicast | anycast | eui64}]
```

```
no ipv6 address <prefix> <prefix Len> [{unicast | anycast | eui64}]
```

Syntax Description	**prefix**	-	IPv6 prefix for the interface
	prefix Len	-	IPv6 prefix length
	unicast	-	Unicast type of Prefix
	anycast	-	Anycast type of Prefix
	eui64	-	Type of Prefix where the latter 64 bits are formed from the link layer address

Mode Interface Configuration Mode

Package Enterprise and Metro

Defaults unicast

Example

```
iss(config-if)# ipv6 address  3333::1111  64  unicast
```

☞ The prefix length for eui64 type must be 64

Related Command

- **show ipv6 interface –** Displays the IPv6 interfaces

33.4 ipv6 address - ipv6prefix/prefix_length

This command configures IPv6 address on the interface.

This command is a standardized implementation of the existing command; ipv6 address - prefix and prefix length. It operates similar to the existing command.

ipv6 address <ipv6prefix/prefix_length> [{unicast | anycast | eui-64| link-local}]

Syntax Description	**ipv6prefix**	-	IPv6 prefix for the interface
	prefix_length	-	IPv6 prefix length
	unicast	-	Unicast type of Prefix
	anycast	-	Anycast type of Prefix
	eui64	-	Type of Prefix where the latter 64 bits are formed from the link layer address
	link-local	-	Link local type prefix

Mode Interface Configuration Mode

Package Enterprise and Metro

Defaults unicast

Example

```
iss(config-if)# ipv6 address 3333::1111/64 unicast
```

☞ The prefix length for eui64 type must be 64

Related Commands

- **show ipv6 interface –** Displays the IPv6 interfaces

33.5 ipv6 - link local address

This command configures the IPv6 link-local address on the interface. The no form of the command deletes the configured IPv6 link-local address.

ipv6 address <prefix> link-local

no ipv6 address <prefix> link-local

Syntax Description	**prefix**	-	IPv6 Prefix for the interface
	link-local	-	Type of address
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Example	`iss(config-if)# ipv6 address fe80::2222 link-local`		

☞ The prefix specified must be a valid link-local prefix.

Related Commands

- **show ipv6 interface –** Displays the IPv6 interfaces

33.6 ipv6 - static routes

This command configures static routes. The no form of the command deletes the configured static routes.

```
ipv6 route [vrf <vrf-name>] <prefix> <prefix len> ([<NextHop>] {vlan <id>
[switch <switch-name>]|[tunnel <id>]}) [<administrative distance>] [unicast]
```

```
no ipv6 route [vrf <vrf-name>] <prefix> <prefix len> ([<NextHop>] {[vlan <id>
[switch <switch-name>]] | [tunnel <id>]}) [<administrative distance>]
[unicast]
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	prefix	-	IPv6 Prefix of the destination
	prefix Len	-	Destination prefix length
	Next-Hop	-	IPv6 prefix of the next hop that is used to reach the destination network
	vlan	-	VLAN Identifier
	switch[7]	-	Switch instance / Virtual switch. This value is a string of size 32.
	tunnel	-	Tunnel Identifier
	administrative distance	-	Metric to reach the destination
	unicast	-	Unicast type of prefix
Mode	Global Configuration Mode		
Package	Enterprise and Metro		

[7] The switch name can be set as **default** only, as the creation of multiple switches is not currently supported in the Enterprise package.

Defaults

administrative distance - 1

vrf - default

unicast

Example

```
iss(config)# ipv6 route  2111::1111  64  3111::1111
```

☞

- A Route will be configured only when a proper route exists for the next-hop prefix in the route table.
- VRF instance should be created, before executing this command to configure the static routes for the context.
- VRF instance should be mapped to the IPV4 / IPV6 interface, before executing this command to configure the static routes for the context in the interface.

Related Commands

- **`ipv6 – link local address`** – Configures the IPv6 link-local address on the interface
- **`show ipv6 route –`** Displays the IPv6 Routes
- **`ip vrf`** - Creates VRF instance
- **`ip vrf forwarding`** - Maps the IPV4 / IPV6 interface to the context

33.7 ipv6 - neighbor

This command configures a static entry in the IPv6 neighbor cache table. The no form of the command removes the static entry from the IPv6 neighbor cache table.

```
ipv6 neighbor [vrf <vrf-name>] <prefix> {vlan <id> [switch <switch-name>] |
tunnel <id>} <MAC ADDRESS (xx:xx:xx:xx:xx:xx)>
```

```
no ipv6 neighbor [vrf <vrf-name>] <prefix> {vlan <id> [switch <switch-name>] |
tunnel <id>} <MAC ADDRESS (xx:xx:xx:xx:xx:xx)>
```

Syntax Description

vrf[6]	-	Name of the VRF instance. This value is a string of size 32.
prefix	-	IPv6 Prefix of the neighbor
vlan	-	VLAN Identifier
switch[7]	-	Switch instance / Virtual switch. This value is a string of size 32.
tunnel	-	Tunnel Identifier
MAC ADDRESS	-	Link layer address of the interface

Mode Global Configuration Mode

Package Enterprise and Metro

Default vrf - default

Example

```
iss(config)# ipv6 neighbor  3333::1111  vlan 1
00:11:22:33:44:55
```

☞
- VRF instance should be created, before executing this command to configure the static entry for the context.
- VRF instance should be mapped to the IPV4 / IPV6 interface, before executing this command to configure the static entry for the context in the interface.

Related Commands

- **`show ipv6 neighbors –`** Displays the IPv6 Neighbor Cache Entries
- **`ip vrf`** - Creates VRF instance
- **`ip vrf forwarding`** - Maps the IPV4 / IPV6 interface to the context

33.8 ipv6 default – hop limit

This command defaults hop limit for IPv6 Datagrams. The no form of command resets default hop limit for IPv6 Datagrams

```
ipv6 default-hop limit [vrf <vrf-name>] <HopLimit (1-255)>
```

```
no ipv6 default-hop limit [vrf <vrf-name>]
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Global Configuration Mode		
Package	Enterprise and Metro		
Default	vrf	-	default
Example	`iss(config)# ipv6 default-hop limit 100`		
☞	• VRF instance should be created, before executing this command to configure the default hop limit for the context.		
Related Commands	• **ip vrf** - Creates VRF instance		

33.9 ipv6 nd suppress-ra

This command suppresses IPv6 router advertisement. The no form of the command enables IPv6 router advertisement.

```
ipv6 nd suppress-ra
```

```
no ipv6 nd suppress-ra
```

Mode	Interface Configuration Mode

Package Enterprise and Metro

Defaults Router advertisements are suppressed

Example

```
iss(config-if)# ipv6 nd suppress-ra
```

Related Commands

- **`show ipv6 interface`** – Displays the IPv6 interfaces
- **`show ipv6 traffic`** – Displays the IPv6 ICMP and UDP statistics

33.10 ipv6 nd managed-config flag

This command sets the 'Managed config flag' which allows the host to use DHCP for address configuration. The no form of the command resets the 'Managed config flag' which in turn does not allow the host to use DHCP for address configuration.

`ipv6 nd managed-config flag`

`no ipv6 nd managed-config flag`

Mode	Interface Configuration Mode
Package	Enterprise and Metro
Example	`iss(config-if)# ipv6 nd managed-config flag`
Related Command	• **`no ip v6 nd suppress-ra`** – Enables IPv6 router advertisement

33.11 ipv6 nd other-config flag

This command sets the 'other config flag' which allows the host to use DHCP for other stateful configuration. The no form of the command resets the 'other config flag' which in turn does not allow the host to use DHCP for other stateful configuration.

`ipv6 nd other-config flag`

`no ipv6 nd other-config flag`

Mode	Interface Configuration Mode
Package	Enterprise and Metro
Example	`iss(config-if)# ipv6 nd other-config flag`
Related Command	• **`no ip v6 nd suppress-ra`** – Enables IPv6 router advertisement

33.12 ipv6 hop-limit

This command configures the maximum hoplimit for all IPv6 packets originating from the interface and the configured hop limit is also used in router advertisement packet Current Hop Limit field. The no form of the command resets the hoplimit to default value for all IPv6 packets originating from the interface and also the value in router advertisement packet Current Hop Limit field is reset to default value.

ipv6 hop-limit <HopLimit (0-255)>

no ipv6 hop-limit

Mode	Interface Configuration Mode
Package	Enterprise and Metro
Defaults	64
Example	`iss(config-if)# ipv6 hop-limit 100`

33.13 ipv6 nd ra-lifetime

This command sets the IPv6 Router Advertisement lifetime.

`ipv6 nd ra-lifetime <LifeTime (0-9000)>`

Mode	Interface Configuration Mode
Package	Enterprise and Metro
Defaults	1800 seconds
Example	`iss(config-if)# ipv6 nd ra-lifetime 100`
☞	The ND RA lifetime value must be greater than or equal to the RA interval.
Related Commands	• **`no ip v6 nd suppress-ra`** – Enables IPv6 router advertisement • **`show ipv6 interface -`** – Displays the IPv6 interfaces

33.14 ipv6 nd dad attempts

This command sets the number of duplicate address detection (dad) attempts. The no form of the command resets the duplicate address detection attempts to its default value.

ipv6 nd dad attempts <no of attempts (1-10)>

no ipv6 nd dad attempts

Mode	Interface Configuration Mode
Package	Enterprise and Metro
Defaults	1
Example	`iss(config-if)# ipv6 nd dad attempts 5`
Related Commands	• **show ipv6 interface -** – Displays the IPv6 interfaces • **no ip v6 nd suppress-ra** – Enables IPv6 router advertisement

33.15 ipv6 nd reachable-time

This command sets the advertised reachability time. The no form of the command resets the advertised reachability time to default value.

ipv6 nd reachable-time {Reachable Time (0-3600) | msec Reachable Time (0-3600000)> }

no ipv6 nd reachable-time

Syntax Description	Reachable Time	-	Advertised reachability in seconds
	msec Reachable Time	-	Advertised reachability in milliseconds
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Defaults	30		
Example	`iss(config-if)# ipv6 nd reachable-time 500`		
Related Commands	• **show ipv6 interface** – Displays the IPv6 interfaces • **no ip v6 nd suppress-ra** – Enables IPv6 router advertisement		

33.16 ipv6 nd ns - interval

This command sets the advertised retransmission time. The no form of the command resets the advertised retransmission time to default value.

```
ipv6 nd ns-interval <Retranmission time (1000-3600000) in milliseconds>
```

```
no ipv6 nd ns-interval
```

Syntax Description	**Retransmission time** - Advertisement retransmission time in milliseconds
Mode	Interface Configuration Mode
Package	Enterprise and Metro
Example	`iss(config-if)# ipv6 nd ns-interval 1000`
Related Commands	• **show ipv6 interface –** – Displays the IPv6 interfaces

33.17 ipv6 nd ra mtu

This command sets router advertisement MTU optional value. The value ranges between 1280 and 1500.The no form of command resets router advertisement MTU option value to default value.

```
ipv6 nd ra-mtu <router advertisement MTU option vlaue>
```

```
no ipv6 nd ra-mtu
```

Mode	Interface Configuration Mode
Package	Enterprise and Metro
Example	`iss(config-if)# ipv6 nd ra-mtu 1400`
Related Commands	• **`show ipv6 interface`** – Displays the IPv6 interfaces

33.18 ipv6 nd ra-interval

This command sets the IPv6 Router Advertisement interval. The no form of the command resets the IPv6 Router Advertisement interval to its default value.

```
ipv6 nd ra-interval <maximum-interval-secs(4-1800) [<minimum-interval-secs(3-1350)>]
```

```
no ipv6 nd ra-interval
```

Syntax Description	**maximum interval-secs**	- Maximum router advertisement interval time in seconds
	minimum-interval-secs	- Minimum router advertisement interval time in seconds
Mode	Interface Configuration Mode	
Package	Enterprise and Metro	
Defaults	600 seconds	
Example	`iss(config-if)# ipv6 nd ra-interval 200`	
Related Commands	• **show ipv6 interface** – Displays the IPv6 interfaces • **no ip v6 nd suppress-ra** – Enables IPv6 router advertisement	

33.19 ipv6 nd prefix

This command configures the prefix to be advertised in IPv6 Router Advertisement. The no form of the command removes the prefix from the IPv6 Router Advertisement.

```
ipv6 nd prefix {<prefix addr> <prefixlen> | default} [{{<valid lifetime> |
infinite | at <var valid lifetime>}{<preferred lifetime> |infinite | at <var
preferred lifetime>} | no-advertise}] [off-link] [no-autoconfig]
```

```
no ipv6 nd prefix {<prefix addr> <prefix len> | default}
```

Syntax Description	**prefix addr**	-	IPv6 prefix to be advertised
	prefixlen	-	Length of the configured prefix
	default	-	Changes the default value of the rest of the parameters
	valid lifetime	-	Sets the valid lifetime value for the prefix
	infinite	-	Sets the infinite valid lifetime value for the prefix
	at	-	Sets the variable valid lifetime value for the prefix
	preferred lifetime	-	Sets the preferred lifetime value for the prefix
	infinite	-	Sets the infinite Preferred lifetime value for the prefix
	at	-	Sets the variable valid lifetime value for the prefix
	no-advertise	-	Sets the No-Advertise flag
	off-link	-	Sets the off-link flag
	no-autoconfig	-	Sets the no-autoconfig flag
Mode	Interface Configuration Mode		

Package Enterprise and Metro

Defaults ra valid lifetime - 25,9200 seconds

ra preferred lifetime - 60,4800 seconds

Example

```
iss(config-if)# ipv6 nd prefix 3333::1111  64 500 400
```

☞ Valid life-time must be greater than or equal to preferred life-time

Related Command

- **`show ipv6 interface`** -Displays the IPv6 interfaces

33.20 ping ipv6

This command sends IPv6 echo messages.

```
ping [vrf <vrf-name>] ipv6 <prefix> [data <hex_str>] [repeat <count>] [size
<value>] [anycast] [source {vlan <id> [switch <switch-name>] | tunnel <id> |
<source_prefix>}] [timeout <value (1-100)>]
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	prefix	-	IPv6 Destination Prefix
	data	-	Data to be sent in ping message
	repeat	-	Number of ping messages
	size	-	Size of the ping message
	anycast	-	Type of Prefix
	source	-	Source Interface of the ping message can be - vlan - tunnel - source_prefix
	switch[7]	-	Switch instance / Virtual switch. This value is a string of size 32.
	timeout	-	Duration to wait for the reply
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	data	-	a5a5

repeat <count>	-	5
size	-	100 bytes
timeout	-	5 seconds
vrf	-	default

Example

```
iss# ping ipv6 3333::1111 data a6b6
```

☞

- VRF instance should be created, before executing this command to send echo messages for the context.
- VRF instance should be mapped to the IPV4 / IPV6 interface, before executing this command to send echo messages for the context in the interface.

Related Commands

- **`ip`** vrf - Creates VRF instance
- **`ip vrf`** forwarding - Maps the IPV4 / IPV6 interface to the context

33.21 debug ipv6

This command enables IPv6 Trace. The no form of the command disables IPv6 Trace.

To get the default VRF trace message in IPV6, **debug ipv6 vrf default udp6** command should be executed. **debug ipv6 udp6** command displays the messages which are common to all VRFs, such as any memory allocation failure.

```
debug ipv6 [vrf <vrf-name>] {IP6|ICMP|UDP6|ND|PING6|TUNNEL}
```

```
no debug ipv6 [vrf <vrf-name>]
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	IP6	-	IP6 Trace
	ICMP	-	ICMP Trace
	UDP6	-	UDP6 Trace
	ND	-	Neighbor Discovery Trace
	PING6	-	PING6 Trace
	TUNNEL	-	Tunnel Trace
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	Disabled		
	vrf	-	default
Example	`iss# debug ipv6 IP6`		

☞
- VRF instance should be created, before executing this command to configure IPv6 trace for the context.

Related Command
- **ip vrf** - Creates VRF instance

33.22 traceroute6

This command traces route to the destination.

```
traceroute6 {<ip-address>} [vrf <vrf-name>] [min-ttl <value (1-99)>] [max-ttl
<value (1-99)>]
```

Syntax Description	**ip-address**	-	Destination IP address to which a route has to be traced.
	vrf[6]	-	Name of the VRF instance. This value is a string of size 32.
	min-ttl	-	Minimum value of the TTL field to be filled up in the IP packets used for the trace route. This value ranges between 1 and 99 seconds.
	max-ttl	-	Maximum value of the TTL field to be filled up in the IP packets used for the trace route. This value ranges between 1 and 99 seconds.
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	min-ttl	-	1
	max-ttl	-	15
	vrf	-	default

Example

```
iss# traceroute6 4444::1111 min-ttl 20 max-ttl 100
```

☞
- VRF instance should be created, before executing this command to trace routes for the context.
- The maximum value of the TTL field should be always greater than the minimum value of the TTL field.

Related Commands
- **ip vrf** - Creates VRF instance

33.23 clear ipv6 neighbors

This command removes all the entries in the IPv6 neighbor table.

```
clear ipv6 neighbors [vrf <vrf-name>]
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default
Example	`iss# clear ipv6 neighbors`		

☞

- VRF instance should be created, before executing this command to clear neighbor entries for the context.

Related Commands

- **show ipv6 neighbours –** Displays the IPv6 Neighbor Cache Entries
- **ip** vrf - Creates VRF instance

33.24 clear ipv6 traffic

This command removes all the entries in the IPv6 traffic table.

```
clear ipv6 traffic [vrf <vrf-name>]
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default
Example	`iss# clear ipv6 traffic`		

☞

- VRF instance should be created, before executing this command to clear traffic entries for the context.

Related Commands

- **show ipv6 traffic –** Displays the IPv6 ICMP and UDP statistics
- **ip** vrf - Creates VRF instance

33.25 clear ipv6 route

This command removes all the entries in IPv6 route table.

```
clear ipv6 route [vrf <vrf-name>]
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default
Example	`iss# clear ipv6 route`		

☞

- VRF instance should be created, before executing this command to clear traffic entries for the context.

Related Commands

- **show ipv6 route –** Displays the IPv6 Routes
- **ip vrf** - Creates VRF instance

33.26 show ipv6 interface

This command displays the IPv6 interfaces.

show ipv6 interface [vrf <vrf-name>] [{vlan <id> [switch <switch-name>] | tunnel <id>}[prefix]]

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	vlan	-	VLAN Identifier
	switch[7]	-	Switch instance / Virtual switch. This value is a string of size 32.
	tunnel	-	Tunnel Identifier
	prefix	-	Prefix information
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# sh ipv6 interface

VRF Id  : 0
VRF Name: default
vlan1 is up, line protocol is up
    Link local address:
        fe80::201:2ff:fe03:401
    Global unicast address(es):
        1111::1111/64
    Joined group address(es):
        ff02::1
        ff02::2
        ff02::1:ff00:1111
        ff02::1:ff03:401
    MTU is 1500
    ICMP redirects are enabled
    ND DAD is enabled, Number of DAD attempts: 1
    ND router advertisement is disabled
vlan2 is up, line protocol is up
```

```
        Link local address:
            fe80::201:2ff:fe03:401
        Global unicast address(es):
            2222::1111/64
        Joined group address(es):
            ff02::1
            ff02::2
            ff02::1:ff00:1111
            ff02::1:ff03:401
        MTU is 1500
        ICMP redirects are enabled
        ND DAD is enabled, Number of DAD attempts: 1
        ND router advertisement is disabled

    VRF Id  : 1
    VRF Name: vr1
    vlan3 is up, line protocol is up
        Link local address:
            fe80::201:2ff:fe03:401
        Global unicast address(es):
            2222::1111/64
        Joined group address(es):
            ff02::1
            ff02::2
            ff02::1:ff00:1111
            ff02::1:ff03:401
        MTU is 1500
        ICMP redirects are enabled
        ND DAD is enabled, Number of DAD attempts: 1
        ND router advertisement is disabled

    iss# sh ipv6 interface vrf vr1

    VRF Id  : 1
    VRF Name: vr1
    vlan3 is up, line protocol is up
        Link local address:
            fe80::201:2ff:fe03:401
        Global unicast address(es):
            2222::1111/64
        Joined group address(es):
            ff02::1
            ff02::2
            ff02::1:ff00:1111
            ff02::1:ff03:401
        MTU is 1500
        ICMP redirects are enabled
        ND DAD is enabled, Number of DAD attempts: 1
        ND router advertisement is disabled
```

Related Commands

- **`ipv6 enable -`** Enables IPv6 processing on an interface that has not been configured with an explicit IPv6 address
- **`ipv6 address - prefix and prefix length - / ipv6 address - ipv6prefix/prefix_length`** – Configures IPv6 address on the interface
- **`ipv6 - link local address`** – Configures the IPv6 link-local address on the interface

- **`ipv6 nd suppress-ra`** – Suppresses IPv6 router advertisement
- **`ipv6 nd ra-lifetime`** – Sets the IPv6 Router Advertisement lifetime
- **`ipv6 nd dad attempts`** – Sets Duplicate Address Detection attempts
- **`ipv6 nd reachable-time`** – Sets the advertised reachability time
- **`ipv6 nd ra-interval`** – Sets the IPv6 Router Advertisement interval
- **`ipv6 nd prefix`** – Configures the prefix to be advertised in IPv6 Router Advertisement

33.27 show ipv6 route

This command displays the IPv6 Routes.

show ipv6 route [vrf <vrf-name>]

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show ipv6 route

VRF    Name:      default
---------------

IPv6 Routing Table  -  2 entries
Codes : C - Connected, S - Static
        O - OSPF, R - RIP, B - BGP
C   1111::/64   [1/20]
        via ::, vlan1

C   2222::/64   [1/20]
        via ::, vlan2

VRF    Name:      vr1
---------------

IPv6 Routing Table  -  1 entries
Codes : C - Connected, S - Static
        O - OSPF, R - RIP, B - BGP
C   2222::/64   [1/20]
        via ::, vlan3

iss# sh ipv6 route vrf vr1

VRF    Name:      vr1
---------------

IPv6 Routing Table  -  1 entries
Codes : C - Connected, S - Static
        O - OSPF, R - RIP, B - BGP
C   2222::/64   [1/20]
        via ::, vlan3
```

Related Command

- `ipv6 - static routes` – Configures static routes

33.28 show ipv6 route summary

This command displays the summary of IPv6 Routes.

show ipv6 route [vrf <vrf-name>] summary

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show ipv6 route summary

VRF    Name:      default
---------------

IPv6 Routing Table Summary - 0 entries
    2 Connected, 0 Static, 0 RIP, 0 BGP, 0 OSPF
    Number of prefixes:
    /64: 2

VRF    Name:      vr1
---------------

IPv6 Routing Table Summary - 0 entries
    1 Connected, 0 Static, 0 RIP, 0 BGP, 0 OSPF
    Number of prefixes:
    /64: 1

iss# sh ipv6 route vrf vr1 summary

VRF    Name:      vr1
---------------

IPv6 Routing Table Summary - 1 entries
    1 Connected, 0 Static, 0 RIP, 0 BGP, 0 OSPF
    Number of prefixes:
    /64: 1
```

Related Command

- **show ipv6 route** – Displays the IPv6 Routes

33.29 show ipv6 neighbors

This command displays the IPv6 Neighbor Cache Entries.

show ipv6 neighbors [vrf <vrf-name>]

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show ipv6 neighbors

VRF Id  : 0
VRF Name: default
     IPv6 Address          Link-layer Addr     State    Interface
     ------------          ---------------     -----    ---------
1111::1222                  00:03:02:03:01:04  Static    vlan1
2222::1333                  00:1b:11:c2:94:f6  Reachable vlan2
fe80::21b:11ff:fec2:94f6    00:1b:11:c2:94:f6  Stale     vlan2

VRF Id  : 1
VRF Name: vr1
     IPv6 Address          Link-layer Addr     State    Interface
     ------------          ---------------     -----    ---------
4444::1111                  00:03:02:03:01:04  Static    vlan3

iss# sh ipv6 neighbors vrf vr1

VRF Id  : 1
VRF Name: vr1
     IPv6 Address          Link-layer Addr     State    Interface
     ------------          ---------------     -----    ---------
4444::1111                  00:03:02:03:01:04  Static    vlan3
```

Related Command

- **ipv6 – neighbor** – Configures a static entry in the IPv6 neighbor cache table

33.30 show ipv6 traffic

This command displays the IPv6 ICMP and UDP statistics.

show ipv6 traffic [vrf <vrf-name>] [interface { vlan <vlan-id> [switch <switch-name>] | tunnel <tunnel-id> | <interface-type> <if-num> }] [hc]

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	vlan-id	-	VLAN identifier
	switch[7]	-	Switch instance / Virtual switch. This value is a string of size 32.
	tunnel-id	-	Tunnel identifier
	<interface-type> <interface-id>	-	Interface type and interface Id
	Linux- Vlan	-	Linux IP Vlan identifier
	hc	-	High counters
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# sh ipv6 traffic
VRF   Name:          default
----------------

    IPv6 Statistics
    ***************
17    Rcvd          0   HdrErrors
0    AddrErrors    0   FwdDgrams      0   UnknownProtos
0    Discards      17   Delivers      11   OutRequests
0    OutDiscards   0   OutNoRoutes    0   ReasmReqds
0    ReasmOKs      0   ReasmFails
 Sent:  0    FragOKs       0   FragFails     0   FragCreates
0    RcvdMCastPkt  5   SentMcastPkts 0   TruncatedPkts
0    RcvdRedirects       0    SentRedirects
```

```
 2364   InOctets            0   InNoRoutes          0
OutFwdDatgrms
    0   OutFrgRqds         11   OutTrnsmit       1140
OutOctets
    0   InMcstOctets      128   OutMcastOctets      0
InBcstPkts
    0   OutBcstPkts         0   DiscntTime       1000
RefrshRate

    ICMP Statistics
    ***************
    Received :
17   ICMPPkts     0 ICMPErrPkt       0 DestUnreach  0 TimeExcds
0   ParmProbs    0 PktTooBigMsg    5 ICMPEchoReq  10
ICMPEchoReps
0   RouterSols   0 RouterAdv        1 NeighSols    1 NeighAdv
0   Redirects    0 AdminProhib
    Sent
15   ICMPMsgs     0 ICMPErrMsgs      0 DstUnReach   0 TimeExcds
0   ParmProbs    0 PktTooBigs       10 EchoReq      5 EchoReply
0   RouterSols   0 RouterAdv        5 NeighSols    1 NeighborAdv
0   RedirectMsgs 0 AdminProhibMsgs

    UDP statistics
    **************
    Received :
0 UDPDgrams    0 UDPNoPorts       0 UDPErrPkts
    Sent :
0 UDPDgrams
VRF   Name:          vr1
----------------

    IPv6 Statistics
    ***************
0    Rcvd          0   HdrErrors
0    AddrErrors    0   FwdDgrams      0   UnknownProtos
0    Discards      0   Delivers       2   OutRequests
0    OutDiscards   0   OutNoRoutes    0   ReasmReqds
0    ReasmOKs      0   ReasmFails
 Sent:  0    FragOKs       0   FragFails     0   FragCreates
0    RcvdMCastPkt  2   SentMcastPkts 0   TruncatedPkts
0    RcvdRedirects       0    SentRedirects

    0   InOctets            0   InNoRoutes          0
OutFwdDatgrms
    0   OutFrgRqds          2   OutTrnsmit        128
OutOctets
    0   InMcstOctets       48   OutMcastOctets      0
InBcstPkts
    0   OutBcstPkts         0   DiscntTime       1000
RefrshRate

    ICMP Statistics
    ***************
    Received :
0   ICMPPkts     0 ICMPErrPkt       0 DestUnreach  0 TimeExcds
0   ParmProbs    0 PktTooBigMsg    0 ICMPEchoReq  0 ICMPEchoReps
```

```
0   RouterSols    0 RouterAdv        0 NeighSols    0 NeighAdv
0   Redirects     0 AdminProhib
    Sent
0   ICMPMsgs      0 ICMPErrMsgs      0 DstUnReach   0 TimeExcds
0   ParmProbs     0 PktTooBigs       0 EchoReq      0 EchoReply
0   RouterSols    0 RouterAdv        2 NeighSols    0 NeighborAdv
0   RedirectMsgs 0 AdminProhibMsgs

    UDP statistics
    **************
    Received :
0 UDPDgrams    0 UDPNoPorts       0 UDPErrPkts
    Sent :
0 UDPDgrams

iss# sh ipv6 traffic vrf default
VRF   Name:          default
----------------

    IPv6 Statistics
    ***************
17    Rcvd          0   HdrErrors
0    AddrErrors    0   FwdDgrams     0   UnknownProtos
0    Discards      17   Delivers      11   OutRequests
0    OutDiscards   0   OutNoRoutes   0   ReasmReqds
0    ReasmOKs      0   ReasmFails
 Sent:  0    FragOKs       0   FragFails     0   FragCreates
0    RcvdMCastPkt  5   SentMcastPkts 0   TruncatedPkts
0    RcvdRedirects       0    SentRedirects

 2364   InOctets            0   InNoRoutes          0
OutFwdDatgrms
    0   OutFrgRqds         11   OutTrnsmit       1140
OutOctets
    0   InMcstOctets      128   OutMcastOctets      0
InBcstPkts
    0   OutBcstPkts         0   DiscntTime       1000
RefrshRate

    ICMP Statistics
    ***************
    Received :
17   ICMPPkts     0 ICMPErrPkt       0 DestUnreach  0 TimeExcds
0   ParmProbs    0 PktTooBigMsg    5 ICMPEchoReq  10
ICMPEchoReps
0   RouterSols   0 RouterAdv        1 NeighSols    1 NeighAdv
0   Redirects    0 AdminProhib
    Sent
15   ICMPMsgs     0 ICMPErrMsgs      0 DstUnReach   0 TimeExcds
0   ParmProbs    0 PktTooBigs       10 EchoReq      5 EchoReply
0   RouterSols   0 RouterAdv        5 NeighSols    1 NeighborAdv
0   RedirectMsgs 0 AdminProhibMsgs

    UDP statistics
    **************
    Received :
0 UDPDgrams    0 UDPNoPorts       0 UDPErrPkts
```

```
            Sent :
        0 UDPDgrams
```

Chapter 34

OSPF

OSPF (Open Shortest Path First) protocol, is an Interior Gateway Protocol used to distribute routing information within a single Autonomous System. Routers use link-state algorithms to send routing information to all nodes in an inter-network by calculating the shortest path to each node based on topography of the Internet constructed by each node. Each router sends that portion of the routing table (keeps track of routes to particular network destinations), which describes the state of its own links, and it also sends the complete routing structure (topography).

The advantage of shortest path first algorithms is that they result in smaller more frequent updates everywhere. They converge quickly, thus preventing such problems as routing loops and Count-to-Infinity (when routers continuously increment the hop count to a particular network). This makes for a stable network.

Before configuring OSPF, RRD must be enabled. This can be done by defining RRD_WANTED in LR/make.h in compilation. In addition, all OSPF interface related configurations, can be done only when the global OSPF is enabled.

☞ The list of CLI commands for the configuration of OSPF is common to both **Single Instance and Multiple Instance** except for a difference in the prompt that appears for the Switch with Multiple Instance support.

The prompt for the **Global Configuration Mod**e is,

```
iss(config)#
```

☞ The **parameters** specific to Multiple Instance are stated so, against the respective parameter descriptions in this document.

☞ The output of the **Show commands** differ for Single Instance and Multiple Instance. Hence both the output are documented while depicting the show command examples.

The list of CLI commands for the configuration of OSPF is as follows:

- router ospf
- router-id
- area - Stability interval
- area - translation-role
- compatible rfc1583
- abr-type
- neighbor
- area-default cost
- area- nssa
- area-stub
- default-information originate always
- area - virtual-link
- ASBR Router
- area - range
- summary-address
- redistribute
- distribute-list route-map in
- redist-config
- capability opaque
- nsf ietf restart-support
- nsf ietf restart-interval
- nsf ietf helper-support
- nsf ietf helper gracetimelimit
- nsf ietf helper strict-lsa-checking
- nsf ietf grace lsa ack required
- nsf ietf grlsa retrans count
- nsf ietf restart-reason
- distance
- route-calculation staggering
- route-calculation staggering-interval
- network

- set nssa asbr-default-route translator
- passive-interface vlan
- passive-interface default
- ip ospf demand-circuit
- ip ospf retransmit-interval
- ip ospf transmit-delay
- ip ospf priority
- ip ospf hello-interval
- ip ospf dead-interval
- ip ospf cost
- ip ospf network
- ip ospf authentication-key
- ip ospf message-digest-key
- debug ip ospf
- show ip ospf interface
- show ip ospf neighbor
- show ip ospf request-list
- show ip ospf retransmission-list
- show ip ospf virtual-links
- show ip ospf border-routers
- show ip ospf - summary address
- show ip ospf
- show ip ospf route
- show ip ospf - database summary
- show ip ospf - database

34.1 router ospf

This command enables OSPF routing process.and the no form of the command disables OSPF routing process.

```
router ospf [vrf <name>]
```

```
no router ospf [vrf <name>]
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Global Configuration Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default
Example	`iss(config)# router ospf`		

☞ The command **no router ospf** disables the OSPF Router Admin Status to terminate the OSPF process.

VRF instance should be created, before executing this command to enable the OSPF in the context.

Related Commands

- **`ip vrf`** - Creates VRF instance
- **`router-id`** – Sets the router-id for the OSPF process
- **`distribute-list route-map in`** - Enables inbound filtering for routes
- **`capability opaque`** - Enables the capability of storing opaque LSAs
- **`nsf ietf restart-support`** - Enables the graceful restart support
- **`nsf ietf restart-interval`** - Configures the OSPF graceful restart timeout interval
- **`nsf ietf helper-support`** - Enables the helper support
- **`nsf ietf helper gracetimelimit`** - Configures the graceful restart interval limit in helper side
- **`nsf ietf helper strict-lsa-checking`** - Enables the strict LSA check option in helper
- **`nsf ietf grace lsa ack required`** - Enables Grace Ack Required state in restarter
- **`nsf ietf grlsa retrans count`** - Configures the maximum number of retransmissions for unacknowledged GraceLSA
- **`nsf ietf restart-reason`** - Configures the reason for graceful restart
- **`distance`** - Enables the administrative distance of the routing protocol and sets the administrative distance value
- **`route-calculation staggering`** - Enables OSPF route calculation staggering feature
- **`route-calculation staggering-interval`** - Configures the OSPF route calculation staggering interval
- **`network`** – Defines the interfaces on which OSPF runs and area ID for those interfaces
- **`show ip ospf route`** – Displays routes learnt by OSPF process
- **`show ip ospf – database`** – Displays OSPF Database summary for the LSA type

34.2 router-id

This command sets the router-id for the OSPF process.

`router-id <router ip address>`

Syntax Description	**`router ip address`** - Specifies the OSPF router ID as an IP address
Mode	Router Configuration Mode
Package	Enterprise and Metro
Example	`iss(config-router)# router-id  10.0.0.1`

☞ An arbitrary value for the ip-address for each router can be configured; however, each router ID must be unique. To ensure uniqueness, the router-id must match with one of the router's IP interface addresses.

Related Commands

- **`router ospf`** – Enables OSPF routing process
- **`show ip ospf route`** – Displays routes learnt by OSPF process

34.3 area - Stability interval

This command configures the Stability interval for NSSA and the no form of the command configures default Stability interval for NSSA.

```
area <area-id> stability-interval <Interval-Value (0 – 0x7fffffff)>
```

```
no area <area-id> stability-interval
```

Syntax Description	**area-id**	-	Area associated with the OSPF address range. It is specified as an IP address
	stability-interval	-	The number of seconds after an elected translator determines its services are no longer required, that it must continue to perform its translation duties
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	40		
Example	`iss(config-router)# area 10.0.0.1 stability-interval 10000`		

☞

- Area ID 0.0.0.0 is used for the OSPF backbone
- The OSPF Sequence Number is a 32 bit signed integer. It starts with the value '80000001'h, -- or -'7FFFFFFF'h, and increments until '7FFFFFFF'h. Thus, a typical sequence number will be very negative

Related Command

- **area- nssa** - Configures an area as a NSSA and other parameters related to that area.

34.4 area - translation-role

This command configures the translation role for the NSSA and the no form of the command configures the default translation role for the NSSA.

```
area  <area-id> translation-role { always | candidate }
```

```
no area  <area-id> translation-role
```

Syntax Description	**area-id**	-	Area associated with the OSPF address range. It is specified as an IP address
	translation-role	-	An NSSA Border router's ability to perform NSSA Translation of Type-7 LSAs to Type-5 LSAs.

Mode Router Configuration Mode

Package Enterprise and Metro

Defaults candidate

Example

```
iss(config-router)# area 10.0.0.1 translation-role always
```

☞ Type-5 LSAs- Originated by AS boundary routers, and flooded through-out the AS. Each AS-external-LSA describes a route to a destination in another Autonomous System. Default routes for the AS can also be described by AS-external-LSAs.

Related Command

- **area-nssa**- Configures an area as a NSSA and other parameters related to that area.

34.5 compatible rfc1583

This command sets OSPF compatibility list compatible with RFC 1583 and the no form of the command disables RFC 1583 compatibility.

`compatible rfc1583`

`no compatible rfc1583`

Mode	Router Configuration Mode
Package	Enterprise and Metro
Defaults	Enabled
Example	`iss(config-router)# compatible rfc1583`

☞

- This command enables support of RFC1583 compatibility in products that support later standards
- It controls the preference rules, when choosing among multiple AS external LSAs advertising the same destination. When set to enabled, the preference rules remain those specified by RFC 1583. When set to disabled, the preference rules are those stated in RFC 2178.
- To minimize the chance of routing loops, all OSPF routers in an OSPF routing domain must have RFC compatibility set identically

34.6 abr-type

This command sets the Alternative ABR Type.

`abr-type { standard | cisco | ibm }`

Syntax Description	**`standard`**	-	Standard ABR type as defined in RFC 2328
	`cisco`	-	CISCO ABR type as defined in RFC 3509
	`ibm`	-	IBM ABR type as defined in RFC 3509

Mode Router Configuration Mode

Package Enterprise and Metro

Defaults standard

Example `iss(config-router)# abr-type standard`

☞
- RFC 2328 – OSPF Version 2.
- RFC-3509 -- Alternative Implementations of OSPF Area Border Routers.

Related Commands
- **`router ospf`** – Enables OSPF routing process
- **`show ip ospf`** – Displays general information about the OSPF routing process

34.7 neighbor

This command specifies a neighbor router and its priority. The no form of the command removes the neighbor/Set default value for the Neighbor Priority.

```
neighbor <neighbor-id> [priority  <priority value (0-255)>]
```

```
no neighbor <neighbor-id> [priority]
```

Syntax Description	**neighbor-id**	-	Neighbor router ID
	priority	-	A number value that specifies the router priority
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	priority	-	1
Example	`iss(config-router)# neighbor 20.0.0.1 priority  25`		

☞ The value 0 signifies that the neighbor is not eligible to become the designated router on this particular network.

Related Commands

- **ip ospf priority** – Sets the router priority
- **ip ospf network** – Configures the OSPF network type to a type other than the default for a given media
- **show ip ospf neighbor –** Displays OSPF neighbor information list

34.8 area-default cost

This command specifies a cost for the default summary route sent into a stub or NSSA and the no form of the command removes the assigned default route cost.

```
area <area-id> default-cost <cost> [tos <tos value(0-30)>]
```

```
no area <area-id> default-cost [tos <tos value (0-30)>]
```

Syntax Description	**area-id**	-	Area associated with the OSPF address range. It is specified as an IP address
	default-cost	-	Cost for the default summary route used for a stub area
	tos	-	Type of Service of the route being configured
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	default-cost	-	10
	tos	-	0
Example	`iss(config-router)# area 10.0.0.1 default-cost 5`		

☞
- A default cost can be defined only for a valid area.
- tos can be configured only if the code is compiled with TOS Support

Related Commands
- **area-stub** – Specifies an area as a stub area and other parameters related to that area
- **area – range** – Consolidates and summarizes routes at an area boundary
- **ip ospf cost** – Specifies the cost of sending a packet on an interface
- **ip ospf authentication** – Specifies the authentication type for an interface

34.9 area- nssa

This command configures an area as a NSSA and other parameters related to that area.

```
area <area-id> nssa [{ no-summary | default-information-originate [metric
<value>] [metric-type <Type(1-3)>] [tos <tos value (0-30)>] }]
```

Syntax Description	**area-id**	-	Area associated with the OSPF address range. It is specified as an IP address
	nssa	-	Configures an area as a not-so-stubby area (NSSA)
	no-summary	-	Allows an area to be a not-so-stubby area but not have summary routes injected into it
	default-information-originate	-	Default route into OSPF **metric** - The Metric value applied to the route before it is advertised into the OSPF domain. **metric-type** - The Metric Type applied to the route before it is advertised into the OSPF domain. **tos** - Type of Service of the route being configured
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	metric	-	10
	metric-type	-	1
	tos	-	0

Example

```
iss(config-router)# area 10.0.0.1 nssa
```

☞

- The **no area <area-id> [{ stub | nssa }]** command removes an area or converts stub/nssa to normal area. tos can be configured only if the code is compiled with TOS Support

Related Commands

- **area – range** – Consolidates and summarizes routes at an area boundary
- **area – translation-role**– Configures the translation role for the NSSA

34.10 area-stub

This command specifies an area as a stub area and other parameters related to that area and the no form of the command removes an area or converts stub/nssa to normal area.

```
area <area-id> stub [no-summary]
```

```
no area <area-id> [{ stub [no-summary] | nssa [no-summary]}]
```

Syntax Description	**area-id**	-	Area associated with the OSPF address range. It is specified as an IP address
	stub	-	Configures an area as a stub area.
	no-summary[8]	-	The router will neither originate nor propagate summary LSAs into the stub area.
	nssa	-	Configures an area as a Not-So-Stubby Area (NSSA).

Mode Router Configuration Mode

Package Enterprise and Metro

Example

```
iss(config-router)# area  10.0.0.1  stub
```

☞ The command must be configured on all routers and access servers in the stub area.

Related Commands

- **area-default cost** – Specifies a cost for the default summary route sent into a stub or NSSA
- **area – range** – Consolidates and summarizes routes at an area boundary
- **ip ospf authentication** – Specifies the authentication type for an interface

[8] This feature has been included to adhere to the Industry Standard CLI syntax. This feature is currently not supported in the no form of the command.

34.11 default-information originate always

This command enables generation of a default external route into an OSPF routing domain and other parameters related to that area. The no form of the command disables generation of a default external route into an OSPF routing domain.

```
default-information originate always [metric <metric-value (0-0xffffff)>]
[metric-type <type (1-2)>]
```

```
no default-information originate always [metric <metric-value (0-0xffffff)>]
[metric-type <type (1-2)>]
```

Syntax Description	**metric**	-	The Metric value applied to the route before it is advertised into the OSPF Domain
	metric-type	-	The Metric Type applied to the route before it is advertised into the OSPF Domain
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	metric	–	10
	metric-type	-	2
Example	`iss(config-router)# default-information originate always metric 1 metric-type 1`		
Related Command	• **redistribute** – Configures the protocol from which the routes have to be redistributed into OSPF		

34.12 area - virtual-link

This command defines an OSPF virtual link and its related parameters. The no form of removes an OSPF virtual link.

```
area <area-id> virtual-link <router-id> [authentication { simple |message-digest | null}] [hello-interval <value (1-65535)>] [retransmit-interval <value (0-3600)>] [transmit-delay <value (0-3600)>] [dead-interval <value>] [{authentication-key <key (8)> | message-digest-key <Key-id (0-255)> md5 <key (16)>}]
```

```
no area <area-id> virtual-link <router-id> [authentication] [hello-interval] [retransmit-interval] [transmit-delay] [dead-interval] [{authentication-key | message-digest-key <Key-id (0-255)>}]
```

Syntax Description

area-id	-	The Transit Area that the Virtual Link traverses. It is specified as an IP address
virtual-link	-	The Router ID of the Virtual Neighbor
authentication	-	The authentication type for an interface
hello-interval	-	The interval between hello packets that the software sends on the OSPF virtual link interface
retransmit-interval	-	The time between link-state advertisement (LSA) retransmissions for adjacencies belonging to the OSPF virtual link interface
transmit-delay	-	The time the router will stop using this key for packets generation
dead-interval	-	The interval at which hello packets must not be seen before its neighbors declare the router down (the range of values for the dead interval is 0–0x7fffffff)
authentication-key	-	Identifies the secret key used to create the message digest appended to the OSPF packet
message-digest-key	-	OSPF MD5 authentication. Enables Message Digest 5 (MD5) authentication on the area specified by the area-id

	md5	-	The secret key which is used to create the message digest appended to the OSPF packet

Mode Router Configuration Mode

Package Enterprise and Metro

Defaults

Authentication	-	null
hello-interval	-	10
retransmit-interval	-	5
transmit-delay	-	1
dead-interval	-	40

Example

```
iss(config-router)# area 10.0.0.1 virtual-link 20.0.0.1
authentication message-digest hello-interval 100 retransmit-
interval 100 transmit-delay 50 dead-interval 200 authentication-
key asdf
```

☞

- In OSPF, all areas must be connected to a backbone area. If the connection to the backbone is lost, it can be repaired by establishing a virtual link
- hello-interval and dead-interval: The value must be the same for all routers and access servers on a specific network

Related Commands

- **`area - range`** – Consolidates and summarizes routes at an area boundary
- **`ip ospf authentication`** – Specifies the authentication type for an interface
- **`show ip ospf`** – Displays general information about OSPF routing process
- **`show ip ospf virtual-links`** - Displays OSPF Virtual link information

34.13 ASBR Router

This command specifies this router as ASBR. The no form of the command disables this router as ASBR.

`ASBR Router`

`no ASBR Router`

Mode	Router Configuration Mode
Package	Enterprise and Metro
Example	`iss(config-router)# ASBR Router`
☞	Routers that act as gateways (redistribution) between OSPF and other routing protocols (IGRP, EIGRP, RIP, BGP, Static) or other instances of the OSPF routing process are called autonomous system boundary router (ASBR).
Related Commands	• **`set nssa asbr-default-route translator`** – Enables/disables setting of P bit in the default Type-7 LSA generated by NSSA internal ASBR • **`show ip ospf`** – Displays general information about the OSPF routing process

34.14 area - range

This command consolidates and summarizes routes at an area boundary. The no form of the command deletes the Summary Address.

```
area <AreaId> range <Network> <Mask> {summary | Type7} [{advertise | not-advertise}] [tag <value>]
```

```
no area <AreaId> range <Network> <Mask> [{advertise | not-advertise}] [tag <tag-value>]
```

Syntax Description	**Area-id**	-	Area associated with the OSPF address range. It is specified as an IP address
	range	-	OSPF address range
	Network	-	The IP address of the Net indicated by the range
	Mask	-	The subnet mask that pertains to the range
	summary	-	Summary LSAs
	Type7	-	Type-7 LSA
	advertise	-	When associated areaId is 0.0.0.0, aggregated Type-5 are generated. Otherwise if associated areaId is x.x.x.x (other than 0.0.0.0) aggregated Type-7 is generated in NSSA x.x.x.x
	not-advertise[9]	-	When associated areaId is 0.0.0.0, Type-5 is not generated for the specified range, while aggregated Type-7 are generated in all attached NSSA. While if associated areaId is x.x.x.x(other than 0.0.0.0), Type-7 are not generated in NSSA x.x.x.x for the specified range This parameter is currently not supported in the no form of the command.
	tag[9]	-	The Tag Type describes whether Tags will be automatically generated or will be manually configured This parameter is currently not supported in the no form of the command.
Mode	Router Configuration Mode		

[9] This parameter is added in the no form of the command to adhere to the Industry Standard CLI syntax. This enhancement is available for the code base using release after Interface Masters ISS 6.1.0.

Package Enterprise and Metro

Defaults tag - 2

Example

```
iss(config-router)# area 10.0.0.1 range 10.0.0.0 255.0.0.0
summary advertise tag 10
```

☞ The mask indicates the range of addresses being described by the particular route. For example, a summary-LSA for the destination 128.185.0.0 with a mask of 0xffff0000 actually is describing a single route to the collection of destinations 128.185.0.0 - 128.185.255.255

This command is used only with Area Border Routers (ABRs). It is used to consolidate or summarize routes for an area. The result is that a single summary route is advertised to other areas by the ABR

Related Commands

- **`ip ospf authentication`** – Specifies the authentication type for an interface
- **`area-default cost`** – Specifies a cost for the default summary route sent into a stub or NSSA
- **`area- nssa`** – Configures an area as a NSSA and other parameters related to that area
- **`area-stub`**– Specifies an area as a stub area and other parameters related to that area
- **`area - virtual-link`** – Defines an OSPF virtual link and its related parameters
- **`summary-address`** – Creates aggregate addresses for OSPF
- **`show ip ospf - summary address`** – Displays OSPF Summary-address redistribution Information

34.15 summary-address

This command creates aggregate addresses for OSPF and the no form of the command deletes the External Summary Address.

```
summary-address <Network> <Mask> <AreaId> [{allowAll | denyAll |  advertise |
not-advertise}] [Translation {enabled | disabled}]
```

```
no summary-address <Network> <Mask> <AreaId> [not-advertise]
```

Syntax Description

Network	-	The IP address of the Net indicated by the range
Mask	-	The subnet mask that pertains to the range
AreaId	-	Area associated with the OSPF address range. It is specified as an IP address
allowAll	-	When set to allowAll and associated areaId is 0.0.0.0 aggregated Type-5 are generated for the specified range. In addition aggregated Type-7 are generated in all attached NSSA, for the specified range
denyAll	-	When set to denyAll neither Type-5 nor Type-7 will be generated for the specified range
advertise	-	When associated areaId is 0.0.0.0, aggregated Type-5 are generated. Otherwise if associated areaId is x.x.x.x(other than 0.0.0.0) aggregated Type-7 is generated in NSSA x.x.x.x
not-advertise[9]	-	When associated areaId is 0.0.0.0, Type-5 is not generated for the specified range, while aggregated Type-7 are generated in all attached NSSA. While associated areaId is x.x.x.x(other than 0.0.0.0), Type-7 are not generated in NSSA x.x.x.x for the specified range
Translation	-	Indicates how an NSSA Border router is performing NSSA translation of Type-7 to into Type-5 LSAs. When set to **enabled**, P Bit is set in the generated Type-7 LSA. When set to **disabled** P Bit is cleared in the generated Type-7 LSA for the range

Mode Router Configuration Mode

Package Enterprise and Metro

Defaults

summary-address	-	advertise
translation	-	disabled

Example

```
iss(config-router)# summary-address 10.0.0.6 255.0.0.0 10.0.0.0
allowAll Translation enabled
```

☞

- When translation {enabled | disabled} is set to enabled, the NSSA border router's futOspfAreaNssaTranslatorRole has been set to always. When this object is set to disabled, a candidate NSSA Border router does not perform translation.
- Indicates whether Type-5/Type-7 will be aggregated or not generated for the specified range.
- allowAll and denyAll are not valid for areaId other than 0.0.0.0.
- Routes learnt from other routing protocols can be summarized. The metric used to advertise the summary is the smallest metric of all the more specific routes.
- This command helps reduce the size of the routing table.

Related Commands

- **`ip ospf authentication-key`** – Specifies a password to be used by neighboring routers that are using the OSPF simple password authentication
- **`area - range`** – Consolidates and summarizes routes at an area boundary
- **`ip ospf message-digest-key`** – Enables OSPF MD5 authentication
- **`show ip ospf - summary address`** – Displays OSPF Summary-address redistribution Information
- **`show ip ospf - database summary`** – Displays OSPF LSA Database summary

34.16 redistribute

This command configures the protocol from which the routes have to be redistributed into OSPF and the no form of the command disables redistribution of routes from the given protocol into OSPF.

```
redistribute {static | connected | rip | bgp | all} [route-map <name(1-20)>]
```

```
no redistribute {static | connected | rip | bgp | all} [route-map <name(1-20)>]
```

Syntax Description

static	-	Redistributes routes, configured statically, to the OSPF routing protocol
connected	-	Redistributes directly connected network routes, to the OSPF routing protocol
rip	-	Redistributes routes, that are learnt by the RIP process, to the OSPF routing protocol
bgp	-	Redistributes routes, that are learnt by the BGP process, to the OSPF routing protocol
all	-	Redistributes all routes to the OSPF routing protocol
route-map	-	Identifies the specified route-map in the list of route-maps. The length of the name ranges from 1 to 20.

Mode Router Configuration Mode

Package Enterprise and Metro

Example

```
iss(config-router)# redistribute static
```

☞ The **ASBR Router** command must be configured prior to the execution of this command.

Related Commands

- **default-information originate always** – Enables generation of a default external route into an OSPF routing domain
- **redist-config** – Configures the information to be applied to routes learnt from RTM

34.17 distribute-list route-map in

This command enables inbound filtering for routes. The no form of the command disables inbound filtering for the routes.

```
distribute-list route-map <name(1-20)> in
```

```
no distribute-list route-map <name(1-20)> in
```

Syntax Description	**name**	-	Name of the Route Map for which inbound filtering should be enabled. This value is a string of size 20.

Mode Router Configuration Mode

Package Enterprise and Metro

Example

```
iss(config-router)# distribute-list route-map rmap-test in
```

☞
- OSPF routing process should be enabled, before executing this command.
- Only one route map can be set for inbound routes. Another route map can be assigned, only if the already associated route map is disassociated.

Related Commands
- **router ospf** – Enables OSPF routing process

34.18 redist-config

This command configures the information to be applied to routes learnt from RTM and the no form of the command deletes the information applied to routes learnt from RTM.

```
redist-config <Network> <Mask> [metric-value <metric (1 - 16777215)>] [metric-type {asExttype1 | asExttype2}]  [tag <tag-value>}
```

```
no redist-config <Network> <Mask>
```

Syntax Description	**Network**	-	IP Address of the Destination route
	Mask	-	Mask of the Destination route
	metric-value	-	The Metric value applied to the route before it is advertised into the OSPF Domain
	metric-type	-	The Metric Type applied to the route before it is advertised into the OSPF Domain
	tag	-	The Tag Type describes whether Tags will be automatically generated or will be manually configured
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	metric-value	-	10
	metric-type	-	asExttype2
	tag	-	manual

Example

```
iss(config-router)# redist-config 10.0.0.0 255.0.0.0 metric-value 100 metric-type asExttype1 tag 10
```

☞ tag <tag-value>: This is not used by OSPF protocol itself. It may be used to communicate information between AS boundary routers. The precise nature of this information is outside the scope of OSPF. If tags are manually configured, the futospfRRDRouteTag MIB has to be set with the Tag value needed.

Related Command

- **redistribute** – Configures the protocol from which the routes have to be redistributed into OSPF

34.19 capability opaque

This command enables the capability of storing opaque LSAs. The no form of the command disables the opaque capability.

`capability opaque`

`no capability opaque`

Mode	Router Configuration mode
Package	Enterprise and Metro
Defaults	Opaque capability is disabled
Example	`iss(config-router)# capability opaque`
☞	OSPF routing process should be enabled, before executing this command
Related Commands	• **`router ospf`** – Enables OSPF routing process • **`nsf ietf restart-support`** - Enables the graceful restart support

34.20 nsf ietf restart-support

This command enables the graceful restart support. Graceful restart support is provided for both unplanned and planned restart, if the command is executed without any option.

The no form of the command disables the graceful restart support.

`nsf ietf restart-support [plannedOnly]`

`no nsf ietf restart-support`

Syntax Description	**plannedOnly**	-	Supports only the planned restarts (such as restarting a control plane after a planned downtime).
Mode	Router Configuration mode		
Package	Enterprise and Metro		
Defaults	Graceful restart support is disabled.		
Example	`iss(config-router)# nsf ietf restart-support`		

☞
- OSPF routing process and opaque functionality should be enabled, before executing this command
- The entity should save any change made using this command in a non-volatile storage, as the configuration set using this command is persistent.

Related Commands
- **`router ospf`** – Enables OSPF routing process
- **`capability opaque`** - Enables the capability of storing opaque LSAs
- **`show ip ospf`** – Displays general information about OSPF routing process

34.21 nsf ietf restart-interval

This command configures the OSPF graceful restart timeout interval. This value specifies the graceful restart interval, in seconds, during which the restarting router has to reacquire OSPF neighbors that are fully operational prior to the graceful restart.

The value ranges between 1 and 1800 seconds. The value is provided as an intimation of the grace period to all neighbors.

The no form of the command resets the interval to default value.

`nsf ietf restart-interval <grace period(1-1800)>`

`no nsf ietf restart-interval`

Mode	Router Configuration Mode
Package	Enterprise and Metro
Defaults	120
Example	`iss(config-router)# nsf ietf restart-interval 200`

☞
- OSPF routing process should be enabled, before executing this command
- The entity should save any change made using this command in a non-volatile storage, as the configuration set using this command is persistent.

Related Commands

- **`router ospf`** – Enables OSPF routing process
- **`show ip ospf`** – Displays general information about OSPF routing process

34.22 nsf ietf helper-support

This command enables the helper support. The helper support is enabled for all the options, if the command is executed without any option. The helper support can be enabled for more than one option, one after the other.

The no form of the command disables the helper support. The helper support is disabled for all the options, if the command is executed without any option.

nsf ietf helper-support [{unknown | softwareRestart | swReloadUpgrade | switchToRedundant}]

no nsf ietf helper-support [{unknown | softwareRestart | swReloadUpgrade | switchToRedundant}]

Syntax Description	**unknown**	-	Enables / disables helper support for restarting of system due to unplanned events (such as restarting after a crash).
	softwareRestart	-	Enables / disables helper support for restarting of system due to restart of software.
	swReloadUpgrade	-	Enables / disables helper support for restarting of system due to reload or upgrade of software.
	switchToRedundant	-	Enables / disables helper support for restarting of system due to switchover to a redundant support processor.

Mode Router Configuration Mode

Package Enterprise and Metro

Defaults Helper support is enabled

Example

```
iss(config-router)# nsf ietf helper-support switchToRedundant
```

☞

- OSPF routing process should be enabled, before executing this command
- The entity should save any change made using this command in a non-volatile storage, as the configuration set using this command is persistent.

Related Commands

- **`router ospf`** – Enables OSPF routing process
- **`nsf ietf helper gracetimelimit`** - Configures the graceful restart interval limit in helper side
- **`nsf ietf helper strict-lsa-checking`** - Enables the strict LSA check option in helper
- **`show ip ospf`** – Displays general information about OSPF routing process

34.23 nsf ietf helper gracetimelimit

This command configures the grace period till which the router acts as Helper. During this period, the router advertises that the restarting router is active and is in FULL state.

The value ranges between 0 and 1800 seconds.

nsf ietf helper gracetimelimit <gracelimit period(0-1800)>

Mode	Router Configuration Mode
Package	Enterprise and Metro
Defaults	0
Example	`iss(config-router)# nsf ietf helper gracetimelimit 100`
☞	• OSPF routing process should be enabled, before executing this command • The grace period can be configured, only if the helper support is enabled.
Related Commands	• **router ospf** – Enables OSPF routing process • **nsf ietf helper-support** - Enables the helper support • **show ip ospf** – Displays general information about OSPF routing process

34.24 nsf ietf helper strict-lsa-checking

This command enables the strict LSA check option in helper. The strict LSA check option allows the helper to terminate the graceful restart, once a changed LSA that causes flooding during the restart process is detected.

The no form of the command disables the strict LSA check option in helper.

`nsf ietf helper strict-lsa-checking`

`no nsf ietf helper strict-lsa-checking`

Mode Router Configuration Mode

Package Enterprise and Metro

Defaults Strict LSA check option is disabled in helper.

Example

```
iss(config-router)# nsf ietf helper strict-lsa-checking
```

☞

- OSPF routing process should be enabled, before executing this command
- The entity should save any change made using this command in a non-volatile storage, as the configuration set using this command is persistent.
- The strict LSA check option can be enabled, only if the helper support is enabled.

Related Commands

- **`router ospf`** – Enables OSPF routing process
- **`nsf ietf helper-support`** - Enables the helper support
- **`show ip ospf`** – Displays general information about OSPF routing process

34.25 nsf ietf grace lsa ack required

This command enables Grace Ack Required state in restarter. The GraceLSAs sent by the router are expected to be acknowledged by peers, if the Grace Ack Required state is enabled.

The no form of the command disables the Grace Ack Required state in restarter.

`nsf ietf grace lsa ack required`

`no nsf ietf grace lsa ack required`

Mode	Router Configuration Mode
Package	Enterprise and Metro
Defaults	Grace Ack Required state is enabled in restarter.
Example	`iss(config-router)# no nsf ietf grace lsa ack required`
☞	• OSPF routing process should be enabled, before executing this command • The entity should save any change made using this command in a non-volatile storage, as the configuration set using this command is persistent.
Related Commands	• **`router ospf`** – Enables OSPF routing process • **`show ip ospf`** – Displays general information about OSPF routing process

34.26 nsf ietf grlsa retrans count

This command configures the maximum number of retransmissions for unacknowledged GraceLSA. This value ranges between 0 and 180.

nsf ietf grlsa retrans count <grlsacout (0-180)>

Mode	Router Configuration Mode
Package	Enterprise and Metro
Defaults	2
Example	`iss(config-router)# nsf ietf grlsa retrans count 100`
☞	OSPF routing process should be enabled, before executing this command
Related Commands	• **router ospf** – Enables OSPF routing process • **show ip ospf** – Displays general information about OSPF routing process

34.27 nsf ietf restart-reason

This command configures the reason for graceful restart.

`nsf ietf restart-reason [{unknown | softwareRestart | swReloadUpgrade | switchToRedundant}]`

Syntax Description	**`unknown`**	-	System restarts due to unplanned events (such as restarting after a crash).
	`softwareRestart`	-	System restarts due to software restart.
	`swReloadUpgrade`	-	System restarts due to reloading / upgrading of software.
	`switchToRedundant`	-	System restarts due to switchover to a switchover to a redundant support processor.
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	unknown		
Example	`iss(config-router)# nsf ietf restart-reason softwareRestart`		

☞

- OSPF routing process should be enabled, before executing this command
- The entity should save any change made using this command in a non-volatile storage, as the configuration set using this command is persistent.

Related Commands

- **`router ospf`** – Enables OSPF routing process
- **`show ip ospf`** – Displays general information about OSPF routing process

34.28 distance

This command enables the administrative distance (that is, the metric to reach destination) of the routing protocol and sets the administrative distance value. The distance value ranges between 1 and 255.

The administrative distance can be enabled for only one route map. The distance should be disassociated for the already associated route map, if distance needs to be associated for another route map.

The no form of the command disables the administrative distance.

```
distance <1-255> [route-map <name(1-20)>]
```

```
no distance [route-map <name(1-20)>]
```

Syntax Description	**name**	-	Name of the Route Map for which the distance value should be enabled and set. This value is a string of size 20.
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	0 (Represents directly connected route)		
Example	`iss(config-router)# distance 10 route-map rmap-test`		
☞	OSPF routing process should be enabled, before executing this command		
Related Commands	• router ospf – Enables OSPF routing process		

34.29 route-calculation staggering

This command enables OSPF route calculation staggering feature and also sets the staggering interval to the last configured value. This feature staggers the OSPF route calculation at regular intervals for processing neighbor keep alive and other OSPF operations.

The no form of the command disables OSPF route calculation staggering and removes the staggering interval.

`route-calculation staggering`

`no route-calculation staggering`

Mode	Router Configuration Mode
Package	Enterprise and Metro
Defaults	OSPF route calculation staggering is enabled
Example	`iss(config-router)# no route-calculation staggering`
☞	OSPF routing process should be enabled, before executing this command
Related Commands	• **`router ospf`** – Enables OSPF routing process • **`route-calculation staggering-interval`** - Configures the OSPF route calculation staggering interval • **`show ip ospf`** – Displays general information about OSPF routing process

34.30 route-calculation staggering-interval

This command configures the OSPF route calculation staggering interval (in milliseconds). This value represents the time after which the route calculation is suspended for doing other OSPF operations.

`route-calculation staggering-interval <milli-seconds (1000-0x7fffffff)>`

Mode Router Configuration Mode

Package Enterprise and Metro

Defaults 10000 (OSPF route calculation staggering interval is equal to Hello interval)

Example

```
iss(config-router)# route-calculation staggering-interval 2000
```

☞ OSPF routing process should be enabled before executing this command

Related Commands

- **`router ospf`** – Enables OSPF routing process
- **`route-calculation staggering`** - Enables OSPF route calculation staggering feature
- **`show ip ospf`** – Displays general information about OSPF routing process

34.31 network

This command defines the interfaces on which OSPF runs and the area ID for those interfaces. The no form of the command disables OSPF routing for interfaces defined and to remove the area ID of that interface.

network <Network number> area <area-id> [unnum Vlan <PortNumber> [switch <switch-name>]]

no network <Network number> area <area-id> [unnum Vlan <PortNumber> [switch <switch-name>]]

Syntax Description	**Network number**	-	Network type
	area	-	Area associated with the OSPF address range. It is specified as an IP address
	unnum Vlan	-	VLAN id for which no ip address is configured
	switch[7]	-	Switch instance / Virtual switch. This value is a string of size 32.

Mode Router Configuration Mode

Package Enterprise and Metro

Example

```
iss(config-router)# network 0.0 area 0.0 unnum Vlan 1
```

☞

- When a more specific OSPF network range is removed, interfaces belonging to that network range will be retained and remain active if and only if a less specific network range exists.
- There is no limit to the number of network commands that can be used on the router.
- The IP address for the entry should be same as that of the configured interface.

Related Commands

- **`router ospf`** – Enables OSPF routing process
- **`show ip ospf - database`** – Displays OSPF Database summary for the LSA type
- **`show ip ospf interface`** – Displays OSPF interface information

34.32 set nssa asbr-default-route translator

This command enables/disables setting of P bit in the default Type-7 LSA generated by NSSA internal ASBR.

`set nssa asbr-default-route translator { enable | disable }`

Syntax Description

`enable`	-	When set to enabled, P-Bit is set in the generated Type-7 default LSA
`disable`	-	When set disabled, P-Bit is clear in the generated default LSA

Mode Router Configuration Mode

Package Enterprise and Metro

Defaults disable

Example

```
iss(config-router)# set nssa asbr-default-route translator
enable
```

☞ Specifies the P-Bit setting for the default Type-7 LSA generated by ASBR(which is not ABR).

Related Command

- **`ASBR Router`** – Specifies this router as ASBR

34.33 passive-interface vlan

This command suppresses routing updates on an interface and the no form of the command enables routing updates on an interface.

```
passive-interface {vlan <vlan-id(1-4094)> [switch <switch-name>] | <interface-type> <interface-id>}
```

```
no passive-interface {vlan <vlan-id(1-4094)> [switch <switch-name>] | <interface-type> <interface-id>}
```

Syntax Description	**vlan-id**	-	LSA retransmissions for adjacencies belonging to the VLAN interface. This value ranges between 1 and 4094.
	switch[7]	-	Switch instance / Virtual switch. This value is a string of size 32.
	interface-type	-	Interface Type
	interface-id	-	Interface Identifier
Mode	Router Configuration Mode		
Package	Enterprise and Metro		

Example `iss(config-router)# passive-interface vlan 1`

☞
- OSPF should be enabled, before executing this command.
- OSPF routing information is neither sent nor received through the specified router interface. The specified interface address appears as a stub network in the OSPF domain.

Related Commands
- **`network`** – Defines the interfaces on which OSPF runs and area ID for those interfaces
- **`passive-interface default`** – Suppresses routing updates on all interfaces
- **`show ip ospf interface`** – Displays OSPF interface information
- **`show ip ospf request-list`** – Displays OSPF Link state request list information

34.34 passive-interface default

This command suppresses routing updates on all interfaces and the no form of the command enables routing updates on all interfaces.

`passive-interface default`

`no passive-interface default`

Mode Router Configuration Mode

Package Enterprise and Metro

Example `iss(config-router)# passive-interface default`

☞ All the OSPF interfaces created after the execution of this command will be passive. This is useful in Internet service provider (ISP) and large enterprise networks where many of the distribution routers have more than 200 interfaces

Related Commands
- **`passive-interface vlan`** – Suppresses routing updates on an interface
- **`show ip ospf interface`** – Displays OSPF interface information
- **`show ip ospf request-list`** – Displays OSPF Link state request list information

34.35 ip ospf demand-circuit

This command configures OSPF to treat the interface as an OSPF demand circuit and the no form of the command removes the demand circuit designation from the interface.

`ip ospf demand-circuit`

`no ip ospf demand-circuit`

Mode Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package Enterprise and Metro

Example `iss(config-if)# ip ospf demand-circuit`

☞

- It indicates whether Demand OSPF procedures (hello suppression to FULL neighbors and setting the DoNotAge flag on prorogated LSAs) must be performed on this interface
- On point-to-point interfaces, only one end of the demand circuit must be configured with this command. Periodic hello messages are suppressed and periodic refreshes of link-state advertisements (LSAs) do not flood the demand circuit

Related Command

- **`show ip ospf interface`** – Displays OSPF interface information

34.36 ip ospf retransmit-interval

This command specifies the time between link-state advertisement (LSA) retransmissions for adjacencies belonging to the interface and the no form of the command uses the default time between link-state advertisement (LSA) retransmissions for adjacencies belonging to the interface.

`ip ospf retransmit-interval <seconds (0 – 3600)>`

`no ip ospf retransmit-interval`

Mode

Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package

Enterprise and Metro

Defaults

5

Example

```
iss(config-if)# ip ospf retransmit-interval 300
```

☞ This value is also used while retransmitting database description and link-state request packets.

Related Commands

- **`ip ospf hello-interval`** – Specifies the interval between hello packets sent on the interface
- **`ip ospf dead-interval`** – Sets the interval at which hello packets must not be seen before neighbors declare the router down
- **`ip ospf transmit-delay`** – Sets the estimated time it takes to transmit a link state update packet on the interface
- **`show ip ospf retransmission-list`** – Displays OSPF Link state retransmission list information

34.37 ip ospf transmit-delay

This command sets the estimated time it takes to transmit a link state update packet on the interface and the no form of the command sets the default estimated time it takes to transmit a link state update packet on the interface.

```
ip ospf transmit-delay <seconds (0 - 3600)>
```

```
no ip ospf transmit-delay
```

Mode Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package Enterprise and Metro

Defaults 1

Example

```
iss(config-if)# ip ospf transmit-delay 50
```

☞ Link-state advertisements (LSAs) in the update packet must have their ages incremented by the amount specified in the seconds argument before transmission.

Related Commands

- **`ip ospf hello-interval`** – Specifies the interval between hello packets sent on the interface
- **`ip ospf dead-interval`** – Sets the interval at which hello packets must not be seen before neighbors declare the router down
- **`ip ospf retransmit-interval`** – Specifies the time between link-state advertisement (LSA) retransmissions for adjacencies belonging to the interface
-

34.38 ip ospf priority

This command sets the router priority and the no form of the command sets default value for router priority.

```
ip ospf priority <value (0 - 255)>
```

```
no ip ospf priority
```

Mode Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package Enterprise and Metro

Defaults 1

Example

```
iss(config-if)# ip ospf priority 25
```

☞ When two routers attached to a network attempt to become the designated router, the one with the higher router priority takes precedence. If there is a tie, the router with the higher router ID takes precedence.

Related Commands

- **`ip ospf network`** – Configures the OSPF network type to a type other than the default for a given media
- **`neighbor`** – Specifies a neighbor router and its priority

34.39 ip ospf hello-interval

This command specifies the interval between hello packets sent on the interface and the no form of the command sets default value for, interval between hello packets sent on the interface.

```
ip ospf hello-interval <seconds (1 - 65535)>
```

```
no ip ospf hello-interval
```

Mode Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package	Enterprise and Metro
Defaults	10
Example	`iss(config-if)# ip ospf hello-interval 75`
☞	This value must be the same for all routers attached to a common network.
Related Commands	• **`ip ospf retransmit-interval`** – Specifies the time between link-state advertisement (LSA) retransmissions for adjacencies belonging to the interface • **`ip ospf dead-interval`** – Sets the interval at which hello packets must not be seen before neighbors declare the router down • **`ip ospf transmit-delay`** – Sets the estimated time it takes to transmit a link state update packet on the interface • **`show ip ospf interface`** – Displays OSPF interface information

34.40 ip ospf dead-interval

This command sets the interval at which hello packets must not be seen before neighbors declare the router down and the no form of the command sets default value for the interval at which hello packets must not be seen before neighbors declare the router down.

```
ip ospf dead-interval <seconds (0-0x7fffffff)>
```

```
no ip ospf dead-interval
```

Mode Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package Enterprise and Metro

Defaults 40

Example

```
iss(config-if)# ip ospf dead-interval 1000
```

☞ This value must be the same for all routers and access servers on a specific network.

Related Commands

- **`ip ospf retransmit-interval`** – Specifies the time between link-state advertisement (LSA) retransmissions for adjacencies belonging to the interface
- **`ip ospf hello-interval`** – Specifies the interval between hello packets sent on the interface
- **`ip ospf transmit-delay`** – Sets the estimated time it takes to transmit a link state update packet on the interface
- **`show ip ospf interface`** – Displays OSPF interface information

34.41 ip ospf cost

This command explicitly specifies the cost of sending a packet on an interface and the no form of the command resets the path cost to the default value.

```
ip ospf cost <cost (1-65535)> [tos <tos value (0-30)>]
```

```
no ip ospf cost [tos <tos value (0-30)>]
```

Syntax Description	**cost**	-	Type 1 external metrics which is expressed in the same units as OSPF interface cost, that is in terms of the OSPF link state metric
	tos	-	Type of Service of the route being configured

Mode

Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package

Enterprise and Metro

Defaults

0

Example

```
iss(config-if)# ip ospf cost 10
```

☞

- In general, the path cost is calculated using the following formula:

  108 / bandwidth

  Using this formula, the default path costs are calculated

  Example: 56-kbps serial link-Default cost is 1785

  Ethernet-Default cost is 10
- tos can be configured only if the code is compiled with TOS Support

Related Commands

- **area-default cost**– Specifies a cost for the default summary route sent into a stub or NSSA
- **show ip ospf interface**– Displays OSPF interface information

34.42 ip ospf network

This command configures the OSPF network type to a type other than the default for a given media and the no form of the command sets the OSPF network type to the default type.

ip ospf network {broadcast | non-broadcast | point-to-multipoint | point-to-point}

no ip ospf network

Syntax Description	**broadcast**	-	Networks supporting many (more than two) attached routers, together with the capability to address a single physical message to all of the attached routers (broadcast)
	non-broadcast	-	Networks supporting many (more than two) routers, but having no broadcast capability
	point-to-multipoint	-	Treats the non-broadcast network as a collection of point-to-point links
	point-to-point	-	A network that joins a single pair of routers

Mode

Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package

Enterprise and Metro

Default

broadcast

Example

```
iss(config-if)# ip ospf network broadcast
```

☞ Each pair of routers on a broadcast network is assumed to be able to communicate directly. An Ethernet is an example of a broadcast network. A 56Kb serial line is an example of a point-to-point network.

Related Commands

- **neighbor**– Specifies a neighbor router and its priority
- **ip ospf priority** – Sets the router priority
- **show ip ospf interface** – Displays OSPF interface information

34.43 ip ospf authentication-key

This command specifies a password to be used by neighboring routers that are using the OSPF simple password authentication. The no form of the command removes a previously assigned OSPF password.

```
ip ospf authentication-key <password (8)>
```

```
no ip ospf authentication-key
```

Mode	Interface Configuration Mode This command is applicable only in VLAN Interface Mode.
Package	Enterprise and Metro
Example	`iss(config-if)# ip ospf authentication-key asdf123`
☞	• The password string can contain from 1 to 8 uppercase and lowercase alphanumeric characters. • A separate password can be assigned to each network on a per-interface basis. All neighboring routers on the same network must have the same password to be able to exchange OSPF information.
Related Commands	• **`ip ospf authentication`** – Specifies the authentication type for an interface • **`summary-address`** – Creates aggregate addresses for OSPF • **`show ip ospf`** – Displays general information about OSPF routing process

34.44 ip ospf authentication

This command specifies the authentication type for an interface and the no form of the command removes the authentication type for an interface and set it to NULL authentication.

```
ip ospf authentication [{message-digest | null}]
```

```
no ip ospf authentication
```

Syntax Description	**`message-digest`**	-	Message Digest authentication
	`null`	-	NULL authentication

Mode

Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package

Enterprise and Metro

Defaults

null

Example

```
iss(config-if)# ip ospf authentication
```

☞

- Before using the ip ospf authentication command, a password for the interface must be configured using the ip ospf authentication-key command
- If the authentication type is 'message digest' then key will be selected from the md-5 table.

Related Commands

- **`area-stub`** – Specifies an area as a stub area and other parameters related to that area
- **`area-default cost`** – Specifies a cost for the default summary route sent into a stub or NSSA
- **`area – virtual-link`** – Defines an OSPF virtual link and its related parameters
- **`area – range`** – Consolidates and summarizes routes at an area boundary
- **`ip ospf authentication-key`** – Specifies a password to be used by neighboring routers that are using the OSPF simple password authentication
- **`ip ospf message-digest-key`** – Enables OSPF MD5 authentication

34.45 ip ospf message-digest-key

This command enables OSPF MD5 authentication and the no form of the command removes an old MD5 key.

```
ip ospf message-digest-key <Key-ID (0-255)> md5 <md5-Key (16)>
```

no ip ospf message-digest-key <Key-ID (0-255)>

Syntax Description	**Key-ID**	-	Identifies the secret key, which is used to create the message digest appended to the OSPF packet
	md5	-	Secret key, which is used to create the message digest appended to the OSPF packet

Mode Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package Enterprise and Metro

Example `iss(config-if)# ip ospf message-digest-key 5 md5 abcd123`

☞

- Message Digest authentication is a cryptographic authentication. A key (password) and key-id are configured on each router. The router uses an algorithm based on the OSPF packet, the key, and the key-id to generate a "message digest" that gets appended to the packet
- Usually, one key per interface is used to generate authentication information when sending packets and to authenticate incoming packets. The same key identifier on the neighbor router must have the same key value

Related Commands

- **ip ospf authentication** – Specifies the authentication type for an interface
- **summary-address** – Creates aggregate addresses for OSPF
- **show ip ospf** – Displays general information about OSPF routing process

34.46 debug ip ospf

This command sets the OSPF debug level. and the no form of the command removes an old MD5 key.

```
debug ip ospf [vrf <name>] { pkt { hp | ddp | lrq | lsu | lsa } | module {
adj_formation | ism | nsm | config | interface | restarting-router | helper }
}
```

```
no debug ip ospf [vrf <name>] { pkt { hp | ddp | lrq | lsu | lsa } | module {
adj_formation | ism | nsm | config | interface | restarting-router | helper }
| all }
```

Syntax Description

vrf[6]	-	Name of the VRF instance. This value is a string of size 32.
pkt	-	Packet High Level Dump debug messages
hp	-	Hello packet debug messages
ddp	-	DDP packet debug messages
lrq	-	Link State Request Packet debug messages
lsu	-	Link State Update Packet debug messages
lsa		Link State Acknowledge Packet debug messages
module	-	RTM Module debug messages
adj_formation	-	Adjacency formation debug messages
ism	-	Interface State Machine debug messages
nsm	-	Neighbor State Machine debug messages
config	-	Configuration debug messages
interface	-	Interface
restarting-router	-	Debug messages related to restarting router

	helper	-	Debug messages related to router in helper mode
	all	-	All debug messages

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults vrf - default

Example

```
iss# debug ip ospf pkt hp
```

☞ The information displayed by the show ip ospf retransmission-list command is useful in debugging OSPF routing operations.

VRF instance should be created, before executing this command to set the OSPF debug level for the context.

Related Commands

- **ip vrf** - Creates VRF instance
- **show ip ospf** – Displays general information about OSPF routing process
- **show debugging** – Displays the state of each debugging option

34.47 show ip ospf interface

This command displays OSPF interface information.

show ip ospf [vrf <name>] interface [{ vlan <vlan-id (1-4094)> [switch <switch-name>] | <interface-type> <interface-id> }]

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	vlan	-	LSA retransmissions for adjacencies belonging to the VLAN interface. This value ranges between 1 and 4094.
	switch[7]	-	Switch instance / Virtual switch. This value is a string of size 32.
	interface-type	-	Interface Type
	interface-id	-	Interface Identifier
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# sh ip ospf interface

vlan1 is line protocol is up
  Internet Address 12.0.0.1, Mask 255.0.0.0, Area 0.0.0.0
  AS 1, Router ID 12.0.0.1, Network Type BROADCAST, Cost 1
  Transmit Delay is 1 sec, State 5, Priority 1
  Designated RouterId 12.0.0.2, Interface address 12.0.0.2
  Backup Designated RouterId 12.0.0.1, Interface address
12.0.0.1
  Timer intervals configured, Hello 10, Dead 40, Wait 40,
Retransmit 5
  Hello due in 4 sec
  Neighbor Count is 1, Adjacent neighbor count is 1
  Adjacent with the neighbor 12.0.0.2
 Connected to VRF   default
```

Related Commands

- **network** – Defines the interfaces on which OSPF runs and to define the area ID for those interfaces
- **passive-interface vlan** – Suppresses routing updates on an interface
- **passive-interface default** – Suppresses routing updates on all interfaces

- **`ip ospf demand-circuit`** – Configures OSPF to treat the interface as an OSPF demand circuit
- **`ip ospf hello-interval`** – Specifies the interval between hello packets sent on the interface
- **`ip ospf dead-interval`** – Sets the interval at which hello packets must not be seen before neighbors declare the router down
- **`ip ospf cost`** – Specifies the cost of sending a packet on an interface

34.48 show ip ospf neighbor

This command displays OSPF neighbor information list.

show ip ospf [vrf <name>] neighbor [{ vlan <vlan-id (1-4094)> [switch <switch-name>] | <interface-type> <interface-id> }] [Neighbor ID] [detail]

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	vlan	-	LSA retransmissions for adjacencies belonging to the VLAN interface. This value ranges between 1 and 4094.
	switch[7]	-	Switch instance / Virtual switch. This value is a string of size 32.
	Neighbor ID	-	Neighbor router ID
	detail	-	OSPF Neighbor information in detail
	interface-type	-	Interface Type
	interface-id	-	Interface Identifier
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# sh ip ospf neighbor

  Vrf  default
12.0.0.2   1   FULL/DR        34      12.0.0.2        vlan1
```

Related Command

- **neighbor** – Specifies a neighbor router and its priority.

34.49 show ip ospf request-list

This command displays OSPF Link state request list information.

show ip ospf [vrf <name>] request-list [<neighbor-id>] [{ vlan <vlan-id (1-4094)> [switch <switch-name>] | <interface-type> <interface-id> }]

Syntax Description

vrf[6]	–	Name of the VRF instance. This value is a string of size 32.
neighbor-id	-	Neighbor router ID
vlan	-	LSA retransmissions for adjacencies belonging to the VLAN interface. This value ranges between 1 and 4094.
switch[7]	-	Switch instance / Virtual switch. This value is a string of size 32.
interface-type	-	Interface Type
interface-id	-	Interface Identifier

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults vrf - default

Example

```
Single Instance:

iss# show ip ospf request-list

OSPF Router with ID (20.0.0.2)
Neighbor 10.0.0.1, interface vlan1 address 40.0.0.1
Type LS-ID     ADV-RTR     SeqNo      Age    Checksum
 ---- ----     -------     -----      ---    --------
Neighbor 20.0.0.2, interface vlan1 address 40.0.0.2
Type LS-ID   ADV-RTR      SeqNo       Age    Checksum
 ---- ----   -------      -----       ---    --------
```

```
Multiple Instance:

iss# show ip ospf request-list

OSPF Router with ID (10.0.0.1) (Vrf  default )

Neighbor 10.0.0.2, interface - address 10.0.0.2

Type LS-ID    ADV-RTR     SeqNo     Age    Checksum

Neighbor 11.0.0.1, interface - address 11.0.0.1

Type LS-ID    ADV-RTR     SeqNo     Age    Checksum


Neighbor 13.0.0.3, interface - address 13.0.0.3

Type LS-ID    ADV-RTR     SeqNo     Age    Checksum


Neighbor 14.0.0.4, interface - address 14.0.0.4

Type LS-ID    ADV-RTR     SeqNo     Age    Checksum
```

Related Commands

- **`passive-interface vlan`** – Suppresses routing updates on an interface
- **`passive-interface default`** – Suppresses routing updates on all interfaces

34.50 show ip ospf retransmission-list

This command displays OSPF Link state retransmission list information.

show ip ospf [vrf <name>] retransmission-list [<neighbor-id>] [{ vlan <vlan-id (1-4094)> [switch <switch-name>] | <interface-type> <interface-id> }]

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	neighbor-id	-	Neighbor router ID
	vlan	-	LSA retransmissions for adjacencies belonging to the VLAN interface. This value ranges between 1 and 4094.
	switch[7]	-	Switch instance / Virtual switch. This value is a string of size 32.
	interface-type	-	Interface Type
	interface-id	-	Interface Identifier
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
Single Instance:

iss# show ip ospf retransmission-list

OSPF Router with ID (20.0.0.2)
Neighbor 10.0.0.1, interface vlan1 address 10.0.0.2
Queue length 3
Type  LS-ID   ADV-RTR   SeqNo   Age  Checksum
1     20.0.0.2 20.0.0.2  0x80000006 0 0x522f

Multiple Instance:
```

```
iss# show ip ospf retransmission-list

OSPF Router with ID (11.0.0.1) (Vrf  default )

Neighbor 10.0.0.1, interface vlan1 address 10.0.0.2
Link State Retransmission due in 30 ticks, Queue length 3
Type  LS-ID   ADV-RTR   SeqNo   Age  Checksum
```

☞ This value is also used while retransmitting database description and link-state request packets.

Related Command

- **`ip ospf retransmit-interval`** – Specifies the time between link-state advertisement (LSA) retransmissions for adjacencies belonging to the interface

34.51 show ip ospf virtual-links

This command displays OSPF Virtual link information.

show ip ospf [vrf <name>] virtual-links

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
Single Instance:

iss# show ip ospf virtual-links

Virtual Link to router 10.0.0.1, Interface State is DOWN
  Transit Area 33.0.0.12
  Transmit Delay is 1 sec, Neighbor State DOWN
  Timer intervals configured, Hello 10, Dead 60, Retransmit 5

Multiple Instance:

iss# show ip ospf virtual-links

Vrf  default

Virtual Link to router 11.0.0.1, Interface State is DOWN
  Transit Area 1.1.1.1
  Transmit Delay is 1 sec, Neighbor State DOWN
  Timer intervals configured, Hello 10, Dead 60, Retransmit 5

Virtual Link to router 16.0.0.6, Interface State is DOWN
  Transit Area 5.5.5.5
  Transmit Delay is 1 sec, Neighbor State DOWN
  Timer intervals configured, Hello 10, Dead 60, Retransmit 5
```

Related Command

- **area - virtual-link** – Defines an OSPF virtual link and its related parameters

34.52 show ip ospf border-routers

This command displays OSPF Border and Boundary Router Information.

show ip ospf [vrf <name>] border-routers

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# sh ip ospf border-routers

 Vrf  default
OSPF Process Border Router Information

Destination  TOS  Type  NextHop      Cost        Rt.Type    Area
-----------  ---  ----  -------      ----        -------    ----
12.0.0.2     0    ASBR  12.0.0.2     1           intraArea  0.0.0.0
```

Related Commands

- **abr-type** – Sets the Alternative ABR Type
- **ASBR Router** – Specifies this router as ASBR

34.53 show ip ospf - summary address

This command displays OSPF summary-address redistribution Information.

show ip ospf [vrf <name>] {area-range | summary-address}

Syntax Description	**vrf**[6]	–	Name of the VRF instance. This value is a string of size 32.
	area-range	-	Area associated with the OSPF address range. It is specified as an IP address
	summary-address	-	Aggregate addresses for OSPF
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
Single Instance:

iss# show ip ospf area-range

Display of Summary addresses for Type3 and Translated Type5
Summary Address
----------------------------------------------
Network  Mask       LSAType Area       Effect         Tag
-------  -------      ----              ------         ---
10.0.0.0  255.0.0.0 Summary 33.0.0.12 Advertise 1074636208

iss# show ip ospf summary-address

Display of Summary addresses for Type5 and Type7 from
redistributed routes
OSPF External Summary Address Configuration Information
-------------------------------------------------------
Network    Mask    Area          Effect   TranslationSt
-------    ----    ----           ------   ------------
10.0.0.1  255.0.0.0  33.0.0.12  advertiseMatching  enabled

Multiple Instance:
```

```
iss# show ip ospf summary-address

Display of Summary addresses for Type5 and Type7 from
redistributed routes

 Vrf  default

OSPF External Summary Address Configuration Information
-------------------------------------------------------
Network     Mask        Area        Effect      TranslationState
---------   ------      ------      -------     ----------------
11.0.0.9    255.0.0.0   0.0.0.0      AllowAll     enabled
16.0.0.1    255.0.0.0   0.0.0.0      AllowAll     enabled
```

Related Commands

- **`area - range`** – Consolidates and summarizes routes at an area boundary
- **`summary-address`** – Creates aggregate addresses for OSPF

34.54 show ip ospf

This command displays general information about the OSPF routing process.

show ip ospf [vrf <name>]

Syntax	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# sh ip ospf
 OSPF Router with ID (20.0.0.2) (Vrf  default)
  Supports only single TOS(TOS0) route
  ABR Type supported is Standard ABR
  and Autonomous System Boundary Router
  Number of Areas in this router is 1
  Area is 0.0.0.0
  Number of interfaces in this area is 1
  SPF algorithm executed 6 times
Non-Stop Forwarding disabled
  Restart-interval limit: 120
  Grace LSA Retransmission Count: 2
  Helper Grace LSA ACK :Required
  Restart Reason is:
         Unknown
  Helper is Giving Support for:
         Unknown
         Software Restart
         Software Reload/Upgrade
         Switch To Redundant
  Helper Grace Time Limit: 0
  Strict LSA checking State Is:Disabled
  Route calculation staggering is enabled
  Route calculation staggering interval is  10 seconds
```

Related Commands

- **area – Stability interval** – Configures the Stability interval for NSSA
- **area – virtual-link** – Defines an OSPF virtual link and its related parameters
- **nsf ietf restart-support** - Enables the graceful restart support

- **`nsf ietf restart-interval`** - Configures the OSPF graceful restart timeout interval
- **`nsf ietf helper-support`** - Enables the helper support
- **`nsf ietf helper gracetimelimit`** - Configures the graceful restart interval limit in helper side
- **`nsf ietf helper strict-lsa-checking`** - Enables the strict LSA check option in helper
- **`nsf ietf grace lsa ack required`** - Enables Grace Ack Required state in restarter
- **`nsf ietf grlsa retrans count`** - Configures the maximum number of retransmissions for unacknowledged GraceLSA
- **`nsf ietf restart-reason`** - Configures the reason for graceful restart
- **`route-calculation staggering`** - Enables OSPF route calculation staggering feature
- **`route-calculation staggering-interval`** - Configures the OSPF route calculation staggering interval
- **`ip ospf authentication-key`** – Specifies a password to be used by neighboring routers that are using the OSPF simple password authentication
- **`debug ip ospf`** – Sets the OSPF debug level

34.55 show ip ospf route

This command displays routes learnt by OSPF process.

show ip ospf [vrf <name>] route

Syntax	**vrf**[6]	–	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# sh ip ospf route

OSPF Routing Table   Vrf  default
Dest/Mask            TOS NextHop/Interface Cost Rt.Type   Area

---------            --- -------/--------- ---- -------   ----

12.0.0.0/255.0.0.0   0   0.0.0.0/vlan1     1    IntraArea 0.0.0.0

20.0.0.0/255.0.0.0   0   12.0.0.2/vlan1    10   Type2Ext  0.0.0.0
```

Related Commands

- **router ospf** – Enables OSPF routing process
- **router-id** – Sets the router-id for the OSPF process

34.56 show ip ospf - database summary

This command displays OSPF LSA Database summary.

show ip ospf [vrf <name>] [area-id] database [{database-summary | self-originate | adv-router <ip-address>}]

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	area-id	-	Area associated with the OSPF address range. It is specified as an IP address.
	database	-	Displays how many of each type of LSA for each area there are in the database
	database-summary	-	Displays how many of each type of LSA for each area there are in the database, and the total number of LSA types
	self-originate	-	Displays only self-originated LSAs (from the local router)
	adv-router	-	Displays all the specified router link-state advertisements (LSAs). If no IP address is included, the information is about the local router itself
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# sh ip ospf database

OSPF Router with ID (12.0.0.1) (Vrf  default)
                  Router Link States (Area 0.0.0.0)
                  ----------------------------------------
Link ID     ADV Router     Age    Seq#       Checksum  Link count
-------     ----------     ---     ----       --------  ----------
12.0.0.1    12.0.0.1       48    0x80000002   0xd129     1
```

```
12.0.0.2   12.0.0.2      50    0x80000002   0xcf28    1

                  Network Link States (Area 0.0.0.0)
                  --------------------------------------
Link ID       ADV Router    Age     Seq#          Checksum
-------       ----------    ---     ----          --------
12.0.0.2      12.0.0.2      49      0x80000001    0x629f


OSPF Router with ID (14.0.0.1) (Vrf  vr1)

iss# sh ip ospf vrf default database

OSPF Router with ID (12.0.0.1) (Vrf  default)
                  Router Link States (Area 0.0.0.0)
                  --------------------------------------
Link ID    ADV Router   Age    Seq#        Checksum  Link count
-------    ----------   ---    ----        --------  ----------
12.0.0.1   12.0.0.1     62     0x80000002  0xd129    1

12.0.0.2   12.0.0.2     64     0x80000002  0xcf28    1

                  Network Link States (Area 0.0.0.0)
                  --------------------------------------
Link ID       ADV Router     Age        Seq#          Checksum
-------       ----------     ---        ----          --------
12.0.0.2      12.0.0.2       63         0x80000001    0x629f
```

Related Command

- **`summary-address`** – Creates aggregate addresses for OSPF

34.57 show ip ospf - database

This command displays OSPF Database summary for the LSA type.

```
show ip ospf [vrf <name>] [area-id] database { asbr-summary | external |
network | nssa-external | opaque-area | opaque-as | opaque-link | router |
summary } [link-state-id] [{adv-router <ip-address> | self-originate}]
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	area-id	-	Area associated with the OSPF address range. It is specified as an IP address
	database	-	Displays how many of each type of LSA for each area there are in the database
	asbr-summary	-	Displays information only about the Autonomous System Boundary Router (ASBR) summary LSAs
	external	-	Displays information only about the external LSAs
	network	-	Displays information only about the network LSAs
	nssa-external	-	Displays information about the NSSA external LSAs
	opaque-area	-	Displays information about the Type-10 LSAs
	opaque-as	-	Displays information about the Type-11 LSAs

opaque-link	-	Displays information about the Type-9 LSAs
router	-	Displays information only about the router LSAs
summary	-	Displays information only about the summary LSAs
link-state-id	-	Portion of the Internet environment that is being described by the advertisement. The value entered depends on the type of the LSA. The value must be entered in the form of an IP address
adv-router	-	Displays all the specified router link-state advertisements (LSAs). If no IP address is included, the information is about the local router itself
self-originate	-	Displays only self-originated LSAs (from the local router)

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults vrf - default

Example

```
Single Instance:

iss# show ip ospf database summary

OSPF Router with ID (10.0.0.1)
      Summary Link States (Area 33.0.0.12)
     ---------------------------------------
LS age              : 300
Options             : (No ToS Capability, DC)
LS Type             : Summary Links(Network)
Link State ID       : 10.0.0.0
Advertising Router  : 10.0.0.1
LS Seq Number       : 0x80000002
Checksum            : 0xae77
Length              : 28

iss# show ip ospf database network

OSPF Router with ID (20.0.0.2)

          Network Link States (Area 33.0.0.12)
        ---------------------------------------
LS age              : 900
Options             : (No ToS Capability, DC)
```

```
LS Type            : Network Links
Link State ID      : 40.0.0.2
Advertising Router : 20.0.0.2
LS Seq Number      : 0x80000001
Checksum           : 0xce09
Length             : 32

Multiple Instance:

iss# show ip ospf database

OSPF Router with ID (10.0.0.1) (Vrf  default)
                  Router Link States (Area 0.0.0.0)
                  -----------------------------------
Link ID     ADV Router    Age     Seq#     Checksum  Link count
-------     ----------    ---     ---     --------  ----------
10.0.0.1   10.0.0.1       900     0x80000009    0xde6     1
14.0.0.4   14.0.0.4       900     0x80000008    0x8f33    2

                  Network Link States (Area 0.0.0.0)
                  -----------------------------------
Link ID      ADV Router     Age     Seq#          Checksum
-------     ----------     ---     ----          --------
14.0.0.1     10.0.0.1       1200    0x80000003    0x8e71

                  Summary Link States (Area 0.0.0.0)
                  -----------------------------------
Link ID       ADV Router       Age     Seq#       Checksum
-------      ----------       ---      ----      --------
13.0.0.0     10.0.0.1         300      0x80000003   0x859c
11.0.0.9     10.0.0.1         900      0x80000016   0x1fe8
20.10.10.10  10.0.0.1         900      0x80000001   0x3db8
10.0.0.0     10.0.0.1         300      0x80000002   0xae77
16.0.0.1     10.0.0.1         900      0x80000016   0x2edc
17.0.0.0     10.0.0.1         900      0x80000001   0x55ca
21.0.0.0     10.0.0.1         900      0x80000001   0x21fa
15.0.0.4     14.0.0.4         900      0x8000000d    0xf812


                  ASBR Summary Link States (Area 0.0.0.0)
                  -------------------------------------------
Link ID       ADV Router     Age        Seq#       Checksum
-------      ----------       ---       ----       --------
11.0.0.1    10.0.0.1        1200       0x80000001    0x8b98

                  Router Link States (Area 1.1.1.1)
                  -----------------------------------
Link ID   ADV Router    Age      Seq#     Checksum  Link count
-------   ----------     --     ----      --------  ----------
10.0.0.1   0.0.0.1      1200     0x80000007  0x4ba8    1
11.0.0.1   11.0.0.1     1200     0x80000007  0xc139    1



                Network Link States (Area 1.1.1.1)
                  -----------------------------------
Link ID    ADV Router       Age        Seq#          Checksum
```

```
-------    ----------         ---         ----          --------
11.0.0.1   11.0.0.1           1200        0x80000003    0x5daa


                  Summary Link States (Area 1.1.1.1)
                  --------------------------------------
Link ID       ADV Router      Age         Seq#          Checksum
-------      ----------        ---        ----          --------
13.0.0.0      10.0.0.1        300         0x80000003    0x859c
20.10.10.10   10.0.0.1        900         0x80000002    0x3bb9
10.0.0.0      10.0.0.1        300         0x80000002    0xae77
16.0.0.1      10.0.0.1        900         0x80000016    0x2edc
17.0.0.0      10.0.0.1        900         0x80000001    0x55ca
14.0.0.0      10.0.0.1        300         0x80000003    0x78a8
21.0.0.0      10.0.0.1        900         0x80000001    0x21fa
18.0.0.0      10.0.0.1        900         0x80000001    0x52cb
15.0.0.0      10.0.0.1        1200        0x80000001    0x79a7


                  NSSA External Link States (Area 4.4.4.4)
                  ---------------------------------------------
Link ID        ADV Router        Age         Seq#        Checksum
-------       ----------         ---         ---         --------
19.0.0.0      10.0.0.1          300         0x80000002    0x89f4
16.0.0.0      10.0.0.1          300         0x80000002    0xb0d0
13.0.0.0      10.0.0.1          300         0x80000002    0xd7ac
10.0.0.0      10.0.0.1          300         0x80000002    0xfe88
```

Related Commands

- **`summary-address`** – Defines the interfaces on which OSPF runs and to define the area ID for those interfaces
- **`router ospf`** – Enables OSPF routing process

34.58 show ip ospf redundancy

This command displays OSPFv2 redundancy information.

show ip ospf redundancy

Mode Privileged EXEC Mode

Example

```
iss# show ip ospf redundancy

Redundancy Summary
 ------------------
  Hotstandby admin status : Enabled
  Hotstandby state : Active and Standby Up
  Hotstandby bulk update status : Completed
  Number of hello PDUs synced : 0
  Number of LSAs synced : 0
```

Chapter 35

OSPFv3

Open Shortest Path First (OSPF) is a link-state, hierarchical Interior Gateway Protocol (IGP) routing algorithm.

OSPFv3 is the modified form of OSPF to support version 6 of the Internet Protocol. The fundamental mechanisms of OSPF (flooding, DR election, area support, SPF calculations, etc.) remain unchanged. However, some changes have been necessary, either due to changes in protocol semantics between IPv4 and IPv6, or simply to handle the increased address size of IPv6.

The list of CLI commands for the configuration of OSPFv3 are as follows:

- ipv6 router ospf
- router-id - IPv4-Address
- area - stub/nssa
- area - stability-interval
- area - translation-role
- timers spf
- abr-type
- area - default-metric value
- area - default-metric type
- area - virtual-link
- ASBR Router
- area - range

- area – summary-prefix
- redistribute
- distribute-list route-map in
- passive-interface
- route-calculation staggering
- route-calculation staggering-interval
- distance
- host - metric/area-id
- no area
- nssaAsbrDfRtTrans
- redist-config
- as-external lsdb-limit
- exit-overflow-interval
- demand-extensions
- reference-bandwidth
- nsf ietf restart-interval
- nsf ietf helper disable
- nsf ietf helper gracetimelimit
- nsf ietf helper strict-lsa-checking
- nsf ietf grace lsa ack required
- nsf ietf grace lsa retransmit-count
- nsf ietf restart-reason
- ipv6 ospf area
- ipv6 ospf demand-circuit
- ipv6 ospf retransmit-interval
- ipv6 ospf transmit-delay
- ipv6 ospf priority
- ipv6 ospf hello-interval
- ipv6 ospf dead-interval
- ipv6 ospf poll-interval
- ipv6 ospf metric
- ipv6 ospf network
- ipv6 ospf neighbor
- ipv6 ospf passive-interface
- ipv6 ospf neighbor probing

- ipv6 ospf neighbor-probe retransmit-limit
- ipv6 ospf neighbor-probe interval
- debug ipv6 ospf - pkt
- show ipv6 ospf interface
- show ipv6 ospf neighbor
- show ipv6 ospf - request/retrans-list
- show ipv6 ospf virtual-links
- show ipv6 ospf border-routers
- show ipv6 ospf - area-range / summary-prefix
- show ipv6 ospf - General Information
- show ipv6 ospf - LSA Database
- show ipv6 ospf route
- show ipv6 ospf areas
- show ipv6 ospf host
- show ipv6 ospf redist-config

35.1 ipv6 router ospf

This command enables the OSPFv3 routing protocol, if the VRF instance name is not specified. This command creates the OSPF instance, if the VRF instance name is specified.

The no form of the command disables the OSPFv3 routing protocol, if the VRF instance name is not specified. The no form of the command deletes the OSPF instance, if the VRF instance name is specified.

```
ipv6 router ospf [vrf <contextname>]
```

```
no ipv6 router ospf [vrf <contextname>]
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Global Configuration Mode		
Package	Enterprise and Metro		
Defaults	OSPFv3 routing protocol is disabled		
	vrf	-	default
Example	`iss(config)# ipv6 router ospf`		

☞ VRF instance should be created, before executing this command to enable the OSPFv3 in the context.

Related Commands

- **ip vrf** - Creates VRF instance
- **redistribute** - Configures the protocol from which the routes have to be redistributed into OSPFv3
- **distribute-list route-map in** - Enables inbound filtering for routes
- **route-calculation staggering** - Enables OSPFv3 route calculation staggering
- **route-calculation staggering-interval** - Configures the OSPFv3 route calculation staggering interval
- **distance** - Enables the administrative distance of the routing protocol and sets the administrative distance value
- **nsf ietf restart-interval** - Enables the graceful restart support and configures grace interval
- **nsf ietf helper disable** - Disables the helper support

- **`nsf ietf helper gracetimelimit`** - Configures the helper grace time limit
- **`nsf ietf helper strict-lsa-checking`** - Enables the strict LSA check option in helper
- **`nsf ietf grace lsa ack required`** - Enables Grace Ack Required state in restarter
- **`nsf ietf grace lsa retransmit-count`** - Configures the maximum number of retransmissions for unacknowledged GraceLSA
- **`nsf ietf restart-reason`** - Configures the reason for restart
- **`ipv6 ospf area`** – Enables OSPFv3 for IPv6 on an interface
- **`debug ipv6 ospf - pkt`** – Sets the trace levels
- **`show ipv6 ospf - request/retrans-list`** - Displays the list of all link state advertisements (LSAs) in request-list or in retransmission-list

35.2 router-id - IPv4-Address

This command sets a fixed router ID.

`router-id <IPv4-Address>`

Syntax Description	**`IPv4-Address`**	-	A 32-bit integer that uniquely identifies the router in the autonomous system.
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	IPv4-Address	-	0.0.0.0
Example	`iss(config-router)# router-id 11.0.0.1`		
Related Command	• **`export ospf`** – Enables redistribution of Ospf area/External routes to protocol • **`show ipv6 ospf - General Information`** – Displays general information about the OSPFv3 routing process		

35.3 area - stub/nssa

This command defines an area as a stub area or an NSSA (Not So Stubby Area).

`area <area-id> {{ stub | nssa } [no-summary]}`

Syntax Description	**`area-id`**	-	A 32-bit integer
	`stub`	-	Stub area
	`nssa`	-	NSSA
	`no-summary`	-	Allows an area to be a stubby/not-so-stubby but does not allow it to have summary routes injected into it

Mode Router Configuration Mode

Package Enterprise and Metro

Example

```
iss(config-router)# area 1.1.1.1 stub no-summary
```

☞

- In stub area, the generation of summary LSA is optional.
- If **`no-summary`** option is specified in the command, then the router neither originates nor propagates summary LSAs into the stubby area /NSSA. It relies entirely on its default route.
- If the **`no-summary`** option is not specified, the router summarizes and propagates summary LSAs.
- The **`no-summary`** option can be specified only in the Area Border Routers and by default, it is set to send summary.

Related Command

- **`show ipv6 ospf areas`** – Displays the Area Table

35.4 area - stability-interval

This command configures the stability interval (in seconds) for the NSSA. The no form of the command sets the default value of the stability interval for the NSSA.

`area <area-id> stability-interval <1-65535>`

`no area <area-id> stability-interval`

Syntax Description	**`area-id`**	-	A 32 bit integer
	`stability-interval`	-	The number of seconds after which an elected translator determines that its services are no longer required, and that it must continue to perform its translation duties.
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	interval-value	-	40
Example	`iss(config-router)# area 0.0.0.1 stability-interval 50`		
Related Command	• **`show ipv6 ospf areas`** – Displays the Area Table		

35.5 area - translation-role

This command configures the translation role for NSSA. The no form of the command configures the default translation role for the NSSA.

```
area <area-id> translation-role { always | candidate }
```

```
no area  <area-id> translation-role
```

Syntax Description	**area-id**	-	A 32 bit integer
	translation-role	-	An NSSA Border router's ability to perform NSSA Translation of Type-7 LSAs to Type-5 LSAs
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	translation-role	-	candidate
Example	`iss(config-router)# area 0.0.0.1 translation-role always`		

☞ When the translator role is set to always, the Type-7 LSAs are always translated into Type-5 LSAs.

When translator role is set to candidate, an NSSA border router participates in the translator election process.

Related Command

- **show ipv6 ospf areas** – Displays the Area Table

35.6 timers spf

This command configures the delay time[10] and the hold time between two consecutive SPF calculations. The no form of the command sets the default values for spf-delay and spf-holdtime.

`timers spf <spf-delay> <spf-holdtime>`

`no timers spf`

Syntax Description	**`spf-delay`**	-	The interval by which SPF calculation is delayed after a topology change reception.
	`spf-holdtime`	-	The delay between two consecutive SPF calculations.
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	spf-delay	-	5
	spf-holdtime	-	10
Example	`iss(config-router)# timers spf 10 20`		
Related Command	• **`show ipv6 ospf – General Information`** – Displays general information about the OSPFv3 routing process		

[10] Delay time is the time interval when OSPFv3 receives a topology change and when it starts a Shortest Path First (SPF) calculation.

35.7 abr-type

This command sets the ABR (Area Border Router) type. The no form of the command sets the default ABR type.

abr-type { standard | cisco | ibm }

no abr-type

Syntax Description	**standard**	-	Standard ABR type
	cisco	-	CISCO ABR type
	ibm	-	IBM ABR type
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	standard		
Example	`iss(config-router)# abr-type cisco`		
Related Command	• **show ipv6 ospf – General Information** – Displays general information about the OSPFv3 routing process		

35.8 area - default-metric value

This command sets the default metric value for an area of type NSS/stub only.

`area <area-id> default-metric <metric>`

Syntax Description	**`area-id`**	-	A 32 bit integer
	`default-metric`	-	Cost for the default summary route in a stub/NSS area
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	metric	-	1
Example	`iss(config-router)# area 1.1.1.1 default-metric 20`		

☞ Default metric can be defined only for a valid area.

Related Command

- **`area - stub/nssa`** – Defines an area as a stub area or an NSSA (Not So Stubby Area)

35.9 area - default-metric type

This command sets the default metric-type for an area type of NSS/stub only.

`area <area-id> default-metric type <metricType(1-3)>`

Syntax Description	**`area-id`**	-	A 32 bit integer
	`default-metric type`	-	Type of metric
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	metricType	-	1
Example	`iss(config-router)# area 1.1.1.1 default-metric type 2`		

☞ Default metric can be defined only for a valid area.

Related Command

- **`area - stub/nssa`** – Defines an area as a stub area or an NSSA (Not So Stubby Area)

35.10 area - virtual-link

This command sets the Virtual Link between areas.

In OSPFv3, all areas must be connected to a backbone area. If there is a break in backbone continuity, or the backbone is purposefully partitioned, a virtual link can be established. The two endpoints of a virtual link are ABRs. The virtual link must be configured in both routers. The configuration information in each router consists of the other virtual endpoint (the other ABR) and the non-backbone area that the two routers have in common (called the transit area).

If 20.0.0.3 is the Router ID of the Neighbor and 100 is the Interface Index assigned to the OSPFv3 virtual interface, then this interface index is advertised in Hello packet sent over the virtual link and in the router's router-LSAs.

```
area <area-id> virtual-link <router-id> <if-index> [hello-interval <seconds>]
[retransmit-interval <seconds>] [transmit-delay <seconds>] [dead-interval
<seconds>]
```

Syntax Description	**area-id**	-	A 32 bit integer
	router-id	-	The Router ID of the Virtual Neighbor
	if-index	-	Interface Index assigned to the OSPFv3 virtual interface
	hello-interval	-	The interval between hello packets on the OSPFv3 virtual link interface. This value ranges between 1 and 65535 seconds.

retransmit-interval	-	The time between link-state advertisement (LSA) retransmissions for adjacencies belonging to the OSPFv3 virtual link interface. This value ranges between 1 and 1800 seconds.
transmit-delay	-	The estimated time it takes to transmit a link state update packet over this interface. This value ranges between 1 and 1800 seconds.
dead-interval	-	The interval at which hello packets must not be seen before its neighbors declare the router down. This value ranges between 1 and 65535 seconds.

Mode Router Configuration Mode

Package Enterprise and Metro

Defaults

hello-interval	-	10
retransmit-interval	-	20
transmit-delay	-	1
dead-interval	-	60

Example

```
iss(config-router)# area 1.1.1.1 virtual-link  20.0.0.3 1 hello-interval 50 retransmit-interval 6 transmit-delay 6 dead-interval 100
```

☞ Virtual links cannot be configured through stub areas.

hello-interval and dead-interval values must be the same for all routers on a specific network.

Related Commands

- **show ipv6 ospf interface** – Displays the OSPFv3-related interface information
- **show ipv6 ospf virtual-links** – Displays the parameters and the current state of OSPFv3 virtual links

35.11 ASBR Router

This command configures the router as an ASBR. The no form of the command disables the ASBR status of the router.

`ASBR Router`

`no ASBR Router`

Mode	Router Configuration Mode
Package	Enterprise and Metro
Example	`iss(config-router)# ASBR Router`
☞	Only when ASBR (Autonomous System Border Router) status is configured to enable, routes from other protocols are redistributed into OSPFv3 domain.
Related Command	• **`show ipv6 ospf - General Information`** – Displays general information about the OSPFv3 routing process

35.12 area - range

This command creates the Internal Aggregation Address Range. The Internal Address Range is of two types:

- Type-3 Aggregation
- Type 7 Translation Aggregation

```
area <Area-ID> range <IPv6-Prefix> <Prefix-Length> [{ advertise | not-advertise }] {summary | Type7} [tag <tag-value>]
```

Syntax Description	**Area-ID**	-	A 32-bit integer
	range	-	Internal Aggregation Address Range
	IPv6-Prefix	-	The IPv6 address prefix of the range
	Prefix-Length	-	The prefix length of the address range
	advertise	-	Flushes out all the routes (LSAs) falling in the range and generates aggregated LSA for the range
	not-advertise	-	Suppresses routes that match the prefix/prefix-length pair
	summary	-	Summary LSA
	Type7	-	Type-7 LSA
	tag	-	Sets the tag value for the aggregated route
Mode	Router Configuration Mode		
Package	Enterprise and Metro		

Defaults	tag	-	0

Example

```
iss(config-router)# area 0.0.0.0 range 3ffe:5000:481d::5 80
advertise Type7 tag 20
```

☞

- When parameter summary is specified, the configured range is used for aggregating Type-3 LSA.
- When parameter Type7 is specified, the configured range is used for aggregating Type-7 LSAs.
- The optional parameter tag is used to set the tag value for the aggregated route. This is not used by the OSPFv3 protocol alone. It can be used to communicate information between AS boundary routers.

Related Command

- **`show ipv6 ospf – area-range / summary-prefix`** – Displays either the list of all area address ranges information or all external summary address configuration information

35.13 area – summary-prefix

This command enables route aggregation/filtering while importing routes in the OSPFv3 domain. The command configures Type-5 and Type-7 Address Range specifying whether Type-5/Type-7 LSAs are generated or not for the configured range for the particular area.

`area <AreaID> summary-prefix <IPv6-Prefix> <Prefix-Length> [{ allowAll | denyAll | advertise | not-advertise}] [Translation { enabled | disabled }]`

Syntax Description	**`AreaID`**	-	A 32-bit integer
	`summary-prefix`	-	Summary Prefix
	`IPv6-Prefix`	-	The IPv6 address prefix of the range
	`Prefix-Length`	-	The prefix length of the address range
	`allowAll`	-	When set to allowAll and the associated areaId is 0.0.0.0, aggregated Type-5 LSAs are generated for the specified range. In addition, aggregated Type-7 LSAs are generated in all the attached NSSAs for the specified range.

denyAll	-	When set to denyAll, neither Type-5 LSA nor Type-7 LSAs are generated for the specified range.
advertise	-	When the associated areaId is 0.0.0.0, aggregated Type-5 LSAs are generated. Otherwise, if the associated areaId is x.x.x.x (other than 0.0.0.0), aggregated Type-7 LSA is generated in NSSA area x.x.x.x.
not-advertise	-	When the associated areaId is 0.0.0.0, Type-5 LSA is not generated for the specified range, while all the NSSA LSAs within this range are flushed out and aggregated Type-7 LSA is generated in all attached NSSAs. If associated areaId is x.x.x.x (other than 0.0.0.0), Type-7 LSA is not generated in NSSA x.x.x.x for the specified range.
Translation	-	When set to enabled, the P-Bit is set in the generated Type-7 LSA. When set to disabled, the P-Bit is cleared in the generated Type-7 LSA for the range.

Mode Router Configuration Mode

Package Enterprise and Metro

Defaults Translation - enabled

advertise

Example

```
iss(config-router)# area  0.0.0.0  summary-prefix
3ffe:5000::481d::5 80  allowall Translation enabled
```

☞ The Value allowAll/denyall is not valid for areaId other than 0.0.0.0.

Related Command

- **show ipv6 ospf – area-range / summary-prefix** – Displays either the list of all area address ranges information or all external summary address configuration information

35.14 redistribute

This command configures the protocol from which the routes have to be redistributed into OSPFv3. The no form of the command disables the redistribution of routes from the given protocol into OSPFv3.

```
redistribute {static | connected | ripng | bgp} [route-map <string(20)>]
```

```
no redistribute {static | connected | ripng | bgp } [route-map <string(20)>]
```

Syntax Description	`static`	-	Advertises routes, configured statically in the OSPFv3 routing process
	`connected`	-	Advertises directly connected networks routes in the OSPFv3 routing process
	`ripng`	-	Advertises routes that are learnt by the RIP process in the OSPFv3 routing process
	`bgp`	-	Advertises routes that are learnt by the BGP process in the OSPFv3 routing process

route-map	-	Identifies the specified route-map in the list of route-maps. Specifies the name of the Route Map to be applied during redistribution of routes to OSPFv3. This value is a string of size 20.

Mode Router Configuration Mode

Package Enterprise and Metro

Example

```
iss(config-router)# redistribute static
```

☞

- OSPFv3 routing protocol should be enabled, before executing this command
- To configure Redistribution of routes from other protocols, the following steps must be performed.
  1. Configure the router as ASBR.
  2. Configure redistribution of routes from particular protocol.
- The above order must be maintained and ASBR setting must be done before enabling redistribution.

Related Commands

- **ipv6 router ospf** - Enables the OSPFv3 routing protocol
- **ASBR Router** – Configures the router as an ASBR
- **show ipv6 ospf – General Information** – Displays general information about the OSPFv3 routing process

35.15 distribute-list route-map in

This command enables inbound filtering for routes. The no form of the command disables inbound filtering for the routes.

```
distribute-list route-map <name(1-20)> in
```

```
no distribute-list route-map <name(1-20)> in
```

Syntax Description	**name**	-	Name of the Route Map for which inbound filtering should be enabled. This value is a string of size 20.
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Example	`iss(config-router)# distribute-list route-map rmap-test in`		

☞
- OSPFv3 routing protocol should be enabled, before executing this command.
- Only one route map can be set for inbound routes. Another route map can be assigned, only if the already assigned route map is disabled.

Related Commands

- **`ipv6 router ospf`** - Enables the OSPFv3 routing protocol
- **`show running-config ospf3`** - Displays the current operating configuration in the system.

35.16 passive-interface

This command sets the global default passive interface status. All the interfaces created after executing this command become passive interfaces. The no form of the command resets the global default passive interface status. All the interfaces created after executing this command become non-passive interfaces.

`passive-interface`

`no passive-interface`

Mode Router Configuration Mode

Package Enterprise and Metro

Defaults Disabled

Example `iss(config-router)# passive-interface`

Related Command	**`show ipv6 ospf - General Information`** – Displays general information about the OSPFv3 routing process

35.17 route-calculation staggering

This command enables OSPFv3 route calculation staggering and also sets the staggering interval to the last configured value. This feature staggers the OSPFV3 route calculation at regular intervals for processing neighbor keep alive and other OSPFV3 operations.

The no form of the command disables OSPFv3 route calculation staggering and removes the staggering interval.

`route-calculation staggering`

`no route-calculation staggering`

Mode	Router Configuration Mode
Package	Enterprise and Metro

Defaults OSPFv3 route calculation staggering is enabled

Example
```
iss(config-router)# no route-calculation staggering
```

☞ OSPFv3 routing protocol should be enabled, before executing this command

Related Commands

- **`ipv6 router ospf`** - Enables the OSPFv3 routing protocol
- **`route-calculation staggering-interval`** - Configures the OSPFv3 route calculation staggering interval
- **`show ipv6 ospf – General Information`** – Displays general information about the OSPFv3 routing process

35.18 route-calculation staggering-interval

This command configures the OSPFv3 route calculation staggering interval (in milliseconds). This value represents the time after which the route calculation is suspended for doing other OSPFv3 operations.

`route-calculation staggering-interval <milli-seconds (1000-0x7fffffff)>`

Mode Router Configuration Mode

Package Enterprise and Metro

Defaults 10000 (OSPF route calculation staggering interval is equal to Hello interval)

Example
```
iss(config-router)# route-calculation staggering-interval 2000
```

☞ OSPFv3 routing protocol and OSPv3 route calculation staggering should be enabled, before executing this command

Related Commands

- **`ipv6 router ospf`** - Enables the OSPFv3 routing protocol
- **`route-calculation staggering`** - Enables OSPFv3 route calculation staggering
- **`show ipv6 ospf – General Information`** – Displays general information about the OSPFv3 routing process
- **`show running-config ospf`** - Displays the current operating configuration in the system.

35.19 distance

This command enables the administrative distance (that is, the metric to reach destination) of the routing protocol and sets the administrative distance value. The distance value ranges between 1 and 255.

This distance value will not be used for distribute list. The administrative distance can be enabled for only one route map. The distance should be disabled for the already assigned route map, if distance needs to be enabled for another route map.

The no form of the command disables the administrative distance.

```
distance <1-255> [route-map <name(1-20)>]
```

```
no distance [route-map <name(1-20)>]
```

Syntax Description	**name**	-	Name of the Route Map for which the distance value should be enabled and set. This value is a string of size 20.
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Defaults	110 (Represents OSPF route)		
Example	`iss(config-router)# distance 10 route-map rmap-test`		
☞	OSPFv3 routing protocol should be enabled, before executing this command		
Related Commands	• **ipv6 router ospf –** Enables the OSPFv3 routing protocol • **show running-config ospf3** - Displays the current operating configuration in the system		

35.20 host - metric/area-id

This command configures a host entry with metric and/or area-id. The no form of the command deletes a host entry.

```
host <IPv6-Address> {metric <cost>} [area-id {<AreaID>}]
```

```
no host <IPv6-Address>
```

Syntax Description	**`IPv6-Address`**	-	IPV6 address prefix
	`metric`	-	Metric to be advertised
	`area-id`	-	A 32-bit integer
Mode	Router Configuration Mode		
Package	Enterprise and Metro		
Example	`iss(config-router)# host 3ffe:481d::5 metric 10 area-id 0.0.0.1`		
Related Command	• **`show ipv6 ospf host`** – Displays the Host Table information		

35.21 no area

This command deletes an area and does any one of the following based on the optional parameter.

- coverts stub/nss area to normal area
- deletes virtual link
- deletes stub cost
- delete area-range or summary-prefix.

no area <area-id> [{ stub | nssa | virtual-link <router-id> | default-metric | {range {summary | Type7} | summary-prefix} <IPv6-Prefix> <Prefix-Length>}]

Syntax Description	**area-id**	-	A 32-bit integer
	stub	-	Stub area
	nssa	-	Not So Stubby Area
	virtual-link	-	The Router ID of the virtual neighbor
	default-metric	-	Cost for the default summary route in a stub/NSS area
	range	-	Type-3 or Type-7 or External LSA range
	IPv6-Prefix	-	The IPv6 address prefix of the range
	Prefix-Length	-	The prefix length of the address range
Mode	Router Configuration Mode		
Package	Enterprise and Metro		

Example

```
iss(config-router)# no area 1.1.1.1

iss(config-router)# no area  1.1.1.1 stub

iss(config-router)# no area 1.1.1.1 default-metric

iss(config-router)# no area 1.1.1.1 virtual-link 20.0.0.3

iss(config-router)# no area 1.1.1.1 range summary
3ffe:3010:481d::5  80
```

☞ Before deleting an area, it is necessary to delete all the interfaces attached to that area.

Related Commands

- **show ipv6 ospf areas** – Displays the Area Table
- **show ipv6 ospf – area-range / summary-prefix** – Displays either the list of all area address ranges information or all external summary address configuration information
- **no ipv6 ospf area** – Disables OSPFv3 routing protocol on the interface

35.22 nssaAsbrDfRtTrans

This command enables setting of P bit in the default Type-7 LSA generated by an NSSA internal ASBR. The no form of the command disables setting of P bit in the default Type-7 LSA generated by an NSSA internal ASBR.

nssaAsbrDfRtTrans

no nssaAsbrDfRtTrans

Mode	Router Configuration Mode
Package	Enterprise and Metro
Defaults	Disabled
Example	`iss(config-router)# nssaAsbrDfRtTrans`
Related Commands	• **`show ipv6 ospf - General Information`** – Displays general information about the OSPFv3 routing process

35.23 redist-config

This command configures the information to be applied to routes learnt from RTM. The no form of the command deletes the information applied to routes learnt from RTM.

redist-config <IPv6-Prefix> <Prefix-Length> [metric-value <metric>] [metric-type {asExttype1 | asExttype2}] [tag <tag-value>]

no redist-config <IPv6-Prefix> <Prefix-Length>

Syntax Description	**IPv6-Prefix**	-	The IPv6 address prefix
	Prefix-Length	-	The prefix length of the address
	metric-value	-	The Metric value applied to the route before it is advertised into the OSPFv3 Domain
	metric-type	-	The Metric Type applied to the route before it is advertised into the OSPFv3 Domain
	tag	-	The Tag Type describes whether Tags will be automatically generated or will be manually configured

Mode Router Configuration Mode

Package Enterprise and Metro

Example

```
iss(config-router)# redist-config  3ffe:5000:481d::5  80 metric-value 30 metric-type  asExttype1 tag 12
```

Related Command

- **show ipv6 ospf redist-config** – Displays the configuration information to be applied to the routes learnt from the RTM

35.24 as-external lsdb-limit

This command sets the maximum number of non-default AS-external-LSA entries that can be stored in the link-state database. If the value is -1, then there is no limit.

as-external lsdb-limit <lsdb-limit (-1 – 0x7fffffff)>

Mode	Router Configuration Mode
Package	Enterprise and Metro
Defaults	lsdb-limit - -1
Example	`iss(config-router)# as-external lsdb-limit 10`

☞

- When the number of non-default AS-external-LSAs in a router's link-state database reaches the configured limit, the router enters Overflow- State. The router never holds more than the configured non-default AS-external-LSAs in its database.
- The LSDB limit MUST be set identically in all routers attached to the OSPFv3 backbone and/or any regular OSPFv3 area. (i.e. OSPFv3 stub areas and NSSAs are excluded)

Related Commands

- **`show ipv6 ospf – General Information`** – Displays general information about the OSPFv3 routing process
- **`exit-overflow-interval`** – Sets the number of seconds after which a router will attempt to leave the Overflow State

35.25 exit-overflow-interval

This command sets the number of seconds after which a router will attempt to leave the Overflow State.

exit-overflow-interval <interval>

Mode	Router Configuration Mode
Package	Enterprise and Metro
Defaults	interval - 0
Example	`iss(config-router)# exit-overflow-interval 10`
Related Command	• **show ipv6 ospf - General Information** – Displays general information about the OSPFv3 routing process

35.26 demand-extensions

This command enables routing support for demand routing. The no form of the command disables routing support for demand routing.

`demand-extensions`

`no demand-extensions`

Mode	Router Configuration Mode
Package	Enterprise and Metro
Defaults	Enabled
Example	`iss(config-router)# demand-extensions`
Related Command	• **`show ipv6 ospf - General Information`** – Displays general information about the OSPFv3 routing process

35.27 reference-bandwidth

This command sets the reference bandwidth in kilobits per second for calculating the default interface metrics.

`reference-bandwidth <ref-bw>`

Mode	Router Configuration Mode
Package	Enterprise and Metro
Defaults	ref-bw - 100,000 KBPS
Example	`iss(config-router)# reference-bandwidth 1000000`
Related Command	• **`show ipv6 ospf - General Information`** – Displays general information about the OSPFv3 routing process

35.28 nsf ietf restart-interval

This command enables the graceful restart support and configures the grace interval. The no form of the command disables the graceful restart support and resets the grace interval to default value.

```
nsf ietf [restart-interval <grace period (1-1800)>] [plannedOnly]
```

```
no nsf ietf [restart-interval <integer (1-1800)>]
```

Syntax Description

restart-interval	-	Interval during which the router can reacquire OSPFv3 neighbors that are fully operational prior to the restart This value ranges between 1 and 1800 seconds. This interval is provided as an intimation of the restart period to the neighbors that do not support graceful restart or that are connected using multipoint interfaces.
plannedOnly	-	Supports only the planned restarts (such as restarting a control plane after a planned downtime).

Mode Router Configuration mode

Package Enterprise and Metro

Defaults Graceful restart support is disabled.

restart-interval - 120

Example

```
iss(config-router)# nsf ietf restart-interval 300 plannedOnly
```

☞
- OSPFv3 routing protocol should be enabled, before executing this command
- The entity should save any change made using this command in a non-volatile storage, as the configuration set using this command is persistent.

Related Commands
- **ipv6 router ospf** - Enables the OSPFv3 routing protocol
- **show ipv6 ospf – General Information** – Displays general information about the OSPFv3 routing process

35.29 nsf ietf helper disable

This command disables the helper support. The no form of the command enables the helper support.

nsf ietf helper disable [unknown] [softwareRestart] [swReloadUpgrade] [switchToRedundant]

no nsf ietf helper disable [unknown] [softwareRestart] [swReloadUpgrade] [switchToRedundant]

Syntax Description	**unknown**	-	Disables / enables helper support for restarting of system due to unplanned events (such as restarting after a crash).
	softwareRestart	-	Disables / enables helper support for restarting of system due to restart of software.
	swReloadUpgrade	-	Disables / enables helper support for restarting of system due to reload or upgrade of software.
	switchToRedundant	-	Disables / enables helper support for restarting of system due to switchover to a redundant support processor.

Mode Router Configuration Mode

Package Enterprise and Metro

Defaults Helper support is enabled.

Example

```
iss(config-router)# nsf ietf helper disable
```

☞

- OSPFv3 routing protocol should be enabled, before executing this command

Related Commands

- **ipv6 router ospf** - Enables the OSPFv3 routing protocol
- **nsf ietf helper gracetimelimit** - Configures the helper grace time limit
- **show ipv6 ospf – General Information** – Displays general information about the OSPFv3 routing process

35.30 nsf ietf helper gracetimelimit

This command configures the grace period till which the router acts as Helper. During this period, the router advertises that the restarting router is active and is in FULL state.

The value ranges between 1 and 1800 seconds. The value is provided as an intimation of the restart period to the neighbors that do not support graceful restart or that are connected using multipoint interfaces.

The no form of the command configures the helper grace time limit as zero.

```
nsf ietf helper gracetimelimit <gracelimit period(1-1800)>
```

```
no nsf ietf helper gracetimelimit
```

Mode Router Configuration Mode

Package Enterprise and Metro

Defaults 0

Example

```
iss(config-router)# nsf ietf helper gracetimelimit 150
```

☞

- OSPFv3 routing protocol and OSPFv3 helper support should be enabled, before configuring the helper grace time limit.

Related Commands

- **`ipv6 router ospf`** - Enables the OSPFv3 routing protocol
- **`no nsf ietf helper disable`** - Enables the helper support
- **`show ipv6 ospf neighbor`** – Displays OSPFv3 neighbors information

35.31 nsf ietf helper strict-lsa-checking

This command enables the strict LSA check option in helper. The strict LSA check option allows the helper to terminate the helper mode, once topology change is detected during the graceful restart process.

The no form of the command disables the strict LSA check option in helper.

`nsf ietf helper strict-lsa-checking`

`no nsf ietf helper strict-lsa-checking`

Mode	Router Configuration Mode
Package	Enterprise and Metro
Defaults	Strict LSA check option is disabled in helper.
Example	`iss(config-router)# nsf ietf helper strict-lsa-checking`
☞	• OSPFv3 routing protocol and OSPFv3 helper support should be enabled, before enabling the strict LSA check option in the helper.
Related Commands	• **`ipv6 router ospf`** - Enables the OSPFv3 routing protocol • **`show ipv6 ospf – General Information`** – Displays general information about the OSPFv3 routing process

35.32 nsf ietf grace lsa ack required

This command enables Grace Ack Required state in restarter. The GraceLSAs sent by the router are expected to be acknowledged by peers, if the Grace Ack Required state is enabled.

The no form of the command disables the Grace Ack Required state in restarter.

`nsf ietf grace lsa ack required`

`no nsf ietf grace lsa ack required`

Mode	Router Configuration Mode
Package	Enterprise and Metro
Defaults	Grace Ack Required state is enabled in restarter.
Example	`iss(config-router)# no nsf ietf grace lsa ack required`
☞	• OSPFv3 routing protocol should be enabled, before executing this command • The entity should save any change made using this command in a non-volatile storage, as the configuration set using this command is persistent.
Related Commands	• **`ipv6 router ospf`** - Enables the OSPFv3 routing protocol

35.33 nsf ietf grace lsa retransmit-count

This command configures the maximum number of retransmissions for unacknowledged GraceLSA. This value specifies the number of retransmission of unacknowledged GraceLSAs. This value ranges between 0 and 180.

The no form of the command resets the GraceLSA retransmission count to default value.

nsf ietf grace lsa retransmit-count <retransmit-count (0-180)>

no nsf ietf grace lsa retransmit-count

Mode	Router Configuration Mode
Package	Enterprise and Metro
Defaults	2
Example	`iss(config-router)# nsf ietf grace lsa retransmit-count 100`
☞	OSPFv3 routing protocol should be enabled, before executing this command
Related Commands	• **ipv6 router ospf** - Enables the OSPFv3 routing protocol

35.34 nsf ietf restart-reason

This command configures the reason for restart.

`nsf ietf restart-reason {unknown | softwareRestart | swReloadUpgrade | switchToRedundant}`

Syntax Description	**`unknown`**	-	System restarts due to unplanned events (such as restarting after a crash).
	`softwareRestart`	-	System restarts due to restart of software.
	`swReloadUpgrade`	-	System restarts due to reload or upgrade of software.
	`switchToRedundant`	-	System restarts due to switchover to a redundant support processor.

Mode Router Configuration Mode

Package Enterprise and Metro

Defaults unknown

Example

```
iss(config-router)# nsf ietf restart-reason softwareRestart
```

☞

- OSPFv3 routing protocol should be enabled, before executing this command
- The entity should save any change made using this command in a non-volatile storage, as the configuration set using this command is persistent.

Related Commands

- **`ipv6 router ospf`** - Enables the OSPFv3 routing protocol

35.35 ipv6 ospf area

This command enables OSPFv3 for IPv6 on an interface. The no form of the command disables OSPFv3 routing protocol on the interface.

ipv6 ospf area <IPv4-Address> [instance <instance-id>]

no ipv6 ospf

Syntax Description	**IPv4-Address**	-	A 32-bit integer
	instance-id	-	ID of the OSPFv3 instance to be run over a link. This ID haas local link significance only.

Mode Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package Enterprise and Metro

Defaults OSPv3 routing protocol is disabled

`instance-id` - 0

Example

```
iss(config-if)# ipv6 ospf area  0.0.0.0
```

☞ The no form of the command disables an interface and triggers flushing of self-originated Link Scope LSAs, and deletes the Link Scope LSAs associated with this interface from the Link State Database. If there is a single interface in the associated area, then this command deletes its Area Scope LSAs from the Link State Database.

Related Commands

- **`ipv6 router ospf`** - Enables the OSPFv3 routing protocol
- **`router-id`**– Sets the router-id for the router
- **`show ipv6 ospf – General Information`** – Displays general information about the OSPFv3 routing process
- **`show ipv6 ospf interface`** – Displays the OSPFv3-related interface information
- **`show ipv6 ospf – request/retrans-list`** - Displays the list of all link state advertisements (LSAs) in request-list or in retransmission-list

35.36 ipv6 ospf demand-circuit

This command configures OSPFv3 to treat the interface as an OSPFv3 demand circuit. It indicates whether Demand OSPFv3 procedures (hello suppression to FULL neighbors and setting the DoNotAge flag on propagated LSAs) must be performed on the configured interface. The no form of the command disables the demand circuit on an interface.

`ipv6 ospf demand-circuit`

`no ipv6 ospf demand-circuit`

Mode

Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package

Enterprise and Metro

Defaults

Disabled

Example

```
iss(config-if)# ipv6 ospf demand-circuit
```

☞ The routing support for demand routing must have been enabled (using the demand-extensions command) prior to the execution of this command.

Related Commands

- **`demand-extensions`** – Enables routing support for demand routing
- **`show ipv6 ospf interface`** – Displays the OSPFv3-related interface information

35.37 ipv6 ospf retransmit-interval

This command sets the time between LSA retransmissions for adjacencies belonging to interface. The no form of the command sets the default retransmit interval for an interface.

ipv6 ospf retransmit-interval <interval>

no ipv6 ospf retransmit-interval

Mode Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package Enterprise and Metro

Defaults interval - 5

Example

```
iss(config-if)# ipv6 ospf retransmit-interval 10
```

☞ The retransmit time interval is the number of seconds between the link-state advertisement retransmissions for adjacencies belonging to an interface. The retransmit-interval value is also used while retransmitting database description and link-state request packets.

Related Command

- **show ipv6 ospf interface** – Displays the OSPFv3-related interface information

35.38 ipv6 ospf transmit-delay

This command sets the estimated time taken to transmit LS update packet over a particular interface. The no form of the command sets the default transmit delay for an interface.

ipv6 ospf transmit-delay <1-1800>

no ipv6 ospf transmit-delay

Mode	Interface Configuration Mode This command is applicable only in VLAN Interface Mode.
Package	Enterprise and Metro
Defaults	delay - 1
Example	`iss(config-if)# ipv6 ospf transmit-delay 10`
Related Command	• **show ipv6 ospf interface** – Displays the OSPFv3-related interface information

35.39 ipv6 ospf priority

This command sets the router priority, which helps to determine the Designated Router for this network. The no form of the command sets the default router priority for an interface.

`ipv6 ospf priority <1-255>`

`no ipv6 ospf priority`

Mode	Interface Configuration Mode This command is applicable only in VLAN Interface Mode.
Package	Enterprise and Metro
Defaults	priority - 1
Example	`iss(config-if)# ipv6 ospf priority 7`
☞	A priority value of 0 signifies that the router is not eligible to become the designated router on a particular network.
Related Command	• **`show ipv6 ospf interface`** – Displays the OSPFv3-related interface information

35.40 ipv6 ospf hello-interval

This command specifies the time interval between the OSPFv3 hello packets on a particular interface (the length of time, in seconds, between the Hello packets that the router sends on the interface). The no form of the command sets the default hello interval for an interface.

ipv6 ospf hello-interval <1-65535>

no ipv6 ospf hello-interval

Mode	Interface Configuration Mode This command is applicable only in VLAN Interface Mode.
Package	Enterprise and Metro
Defaults	interval - 10
Example	`iss(config-if)# ipv6 ospf hello-interval 20`
☞	The hello interval value must be same for all routers attached to a common link.
Related Command	• **show ipv6 ospf interface** – Displays the OSPFv3-related interface information

35.41 ipv6 ospf dead-interval

This command configures the router dead interval. It is configured in seconds and indicates the time period for which the router waits for hello packet from the neighbor before declaring this neighbor down. The no form of the command sets the interface dead interval to default value.

ipv6 ospf dead-interval <1-65535>

no ipv6 ospf dead-interval

Mode	Interface Configuration Mode This command is applicable only in VLAN Interface Mode.
Package	Enterprise and Metro
Defaults	interval - 40
Example	`iss(config-if)# ipv6 ospf dead-interval 50`
☞	This value must be a multiple of the Hello interval and must be same for all routers attached to a common link.
Related Command	• **show ipv6 ospf interface** – Displays the OSPFv3-related interface information

35.42 ipv6 ospf poll-interval

This command configures the larger time interval, in seconds, between the Hello packets sent to an inactive non-broadcast multi-access neighbor. The no form of the command sets the default poll interval for an interface.

ipv6 ospf poll-interval <1-65535>

no ipv6 ospf poll-interval

Mode	Interface Configuration Mode This command is applicable only in VLAN Interface Mode.
Package	Enterprise and Metro
Defaults	interval - 120
Example	`iss(config-if)# ipv6 ospf poll-interval 30`
Related Command	• **show ipv6 ospf interface** – Displays the OSPFv3-related interface information

35.43 ipv6 ospf metric

This command explicitly specifies the metric value for sending a packet on an interface. The no form of the command sets the default value for the interface metric.

`ipv6 ospf metric <1-65535>`

`no ipv6 ospf metric`

Mode	Interface Configuration Mode This command is applicable only in VLAN Interface Mode.
Package	Enterprise and Metro
Defaults	metric - 10
Example	`iss(config-if)# ipv6 ospf metric 20`
Related Command	• **`show ipv6 ospf interface`** – Displays the OSPFv3-related interface information

35.44 ipv6 ospf network

This command sets the network type for an interface. The no form of the command sets the default value for the network type.

`ipv6 ospf network { broadcast | non-broadcast | point-to-multipoint | point-to-point }`

`no ipv6 ospf network`

Syntax Description	**`broadcast`**	-	Networks supporting many (more than two) attached routers, together with the capability to address a single physical message to all of the attached routers (broadcast)
	`non-broadcast`	-	Networks supporting many (more than two) routers, but having no broadcast capability
	`point-to-multipoint`	-	Treats the non-broadcast network as a collection of point-to-point links
	`point-to-point`	-	A network that joins a single pair of routers
Mode	Interface Configuration Mode This command is applicable only in VLAN Interface Mode.		

Package Enterprise and Metro

Defaults broadcast

Example

```
iss(config-if)# ipv6 ospf network non-broadcast
```

☞

- If the Interface Network type is NBMA or Point-to-Multipoint, neighbor must be configured.
- When there are few configured neighbors on the interface, then both network type change command and the no form of the command do not succeed.

Related Commands

- **`ipv6 ospf neighbor`** – Configures a neighbor on non-broadcast networks and sets the priority value for the neighbor if specified
- **`show ipv6 ospf interface`** – Displays the OSPFv3-related interface information

35.45 ipv6 ospf neighbor

This command configures a neighbor on non-broadcast networks and sets the priority value for the neighbor if specified. The no form of the command deletes a configured neighbor or sets the default priority value (if the priority option is specified).

```
ipv6 ospf neighbor <IPv6-Address> [priority <1-255>]
```

```
no ipv6 ospf neighbor <IPv6-Address> [priority]
```

Syntax Description

`IPv6-Address`	-	IPv6 Address Prefix
`priority`	-	A number that specifies the router priority

Mode Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package Enterprise and Metro

Defaults priority <Number> - 1

Example

```
iss(config-if)# ipv6 ospf neighbor fe80::220:35ff:fe43:6020
priority  2
```

☞

- In the OSPFv3 protocol packets, the IPv6 address indicates the source address of the neighbor. The Link Local address of the neighbor must be used for this field.
- Neighbors can be configured only in NBMA networks and Point-to-Multipoint networks.

Related Commands

- **`show ipv6 ospf interface`** – Displays the OSPFv3-related interface information
- **`show ipv6 ospf neighbor`** – Displays OSPFv3 neighbors information

35.46 ipv6 ospf passive-interface

This command configures an OSPFv3 interface to be Passive. The execution of the command results in suppressing OSPFv3 protocol packets traffic on this interface. The no form of the command configures an OSPFv3 interface to be non-passive.

`ipv6 ospf passive-interface`

`no ipv6 ospf passive-interface`

Mode

Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package

Enterprise and Metro

Defaults

Disabled

Example

```
iss(config-if)# ipv6 ospf passive-interface
```

Related Command

- **`show ipv6 ospf interface`** – Displays the OSPFv3 related interface information

35.47 ipv6 ospf neighbor probing

This command enables neighbor probing on demand-circuit enabled interface. The no form of the command disables neighbor probing on demand-circuit enabled interface.

`ipv6 ospf neighbor probing`

`no ipv6 ospf neighbor probing`

Mode Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package Enterprise and Metro

Defaults Disabled

Example `iss(config-if)# ipv6 ospf neighbor probing`

Related Command

- **`show ipv6 ospf interface`** – Displays the OSPFv3-related interface information

35.48 ipv6 ospf neighbor-probe retransmit-limit

This command sets the number of consecutive LSA retransmissions before the neighbor is deemed inactive. The no form of the command sets the default neighbor probe retransmission limit.

`ipv6 ospf neighbor-probe retransmit-limit <retrans-limit>`

`no ipv6 ospf neighbor-probe retransmit-limit`

Mode Interface Configuration Mode

This command is applicable only in VLAN Interface Mode.

Package Enterprise and Metro

Defaults	retrans-limit - 10
Example	`iss(config-if)# ipv6 ospf neighbor-probe retransmit-limit 30`
Related Command	• **`show ipv6 ospf interface`** – Displays the OSPFv3-related interface information

35.49 ipv6 ospf neighbor-probe interval

This command sets the number of seconds, that indicates how often neighbor will be probed. The no form of the command sets the default neighbor probe interval.

`ipv6 ospf neighbor-probe interval <interval>`

`no ipv6 ospf neighbor-probe interval`

Mode	Interface Configuration Mode This command is applicable only in VLAN Interface Mode.

Package	Enterprise and Metro
Defaults	interval - 120
Example	`iss(config-if)# ipv6 ospf neighbor-probe interval 200`
Related Command	• **`show ipv6 ospf interface`** – Displays the OSPFv3-related interface information

35.50 debug ipv6 ospf - pkt

This command sets the trace levels. The no form of the command resets the trace levels.

```
debug ipv6 ospf [vrf <contextname>] [pkt ( [{high | low | hex}] [hp] [ddp]
[lrq] [lsu] [lsa] )] [level ([fn_entry] [fn_exit] [critical] [mem_alloc_succ]
[mem_alloc_fail])] [module ( [ppp] [rtm] [nssa] [rt_aggrg] [adj_formation]
[lsdb] [ism] [nsm] [rt_calc] [interface] [config] [restarting-router]
[helper] [redundancy])]
```

```
no debug ipv6 ospf [vrf <contextname>] [ pkt ( [{high | low | hex}] [hp]
[ddp] [lrq] [lsu] [lsa] )] [level ( [fn_entry] [fn_exit] [critical]
```

[mem_alloc_succ] [mem_alloc_fail])] [module ([ppp] [rtm] [nssa] [rt_aggrg] [adj_formation] [lsdb] [ism] [nsm] [rt_calc] [interface] [config] [restarting-router] [helper] [redundancy])]

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	pkt	-	Packet High Level Dump debug messages
	high	-	Packet High Level Dump Trace
	low	-	Packet Low Level Dump Trace
	hex	-	Packet Hex Dump Trace
	hp	-	Hello packet Trace
	ddp	-	DDP packet Trace
	lrq	-	Link State Request Packet Trace
	lsu	-	Link State Update Packet Trace
	lsa	-	Link State Acknowledge Packet Trace
	level	-	Trace Level Debug Messages
	fn_entry	-	Function Entry Trace
	fn_exit	-	Function Exit Trace
	critical	-	Critical Trace
	mem_alloc_succ	-	Memory Allocation Success Trace
	mem_alloc_fail	-	Memory Allocation Failure Trace

module	-	OSPFv3 Module Debug Messages
ppp	-	Protocol Packet Processing Trace
rtm	-	RTM Module Trace
nssa	-	NSSA Trace
rt_aggrg	-	Route Aggregation Trace
adj_formation	-	Adjacency formation Trace
lsdb	-	Link State Database Trace
ism	-	Interface State Machine Trace
nsm	-	Neighbor State Machine Trace
rt_calc	-	Routing Table Calculation Trace
interface	-	Interface Trace
config	-	Configuration Trace
restarting-router	-	Debug messages related to restarting router
helper	-	Debug messages related to router in helper mode
redundancy	-	High redundancy trace.

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults Debugging is disabled

vrf - default

Example

```
iss# debug ipv6 ospf pkt  high  hp  level  fn_entry  module ppp
```

Related Command

- **`ip vrf`** - Creates VRF instance
- **`ipv6 router ospf`** - Enables the OSPFv3 routing protocol
- **`show ipv6 ospf – General Information`** – Displays general information about the OSPFv3 routing process

35.51 show ipv6 ospf interface

This command displays the OSPFv3-related interface information.

```
show ipv6 ospf [vrf <contextname>] interface [ vlan <vlan-id(1-4094)> ]
```

Syntax Description

`vrf`[6] - Name of the VRF instance. This value is a string of size 32.

vlan - VLAN Identifier. This value ranges between 1 and 4094.

Mode User/Privileged EXEC Mode

Package Enterprise and Metro

Defaults vrf - default

Example

```
iss# show ipv6 ospf interface

Interface Name: Slot0/2     Interface Id: 2     Area Id: 0.0.0.1
Local Address: fe80::211:22ff:fe33:4421         Router Id:
11.0.0.1
Network Type: PTOP          Cost: 2             State: PTOP
Designated Router Id: 0.0.0.0       local address: (null)
Backup Designated Router Id: 0.0.0.0       local address: (null)
Transmit Delay: 1 sec        Priority: 1         IfOptions: 0x0
Timer intervals configured:
Hello: 10, Dead: 40, Retransmit: 5, Poll: 120
Demand Circuit: Disable            Neighbor Probing: Disable
Nbr Probe Retrans Limit: 10        Nbr Probe Interval: 120
Hello due in 4 sec
Neighbor Count is: 1
Adjacent with neighbor 11.0.0.2

Interface Name: Slot0/4     Interface Id: 4     Area Id: 0.0.0.1
Local Address: fe80::211:22ff:fe33:4422         Router Id:
11.0.0.2
Network Type: PTOP          Cost: 2             State: PTOP
Designated Router Id: 0.0.0.0       local address: (null)
Backup Designated Router Id: 0.0.0.0       local address: (null)
Transmit Delay: 1 sec        Priority: 1         IfOptions: 0x0
Timer intervals configured:
Hello: 10, Dead: 40, Retransmit: 5, Poll: 120
Demand Circuit: Disable            Neighbor Probing: Disable
Nbr Probe Retrans Limit: 10        Nbr Probe Interval: 120
Hello due in 6 sec
Neighbor Count is: 1
Adjacent with neighbor 11.0.0.1
```

Related Commands

- **area – virtual-link** – Sets the Virtual Link between Areas
- **ipv6 ospf area** – Enables OSPFv3 for IPv6 on an interface
- **ipv6 ospf demand-circuit** – Configures OSPFv3 to treat the interface as an OSPFV3 demand circuit
- **ipv6 ospf retransmit-interval** – Sets the time between LSA retransmissions for adjacencies belonging to an interface
- **ipv6 ospf transmit-delay** – Sets the estimated time taken to transmit LS update packet over a particular interface
- **ipv6 ospf priority** – Sets the router priority, which helps to determine the

Designated Router for this network

- **ipv6 ospf hello-interval** – Specifies the time interval between the OSPFv3 hello packets on a particular interface
- **ipv6 ospf dead-interval** – Configures the router dead interval
- **ipv6 ospf poll-interval** – Configures the larger time interval, in seconds, between the Hello packets sent to an inactive non-broadcast multi-access neighbor
- **ipv6 ospf metric** – Specifies the metric value for sending a packet on an interface
- **ipv6 ospf network** – Sets the network type for an interface
- **ipv6 ospf neighbor** – Configures a neighbor on non-broadcast networks and sets the priority value for the neighbor if specified
- **ipv6 ospf passive-interface** – Configures an OSPFv3 interface to be Passive
- **ipv6 ospf neighbor probing** – Enables neighbor probing on demand-circuit enabled interface
- **ipv6 ospf neighbor-probe retransmit-limit** – Sets the number of consecutive LSA retransmissions before the neighbor is deemed inactive
- **ipv6 ospf neighbor-probe interval** – Sets the number of seconds, that indicates how often neighbor will be probed

35.52 show ipv6 ospf neighbor

This command displays OSPFv3 neighbor information.

```
show ipv6 ospf [vrf <contextname>] neighbor [ <Neighbor-RouterID> ]
```

Syntax Description

vrf[6]	-	Name of the VRF instance. This value is a string of size 32.
Neighbor-RouterID	-	Router ID of the neighbor whose information should be displayed.

Mode User/Privileged EXEC Mode

Package Enterprise and Metro

Defaults vrf - default

Example

```
iss# show ipv6 ospf neighbor

ID          Pri  State      DeadTime  Address
Helper         HelperAge    HelperExitReason
20.0.0.3    1   FULL/BACKUP  35     fe80::203:2ff:fe03:401
Not Helping       0           0
```

Related Command

- **ipv6 ospf neighbor** – Configures a neighbor on non-broadcast networks and sets the priority value for the neighbor if specified
- **nsf ietf helper gracetimelimit** - Configures the helper grace time limit

35.53 show ipv6 ospf - request/retrans-list

This command displays the list of all link state advertisements (LSAs) in request-list or in retransmission-list.

show ipv6 ospf [vrf <contextname>] { request-list | retrans-list } [<Neighbor-RouterID>]

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	request-list	-	The list of Link State Advertisements for which the neighbor has more up-to-date instances.
	retrans-list	-	The list of Link State Advertisements that have been sent but not acknowledged.
	Neighbor-RouterID	-	Neighbor router ID
Mode	User/Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show ipv6 ospf retrans-list

  Vrf  switch1

NeighborId: 11.0.0.2     Nbr Address: fe80::211:22ff:fe33:4422
Type      LsId       AdvRtr     SeqNo         Age     Checksum
0x2009    11.0.0.1   11.0.0.1   0x3000080     0       0xc7f5

  Vrf  switch2

NeighborId: 11.0.0.1     Nbr Address: fe80::211:22ff:fe33:4421
Type      LsId       AdvRtr     SeqNo         Age     Checksum
0x2001    11.0.0.2   11.0.0.2   0x2000080     0       0xebf3
```

Related Command

- **ipv6 router ospf** - Enables the OSPFv3 routing protocol
- **router-id** – Sets the router-id for the router
- **ipv6 ospf area** – Enables OSPFv3 for IPv6 on an interface

35.54 show ipv6 ospf virtual-links

This command displays the parameters and the current state of OSPFv3 virtual links.

show ipv6 ospf [vrf <contextname>] virtual-links

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	User/Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show ipv6 ospf virtual-links

Vrf switch3

Interface State: DOWN, Neighbor State: DOWN
Transit Area: 0.0.0.2, Virtual Neighbor: 11.0.0.8
Intervals Configured for the Virtual Interface:
Hello: 10, Dead: 60, Transit: 1, Retransmit : 5
```

Related Command

- **area – virtual-link** – Sets the Virtual Link between Areas

35.55 show ipv6 ospf border-routers

This command displays the internal OSPFv3 routing table entries to an ABR/ASBR.

`show ipv6 ospf [vrf <contextname>] border-routers`

Syntax Description	**`vrf`**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	User/Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show ipv6 ospf border-routers

  Vrf  switch1

Destination  Type              NextHop        Cost    Rt Type
Area Id
11.0.0.2     ABR    fe80::211:22ff:fe33:4422    2     intraArea
0.0.0.1
11.0.0.2     ASBR   fe80::211:22ff:fe33:4422    2     intraArea
0.0.0.1

  Vrf  switch10

Destination  Type              NextHop        Cost    Rt Type
Area Id
11.0.0.11    ABR    fe80::211:22ff:fe33:443c    5     intraArea
0.0.0.2
11.0.0.11    ASBR   fe80::211:22ff:fe33:443c    5     intraArea
0.0.0.2

  Vrf  switch11

Destination  Type              NextHop        Cost    Rt Type
Area Id
11.0.0.10    ABR    fe80::211:22ff:fe33:442c    6     intraArea
0.0.0.2
11.0.0.10    ASBR   fe80::211:22ff:fe33:442c    6     intraArea
0.0.0.2
```

Related Commands

- **`abr-type`** – Sets the ABR (Area Border Router) type
- **`ASBR Router`** – Configures the router as an ASBR

35.56 show ipv6 ospf - area-range / summary-prefix

This command displays either the list of all area address ranges information or all external summary address configuration information.

show ipv6 ospf [vrf <contextname>] { area-range | summary-prefix }

Syntax Description

vrf[6]	-	Name of the VRF instance. This value is a string of size 32.
area-range	-	Area associated with the OSPFv3 address range
summary-prefix	-	Aggregate addresses for OSPFv3

Mode User/Privileged EXEC Mode

Package Enterprise and Metro

Defaults vrf - default

Example

```
iss# show ipv6 ospf area-range

Ospfv3 Summary Address Configuration Information

 Vrf switch8

Network            PfxLength  LSA Type   Area      Effect        Tag
3ffe:801:481d::      48       Summary   0.0.0.0   advertise      0


iss# show ipv6 ospf summary-prefix

Ospfv3 External Summary AddressConfiguration Information

 Vrf switch3

Prefix              PfxLength   AreaId    Effect      TranslationState
3ffe::172:100:0:0     88        0.0.0.1   advertise      enabled
3ffe::172:200:0:0     88        0.0.0.4   advertise      enabled
```

Related Commands

- **area – range** – Creates the Internal Aggregation Address Range
- **area – summary-prefix** – Enables route aggregation/filtering while importing routes in the OSPFv3 domain
- **no area –** Deletes an area

35.57 show ipv6 ospf - General Information

This command displays general information about OSPFv3 routing process.

show ipv6 ospf [vrf <contextname>]

Syntax Description

vrf[6]	-	Name of the VRF instance. This value is a string of size 32.

Mode User/Privileged EXEC Mode

Package Enterprise and Metro

Defaults

vrf	-	default

Example

```
iss# show ipv6 ospf

Router Id: 20.0.0.2            ABR Type:  Standard ABR
 SPF schedule delay: 5 secs  Hold time between two SPFs: 10 secs
 Exit Overflow Interval: 0   Ref BW: 100000   Ext Lsdb Limit: -1
 Trace Value: 0x00000800    As Scope Lsa: 0   Checksum Sum: 0x0
 Demand Circuit: Enable             Passive Interface: Disable
 Nssa Asbr Default Route Translation: Disable
 Autonomous System Boundary Router
 Number of Areas in this router  1
 Route calculation staggering is enabled
 Route calculation staggering interval is 10 seconds
 IETF Non-Stop Forwarding enabled
    restart-interval limit: 100 sec
    restart exit reason: none
 IETF NSF helper support enabled
            Area      0.0.0.0
    Number of interfaces in this area is  1
    Number of Area Scope Lsa: 4  Checksum Sum: 0x257bb
    Number of Indication Lsa: 0  SPF algorithm executed: 2 times
```

Related Commands

- **router-id - IPv4-Address** – Sets a fixed router ID
- **timers spf** – Configures the delay time and the hold time between two consecutive SPF calculations
- **abr-type** – Sets the ABR (Area Border Router) type
- **ASBR Router** – Configures the router as an ASBR
- **passive-interface** – Sets the global default passive interface status
- **route-calculation staggering** - Enables OSPFv3 route calculation staggering
- **route-calculation staggering-interval** - Configures the OSPFv3

route calculation staggering interval

- **nssaAsbrDfRtTrans** – Enables setting of P bit in the default Type-7 LSA generated by an NSSA internal ASBR
- **as-external lsdb-limit** – Sets the maximum number of non-default AS-external-LSAs entries that can be stored in the link-state database
- **exit-overflow-interval** – Sets the number of seconds after which a router will attempt to leave the Overflow State
- **demand-extensions** – Enables routing support for demand routing
- **reference-bandwidth** – Sets the reference bandwidth in kilobits per second for calculating the default interface metrics
- **nsf ietf restart-interval** - Enables the graceful restart support and configures grace interval
- **nsf ietf helper disable** - Disables the helper support
- **nsf ietf helper strict-lsa-checking** - Enables the strict LSA check option in helper
- **ipv6 ospf area** – Enables OSPFv3 for IPv6 on an interface
- **debug ipv6 ospf - pkt** – Sets the trace levels

35.58 show ipv6 ospf - LSA Database

This command displays the LSA information.

```
show ipv6 ospf [vrf <contextname>] [area <AreaID>] database
[{router|network|as-external|inter-prefix|inter-router|intra-
prefix|link|nssa}] [{detail|HEX}]
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	area	-	A 32-bit integer
	database	-	Displays the number of each type of LSA for each area in the database
	router	-	Router LSAs
	network	-	Network LSAs
	as-external	-	AS-External LSAs
	inter-prefix	-	Inter-prefix LSAs
	inter-router	-	Inter-router LSAs
	intra-prefix	-	Intra-prefix LSAs
	link	-	Link State LSAs
	nssa	-	NSSA LSAs
	detail	-	Displays the LSAs information in detail
	HEX	-	Displays the LSAs information in hexadecimal format

Mode User/Privileged EXEC Mode

Package Enterprise and Metro

Defaults vrf - default

Example

```
iss# show ipv6 ospf database

  Vrf  switch1

AreaId           RtrId            LsaType   Age   Seq#
Checksum
0.0.0.1          11.0.0.1         0x0008    0     0x80000002
0xe9d0
0.0.0.1          11.0.0.2         0x0008    8     0x80000002
0xe5d0
0.0.0.1          11.0.0.1         0x2001    0     0x80000001
0x23bc
0.0.0.1          11.0.0.2         0x2001    8     0x80000003
0x4d6

  Vrf  switch2

AreaId           RtrId            LsaType   Age   Seq#
Checksum
0.0.0.1          11.0.0.1         0x0008    9     0x80000002
0xe9d0
0.0.0.1          11.0.0.2         0x0008    0     0x80000002
0xe5d0
3.3.3.3          11.0.0.2         0x0008    0     0x80000002
0x613e
0.0.0.1          11.0.0.1         0x2001    3     0x80000001
0x23bc
0.0.0.1          11.0.0.2         0x2001    0     0x80000003
0x4d6
3.3.3.3          11.0.0.2         0x2001    0     0x80000001
0xac4f
3.3.3.3          11.0.0.2         0x2007    0     0x80000002
0x428

  Vrf  switch3
AreaId           RtrId            LsaType   Age   Seq#
Checksum
3.3.3.3          11.0.0.3         0x0008    0     0x80000002
0x6a6
3.3.3.3          11.0.0.3         0x0008    0     0x80000002
0x5d3e
3.3.3.3          11.0.0.3         0x0008    0     0x80000002
0xb4d5
3.3.3.3          11.0.0.7         0x0008    8     0x80000002
0x5e15
3.3.3.3          11.0.0.3         0x0008    0     0x80000002
```

```
0xc6d
3.3.3.3          11.0.0.7         0x0008    8    0x80000002
0xb5ac
3.3.3.3          11.0.0.3         0x2001    0    0x80000002
0xf07c
3.3.3.3          11.0.0.7         0x2001    3    0x80000002
0x6f02
```

35.59 show ipv6 ospf route

This command displays routes learned by the OSPFv3 process

show ipv6 ospf [vrf <contextname>] route

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	User/Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show ipv6 ospf route

OSPFV3 Process Routing Table

  Vrf   switch3

 Dest/Prefix-Length    NextHop/IfIndex      Cost      Rt.Type      Area
::                                /0
   fe80::211:22ff:fe33:4432       /Slot0/6    3    type1Ext     3.3.3.3

  Vrf   switch7

 Dest/Prefix-Length    NextHop/IfIndex      Cost      Rt.Type      Area
::                                /0
   fe80::211:22ff:fe33:4443      /Slot0/23    7    type1Ext     3.3.3.3

  Vrf   switch8

 Dest/Prefix-Length    NextHop/IfIndex      Cost      Rt.Type      Area
::                               /0
   fe80::211:22ff:fe33:4426      /Slot0/26    9    type1Ext     3.3.3.3
```

Related Commands

- **ipv6 router ospf** – Enables the OSPFv3 routing protocol
- **router-id - IPv4-Address** – Sets a fixed router ID

35.60 show ipv6 ospf areas

This command displays the Area Table.

show ipv6 ospf [vrf <contextname>] areas

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	User/Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show ipv6 ospf areas

  Vrf  switch1

AreaId: 0.0.0.0                 Area Type: NORMAL AREA
Spf Calculation: 0 (times)  Area Bdr Rtr Count: 0
As Bdr Rtr Count: 0             Area Summary: Send Summary
  Vrf  switch1

AreaId: 0.0.0.1                 Area Type: NORMAL AREA
Spf Calculation: 2 (times)  Area Bdr Rtr Count: 1
As Bdr Rtr Count: 1             Area Summary: Send Summary
  Vrf  switch2

AreaId: 0.0.0.0                 Area Type: NORMAL AREA
Spf Calculation: 0 (times)  Area Bdr Rtr Count: 0
As Bdr Rtr Count: 0             Area Summary: Send Summary
  Vrf  switch2

AreaId: 0.0.0.1                 Area Type: NORMAL AREA
Spf Calculation: 2 (times)  Area Bdr Rtr Count: 0
As Bdr Rtr Count: 0             Area Summary: Send Summary
  Vrf  switch2

AreaId: 3.3.3.3                 Area Type: NSS AREA
Spf Calculation: 2 (times)  Area Bdr Rtr Count: 0
As Bdr Rtr Count: 0             Area Summary: Send Summary
```

```
Stub Metric: 0x1                Stub Metric Type: 2
Translator Role: Candidate      Translator State:
Elected/Enabled
Nssa Stability Interval: 40
```

Related Commands

- **`area - stub/nssa`** – Defines an area as a stub area or an NSSA (Not So Stubby Area)
- **`area - stability-interval`** – Configures the stability interval (in seconds) for the NSSA
- **`area - translation-role`** – Configures the translation role for NSSA
- **`no area`** – Deletes an area

35.61 show ipv6 ospf host

This command displays the Host Table information.

show ipv6 ospf [vrf <contextname>] host

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	User/Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show ipv6 ospf host

 OSPFV3  HOST  CONFIGURATION Information
Address                 AreaId            StubMetric
  Vrf  switch1
3ffe:501:481d:f001::1   0.0.0.1             10
  Vrf  switch1
3ffe:601:481d:f001::1   0.0.0.1             10
  Vrf  switch5
3ffe:501:481d:f004::5   0.0.0.0             10
  Vrf  switch6
3ffe:501:481d:f004::6   0.0.0.0             10
```

Related Command

- **host – metric/area-id** – Configures a host entry with metric and/or area-id

35.62 show ipv6 ospf redist-config

This command displays the configuration information to be applied to the routes learnt from the RTM.

show ipv6 ospf [vrf <contextname>] redist-config

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	User/Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show ipv6 ospf redist-config

Ospfv3  External Summary AddressConfiguration Information

  Vrf  switch3

Address Prefix     PfxLength  MetricType Metric  TagType TagValue
3ffe::100:100:0:0    88       asExtType1   10     manual      0
3ffe::100:200:0:0    88       asExtType1   20     manual      0
3ffe::100:300:0:0    88       asExtType1   30     manual      0
```

Related Command

- **redist-config** – Configures the information to be applied to routes learnt from RTM

35.63 show ip6 ospf redundancy

This command displays OSPFv3 redundancy information.

show ip6 ospf redundancy

Mode Privileged EXEC Mode

Example

```
iss# show ip6 ospf redundancy

 OSPFv3 Hot Standby Admin Status : Enabled
 OSPFv3 Hot Standby State        : Active - Standby Up
 OSPFv3 Hot Standby Dynamic Bulk Update Status : Completed
 OSPFv3 Hot Standby Hello Sync count : 0
 OSPFv3 Hot Standby LSA Sync count   : 0
```

Chapter 36

RRD

RRD (Route Redistribution) allows different routing protocols to exchange routing information. Using a routing protocol to advertise routes that are learnt by other means, such as, another routing protocol, static routes, or directly connected routes, is called redistribution. While running a single routing protocol throughout an entire IP internetwork is desirable, multi-protocol routing is widespread for a number of reasons, for example, company mergers, multiple departments managed by multiple network administrators, and multi-vendor environments. If a single routing protocol cannot be used, route redistribution is the only solution. Running different routing protocols is often part of a network design. In any case, having a multiple protocol environment makes redistribution a necessity.

Each routing protocol on a network is separated into an autonomous system (AS). All routers in the same autonomous system (running the same routing protocol) have complete knowledge of the entire AS. A router that connects two (or more) autonomous systems is known as a border router. A border router advertises routing information from one AS to the other AS(s). It is only possible to redistribute routing information for like routed protocols. Different routing protocols have different and often incompatible algorithms and metrics.

The list of CLI commands for the configuration of RRD is as follows:

- as-num
- router-id
- export ospf
- redistribute-policy
- default redistribute-policy
- ipv4 route throttle limit
- show ip protocols
- show redistribute-policy
- show redistribute information

36.1 as-num

This command sets the AS (Autonomous System) number for the router.

```
as-num <value(1-65535)> [vrf <vrf-name>]
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Global Configuration Mode		
Package	Enterprise and Metro		
Defaults	0		
	vrf	-	default
Example	`iss (config)# as-num 5`		

☞
- The RRD Module must be enabled before any routing protocol module is configured.
- VRF instance should be created, before executing this command to configure the AS number of the router in the context.

Related Command
- **ip vrf** - Creates VRF instance
- **show redistribute information** – Displays RTM RRD status for registered protocols

36.2 router-id

This command sets the router ID's address for the router.

```
router-id <addr> [vrf <vrf-name>]
```

Syntax Description	**addr**	-	Address for the router.
	vrf[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Global Configuration Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default
Example	`iss (config)# router-id 12.0.0.1`		

☞
- The router-id must be one of the IP addresses of the IP interfaces configured in the switch.
- VRF instance should be created, before executing this command to configure the router ID in the context.

Related Command
- **ip vrf** - Creates VRF instance
- **router-id** – Sets the router-id for the router
- **show ipv6 ospf – request/retrans-list –** Displays the list of all link state advertisements (LSAs) in request-list or in retransmission-list
- **show redistribute information** – Displays RTM RRD status for registered protocols

36.3 export ospf

This command enables redistribution of OSPF (Open Shortest Path First) area / External routes to the protocol and the no form of the command disables redistribution of OSPF area / External routes to the protocol.

```
export ospf [vrf <vrf-name>] {area-route|external-route} {rip|bgp}
```

```
no export ospf [vrf <vrf-name>] {area-route|external-route} {rip|bgp}
```

Syntax Description

vrf[6]	-	Name of the VRF instance. This value is a string of size 32.
area-route	-	OSPF inter-area and intra-area address/mask pairs to be exported into the routing protocol
external-route	-	OSPF Type 1 and Type 2 External address/mask pairs to be exported into the routing protocol
rip	-	Routing Information Protocol
bgp	-	Border Gateway Protocol

Mode Global Configuration Mode

Package Enterprise and Metro

Defaults vrf - default

Example

```
iss (config)# export ospf  area-route   rip
```

☞

- Router ID must be set for the OSPF, before executing this command.
- VRF instance should be created, before executing this command to configure the OSPF redistribution for the context.

Related Command

- **ip vrf** - Creates VRF instance
- **router-id – Ipv4-Address** – Sets a fixed router ID
- **show ip protocols** – Displays information about the active routing protocol process

36.4 redistribute-policy

This command adds the permit/deny Redistribution Policy and the no form of the command removes the permit/deny Redistribution Policy.

```
redistribute-policy [vrf <vrf-name>] {permit|deny} <DestIp> <DestRange>
{connected|static|rip|ospf|bgp} {rip|bgp|ospf|all}
```

```
no redistribute-policy [vrf <vrf-name>] <DestIp> <DestRange>
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	permit	-	Sets the default rule for all prefixes to 'permit'
	deny	-	Sets the default rule for all prefixes to 'deny'
	DestIp	-	Destination IP address
	DestRange	-	Destination range
	connected		Connected routes
	static	-	Static routes
	rip	-	Routing Information Protocol
	ospf	-	Open Shortest Path First
	bgp	-	Border Gateway Protocol
	all	-	All
Mode	Global Configuration Mode		
Package	Enterprise and Metro		

Defaults permit all

vrf - default

Example

```
iss (config)# redistribute-policy permit 10.0.0.0  0.0.0.255
connected ospf
```

- The addresses learnt within the specified range through the specified routing protocol will be redistributed to other routing protocols, if **`permit`** is used and will not be redistributed to other routing protocols, if **`deny`** is used.
- VRF instance should be created, before executing this command to add redistribution policy for the context.

Related Command

- **`ip vrf`** - Creates VRF instance
- **`show redistribute-policy`** – Displays route redistribution filters

36.5 default redistribute-policy

This command sets the default behavior of RRD Control Table.

`default redistribute-policy [vrf <vrf-name>] {permit | deny}`

Syntax Description	**`vrf`**[6]	-	Name of the VRF instance. This value is a string of size 32.
	`permit`	-	Sets the default rule for all prefixes to 'permit'
	`deny`	-	Sets the default rule for all prefixes to 'deny'
Mode	Global Configuration Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default
Example	`iss (config)# default redistribute-policy permit`		

☞
- VRF instance should be created, before executing this command to configure the default behavior of control table for the context.

Related Command
- **`ip vrf`** - Creates VRF instance
- **`show redistribute-policy`** – Displays route redistribution filters

36.6 ipv4 route throttle limit

This command configures the maximum number of routes processed for every route redistribution proessing performed for the RTM routes populated by the routing protocols.

ipv4 route throttle limit <value>

Syntax Description	**value**	-	Specifies the maximum number of routes. This value ranges between 1 and 4294967295
Mode	Global Configuration Mode		
Package	Enterprise and Metro		
Defaults	1000		
Example	`iss(config)# ipv4 route throttle limit 100`		
Related Command	• **show redistribute information** – Displays RTM RRD status for registered protocols		

36.7 show ip protocols

This command displays information about the active routing protocol process.

show ip protocols [vrf <vrf-name>]

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show ip protocols


Routing Protocol is rip

Vrf  default
 RIP2 security level is Maximum
 Redistributing : rip
 Output Delay is disabled
 Retransmission timeout interval is 5 seconds
 Number of retransmission retries is 36
 Default metric is 3
 Auto-Summarisation of routes is enabled
 Routing for Networks :
 Routing Information Sources :
 Interface Specific Address Summarization :
 Trusted Neighors :


Routing Protocol is "ospf"
Routing Protocol is "ospf"
Vrf  default
  Router ID 12.0.0.1
  Number of areas in this router is 0 . 0 normal 0 stub 0 nssa
  Routing for Networks:
  Passive Interface(s):
  Routing Information Sources:
    Gateway         Distance      Last Update(secs)
 Distance: (default is 121)

Routing Protocol is "ospf"
```

```
Vrf  vr1
  Router ID 14.0.0.1
  Number of areas in this router is 0 . 0 normal 0 stub 0 nssa
  Routing for Networks:
  Passive Interface(s):
  Routing Information Sources:
    Gateway         Distance      Last Update(secs)
 Distance: (default is 121)

Routing Protocol is "bgp 0"
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set

Neighbor(s):
Address

Routing Information sources:
Gateway  Last Update

iss# sh ip protocols vrf vr1

Vrf  vr1
 RIP2 security level is Minimum
 Redistributing : rip, bgp, ospf
 Output Delay is enabled
 Retransmission timeout interval is 1 seconds
 Number of retransmission retries is 1
 Default metric is 1
 Auto-Summarisation of routes is enabled
 Routing for Networks :
 Routing Information Sources :
 Interface Specific Address Summarization :

Routing Protocol is "ospf"
Vrf  vr1
  Router ID 14.0.0.1
  Number of areas in this router is 0 . 0 normal 0 stub 0 nssa
  Routing for Networks:
  Passive Interface(s):
  Routing Information Sources:
    Gateway         Distance      Last Update(secs)
 Distance: (default is 121)

Routing Protocol is "bgp 0"
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set

Neighbor(s):
Address

Routing Information sources:
Gateway  Last Update
```

☞ The information displayed by this command is useful in debugging routing operations.

Related Command

- **`export ospf`** – Enables redistribution of Ospf area/External routes to protocol

36.8 show redistribute-policy

This command displays route redistribution filters.

`show redistribute-policy [vrf <vrf-name>]`

Syntax Description

vrf[6]	-	Name of the VRF instance. This value is a string of size 32.

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults vrf - default

Example

```
iss# show redistribute-policy

VRF  Name:  default
Destination   Range             SrcProto  DestProto       Flag
-----------   -----             --------  -----------     ----
0.0.0.0       255.255.255.255   none      others          Allow

VRF  Name:  vr1
Destination   Range             SrcProto  DestProto       Flag
-----------   -----             --------  -----------     ----
0.0.0.0       255.255.255.255   none      others          Allow

iss# sh redistribute-policy vrf default

VRF  Name:  default
Destination   Range            SrcProto  DestProto       Flag
-----------   -----            --------  -----------     ----
0.0.0.0       255.255.255.255  none      others          Allow
```

Related Commands

- **`redistribute-policy`** – Adds the permit/Deny Redistribution Policy
- **`default redistribute-policy`** – Sets the default behavior of RRD Control Table

36.9 show redistribute information

This command displays RTM (Route Table Manager) RRD status for registered protocols.

show redistribute information [vrf <vrf-name>]

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show redistribute information

Current Throttle Limit:  1000

VRF  Name:  default
Router ID is 0.0.0.0
AS Number is 0
Current State is disabled

ProtoName    OspfAreaRoutes    OspfExtRoutes
---------    --------------    -------------
local        Disable           Disable
static       Disable           Disable
rip          Enable            Enable
bgp          Enable            Enable


VRF  Name:  vr1
Router ID is 0.0.0.0
AS Number is 0
Current State is disabled

ProtoName    OspfAreaRoutes    OspfExtRoutes
---------    --------------    -------------
local        Disable           Disable
static       Disable           Disable
```

```
iss# sh redistribute information vrf vr1

Current Throttle Limit:  1000

VRF  Name:  vr1
Router ID is 0.0.0.0
AS Number is 0
Current State is disabled

ProtoName    OspfAreaRoutes    OspfExtRoutes
---------    --------------    -------------
other        Disable           Disable
local        Disable           Disable
static       Disable           Disable
```

Related Commands

- **`as-num`** – Sets the AS (Autonomous System) number for the router
- **`router-id`** – Sets the router-id for the router
- **`ipv4 route throttle limit`** - Configures the maximum number of routes processed for every route redistribution proessing performed for the RTM routes populated by the routing protocols

Chapter 37

RRD6

RRD6 (Route Redistribution) allows different routing protocols to exchange IPv6 routing information.[11]

The list of CLI commands for the configuration of RRD6 is as follows:

- export ospfv3
- redistribute-policy – IPv6
- default redistribute-policy – IPv6
- throt
- show redistribute-policy ipv6
- show redistribute information ipv6

[11] Refer section on RRD (Route Redistribution) in ISS Base CLI User Manual for more details on route redistribution.

37.1 export ospfv3

This command enables redistribution of OSPF area/External routes to the protocol. The no form of the command disables redistribution of OSPF area/External routes to the protocol.

```
export ospfv3 [vrf <vrf-name>] {area-route|external-route} {rip}
```

```
no export ospfv3 [vrf <vrf-name>] {area-route|external-route} {rip}
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	area-route	-	OSPFv3 inter-area and intra-area address/mask pairs to be exported into the routing protocol
	external-route	-	OSPFv3 Type 1 and Type 2 External address/mask pairs to be exported into the routing protocol
	rip	-	Routing Information Protocol
Mode	Global Configuration Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default
Example	`iss(config)# export ospfv3 area-route rip`		

☞ **Related Command**

- VRF instance should be created, before executing this command to configure the OSPF routes redistribution for the context.
- **ip vrf** - Creates VRF instance
- **show redistribute information ipv6** – Displays the RTM6 RRD status for registered protocols

37.2 redistribute-policy – IPv6

This command adds the IPv6 permit/deny Redistribution Policy. The no form of the command removes the IPv6 permit/deny Redistribution Policy.

```
redistribute-policy [vrf <vrf-name>] {ipv6} {permit|deny} <DestIp> <DestRange>
{static|local|rip|ospf} {rip|ospf|all}
```

```
no redistribute-policy [vrf <vrf-name>] {ipv6} <DestIp> <DestRange>
```

Syntax Description

vrf[6]	-	Name of the VRF instance. This value is a string of size 32.
ipv6	-	IPv6 Protocol
permit	-	Sets the default rule for all prefixes to 'permit'
deny	-	Sets the default rule for all prefixes to 'deny'
DestIp	-	Destination IP address
DestRange	-	Destination range
static	-	Static routes
local	-	Local routes
rip	-	Routing Information Protocol
ospf	-	Open Shortest Path First Protocol
all	-	All

Mode Global Configuration Mode

Package Enterprise and Metro

Defaults permit all

vrf - default

Example

```
iss(config)# redistribute-policy ipv6 permit 4444::1111 64
static ospf
```

☞

- The addresses learnt within the specified range through the specified routing protocol will be redistributed to other routing protocols
- No routes will be exchanged between RTM and the re-distributing protocols
- VRF instance should be created, before executing this command to configure the IPv6 permit/deny Redistribution Policy for the context.

Related Commands

- **`ip vrf`** - Creates VRF instance
- **`show redistribute-policy ipv6`** – Displays route redistribution filters

37.3 default redistribute-policy – IPv6

This command sets the default behavior of the RRD6 Control Table.

```
default redistribute-policy [vrf <vrf-name>] {ipv6} {permit | deny}
```

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
	ipv6	-	IPv6 Protocol
	permit	-	Sets the default rule for all prefixes to 'permit'
	deny	-	Sets the default rule for all prefixes to 'deny'
Mode	Global Configuration Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default
Example	`iss(config)# default redistribute-policy ipv6 permit`		

☞

- VRF instance should be created, before executing this command to configure the default behavior of the control table for the context.

Related Command

- **ip vrf** - Creates VRF instance
- **show redistribute-policy ipv6** – Displays route redistribution filters

37.4 throt

This command configures the maximum number of routes processed for every iteration.

throt <value>

Mode	Global Configuration Mode
Package	Enterprise and Metro
Defaults	1000
Example	`iss(config)# throt 100`

37.5 show redistribute-policy ipv6

This command displays the route redistribution filters

show redistribute-policy ipv6 [vrf <vrf-name>]

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show redistribute-policy ipv6

VRF  Name:  default
Destination   Range          SrcProto   DestProto       Flag
-----------   -----          --------   -----------     ----
::             128             all       others         Allow

VRF  Name:  vr1
Destination   Range          SrcProto    DestProto      Flag
-----------   -----          --------    -----------     ----
::            128              all        others         Allow

iss# show redistribute-policy ipv6 vrf default

VRF  Name:  default
Destination   Range         SrcProto   DestProto         Flag
-----------   -----        --------   -----------       ----
::             128           all       others           Allow
```

Related Commands

- **redistribute-policy-IPv6** – Adds the IPv6 permit/deny Redistribution Policy
- **default redistribute-policy ipv6** – Sets the default behavior of the RRD6 Control Table

37.6 show redistribute information ipv6

This command displays the RTM6 RRD status for registered protocols.

show redistribute information ipv6 [vrf <vrf-name>]

Syntax Description	**vrf**[6]	-	Name of the VRF instance. This value is a string of size 32.
Mode	Privileged EXEC Mode		
Package	Enterprise and Metro		
Defaults	vrf	-	default

Example

```
iss# show redistribute information ipv6

Current Throttle Limit:  1000

VRF  Name:  default
Current State is disabled

ProtoName    OspfAreaRoutes    OspfExtRoutes
---------    --------------    -------------
local        Disable           Disable
static       Disable           Disable
rip          Enable            Enable


VRF  Name:  vr1
Current State is disabled

ProtoName    OspfAreaRoutes    OspfExtRoutes
---------    --------------    -------------
local        Disable           Disable
static       Disable           Disable

iss# show redistribute information ipv6 vrf default

Current Throttle Limit:  1000

VRF  Name:  default
Current State is disabled

ProtoName    OspfAreaRoutes    OspfExtRoutes
---------    --------------    -------------
local        Disable           Disable
static       Disable           Disable
rip          Enable            Enable
```

Related Command

- **`export ospfv3`** – Enables redistribution of OSPF area/External routes to the protocol

Chapter 38

MPLS

MPLS (MultiProtocol Label Switching) blends the intelligence of routing with the performance of switching, providing significant benefits to networks with a native IP architecture as well as those with IP, ATM, or a mixture of other Layer 2 technologies. MPLS is designed to address network problems such as networks-speed, scalability, quality-of-service (QoS), and traffic engineering. MPLS has also become a solution to meet the bandwidth-management and service requirements for next-generation IP-based backbone networks.

In MPLS, data transmission occurs on Label-Switched Paths (LSPs). LSPs are a sequence of labels at each and every node along the path from the source to the destination. There are several label distribution protocols used today, such as Label Distribution Protocol (LDP) or RSVP or piggybacked on routing protocols like border gateway protocol (BGP) and OSPF.

Some of the salient features of MPLS are as follows.

- Efficient Packet Forwarding Mechanism compared to the Native IP Forwarding Architecture.
- Optimizes Transmission resources Differentiated Service Capabilities
- Provides Traffic Engineering support using RSVPTE (Resource Reservation Protocol with Traffic Engineering)

The list of CLI commands for the configuration of static MPLS is as follows:

- mpls ip
- mpls traffi-eng backup-path
- mpls traffic-eng detour-merging
- mpls traffic-eng detour

- mpls traffic-eng fast-reroute revertive local
- mpls traffic-eng cspf time interval
- mpls traffic-eng fast-reroute protection make-after-break
- mpls static binding ipv4
- mpls static crossconnect
- tunnel mode mpls traffic-eng
- tunnel mpls destination
- tunnel mpls traffic-eng bandwidth
- tunnel mpls static
- tunnel mpls traffic-eng fast-reroute
- tunnel mpls traffic-eng priority
- tunnel mpls traffic-eng
- tunnel mpls traffic-eng record-route
- tunnel mpls traffic-eng path-option number
- mpls traffic-eng fast-reroute max-global-revertive-time
- tunnel tsp-hop
- tunnel signalling protocol
- show mpls static binding ipv4
- show mpls static crossconnect
- show mpls traffic-eng tunnels
- show mpls traffic-eng fast-reroute database

The list of CLI commands for the configuration of MPLS is as follows:

- mpls l2transport
- l2 vfi
- vpn
- xconnect vfi
- neighbor
- show mpls l2transport
- show vfi

The list of CLI commands for the configuration of LDP is as follows:

- mpls ldp
- entity
- label allocation
- discovery hello holdtime
- holdtime
- max-hops
- neighbor - targeted
- label distribution
- label retention
- encapsulate
- ldp - interface
- shutdown
- debug mpls ldp advertisements
- debug mpls ldp interface
- debug mpls ldp memory
- debug mpls ldp messages
- debug mpls ldp process
- debug mpls ldp session
- debug mpls ldp timers
- debug mpls ldp dump-messages
- show mpls ldp label range
- show mpls ldp parameters
- show mpls ldp discovery
- show mpls ldp neighbor

The list of CLI commands for the configuration of RSVP is as follows:

- rsvp
- set rsvp
- interface - type
- signalling refresh reduction disable
- router-id
- signalling label range min - max
- signalling - supported
- signalling hello refresh interval
- signalling max
- signalling rmd policy
- signalling refresh interval
- signalling refresh missed
- signalling route change delay
- signalling encapsulation udp
- signalling hello supported
- signalling link attributes
- signaling – mtu, ttl
- mpls traffic-eng fast-reroute
- debug rsvp dump-messages
- debug rsvp hello
- debug rsvp interface
- debug rsvp packet
- debug rsvp path
- debug rsvp process
- debug rsvp resv
- show rsvp counters messages
- show rsvp hello instance
- show rsvp neighbor
- show rsvp request

38.1 mpls ip

This command enables MPLS on the specified interface and the no form of the command disables MPLS on the specified interface.

`mpls ip`

`no mpls ip`

Mode	Interface Configuration Mode
Package	Enterprise and Metro
Example	`iss(config-if)# mpls ip`
☞	• MPLS can be enabled only on L3 interfaces[12].
Related Command	• **`show mpls traffic-eng tunnels`** - Displays MPLS tunnel information

[12] L3 interface may be a VLAN interface or a router port.

38.2 mpls traffi-eng backup-path

This command configures the backup tunnel and the no form of the command destroys the backup tunnel.

mpls traffi-eng backup-path <tnl-no (1-100)>

no mpls traffi-eng backup-path <tnl-no (1-100)>

Syntax Description	**tnl-no**	- Tunnel number
Mode	Interface Configuration Mode	
Package	Enterprise and Metro	
Example	`iss(config-if)# mpls traffi-eng backup-path tnl-no 24`	
Related Command	• **show mpls traffic-eng tunnels** - Displays MPLS tunnel information	

38.3 mpls traffic-eng detour-merging

This command configures to enable or disable detour merging.

mpls traffic-eng detour-merging {enable | disable}

Mode	Global Configuration Mode
Package	Enterprise and Metro
Default	enable
Example	`iss(config)# mpls traffic-eng detour-merging disable`

38.4 mpls traffic-eng detour

This command configures to enable or disable the detour support.

`mpls traffic-eng detour {enable | disable}`

Mode	Global Configuration Mode
Package	Enterprise and Metro
Default	enable
Example	`iss(config)# mpls traffic-eng detour disable`

38.5 mpls traffic-eng fast-reroute revertive local

This command configures to enable local revertive behavior. The no form of the command configures to enable global revertive behavior.

mpls traffic-eng fast-reroute revertive local

no mpls traffic-eng fast-reroute revertive local

Mode Global Configuration Mode

Package Enterprise and Metro

Example

```
iss(config)# mpls traffic-eng fast-reroute revertive local
```

38.6 mpls traffic-eng cspf time interval

This command configures the CSPF time interval and retry count. The no form of the command configures default CSPF time interval and retry count.

mpls traffic-eng cspf time-interval <10-100> retry-count <1-10>

no mpls traffic-eng cspf time-interval

Syntax Description	**retry count**	-	Number of times, the CSPF computation to be performed
Mode	Global Configuration Mode		
Package	Enterprise and Metro		
Default	**retry-count**	-	10
Example	`iss(config)# mpls traffic-eng cspf time-interval 15 retry-count 5`		

38.7 mpls traffic-eng fast-reroute protection make-after-break

This command configures the make after break enable or disable.

mpls traffic-eng fast-reroute protection make-after-break {enable | disable}

Mode	Global Configuration Mode
Package	Enterprise and Metro
Default	disable
Example	`iss(config)# mpls traffic-eng fast-reroute protection make-after-break enable`

38.8 mpls static binding ipv4

This command specifies the static binding of labels to IPv4 prefixes. The no form of the command removes the static binding of labels from IPv4 prefixes.

```
mpls static binding ipv4 <prefix> <mask> {input {vlan <in-vlan-id (1-4094)> |
<in-interface-type> <in-interface-id>} | output <nexthop>} <label (200001-
300000)>
```

```
no mpls static binding ipv4 [<prefix> <mask> {input | output <nexthop>} <label
(200001-300000>]
```

Syntax Description

prefix	-	Destination IPv4 prefix
mask		Destination IPv4 mask
input	-	Configuration for handling incoming MPLS packets
vlan	-	VLAN ID
in-interface-type	-	Incoming L3 Interface type with interface ID
output	-	Configuration for sending outgoing MPLS packets
nexthop	-	Next Hop to reach the destination prefix
label	-	MPLS Label

Mode Global Configuration Mode

Package Enterprise and Metro

Example Example for VLAN interface as Incoming Interface

```
iss(config)# mpls static binding ipv4 50.0.0.0 255.0.0.0 input
vlan 2 200002
```

Example for Router Port as Incoming Interface

```
iss(config)# mpls static binding ipv4 50.0.0.0 255.0.0.0 input
gigabitethernet 0/1 200002
```

- An IPv4 route must exist for the given IPv4 prefix prior to the execution of this command.
- MPLS must be enabled on the interface through which the desination IPv4 prefix is reached (using the command mpls ip)
- Input must be configured at Egress node and output must be configured at Ingress node
- Incoming interface can either be a VLAN interface or a router port.

Related Commands

- **`mpls ip`** – Enables MPLS on the specified interface
- **`show mpls static binding ipv4`** – Displays information about the configured static prefix/label bindings

38.9 mpls static crossconnect

This command configures a crossconnect from an incoming label to go out a specified interface. The no form of the command removes a crossconnect from an incoming label to go out a specified interface.

```
mpls static crossconnect {vlan <in-vlan-id (1-4094)> |<in-interface-type> <in-interface-id>} <inlabel (200001-300000)><nexthop> {<outlabel (200001-300000)> | explicit-null | implicit-null}
```

```
no mpls static crossconnect <inlabel (200001-300000)> <nexthop> {<outlabel (200001-300000)> | explicit-null | implicit-null}
```

Syntax Description

vlan	-	VLAN ID
in-interface-type	-	Incoming L3 Interface type with interface ID
inlabel	-	MPLS Label for the incoming interface
nexthop	-	Next Hop to reach the prefix
outlabel	-	MPLS Label that is to be swapped for the MPLS Label on the incoming interface
explicit-null	-	Special type of MPLS Label where incoming label is swaped with outgoing label of value zero
implicit-null	-	Special type of MPLS Label where swaping occurs with no outgoing label. This is called Penultimate Hop Pop (PHP)

Mode Global Configuration Mode

Package Enterprise and Metro

Example Example for VLAN interface as Incoming Interface

```
iss(config)# mpls static crossconnect vlan 2 200010 35.0.6.223 200011
```

Example for Router Port as Incoming Interface

```
iss(config)# mpls static crossconnect gigabitethernet 0/1 200010
35.0.6.223 200011
```

- An IPv4 route must exist for the given IPv4 prefix prior to the execution of this command.
- MPLS must be enabled on VLAN interfaces (both incoming and outgoing) prior to the execution of this command.
- This command is meant for intermediate switches to perform label switching

Related Commands

- **`mpls ip`** – Enables MPLS on the specified interface
- **`show mpls static crossconnect`** – Displays information about the configured crossconnects

38.10 mpls binding ipv4

This command associates a FTN [Forwarding Equivalence Class (FEC) To Network Mapping] to a tunnel. The no form of the command dissociates the FTN from the tunnel.

```
mpls binding ipv4 <prefix> <mask> te <tunnel-id (1-100)>
```

```
no mpls binding ipv4 <prefix> <mask>
```

Syntax Description

prefix	-	Destination IPv4 prefix
mask	-	Destination IPv4 subnet mask
te	-	Tunnel that is to be associated with the specified FTN

Mode Global Configuration Mode

Package Enterprise and Metro

Example

```
iss(config)# mpls binding ipv4 50.0.0.0 255.0.0.0 te 2
```

☞

- An IPv4 route must exist for the given IPv4 prefix prior to the execution of this command.
- MPLS must be enabled on the interface through which the desination IPv4 prefix is reached (using the command mpls ip).
- MPLS tunnel that is to be associated with the FTN must be created prior to the execution of this command.

Related Command

- **mpls ip** - Enables MPLS on the specified interface

38.11 tunnel mode mpls traffic-eng

This command configures the tunnel mode to be an MPLS traffic-engineered tunnel.

`tunnel mode mpls traffic-eng`

Mode	Interface Configuration Mode
Package	Enterprise and Metro
Example	`iss(config-if)# tunnel mode mpls traffic-eng`
Related Commands	• **`interface mplstunnel`** – Creates or modifies the MPLS Tunnel

38.12 tunnel mpls destination

This command configures MPLS Tunnel endpoints.

`tunnel mpls destination <remote ip> [source <src ip>]`

Syntax Description	**`remote ip`**	-	Tunnel destination
	`source`	-	Tunnel source
	`tunnel-id`	-	Unique Identifier of the tunnel
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Example	`iss(config-if)# tunnel mpls destination 20.0.6.224 source 20.0.6.223`		
Related Commands	• **`interface mplstunnel`** - Changes the mode to the MPLS Tunnel Mode • **`show mpls traffic-eng tunnels`** - Displays the MPLS tunnel information		

38.13 tunnel mpls traffic-eng bandwidth

This command configures the bandwidth associated with the tunnel.

`tunnel mpls traffic-eng bandwidth <value>`

Syntax	**`bandwidth`**	-	Maximum rate in bits/second
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Example	`iss(config-if)# tunnel mpls traffic-eng bandwidth 150`		

☞ • MPLS must be enabled on a VLAN Interface prior to the execution of this command.

Related Commands

- **`mpls ip`** - Enables MPLS on the specified interface
- **`interface mplstunnel`** - Changes the mode to MPLS Tunnel Mode
- **`show mpls traffic-eng tunnels`** - Displays the MPLS tunnel information

38.14 tunnel mpls static

This command configures static labels for the configured mpls tunnel.

```
tunnel mpls static [in-label <label (200001-300000)> {vlan <in-vlan-id (1-4094)> | <in-interface-type> <in-interface-id>}] [out-label <label (200001-300000)> <nexthop>]
```

Syntax Description

in-label	-	MPLS Label for Incoming Interface
vlan	-	VLAN ID range from 1 to 4094
in-interface-type	-	Incoming L3 Interface type with interface ID
out-label	-	MPLS Label for Outgoing L3 Interface
nexthop	-	Nexthop Address

Mode Interface Configuration Mode

Package Enterprise and Metro

Example Example for VLAN interface

```
iss(config-if)# tunnel mpls static in-label 210000 vlan 2
```

Example for Router Port interface

```
iss(config-if)# tunnel mpls static in-label 210000 interface
Slot0/2
```

☞ • MPLS must be enabled on the specifed incoming and outgoing L3 Interfaces prior to the execution of this command.

Related Commands

- **mpls ip** - Enables MPLS on the specified interface
- **interface mplstunnel** - Changes the Mode to the MPLS Tunnel Mode
- **tunnel mpls destination** - Configures an MPLS Tunnel

38.15 tunnel mpls traffic-eng fast-reroute

This command configures the constraint information to enable Fast ReRoute and the no form of the command disables the protection method.

```
tunnel mpls traffic-eng fast-reroute {one-to-one | many-to-one} [bw-prot
[bandwidth]][node-prot][priority <setup-priority (0-7)> [holding-priority (0-
7)]][hop-limit <hop-limit value (1-64)>] [affinity <inc-any-attr> <exc-any-
attr> <inc-all-attr>] [backup-path {sender-template | path-specific}]
```

```
no tunnel mpls traffic-eng fast-reroute
```

Syntax Description	**bw-prot**	-	Bandwidth protection
	node-prot	-	Node protection
	setup-priority	-	Indicates the setup priority of the tunnel
	holding-priority	-	Indicates the holding priority of the tunnel
	hop-limit	-	Maximum number of hops the backup tunnel can traverse.
	inc-any-attr	-	include-any constraint
	exc-any-attr		exclude-any constraint
	inc-all-attr		include-all constraint
	backup-path	-	Indicates the type of back up path
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Defaults	traffic-eng fast-reroute	-	one-to-one
	setup-priority	-	7
	holding-priority	-	0
	hop-limit value	-	32
	inc-any-attr	-	0
	exc-any-attr	-	0
	inc-all-attr	-	0
	backup-path	-	sender-template
Example	`iss(config-if)# tunnel mpls traffic-eng fast-reroute one-to-one`		

Related Commands

- **`mpls ip`** - Enables MPLS on the specified interface
- **`interface mplstunnel`** - Changes the mode to MPLS Tunnel Mode
- **`show mpls traffic-eng tunnels`** - Displays the MPLS tunnel information

38.16 tunnel mpls traffic-eng priority

This command configures priorities of the protected tunnel and the no form of the command disables the priorities of the protected tunnels.

```
tunnel mpls traffic-eng priority <setup_priority (0-7)> [holding-priority (0-7)]
```

```
no tunnel mpls traffic-eng priority
```

Syntax Description

`setup_priority`	-	Indicates the setup priority of the tunnel
`holding-priority`	-	Indicates the holding priority of the tunnel

Mode Interface Configuration Mode

Package Enterprise and Metro

Defaults

setup-priority	-	7
holding-priority	-	0

Example

```
iss(cofig-if)# tunnel mpls traffic-eng priority setup_priority 4
holding-priority 2
```

Related Commands

- **`mpls ip`** - Enables MPLS on the specified interface
- **`interface mplstunnel`** - Changes the mode to MPLS Tunnel Mode
- **`show mpls traffic-eng tunnels`** - Displays the MPLS tunnel information

38.17 tunnel mpls traffic-eng affinity

This command configures the include-any,exclude-any and include-all values of protected tunnel and the no form of the command disables the affinities of the protected tunnel.

tunnel mpls traffic-eng [affinity <inc-any-attr> <exc-any-attr> <inc-all-attr>]

no tunnel mpls traffic-eng affinity

Syntax Description	**inc-any-attr**	-	include-any constraint
	exc-any-attr	-	exclude-any constraint
	inc-all-attr	-	include-all constraint
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Defaults	inc-any-attr	-	0
	exc-any-attr	-	0
	inc-all-attr	-	0
Example	`iss(config-if) tunnel mpls traffic-eng affinity inc-any-attr 14 exc-any-attr 23 inc-all-attr 17`		

Related Commands

- **mpls ip** - Enables MPLS on the specified interface
- **interface mplstunnel** - Changes the mode to MPLS Tunnel Mode
- **show mpls traffic-eng tunnels** - Displays the MPLS tunnel information

38.18 tunnel mpls traffic-eng record-route

This command enables the record-route object and the no form of the command disables the record-route object.

`tunnel mpls traffic-eng record-route`

`no tunnel mpls traffic-eng record-route`

Mode	Interface Configuration Mode
Package	Enterprise and Metro
Example	`iss(config-if) tunnel mpls traffic-eng record-route`
Related Commands	• **`mpls ip`** - Enables MPLS on the specified interface • **`interface mplstunnel`** - Changes the mode to MPLS Tunnel Mode • **`show mpls traffic-eng tunnels`** - Displays the MPLS tunnel information

38.19 tunnel mpls traffic-eng path-option number

This command configures the path-option index and hop list index and the no form of the command deletes the path-option index and hop list index.

tunnel mpls traffic-eng path-option number <path-option-number> explicit identifier <path-number>

no tunnel mpls traffic-eng path-option number <path-option-number> explicit identifier <path-number>

Syntax Description	**path-option-number**	-	Path option number
	explicit identifier	-	Path number
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Example	`iss(config-if)# tunnel mpls traffic-eng path-option number 11 explicit identifier 1`		
Related Commands	• **mpls ip** - Enables MPLS on the specified interface • **interface mplstunnel** - Changes the mode to MPLS Tunnel Mode • **show mpls traffic-eng tunnels** - Displays the MPLS tunnel information		

38.20 mpls traffic-eng fast-reroute max-global-revertive-time

This command configures the global revertive time in milli seconds.

`mpls traffic-eng fast-reroute max-global-revertive-time <0-1200000ms>`

Mode Interface Configuration Mode

Package Enterprise and Metro

Example

```
iss(config-if) mpls traffic-eng fast-reroute max-global-
revertive-time 100ms
```

Related Commands

- **`mpls ip`** - Enables MPLS on the specified interface
- **`interface mplstunnel`** - Changes the mode to MPLS Tunnel Mode
- **`show mpls traffic-eng tunnels`** - Displays the MPLS tunnel information

38.21 tunnel tsp-hop

This command configures the Hop Table and the no form of the command destroys the Hop Table.

```
tunnel tsp-hop <hop-number> <ip_addr> {strict | loose}
```

```
no tunnel tsp-hop <hop-number>
```

Syntax Description	**hop-number**	-	The maximum number of hops that the detour LSP or bypass tunnel may traverse.
	ip_addr	-	IP address
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Defaults	hop-number	-	32
Example	`iss(config-if)# tunnel tsp-hop 1 20.0.6.223 strict`		

Related Commands

- **mpls ip** - Enables MPLS on the specified interface
- **interface mplstunnel** - Changes the mode to MPLS Tunnel Mode
- **show mpls traffic-eng tunnels** - Displays the MPLS tunnel information

38.22 tunnel signalling protocol

This command sets the signaling protocol for the specified tunnel.

`tunnel signalling protocol {none | rsvp | crldp | other}`

Syntax Description	**`none`**	-	No Signaling Protocol
	`rsvp`	-	Resource Reservation Protocol
	`crldp`	-	Constraint based Label Distribution Protocol
	`other`	-	Other Signaling Protocols. This option is not supported for this release.

Mode Interface Configuration Mode

Package Enterprise and Metro

Defaults None

Example

```
iss(config-if)# tunnel signalling protocol rsvp
```

☞ RSVP must be enabled.

Related Commands

- **`set rsvp`** – Enables/disables RSVP protocol under MPLS

- **`show mpls traffic-eng tunnels`** - Displays the MPLS tunnel information

38.23 show mpls static binding ipv4

This command displays information about the configured static prefix/label bindings.

`show mpls static binding ipv4 [prefix {mask-length | mask}] [{local | remote}] [nexthop address]`

Syntax Description	**`prefix`**	-	Destination IPv4 prefix, can be retrieved using mask-length or mask
	`local`		Incoming MPLS Label
	`remote`	-	Outgoing MPLS Label
	`nexthop address`	-	Next Hop Address
Mode	Privileged Exec Mode		
Package	Enterprise and Metro		

Example

```
iss# show mpls static binding ipv4
40.0.0.0/8: Incoming Label: none;
Outgoing Labels:
    20.0.6.224       500
```

```
60.0.0.0/8: Incoming Label: 2000 (in LIB)

    Outgoing Labels: None
```

Related Commands

- **`mpls static binding ipv4`** - Specifies the static binding of labels to IPv4 prefixes

38.24 show mpls static crossconnect

This command displays information about the configured crossconnects.

`show mpls static crossconnect [low label (200001-300000) [high label (200001-300000)]]`

Syntax Description

`low label`	-	Incoming MPLS label
`high label`	-	Outgoing MPLS label

Mode Privileged Exec Mode

Package Enterprise and Metro

Example

```
iss# show mpls static crossconnect

Local        Outgoing        Outgoing         Next Hop
label        label           interface
500          1000             vlan3          35.0.6.223
1500         2000             vlan2          20.0.6.223
```

Related Commands

- **`mpls static crossconnect`** - Configures a crossconnect from an incoming label to go out a specified interface

38.25 show mpls traffic-eng tunnels

This command displays the MPLS tunnel information.

```
show mpls traffic-eng tunnels [ destination <destination-address> | source
<source-address> | role {all | head | middle | tail | remote} | name <tunnel
name> ] [brief] [summary]
```

Syntax Description	**destination**	-	Destination Address of the Tunnel
	source	-	Source Address of the Tunnel
	role	-	Tunnel Role. Can be **all** – All tunnels **head** – Tunnels starting from this node **middle** – Tunnels that are in between the Tunnel source and destination **tail** – Tunnels that ends in this node **remote** – Tunnels that are not starting from this node
	name	-	Tunnel Name

brief	-	Tunnel Information in Brief
summary	-	Summary of Tunnel Information

Mode Privileged Exec Mode

Package Enterprise and Metro

Example

```
iss# show mpls traffic-eng tunnels

Name              : mplsStaticTunnel2
Destination       : 20.0.6.224
Status:            Admin : UP              Oper : UP


Config Parameters:
Bandwidth   : 100 kbps(Global) Priority: 4 4 Affinity: 0
InLabel     : -
OutLabel    : vlan2,500
History     :
Tunnel      :
Time since created     :   00:00:03
Time since path change :  00:00:00

Name            : mplsStaticTunnel3
Destination     : 20.0.6.223
Status:         Admin : UP              Oper : UP


Config Parameters:
Bandwidth    : 100 kbps(Global) Priority: 4 4 Affinity: 0
InLabel      : vlan2,1000
OutLabel     : -
History      :
Tunnel       :
Time since created :   00:00:03
Time since path change :  00:00:00
```

Related Commands

- **mpls ip** - Enables MPLS on the specified interface
- **interface mplstunnel** - Creates or modifies an MPLS Tunnel
- **tunnel mpls destination** - Configures MPLS Tunnel endpoints
- **tunnel mpls traffic-eng bandwidth** - Configures the bandwidth associated with the tunnel

38.26 show mpls traffic-eng fast-reroute database

This command displays the mpls-frr database.

show mpls traffic-eng fast-reroute database [one-to-one] [many-to-one]

Mode Privileged Exec Mode

Package Enterprise and Metro

Example /***output at head end***/

```
iss# sh mpls traffic-eng fast-reroute database
One-to-one Backup : Sender-Template Specific
Detour Support : Active
Detour-Merging : Active
Revertive Mode : Global
CSPF Time Interval : 30000ms
CSPF Retry Count : 10
Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=Softpreempt)
Record Route :  20.0.6.224(flag=1)  35.0.6.225(flag=1)
45.0.6.226(flag=0)

 Many to One fast reroute tunnels information
 Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=Softpreempt)
 Tunnel head end item frr information:
```

```
 Protected tunnel         In-label        Out intf/label     FRR
intf/label      state/oper
 mplsTunnel11 Tun hd         -             vlan2/100001       --
up/up
 Record Route :  20.0.6.224(flag=1,Label=100001)
35.0.6.225(flag=1,Label=100001)  45.0.6.226(flag=0,Label=100001)
55.0.6.227(flag=0,Label=100001)
```

/*output at PLR*/

```
iss# sh mpls traffic-eng fast-reroute database
One-to-one Backup : Sender-Template Specific
PLR Address :  40.0.6.224
PLR Sender Address Type : IPv4
PLR Sender Address : 40.0.6.224
Avoid Node Address : 35.0.6.225
Detour Support : Active
Detour-Merging : Active
Revertive Mode : Global
CSPF Time Interval : 30000ms
CSPF Retry Count : 10
Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=Softpreempt)
Record Route :  35.0.6.225(flag=1)  45.0.6.226(flag=0)

 Many to One fast reroute tunnels information
 Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=Softpreempt)
 LSP midpoint item frr information:
 LSP midpoint     In-label        Out intf/label         FRR
intf/label      state/oper
 mplsTunnel11      100001            vlan3/100001
mplsTunnel20   vlan6/100001      up/up
 Record Route :  35.0.6.225(flag=1,Label=100001)
45.0.6.226(flag=0,Label=100001)  55.0.6.227(flag=0,Label=100001)
```

/*output at PLR+MP*/

```
iss# sh mpls traffic-eng fast-reroute database
One-to-one Backup : Sender-Template Specific
PLR Address :  50.0.6.225
PLR Sender Address Type : IPv4
PLR Sender Address : 50.0.6.225
Avoid Node Address : 45.0.6.226
Detour Support : Active
Detour-Merging : Active
Revertive Mode : Global
CSPF Time Interval : 30000ms
CSPF Retry Count : 10
Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=Softpreempt)
Record Route :  45.0.6.226(flag=0)

 Many to One fast reroute tunnels information
 Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=Softpreempt)
 LSP midpoint item frr information:
```

```
 LSP midpoint     In-label        Out intf/label         FRR
intf/label      state/oper
 mplsTunnel11      100001            vlan4/100001     mplsTunnel4
vlan7/100002      up/up
 Record Route :  45.0.6.226(flag=0,Label=100001)
55.0.6.227(flag=0,Label=100001)
```

/*output at head end*/

```
iss# sh mpls traffic-eng fast-reroute database one-to-one
One-to-one Backup : Sender-Template Specific
Detour Support : Active
Detour-Merging : Active
Revertive Mode : Global
CSPF Time Interval : 30000ms
CSPF Retry Count : 10
Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=Softpreempt)
Record Route :  20.0.6.224(flag=1)  35.0.6.225(flag=1)
45.0.6.226(flag=1)  55.0.6.227(flag=0)
```

/*ouput at PLR*/

```
iss# sh mpls traffic-eng fast-reroute database one-to-one
One-to-one Backup : Sender-Template Specific
PLR Address :  40.0.6.224
PLR Sender Address Type : IPv4
PLR Sender Address : 40.0.6.224
Avoid Node Address : 35.0.6.225
Detour Support : Active
Detour-Merging : Active
Revertive Mode : Global
CSPF Time Interval : 30000ms
CSPF Retry Count : 10
Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=Softpreempt)
Record Route :  35.0.6.225(flag=1)  45.0.6.226(flag=1)
55.0.6.227(flag=0)
```

/*ouput at PLR+MP*/

```
iss# sh mpls traffic-eng fast-reroute database one-to-one
One-to-one Backup : Sender-Template Specific
PLR Address :  50.0.6.225
PLR Sender Address Type : IPv4
PLR Sender Address : 50.0.6.225
Avoid Node Address : 45.0.6.226
Detour Support : Active
Detour-Merging : Active
Revertive Mode : Global
CSPF Time Interval : 30000ms
CSPF Retry Count : 10
Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=Softpreempt)
Record Route :  45.0.6.226(flag=1)  55.0.6.227(flag=0)
```

/*output at tail-end*/

```
iss# sh mpls traffic-eng fast-reroute database one-to-one
One-to-one Backup : Sender-Template Specific
```

```
Detour Support : Active
Detour-Merging : Active
Revertive Mode : Global
CSPF Time Interval : 30000ms
CSPF Retry Count : 10
Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=Softpreempt)
Record Route :
```

/*output at MP*/

```
iss# sh mpls traffic-eng fast-reroute database one-to-one
One-to-one Backup : Sender-Template Specific
PLR Address :  50.0.6.225
PLR Sender Address : 50.0.6.225
Avoid Node Address : 45.0.6.226
Detour Support : Active
Detour-Merging : Active
Revertive Mode : Global
CSPF Time Interval : 30000ms
CSPF Retry Count : 10
Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=Softpreempt)
Record Route :  45.0.6.226(flag=0)  55.0.6.227(flag=0)
```

/*output at head end*/

```
iss# sh mpls traffic-eng fast-reroute database many-to-one
  Many to One fast reroute tunnels information
 Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=Softpreempt)
 Tunnel head end item frr information:
 Protected tunnel         In-label        Out intf/label     FRR
intf/label      state/oper
 mplsTunnel11 Tun hd         -             vlan2/100001       --
up/up
 Record Route :  20.0.6.224(flag=1,Label=100001)
35.0.6.225(flag=0,Label=100001)  45.0.6.226(flag=0,Label=100001)
55.0.6.227(flag=0,Label=100001)
```

/*output at PLR*/

```
iss# sh mpls traffic-eng fast-reroute database many-to-one

 Many to One fast reroute tunnels information
 Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=Softpreempt)
 LSP midpoint item frr information:
 LSP midpoint     In-label        Out intf/label         FRR
intf/label      state/oper
 mplsTunnel11      100001            vlan3/100001
mplsTunnel20   vlan6/100001      up/up
 Record Route :  35.0.6.225(flag=0,Label=100001)
45.0.6.226(flag=0,Label=100001)  55.0.6.227(flag=0,Label=100001)
```

/*output at MP*/

```
iss# sh mpls traffic-eng fast-reroute database many-to-one
```

```
 Many to One fast reroute tunnels information
 Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=Softpreempt)
 LSP midpoint item frr information:
 LSP midpoint     In-label        Out intf/label         FRR
intf/label      state/oper
 mplsTunnel11      100001            vlan4/100001          --
up/up
 Record Route :  45.0.6.226(flag=0,Label=100001)
55.0.6.227(flag=0,Label=100001)
```

/*output at PLR+MP*/

```
iss# sh mpls traffic-eng fast-reroute database many-to-one

 Many to One fast reroute tunnels information
 Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=Softpreempt)
 LSP midpoint item frr information:
 LSP midpoint     In-label        Out intf/label         FRR
intf/label      state/oper
 mplsTunnel11      100001            vlan4/100001     mplsTunnel4
vlan7/100002      up/up
 Record Route :  45.0.6.226(flag=0,Label=100001)
55.0.6.227(flag=0,Label=100001)
```

38.27 mpls l2transport

This command creates a pseudowire to the given destination address. The no form of the command deletes the configured pseudowire.

```
mpls l2transport { manual <destination address> locallabel <InBoundLabel (200001-300000)> remotelabel <OutBoundLabel (200001-300000)> | pwidfec <destination address> pwid <pwid> groupid <groupid> | genfec <destination address>agi <attachment group id> saii <source attachment individual identifier>taii <targer attachment individual identifier> } mplstype {te <tunnel-id> | non-te | vconly} [vlanmode {other | portbased | nochange |changevlan <vlan-id(1-4094)>| addvlan <vlan-id(1-4094)> | removevlan <vlan-id(1-4094)>}] }
```

```
no mpls l2transport { manual <destination address> locallabel <InBoundLabel (200001-300000)> remotelabel <OutBoundLabel (200001-300000)> | pwidfec <destination address> | genfec <destination address> }
```

Syntax Description	`destination address`	-	Pseudo wire end point address
	`pwid`	-	Pseudowire ID
	`groupid`	-	Group ID
	`locallabel`	-	Incoming MPLS Label

remotelabel	-	Outgoing MPLS Label
pwidfec		Pseudo wire ID FEC (Forward Equivalance Class) signaling
genfec		Generic FEC signaling
agi	-	Attachment group ID
saii	-	Source attachment individual identifier
taii	-	Target attachment individual identifier
mplstype	-	MPLS type, can be TE, Non-TE or VCONLY
vlanmode	-	VLAN Mode. This can be **other**, **portbased**, **nochange**, **changevlan**, **addvlan** or **removevlan**.**other** indicates an operation that is not defined **portbased** indicates that the forwarder will forward packets between the port and the psuedowire independent of their structure **nochange** – no change needs to be done in the existing VLAN **changevlan** - indicates that the VLAN field on the PW may be different from the VLAN field on the user's port **addvlan** - indicates that a VLAN field is to be added on the Public Switch Network (PSN) bound direction **removevlan** indicates that the encapsulation on the PW does not include the service delimiting VLAN field

Mode Interface Configuration Mode / Config-VLAN Mode

Package Enterprise and Metro

Default vlanmode - no change

Example

Example for Interface Configuration Mode

```
iss(config)# interface gigabitethernet 0/1

iss(config-if)# mpls l2transport manual 50.0.0.0 locallabel
200005 remotelabel 200006 mplstype non-te
```

Example for Config-VLAN Mode

```
iss(config)#  vlan 4

iss(config-vlan)# mpls l2transport manual 50.0.0.0 locallabel
200007 remotelabel 200008 mplstype non-te
```

☞

- MPLS Tunnel must exist if MPLS type is to be configured as TE.
- An FTN entry must be associated if MPLS type is to be configured as Non-TE.

Related Commands

- **`show mpls l2transport`** - Displays the pseudowire entries
- **`interface mpls tunnel`** - Creates or modifies the MPLS tunnel

38.28 l2 vfi

This command configures a Layer-2 VFI (Virtual Forwarding Interface) in the Virtual Switch. The no form of the command deletes the Layer-2 VFI in the Virtual Switch.

```
l2 vfi <vfi-name (32)> manual
```

```
no l2 vfi <vfi-name (32)> manual
```

Syntax Description	**vfi-name**	- Name of the L2 VFI that is to be configured
Mode	Global Configuration Mode	
Package	Enterprise and Metro	
Example	`iss(config)# l2 vfi PE2-PE1 manual`	
Related Command	• **show vfi** - Displays information about all/specified VFI	

38.29 vpn

This command associates an L2-VPN (Virtual Private Network) to a VFI and the no form of the command dissociates the VPN from a VFI.

`vpn <vpnid>`

`no vpn <vpnid>`

Mode	VFI Configuration Mode
Package	Enterprise and Metro
Example	`iss(config-vfi)# vpn 10`
☞	• The VPLS table gets activated only when it is associated with L2 VPN.
Related Command	• **`l2 vfi`** - Configures a Layer-2 VFI

38.30 xconnect vfi

This command connects an interface (attachment circuit) to a VPLS (Virtual Private LAN service) Instance. The no form of the command disconnects an interface from a VPLS Instance.

xconnect vfi <vfi-name(32)> [vlanmode {other | portbased | nochange | changevlan <vlan-id (1-4094)> | addvlan <vlan-id (1-4094)> | removevlan <vlan-id (1-4094)> }]

no xconnect vfi <vfi-name(32)>

Syntax Description	vfi	-	Name of the Virtual Forwarding Interface.

vlanmode	-	VLAN Mode. This can be other, portbased, nochange, changevlan, addvlan or removevlan **other** indicates an operation that is not defined **portbased** indicates that the forwarder will forward packets between the port and the psuedowire independent of their structure **nochange** – no change needs to be done in the existing VLAN **changevlan** - indicates that the VLAN field on the PW may be different from the VLAN field on the user's port **addvlan** - indicates that a VLAN field is to be added on the Public Switch Network (PSN) bound direction **removevlan** indicates that the encapsulation on the PW does not include the service delimiting VLAN field

Mode Interface Configuration Mode/Config-VLAN Mode

Package Enterprise and Metro

Example Example for Interface Configuration Mode

```
iss(config)# interface gigabitethernet 0/1

iss(config-if)# xconnect vfi PE2-PE1
```

Example for Config-VLAN Mode

```
iss(config)# vlan 4

iss(config-vlan)# xconnect vfi PE2-PE1
```

☞ VFI must be created using the **l2 vfi** command and associated with VPN prior to the execution of this command.

Related Commands

- **l2 vfi** - Configures a Layer-2 VFI
- **show mpls l2transport** - Displays the pseudowire entries

38.31 neighbor

This command creates a Pseudo wire to a particular destination manually or through signaling protocol. The no form of the command deletes the Pseudo wire from the destination.

```
neighbor <peer-address> { manual locallabel <label (200001-300000)>
remotelabel <label (200001-300000)> | pwidfec pwid <pwid> groupid <groupid>|
genfec agi < attachment group id > saii <source attachment individual id> taii
<target attachment individual id>} {encapsulation mpls} [no-split-horizon]
mplstype {te <tunnel-id (1-65535)> | non-te | vconly} [pwtype {ethernet |
ethernettagged}]
```

```
no neighbor <peer-address>
```

Syntax Description	**peer-address**	-	Pseudo wire end point address

	locallabel	- Incoming MPLS Label
	remotelabel	- Outgoing MPLS Label
	pwidfec	- Pseudo wire ID FEC (Forward Equivalance Class) signaling
	pwid	- Pseudo wire ID
	groupid	- Group ID
	genfec	- Generic FEC signaling
	agi	- Attachment Group ID
	saii	- Source Attachment Individual ID
	taii	- Target Attachment Individual ID
	encapsulation mpls	- Configures the encapsulation type as MPLS
	no-split-horizon	- Disables split-horizon[13]
	mplstype	- MPLS Type. This can be TE, Non-TE or VCONLY
	pwtype	- Pseudowire type. This can be ethernet or ethernettagged. ethernet specifies that the pseudowire type is raw mode ethernettagged specifies that the pseudowire type is vlan mode
Mode	VFI Configuration Mode	
Package	Enterprise and Metro	

[13] This is not implemented in the current release of ISS

Example

```
iss(config-vfi)# neighbor 50.0.0.0 manual locallabel 200009
remotelabel 200010 encapsulation mpls no-split-horizon mplstype
non-te
```

☞

- MPLS Tunnel must exist if MPLS Type is to be configured as te.
- An FTN entry must have been associated with the destination address if the MPLS type is to be configured as non-te.
- It is possible to excute this command for different neighbors to create multiple pseudo wires in a single vfi context.

Related Commands

- **`l2 vfi`** - Configures a Layer-2 VFI
- **`show vfi`** - Displays information about All/Specified VFI
- **`show mpls l2transport –`** Displays the pseudowire entries

38.32 show mpls l2transport

This command displays the pseudowire entries.

`show mpls l2transport [{manual | pwid | genfec}] [peer <Destination Address>] {detail|summary}`

Syntax Description

`manual`	-	Manual
`pwid`	-	Pseudo wire ID
`genfec`	-	Generic FEC signaling
`peer`	-	Destination address to which the pseudowire is created

detail	-	Displays the pseudowire information in detail
summary	-	Displays the summary of pseudowire configuration

Mode Privileged Exec Mode

Package Enterprise and Metro

Example

```
iss# show mpls l2transport manual peer 20.0.6.224 detail

Local interface: Gi0/1
 Line protocol: up
 Destination address: 20.0.6.224 status: 1
 Output interface:vlan2
 Preferred path: not configured
 Default path: active
 Tunnel label: 0
Create time:   00:00:00, last status change time:   00:04:01
 MPLS VC labels  : local 200003, remote 200004
 Group ID        : local 0 , remote 0
 MTU             : local 0, remote  0
 Remote interface description :
 VC statistics:
 packet totals: receive 12872016986409, send 13103945220447
 byte   totals: receive 12987981103428, send 13219909337466
 packet drops : 15

iss# show mpls l2transport manual detail
Local intf    Local circuit    Dest address    Status
------------  --------------- --------------- -----------
Gi0/1             1               20.0.6.223      1
```

Related Commands

- **mpls l2transport** - Creates a pseudowire
- **xconnect vfi** - Connects an interface (attachment circuit) to a VPLS (Virtual Private LAN service) Instance
- **neighbor** - Creates a Pseudo wire to a particular destination manually

38.33 show vfi

This command displays information about all/specified VFI.

```
show vfi [name <vfi-name>]
```

Syntax Description	**name**	-	Name of the VFI
Mode	Privileged Exec Mode		
Package	Enterprise and Metro		

Example

```
iss# show vfi

VPLS Name : PE2-PE1     Bridge Domain : 0

        Neighbor     Pw Id     Pw Status
        --------     -----     ---------

        20.0.6.223       0         1

No. of Neighbors in this VSI : 1
```

Related Commands

- **`l2 vfi`** - Configures a Layer-2 VFI
- **`neighbor`** - Creates a Pseudo wire to a particular destination manually

38.34 LDP Signaling

38.34.1 mpls ldp

This command enters the MPLS LDP mode.

`mpls ldp`

Mode Global Configuration Mode

Package Enterprise and Metro

Example

```
iss(config)# mpls ldp
iss(config-mpls-ldp)#
```

38.34.2 entity

This command creates an LDP entity. The no form of the command deletes an LDP entity.

```
entity <entity_index (1-16)>
```

```
no entity <entity_index (1-16)>
```

Syntax Description	`entity_index`	-	Entity Identifier
Mode	MPLS LDP Mode		

Package Enterprise and Metro

Example

```
iss(config-mpls-ldp)# entity 1
iss(config-mpls-ldp-entity-1)#
```

38.34.3 label allocation

This command configures the label allocation method. The no form of the command resets the label allocation method.

`label allocation {ordered | independent}`

`no label allocation`

Syntax Description	**`ordered`**	-	Ordered Label Allocation method

	independent	- Independent Label Allocation method
Mode	MPLS LDP Mode	
Package	Enterprise and Metro	
Defaults	ordered	
Example	`iss(config-mpls-ldp)# label allocation independent`	
Related Commands	• **label retention** – Configures the label retentionmethod • **label distribution** – Configures the label distribution method • **show mpls ldp parameters** - Displays the LDP parameters	

38.34.4 discovery hello holdtime

This command configures the hello holdtime for the discovery process. The no form of the command disables the hello holdtime for the discovery process.

```
discovery hello holdtime <seconds (0-65535)>
```

```
no discovery hello holdtime
```

Syntax Description	**seconds**	- Hello holdtime for the discovery process in seconds
Mode	MPLS LDP Entity Mode	
Package	Enterprise and Metro	
Defaults	15 seconds – Link hello, 45 seconds – Targeted hello	
Example	`iss(config-mpls-ldp-entity-1)# discovery hello holdtime 40`	
Related Commands	• **holdtime** – Configures the keep alive holdtime • **show mpls ldp discovery** – Displays the status information of LDP discovery process • **show mpls ldp parameters** - Displays the LDP parameters	

38.34.5 holdtime

This command configures the keep alive holdtime. The no form of the command disables the keep alive holdtime.

```
holdtime <seconds(1-65535) >
```

```
no holdtime
```

Syntax Description	**seconds**	- keep alive holdtime in seconds
Mode	MPLS LDP Entity Mode	
Package	Enterprise and Metro	
Defaults	40 seconds	
Example	`iss(config-mpls-ldp-entity-1)# holdtime 25`	
Related Commands	• **discovery hello holdtime** - Configures the hello holdtime for the discovery process • **show mpls ldp discovery** – Displays the status information of LDP discovery process • **show mpls ldp parameters** - Displays the LDP parameters	

38.34.6 max-hops

This command configures the maximum number of hops. The no form of the command reverts back to the default maximum number of hops.

max-hops <number(0-255)>

no max-hops

Syntax Description	**number**	-	Maximum number of hops
Mode	MPLS LDP Entity Mode		
Package	Enterprise and Metro		
Defaults	32		
Example	`iss(config-mpls-ldp-entity-1)# max-hops 10`		

38.34.7 neighbor - targeted

This command establishes the targeted session with another LDP. The no form of the command disables the targeted session with another LDP.

neighbor <ip address> targeted

no neighbor <ip address> targeted

Syntax Description	**ip address**	- IP Address of the neighbor for which the targeted session needs to be established
Mode	MPLS LDP Entity Mode	
Package	Enterprise and Metro	
Example	`iss(config-mpls-ldp-entity-1)# neighbor 12.0.0.1 targeted`	
Related Command	• **show mpls ldp neighbor** - Displays the neighbor information	

38.34.8 label distribution

This command configures the label distribution method. The no form of the command disables the label distribution method.

`label distribution {ondemand | unsolicited}`

`no label distribution`

Syntax Description	**`ondemand`**	-	ondemand label distribution method
	`unsolicited`	-	unsolicited label distribution method

Mode MPLS LDP Entity Mode

Package Enterprise and Metro

Defaults ondemand

Example

```
iss(config-mpls-ldp-entity-1)# label distribution unsolicited
```

Related Commands

- **`label allocation`** – Configures the label allocation method
- **`label retention`** – Configures the label retentionmethod
- **`show mpls ldp parameters`** - Displays the LDP parameters

38.34.9 label retention

This command configures the label retention method. The no form of the command resets the label retention method.

`label retention {liberal | conservative}`

`no label retention`

Syntax Description	**`liberal`**	-	Liberal label retention method
	`conservative`	-	Conservative label retention method
Mode	MPLS LDP Entity Mode		
Package	Enterprise and Metro		
Defaults	conservative		
Example	`iss(config-mpls-ldp-entity-1)# label retention conservative`		
Related Commands	• **`label allocation`** – Configures the label allocation method • **`label distribution`** - Configures the label distribution method • **`show mpls ldp parameters`** - Displays the LDP parameters		

38.34.10 encapsulate

This command enables Penultimate Pop option. The no form of the command disables the Penultimate Pop option.

`encapsulate {explicit-null | implicit-null}`

`no encapsulate`

Syntax Description	**`explicit-null`**	-	explicit-null Penultimate Pop option
	`implicit-null`	-	implicit-null Penultimate Pop option
Mode	MPLS LDP Entity Mode		
Package	Enterprise and Metro		
Defaults	Disabled		
Example	`iss(config-mpls-ldp-entity-1)# encapsulate explicit-null`		
Related Command	**`show mpls ldp parameters`** – Displays the LDP parameters		

38.34.11 ldp - interface

This command sets the LDP as the label distribution protocol for interface configuration. The no form of the command disables the LDP as label distribution protocol in the interface.

```
ldp [label range min <min label> max <max label>] interface {vlan <vlan-id (1-4094)> | <interface-type> <interface-id>}
```

```
no ldp [label range min <min label> max <max label>]
```

Syntax Description	**label range min <min label> max <max label>**	-	Label range for - Targeted - 160001- 200000 - Basic – 100 - 100000
	interface	-	Interface string – can be vlan or interface-type
	vlan	-	VLAN ID range from 1 to 4094
	interface-type	-	Type of the interface with interface ID
Mode	MPLS LDP Entity Mode		
Package	Enterprise and Metro		
Defaults	Targeted	-	Min:160001 max: 200000
	Basic	-	Min:100 max:100000

Example

```
iss(config-mpls-ldp-entity)# ldp label range min 160001 max 160004 interface vlan 2
```

☞ • The **interface vlan <vlan-id (1-4094)>** command must be executed prior to the execution of this command. In this mode, the **mpls ip** command must be configured.

Related Commands

- **show mpls ldp label range** - Displays the MPLS label range assigned for each entity

38.34.12 shutdown

This command makes the LDP entity not in service or not ready. The no form of the command makes the LDP entity active.

shutdown

no shutdown

Mode MPLS LDP Entity Mode

Package Enterprise and Metro

Example `iss(config-mpls-ldp-entity)# no shutdown`

38.34.13 debug mpls ldp advertisements

This command enables LDP Advertisement related traces. The no form of the command disables LDP Advertisement related traces.

debug mpls ldp advertisements

no debug mpls ldp advertisements

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults Debugging is disabled by default.

Example

```
iss# debug mpls ldp advertisements
```

Related Commands

- **debug mpls ldp interface** - Enables LDP interface database related traces
- **debug mpls ldp memory –** Enables LDP allocation, lock and freeing of various memory related traces
- **debug mpls ldp messages –** Enables the transmission and receipt of LDP control message related traces
- **debug mpls ldp process –** Enables the process and thread level intialization traces
- **debug mpls ldp session –** Enables session related traces
- **debug mpls ldp timers –** Enables timer event related traces

38.34.14 debug mpls ldp interface

This command enables LDP interface database related traces and the no form of the command disables LDP interface database related traces.

`debug mpls ldp interface`

`no debug mpls ldp interface`

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults Debugging is disabled by default.

Example

```
iss# debug mpls ldp interface
```

Related Commands

- **`debug mpls ldp advertisements`** – Enables LDP Advertisement related traces
- **`debug mpls ldp memory`** – Enables LDP allocation, lock and freeing of various memory related traces
- **`debug mpls ldp messages`** – Enables the transmission and receipt of LDP control message related traces
- **`debug mpls ldp process`** – Enables the process and thread level intialization traces
- **`debug mpls ldp session`** – Enables the session related traces
- **`debug mpls ldp timers`** – Enables the timer event related traces

38.34.15 debug mpls ldp memory

This command enables LDP allocation, lock and freeing of various memory related traces. The no form of the command disables LDP allocation, lock and freeing of various memory related traces.

debug mpls ldp memory

no debug mpls ldp memory

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults Debugging is disabled by default.

Example

```
iss# debug mpls ldp memory
```

Related Commands

- **debug mpls ldp advertisements** – Enables LDP Advertisement related traces
- **debug mpls ldp interface** – Enables LDP interface database related traces
- **debug mpls ldp messages** – Enables the transmission and receipt of LDP control message related traces
- **debug mpls ldp process** – Enables the process and thread level intialization traces
- **debug mpls ldp session** – Enables the session related traces
- **debug mpls ldp timers** – Enables the timer event related traces

38.34.16 debug mpls ldp messages

This command enables the transmission and receipt of LDP control message related traces. The no form of the command disables the transmission and receipt of LDP control message related traces.

`debug mpls ldp messages { sent | received }`

`no debug mpls ldp messages { sent | received }`

Syntax Description	**`sent`**	LDP messages sent
	`received`	LDP messages received
Mode	Privileged EXEC Mode	
Package	Enterprise and Metro	
Defaults	Debugging is disabled by default.	
Example	`iss# debug mpls ldp messages sent`	
Related Commands	• **`debug mpls ldp advertisements`** – Enables LDP Advertisement related traces • **`debug mpls ldp interface`** - Enables LDP interface database related traces • **`debug mpls ldp memory`** – Enables LDP allocation, lock and freeing of various memory related traces • **`debug mpls ldp process`** – Enables the process and thread level intialization traces • **`debug mpls ldp session`** – Enables the session related traces • **`debug mpls ldp timers`** – Enables the timer event related traces	

38.34.17 debug mpls ldp process

This command enables the process and thread level intialization traces. The no form of the command disables the process and thread level intialization traces.

`debug mpls ldp process`

`no debug mpls ldp process`

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults Debugging is disabled by default.

Example

```
iss# debug mpls ldp process
```

Related Commands

- **`debug mpls ldp advertisements`** – Enables LDP Advertisement related traces
- **`debug mpls ldp interface`** - Enables LDP interface database related traces
- **`debug mpls ldp memory`** – Enables LDP allocation, lock and freeing of various memory related traces
- **`debug mpls ldp messages`** – Enables the transmission and receipt of LDP control message related traces
- **`debug mpls ldp session`** – Enables the session related traces
- **`debug mpls ldp timers`** – Enables the timer event related traces

38.34.18 debug mpls ldp session

This command enables the session related traces. The no form of the command disables the session related traces.

`debug mpls ldp session`

`no debug mpls ldp session`

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults Debugging is disabled by default.

Example

```
iss# debug mpls ldp session
```

Related Commands

- **`neighbor – targeted`** - establishes the targeted session with another LDP
- **`holdtime`** - configures the keep alive holdtime
- **`discovery hello holdtime`** - configures the hello holdtime for the discovery process
- **`show mpls ldp neighbor`** - displays the neighbor information

38.34.19 debug mpls ldp timers

This command enables timer event related traces. The no form of the command disables timer event related traces.

`debug mpls ldp timers`

`no debug mpls ldp timers`

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults Debugging is disabled by default

Example `iss# debug mpls ldp timers`

Related Commands

- **`debug mpls ldp advertisements`** – Enables LDP Advertisement related traces
- **`debug mpls ldp interface`** - Enables LDP interface database related traces
- **`debug mpls ldp memory`** – Enables LDP allocation, lock and freeing of various memory related traces
- **`debug mpls ldp messages`** – Enables the transmission and receipt of LDP control message related traces
- **`debug mpls ldp process`** – Enables the process and thread level

intialization traces

- **`debug mpls ldp session`** – Enables the session related traces

38.34.20 debug mpls ldp dump-messages

This command enables dumping traces such as address, hello, initialisation, label request, label mapping, release and withdrawl. The no form of the commands disables the dumping traces.

```
debug mpls ldp dump-messages { address | all | hello | init | keepalive | map
| notif | release | request | withdraw } direction { in | out | both}
```

```
no debug mpls ldp dump-messages [{address | all | hello | init | keepalive |
map | notif | release | request | withdraw}] [direction]
```

Syntax Description	**`address`**	Address Messages
	`all`	All Dumping Messages
	`hello`	Hello Messages
	`init`	Initialization Messages
	`keepalive`	Keep Alive Messages
	`map`	Label Mapping Messages

notif	Notification Messages
release	Label Release Messages
request	Label Request Messages
withdraw	Label Withdrawal Messages
direction	Direction for the transmission of messages. Can be in, out or both

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults all

Debugging is disabled by default.

Example

```
iss# debug mpls ldp dump-messages direction in
```

38.34.21 show mpls ldp label range

This command displays the MPLS label range assigned for each entity.

`show mpls ldp label range`

Mode Privileged Exec Mode

Package Enterprise and Metro

Example

```
iss# show mpls ldp label range

Interface: vlan2
     Entity Index: 1
           Downstream Label Pool
           Label Type: Generic  Min/Max Label: 10100/10200
```

Related Command

- **`ldp - interface`** - Sets the LDP as the label distribution protocol for interface configuration

38.34.22 show mpls ldp parameters

This command displays the LDP parameters like hello hold time, keep alive time, label distribution method, label retention method, label allocation method, etc.

`show mpls ldp parameters`

Mode Privileged Exec Mode

Package Enterprise and Metro

Example

```
iss# show mpls ldp parameters

Ldp Protocol Version: 1
Router Id: 12.0.0.1
Label Allocation Mode: Ordered
Entity Index: 1

        HelloHoldTime: 60 Interval: 12
        KeepAliveTime: 60 Interval: 24
        Label Distribution Mode: On Demand
        Label Retention Mode: Liberal
```

Related Commands

- **`label allocation`** – Configures the label allocation method
- **`discovery hello holdtime`** - Configures the hello holdtime for the discovery process.
- **`holdtime`** – Configures the keep alive holdtime

- **`label distribution`** - Configures the label distribution method.
- **`label retention`** - Configures the label retention method.
- **`encapsulate`** - Enables Penultimate Pop option

38.34.23 show mpls ldp discovery

This command displays the status information of LDP discovery process.

`show mpls ldp discovery [ detail ]`

Syntax Description	**`detail`**	- Detailed status information of LDP discovery process
Mode	Privileged Exec Mode	
Package	Enterprise and Metro	

Example

```
iss# show mpls ldp discovery

Local Ldp Identifier:
    60.0.6.223,1

Discovery Sources:
    Interfaces:
         vlan2:
    Ldp Id: 35.0.6.224 Adjacency Type : Local Peer

iss# show mpls ldp discovery detail
```

```
Local Ldp Identifier:
    60.0.6.223,1

Discovery Sources:
    Interfaces:

              vlan2:
    Ldp Id: 35.0.6.224 Adjacency Type : Local Peer
         Hello Interval: 12 s; Transport Addr: 20.0.6.223
         Peer Hello time : 60 s; Transport Addr: 20.0.6.224
         Proposed local/peer : 60/60 s
```

Related Commands

- **`discovery hello holdtime`** - Configures the hello holdtime for the discovery process
- **`holdtime`** - Configures the keep alive holdtime

38.34.24 show mpls ldp neighbor

This command displays the neighbor information.

`show mpls ldp neighbor [{address <neighbor_address> | interface <interface>}] [detail]`

Syntax Description

`address`	-	IP address of the neighbor
`interface`	-	Interface to which the specified router is connected
`detail`	-	Detailed Neighbor information

Mode Privileged Exec Mode

Package Enterprise and Metro

Example

```
iss# show mpls ldp neighbor

Peer Ldp Id: 35.0.6.224 Local Ldp Id: 60.0.6.223,1
        TCP Connection: 35.0.6.224 - 60.0.6.223
        State: oper; On Demand
        LDP Discovery Sources: vlan2



iss# show mpls ldp neighbor address 35.0.6.224 detail

Peer Ldp Id: 35.0.6.224 Local Ldp Id: 60.0.6.223,1
        TCP Connection: 35.0.6.224 - 60.0.6.223
        State: oper; On Demand
        LDP Discovery Sources: vlan2

              Hello holdtime: 60 s, Interval: 12 s
              Peer Holdtime: 60 s, KA Interval: 0 s
```

Related Commands

- **`neighbor - targeted`** - Establishes the targeted session with another LDP

38.35 RSVP Signaling

38.35.1 rsvp

This command enters the RSVP configuration submode and allows configuration of global RSVP parameters.

`rsvp`

Mode Global Configuration Mode

Package Enterprise and Metro

Example

```
iss(config)# rsvp
iss(config-rsvp)#
```

38.35.2 set rsvp

This command globally enables/disables RSVP protocol under MPLS.

```
set rsvp {enable | disable}
```

Syntax Description	**enable**	-	Enables RSVP protocol under MPLS
	disable	-	Disables RSVP protocol under MPLS
Mode	RSVP Configuration Mode		
Package	Enterprise and Metro		
Defaults	Disable		

Example `iss(config-rsvp)# set rsvp enable`

☞
- The **`router-id`** command must be configured prior to the execution of this command.
- To configure any RSVP parameters, the RSVPmust be disabled.

Related Commands
- **`router-id`** - Specifies the router-id to be the IP address

38.35.3 interface - type

This command selects an interface to configure the RSVP protocol. This command changes the configuration mode to RSVP interface submode within which interface-specific configuration commands can be entered. The no form of the command disables the RSVP protocol on the interface.

```
interface {vlan <vlan-id (1-4094)> | <interface-type> <interface-id>}
```

```
no interface {vlan <vlan-id (1-4094)> | <interface-type> <interface-id>}
```

Syntax Description

`vlan`	-	VLAN Interface
`interface-type`	-	Interface Type

interface-id - Interface Identifier

Mode RSVP Configuration Mode

Package Enterprise and Metro

Example

```
iss(config-rsvp)# interface vlan 1
iss(config-rsvp-if)#
```

☞

- The MPLS must be enabled on the interface.

Related Commands

- **mpls ip** - Enables MPLS on the specified interface
- **show rsvp counters messages** - Displays a historical count of the number of messages RSVP has received and sent on each interface along with a summation

38.35.4 signalling refresh reduction disable

This command disables RSVP refresh reduction capabilities like message-id generation, reliable message delivery, etc. The no form of the command enables RSVP refresh reduction capabilities.

signalling refresh reduction disable

no signalling refresh reduction disable

Mode RSVP Configuration Mode

Package Enterprise and Metro

Defaults Refresh reduction capabilities are disabled.

Example `iss(config-rsvp)# signalling refresh reduction disable`

38.35.5 router-id

This command specifies the RSVP router-id to be the IP address [of the interface].

`router-id {vlan <vlan-id (1-4094)> | <interface-type> <interface-id> | <ip-address>}`

Syntax Description	**`vlan`**	-	VLAN Interface
	`interface-type`	-	Interface Type

interface-id	-	Interface Identifier
ip-address	-	IP address

Mode RSVP Configuration Mode

Package Enterprise and Metro

Example `iss(config-rsvp)# router-id vlan 1`

38.35.6 signalling label range min - max

This command configures the range of local labels available for use on RSVP interfaces. The no form of the command sets the RSVP label space to its default value.

```
signalling label range min <label-id (100001-160000)> max <label-id (100001-160000)>
```

```
no signalling label range
```

Syntax Description	**min <label-id>**	-	Minimum Label range
	max <label-id>	-	Maximum Label range
Mode	RSVP Configuration Mode		
Package	Enterprise and Metro		
Defaults	min	-	100001
	max	-	160000
Example	`iss(config-rsvp)# signalling label range min 100005 max 150000`		

☞ • The maximum min label and maximum max labels are compile time options.

38.35.7 signalling - supported

This command enables the usage of UDP sockets , hello messages and message Identifiers. The no form of the command disables the usage of UDP sockets, hello messages and message Identifiers.

signalling {[socket] [hello] [msg-id]} supported

no signalling {[socket] [hello] [msg-id]} supported

Syntax Description	**socket**	-	RSVP PDUs received/transmitted through raw/UDP sockets
	hello	-	RSVP Hello messages that are enabled globally
	msg-id	-	Message Identifiers - To make the node capable of handling and generating message IDs
Mode	RSVP Configuration Mode		
Package	Enterprise and Metro		
Defaults	None of the options are enabled.		
Example	`iss(config-rsvp)# signalling hello supported`		
Related Commands	• **signalling hello supported** – Enables transmitting of hello packets on this interface • **signalling hello refresh interval** - Sets the hello interval at which RSVP hello messages are sent to each neighbor • **signalling refresh reduction disable** – Disables RSVP refresh reduction capabilities		

38.35.8 signalling hello refresh interval

This command sets the hello interval at which RSVP hello messages are sent to each neighbor. The no form of the command resets the hello interval to its default value.

```
signalling hello refresh interval <seconds (1-30)>
```

```
no signalling hello refresh interval
```

Syntax Description	**seconds**	- RSVP hello interval in seconds sent to each neighbor
Mode	RSVP Configuration Mode	
Package	Enterprise and Metro	
Defaults	5 seconds	
Example	`iss(config-rsvp)# signalling hello refresh interval 10`	
Related Commands	• **signalling – supported** – Enables the usage of UDP sockets , hello messages and message Identifiers • **signalling hello supported** - Enables transmitting of hello packets on this interface	

38.35.9 signalling max

This command sets the maximum number of RSVP tunnels supported, maximum number of explicit hops that can be supported per tunnel (erhops), maximum number of interfaces that supports RSVP in the system and the maximum RSVP neighbors that can be supported by the router. The no form of the command resets the maximum number of tunnels, erhops, RSVP interfaces and neighbors to their default value.

```
signalling max {[tunnels <number (1-65535)>] [erhops <number (1-65535)>]
[interfaces <number (1-65535)>] [neighbors <number (1-65535)>]}
```

```
no signalling max {[tunnels] [erhops] [interfaces] [neighbors]}
```

Syntax Description	**tunnels**	-	Maximum number of RSVP tunnels
	erhops	-	Maximum number of explicit hops that can be supported per tunnel
	interfaces	-	Maximum number of interfaces that supports RSVP in the system
	neighbors	-	Maximum RSVP neighbors that can be supported by the router
Mode	RSVP Configuration Mode		
Package	Enterprise and Metro		
Defaults	Tunnel	-	16
	erhops	-	32
	interfaces	-	16
	neighbors	-	16
Example	`iss(config-rsvp)# signalling max tunnels 100`		

38.35.10 signalling rmd policy

This command specifies the messages for which acknowledgement desired flag needs to be set. The no form of the command disables the acknowledgement desired flag in the messages specified.

```
signalling rmd policy {[pathonly] [resvonly] [patherr] [resverr] [pathtear]
[resvtear] | all}
```

no signalling rmd policy [pathonly] [resvonly] [patherr] [resverr] [pathtear] [resvtear]

Syntax Description	**pathonly**	-	Path messages
	resvonly	-	Reserve messages
	patherr	-	Path error messages
	resverr	-	Reserve error messages
	pathtear	-	Path tear messages
	resvtear	-	Reserve tear messages
	all	-	All messages

Mode RSVP Configuration Mode

Package Enterprise and Metro

Defaults None

Example

```
iss(config-rsvp)# signalling rmd policy resvonly
```

38.35.11 signalling refresh interval

This command sets the frequency with which a router updates the network about the RSVP state of a particular interface. The no form of the command resets the refresh interval to its default value.

signalling refresh interval <milliseconds (0-8640000)>

no signalling refresh interval

Syntax Description	**milliseconds**	-	Refresh interval in milliseconds
Mode	RSVP Interface Configuration Mode		
Package	Enterprise and Metro		
Defaults	30000 milliseconds		
Example	`iss(config-rsvp-if)# signalling refresh interval 1000`		

38.35.12 signalling refresh missed

This command sets the number of successive refresh messages that can be missed before the RSVP deems a state to be expired. The no form of the command resets the maximum refresh misses to its default value.

signalling refresh missed <maxcount (1-8)>

no signalling refresh missed

Syntax Description	**maxcount**	-	Maximum refresh misses count
Mode	RSVP Interface Configuration Mode		
Package	Enterprise and Metro		
Defaults	3		
Example	`iss(config-rsvp-if)# signalling refresh missed 5`		
Related Command	• **signalling refresh interval** - Sets the refresh interval		

38.35.13 signalling route change delay

This command sets the time for local repair if the local protection is enabled for this path. The no form of the command sets the local repair time to its default.

```
signalling route change delay <seconds (0-360000)>
```

```
no signalling route change delay
```

Syntax Description	**seconds**	-	Local repair time in seconds
Mode	RSVP Interface Configuration Mode		
Package	Enterprise and Metro		
Defaults	2 seconds		
Example	`iss(config-rsvp-if)# signalling route change delay 10`		

38.35.14 signalling encapsulation udp

This command forces to use UDP for packet encapsulation. The no form of the command uses UDP packet encapsulation only for UDP neighbors.

signalling encapsulation udp

no signalling encapsulation udp

Mode	RSVP Interface Configuration Mode
Package	Enterprise and Metro
Defaults	By default, it is disabled for all except for UDP neighbors.
Example	`iss(config-rsvp-if)# signalling encapsulation udp`
☞	• The **signaling socket support** must be enabled.
Related Command	• **signalling – supported** - Enables the usage of UDP sockets , hello messages and message Identifiers

38.35.15 signalling hello supported

This command enables transmitting of hello packets on this interface. The no form of the command disables transmitting of hello packets on this interface.

signalling hello supported

no signalling hello supported

Mode	RSVP Interface Configuration Mode
Package	Enterprise and Metro
Defaults	not supported
Example	`iss(config-rsvp-if)# signalling hello supported`
☞	• This command can be enabled only when hello messages are supported globally.
Related Command	• **signalling – supported** - Enables the usage of UDP sockets , hello messages and message Identifiers

38.35.16 signalling link attributes

This command sets path resource affinity validation criteria. The no form of the command sets the transmission path attributes to its default value.

signalling link attributes <number (1-65535)>

no signalling link attributes

Syntax Description	**number**	-	Transmission path attributes value
Mode	RSVP Interface Configuration Mode		
Package	Enterprise and Metro		
Defaults	1		
Example	`iss(config-rsvp-if)# signalling link attributes 1`		

38.35.17 signaling – mtu, ttl

This command sets the Max Transmission Unit (MTU) size and Time To Live (TTL) value for the packets originated from this interface. The no form of the command resets the TTL and MTU values to their defaults.

```
signalling {[mtu <size (1500-4096)>] [ttl <count (1-255)>]}
```

```
no signalling {[mtu] [ttl]}
```

Syntax Description	**mtu**	-	MTU value
	ttl	-	TTL value
Mode	RSVP Interface Configuration Mode		
Package	Enterprise and Metro		
Defaults	mtu	-	1500
	ttl	-	64
Example	`iss(config-rsvp-if)# signaling mtu 2500`		

38.35.18 mpls traffic-eng fast-reroute

This command configures PLR and Avoid node address.

mpls traffic-eng fast-reroute [plr-id <ip address>] [avoid-node-id <ip address>]

Syntax Description	**plr-id**	-	PLR address
	avoid-node-id	-	Avoid node address
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Example	`iss(config-if)# mpls traffic-eng fast-reroute plr-id 10.0.0.2 avoid-node-id 10.0.0.4`		

38.35.19 debug rsvp dump-messages

This command enables printing of RSVP PDUs in selected direction and format. The no form of the command disables the selected attribute of message dumping.

```
debug rsvp dump-messages {all | ack | bundle | confirm | hello | path | perr |
ptear | rerr | resv| rtear | srefresh} {brief | detail} direction {in | out |
both}
```

```
no debug rsvp dump-messages [all | ack | bundle | confirm | hello | path |
perr | ptear | rerr | resv| rtear | srefresh] [level] [direction]
```

Syntax Description

all	-	RSVP messages sent and received
ack	-	Acknowledgement messages send and received
bundle	-	Bundled messages
confirm	-	Confirm messages
hello	-	Incoming and outgoing Hello messages
path	-	Path messages
perr	-	Path Error messages
ptear	-	Path tear messages
rerr	-	Reserve Error messages
resv	-	Reserve messages
rtear	-	Reserver tear messages
srefresh	-	Summary refresh messages

brief	-	Selected messages in brief format
detail	-	Selected messages in detail format
direction	-	Dump direction – can be *in*, *out* or *both*
level	-	Selected messages can be in brief or detail format

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults Debugging is disabled

Example

```
iss# debug rsvp dump-messages all detail direction in
```

☞ • If the command is given without level it will take the default (headers) option.

38.35.20 debug rsvp hello

This command monitors the activity of the hello module. The no form of the command disables the monitoring of hello module.

debug rsvp hello

no debug rsvp hello

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults Debugging is disabled

Example

```
iss# debug rsvp hello
```

☞ This command must be used carefully. The frequency and number of hello instances can generate an equally large debug output.

38.35.21 debug rsvp interface

This command monitors the activity related to interfaces, such as, configuration, deletion, etc. The no form of the command disables the traces related to interfaces.

`debug rsvp interface`

`no debug rsvp interface`

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults Debugging is disabled

Example

```
iss# debug rsvp interface
```

38.35.22 debug rsvp packet

This command displays the RSVP packet building, input/output events. The no form of the command disables the RSVP packet input/output events display.

debug rsvp packet

no debug rsvp packet

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults Debugging is disabled

Example

```
iss# debug rsvp packet
```

38.35.23 debug rsvp path

This command displays RSVP path events. The no form of the command disables RSVP path events display.

debug rsvp path

no debug rsvp path

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults Debugging is disabled

Example

```
iss# debug rsvp path
```

38.35.24 debug rsvp process

This command displays the RSVP process (Main flow, Refresh Reducion, Utility, etc.) events. The no form of the command disables the RSVP process and DB related traces.

debug rsvp process

no debug rsvp process

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults Debugging is disabled

Example

```
iss# debug rsvp process
```

38.35.25 debug rsvp resv

This command displays the RSVP reservation events. The no form of the command disables the RSVP reservation related traces.

debug rsvp resv

no debug rsvp resv

Mode Privileged EXEC Mode

Package Enterprise and Metro

Defaults Debugging is disabled

Example

```
iss# debug rsvp resv
```

38.35.26 show rsvp counters messages

This command displays a historical count of the number of messages RSVP has received and transmitted on each interface along with a summation.

show rsvp counters messages [vlan <vlan-id (1-4094)> | <interface-type> <interface-id>]

Syntax Description

vlan	-	VLAN interface
interface-type	-	Interface type
interface-id	-	Interface Identifier

Mode Privileged Exec Mode

Package Enterprise and Metro

Example

```
iss# show rsvp counters messages

mpls0            Recv    Xmit                     Recv    Xmit
PathError        0       0       ResvError        0       0
PathTear         0       0       ResvTear         0       0
Hello            0       0       ResvConfirm      10      0
Bundle           233     256     SRefresh         0       0
TotalMsgs        263     286

mpls1            Recv    Xmit                     Recv    Xmit
PathError        0       0       ResvError        0       0
PathTear         0       0       ResvTear         0       0
Hello            0       0       ResvConfirm      0       0
Bundle           0       0       SRefresh         0       0
TotalMsgs        0       0
```

38.35.27 show rsvp hello instance

This command displays the status of RSVP hello instance(s).

show rsvp hello instance [<ip-address>] [detail]

Syntax Description

ip-address	-	IP Address of the neighbor. If this argument is not specified, all neighbors are displayed.
detail	-	Displays multiline status for each hello instance. If this keyword is not specified, only a single-line table entry is displayed.

Mode Privileged Exec Mode

Package Enterprise and Metro

Example

```
iss# show rsvp hello instance

Neighbor         Type            State           Interface
------------     ---------       ----------      ---------
10.0.20.204      Passive         Not Supported   mpls0

iss# show rsvp hello instance detail

Neighbour: 10.0.20.204   Source: 10.0.20.205 (MPLS)
State: Not Supported
Type: Active (Sending requests)
I/F: mpls0
Hello interval (seconds) (used when ACTIVE)
Configured: 1
Src_Instance 0x1, Dst_Instance 0x0
Counters:
Msgs Received: 0
Sent: 3
```

Related Commands

- **signalling hello refresh interval** – Sets the hello interval at which RSVP hello messages are sent to each neighbor
- **signalling – supported** - Enables the usage of UDP sockets , hello messages and message Identifiers

38.35.28 show rsvp neighbor

This command displays various configurations of neighbors including their refresh reduction capabilities.

show rsvp neighbor [<ip-address>] [detail]

Syntax Description	**ip-address**	-	IP Address
	detail	-	Detailed information on configurations of neighbors
Mode	Privileged Exec Mode		
Package	Enterprise and Metro		

Example

```
iss# show rsvp neighbor

Neighbor     RR State      RMD Status     Hello State      No.of Tnls
---------   ----------    ----------     -------------    ----------
20.0.6.223   Enabled       Enabled        Not Supported    10
50.0.6.225   Enabled       Enabled        Not Supported    5
60.0.6.225   Enabled       Enabled        Not Supported    5

iss# show rsvp neighbor detail

Neighbour: 20.0.6.223
Interface Neighbor: 20.0.6.224
Interface: mpls0
Refresh Reduction: Enabled
Remote epoch: 0x2878

Neighbour: 50.0.6.225
Interface Neighbor: 50.0.6.224
Interface: mpls2
Refresh Reduction: Enabled
Remote epoch: 0x1d55

Neighbour: 60.0.6.225
Interface Neighbor: 60.0.6.224
Interface: mpls3
Refresh Reduction: Enabled
Remote epoch: 0x1366
```

38.35.29 show rsvp request

This command displays information on only upstream reservations (reservations being sent to upstream hops).

show rsvp request [detail] [destination <ip-address> | source <ip-address>]

Syntax Description

detail	-	Displays multiline status for each path. If this keyword is not specified, only a single-line table entry is displayed.
destination	-	Destination Address information
source	-	Source Address information

Mode Privileged Exec Mode

Package Enterprise and Metro

Example

```
iss# show rsvp request

Dest Addr     Source Addr      Pro  O/p Intf       Sty  Serv   Rate
----------   ---------------   ---  -------------  ---  ----   ----
50.0.6.225    20.0.6.223       Dis  mplstunnel0    FF   LOAD    100
60.0.6.225    20.0.6.223       Dis  mplstunnel5    FF   LOAD    100

iss# show rsvp request detail

REQ: IPv4-LSP Session addr: 50.0.6.225.  TunID: 1.  LSPId: 1.
Source addr: 20.0.6.223.  ExtID: 20.0.6.223.
Output interface: mplstunnel0.  Next hop: 50.0.6.225 (lih:
0x485).
Local Protection: Not in use.
Reservation Style: Fixed-Filter.  Service: Controlled-Load.
Token bucket rate: 100 bits/sec.  Peak data rate: 100 bits/sec.
MTU min: 1500, max: 1500 bytes.
Number of supporting PSBs: 1
Number of supporting RSBs: 1

REQ: IPv4-LSP Session addr: 60.0.6.225.  TunID: 1.  LSPId: 1.
Source addr: 20.0.6.223.  ExtID: 20.0.6.223.
Output interface: mplstunnel5.  Next hop: 60.0.6.225 (lih:
0x485).
Local Protection: Not in use.
Reservation Style: Fixed-Filter.  Service: Controlled-Load.
Token bucket rate: 100 bits/sec.  Peak data rate: 100 bits/sec.
MTU min: 1500, max: 1500 bytes.
Number of supporting PSBs: 1
Number of supporting RSBs: 1
```

Related Commands

- **`tunnel mpls destination`** – Configures MPLS Tunnel endpoints
- **`tunnel signalling protocol`** - Sets the signaling protocol for the specified tunnel

Chapter 39

Route Map

Route Map provides a set of rules which should be satisfied for a route to be redistributed from one routing domain to another. When a route is to be redistributed from a routing domain to another, it is checked against a set of match conditions. If the match conditions are satisfied, access control of **Permit**/**Deny** is provided to the route. Route Map permits to modify route information during redistribution. Route Map permits to set conditions using the **match** clause and set actions using the **set** clause.

The list of CLI commands[14] for the configuration of Route Map is as follows:

- route-map
- match destination ip
- match destination ipv6
- match source ip
- match source ipv6
- match next-hop ip
- match next-hop ipv6
- match interface
- match metric
- match tag
- match metric-type

[14] The CLI commands for the Route Map are applicable only for RIP.

- match route-type
- match as-path tag
- match community
- match local-preference
- match origin
- set next-hop ip
- set next-hop ipv6
- set interface
- set metric
- set tag
- set route-type
- set as-path tag
- set community
- set local-preference
- set origin
- set weight
- set auto-tag
- set level
- set metric-type
- show route-map

39.1 route-map

This command creates a route-map with name, sequence number and associated access type. The no form of the command removes the specified sequence number from route-map. If the sequence number is not specified the complete route map gets deleted.

```
route-map <name(1-20)> [ {permit | deny } ] [ <seqnum(1-10)> ]
```

```
no route-map <name (1-20)> [<seqnum (1-10)> ]
```

Syntax Description	**<name(1-20)>**	-	Identifies the specified route-map in the list of route-maps. The length ranges between 1 and 20.
	permit	-	Permits the route entry matching the match entry rules
	deny	-	Denies the route entry matching the match entry rules
	<seqnum(1-10)>	-	Indicates the position of a new route map in the list of route maps already configured with the same name. The sequence number ranges between 1 and 10.
Mode	Global Configuration Mode		
Package	Workgroup, Enterprise and Metro		
Defaults	permit / deny	-	permit
	seqnum	-	1
Example	`iss(config)# route-map rmap-test`		
Related Commands	• **show route-map** – Displays the configured route maps		

39.2 match destination ip

This command matches the destination IP address with the permitted range of addresses. The no form of the command removes the match IP address entry from the match entry list.

```
match destination ip <Ip address> <Net Mask>
```

```
no match destination ip <Ip address> <Net Mask>
```

Syntax Description	`<Ip address>`	-	Specifies the destination network IP address. The destination IP address provides the range of addresses that will get to pass the route-map, when logically ANDed with the mask.
	`<Net Mask>`	-	Specifies the mask that provides the range of the network addresses.

Mode Route Map Configuration Mode

Package Workgroup, Enterprise and Metro

Example

```
iss(config-rmap-rmap-test)# match destination ip 25.0.0.0
255.0.0.0
```

Related Commands

- **`show route-map`** – Displays the configured route maps
- **`show running-config`** - Displays the current operating configuration in the system

39.3 match destination ipv6

This command matches that have a destination network address against the permitted range of addresses and the no form of the command matches that have a destination network address against the permitted range of addresses.

match destination ipv6 <IPv6 address> <Prefix Lenght>

no match destination ipv6 <IPv6 address> <Prefix Lenght>

Syntax Description	**IPv6 address**	-	Specifies the destination network number address.
	Prefix Length	-	Specifies the prefix length of Inet address of destination network.

Mode Route Map Configuration Mode

Package Workgroup-Enterprise-Metro

Example

```
iss(config-rmap-rmap-test)# match destination ipv6 25.0.0.0 6
```

Related Commands

- **show route-map** – Displays the configured route maps
- **show running-config** - Displays the current operating configuration in the system

39.4 match source ip

This command matches that have a source network address against the permitted range of addresses. The no form of the command removes the match source ip address entry in the match entry list.

```
match source ip <Ip address> <Net Mask>
```

```
no match source ip <Ip address> <Net Mask>
```

Syntax Description	**Ip address**	-	Specifies the source network number address.
	Net Mask	-	Specifies the mask that provides the range of the network addresses.

Mode Route Map Configuration Mode

Package Workgroup-Enterprise-Metro

Example

```
iss(config-rmap-rmap-test)# match source ip 25.0.0.0 255.0.0.0
```

Related Commands

- **show route-map** – Displays the configured route maps
- **show running-config** - Displays the current operating configuration in the system

39.5 match source ipv6

This command matches that have a source network address against the permitted range of addresses. The no form of the command removes the match source ipv6 entry from match entry list.

```
match source ipv6 <IPv6 address> <Prefix Lenght>
```

```
no match source ipv6 <IPv6 address> <Prefix Lenght>
```

Syntax Description	**Ipv6 address**	-	Specifies the source network number address.
	Prefix Lenght	-	Specifies the prefix length of Inet address of source network.

Mode Route Map Configuration Mode

Package Workgroup-Enterprise-Metro

Example

```
iss(config-rmap-rmap-test)# match destination ipv6 25.0.0.0 6
```

Related Commands

- **show route-map** – Displays the configured route maps
- **show running-config** - Displays the current operating configuration in the system

39.6 match next-hop ip

This command matches the routes having the specified next-hop address. The no form of the command removes the match IP next-hop entry from the match entry list.

```
match next-hop ip < next-hop Ip address>
```

```
no match next-hop ip <next-hop ip address >
```

Mode	Route Map Configuration Mode
Package	Workgroup, Enterprise and Metro
Example	`iss(config-rmap-rmap-test)# match next-hop ip 12.0.0.10`
Related Commands	**`show route-map`** – Displays the configured route maps

39.7 match next-hop ipv6

This command matches the routes having the specified nexthop IPv6 address. The no form of the command removes the match next-hop IPv6 entry from match entry list.

```
match next-hop ipv6 <next hop IPv6 address>
```

```
no match next-hop ipv6 <next-hop IPv6 address>
```

Syntax Description	**next hop IPv6 address**	- Specifies the next-hop IPv6 address.
Mode	Route Map Configuration Mode	
Package	Workgroup-Enterprise-Metro	
Example	`iss(config-rmap-rmap-test)# match ip next-hop 12.0.0.10`	
Related Commands	• **show route-map** – Displays the configured route maps • **show running-config** - Displays the current operating configuration in the system	

39.8 match interface

This command matches nexthop interface of the route out of the specified interface. The no form of the command removes the match interface entry from the match entry list.

```
match interface { Vlan < vlan-id(1-4094)> | <interface-type> < interface-id> }
```

```
no match interface { Vlan <vlan-id (1-4094)> | <interface-type> <interface-id>
}
```

Syntax Description

vlan - Configures the vlan for the specified VLAN ID. This is a unique value that represents the specific VLAN created / to be created.

This value ranges between 1 and 4094.

interface-type - Configures the interface type for the specified type of interface. The interface can be:

- fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second.
- gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second.
- extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links.
- i-lan / internal-lan – Internal LAN created on a bridge per IEEE 802.1ap.
- port-channel – Logical interface that represents an aggregator which contains several ports aggregated together.

interface-id - Configures the interface id for the specified interface identifier. This is a unique value that represents the specific interface.

This value is a combination of slot number and port number separated by a slash, for interface type other than i-lan and port-channel.

For example: 0/1 represents that the slot number is 0 and port number is 1.

Only i-lan or port-channel ID is provided, for interface types i-lan and port-channel. For example: 1 represents i-lan and port-channel ID.

Mode	Route Map Configuration Mode
Package	Workgroup, Enterprise and Metro
Example	`iss(config-rmap-rmap-test)# match interface vlan 1`
Related Command	• **`show route-map`** – Displays the configured route maps

39.9 match metric

This command matches the configured metric with the metric specified in the route-map. The no form of the command removes the match metric entry from the match entry list. The metric value ranges between 1 and 0x7fffffff

```
match metric <value(1-0x7fffffff)>
```

```
no match metric <value(1-0x7fffffff)>
```

Mode	Route Map Configuration Mode
Package	Workgroup, Enterprise and Metro
Example	`iss(config-rmap-rmap-test)# match metric 2000`
Related Command	• **`show route-map`** – Displays the configured route maps

39.10 match tag

This command matches the given tag with the tag specified in the route-map. The value ranges between 1 and 0x7fffffff. The no form of the command removes the match tag entry from the match entry list.

```
match tag <integer>
```

```
no match tag <value>
```

Mode Route Map Configuration Mode

Package Workgroup, Enterprise and Metro

Example

```
iss(config-rmap-rmap-test)# match tag 2020
```

Related Command

- **`show route-map`** – Displays the configured route maps

39.11 match metric-type

This command matches the metric type of a given route with the specified metric type. The no form of the command removes match metric-type entry from match entry list

```
match metric-type { inter-area | intra-area | type-1-external | type-2-external }
```

```
no match metric-type { inter-area | intra-area | type-1-external | type-2-external }
```

Syntax Description

inter-area	-	OSPF (Open Shortest Path First) inter area route metric.
intra-area	-	OSPF intra area route metric.
type-1-external	-	Matches the ospf routes with metric type as external type 1 routes. If the option external type-1 is specified as the route-type, Cost from the Router to Autonomous Border System Router (ASBR) + Cost from ASBR to Destination are included when route calculation is done for a destination.
type-2-external	-	Matches the ospf routes with metric type as external type 2 routes. If the option external type-2 is specified as the route-type, only the Cost from the Router to Autonomous Border System Router (ASBR) is included when route calculation is done for a destination.

Mode Route Map Configuration Mode

Package Workgroup, Enterprise and Metro

Example

```
iss(config-rmap-rmap-test)# match metric-type inter-area
```

Related Commands

- **show route-map** – Displays the configured route maps
- **show running-config** - Displays the current operating configuration in the system

39.12 match route-type

This command matches the specified route-type with the entries in route-map. The no form of the command removes match route-type entry from match entry list.

`match route-type {local |remote}`

`no match route-type { local | remote}`

Syntax Description	**`local`**	-	Matches the local routes.
	`remote`	-	Matches the non-connected routes (static/ routing protocol installed routes).

Mode Route Map Configuration Mode

Package Workgroup, Enterprise and Metro

Example

```
iss(config-rmap-rmap-test)# match route-type local
```

Related Commands

- **`show route-map`** – Displays the configured route maps
- **`show running-config`** - Displays the current operating configuration in the system

39.13 match as-path tag

This command matches the AS path tag of the route with the existing AS-path in BGP. The value ranges between 1 and 0x7fffffff The no form of the command removes match AS-path entry from the match entry list.

```
match as-path tag <value(1-0x7fffffff)>
```

```
no match as-path tag <value(1-0x7fffffff) >
```

Mode Route Map Configuration Mode

Package Workgroup, Enterprise and Metro

Example

```
iss(config-rmap-rmap-test)# match as-path tag 2828
```

☞ This command is applied only when redistributing routes into BGP.

Related Commands

- **`show route-map`** – Displays the configured route maps

39.14 match community

This command matches the BGP communities attribute in the route with the specified community. The no form of the command removes the match community entry from the match entry list.

```
match community { internet|local-as|no-advt |no-export| comm-num <value (1-0x7fffffff)>| none }
```

```
no match community {internet|local-as|no-advt |no-export| comm-num <value>| none }
```

Syntax Description

`internet`	-	Advertises this route to the Internet community. All routers in the network belong to it.
`local-as`	-	Sends this route to peers in other sub autonomous systems within the local confederation. Does not advertise this route to an external system.
`No-advt`	-	Does not advertise all routes carrying a communities attribute to other BGP peers.
`No-export`	-	All routes received carrying a communities attribute containing this value MUST NOT be advertised outside a BGP confederation boundary.
`comm-num`	-	Sets the community number.
`none`	-	Removes the match community entry from the match entry list

Mode Route Map Configuration Mode

Package Workgroup, Enterprise and Metro

Example

```
iss(config-rmap-rmap-test)# match community internet
```

☞ This command is applied only while redistributing routes into BGP.

Related Commands

- **`show route-map`** – Displays the configured route maps

39.15 match local-preference

This command matches a preference value for the autonomous system path. The value ranges between 1 and 0x7fffffff. The no form of the command removes the match local-preference entry from the match entry list.

```
match local-preference <value(1-0x7fffffff)>
```

```
no match local-preference <value(1-0x7fffffff)>
```

Mode	Route Map Configuration Mode
Package	Workgroup, Enterprise and Metro
Example	`iss(config-rmap-rmap-test)# match local-preference 2626`
Related Command	• **`show route-map`** – Displays the configured route maps

39.16 match origin

This command matches the origin of the route in BGP with the specified origin. The no form of the command removes the match origin entry from match entry list.

```
match origin { igp |egp | incomplete }
```

```
no match origin { igp |egp | incomplete }
```

Syntax Description	**igp**	-	Specifies that the route is originated through Interior Gateway Protocol
	egp	-	Specifies that the route is originated through Exterior Gateway Protocol
	incomplete	-	Specifies that the route is originated through unknown heritage
Mode	Route Map Configuration Mode		
Package	Workgroup, Enterprise and Metro		
Example	`iss(config-rmap-rmap-test)# match origin igp`		
Related Command	• **show route-map** – Displays the configured route maps		

39.17 set next-hop ip

This command sets the next hop ip address and sets the address for a route that satisfies the match conditions of the route. The no form of the command removes the set ip next-hop from the set entry list.

set next-hop ip <next-hop ip address>

no set next-hop ip

Mode	Route Map Configuration Mode
Package	Workgroup, Enterprise and Metro
Example	`iss(config-rmap-rmap-test)# set ip next-hop 12.0.0.2`
Related Command	• **show route-map** – Displays the configured route maps

39.18 set next-hop ipv6

This command sets the next hop IPv6 address of the route and the no form of the command removes set next-hop IPv6 from the set entry list.

set next-hop ipv6 <next-hop ipv6 address>

no set next-hop ipv6

Syntax Description	**next-hop ipv6 address**	-	Specifies the next hop IPv6 address
Mode	Route Map Configuration Mode		
Package	Workgroup-Enterprise-Metro		
Example	`iss(config-rmap-rmap-test)# set next-hop ipv6 12.0.0.2`		
Related Commands	• **show route-map** – Displays the configured route maps • **show running-config** - Displays the current operating configuration in the system		

39.19 set interface

This command sets the next hop interface of the route. The no form of the command removes the set interface entry from the set entry list.

```
set interface { Vlan <vlan-id (1-4094)> | <interface-type> <interface-id> }
```

```
no set interface
```

Syntax Description

`Vlan <vlan-id (1-4094)>` - Configures the specified VLAN ID as the next hop interface. This is a unique value that represents the specific VLAN created / to be created.

This value ranges between 1 and 4094.

`interface-type` - Configures the specified type of interface as the next hop interface. The interface can be:

- fastethernet – Officially referred to as 100BASE-T standard. This is a version of LAN standard architecture that supports data transfer upto 100 Megabits per second.
- gigabitethernet – A version of LAN standard architecture that supports data transfer upto 1 Gigabit per second.
- extreme-ethernet – A version of Ethernet that supports data transfer upto 10 Gigabits per second. This Ethernet supports only full duplex links.
- i-lan / internal-lan – Internal LAN created on a bridge per IEEE 802.1ap.
- port-channel – Logical interface that represents an aggregator which contains several ports aggregated together.

`interface-id` - Configures the specified interface identifier as the next hop interface. This is a unique value that represents the specific interface.

This value is a combination of slot number and port number separated by a slash, for interface type other

	than i-lan and port-channel. For example: 0/1 represents that the slot number is 0 and port number is 1. Only i-lan or port-channel ID is provided, for interface types i-lan and port-channel. For example: 1 represents i-lan and port-channel ID.

Mode Route Map Configuration Mode

Package Workgroup, Enterprise and Metro

Example

```
iss(config-rmap-rmap-test)# set interface vlan 1
```

Related Command

- **`show route-map`** – Displays the configured route maps

39.20 set metric

This command sets the metric value in the route. The no form of the command removes the set metric entry from the set entry list.

```
set metric <value(1-0x7fffffff)>
```

```
no set metric
```

Mode Route Map Configuration Mode

Package Workgroup, Enterprise and Metro

Example

```
iss(config-rmap-rmap-test)# set metric 400
```

Related Command

- **`show route-map`** – Displays the configured route maps

39.21 set tag

This command sets the tag value for BGP/OSPF/RIP routing protocols in the given route. The value ranges between 1 and 0x7fffffff. The no form of the command removes the set tag from the set entry list.

```
set tag <value(1-0x7fffffff)>
```

```
no set tag
```

Mode Route Map Configuration Mode

Package Workgroup, Enterprise and Metro

Example

```
iss(config-rmap-rmap-test)# set tag 282828
```

Related Command

- **`show route-map`** – Displays the configured route maps

39.22 set route-type

This command sets the route-type and the no form of the command removes the set route-type entry from set entry list.

`set route-type {local | remote }`

`no set route-type`

Syntax Description	**`local`**	-	Sets the connected routes.
	`remote`	-	Sets the non-connected routes.
Mode	Route Map Configuration Mode		
Package	Workgroup-Enterprise-Metro		

Example

```
iss(config-rmap-rmap-test)# set route-type local
```

Related Commands

- **`show route-map`** – Displays the configured route maps
- **`show running-config`** - Displays the current operating configuration in the system

39.23 set as-path tag

This command sets the tag to the existing AS-path in BGP. The value ranges between 1 and 0x7fffffff. The no form of the command removes the set AS-path from the set entry list.

```
set as-path tag <value(1-0x7fffffff)>
```

```
no set as-path tag
```

Mode Route Map Configuration Mode

Package Workgroup, Enterprise and Metro

Example

```
iss(config-rmap-rmap-test)# set as-path tag 2929
```

Related Command

- **`show route-map`** – Displays the configured route maps

39.24 set community

This command sets the BGP communities attribute in the route. The no form of the command removes the set community from the set entry list.

```
set community { internet | local-as | no-advt | no-export | comm-num <value
(1-0x7fffffff)> | none }
```

```
no set community
```

Syntax Description

`internet`	-	Advertises this route to the Internet community. All routers in the network belong to it.
`local-as`	-	Sends this route to peers in other sub autonomous systems within the local confederation. Does not advertise this route to an external system.
`No-advt`	-	Does not advertise all routes carrying a communities attribute to other BGP peers.
`No-export`	-	All routes received carrying a communities attribute containing this value MUST NOT be advertised outside a BGP confederation boundary.
`comm-num`	-	Sets the community number.
`none`	-	Removes the match community entry from the match entry list.

Mode Route Map Configuration Mode

Package Workgroup, Enterprise and Metro

Example
```
iss(config-rmap-rmap-test)# set community no-export
```

Related Command
- **`show route-map`** – Displays the configured route maps

39.25 set local-preference

This command specifies a preference value for the autonomous system path in the route. The value ranges between 1 and 0x7fffffff. The no form of the command removes the set local-preference from the set entry list.

```
set local-preference <value(1-0x7fffffff>
```

```
no set local-preference
```

Mode Route Map Configuration Mode

Package Workgroup, Enterprise and Metro

Example
```
iss(config-rmap-rmap-test)# set local-preference 202020
```

Related Command
- **`show route-map`** – Displays the configured route maps

39.26 set origin

This command sets the origin of the route in BGP. The no form of the command removes the set origin from the set entry list.

`set origin {igp |egp | incomplete }`

`no set origin`

Syntax Description	**`igp`**	-	Specifies that the route is originated through Interior Gateway Protocol.
	`egp`	-	Specifies that the route is originated through Exterior Gateway Protocol.
	`incomplete`	-	Specifies that the route is originated through unknown heritage.

Mode Route Map Configuration Mode

Package Workgroup, Enterprise and Metro

Example

```
iss(config-rmap-rmap-test)# set origin incomplete
```

Related Command

- **`show route-map`** – Displays the configured route maps

39.27 set weight

This command seta the weight value and the no form of the command removes the set weight from the set entry list.

```
set weight <value(1-0x7fffffff)>
```

```
no set weight
```

Mode Route Map Configuration Mode

Package Workgroup-Enterprise-Metro

Example

```
iss(config-rmap-rmap-test)# set weight 1
```

Related Commands

- **`show route-map`** – Displays the configured route maps
- **`show running-config`** - Displays the current operating configuration in the system

39.28 set auto-tag

This command sets automatic tag generation and the no form of the command removes set auto-tag entry from set entry list.

`set auto-tag {enable | disable}`

`no set auto-tag`

Syntax Description	**`enable`**	-	Enables automatic computing of tag table when redistributing routes from BGP into IGP.
	`disable`	-	Disables automatic computing of tag table when redistributing routes from BGP into IGP.

Mode Route Map Configuration Mode

Package Workgroup-Enterprise-Metro

Defaults disable

Example

```
iss(config-rmap-rmap-test)# set auto-tag enable
```

Related Commands

- **`show route-map`** – Displays the configured route maps
- **`show running-config`** - Displays the current operating configuration in the system

39.29 set level

This command sets the level of the route and the no form of the command removes set level from the set entry list.

`set level {level-1 |level-2 | level-1-2 | level-stub-area | level_backbone }`

`no set level`

Syntax Description	**`level-1`**	-	Imports routes into a Level 1 area.
	`level-2`	-	Imports routes into a Level 2 subdomain.
	`level-1-2`	-	Imports routes into Level 1 and Level 2.
	`level-stub-area`	-	Imports routes into an OSPF (Open Shortest Path First) NSSA (not-so-stubby area).
	`level_backbone`	-	Imports routes into an OSPF backbone area.

Mode Route Map Configuration Mode

Package Workgroup-Enterprise-Metro

Example

```
iss(config-rmap-rmap-test)# set level level-1
```

Related Commands

- **`show route-map`** – Displays the configured route maps
- **`show running-config`** - Displays the current operating configuration in the system

39.30 set metric-type

This command sets the value of metric type in the route. The no form of the command removes the set metric-type entry from the set entry list.

```
set metric-type { type-1 | type-2 }
```

```
no set metric-type { type-1 | type-2 }
```

Syntax Description

`internal` - Sets the static or connected metric type.

`external` - Sets the external metric type. Options are:

`type-1` - OSPF external type 1 metric.

Cost from the Router to ASBR (Autonomous Border System Router) and cost from ASBR to Destination are included when route calculation is done for a destination.

`type-2` - OSPF external type 2 metric.

Cost from the Router to ASBR is included when route calculation is done for a destination.

Mode Route Map Configuration Mode

Package Workgroup, Enterprise and Metro

Example

```
iss(config-rmap-rmap-test)# set metric-type external type-2
```

- If the option external type-1 is specified as the metric-type, Cost from the Router to Autonomous Border System Router (ASBR) + Cost from ASBR to Destination is included when route calculation is done for a destination.
- If the option external type-2 is specified as the metric-type, only the Cost from the Router to Autonomous Border System Router (ASBR) is included when route calculation is done for a destination.

Related Command

- **`show route-map`** – Displays the configured route maps

39.31 show route-map

This command displays the configured route maps.

`show route-map [name(1-20)]`

Syntax Description

`name`	-	Displays the route map related configuration details for the specified route map name. This value is a string whose maximum size is 20.

Mode Privileged EXEC Mode

Package Workgroup, Enterprise and Metro

Example

```
iss# show route-map

Route-map rmap-test, Permit, Sequence 1

 Match Clauses:
 --------------
 destination ip 25.0.0.10  255.255.255.0
 source ip 12.0.0.10  255.255.255.0
 next-hop ip 20.0.0.10
 interface vlan1
```

```
 metric 2000
 tag 200
 metric-type type-1-external
 metric-type type-2-external
 route-type local
 as-path tag 2828
 community internet
 local-preference 2626
 origin igp


 Set Clauses:
 --------------
 next-hop ip 12.0.0.2
 interface vlan1
 metric 400
 tag 282828
 as-path tag 2929
 community no-export
 local-preference 200000
 origin egp



iss# show route-map rmap-test

Route-map rmap-test, Permit, Sequence 1

 Match Clauses:
 --------------
 destination ip 25.0.0.10  255.255.255.0
 source ip 12.0.0.10  255.255.255.0
 next-hop ip 20.0.0.10
 interface vlan1
 metric 2000
 tag 200
 metric-type type-1-external
 metric-type type-2-external
 route-type local
 as-path tag 2828
 community internet
 local-preference 2626
 origin igp


 Set Clauses:
 --------------
 next-hop ip 12.0.0.2
 interface vlan1
 metric 400
 tag 282828
 as-path tag 2929
 community no-export
 local-preference 200000
 origin egp
```

Related

- **`route-map`** – Creates a route-map with name, sequence number and

Commands

associated access type.

- **`match interface`** – Matches nexthop interface of the route out of the specified interface.
- **`match destination ip`** – Matches the route that have a destination network address against the permitted range of addresses.
- **`match next-hop ip`** – Matches the routes having the specified Nexthop address.
- **`match metric`** – Matches the given metric with the metric specified in the route-map
- **`match tag`** – Matches the given tag with the tag specified in the route-map.
- **`match route-type`** – Matches the specified route-type with that of in route-map.
- **`match metric-type`** – Matches the metric type of a given route with the specified metric type
- **`match as-path tag`** – Matches the AS path tag of the route with the existing AS-path in BGP
- **`match community`** – Matches the BGP communities attribute in the route with the specified community
- **`match origin`** – Matches the origin of the route in BGP with the specified origin.
- **`match local-preference`** – Matches a preference value for the autonomous system path.
- **`set interface`** – Sets the next hop interface of the route.
- **`set as-path tag`** – Sets the tag to the existing AS-path in BGP
- **`set community`** – Sets the BGP communities attribute in the route.
- **`set local-preference`** – Specifies a preference value for the autonomous system path in the route.
- **`set origin`** – Sets the origin of the route in BGP
- **`set tag`** – Sets the tag value for BGP/OSPF/RIP routing protocols in the given route.
- **`set next-hop ip`** – Sets the next hop ip address of the route
- **`set metric`** – Sets the metric value in the route

Chapter 40

NAT

NAT (Network Address Translation) provides a mechanism for a privately addressed network to access registered networks, such as the Internet, without requiring a registered subnet address. This eliminates the need for host renumbering and allows the same IP address range to be used in multiple intranets.

With NAT, the privately addressed network (designated as **inside**) continues to use its existing private or obsolete addresses. These addresses are converted into legal addresses before packets are forwarded onto the registered network (designated as **outside**). The translation function is compatible with standard routing; the feature is required only on the router connecting the inside network to the outside domain.

The following are the list of NAT commands:

- ip nat
- ip nat - timeout
- virtual server
- enable virtual server
- disable virtual server
- ip nat napt
- interface nat
- static nat
- port trigger
- ip nat pool
- portrange
- show nat config
- show ip nat

- show virtual servers
- show portrange
- show ip nat interface
- show port trigger
- show port trigger reserved list
- debug nat

40.1 ip nat

This command enables NAT globally. The no form of the command disables NAT globally.

`ip nat`

`no ip nat`

Mode	Global Configuration Mode
Package	Enterprise and Metro
Defaults	NAT is enabled.
Example	`iss(config)# ip nat`
Related Command	• **`show nat config`** - Displays NAT configuration.

40.2 ip nat - timeout

This command sets the NAT timeout value.

`ip nat { idle | tcp | udp } timeout <seconds ((idle-60|udp-300|tcp-3600) - 86400)>`

Syntax Description	**`idle`**	-	NAT Idle Timeout
	`tcp`	-	NAT TCP Timeout
	`udp`	-	NAT UDP Timeout
	`timeout`	-	Timeout value in seconds. The value ranges between 60 and 86400 seconds
Mode	Global Configuration Mode		
Package	Enterprise and Metro		
Defaults	idle	-	60 seconds
	tcp	-	3600 seconds
	udp	-	300 seconds

Example

```
iss(config)# ip nat idle timeout 75
```

Related Commands

- **`show nat config`** - Displays NAT configuration.

40.3 virtual server

This command configures a virtual server. The no form of command deletes the virtual server configuration.

```
virtual server <local ip> [<local port number>] { auth | dns | ftp | pop3 |
pptp | smtp | telnet | http | nntp | snmp | { other [<global port number>] } }
[<tcp|udp|any>] [<description>]
```

```
no virtual server {{<local ip> <local port number> [<tcp|udp|any>]}|all}
```

Syntax Description

`local ip`	-	Local IP address
`local port number`	-	Local Port Number
`auth | dns | ftp | pop3 | pptp | smtp | telnet | http | nntp | snmp | other`	-	Application Modes
`global port number`	-	External Port
`[<tcp|udp|any>]`		Transport protocols
`description`	-	Description of internal host

Mode Interface Configuration Mode

Package Enterprise and Metro

Example

```
iss(config-if)# virtual server 192.168.0.10 ftp Internal-Ftp-Server

iss(config-if)# no virtual server 192.168.0.10 ftp
```

☞

- WAN interface must be created before the execution of this command.

Related Command

- **`show virtual servers`** – Displays the current virtual server configurations.

40.4 enable virtual server

This command enables the virtual server configuration.

`enable virtual server { { <local ip> <portno> } | all }`

Syntax Description	**`local ip`**	-	Local IP address
	`portno`	-	Port Number
	`all`	-	All virtual servers

Mode Interface Configuration Mode

Package Enterprise and Metro

Example

```
iss(config-if)# enable virtual server 192.168.0.10 21
```

☞ WAN interface must be created before the execution of this command.

Related Command

- **`interface nat`** – Enables or disables Interface NAT status.
- **`virtual server`** - Configures a virtual server.
- **`show virtual servers`** – Displays the current virtual server configurations.

40.5 disable virtual server

This command disables the virtual server configuration.

```
disable virtual server { { <local ip> <port number> } | all }
```

Syntax Description	**local ip**	-	Local IP address
	port number	-	Port Number
	All	-	All virtual servers
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Example	`iss(config-if)# disable virtual server all`		

☞

- WAN interface must be created before the execution of this command.

Related Commands

- **interface nat** – Enables or disables Interface NAT status.
- **virtual server** - Configures a virtual server.
- **show virtual servers** – Displays the current virtual server configurations.

40.6 ip nat napt

This command configures NAPT status in a interface

`ip nat napt {enable|disable}`

Syntax Description	**`enable`**	-	Enables NAPT status
	`disable`	-	Disables NAPT status
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Defaults	disable		
Example	`iss(config-if)# ip nat napt enable`		

☞
- WAN interface must be created before the execution of this command.
- Enabling or disabling NAT status enables or disables NAPT status.

Related Command
- **`show ip nat interface`** - Displays NAT interface configuration.

40.7 interface nat

This command enables or disables NAT status in a interface.

`interface nat {enable|disable}`

Syntax Description	**`enable`**	-	Enables Interface NAT status. WAN interface is automatically created by enabling NAT status.
	`disable`	-	Disables Interface NAT status
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Defaults	disable		
Example	`iss(config-if)# interface nat enable`		
☞	• Enabling or disabling NAT status enables or disables NAPT status.		
Related Command	• **`show ip nat interface`** - Displays NAT interface configuration.		

40.8 static nat

This command adds a static mapping between local and global address on the specified interface. The no form of the command deletes the static mapping for the given local IP on the specified interface.

```
static nat <local ip> <translated local ip>
```

```
no static nat <local ip>
```

Syntax Description	**local ip**	-	Local IP
	translated local ip	-	Translated Local IP
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Example	`iss(config-if)# static nat 192.168.0.100 202.68.0.78`		
☞	WAN interface must be created before the execution of this command.		
Related Command	• show ip nat – Displays various NAT tables.		

40.9 port trigger

This command configures port trigger for outbound and inbound application. The no form of the command deletes the configured port trigger for the given application.

`port trigger <App Name> {tcp|udp|any} <Outbound Port Range> <Inbound Port Range>`

`no port trigger <App Name>`

Syntax Description	**`App Name`**	-	Application name
	`tcp|udp|any`	-	Protocol Name
	`Outbound Port Range`	-	Outbound Port Range
	`Inbound Port Range`	-	Inbound Port Range
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Example	`iss(config-if)# port trigger fifa2000 tcp 2000-3000 200-600`		
Related Commands	• **`show port triggers`** - Displays the port trigger configurations. • **`show port trigger reserved list`** – Displays the port trigger reserved list.		

40.10 ip nat pool

This command adds global address pool. The no form of the command deletes the global address pool.

```
ip nat pool <global ip> <mask>
```

```
no ip nat pool <global ip>
```

Syntax Description	**global ip**	-	Global IP address
	mask	-	Subnet mask
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Example	`iss(config-if)# ip nat pool 202.168.0.100  255.0.0.0`		
☞	WAN interface must be created before the execution of this command.		
Related Command	• **show ip nat** – Displays various NAT tables.		

40.11 portrange

This command configures port forwarding range. The no form of the command deletes port forwarding range.

```
portrange <local ip> {tcp|udp|any} <start port no> <end port no>
```

```
no portrange <local ip> {tcp|udp|any} <start port no> <end port no>
```

Syntax Description	**local ip**	-	Local IP address
	tcp|udp|any	-	Protocol Name
	start port no	-	Start Port Number
	end port no	-	End Port Number
Mode	Interface Configuration Mode		
Package	Enterprise and Metro		
Example	`iss(config-if)# portrange 192.168.1.10 tcp 20 25`		
☞	WAN interface must be created before the execution of this command.		
Related Command	• **show portrange**– Displays the port range configurations.		

40.12 debug nat

This command sets the NAT module trace level and the no form of the command resets the NAT module trace level.

`debug nat [all] [fn-entry] [fn-exit] [packet-flow] [dns] [ftp] [http] [smtp] [icmp] [pptp] [memory]`

`no debug nat [all] [fn-entry] [fn-exit] [packet-flow] [dns] [ftp] [http] [smtp] [icmp] [pptp] [memory]`

Syntax Description	**`all`**	-	All traces
	`fn-entry`	-	Function Entry related traces
	`fn-exit`	-	Function Exit related traces
	`packet-flow`	-	Packet-flow related traces
	`dns`	-	DNS related traces
	`ftp`	-	FTP related traces
	`http`	-	HTTP related traces
	`smtp`	-	SMTP related traces
	`icmp`	-	ICMP related traces
	`pptp`	-	PPTP related traces
	`memory`	-	Memory related traces
Mode	User EXEC Mode		
Package	Enterprise and Metro		
Defaults	Debugging is disabled		
Example	`iss # debug nat packet-flow`		

40.13 show nat config

This command displays NAT configuration.

`show nat config`

Mode User EXEC Mode

Package Enterprise and Metro

Example

```
iss# show nat config

NAT Configuration
-----------------
NAT Status                   : Enabled
Maximum Translation Entries  : 9000
Start Free Port              : 6001
Idle Timeout                 : 75 seconds
TCP  Timeout                 : 3600 seconds
UDP  Timeout                 : 300 seconds
```

Related Command

- **`static nat`** - Adds a static mapping between local and global address on the specified interface.

40.14 show ip nat

This command displays various NAT tables.

`show ip nat { global | static | translations }`

Syntax Description

`global`	-	Global IP NAT
`static`	-	Static IP NAT
`translations`	-	NAT Translations

Mode User EXEC Mode

Package Enterprise and Metro

Example

```
iss# show ip nat global
Global Addresses Configured
---------------------------

Interface   Translated Local IP      Translated IP Address Range
---------   -------------------      ---------------------------
vlan1       35.1.1.1                 255.0.0.0
```

Related Commands

- **`static nat`** - Adds a static mapping between local and global address on the specified interface.
- **`ip nat pool`** - Adds global address pool.

40.15 show virtual servers

This command displays the current virtual server configurations.

`show virtual servers`

Mode User EXEC Mode

Package Enterprise and Metro

Example

```
iss# show virtual servers

Virtual Servers Configuration
-----------------------------
Interface   :  vlan1
Local IP    :  192.168.0.10       Local Port  :  21
Protocol    :  ANY
Global IP   :  12.0.0.1           Global Port :  21
Description :
Status      :  Enabled
-------------------------------------------------------
```

Related Command

- **`virtual server`** – Configures a virtual server.

40.16 show portrange

This command displays the port range configurations.

show portrange

Mode User EXEC Mode

Package Enterprise and Metro

Example

```
iss# show portrange

Port Range Configuration
------------------------

I/f     Local IP     Start Port   End Port   Protocol   Status
---     --------     ----------   --------   --------   ------
vlan1  12.0.0.100      21           21         255        Enabled
```

Related Command

- **portrange** - Configures port forwarding range.

40.17 show ip nat interface

This command displays NAT interface configuration.

`show ip nat interface`

Mode User EXEC Mode

Package Enterprise and Metro

Example

```
iss# show ip nat interface

NAT Configuration on the WAN Interface
--------------------------------------
Interface       NAT         NAPT
---------       ------      -------
vlan1           Enabled     Enabled
```

Related Command

- **`interface nat`** – Enables or disables Interface NAT status.

40.18 show port trigger

This command displays the port trigger configurations.

show port trigger

Mode User EXEC Mode

Package Enterprise and Metro

Example

```
iss# show port trigger

Application     Outbound       Inbound         Protocol
Name            Port Range     Port Range
--------------- -------------- --------------- --------
fifa2000         2000-3000      200-600         TCP
```

Related Command

- **port trigger** - Configures port trigger for outbound and inbound application.

40.19 show port trigger reserved list

This command displays the port trigger reserved list.

show port trigger reserved list

Mode User EXEC Mode

Package Enterprise and Metro

Example

```
iss# show port trigger reserved list

Application    Local      Remote      Outbound    Inbound     Protocol
Name         IpAddress  IpAddress   Port Range  Port Range
----------------- ---------------- ----------- ----------- -----
ftp1      192.168.1.20   30.1.1.10    20-25       20-25       TCP
```

☞ After the connection is made if corresponding port trigger entry is there, it is dynamically added to reserved port trigger list.

Related Command

- **port trigger** – Configures port trigger for outbound and inbound application

Appendix A

DHCP Options

This section describes the various DHCP options that can be configured using the ip dhcp option command.

Table A-1: DHCP Options

Option Code	Option	Description
1	Subnet Mask (IP Format)	Specifies the client's subnet mask. The subnet mask option should be configured prior to the router option. The length is 4 octets.
2	Time Offset (IP Format)	Specifies the offset of the client's subnet (in seconds) from UTC (Coordinated Universal Time). A positive offset indicates a location east of the zero meridian and a negative offset indicates a location west of the zero meridian. The length is 4 octets.
3	Router Option (IP Format)	Specifies a list of IP addresses for routers on the client's subnet. Routers should be listed in order of preference. The minimum length is 4 octets. The length should always be a multiple of 4.
4	Time Server Option (IP Format)	Specifies a list of time servers available to the client. Servers should be listed in order of preference. The minimum length is 4 octets. The length should always be a multiple of 4.
5	Name Server (IP Format)	Specifies a list of name servers available to the client. Servers should be listed in order of preference.

Option Code	Option	Description
		The minimum length is 4 octets. The length should always be a multiple of 4.
6	Domain Name Server (IP Format)	Specifies a list of domain name system name servers available to the client. Servers should be listed in order of preference. The minimum length is 4 octets. The length should always be a multiple of 4.
7	Log Server (IP Format)	Specifies a list of MIT-LCS UDP log servers available to the client. Servers should be listed in order of preference. The minimum length is 4 octets. The length should always be a multiple of 4.
8	Cookie Server (IP Format)	Specifies a list of cookie servers available to the client. Servers should be listed in order of preference. The minimum length is 4 octets. The length should always be a multiple of 4.
9	LPR Server (IP Format)	Specifies a list of line printer servers available to the client. Servers should be listed in order of preference. The minimum length is 4 octets. The length should always be a multiple of 4.
10	Impress Server (IP Format)	Specifies a list of imagen impress servers available to the client. Servers should be listed in order of preference. The minimum length is 4 octets. The length should always be a multiple of 4.
11	Resource Location Server (IP Format)	Specifies a list of resource location servers available to the client. Servers should be listed in order of preference. The minimum length is 4 octets. The length should always be a multiple of 4.
12	Host Name (String)	Specifies the name of the client. The minimum length is 1.
13	Boot File Size (String) – This option is not configurable.	
14	Merit Dump File (String)	Specifies the path name of a file to which the client's core image should be dumped when the client crashes. The minimum length is 1.
15	Domain Name (String)	Specifies the domain name that client uses while resolving host names through the domain name system. The minimum length is 1.
16	Swap Server (IP Format)	Specifies the IP address of the client's swap server. The length is 4.
17	Root Path (String)	Specifies the path name containing the client's root disk. The minimum length is 1.
18	Extensions Path (String)	Specifies a file that is retrievable through TFTP. This file contains information that can be interpreted in the same way as the 64-octet vendor-extension field within the BOOTP response, with the following exceptions:

Option Code	Option	Description
		• The length of the file is unconstrained. • All references to Tag 18 (that is, instances of the BOOTP Extensions Path field) within the file are ignored. The minimum length is 1.
19	IP Forwarding Enable/Disable (Integer)	Specifies whether the client should configure its IP layer for packet forwarding. Value 0 means disable IP forwarding, and value 1 means enable IP forwarding. The length is 1.
20	Non-local Source Routing Enable/Disable (Integer)	Specifies whether the client should configure its IP layer to allow forwarding of datagrams with non-local source routes. Value 0 means disable forwarding of such datagrams, and value 1 means enable forwarding of such datagrams. The length is 1.
21	Policy Filter (IP Format)	Specifies policy filters for non-local source routing. The filters consist of a list of IP addresses and masks that specify destination/mask pairs with which to filter incoming source routes. The client should discard any source-routed datagram whose next-hop address does not match with anyone of the filters. The minimum length is 8. The length should always be a multiple of 8.
22 – 24 These options are not configurable.		
25	Path MTU Plateau Table (Integer)	Specifies a table of MTU sizes to use when performing path MTU discovery. The table is formatted as a list of values, ordered from smallest to largest. The minimum length is 2. The length should always be a multiple of 2.
26	Interface MTU (Integer) – This option is not configurable	
27	All Subnets are Local (Integer)	Specifies whether the client assumes that all subnets of the IP network to which the client is connected use the same MTU as the subnet of that network to which the client is directly connected. Value 1 means all subnets share the same MTU, and value 0 means some subnets of the directly connected network have smaller MTUs. The length is 1.
28	Broadcast Address (IP Format) – This option is not configurable	
29	Perform Mask Discovery (Integer)	Specifies whether the client should perform subnet mask discovery using ICMP. Value 0 means the client should not perform mask discovery, and value 1 means the client should perform mask discovery. The length is 1.
30	Mask Supplier (Integer)	Specifies whether the client should respond to subnet mask requests using ICMP. Value 0 means the client should not respond, and value 1 means the client should respond. The length is 1.

Option Code	Option	Description
31	Perform Router Discovery (Integer)	Specifies whether the client should solicit routers using the router discovery mechanism. Value 0 means the client should not perform router discovery, and value 1 means the client should perform router discovery. The length is 1.
32	Router Solicitation Address (IP Format) – This option is not configurable.	
33	Static Route (IP Format)	Specifies a list of static routes that the client should install in its routing cache. The minimum length is 8. The length should always be a multiple of 8.
34	Trailer Encapsulation (Integer)	Specifies whether the client should negotiate the use of trailers while using the ARP protocol. Value 0 means the client should not attempt to use trailers, and value 1 means the client should attempt to use trailers. The length is 1.
35	ARP Cache Timeout (Integer) – This option is not configurable.	
36	Ethernet Encapsulation (Integer)	Specifies whether the client should use Ethernet version 2 (RFC 894) or IEEE 802.3 (RFC 1042) encapsulation if the interface is an Ethernet. Value 0 means the client should use RFC 894 encapsulation, and value 1 means the client should use RFC 1042 encapsulation. The length is 1.
37 – 38 These options are not configurable.		
39	TCP keepalive Garbage (Integer)	Specifies whether the client should send TCP keep-alive messages with an octet of garbage for compatibility with older implementations. Value 0 means a garbage octet should not be sent, and value 1 means a garbage octet should be sent. The length is 1.
40	Network Information Service Domain (String)	Specifies the name of the client's NIS domain. The minimum length is 1.
41	Network Information Server (IP Format)	Specifies a list of IP addresses indicating NIS servers available to the client. The minimum length is 4. The length should always be a multiple of 4.
42	Network Time Protocol server (IP Format)	Specifies a list of IP addresses indicating NTP servers available to the client. The minimum length is 4. The length should always be a multiple of 4.
43	Vendor specific information	Allows clients and servers to exchange vendor-specific information. The information is presumably interpreted by vendor-specific code on the clients and servers. The minimum length is 1.
44	NetBIOS over TCP/IP name server (IP	Specifies a list of RFC 1001/1002 NBNS name servers. The minimum length is 4 octets. The length should always be a multiple of

Option Code	Option	Description
	Format)	4.
45	NetBIOS over TCP/IP Datagram Distribution Server (IP Format)	Specifies a list of RFC 1001/1002 NBDD servers. The minimum length is 4 octets. The length should always be a multiple of 4.
46	NetBIOS over TCP/IP Node Type (Integer)	Allows NetBIOS over TCP/IP client, which are configured as described in RFC 1001/1002. The length is 1.
47	NetBIOS over TCP/IP Scope (String)	Specifies the NetBIOS over TCP/IP scope parameter for the client as specified in RFC 1001/1002. The minimum length is 1.
48	X Window System Font Server (IP Format)	Specifies a list of X window system font servers available to the client. The minimum length is 4 octets. The length should always be a multiple of 4.
49	Window System Display Manager (IP Format)	Specifies a list of IP addresses of systems that are running the X window system display manager and are available to the client. The minimum length is 4. The length should always be a multiple of 4.
50 – 63 These options are not configurable		
64	Network Information Service+ Domain (String)	Specifies the name of the client's NIS and domain. The minimum length is 1.
65	Network Information Service+ Servers (IP Format)	Specifies a list of IP addresses indicating NIS and servers available to the client. The minimum length is 4. The length should always be a multiple of 4.
66	TFTP Server Name (IP Format/String)	Allows to identify a TFTP server when the sname field in the DHCP header is used for DHCP options. The minimum length is 1.
67	Bootfile Name (String)	Allows to identify a bootfile when the file field in the DHCP header is used for DHCP options. The minimum length is 1.
68	Mobile IP Home Agent (IP Format)	Specifies a list of IP addresses indicating mobile IP home agents available to the client. The minimum length is 0 (indicating home agents are not available). The length should always be a multiple of 4.
69	SMTP Server (IP Format)	Specifies a list of SMTP (Simple Mail Transfer Protocol) servers available to the client. The minimum length is 4 octets. The length should always be a multiple of 4.
70	POP3 Server (IP	Specifies a list of POP3 servers available to the client.

Option Code	Option	Description
	Format)	The minimum length is 4 octets. The length should always be a multiple of 4.
71	NNTP Server (IP Format)	Specifies a list of NNTP servers available to the client. The minimum length is 4 octets. The length should always be a multiple of 4.
72	Default WWW server (IP Format)	Specifies a list of WWW (World Wide Web) servers available to the client. The minimum length is 4 octets. The length should always be a multiple of 4.
73	Finger Server (IP Format)	Specifies a list of finger servers available to the client. The minimum length is 4 octets. The length should always be a multiple of 4.
74	Default Internet Relay Chat Server (IP Format)	Specifies a list of IRC servers available to the client. The minimum length is 4 octets. The length should always be a multiple of 4.
75	StreetTalk Server (IP Format)	Specifies a list of StreetTalk servers available to the client. The minimum length is 4 octets. The length should always be a multiple of 4.
76	StreetTalk Directory Assistance Server (IP Format)	Specifies a list of STDA servers available to the client. The minimum length is 4 octets. The length should always be a multiple of 4.
77 – 2147483647 These options are not configurable		

Feature not supported - This feature has been included to adhere to the Industry Standard CLI syntax. This feature is currently not supported.