Carrier Grade IPv6 without Service Modules

This module describes how to implement the Carrier Grade IPv6 (CGv6) without Services Modules.

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MAP-E without service modules

Table 1: Feature History Table

Feature Name	Release Information	Feature Description
MAP-E support on 5th Generation ASR 9000 Series Line Cards	Release 7.4.1	MAP-E has been supported on Cisco ASR 9000 Series and Cisco ASR 9900 series 4th generation Ethernet line cards. In this release, Map-E support is extended to the following Cisco ASR9000 Series and Cisco ASR 9900 Series 5th generation hardware: • A9K-20HG-FLEX-SE/TR • A9K-8HG-FLEX-SE/TR • A99-32X100GE-X-SE/TR • A99-10X400GE-X-SE/TR • A9K-4HG-FLEX-SE/TR • ASR-9903 fixed-port router and Port Expansion Cards (PECs) • ASR-9902 fixed-port router

This feature configures Mapping of Address and Portal-Encapsulation Mode (MAP-E) CGN solution without service cards (ISM or VSM). The CGN application directly interacts with the line cards to configure MAP-E.

Note The MAP-E CGN solution without service cards (VSM/ISM) is supported on Cisco IOS XR and Cisco IOS XR 64 bit operating system.

Restrictions for Configuring MAP-E without Service Card on Cisco IOS XR 32-bit Operating System

- MAP-E is supported on the 3rd and 4th generation of Cisco ASR 9000 Series Ethernet line cards.
- MAP-E without service cards can be enabled only in a default VRF.
- If MAP-E or MAP-T is enabled on an interface, other policy based routing (PBR) features such as CLI PBR, BGP Flow Spec, One Platform Kit (onePK), OpenFlow, ingress ACLs and BNG are not supported. This is because only one PBR policy is allowed on the interface per direction.
- In a router, only one mode of either inline-service with service card or inline-service without service card is supported.

Restrictions for Configuring MAP-E without Service Card on Cisco IOS XR 64-bit Operating System

- From Cisco IOS XR Release 7.0.1 onwards, Cisco ASR 9000 Series 4th Generation Ethernet line cards support MAP-E.
- From Cisco IOS XR Release 7.4.1 onwards, Cisco ASR 9000 Series 5th Generation Ethernet line cards support MAP-E.

Types of exception packets handled only by Service Module:

- IPv6 extension headers.
- V4/V6 fragmented packets.
- ICMP messages (excluding ICMP echo message and reply packets, which are processed by the inline interface for MAP-E)
- TCP Maximum Segment Size and Path MTU checks.
- Packets with Loose Source Route (LSR) and Strict Source Route (SSR) IPv4 options

Configuring MAP-E without service modules

This feature allows to configure Mapping of Address and Portal-Encapsulation Mode (MAP-E) CGN solution without service cards (ISM or VSM). The CGN application directly interacts with the line cards to configure MAP-E.

Configuring MAP-E instances without service modules

Perform these tasks to configure MAP-E without service modules.

SUMMARY STEPS

1. **configure**
2. **service cgv6** *instance-name*
3. **service-inline***interface-name*
4. **service-type map-e** *instance-name*
5. **end** or **commit**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RSP0/CPU0:routerco# configure`	Enters global configuration mode.

Step 2	**service cgv6** *instance-name*
	Example:
	`RP/0/RSP0/CPU0:router(config)# service Cgv6 cgv6-1`
	`RP/0/RSP0/CPU0:router(config-cgv6)#`
		Configures the instance for the CGv6 application and enters CGv6 configuration mode.
		Note
		The maximum number of CGv6 applications allowed for a MAP-E instance is 6.

Step 3	**service-inline***interface-name* **Example:** `RP/0/RSP0/CPU0:router(config-cgv6)#Service-inline interface TenGigE0/0/0/0`	Configures the service-inline interface.

Step 4	**service-type map-e** *instance-name*
	Example:
	`RP/0/RSP0/CPU0:router(config-cgv6) #service-type map-e map1`
	`RP/0/RSP0/CPU0:router(config-cgV6-map_e)#`
		Configures the service type keyword definition for CGv6 MAP-E application.

Step 5	**end** or **commit**
	Example:
	`RP/0/RSP0/CPU0:router(config-cgv6-map_e)# end`
	`or`
	`RP/0/RSP0/CPU0:router(config-cgv6-map_e)# Commit`
		Saves configuration changes.
		• When you issue the end command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting (yes/no/cancel)?`
		`[cancel]:`
		  • Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		  • Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.

	Command or Action	Purpose
		• Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes. • Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Configuring cpe domain parameters without service modules

Perform this task to configure cpe domain interface for MAP-E without service modules.

SUMMARY STEPS

1. **configure**
2. **service cgv6** *instance-name*
3. **service-inline** *interface-name*
4. **service-type map-e** *instance-name*
5. **cpe-domain ipv4 prefix** *ipv4 adress/prefix* **cpe-domain ipv6 prefix** *ipv6 adress/prefix*
6. **end** or **commit**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RSP0/CPU0:routerco# configure`	Enters global configuration mode.

Step 2	**service cgv6** *instance-name*
	Example:
	`RP/0/RSP0/CPU0:router(config)# service Cgv6 cgv6-1`
	`RP/0/RSP0/CPU0:router(config-cgv6)#`
		Configures the instance for the CGv6 application and enters CGv6 configuration mode.

Step 3	**service-inline** *interface-name* **Example:** `RP/0/RSP0/CPU0:router(config-cgv6)#Service-inline interface TenGigE0/0/0/0`	Configures the service-inline interface.
Step 4	**service-type map-e** *instance-name* **Example:**	Configures the service type keyword definition for CGv6 MAP-E application.

	Command or Action	Purpose
	`RP/0/RSP0/CPU0:router(config-cgv6) #service-type map-e map1` `RP/0/RSP0/CPU0:router(config-cgV6-map_e)#`	

Step 5	**cpe-domain ipv4 prefix** *ipv4 adress/prefix* **cpe-domain ipv6 prefix** *ipv6 adress/prefix*
	Example:
	`RP/0/RSP0/CPU0:router(config-cgv6-map_e)#cpe-domain ipv4 prefix 120.2.1.0/24`
	`RP/0/RSP0/CPU0:router(config-cgv6-map_e)#cpe-domain ipv6 prefix 9020:da8:2::/48`
		Configures the IPv4 or IPv6 prefixes of the CPE domain parameter without service modules.

Step 6	**end** or **commit**
	Example:
	`RP/0/RSP0/CPU0:router(config-cgv6-map_e)# end`
	`or`
	`RP/0/RSP0/CPU0:router(config-cgv6-map_e)# Commit`
		Saves configuration changes.
		• When you issue the end command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting (yes/no/cancel)?`
		`[cancel]:`
		  • Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		  • Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		  • Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Configuring port sharing ratio and contiguous port without service modules

Perform this task to configure port sharing ratio and contiguous port.

SUMMARY STEPS

1. **configure**
2. **service cgv6** *instance-name*
3. **service-inline** *interface-name*
4. **service-type map-e** *instance-name*
5. **cpe-domain ipv4 prefix** *ipv4 adress/prefix* **cpe-domain ipv6 prefix** *ipv6 adress/prefix*
6. **sharing-ration 256**
7. **contiguous-port 16**

8. **end** or **commit**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RSP0/CPU0:routerco# configure`	Enters global configuration mode.

Step 2	**service cgv6** *instance-name*
	Example:
	`RP/0/RSP0/CPU0:router(config)# service Cgv6 cgv6-1`
	`RP/0/RSP0/CPU0:router(config-cgv6)#`
		Configures the instance for the CGv6 application and enters CGv6 configuration mode.

Step 3	**service-inline** *interface-name* **Example:** `RP/0/RSP0/CPU0:router(config-cgv6)#Service-inline interface TenGigE0/0/0/0`	Configures the service-inline interface.

Step 4	**service-type map-e** *instance-name*
	Example:
	`RP/0/RSP0/CPU0:router(config-cgv6) #service-type map-e map1`
	`RP/0/RSP0/CPU0:router(config-cgV6-map_e)#`
		Configures the service type keyword definition for CGv6 MAP-E application.

Step 5	**cpe-domain ipv4 prefix** *ipv4 adress/prefix* **cpe-domain ipv6 prefix** *ipv6 adress/prefix*
	Example:
	`RP/0/RSP0/CPU0:router(config-cgv6-map_e)#cpe-domain ipv4 prefix 120.2.1.0/24`
	`RP/0/RSP0/CPU0:router(config-cgv6-map_e)#cpe-domain ipv6 prefix 9020:da8:2::/48`
		Configures the IPv4 or IPv6 prefixes of the CPE domain parameter without service modules.

Step 6	**sharing-ration 256** **Example:** `RP/0/RSP0/CPU0:router(config-cgv6-map_e)#sharing-ratio 256`	Configures the port sharing ratio. The value for the port sharing ratio is 256.
Step 7	**contiguous-port 16** **Example:** `RP/0/RSP0/CPU0:router(config-cgv6-map_e)#contiguous-ports 16`	Configures the contiguous port. The value for the contiguous port is 16.
Step 8	**end** or **commit**	Saves configuration changes.

	Command or Action	Purpose

	Example:
	`RP/0/RSP0/CPU0:router(config-cgv6-map_e)# end`
	or
	`RP/0/RSP0/CPU0:router(config-cgv6-map_e)# Commit`
		• When you issue the end command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting (yes/no/cancel)? [cancel]:`
		• Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
		• Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
		• Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
		• Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Configuring BR Endpoint Address without modules

Perform this task to configure the BR Endpoint Address without service modules.

SUMMARY STEPS

1. **configure**
2. **service cgv6** *instance-name*
3. **service-inline** *interface-name*
4. **service-type map-e** *instance-name*
5. **cpe-domain ipv4 prefix** *ipv4 adress/prefix* **cpe-domain ipv6 prefix** *ipv6 adress/prefix*
6. **sharing-ration 256**
7. **contiguous-port 16**
8. **br-endpoint-adress**
9. **end**or **commit**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RSP0/CPU0:routerco# configure`	Enters global configuration mode.

	Command or Action	Purpose

Step 2	**service cgv6** *instance-name*
	Example:
	`RP/0/RSP0/CPU0:router(config)# service Cgv6 cgv6-1`
	`RP/0/RSP0/CPU0:router(config-cgv6)#`
		Configures the instance for the CGv6 application and enters CGv6 configuration mode.

Step 3	**service-inline** *interface-name* **Example:** `RP/0/RSP0/CPU0:router(config-cgv6)#Service-inline interface TenGigE0/0/0/0`	Configures the service-inline interface.

Step 4	**service-type map-e** *instance-name*
	Example:
	`RP/0/RSP0/CPU0:router(config-cgv6) #service-type map-e map1`
	`RP/0/RSP0/CPU0:router(config-cgV6-map_e)#`
		Configures the service type keyword definition for CGv6 MAP-E application.

Step 5	**cpe-domain ipv4 prefix** *ipv4 adress/prefix* **cpe-domain ipv6 prefix** *ipv6 adress/prefix*
	Example:
	`RP/0/RSP0/CPU0:router(config-cgv6-map_e)#cpe-domain ipv4 prefix 120.2.1.0/24`
	`RP/0/RSP0/CPU0:router(config-cgv6-map_e)#cpe-domain ipv6 prefix 9020:da8:2::/48`
		Configures the IPv4 or IPv6 prefixes of the CPE domain parameter without service modules.

Step 6	**sharing-ration 256** **Example:** `RP/0/RSP0/CPU0:router(config-cgv6-map_e)#sharing-ratio 256`	Configures the port sharing ratio. The value for the port sharing ratio is 256.
Step 7	**contiguous-port 16** **Example:** `RP/0/RSP0/CPU0:router(config-cgv6-map_e)#contiguous-ports 16`	Configures the contiguous port. The value for the contiguous port is 16.
Step 8	**br-endpoint-adress** **Example:** `RP/0/RSP0/CPU0:router(config-cgv6-map_e)#br-endpoint-address 9020:da8:2:ffff::1`	Configures the br-endpoint-address.

Step 9	**end**or **commit**
	Example:
	`RP/0/RSP0/CPU0:router(config-cgv6-map_e)# end`
	`or`
	`RP/0/RSP0/CPU0:router(config-cgv6-map_e)# Commit`
		Saves configuration changes.
		• When you issue the end command, the system prompts you to commit changes:
		`Uncommitted changes found, commit them before exiting (yes/no/cancel)?`
		`[cancel]:`

	Command or Action	Purpose
		• Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode. • Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes. • Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes. • Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

MAP-T without Service Cards

The objective of this feature is to ensure that the Mapping of Address and Port-Translation Mode (MAP-T) CGN solution can be implemented without service cards (VSM/ISM). With this feature, the CGN application directly interacts with the line cards to configure the MAP-T parameters and eliminates the dependency on the service cards.

Note The MAP-T CGN solution without service cards (VSM/ISM) is supported on Cisco IOS XR and Cisco IOS XR 64 bit operating system.

Restrictions for Configuring MAP-T without Service Card on Cisco IOS XR 32-bit Operating System

- MAP-T is supported on Cisco ASR 9000 Series and Cisco ASR 9900 Series 3rd, 4th, and 5th generation Ethernet line cards.
- If this feature is enabled on an interface, other PBR (policy based routing) features such as CLI PBR, BGP Flow Spec, One Platform Kit (onePK) or OpenFlow may not be functional; this is because only one PBR policy will be allowed on the interface.
- In a router, only one mode of either inline-service with service card or inline-service without service card will be supported.
- At a router level, the max scale limit for CPE domain parameters is 25 and for external domain parameters is 8k. If a single MAP-T instance has utilized 25 of CPE domain and 8k of external domain parameters; it is not possible to configure additional CPE and external domain parameters in the same router.

Restrictions for Configuring MAP-T without Service Card on Cisco IOS XR 64-bit Operating System

- From Cisco IOS XR Release 7.0.1 onwards, Cisco ASR 9000 Series 4th Generation Ethernet line cards support MAP-T.

- From Cisco IOS XR Release 7.1.2 onwards, Cisco ASR 9000 Series 5th Generation Ethernet line cards support MAP-T.
- MAP-T can be enabled in normal unicast routing scenario with default VRF. With non-default VRF, MAP-T works only in L3VPN and 6VPE cloud.
- For the IPv6 prefix length greater than 48 and less than 64 the sharing-ratio and contiguous-ports configurations are not considered during the translation.
- The Exception and Fragmented packets are not supported with inline MAP-T.
- In a single MAP-T instance only 255 CPE-domains are supported.

Note

- When you configure the MAP-T on Cisco ASR 9000 fourth generation line cards, verify the value in the num free field of the TCAM table.

  To verify the num free field values, use the **show controller controllers rm tcam summary 640-ING all np all location <node-id>** command.

  The number of MAP-T external domains that you can configure is based on the num free field values. When you configure a number of MAP-T external domains that exceed the num free field value, it results in a complete loss of traffic.

- Adding duplicate prefixes that already exist in other domains is not supported. If attempted, the RIB updates to map these prefixes to the new domain. If the duplicate domain is then deleted, the RIB removes the prefix instead of reverting it to the original domain, which interrupts forwarding.

This table shows the supported values for configuring MAP-T feature:

Table 2: Maximum Supported Values for Configuring MAP-T without Service Card on Cisco IOS XR 64-bit

Parameters	Maximum Supported Values
CGv6 Services	6
MAP-T Instances	255
CPE-domain	1023
External-domains	8191

Configuring MAP-T without Service Cards

To configure a MAP-T without service cards, perform the steps below.

SUMMARY STEPS

1. **configure**
2. **service cgv6** *instance-name*
3. **service-inline interface** *type interface-path-id*
4. **service-type map-t-cisco***instance-name*

5. **cpe-domain ipv4 prefix length** *value*
6. **cpe-domain ipv6 vrf** *vrf-name*
7. **cpe-domain ipv6 prefix length** *value*
8. **sharing ratio***number*
9. **contiguous-ports***number*
10. **cpe-domain-name** *cpe-domain-name* **ipv4 prefix** *address/prefix* **ipv6 prefix** *address/prefix*
11. **ext-domain-name** *ext-domain-name* **ipv6 prefix** *address/prefix* **ipv4-vrf** *vrf-name*
12. Use the **commit** or **end** command.
13. **show policy-map transient type pbr**
14. **show pbr service-node table summary**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure`	Enters global configuration mode.

Step 2	**service cgv6** *instance-name*
	Example:
	`RP/0/RP0/CPU0:router(config)# service cgv6 cgv6-1`
	`RP/0/RP0/CPU0:router(config-cgv6)#`
		Configures the instance for the CGv6 application and enters CGv6 configuration mode.
		Note
		The maximum number of CGv6 applications allowed for a MAP-T instance is 6.

Step 3	**service-inline interface** *type interface-path-id*
	Example:
	`RP/0/RP0/CPU0:router(config-cgv6)# service-inline interface TenGigE0/0/0/0`
	`RP/0/RP0/CPU0:router(config-cgv6)#`
		Specifies an Ethernet interface on which the CGv6 service must be enabled.

Step 4	**service-type map-t-cisco***instance-name* **Example:** `RP/0/RP0/CPU0:router(config-cgv6)# service-type map-t-cisco map1`	Configures the service type keyword definition for CGv6 MAP-T application. application.
Step 5	**cpe-domain ipv4 prefix length** *value* **Example:** `RP/0/RP0/CPU0:router(config-cgn-map-t-cisco)#` **`cpe-domain ipv4 prefix length 24`**	Configures the IPv4 prefix of the CPE domain
Step 6	**cpe-domain ipv6 vrf** *vrf-name* **Example:** `RP/0/RP0/CPU0:router(config-cgn-map-t-cisco)#` **`cpe-domain ipv6 vrf mapt-v6`**	Enables Virtual Routing and Forwarding (VRF) for the MAP-T configuration.

	Command or Action	Purpose
Step 7	**cpe-domain ipv6 prefix length** *value* **Example:** `RP/0/RP0/CPU0:router(config-cgn-map-t-cisco)#cpe-domain ipv6 prefix length 48`	Assigns a value for the ipv6-prefix length to be used as part of the MAP-T instance.
Step 8	**sharing ratio***number* **Example:** `RP/0/RP0/CPU0:router(config-cgn-map-t-cisco)#sharing-ratio 256`	Enters global configuration mode.
Step 9	**contiguous-ports***number* **Example:** `RP/0/RP0/CPU0:router(config-cgn-map-t-cisco)#contiguous-ports 8`	Specifies the Port Set ID (PSID) configuration.
Step 10	**cpe-domain-name** *cpe-domain-name* **ipv4 prefix** *address/prefix* **ipv6 prefix** *address/prefix* **Example:** `RP/0/RP0/CPU0:router(config-cgn-map-t-cisco)#cpe-domain-name cpe1 ipv4-prefix 10.0.0.1 ipv6-prefix 1000:1000::1`	Configures IPv4 and IPv6 prefix for a specific CPE domain.
Step 11	**ext-domain-name** *ext-domain-name* **ipv6 prefix** *address/prefix* **ipv4-vrf** *vrf-name* **Example:** `RP/0/RP0/CPU0:router(config-cgn-map-t-cisco)#ext-domain-name ext1 ipv6-prefix 2000:2000::1/48 ipv4-vrf mapt`	Configures IPv6 prefix and IPv4 VRF for the external domain.
Step 12	Use the **commit** or **end** command.	**commit** —Saves the configuration changes and remains within the configuration session. **end** —Prompts user to take one of these actions: • **Yes** — Saves configuration changes and exits the configuration session. • **No** —Exits the configuration session without committing the configuration changes. • **Cancel** —Remains in the configuration session, without committing the configuration changes.
Step 13	**show policy-map transient type pbr** **Example:** `RP/0/RP0/CPU0:router#show policy-map transient type pbr`	Displays the transient list type pbr of the policy-map.
Step 14	**show pbr service-node table summary** **Example:**	Displays the output for the class-maps.

	Command or Action	Purpose
	`RP/0/RP0/CPU0:router#show pbr service-node table summary`	

Configuration Example

Running Configuration

Verification

The following example shows the configuration of MAP-T without service cards:

```
RP/0/RP0/CPU0:router#show running-config service cgv6 cgv6-1
service cgv6 cgv6-1
service-inline interface Bundle-Ether2
service-type map-t-cisco mapt1
  cpe-domain ipv4 prefix length 24
  cpe-domain ipv6 vrf SVRF-003
  sharing-ratio 256
  contiguous-ports 8
  cpe-domain-name cpe1 ipv4-prefix 192.1.1.0 ipv6-prefix 2301:d01:1122::
  ext-domain-name ext1 ipv6-prefix 3301:d01:1122::/48 ipv4-vrf VRF-1
!
!
```

The following example shows the running configuration of MAP-T without service cards:

The following example shows the verification output:

```
RP/0/RP0/CPU0:router#show policy-map transient type pbr
policy-map type pbr CGN_0
handle:0x38000002
table description: L3 IPv4 and IPv6
class handle:0x78000003  sequence 1
   match destination-address ipv4 192.1.1.0 255.255.255.0--->should match the cpe domain
IPV4 address and mask
  punt service-node index 1001 app-id 0 local-id 0xfa1
!
 class handle:0x78000004  sequence 1
   match destination-address ipv6 3301:d01:1122::/48--->should match the ext domain IPV6
address and mask
  punt service-node index 2001 app-id 0 local-id 0x1771
!
 class handle:0xf8000002  sequence 4294967295 (class-default)
!
 end-policy-map
```

The following example shows the output for the class-maps:

```
RP/0/RP0/CPU0:router#show pbr service-node table summary

Service node count: 4
nodeid node0_RSP1_CPU0
_____________________________________
 Name          VIdx          Enc
_____________________________________
 CGN_1001           1001   cgn
 CGN_3001           3001   cgn
 CGN_5001           5001   cgn
 CGN_7001           7001   cgn
```

Overview of MAP-T Logging

MAP-T Logging feature records and exports the IPv4 to IPv6 and IPv6 to IPv4 address translation information to the server. It captures all the following information and stores in the server as a template. It helps to map which IPv4 address translated to which corresponding IPv6 address, and vice versa.

A single translated flow captures the following details:

- IPv4 source address
- IPv4 destination address
- Source port
- Destination port
- VRF name configured in CPE-domain
- VRF name configured in EXT-domain
- Timestamp
- IPv6 source address
- IPv6 destination address

Following is the detail information:

- Ports are not being translated during MAP-T conversion so there is no pre-NAT or post-NAT display. Only one pair of IPv4 or IPv6 address or port is displayed in a MAP-T logging record.
- There is no indication that MAP-T converted flow is IPv4 to IPv6 or IPv6 to IPv4.
- The following information is displayed from the point of view IPv4 packet, which is IPv4 to IPv6:
  - The ingress VRF is of IPv4 address, and the egress VRF is of IPv6 address.
  - The Layer 4 destination port and source port are the same as seen in IPv4 packet header.
- Flows with same address pair in different VRFs are considered as separate flows.
- Any new flow that comes in, after 512k flows are learnt, is dropped. There is no MAP-T conversion for any new flow.
- Output interface is not displayed in the records.
- A 60 second timer runs by default for all flows. If any flow is active for 60 seconds, it is exported out. This is to ensure high availability. If a line card went down or there was a network process failure, all learned flow available in the system for at least 60 seconds will not be lost.

Restrictions

- Ipv4 to IPv6 and IPv6 to IPv4 address translation flow for same pair of address is considered as a single flow if IPv4 to IPv6 and IPvV6 to IPv4 traffic is on same network process. Flow learning across different network process cannot be considered as the same flow on that line card. If they are on a different network process, they are considered as two different flow. Flow collector application can identify unique flows.
- There is a 3-second deviation in flow expiration timer as it takes 3 seconds to scan all the 512k flows.

Configuration Example

```
/* Configure the MAP-T Monitor command */
RP/0/RSP0/CPU0:ios(config)# flow monitor-map map1
RP/0/RSP0/CPU0:ios(config-fmm)# record map-t
RP/0/RSP0/CPU0:ios(config-fmm)# exporter exp1

/* Apply the MAP-T monitor in the ingress interface where translation happens */
RP/0/RSP0/CPU0:ios(config)# interface HundredGigE 0/0/0/2
RP/0/RSP0/CPU0:ios(config-if)# flow map-t monitor map1 ingress

/* Configure the interface in Border Relay (BR) to export the flows to Logging server*/
RP/0/RSP0/CPU0:ios(config)# flow exporter-map exp1
RP/0/RSP0/CPU0:ios(config-fem)# version v9
RP/0/RSP0/CPU0:ios(config-fem)# source TenGigE0/4/0/2
/* Configure the IP address of the server interface */
RP/0/RSP0/CPU0:ios(config-fem)# destination 10.0.0.1
```