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Configuring Bindings

SYSTEM ADMINISTRATOR GUIDE

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Contents

1 Overview

This document describes how to bind a SmartEdge interface to a port, channel, or circuit. Static bindings to circuits include permanent virtual circuits (PVCs), child circuits, link groups, clientless IP service selection (CLIPS) PVCs, and Generic Routing Encapsulation (GRE) tunnel circuits. Dynamic bindings attach to dynamically created subscribers circuits. The administration and monitoring of bindings is also described.

This document applies to both the Ericsson SmartEdge® and SM family routers. However, the software that applies to the SM family of systems is a subset of the SmartEdge OS; some of the functionality described in this document may not apply to SM family routers.

For information specific to the SM family chassis, including line cards, refer to the SM family chassis documentation.

For specific information about the differences between the SmartEdge and SM family routers, refer to the Technical Product Description *SM Family of Systems* (part number 5/221 02-CRA 119 1170/1) in the **`Product Overview`** folder of this Customer Product Information library.

A binding forms the association in the SmartEdge router between a port, channel, or circuit and the higher-layer interface over which routing protocols are configured for a given context. No subscriber data can flow on a port, channel, or circuit until some higher-layer service is configured and associated with it. After you bind a port, channel, or circuit to an interface, traffic flows through the port, channel, or circuit as it would through any IP router.

Note: Unless otherwise noted, the SmartEdge 100 router supports all commands described in this document.

Note: Throughout this document, the term circuit refers to Asynchronous Transfer Mode (ATM), Frame Relay, 802.1Q, and CLIPS PVCs, and Point-to-Point Protocol over Ethernet (PPPoE)-encapsulated child circuits on ATM and 802.1Q PVCs.

Note: When IP Version 6 (IPv6) addresses are not referenced or explicitly specified, the term IP address can refer generally to IP Version 4 (IPv4) addresses, IPv6 addresses, or IP addressing. In instances where IPv6 addresses are referenced or explicitly specified, the term IP address refers only to IPv4 addresses. For a description of IPv6 addressing and the types of IPv6 addresses, see RFC 3513, *Internet Protocol Version 6 (IPv6) Addressing Architecture*.

1.1 Types of Bindings

Bindings are either static, to a fixed interface, or dynamic, based on subscriber characteristics as defined in the local database or on a Remote Authentication Dial-In User Service (RADIUS) server.

Static binding occurs when you bind the port, channel, or circuit directly to an interface. In this case, the port, channel, or circuit is hard-wired to the higher-layer protocols defined for the interface. This is the simplest form of binding available in the SmartEdge router , and provides functions similar to those provided by traditional network devices, such as routers. You can create a static binding for any port, channel, or circuit with any encapsulation type.

Dynamic binding occurs when you bind a port, channel, or circuit to the higher-layer protocols based on session information. Dynamic binding enables SmartEdge router advanced features, such as dynamic service and provider selection. Dynamic bindings can be restricted or unrestricted:

- Unrestricted dynamic binding allows binding to any context; it provides the subscriber with simultaneous access to services that are provided in different contexts on a single circuit.
- Restricted dynamic binding restricts the subscriber to a specified context; the subscriber has access to only the services provided in that context.

Note: You do not bind Layer 2 Tunneling Protocol (L2TP) peers or groups.

1.2 Binding Guidelines

Follow these guidelines to determine whether the port, channel,, PVC, child circuit, link group, or GRE tunnel circuit is to be bound:

- Ports:
  - You do not bind an ATM port; you bind the PVCs configured on it, as described later.
  - You do not bind a channelized OC-12 or STM-1 port; you bind the channels configured on it, as described later.
  - If an Ethernet port has no 802.1Q PVCs or tunnels, CLIPS static circuits, or child circuits configured on it, or is not a member of a link group, you bind the port; otherwise, you bind the port and each 802.1Q PVC and tunnel, CLIPS PVC, and child circuit.
  - If a Fast Ethernet (FE) or Gigabit Ethernet (GE) port is a member of an access, Ethernet, or 802.1Q PVC link group, you do not bind the port; instead, you bind the link group.
  - If an ATM or Packet over a channelized SONET/SDH (POS) port is the working port in an Automatic Protection Switching (APS) group, you

bind it only after it has been added to the group; you do not bind the port if it is a protect port.

  - If a POS port has no Frame Relay PVCs configured on it, you bind the port; otherwise you bind the PVCs configured on it. (Only Frame Relay PVCs are supported.)

  - If an E1 port is a member of a link Frame Relay (MFR) bundle, you do not bind the port, instead you bind the Frame Relay PVCs as members of the link group, as described later.

  - If an E1 port has no DS-0 channel groups or Frame Relay PVCs configured on it or is not a member of a link group, you bind the E1 port; otherwise, you bind each DS-0 channel group and PVC, as described later.

- Channels:

  - If a DS-1 channel has no Frame Relay PVCs configured on it or is not a member of a link group, you bind the DS-1 channel (regardless of whether you have configured DS-0 channels on it); otherwise, you bind each PVC, as described later.

  - If a DS-1 or E1 channel is a member of a link Point-to-Point Protocol (MLPPP) bundle, you do not bind the channel; instead, you bind the link group.

  - If a DS-1 or E1 channel is a member of an MFR bundle, you do not bind the channel, instead you bind the Frame Relay PVCs as members of the link group, as described later.

  - If an E1 channel has no DS-0 channel groups or Frame Relay PVCs configured on it or is not a member of a link group, you bind the E1 channel; otherwise, you bind each DS-0 channel group and PVC, as described later.

  - If a DS-0 channel group has no Frame Relay PVCs configured on it, you bind the DS-0 channel group; otherwise, you bind each PVC, as described later.

- GRE tunnels and tunnel circuits:

  - You do not bind a GRE tunnel; instead, you associate it with its local interface when you specify the IP address of the interface in the **`peer-end-point`** command in tunnel configuration mode.

  - You bind every GRE tunnel circuit.

- Overlay tunnels and tunnel circuits:

  - You do not bind an overlay tunnel; instead, you associate it with its local interface when you specify the IP address of the interface in the **`ipv6 v4tunnel-peer`** command in context configuration mode.

  - You bind every overlay tunnel circuit.

- L2TP tunnels—You do not bind L2TP tunnels.
- Link groups:
  - If the link group is an access, Ethernet, or 802.1Q PVC link group, you bind the link group. This effectively binds the constituent FE or GE ports that are members of the link group.
  - If the link group is an MLPPP bundle, you bind the link group. This effectively binds the constituent DS-1 channels, or E1 channels or ports, that are members of the MLPPP bundle.
  - If the link group is an MFR bundle, you do not bind it; instead, you bind the aggregated Frame Relay PVCs that are members of the link group. This effectively binds the constituent DS-1 channels or E1 channels or ports that are members of the link group.
  - You bind each aggregated Frame Relay PVC that is a member of an MFR bundle.
  - You bind each aggregated 802.1Q PVC that is a member of an access or 802.1Q PVC link group.
- 802.1Q PVCs and tunnels, ATM PVCs, Frame Relay PVCs, and child circuits, and CLIPS PVCs:
  - You can bind the untagged traffic on an FE or a GE port; otherwise, it is dropped.
  - You bind each 802.1Q tunnel.
  - If an 802.1Q PVC has no CLIPS PVCs or child circuits configured on it, you bind the PVC; otherwise, you bind or cross-connect its child circuits; or as a member of a link group, you bind the link group, as described earlier.
  - An 802.1Q PVC within an 802.1Q tunnel is bound according to the same criteria as an 802.1Q PVC that is not within an 802.1Q tunnel.
  - You bind ATM PVCs.
  - If a Frame Relay PVC is not a member of an MFR bundle, you bind the PVC.
  - You bind any PVC that is to be cross-connected.
  - You bind any static CLIPS PVC; dynamic CLIPS PVCs are effectively bound by the **`service`** command in port configuration mode.

1.3 Binding Summary Tables

This section provides binding options for each type of port, channel and circuit.

1.3.1 Bindings for Port Types

The following types of ports and channels are not bound; the channels and circuits configured on them are bound instead:

- ATM OC ports, Section 1.3.4 on page 6, Section 1.3.5 on page 7

The following types of ports can be bound, or the circuits on them can be bound:

- POS ports, Section 1.3.2 on page 5
- FE and GE ports, Section 1.3.3 on page 5, Section 1.3.5 on page 7

1.3.2 Bindings for POS Ports with and without Frame Relay PVCs

Table 1 lists the binding options for POS ports on OC-3c/STM-1c, OC-12c/STM-4c, and OC-48c/STM-16c cards.

Note: POS ports configured with Frame Relay encapsulation are not bound; the Frame Relay PVCs are bound instead. Entering the **`bind`** command in port configuration mode displays an error message.

Table 1 Binding Options for POS Ports with and Without Frame Relay PVCs

Type of Binding	Bind Command	Port Encapsulation PPP	Port Encapsulation Cisco HDLC	Port Encapsulation Frame Relay	PVC Encapsulation Frame Relay
Dynamic	authentication	No	No	No	No
Static	interface	Yes	Yes	No	Yes
	subscriber	No	No	No	No
	auto-subscriber	No	No	No	No

Note: A POS port in an APS group is bound only if it is a working port; you do not bind the protect port.

1.3.3 Bindings for FE and GE Ports and 802.1Q PVCs

Table 2 lists the binding options for FE and GE ports.

Table 2 Binding Options for FE and GE Ports

Type of Binding	Bind Command	Port Encapsulation IPoE	Port Encapsulation PPPoE	Port Encapsulation 802.1Q (dot1q)
Dynamic	authentication	No	Yes	No
Static	interface	Yes	No	Yes
	subscriber	No	No	No
	auto-subscriber	No	No	No

Table 3 lists the binding options for static and on-demand 802.1Q PVCs.

Table 3 Binding Options for Static and On-Demand 802.1Q PVCs

Type of Binding	Bind Command	Type of PVC	802.1Q PVC Encapsulation		
			IPoE	Multi	PPPoE
Dynamic	authentication	Static or on-demand	No	No	Yes
Static	interface	Static only	Yes	Yes	No
	subscriber	Static or on-demand	Yes	Yes	No
	auto-subscriber	On-demand only	No	No	No

Note: When an 802.1Q PVC is configured with encapsulation, the parent circuit is encapsulated with IP over Ethernet (IPoE) encapsulation. Table 8 lists binding options for the child circuits.

1.3.4 Bindings for ATM PVCs

Table 4 lists the binding options for static and on-demand ATM PVCs configured on ATM OC ports.

Table 4 Binding Options for Static and On-Demand ATM PVCs

Type of Binding	Bind Command	Type of ATM PVC	Encapsulation					
			Bridge1483	Multi	Route1483	Raw	PPP	PPPoE
Dynamic	authentication		No	No	No	No	Yes	Yes

Table 4 Binding Options for Static and On-Demand ATM PVCs

Type of Binding	Bind Command	Type of ATM PVC	Encapsulation					
			Bridge1483	Multi	Route1483	Raw	PPP	PPPoE
Static	interface	Static only	Yes	Yes	Yes	No	No	No
	subscriber	See Note	Yes	Yes	Yes	No	Yes	No
	auto-subscriber	Static or on-demand	Yes	Yes	Yes	No	Yes	No

Note: You can use the **`bind subscriber`** command in ATM PVC configuration mode for a single on-demand ATM PVC if you have configured the PVC with the **`aaa`** keyword to use the Remote Authentication Dial-In User Service (RADIUS) to supply the binding, or for a single static ATM PVC.

The following guidelines apply to the encapsulations in Table 4

- The parent circuit with multiprotocol encapsulation carries IPoE traffic. Table 8 lists binding options for the child circuits.
- ATM PVCs configured with **`raw`** mode encapsulation are not bound, but are cross-connected instead.

The following guidelines apply to the subscriber and auto-subscriber commands in Table 4

- Subscriber binding is available only for ATM PVCs created with the **`atm pvc`** command in ATM OC configuration mode.
- Auto-subscriber binding is available only for ATM PVCs created with the **`atm pvc explicit`** or **`atm pvc on-demand`** command in ATM OC configuration mode.

1.3.5 Bindings for CLIPS PVCs

The following guidelines apply to binding CLIPS PVCs:

- You do not bind dynamic CLIPS PVCs, only the Ethernet port, ATM PVC, or 802.1Q PVC on which they are configured.
- CLIPS PVCs, either dynamic or static, are not supported on the on-demand ATM or 802.1Q PVCs.

Table 5 lists the binding options for Ethernet ports with static CLIPS PVCs configured on them.

Table 5 Binding Options for Static CLIPs PVCs on Ethernet Ports

Type of Binding	Bind Command	Port Encapsulation IPoE	Port Encapsulation PPPoE	Port Encapsulation 802.1Q (dot1q)	Static CLIPS PVC Encapsulation IPoE
Dynamic	authentication	No	Yes	No	No
Static	interface	Yes	No	Yes	No
	subscriber	No	No	No	Yes
	auto-subscriber	No	No	No	Yes

Table 6 lists the binding options for static 802.1Q PVCs with static CLIPS PVCs configured on them.

Table 6 Binding Options for Static CLIPS PVCs on Static 802.1Q PVCs

Type of Binding	Bind Command	802.1Q PVC Encapsulation IPoE	802.1Q PVC Encapsulation Multi	802.1Q PVC Encapsulation PPPoE	Static CLIPS PVC Encapsulation IPoE
Dynamic	authentication	No	No	Yes	No
Static	interface	Yes	Yes	No	No
	subscriber	Yes	Yes	No	Yes
	auto-subscriber	No	No	No	Yes

Table 7 lists the binding options for static ATM PVCs with static CLIPS PVCs configured on them.

Table 7 Binding Options for Static ATM PVCs with Static CLIPS PVCs

Type of Binding	Bind Command	ATM PVC Encapsulation Bridge1483	Static CLIPS PVC Encapsulation IPoE
Dynamic	authentication	No	No
Static	interface	Yes	No

Table 7 Binding Options for Static ATM PVCs with Static CLIPS PVCs

Type of Binding	Bind Command	ATM PVC Encapsulation Bridge1483	Static CLIPS PVC Encapsulation IPoE
	subscriber	Yes	Yes
	auto-subscriber	Yes	Yes

The following guidelines apply to the subscriber and auto-subscriber commands in Table 7

- Subscriber binding is available only for static ATM PVCs created with the **`atm pvc`** command in ATM OC configuration mode.
- Auto-subscriber binding is available only for static ATM PVCs created with the **`atm pvc explicit`** command in ATM OC configuration mode.

1.3.6 Bindings for Child Circuits

Table 8 lists the binding options for the child circuits on ATM PVCs and 802.1Q PVCs with multiprotocol encapsulation.

Table 8 Binding Options for Child Circuits

Type of Binding	Bind Command	Encapsulation IPv6oE	Encapsulation PPPoE
Dynamic	authentication	No	Yes
Static	interface	No	No
	subscriber	No	No
	auto-subscriber	No	No

Note: Child circuits configured with IP Version 6 over Ethernet (IPv6oE) encapsulation are not bound, but are cross-connected instead.

1.4 IPv6 Dual Stack Bindings Supported

Table 9 IPv6 Dual Stack Bindings Supported

Type of Binding	Bind Command	Application	Supported Ports	Supported Circuits and Link Groups
Static	`bind interface`	Network-Facing	FE and GE ports	• Dot1Q and Q-in-Q circuits (multibind and, non-multibind), untagged • Network-facing link aggregation groups (LAGs); namely, the Ethernet and 802.1Q link group types.
Dynamic	`bind authentication`	Subscriber-Facing	Binding to subscriber-facing ports is not supported.	Dot1Q and Q-in-Q circuits (multibind and non-multibind) (PPPoE only)

1.5 Related Information

Other documents with related commands include:

- *Configuring ATM, Ethernet, and POS Ports*
- *Configuring Circuits*
- *Configuring Cross-Connections*
- *Configuring Link Aggregation*

2 Configuration and Operations Tasks

To configure a binding, perform the tasks described in one of the following sections:

2.1 Create a Static Binding

To create a static binding, perform one of the task options described in Table 10.

Table 10 Create a Static Binding

Task(1)	**Root Command**	**Notes**
Statically bind a circuit to allow it to be cross-connected.	*bind bypass*	Enter this command in ATM child circuit, ATM PVC, dot1q child circuit, or dot1q PVC configuration mode.
Statically bind a port, channel, or circuit to a previously created interface in the specified context.	*bind interface*	Enter this command in ATM PVC, dot1q PVC, Frame Relay PVC, GRE tunnel, IPv6 tunnel, link group, link PVC, or port configuration mode.
Statically bind a circuit to an interface using the IP address in a subscriber record.	*bind subscriber*	Enter this command in ATM PVC, CLIPS PVC, or dot1q PVC configuration mode.
Statically bind multiple circuits to an interface and automatically generate subscriber names and optional passwords.	*bind auto-subscriber*	Enter this command in ATM or CLIPS PVC configuration mode.

(1) Select only one of the task options.

2.2 Create a Dynamic Binding

To create a dynamic binding, perform one of the task options described in Table 11; enter this command in ATM PVC, dot1q PVC, port, ATM child protocol, or dot1q child protocol configuration mode.

Table 11 Create a Dynamic Binding

Task(1)	**Root Command**	**Notes**
Dynamically bind a port or circuit through a subscriber record or remotely through a RADIUS record without restrictions.	*bind authentication*	You must specify the context to restrict the binding.
Dynamically bind a circuit to an interface using the IP address in a subscriber record and restrict the binding to a specific context.	*bind authentication*	

(1) Select only one of the following task options

2.3 Display Bindings Status

To display bindings status use the **`show bindings`** command listed in Table 12; enter the command in any mode.

Table 12 Display Bindings Status

Task	**Root Command**
Display configured bindings for one or more subscribers, ports, , channel or permanent virtual circuits (PVCs) on the system.	*show bindings*

3 Configuration Examples

This section provides examples of configuring static binding for a single circuit in an interface, static binding for multiple circuits, and restricted dynamic binding for a circuit.

3.1 Static Binding for a Single Circuit to an Interface

The following example shows how to create a static binding between the Ethernet management port and an interface configured in the `local` context:

```
[local]Redback#configure
[local]Redback(config)#context local
[local]Redback(config-ctx)#interface mgmt
[local]Redback(config-if)#ip address 1.2.3.4/24
[local]Redback(config-if)#exit
[local]Redback(config-ctx)#exit
[local]Redback(config)#port ethernet 7/1
[local]Redback(config-port)#bind interface mgmt local
```

3.2 Static Binding for Multiple ATM Circuits

The following example shows how to create 10 ATM PVCs with a virtual path identifier (VPI) value of `100`, and virtual circuit identifier (VCI) values ranging from `100` to `109`, then use the `bind auto-subscriber` command to statically bind each PVC to an automatically generated subscriber record beginning with the string `DSL:`

```
[local]Redback(config)#port atm 3/1
[local]Redback(config-port)#atm pvc explicit 100:100 through 100:109 profile encapsulation route1483
[local]Redback(config-pvc)#bind auto-subscriber DSL local
```

3.3 Static Binding for Multiple 802.1Q PVCs

The following example shows how to create 20 Dot1Q PVCs and bind them to the interface named `california` in the `local` context:

```
[local]Redback(config)#port ethernet 5/1
[local]Redback(config-port)#encap dot1q
[local]Redback(config-port)#dot1q pvc explicit 20 through 40
[local]Redback(config-dot1q-pvc)#bind interface california local
```

3.4 Restricted Dynamic Binding for a Circuit

The following example shows how to limit subscriber sessions on the PPP-encapsulated ATM PVC to the `isp.net` context:

```
[local]Redback(config)#port atm 3/1
[local]Redback(config-port)#atm pvc 100 101 profile ubr encapsulation ppp
[local]Redback(config-pvc)#bind authentication pap context isp.net
```