



Brocade 7810 IP Extension Switch User Guide

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Introduction

1.1 About This Document

This document describes how to deploy the Brocade 7810 Extension Switch for Fabric OS® IP Extension.

1.2 What Is New in This Document

Editorial changes.

1.3 Supported Hardware and Software

This guide is devoted to the Brocade 7810 Extension Switch.

The supported software is Brocade FOS 8.2.1x.

1.4 Contacting Technical Support for Your Brocade® Product

For product support information and the latest information on contacting the Technical Assistance Center, go to <https://www.broadcom.com/support/fibre-channel-networking/>. If you have purchased Brocade® product support directly from Broadcom, use one of the following methods to contact the Technical Assistance Center 24x7.

Online	Telephone
<p>For nonurgent issues, the preferred method is to log in to myBroadcom at https://www.broadcom.com/mybroadcom. (You must initially register to gain access to the Customer Support Portal.) Once there, select Customer Support Portal > Support Portal. You will now be able to navigate to the following sites:</p> <ul style="list-style-type: none"> ■ Knowledge Search: Clicking the top-right magnifying glass brings up a search bar. ■ Case Management: The legacy MyBrocade case management tool (MyCases) has been replaced with the Fibre Channel Networking case management tool. ■ DocSafe: You can download software and documentation. ■ Other Resources: Licensing Portal (top), SAN Health (top and bottom), Communities (top), Education (top). 	<p>Required for Severity 1 (critical) issues: Please call Fibre Channel Networking Global Support at one of the numbers listed at https://www.broadcom.com/support/fibre-channel-networking/.</p>

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- For questions regarding service levels and response times, contact your OEM/solution provider.

1.5 Document Feedback

Quality is our first concern. We have made every effort to ensure the accuracy and completeness of this document. However, if you find an error or an omission or if you think that a topic needs further development, we want to hear from

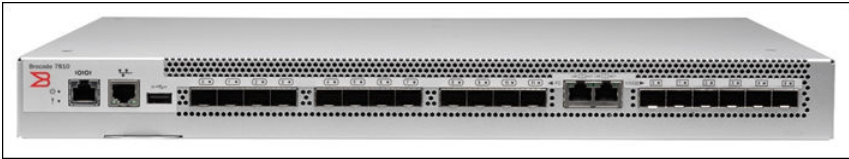
you. Send your feedback to documentation.pdl@broadcom.com. Provide the publication title, publication number, topic heading, page number, and as much detail as possible.

Steps to Configure IP Extension

This document is an adjunct to the *Brocade Fabric OS Extension User Guide*, version 8.2.1x or later, and the *Brocade Fabric OS Command Reference Manual*, version 8.2.1x or later.

The details in this document are specific to the configuration of IP Extension on the Brocade 7810 Extension Switch (image below). Configuration of the Brocade 7840 Extension Switch and the SX6 Extension Blade may vary. Refer to the *Brocade Fabric OS Extension User Guide*, version 8.2.1x, for details on configuring those platforms.

Figure 1: Brocade 7810 Extension Switch



The steps to configure Brocade IP Extension include the following. Although each step is important, none is complicated.

1. Establish the extension architecture.
2. Gather the necessary information to configure your architecture (for example, the Brocade 7810 management address and whether the Brocade 7810 Switch has a base or full license).
3. Configure each Brocade 7810 Switch.
4. Validate each Brocade 7810 Switch.
5. Redirect end-device IP storage traffic to the appropriate IP Extension gateway.
6. Validate the IP storage traffic across IP Extension.

Reference Architecture

For the following discussion, refer to the architecture and data flow diagrams below.

Referenced throughout this document is a 1x1 architecture where one Brocade 7810 Switch is located at each location. There are two locations: local and remote.

NOTE

You may have chosen a different extension environment. For example, you may have chosen to use two Brocade 7810 Switches at each location instead of one.

- *Local* refers to the location where data originates, and *remote* refers to the location where data is replicated.
- Each Brocade 7810 Switch has three distinct “sides”: LAN, WAN, and FC, where each side has unique configuration requirements.
- Each WAN link carries one circuit and represents a distinct path (“A” or “B”) starting from the data center (DC) WAN switches.
- BET (Brocade Extension Trunking) refers to the use of multiple circuits (two in this case) comprising a single tunnel (represented by a VE_Port). The member circuits aggregate into the overall bandwidth of the tunnel, take diverse paths for greater availability, enable failover/failback, and never lose or deliver out-of-order data. This means that the tunnel passes through both the top and bottom WAN links. Two or more circuits are a best practice and are strongly recommended.
- Each location has two DC LAN switches. They are interconnected to each other forming a single logical switch (referred to as a vPC [Virtual Port Channel], VSS [vNetwork Standard Switch], or vLAG [Virtual Link Aggregation Group]). Only a single connection is allowed: a single physical connection or multiple connections forming one logical connection. Link aggregation (LAG) is a method of using multiple links for redundancy while maintaining a single logical connection. This reference architecture uses a link aggregation group on the LAN sides.

Figure 2: IP Extension Deployment Architecture

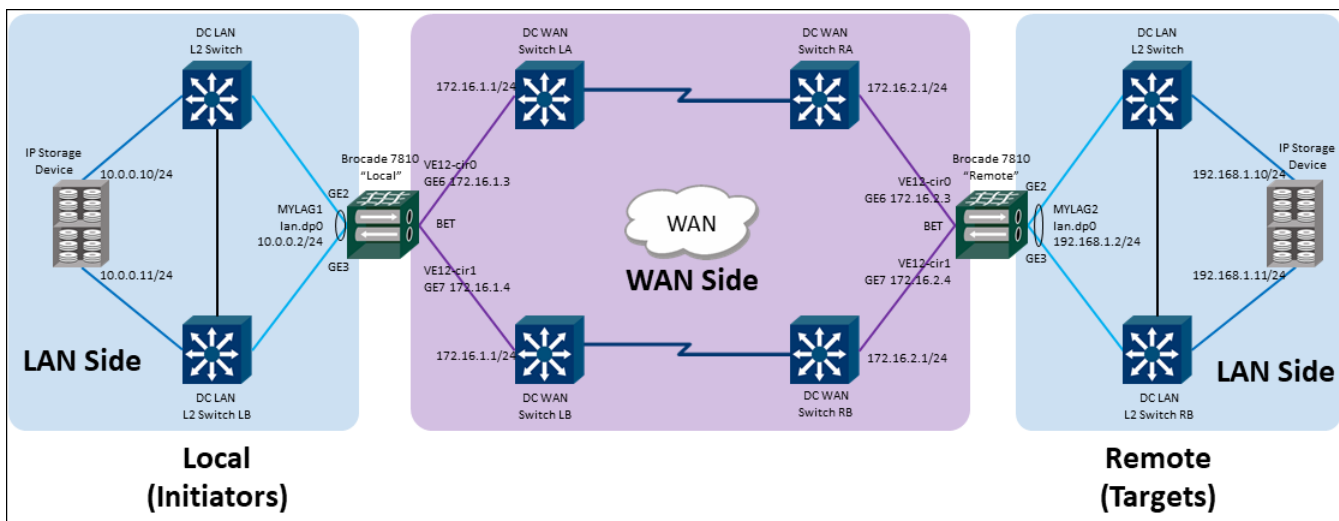
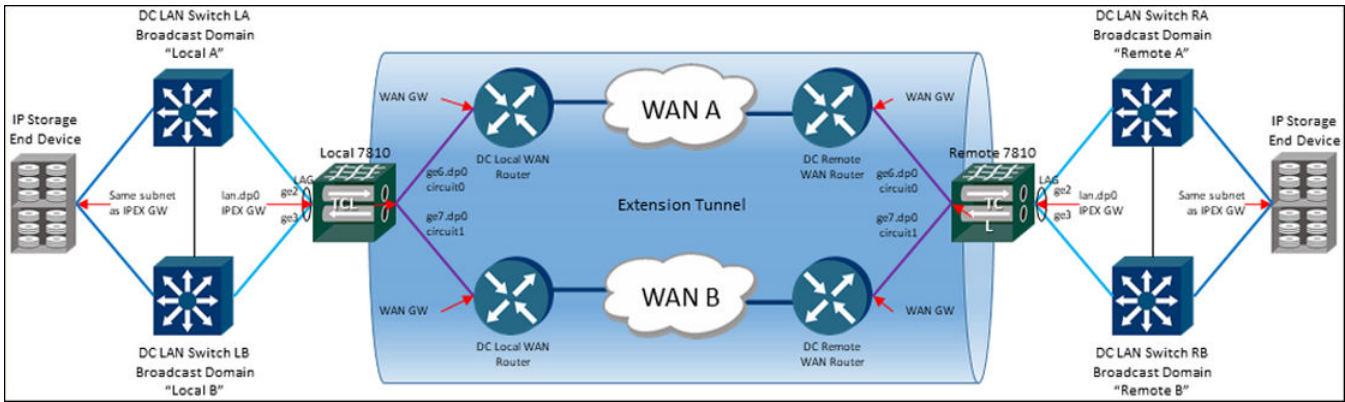


Figure 3: Data Flow through an IP Extension Tunnel



Assumptions and Prerequisites Specific to This Configuration

The assumptions listed here are specific to this deployment guide and example. You can change configuration parameters to suite your own needs and environment.

- Cabling (power, management, LAN Ethernet, and WAN Ethernet) is complete.
- The Brocade 7810 Extension Switches are installed, powered, and initially configured. Settings like domain ID and management port access are established.

NOTE

The initial configuration is not within the scope of this document.

- Extension switches, LAN switches, and WAN routers are operational.
- The two DC LAN switches at each site form a single logical switch.
- You have administration access to all switches that you need to configure. Default user/password is admin/password.
- WAN links are provisioned, up, and operational.
- Brocade 7810 Extension Switches do not have any preexisting extension configuration.
- 10GbE interfaces are used.
- The two DC LAN switches have redundant 10GbE connections to IP Extension (one link to each).
- The two DC WAN switches have one Brocade 7810 10GbE connection to each, one circuit per link.
- The LAN and WAN networks can use the default MTU of 1500 bytes.
- You have the LAN information of your IP storage end devices.
- The end devices are on the same VLAN as the Brocade IP Extension (IPEX) gateway.
- No VLAN tagging is required for the Brocade 7810 Switch.
- No QoS implementation is required for the Brocade 7810 Switch.
- The WAN can accommodate at least 2Gb/s of available bandwidth for IP Extension.

NOTE

The maximum WAN-side bandwidth of the Brocade 7810 is 2.5Gb/s.

- A maximum of 1Gb/s (ceiling) and a minimum of 500Mb/s (floor) of bandwidth per circuit will suffice to perform extension on your IP storage applications.

NOTE

The maximum WAN-side bandwidth of the Brocade 7810 is 2.5Gb/s.

- The VE_Port is 12, which is synonymous with the tunnel ID. Typically, the first VE_Port is used, representing ports 12–15 on a Brocade 7810 Switch.
- The tunnel configuration comprises two circuits: VE12–Circuit0 and VE12–Circuit1.
- The following Brocade 7810 Ethernet interfaces are used: GE2–GE5 (IP Extension LAN side) and GE6–GE7 (WAN-side tunnel).
- The following WAN IP subnets and masks are used to assign IP addresses at each circuit endpoint.

Side	Subnet	Cir0	Cir1
Local WAN	172.16.1.0/24	172.16.1.3	172.16.1.4
Remote WAN	172.16.2.0/24	172.16.2.3	172.16.2.4

- The following LAN IP subnets and masks are used to assign IP Extension gateway addresses.

Side	LAN IP Subnet	IP Extension Gateway
Local LAN	10.0.0.0/24	10.0.0.2
Remote LAN	192.168.1.0/24	192.168.1.2

- The WAN gateway addresses are on the same IP subnet as the WAN circuit's IP interface.

NOTE

The gateways can differ for each circuit. Often, network gateways are created using HSRP/VRRP VIP (Virtual IP). For VRRP, VIP is active on only one switch at a time. If circuit0 and circuit1 have the same gateway, these circuits cannot be in active-active mode.

Side	IP Extension WAN Gateway
Local WAN	172.16.1.1/24
Remote WAN	172.16.2.1/24

- The minimum and maximum values represent the adaptive rate limiting (ARL) rates for each circuit.

Limits	ARL Rate
Minimum	500Mb/s (500,000Kb/s)
Maximum	1Gb/s (1,000,000Kb/s)

NOTE

If ARL is not used, set the minimum equal to the maximum because both ends of a circuit must be set the same.

- Metrics are not used in this example. Metrics and groups are used for failover/failback scenarios.
- You know how to redirect your replication traffic from the current DC gateway to the new IP Extension gateway.

Configuring Brocade 7810 IP Extension

This chapter provides a summary of the configuration steps as well as a detailed configuration sequence.

Refer to the *Brocade Fabric OS Command Reference Manual*, version 8.2.1x (see [Where to Learn More](#)) for details on the syntax and parameters for each of the following commands.

The following is a complete list of the configuration commands.

```
version
portcfgpersistentdisable <port-num|port-range>
extnfcfg <action> [options]
portcfgge [<port>] [<args>]
lacp --config -sysprio <priority>
portchannel --create <po_name> -type <static|dynamic> [-key <po-number>]
portchannel --add <po_name> -port <port-num|port-range>
portcfg ipif <port> <option> [<args>]
portcfg iproute <port> <option> [<args>]
portcfg ipsec-policy <name> <option> [<args>]
portcfg fciptunnel <port> <option> [<args>]
portcfg fcipcircuit <port> <option> <cid> [<args>]
portcfg tcl <name> <option> [<args>]
portcfgpersistentenable <port-num|port-range>
```

The following list of steps provides a detailed configuration sequence. The commands and actions can apply to one or both sides (local and remote) of the tunnel or circuit.

1. Verify the Fabric OS (FOS) versions.

```
version
```

Example: Local and Remote Sides

```
Local7810:admin> version
Kernel:      2.6.34.6
Fabric OS: v8.2.1b
Made on:    Wed Dec 12 16:01:18 2018
Flash:     Mon Dec 17 19:53:25 2018
BootProm:   3.0.31
```

Notes

- Determine if all tunnels connected to the Extension switches are running identical versions of FOS.
- If you are not performing an update to FOS, do not run extension with different versions of the operating system.

2. Disable VE_Port 12.

```
portcfgpersistentdisable port-num|port-range
```

Example: Local and Remote Sides

```
Local7810:admin> portcfgpersistentdisable 12
```

Notes

- Disable the VE_Ports while configuring a tunnel.
- As you are configuring only VE12, the first port of type VE_Port, you will enable only VE12 when the tunnel has been fully configured.
- This command does not query whether "You are sure," and it does not return any response.

3. Set GE mode to either copper or optical.

```
extnconfg action [options]
```

Example: Local and Remote Sides

```
Local7810:admin> extnconfg --ge-mode optical
```

Notes

- GE0/GE1 RJ-45 (copper) and GE2/GE3 (SFP+ [optical]) are all changed together by this command; that is GE2 and GE3 are enabled, and GE0 and GE1 are disabled.
- This command does not initiate a change if any configuration objects exist on these GE interfaces.
- The switch operation is nondisruptive. No reboot is necessary.

4. Set GE interfaces to 10Gb/s.

```
portcfgge [port] [args]
```

Example: Local and Remote Sides

```
Local7810:admin> portcfgge ge2
--set -speed 10G
portcfgge ge3 --set -speed 10G
portcfgge ge4 --set -speed 10G
portcfgge ge5 --set -speed 10G
portcfgge ge6 --set -speed 10G
portcfgge ge7 --set -speed 10G
```

Notes

- The default is 1Gb/s.
 - GE0 and GE1 support only 1Gb/s.
 - All GE interfaces must be configured identically for speed and auto-negotiation.
 - Each GE interface is set individually. This command does not accept a range of ports.
- ### 5. Set the LAN mode.

```
portcfgge [port] [args]
```

Example: Local and Remote Sides

```
Local7810:admin> portcfgge ge2 --set -lan
portcfgge ge3 --set -lan
portcfgge ge4 --set -lan
portcfgge ge5 --set -lan
```

Notes

- When configuring the Brocade 7810 Switch for extension, the GE interfaces needed for IP Extension LAN-side connectivity must be configured as "LAN." By default they are "WAN."
- This command does not accept a range of ports. Each GE interface is done individually.

6. Assign a unique sysprio to the LAG.

```
lacp --config -sysprio priority
```

Example: Local and Remote Sides

```
Local7810:admin> lacp --config
-sysprio 101
```

Notes

- Multiple LAGs (link aggregations) might be connected to the same data center (DC) Ethernet LAN switch. So, it is critical to assign a unique sysprio (that is, a key) to your dynamic LAG.
- The default is 32768.

7. Create a port channel (LAG) from the Brocade 7810 Extension Switch to the DC LAN switch.

```
portchannel --create po_name -type static|dynamic [-key po-number]
```

Example: Local Side

```
Local7810:admin> portchannel
--create MYLAG1 -type dynamic -key 101
```

Example: Remote Side

```
Remote7810:admin> portchannel
--create MYLAG2 -type dynamic -key 101
```

Notes

- Grant the port channel a human-readable name (no spaces).
- Dynamic is recommended.
- Use the `--sysprio` value from the previous step as the key value.
- This command creates only the port channel entity. You add the actual Ethernet links in the next step.
- If there are two DC LAN switches, they must appear together as a single logical switch provided the Brocade 7810 Switch links from this port channel are connected to each DC LAN switch.

8. Add a GbE interface to the port channel.

```
portchannel --add po_name -port port-num|port-range
```

Example: Local Side

```
Local7810:admin> portchannel --add
MYLAG1 -port ge2,ge3
```

Example: Remote Side

```
Remote7810:admin> portchannel --add
MYLAG2 -port ge2,ge3
```

Notes

- Add the LAN ports that you want as members of this port channel.
- Use the human-readable name created in the previous step.

9. Create an IP Extension LAN gateway for traffic that targets the remote DC.

```
portcfg ipif port option [args]
```

Example: Local Side

```
Local7810:admin> portcfg ipif
lan.dp0 create 10.0.0.2/24
```

Example: Remote Side

```
Remote7810:admin> portcfg ipif
lan.dp0 create 192.168.1.2/24
```

Notes

- The IP Extension gateway is an IP interface (ipif) designated as lan.dp0 with an assigned IP address and mask. The Brocade 7810 Switch contains only one dp (dp0), and it must be specified when selecting the interface.

NOTE

Configuring an ipif lan.dp0 gateway is essential.

- One or more IP Extension gateways might exist depending on your needs. However, if all IP storage devices are on a single subnet, one IP Extension gateway will suffice and you will need only one IP address on that subnet.

10. Create an IP interface for the WAN circuit endpoint.

```
portcfg ipif port option [args]
```

Example: Local Side

```
Local7810:admin>
portcfg ipif ge6.dp0 create 172.16.1.3/24
portcfg ipif ge7.dp0 create 172.16.1.4/24
```

Example: Remote Side

```
Remote7810:admin>
portcfg ipif ge6.dp0 create 172.16.2.3/24
portcfg ipif ge7.dp0 create 172.16.2.4/24
```

Notes

- This is how circuits are assigned to Ethernet interfaces. In this example, each circuit has its own Ethernet interface.
- The endpoints for WAN circuits are IP interfaces (ipif) designated as ge#.dp0.
- The default MTU is 1500 bytes.

11. Create IP routes for WAN circuits.

```
portcfg iproute port option [args]
```

Example: Local Side

```
Local7810:admin>
portcfg iproute ge6.dp0
create 172.16.2.0/24 172.16.1.1
portcfg iproute ge7.dp0
create 172.16.2.0/24 172.16.1.1
```

Example: Remote Side

```
Remote7810:admin>
portcfg iproute ge6.dp0
create 172.16.1.0/24 172.16.2.1
portcfg iproute ge7.dp0
create 172.16.1.0/24 172.16.2.1
```

Notes

- If the local and remote IP subnets for the WAN circuits differ on each end, an IP route that designates the gateway router is required.
- IP routes do not forward IP Extension traffic from the LAN side toward the WAN or remote side. Instead, IP Extension uses a traffic control list (TCL) to determine which traffic entering the IP Extension gateway is sent through the tunnel (target VE). However, a LAN-side (`lan.dp0`) IP route can be used to forward IP Extension traffic into the LAN toward IP storage end devices if they are on a different subnet than the IP Extension gateway.

12. (Optional) Create a policy for IPsec encryption.

```
portcfg ipsec-policy name option [args]
```

Example: Local and Remote Sides

```
Local7810:admin> portcfg
ipsec-policy MYPOLICY create --preshared-key
"mykeymykeymykeymykey"
```

Notes

- This example uses a preshared key method to create a security policy.
- The simplest way to configure this security policy is to create a random string, for example "iKsh7vPo0q3jnqW2". Copy and paste it to the remote side. Do not bother to remember it or write it down as you will never need to recall it. Nobody will know the string, making it more secure than writing it down. If you need to rebuild the tunnel for some reason, repeat this process.
- IPsec is applied to the entire tunnel and all its member circuits. It cannot be applied to just one circuit.

13. Create a WAN-side tunnel.

```
portcfg fciptunnel port option [args]
```

Example: Local and Remote Sides

```
Local7810:admin> portcfg
fciptunnel 12 create --ipext enable
```

Notes

- This example creates and enables an IP Extension WAN-side tunnel on VE12, which is the first of four VE_Ports. The tunnel is now "IP Extension capable." Extension tunnels are not enabled for IP Extension by default.
- Staging your configuration is advised. It is done by first creating a basic tunnel and then using the `modify` operand to add or change various qualities of the tunnel. The tunnel should be administratively disabled during staging.

14. (Optional) Add IPsec to the tunnel (VE12).

```
portcfg fciptunnel port option [args]
```

Example: Local and Remote Sides

```
Local7810:admin> portcfg
fciptunnel 12 modify --ipsec MYPOLICY
```

Notes

- Earlier in this command sequence, an IPsec policy called "MYPOLICY" was created. This command applies that policy to the VE12 tunnel.
- The IPsec policy name might differ on each end of the tunnel, but the policy parameters must match.
- Applying the policy is disruptive to the tunnel and circuits for both IP Extension and FCIP.

15. (Optional) Enable the "deflate" compression algorithm on the tunnel (VE12).

```
portcfg fciptunnel port option [args]
```

Example: Local and Remote Sides

```
Local7810:admin> portcfg
fciptunnel 12 modify --compression deflate
```

Notes

- The "deflate" algorithm is most appropriate for the amount of bandwidth that the WAN side uses in this sample environment.

16. Create circuit 0 on the tunnel (VE12).

```
portcfg fcipcircuit port option cid [args]
```

Example: Local and Remote Sides

```
Local7810:admin> portcfg
fcipcircuit 12 create 0
```

Notes

- A tunnel is not an object that can transmit data alone. A tunnel requires the creation of one or more circuits, which live within and are managed by the tunnel.
- You must create a circuit for each path through the IP infrastructure. Circuits require identical settings on each end before coming up. The circuits themselves can be unique.

17. Add endpoint IP addresses to circuit 0.

```
portcfg fcipcircuit port option cid [args]
```

Example: Local Side

```
Local7810:admin>
portcfg fcipcircuit 12 modify 0
--local-ip 172.16.1.3
--remote-ip 172.16.2.3
```

Example: Remote Side

```
Remote7810:admin>
portcfg fcipcircuit 12 modify 0
--local-ip 172.16.2.3
--remote-ip 172.16.1.3
```

Notes

- Each circuit requires both a local and remote IP address when created.

NOTE

Setting `--local-ip` and `--remote-ip` are not optional. Circuits will not come up if these options are not specified.

- The local IP address must already exist as an ipif (created earlier in this task sequence). The ipif is assigned to an Ethernet interface, and that interface will be used by the circuit.

NOTE

The remote side IP address is not checked to see whether it exists when the circuit is configured.

18. Add bandwidth limits to circuit 0.

```
portcfg fcipcircuit port option cid [args]
```

Example: Local and Remote Sides

```
Local7810:admin> portcfg
fcipcircuit 12 modify 0
--max-comm-rate 1000000
--min-comm-rate 500000
```

Notes

- The rate is in Kb/s.
- The bandwidth limits (min and max) must be added to each circuit before that circuit will come online. These settings are not optional.
- The aggregate of the max values cannot exceed the licensing limits of the platform, either 1Gb/s (base license) or 2.5Gb/s (full license).
 - If max-comm-rate > min-comm-rate, Adaptive Rate Limiting (ARL) is automatically enabled.
 - If max-comm-rate = minimum-comm-rate, a single committed rate is used (no ARL).

19. Create circuit 1 on the tunnel (VE12).

```
portcfg fcipcircuit port option cid [args]
```

Example: Local and Remote Sides

```
Local7810:admin> portcfg
fcipcircuit 12 create 1
```

Notes

- Brocade Extension Trunking (BET) is automatically enabled when more than one circuit is added to the same tunnel.
- A full license is required for BET.

20. Add the endpoint IP addresses to circuit 0.

```
portcfg fcipcircuit port option cid [args]
```

Example: Local Side

```
Local7810:admin>
portcfg fcipcircuit 12 modify 1 --local-ip
172.16.1.4 --remote-ip 172.16.2.4
```

Example: Remote Side

```
Remote7810:admin>
portcfg fcipcircuit 12 modify 1 --local-ip
172.16.2.4 --remote-ip 172.16.1.4
```

Notes

- Each circuit requires both a local and remote IP address when created.

NOTE

The IP settings (local and remote) are not optional. Circuits will not come up if these options are not specified.

- The local IP address must already exist as an ipif (created earlier in this task sequence). The ipif is assigned to an Ethernet interface, and that interface is used by the circuit.
- The remote side IP address is not checked to see whether it exists when the circuit is configured.

21. Add bandwidth limits to circuit 1.

```
portcfg fcipcircuit port option cid [args]
```

Example: Local and Remote Sides

```
Local7810:admin> portcfg
fcipcircuit 12 modify 1 --max-comm-rate 1000000
--min-comm-rate 500000
```

Notes

- The rate is in Kb/s.
- The bandwidth limits (min and max) must be added to each circuit before that circuit will come online. These settings are not optional.
- The aggregate of the max values cannot exceed the licensing limits of the platform, either 1Gb/s (base license) or 2.5Gb/s (full license).
 - If max-comm-rate exceeds min-comm-rate, Adaptive Rate Limiting (ARL) is automatically enabled.
 - If max-comm-rate equals minimum-comm-rate, a single committed rate is used (no ARL).

22. Create a traffic control list (TCL) for the tunnel (VE12).

```
portcfg tcl name option [args]
```

Example: Local Side

```
Local7810:admin>
portcfg tcl MYTCL create --priority 10 --target 12
--dst-addr 192.168.1.0/24 --admin enable
```

Example: Remote Side

```
Remote7810:admin>
portcfg tcl MYTCL create --priority 10 --target 12
--dst-addr 10.0.0.0/24 --admin enable
```

Notes

- Creating a TCL is required before traffic is transmitted across an IP Extension tunnel.
- The TCL should have a human-readable name, for example "MYTCL."
- The convention is to use all capital letters in user-defined names.
- TCL rules default to the "allow" type.
- As a best practice, TCLs should include source and destination addresses.
- Before IP storage traffic is forwarded to the target (VE12, in this case), at least one TCL "allow" rule must match your IP storage traffic.
- TCL rules must be administratively enabled.
- You arbitrarily select the TCL priority number and provide numerical space before or after to support additional priority rules.

23. Enable the tunnel (VE12) on the Brocade 7810 Switch.

```
portcfgpersistentenable port-num|port-range
```

Example: Local and Remote Sides

```
Local7810:admin> portcfgpersistentenable 12
```

Notes

- Because only VE12 is being used, only VE12 must be enabled.
- This command returns no response.

Validating Brocade 7810 IP Extension

This chapter provides a summary of the validation steps as well as a detailed validation sequence.

Refer to the *Brocade Fabric OS Command Reference Manual*, 8.2.1x (see [Where to Learn More](#)) for details on the syntax and parameters for each of the following commands.

The following is a complete list of the configuration commands.

```
switchshow
portcfgge [<slot>/][<port>] [<args>]
portshow <option> [<SlotNumber>/]<PortNumber> [<Args>]
lldp --show
lldp --show -nbr [<port_num | port-range>] [-detail]
portchannel --show -detail | -static | -dynamic | -all | <po_name>
portcmd --ping
portcmd --wtool
```

The following list of steps provides a detailed validation sequence. The commands and actions can apply to one or both sides (local and remote) of the tunnel or circuit.

1. Validate that the required ports (VE and GE) are online and set up properly.

```
switchshow
```

Example: Local and Remote Sides

```
Local7810:admin> switchshow
switchName:      Local7810
switchType:      178.0
switchState:     Online
switchMode:      Native
switchRole:      Principal
switchDomain:    1
switchId:        fffc01
switchWwn:       10:00:88:94:71:5c:f7:e2
zoning:          OFF
switchBeacon:    OFF
FC Router:       OFF
HIF Mode:        OFF
```

Index	Port	Address	Media	Speed	State	Proto
0	0	010000	--	N32	No_Module	FC
1	1	010100	--	N32	No_Module	FC
2	2	010200	--	N32	No_Module	FC
3	3	010300	--	N32	No_Module	FC
4	4	010400	--	N32	No_Module	FC
5	5	010500	--	N32	No_Module	FC
6	6	010600	--	N32	No_Module	FC
7	7	010700	--	N32	No_Module	FC
8	8	010800	--	N32	No_Module	FC
9	9	010900	--	N32	No_Module	FC

```

10 10 010a00 -- N32 No_Module FC
11 11 010b00 -- N32 No_Module FC
12 12 010c00 -- -- Online VE VE-Port
10:00:88:94:71:60:98:5e "Remote7810" (downstream)
13 13 010d00 -- -- Offline VE Disabled (Persistent)
14 14 010e00 -- -- Offline VE Disabled (Persistent)
15 15 010f00 -- -- Offline VE Disabled (Persistent)
ge0 cu 1G Offline FCIP Copper Disabled
ge1 cu 1G Offline FCIP Copper Disabled
ge2 id 10G Online LAN
ge3 id 10G Online LAN
ge4 id 10G No_Sync LAN Disabled (Persistent)
ge5 id 10G No_Sync LAN Disabled (Persistent)
ge6 id 10G Online FCIP
ge7 id 10G Online FCIP

```

Relative to the output of this command, ask the following questions:

- Are the ports enabled or disabled persistently (across a reboot)?

NOTE

Unused ports are persistently disabled for security reasons.

- What is the switch domain, and is it a unique value compared to the other Extension switch?
 - Is the port online or offline? Why (that is, no sync or no light)?
 - Is a GbE interface set to LAN or WAN?
 - What is the status of the VE_Port (online or offline)? And if online, what is it connected to?
 - Are the copper (GE0 and GE1) or optical (GE2 and GE3) Ethernet interfaces enabled or disabled?
2. Validate the Ethernet settings (speed, auto-negotiation, media type, LAN, or WAN) on the GE interfaces and whether a port is a member of a LAG.

```
portcfgge [port] [args]
```

Example: Local Side

```
Local7810:admin> portcfgge --show
```

Port	Speed	Flags	Channel	Lag Name
ge0	1G	AC--	N/A	-
ge1	1G	AC--	N/A	-
ge2	10G	--LG	N/A	MYLAG1
ge3	10G	--LG	N/A	MYLAG1
ge4	10G	----	N/A	-
ge5	10G	----	N/A	-
ge6	10G	----	N/A	-
ge7	10G	----	N/A	-

```

Flags: A:Auto-Negotiation Enabled C:Copper Media Type
L:LAN Port G: LAG Member

```

Example: Local Side

```
Local7810:admin> portcfgge --show -lmac
```

Port	dpid	MAC Address
ge0	dp0	88:94:71:5c:f7:e3
ge1	dp0	88:94:71:5c:f7:e4
ge2	dp0	88:94:71:5c:f7:e5
ge3	dp0	88:94:71:5c:f7:e6
ge4	dp0	88:94:71:5c:f7:e7
ge5	dp0	88:94:71:5c:f7:e8
ge6	dp0	88:94:71:5c:f7:e9
ge7	dp0	88:94:71:5c:f7:ea
lan	dp0	88:94:71:5c:f7:eb

Example: Remote Side

```
Remote7810:admin> portcfgge --show
```

Port	Speed	Flags	Channel	Lag Name
ge0	1G	AC--	N/A	-
ge1	1G	AC--	N/A	-
ge2	10G	--LG	N/A	MYLAG2
ge3	10G	--LG	N/A	MYLAG2
ge4	10G	----	N/A	-
ge5	10G	----	N/A	-
ge6	10G	----	N/A	-
ge7	10G	----	N/A	-

Flags: A:Auto-Negotiation Enabled C:Copper Media Type
L:LAN Port G: LAG Member

NOTE

For troubleshooting purposes, the network admin may need the MAC address of the GE interfaces on the Brocade 7810 Switch. Use the `portcfgge --show -lmac` command to list the MAC addresses on the switch.

3. Validate the settings (MAC address, speed, and state of the Ethernet interface and PHY) on the Ethernet interface.

```
portshow geport-Num
```

Example: Local and Remote Sides

```
Local7810:admin> portshow ge2
Eth Mac Address: 88.94.71.5c.f7.e5
Port State: 1 Online
Port Phys: 6 In_Sync
Port Flags: 0x3 PRESENT ACTIVE
Port Speed: 10G
```

NOTE

The information provided by this command is also provided by the `switchshow` command, which displays all GbE interfaces with one command.

4. Validate that LLDP is working.

NOTE

If LLDP is not working, it will not prevent this extension environment from working properly. LLDP is informational only—for troubleshooting.

Example: Local Side

```
Local7810:admin> lldp --show
LLDP Global Information
  system-name: Local7810
  system-description: Brocade_7810_Fabric_OS_Version_821
  State:                Enabled
  Mode:                 Receive/Transmit
  Advertise Transmitted: 30 seconds
  Hold time for advertise: 120 seconds
  Tx Delay Timer:       1 seconds
  Transmit TLVs:        Chassis ID           Port ID
                       TTL                 Port Description
                       System Name        System Description
                       System Capabilities Management Address
  DCBx FCoE Priority Values: 3
```

Example: Local Side

```
Local7810:admin> lldp --show -nbr
Local-Int  DeadInt  Remain  Remote-Int  ChassisID      Tx   Rx   System
ge2        120      106     Ethernet1/16 0062.ecbb.f14f 88928 88922 torsw9
ge3        120      102     Ethernet1/16 0062.ecbb.eea5 88927 100  torsw8
ge6        120      106     Ethernet1/17 0062.ecbb.f150 86675 812  torsw9
ge7        120      102     Ethernet1/17 0062.ecbb.eea5 88901 109  torsw8
```

Observe the following in the output:

- LLDP is enabled by default. For LLDP to function, you must enable it on the other end of the Ethernet connection.
- If LLDP is enabled and working on both LAN and WAN ends of the Ethernet link, you have information about what each neighbor link is connected to.

5. Validate the port channel (LAG) to the DC LAN switches.

```
portchannel --show [-detail | -static | -dynamic | -all | po_name]
```

Example: Local Side

```
Local7810:admin> portchannel --show
Name          Type          Oper-State  Port-Count  Member-Ports
-----
MYLAG1      Dynamic      Online      2           ge2 ,ge3
```

Example: Local Side

```
Local7810:admin> portchannel --show -detail
Name :MYLAG1
Type :Dynamic
Key  :101
```

```

Speed :10G
Autoneg :Off
Admin-state: Enable
Oper-state : Online
Admin Key: 0065 - Oper Key 0065
LACP System ID: 0x8000,c4-f5-7c-3b-24-c0
PART System ID: 0x8000,01-e0-52-00-00-0a
Portchannel Member count = 2
Port          Oper state      Sync      Timeout
-----
ge2           Online           1         Long
ge3           Online           1         Long

```

Example: Remote Side

```

Remote7810:admin> portchannel --show -detail

Name :MYLAG2
Type :Dynamic
Key :101
Speed :10G
Admin-state: Enable
Oper-state : Online
Admin Key: 0999 - Oper Key 0999
LACP System ID: 0x8000,00-27-f8-f2-6c-fa
PART System ID: 0x8000,01-e0-52-00-00-06
Portchannel Member count = 2
Port          Oper state      Sync      Timeout      Auto-Negotiation
-----
ge2*         Online           1         Long          Disabled
ge3         Online           1         Long          Disabled

```

Observe the following in the output:

- The LAG contains two Ethernet links where each is connected to a different DC LAN switch. However, those switches appear as a single logical switch.
- The LAG is dynamic, which means that it uses LACP with an "Online" status.

NOTE

If you require additional details, run the `portchannel --show` command with the `-detail` keyword.

6. Validate that the IP interfaces (ipif) have been created properly.

```
portshow option PortNumber [Args]
```

Example: Local and Remote Sides

```

Local7810:admin> portshow ipif

Port          IP Address          / Pfx  MTU  VLAN  Flags
-----
ge6.dp0      172.16.1.3          / 24   1500  0     U R M I
ge7.dp0      172.16.1.4          / 24   1500  0     U R M I
lan.dp0      10.0.0.2            / 24   1500  0     U R M

```

```
-----
Flags: U=Up B=Broadcast D=Debug L=Loopback P=Point2Point R=Running I=InUse
      N=NoArp PR=Promisc M=Multicast S=StaticArp LU=LinkUp X=Crossport
```

Observe the following in the output:

- The Brocade 7810 Switch has only one dp (dp0).
- There is one ipif for the IP Extension gateway. It is on the LAN side and uses the lan.dp0 interface.
- There are two WAN ipifs, one for each circuit. They use interfaces ge6 and ge7 on dp0.
- The MTU is set for 1500 bytes.
- All the interfaces are Up, Running, and InUse.

7. Validate the WAN-side IP routes.

```
portshow option PortNumber [Args]
```

Example: Local and Remote Sides

```
Local7810:admin> portshow iproute
```

Port	IP Address	/ Pfx	Gateway	Flags
ge6.dp0	172.16.2.0	/ 24	172.16.1.1	U G S
ge6.dp0	172.16.1.0	/ 24	*	U C
ge6.dp0	172.16.1.1	/ 32	*	U H L
ge7.dp0	172.16.2.0	/ 24	172.16.1.1	U G S
ge7.dp0	172.16.1.0	/ 24	*	U C
ge7.dp0	172.16.1.1	/ 32	*	U H L
lan.dp0	10.0.0.0	/ 24	*	U C

```
-----
Flags: U=Usable G=Gateway H=Host C=Created(Interface)
      S=Static L=LinkLayer X=Crossport
```

Observe the following in the output:

- The output table displays more routes than you configured since the switch generates some of the routes when an ipif is created. Routes with flags U C and U H L are self-created.
- The user-defined static routes have flags U G S. These flags indicate the WAN router gateway the GbE interface communicates with to reach the subnet. For example, ge6.dp0 must use the gateway 172.16.1.1 to communicate with 172.16.2.0/24.
- IP routes are not used to send IP Extension traffic into a tunnel or to forward it across the WAN. Instead, a TCL input filter designates a particular stream of traffic through the IP Extension tunnel.

8. Validate that the IPsec policy was created successfully.

```
portshow option [PortNumber] [Args]
```

Example: Local and Remote Sides

```
Local7810:admin> portshow ipsec-policy --show-password
```

```
IPSec Policy   Flg Authentication data
-----
MYPOLICY      S-- mykeymykeymykeymykey
```

```
-----
Flags: *=Name Truncated. Use "portshow ipsec-policy -d for details".
      P=PKI Profile   S=Shared-Key Profile
      X=Expired Cert  M=Hash Mismatch
```

NOTE

The `--show-password` option is voluntary.

Observe the following in the output:

- The S flag denotes that the IPsec policy uses the PSK (pre-shared key) method. IPsec uses AES 256 encryption. Internally, after the tunnel is up, the key and its vector are frequently changed based on a finite amount of time or data. This process is nondisruptive.

9. Validate that the tunnel and circuits were created properly and their current state.

```
portshow option PortNumber [Args]
```

Example: Local and Remote Sides

```
Local7810:admin> portshow fciptunnel -c
```

Tunnel	Circuit	OpStatus	Flags	Uptime	TxMBps	RxMBps	ConnCnt	CommRt	Met/G
12	-	Up	--i----PI	1d2h22m	42.24	0.46	1	-	-
12	0 ge6	Up	----a--i4	1d2h22m	21.15	0.28	1	500/1000	0/-
12	1 ge7	Up	----a--i4	1d2h22m	21.09	0.18	1	500/1000	0/-

```
Flags (tunnel): l=Legacy QoS Mode
                i=IPSec f=Fastwrite T=TapePipelining F=FICON r=ReservedBW
                a=FastDeflate d=Deflate D=AggrDeflate P=Protocol
                I=IP-Ext
(circuit): h=HA-Configured v=VLAN-Tagged p=PMTU i=IPSec 4=IPv4 6=IPv6
           ARL a=Auto r=Reset s=StepDown t=TimedStepDown S=SLA
```

Observe the following in the output:

- IPsec and IP Extension have the "Enable" status.
- CommRt is set to 500 for the minimum rate and 1000 for the maximum rate.
- The compression algorithm is not visible under Flags because the IP Extension protocol (P) has been set.
- Two circuits belong to tunnel 12. One has an ipif assigned to ge6, and the other is assigned to ge7.

Example: Local and Remote Sides

The following form of the command displays information for a specific tunnel.

```
Local7810:admin> portshow fciptunnel 12
```

```
Tunnel: VE-Port:12 (idx:0, DP0)
=====
Oper State       : Online
TID              : 12
Flags            : 0x00000000
IP-Extension     : Enabled
Compression     : Aggressive Deflate
FC-Compression  : Aggressive Deflate (Inherited)
IP-Compression  : Aggressive Deflate (Override)
QoS Distribution : Protocol (FC:50% / IP:50%)
FC QoS BW Ratio : 50% / 30% / 20%
IP QoS BW Ratio : 50% / 30% / 20%
Fastwrite       : Disabled
Tape Pipelining : Disabled
```

```

IPSec                : Enabled
IPSec-Policy         : MYPOLICY
Legacy QOS Mode      : Disabled
Load-Level (Cfg/Peer): Failover (Failover / Failover)
Local WWN             : 10:00:88:94:71:5c:f7:e2
Peer WWN              : 10:00:88:94:71:60:98:5e
RemWWN (config)      : 00:00:00:00:00:00:00:00
cfgmask              : 0x0080001f 0x4001024c
Uncomp/Comp Bytes    : 227080089661 / 102116427081 / 2.22 : 1
Uncomp/Comp Byte(30s): 0 / 0 / 1.00 : 1
Flow Status          : 0
ConCount/Duration    : 63 / 30d22h
Uptime               : 20d20h
Stats Duration       : 20d20h
Receiver Stats       : 1499001344 bytes / 17623773 pkts / 63.00 Bps Avg
Sender Stats         : 102234597113 bytes / 36732398 pkts / 63.00 Bps Avg
TCP Bytes In/Out     : 25358770278 / 131835674292
ReTx/OOO/SloSt/DupAck: 3159207 / 61673 / 532853 / 2872159
RTT (min/avg/max)    : 1 / 20 / 1826 ms
Wan Util             : 0.6%
TxQ Util             : 0.0%

```

10. Validate tunnel and circuit performance as well as the compression ratio being achieved.

```
portshow option PortNumber [Args]
```

Example: Local and Remote Sides

```
Local7810:admin> portshow fciptunnel -c --perf
```

```

Tunnel Circuit St Flg TxMBps RxMBps CmpRtio RTTms ReTx TxWAN% TxQ%/BW Met/G
-----
12 - Up -I- 42.2 0.4 3.4:1 - 18 72 0 -
12 0 ge6 Up --- 21.1 0.2 - 20 18 72 500/1000 0/-
12 1 ge7 Up --- 21.1 0.2 - 20 18 72 500/1000 0/-
-----
Flg (tunnel): I=IP-Ext, s=Spillover
St: High level state, Up or Dn
TxWAN (tunnel): Tx WAN utilization high of primary circuits (--qos for range)
(circuit): Tx WAN utilization high (--qos for range)
TxQ (tunnel): Tx data buffering utilization high (--qos for range)

```

Observe that only the transmit compression ratio is visible. The receiving side decompression is not shown.

11. Validate Tx and Rx.

```
portshow option PortNumber [Args]
```

Example: Local and Remote Sides

```
Local7810:admin> portshow fciptunnel --qos
```

```

Tunnel Circuit OpStatus Flags Uptime TxMBps RxMBps ConnCnt CommRt Met/G
-----
12 - Up c-i----dI 1d2h26m 0.00 0.00 1 - 0
12 - Up h-i----d- 1d2h26m 0.00 0.00 1 - 1
12 - Up m-i----d- 1d2h26m 0.00 0.00 1 - 1

```

```

12 - Up l-i----d- 1d2h26m 0.00 0.00 1 - 1
12 - Up h-i----dI 1d2h26m 0.00 0.00 1 - 2
12 - Up m-i----dI 1d2h26m 42.24 0.46 1 - 2
12 - Up l-i----dI 1d2h26m 0.00 0.00 1 - 2

```

```

-----
Flags (tunnel): c=Control h=HighPri m=MedPri l=LowPri
                i=IPSec f=Fastwrite T=TapePipelining F=FICON r=ReservedBW
                a=FastDeflate d=Deflate D=AggrDeflate P=Protocol
                I=IP-Ext

```

Observe the following in the output:

- "m" represents medium and is the default QoS priority. FCIP and IP Extension have their own h, m, l (High, Medium, Low) QoS priorities, plus one for control traffic.
- Because no QoS settings were established in this task flow, all IP storage traffic uses "m" priority on the line indicating IP-Ext (I).
- "c" category traffic represents control traffic between the Brocade 7810 Switches.
- All channels are encrypted showing IPsec ("i" flag).

NOTE

Do not use the `-c` argument with this command because the output displays tunnel scope information.

12. Validate that the traffic control list (TCL) has been configured successfully.

```
portshow option PortNumber [Args]
```

Example: Local and Remote Sides

```

Local7810:admin> portshow tcl

Pri      Name      Flgs Target L2COS VLAN DSCP Proto Port Hit  Src-Addr Dst-Addr
-----
*10     MYTCL      AI--- 12-Med ANY   ANY  ANY  ANY   ANY 248223 ANY 10.10.10.0/24

*65535  default    D---- -      ANY   ANY  ANY  ANY   ANY 2949  ANY ANY
-----

Flags: *=Enabled ..=Name Truncated (see --detail for full name)
       A=Allow D=Deny I=IP-Ext P=Segment Preservation
       R=End-to-End RST Propagation N=Non Terminated.

Active TCL Limits:   Cur / Max
-----
DPO                      3 / 32
-----

Configured Total:    3 / 256

```

Observe the following in the output:

- "*" indicates that the priority is administratively enabled.
- The default has a priority of 65535.
- Because broadcasts and multicasts are not permitted across the WAN, these traffic types will cause the default counter to increase. This is expected.

Relative to the output of this command, ask the following questions:

- Is there an allow rule with a target? The target in this case is VE12.
- Is the source (Src) or destination (Dst) address configured correctly?
- Are you seeing hits on the priority rule on which you anticipate matching your traffic? If not, then either the traffic is not getting to the lan.dp0 (no hit counters increment) or the rule is not matching any traffic. In the second case, the default deny rule will increment.

NOTE

Because broadcasts and multicasts are not permitted across the WAN, these traffic types will cause the default counter to increase. This is expected.

13. Validate basic connectivity from the WAN side.

```
Portcmd --ping [slot/]port options
```

Example: Local and Remote Sides

```
Local7810:admin> portcmd --ping ge6.dp0
-s 172.16.1.3 -d 172.16.2.3

PING 172.16.2.3 (172.16.1.3) with 64 bytes of data.
64 bytes from 172.16.2.3: icmp_seq=1 ttl=250 time=19 ms
64 bytes from 172.16.2.3: icmp_seq=2 ttl=250 time=19 ms
64 bytes from 172.16.2.3: icmp_seq=3 ttl=250 time=19 ms
64 bytes from 172.16.2.3: icmp_seq=4 ttl=250 time=19 ms

--- 172.16.2.3 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 789 ms
rtt min/avg/max = 19/19/19 ms
```

Observe the following in the output:

- The `portcmd -ping` command is specific to WAN and LAN ports.

NOTE

This command does not apply to management ports.

- You must specify the Ethernet interface, the source IP address assigned to that interface, and a destination IP address. The destination IP address need not be another Brocade Extension platform.

NOTE

You cannot ping any other ipif (IP address) within the same Brocade 7810 Switch. You can ping only an ipif on another extension device.

14. Validate basic connectivity from the LAN side.

NOTE

Validating connectivity from the LAN side might be very useful when troubleshooting why the TCL hit count is not increasing and traffic is not running.

```
Portcmd --ping [slot/]port options
```

Example: Local and Remote Sides

```
Local7810:admin> portcmd --ping lan.dp0 -s 10.0.0.1 -d 10.0.0.10

PING 10.0.0.10 (10.0.0.1) with 64 bytes of data.
64 bytes from 10.0.0.10: icmp_seq=1 ttl=128 time=1 ms
64 bytes from 10.0.0.10: icmp_seq=2 ttl=128 time=1 ms
64 bytes from 10.0.0.10: icmp_seq=3 ttl=128 time=1 ms
64 bytes from 10.0.0.10: icmp_seq=4 ttl=128 time=1 ms
```

```
--- 10.0.0.10 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 726 ms
rtt min/avg/max = 1/1/1 ms
```

Observe the following in the output:

- The `portcmd -ping` command is specific to WAN and LAN ports.

NOTE

This command does not apply to management ports.

- You must specify the Ethernet interface, the source IP address assigned to that interface, and a destination IP address. The destination IP address need not be another Brocade Extension platform.

NOTE

You cannot ping any other ipif (IP address) within the same Brocade 7810 Switch. You can ping only an ipif on another extension device.

15. Validate flow stats.

NOTE

The following output represents IP Extension features introduced with FOS 8.2.0.

```
Portshow lan-stats cmd --ping [slot/]port options
```

Example: Local and Remote sides

`portshow lan-stats --ip-pair` shows the aggregate bytes that have flowed between two particular end devices. The Tx and Rx values are in bytes, not bits.

```
Local7810:admin> portshow lan-stats --ip-pair
```

DP	Idx	SrcAddr	DstAddr	Active	TxB	RxB
DP0	0	192.168.1.10	10.0.0.10	1	46.9g	46.9g
DP0	1	192.168.1.11	10.0.0.10	1	36.9g	36.9g
DP0	2	192.168.1.10	10.0.0.20	1	46.9g	46.9g
DP0	3	192.168.1.11	10.0.0.20	1	36.9g	36.9g

```
Local7810:admin>
```

Example: Local and Remote Sides

The `portshow lan-stats --per-flow` command shows IP pairs with their ports numbers and bytes/second flows over a moving average of the last 30 seconds. It also shows the number of active and exceeded TCP sessions.

```
Local7810:admin> portshow lan-stats --per-flow
```

```
*** Displaying Top 4 connections by throughput ***
```

DP	Idx	Src-Address	Dst-Address	Sport	Dport	Pro	Tx (B/s)	Rx (B/s)
DP0	0	192.168.1.10	10.0.0.10	41867	59664	TCP	4.7m	4.7m
DP0	1	192.168.1.11	10.0.0.10	39298	59665	TCP	4.7m	4.7m
DP0	2	192.168.1.10	10.0.0.20	47859	59666	TCP	4.7m	4.7m
DP0	3	192.168.1.11	10.0.0.20	34993	59667	TCP	4.7m	4.7m

```
Sport=Source-Port Dport=Destination-Port Pro=Protocol
```

```
DP            ActTCP   ExdTCP   TCLDeny   TCLFail
```

```
-----
DP0      4      0      0      0
-----
ActTCP=Active TCP Conns  ExdTCP=Exceeded TCP Conn Cnt
```

Example: Local and Remote Sides

You can burrow still deeper with `portshow lan-stats --per-flow DP0 0`, which displays the source and destination IP address, the connection status, and the throughput.

```
Local7810:admin> portshow lan-stats --per-flow DP0 0

*** Displaying Top 1 connection by throughput ***

TCP Flow-ID: DP0 6 [0x00e5beaa]
-----
Src IP Address / Port:      10.0.0.10 / 41867
Dest IP Address / Port:    192.168.1.10 / 59664
VE-Port / QoS:             12 / IPMedium
GE-Port:                   MYLAG1
HCL-Connection:           Yes
Connection State:         Active
Start Time:                Tue Feb  5 14:28:59 2019 (1d2h22m ago)
Throughput Stats:
  Transmit Bytes / Pkts:    443453508024 (443.4g) / 377807729 (377.8m)
  Receive Bytes / Pkts:    440709757304 (440.7g) / 309213961 (309.2m)
  Throughput Rate Tx / Rx:  4.8m / 4.8m
  Drops Tx / Rx:           0 / 0
  SlwReTx/FstReTx/DupAck/OOO: 0 / 0 / 0 / 0
  RTT Cur / Max:           1ms / 5ms
  Rx Zero Wnd cnt / Max Wnd period: 0 / 0ms
  CRC Errors:              0
  Local Host MSS:          1460
  Remote Host MSS:         1460
ACM Stats:
  Pre-Compr Bytes Tx / Rx:  428341198852 / 428341198852
  Post-Compr Bytes Tx / Rx: 8799287894 / 8828723609
  Compression Ratio:        48.7:1
```

16. Validate the integrity of the network.

See [Validating the Network with a Traffic Generator](#).

Validating the Network with a Traffic Generator

To validate the integrity of a WAN network, you run a traffic generator over a period of time.

Be aware of the following:

- Except for swapped src/dst IP addresses, WAN Tool must be set up identically on both sides of the circuit.
- The circuit or circuits that you want to test must be admin disabled but not necessarily at the same time. The tunnel will continue to operate if at least one circuit remains online.
- Up to four circuits can be tested at one time, each consuming one WAN Tool session.

Perform the following steps:

1. Configure WAN Tool to run for a period of time in minutes, and set the rate (in Kb/s) that you want WAN Tool to run at. In this example, the rate is set to 1Gb/s.

```
Local7810:admin> portcmd --wtool show
No wtool sessions found.
```

```
Local7810:admin> portcmd --wtool 0 create
Operation Succeeded.
```

```
Local7810:admin> portcmd --wtool 0 modify --time 15
Operation Succeeded.
```

```
Local7810:admin> portcmd --wtool 0 modify --rate 1000000
Operation Succeeded.
```

2. Enable IPsec using the same policy that you created for your tunnel. This ensures that your tunnel operates as expected with encryption enabled.

```
Local7810:admin> portcmd --wtool 0 modify --ipsec-policy MYPOLICY
!!!! WARNING !!!!
Modify operation will disrupt traffic on the WAN Tool session specified. This operation will bring the
existing WAN Tool session down before applying the new configuration.
Continue with delayed modification (Y,y,N,n): [ n]      y
Operation Succeeded.
```

3. Specify the source and destination IP addresses.

```
Local7810:admin> portcmd --wtool 0 modify --src 172.16.1.3
!!!! WARNING !!!!
Modify operation will disrupt traffic on the WAN Tool session specified. This operation will bring the
existing WAN Tool session down before applying the new configuration.
Continue with delayed modification (Y,y,N,n): [ n]      y
Operation Succeeded.
```

```
Local7810:admin> portcmd --wtool 0 modify --dst 172.16.2.3
!!!! WARNING !!!!
Modify operation will disrupt traffic on the WAN Tool session specified. This operation will bring the
existing WAN Tool session down before applying the new configuration.
Continue with delayed modification (Y,y,N,n): [ n]      y
Operation Succeeded.
```

4. Disable the circuit from the tunnel before enabling the circuit on the wtool session. In this case, the wtool session is 0, and the circuit is VE12 circuit 0.

```
Local7810:admin> portcfg fcipcircuit 12 modify 0 --admin-status disable
!!!! WARNING !!!!
Modify operation can disrupt the traffic on the fciptunnel specified for a brief period of time. This
operation will bring the existing tunnel down (if tunnel is up) before applying new configuration.
Continue with Modification (Y,y,N,n): [ n]      y
Operation Succeeded.
```

5. Enable the WAN Tool session.

```
Local7810:admin> portcmd --wtool 0 modify --admin-status enable
!!!! WARNING !!!!
Modify operation will disrupt traffic on the WAN Tool session specified. This operation will bring the
existing WAN Tool session down before applying the new configuration.
Continue with delayed modification (Y,y,N,n): [ n]      y
Operation Succeeded.
```

6. Start WAN Tool session 0.

```
Local7810:admin> portcmd --wtool 0 start
Operation Succeeded.
```

7. Use the portcmd --wtool show commands to view the WAN characteristics based on the configured bandwidth. Important things to monitor include the following:

- Utilization (in the send direction)
- Drop% (overall / 5s)
- RTT (min)
- RTT VAR (min)

```
Local7810:admin> portcmd --wtool show
```

```
Session  OperSt  Flags   LocalIP           RemoteIp          TxMBps  RxMBps  Drop%
-----
0         Running --i-4-- 172.16.1.3       172.16.2.3       6.26    0.27    0.00
-----
Flags (wtool): S=SLA v=VLAN i=IPsec 4=IPv4 6=IPv6 L=Listener I=Initiator
```

```
Local7810:admin> portcmd --wtool 0 show --detail
```

```
WTool Session: 0 (DP0)
=====
Admin / Oper State      : Enabled / Online
Up Time                 : 8m44s
Run Time                : 15m0s
Time Remaining         : -
IP Addr (L/R)          : 172.16.1.3 ge2 <-> 172.16.2.3
IP-Sec Policy          : MYPOLICY
PMTU Discovery (MTU)   : disabled (1500)
Bi-Directional        : disabled
L2CoS / DSCP           : (none) / (none)
Configured Comm Rate   : 1000000 kbps
Peer Comm Rate         : 1000000 kbps
Actual Comm Rate       : 1000000 kbps
```

```

Tx rate           : 978998.14 Kbps ( 978.99 MB/s)
Rx rate           : 513.14 Kbps ( 0.06 MB/s)
Tx Utilization    : 1.03%
Rx Utilization    : 1.03%
RTT (Min/Max)     : 19 ms/204 ms
RTT VAR (Min/Max) : 1 ms/337 ms
Local Session Statistics
Tx pkts           : 1234259
Peer Session Statistics
Rx pkts           : 0
Ooo pkts          : 0
Drop pkts         : 0
Drop% (Overall/5s) : 0.00% / 0.00%

```

```
Local7810:admin> portcmd --wtool show --peer
```

WTool Session (0)	(Local)	(Remote)

Admin / Oper State	: Up	
	: Up	
Up Time	: 5m57s	: 5m57s
Run Time	: 15m0s	: 0s
Time Remaining	: -	: 15m0s
Port	: ge2	: -
IP Addr	: 172.16.1.3	: 172.16.2.3
IP-Sec Policy	: Enabled	: Enabled
Configured Comm Rate	: 1000000 kbps	: 1000000 kbps
Actual Comm Rate	: 1000000 kbps	: 1000000 kbps
PMTU Discovery (MTU)	: disabled (1500)	: disabled (1500)
L2cos /DSCP	: (none) / (none)	: (none) / (none)
Tx Rate	: 963893.01 Kbps	: 2073.04 Kbps
Rx Rate	: 2013.07 Kbps	: 963112.38 Kbps
Tx Utilization	: 98.03%	: 4.15%
Rx Utilization	: 4.03%	: 98.47%
RTT (Min/Max)	: 19 ms/204 ms	: 20 ms/249 ms
RTT VAR (Min/Max)	: 1 ms/337 ms	: 1 ms/372 ms
Tx pkts	: 12348259	: 0
Rx pkts	: 0	: 12348245
Ooo pkts	: 0	: 0
Drop pkts	: 0	: 14
Drop% (Overall / 5s)	: 0.00% / 0.00%	: 0.00% / -

8. Stop WAN Tool session 0.

```
Local7810:admin> portcmd --wtool 0 stop
Operation Succeeded.
```

9. Disable the WAN Tool session.

NOTE

Deleting the session is unnecessary. In fact, you might want to retain it for future use.

```
Local7810:admin> portcmd --wtool 0 modify --admin-status disable
!!!! WARNING !!!!
Modify operation will disrupt traffic on the WAN Tool session specified. This operation will bring the
```

```
existing WAN Tool session down before applying the new configuration.
Continue with delayed modification (Y,y,N,n): [ n]      y
Operation Succeeded.
```

```
Local7810:admin> portcmd --wtool show
```

Session	OperSt	Flags	LocalIP	RemoteIp	TxMBps	RxMBps	Drop%
0	Disable	--i-4--	10.177.128.90	10.108.34.6	0.00	0.00	0.00

Flags (wtool): S=SLA v=VLAN i=IPsec 4=IPv4 6=IPv6 L=Listener I=Initiator

10. After disabling the WAN Tool session, enable the circuit back into the tunnel.

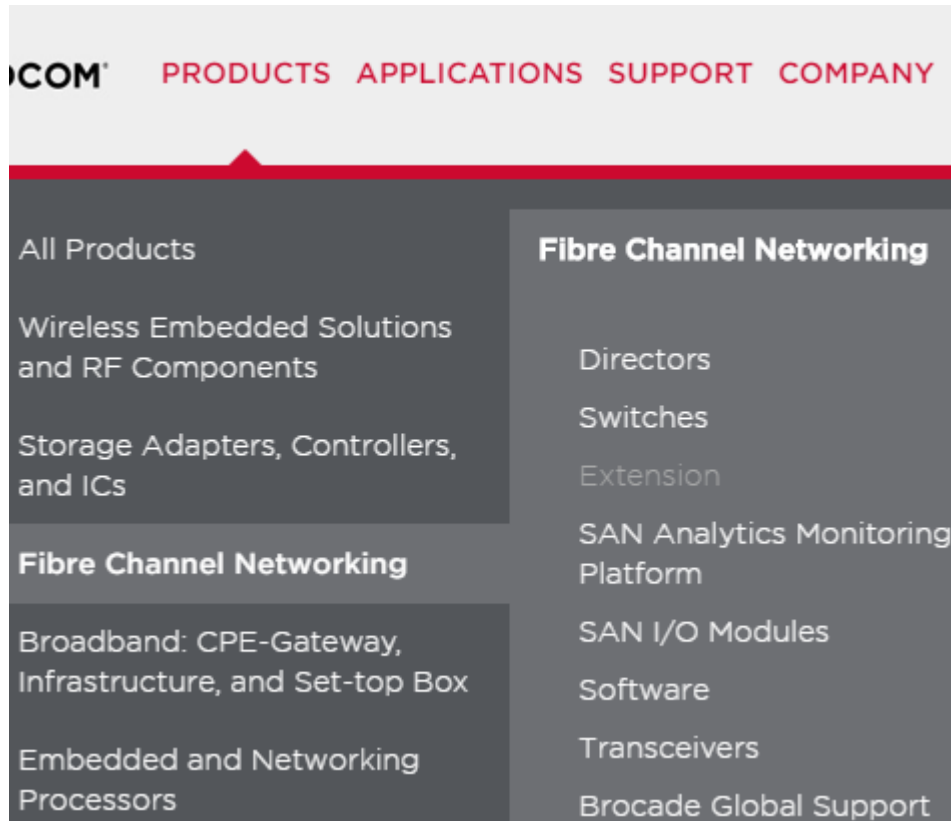
```
Local7810:admin> portcfg fcipcircuit 12 modify 0 --admin-status enable
!!!! WARNING !!!!
Modify operation can disrupt the traffic on the fciptunnel specified for a brief period of time. This
operation will bring the existing tunnel down (if tunnel is up) before applying new configuration.
Continue with Modification (Y,y,N,n): [ n]      y
Operation Succeeded.
```

11. If WAN integrity is good (for example, minimal drops), placing the tunnel and circuits into production would be the next step.

Where to Learn More

To access details about the Brocade 7810 Extension Switch, do the following.

1. Access the Broadcom.com main page (www.broadcom.com).
2. Click **Products** > **Fibre Channel Networking** > **Extension**.



3. Click the image of the Brocade 7810 Extension Switch.



4. Click the **DOCUMENTATION** tab.
5. Access the following under the respective documentation folders.

Document	Under Folder
<i>Brocade Fabric OS Administration Guide, 8.2.1x</i>	Administration Guide
<i>Brocade Storage Extension Solutions Frequently Asked Questions</i>	FAQs
<i>Brocade 7810 Extension Switch Product Brief</i>	Product Brief
<i>Brocade Fabric OS Command Reference Manual, 8.2.1x</i>	Reference Manual
<i>Brocade 7810 Extension Switch Technical Specifications</i>	Specification
<i>Brocade Fabric OS Extension User Guide, 8.2.1x</i>	User Guide
<i>Fast, Secure, and Reliable Replication for Midrange Storage Using the Brocade 7810 Extension Switch</i>	White Papers

Revision History

7810-IPEX-UG101; 10 April 2019

Editorial changes.

7810-IPEX-UG100; 28 February 2019

Initial release.

