

# Switch Virtual Interface for Cisco Integrated Services Routers

## Introduction

This document provides an overview of the switch virtual interface (SVI) for Cisco® Integrated Services Routers.

Cisco offers different flavors of integrated switching modules for the modular Cisco 3900, 3800, 2900, 2800, 1900 and 1800 Series Integrated Services Routers: the Cisco 4- and 8-Port Gigabit Ethernet Enhanced High-Speed WAN Interface Cards (EHWICs), 16- and 36-port Cisco EtherSwitch® modules, the Cisco EtherSwitch 4- and 9-port high-speed WAN interface cards (HWICs), the Cisco EtherSwitch service modules, and the Enhanced Cisco EtherSwitch service modules. In addition, the Cisco 1800 and 890 Series fixed-configuration Integrated Services Routers are integrated with an 8-port switch. The Cisco 880, 870, 860 and 850 Series Integrated Services Routers are integrated with a 4-port switch.

The integrated switch ports for the fixed-configuration Integrated Services Routers and the switch ports on the HWICs/EHWICs do not natively support Layer 3 addresses or Layer 3 features. They must be assigned to a SVI and use a VLAN interface for Layer 3 features. SVI represents a logical Layer 3 interface on a switch. In addition to basic routing, SVI can be used to support additional features for the network that the SVI represents.

Table 1 lists the Cisco IOS® Software features supported by SVI and summarized the typical use of these features. Please refer to the Feature Navigator Tool to check whether a specific platform supports a specific feature.

**Table 1.** Cisco IOS Software Features Supported by SVI

Cisco IOS Software Feature	SVI Use Scenario	SVI Support Status
<b>Routing Features</b>		
<b>Routing protocols</b>	Interconnects Layer 3 networks using protocols such as Routing Information Protocol (RIP), Open Shortest Path First (OSPF) Protocol, and Enhanced Interior Gateway Routing Protocol (EIGRP) configured under SVI	Yes
<b>IP Version 6 (IPv6)</b>	Provides IPv6 support	Yes
<b>Network Address Translation (NAT)</b>	Translates public IP addresses to private address pools, and private addresses to public IP addresses; SVI is typically used as a NAT inside interface	Yes
<b>Dynamic Host Configuration Protocol (DHCP)</b>	<ul style="list-style-type: none"> <li>DHCP server feature: Dynamically assigns private IP addresses to devices connected to the switch ports</li> <li>DHCP client feature: Allows the SVI to receive a dynamically assigned IP address</li> </ul>	Yes
<b>Hot Standby Routing Protocol (HSRP)</b>	Supports redundancy and high availability with a secondary device connected to the LAN with SVI, using HSRP	Yes
<b>Virtual Router Redundancy Protocol (VRRP)</b>	Supports redundancy and high availability with a secondary device connected to the LAN with SVI, using VRRP	Yes
<b>Gateway Load Balancing Protocol (GLBP)</b>	Supports redundancy and high availability with a secondary device connected to the LAN with SVI, using GLBP	No
<b>Policy-Based Routing (PBR)</b>	Creates policy maps for routing decisions and QoS settings	Yes
<b>Point-to-Point Protocol (PPP) over Ethernet (PPPoE)</b>	Provides PPPoE client support for a device (such as a DSL modem) connected to the switch port; typically used when the SVI is the only interface available to provide backup using the external device	Yes
<b>Multicast</b>	Provides multicast support for clients connected to the switch ports	Yes
<b>VPN Routing and Forwarding (VRF)</b>	Associates a VRF instance with an SVI to map VLANs to different logical or physical VPN WAN connections	Yes
<b>Layer 2 Tunnel Protocol Version 3 (L2TPv3)</b>	Provides LAN extension between remote sites; SVI is used as the Layer 2 tunnel termination point	Yes (12.4(20)T or later)
<b>Ethernet over MPLS (EoMPLS)</b>	Provides Ethernet extension between remote sites; SVI interface used as the EoMPLS pseudowire attachment circuit	Yes(15.2(2)T or later)

Cisco IOS Software Feature	SVI Use Scenario	SVI Support Status
<b>Security Features</b>		
<b>IP Security (IPsec)</b>	<ul style="list-style-type: none"> <li>Supports Easy VPN remote as the inside interface</li> <li>Provides IPsec tunnel termination on the SVI; typically used when SVI is the only interface available to provide backup WAN connection with an external device (such as a DSL modem)</li> </ul>	Yes
<b>Generic Routing Encapsulation (GRE)</b>	Provides GRE tunnel termination on the SVI; typically used when SVI is the only interface available to provide backup WAN connection with an external device (such as a DSL modem)	Yes
<b>Firewall</b>	Provides Firewall support for VLANs	Yes*
<b>Intrusion Prevention System (IPS)</b>	Provides IPS support for VLANs	Yes
<b>IP access control lists (ACLs)</b>	Provides packet filtering to control network traffic and restrict the access of users and devices to the network	Yes
<b>Network Admission Control (NAC)</b>	Enforces NAC of endpoint devices connected to the VLAN	Yes
<b>Auth-proxy</b>	Authenticates inbound and outbound users connected to the VLAN	Yes
<b>Quality-of-Service (QoS) Features</b>		
<b>Classification with standard and extended access list</b>	Provides QoS classification with standard and extended access lists	Yes (CSCsi01713)
<b>Classification with IP type of service (ToS): IP precedence, differentiated services code point (DSCP), or destination address</b>	Provides QoS classification with IP ToS bits	Yes
<b>Classification with Network-Based Application Recognition (NBAR) with TCP</b>	Provides QoS classification with NBAR TCP traffic	Yes
<b>Class-based marking</b>	Provides QoS marking based on user-defined traffic class with DSCP and IP precedence values	Yes
<b>Policing</b>	Limits the input or output transmission rate on SVI and specifies traffic handling policies when the traffic either conforms to or exceeds the specified rate limits	Yes (15.1(1)T or later)
<b>Committed Access Rate</b>	Limits the input or output transmission rate on SVI	Yes
<b>Class-Based Traffic Shaping</b>	Provides Generic Traffic Shaping based on user defined traffic class	No
<b>Generic-Traffic Shaping</b>	Limits the transmission rate of data to match the speed of the remote, target interface and helps ensure that the traffic conforms to policies contracted for it	No
<b>Weighted Random Early Detection (WRED)</b>	Provides early detection of congestion and differentiated performance characteristics for different classes of service	No
<b>Class-Based Weighted Fair Queue (CBWFQ)</b>	Allocates bandwidth based on user-defined traffic class	No
<b>Low-Latency Queue (LLQ)</b>	Provides strict priority queuing with CBWFQ to allow delay-sensitive data such as voice to be dequeued and sent first, giving delay-sensitive data preferential treatment over other traffic	No
<b>Hierarchical QoS</b>	Using a modular QoS command-line interface (CLI) in a hierarchical structure, provides a high degree of granularity for QoS policies and helps meet complex service-level agreement (SLA) requirements	No

\* Transparent Firewall is only supported between a VLAN and WAN interfaces. It's not supported between 2 or more VLANs. Please refer to CSCse92575.

## Conclusion

SVI on Cisco Integrated Services Routers is designed to provide basic Layer 3 functions for the Layer 2 switch ports that belong to a specific VLAN. The SVI does not provide the same feature set and functions as the integrated Layer 3 Ethernet ports of the integrated services routers and should not be used to entirely replace the Layer 3 Ethernet ports. Customer who need additional Layer 3 Ethernet ports for their Integrated Services Routers may consider the use of 1- and 2-Port Fast Ethernet High-Speed WIC for modular ISR platforms. The guidelines presented in this document summarize feature support considerations for an Integrated Services Router deployment that uses SVIs.

## For More Information

Please refer to the following links for more information:

- Cisco 4- and 8-Port Gigabit Ethernet Enhanced High-Speed WAN Interface Cards:
- Cisco HWIC-4ESW and HWIC-D-9ESW EtherSwitch interface cards:  
[http://www.cisco.com/en/US/partner/products/sw/iosswrel/ps5207/products\\_feature\\_guide09186a00802c6bb6.html](http://www.cisco.com/en/US/partner/products/sw/iosswrel/ps5207/products_feature_guide09186a00802c6bb6.html)
- Cisco EtherSwitch modules comparison:  
[http://www.cisco.com/en/US/products/ps5854/products\\_qanda\\_item0900aecd802a9470.shtml](http://www.cisco.com/en/US/products/ps5854/products_qanda_item0900aecd802a9470.shtml)
- 1- and 2-Port Fast Ethernet High-Speed WIC for Cisco 1841, 2800, and 3800 Integrated Services Routers:  
[http://www.cisco.com/en/US/partner/products/ps5853/products\\_data\\_sheet0900aecd80581fe6.html](http://www.cisco.com/en/US/partner/products/ps5853/products_data_sheet0900aecd80581fe6.html)
- Cisco IOS Security Configuration Guide:  
[http://www.cisco.com/en/US/partner/products/ps6441/products\\_configuration\\_guide\\_book09186a008049e249.html](http://www.cisco.com/en/US/partner/products/ps6441/products_configuration_guide_book09186a008049e249.html)
- Cisco IOS Quality-of-Service Solutions Configuration Guide:  
[http://www.cisco.com/en/US/partner/products/ps6441/products\\_configuration\\_guide\\_book09186a008065c7a1.html](http://www.cisco.com/en/US/partner/products/ps6441/products_configuration_guide_book09186a008065c7a1.html)

## SVI Configuration Examples

### Easy VPN Remote and NAT

[http://www.cisco.com/en/US/technologies/tk583/tk372/technologies\\_white\\_paper09186a00801fdef9.shtml](http://www.cisco.com/en/US/technologies/tk583/tk372/technologies_white_paper09186a00801fdef9.shtml)

### Zone-Based Policy Firewall

[http://www.cisco.com/en/US/products/ps6350/products\\_feature\\_guide09186a008072c6e3.html](http://www.cisco.com/en/US/products/ps6350/products_feature_guide09186a008072c6e3.html)

## DHCP

```

! SDM Default Configuration
! The default startup configuration file for Cisco Router and Security Device
Manager (SDM)
! DO NOT modify this file; it is required by SDM as is for factory defaults
! Version 1.0
!
hostname yourname
!
logging buffered 51200 warnings
!
username cisco privilege 15 secret 0 cisco
!
ip dhcp excluded-address 10.10.10.1
!
ip dhcp pool sdm-pool
  import all
  network 10.10.10.0 255.255.255.248
  default-router 10.10.10.1
  lease 0 2
!
no ip domain lookup
ip domain-name yourdomain.com

```

```
!  
interface FastEthernet2  
  no ip address  
  no shutdown  
!  
interface FastEthernet3  
  no ip address  
  no shutdown  
!  
interface FastEthernet4  
  no ip address  
  no shutdown  
!  
interface FastEthernet5  
  no ip address  
  no shutdown  
!  
interface FastEthernet6  
  no ip address  
  no shutdown  
!  
interface FastEthernet7  
  no ip address  
  no shutdown  
!  
interface FastEthernet8  
  no ip address  
  no shutdown  
!  
interface FastEthernet9  
  no ip address  
  no shutdown  
!  
interface Vlan1  
  description $ETH-SW-LAUNCH$$INTF-INFO-FE 2$  
  ip address 10.10.10.1 255.255.255.248  
  ip tcp adjust-mss 1452  
!  
ip http server  
ip http access-class 23  
ip http secure-server  
ip http authentication local  
ip http timeout-policy idle 60 life 86400 requests 10000  
!  
access-list 23 permit 10.10.10.0 0.0.0.7  
!  
banner login ^  
-----  
Cisco Router and Security Device Manager (SDM) is installed on this device.
```

This feature requires the one-time use of the username "cisco" with the password "cisco". The default username and password have a privilege level of 15.

Please change these publicly known initial credentials using SDM or the IOS CLI.

Here are the Cisco IOS commands.

```
username <myuser> privilege 15 secret 0 <mypassword>
no username cisco
```

Replace <myuser> and <mypassword> with the username and password you want to use.

For more information about SDM please follow the instructions in the QUICK START GUIDE for your router or go to <http://www.cisco.com/go/sdm>

```
-----
^
!
no cdp run
!
!
line con 0
  login local
line vty 0 4
  access-class 23 in
  privilege level 15
  login local
  transport input telnet
  transport input telnet ssh
line vty 5 15
  access-class 23 in
  privilege level 15
  login local
  transport input telnet
  transport input telnet ssh
!
! End of SDM default config file
end
```

## HSRP

### Router A Config

```
interface Loopback0
  no ip address
!
interface FastEthernet0
  ip address 100.0.0.4 255.255.255.0
  duplex auto
  speed auto
!
interface FastEthernet2
  switchport mode trunk
!
interface Vlan1
  no ip address
!
```

```
interface Vlan2
  ip address 20.0.0.1 255.255.255.0
  standby 2 ip 20.0.0.254
  standby 2 preempt
  standby 2 track Loopback0 20
!
interface Vlan4
  ip address 40.0.0.1 255.255.255.0
  standby 4 ip 40.0.0.254
  standby 4 preempt
  standby 4 track Loopback0 20
```

#### Router B Config

```
interface Loopback0
  no ip address
!
interface FastEthernet0
  ip address 100.0.0.5 255.255.255.0
  duplex auto
  speed auto
!
interface FastEthernet2
  switchport mode trunk
!
interface Vlan1
  no ip address
!
interface Vlan2
  ip address 20.0.0.2 255.255.255.0
  standby 2 ip 20.0.0.254
  standby 2 priority 90
  standby 2 preempt
  standby 2 track Loopback0 20
!
interface Vlan4
  ip address 40.0.0.2 255.255.255.0
  standby 4 ip 40.0.0.254
  standby 4 priority 90
  standby 4 preempt
  standby 4 track Loopback0 20
!
```

## QoS Marking

```
Current configuration: 2002 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname 1841-SVI-DUT
!
boot-start-marker
boot-end-marker
!
no aaa new-model
!
resource policy
!
mmi polling-interval 60
no mmi auto-configure
no mmi pvc
mmi snmp-timeout 180
ip subnet-zero
ip cef
!
class-map match-all non-critical-traffic
  match access-group name ACL2
class-map match-all PREC-5
  match ip precedence 5
class-map match-all critical-traffic
  match access-group name ACL1
class-map match-all DSCP-AF
  match dscp af21
!
!
policy-map mark-traffic
  class critical-traffic
    set ip dscp cs5
  class non-critical-traffic
    set ip precedence 2
!
interface FastEthernet0/0
  ip address 20.0.0.2 255.255.255.0
  speed 100
  full-duplex
!
interface FastEthernet0/1
  ip address 202.82.33.153 255.255.255.252
  shutdown
  duplex auto
```

```
    speed auto
!
interface FastEthernet0/0/0
!
interface FastEthernet0/0/1
!
interface FastEthernet0/0/2
!
interface FastEthernet0/0/3
    duplex full
    speed 100
!
interface Vlan1
    ip address 10.0.0.2 255.255.255.0
    service-policy input mark-traffic
!
ip classless
ip route 0.0.0.0 0.0.0.0 10.0.0.1
!
ip http server
no ip http secure-server
!
ip access-list standard ACL
ip access-list standard ACL1
    permit 10.0.0.100
!
ip access-list extended ACL2
    permit ip host 10.0.0.1 host 20.0.200.1
!
control-plane
!
line con 0
    exec-timeout 0 0
    privilege level 15
line aux 0
line vty 0 4
    exec-timeout 0 0
login
!
scheduler allocate 20000 1000
end
```



**PBR**

```
interface FastEthernet0/0/0
!
interface FastEthernet0/0/1
!
interface FastEthernet0/0/2
!
interface FastEthernet0/0/3
  duplex full
  speed 100
!
interface Vlan1
  ip address 10.0.0.2 255.255.255.0
  ip policy route-map PBR
!
route-map PBR permit 10
  match ip address ACL2
  set ip precedence critical
!
ip classless
ip route 0.0.0.0 0.0.0.0 10.0.0.1
!
ip http server
no ip http secure-server
!
ip access-list standard ACL
ip access-list standard ACL1
  permit 10.0.0.100
!
ip access-list extended ACL2
  permit ip host 10.0.0.1 host 20.0.200.1
!
control-plane
!
```

**CAR**

```
interface FastEthernet0/0
  ip address 20.0.0.2 255.255.255.0
  speed 100
  full-duplex
!
interface FastEthernet0/1
  ip address 202.82.33.153 255.255.255.252
  shutdown
  duplex auto
  speed auto
!
interface FastEthernet0/0/0
!
```

```
interface FastEthernet0/0/1
!
interface FastEthernet0/0/2
!
interface FastEthernet0/0/3
duplex full
speed 100
!
interface Vlan1
ip address 10.0.0.2 255.255.255.0
rate-limit output 128000 16000 16000 conform-action transmit exceedaction drop
!
ip classless
!
```



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