

# MDS 9000-software voor MDS-configuratie met FCIP

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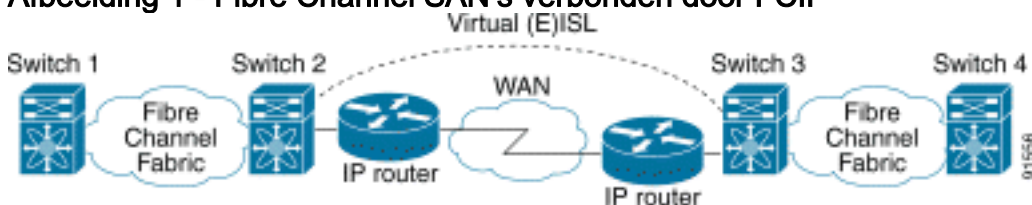
[Gerelateerde informatie](#)

## Inleiding

Dit document biedt een voorbeeldconfiguratie voor het uitgebreide Fibre Channel over TCP/IP (FCIP) Multilayer Director Switch (MDS) naar MDS.

FCIP beschrijft mechanismes die de onderlinge verbinding van eilanden van Fibre Channel (FC) Storage Area Networks (SAN's) via IP-gebaseerde netwerken mogelijk maken om een verenigd SAN in één FC-structuur te vormen. FCIP is gebaseerd op IP-gebaseerde netwerkservices om de connectiviteit tussen de SAN-eilanden te bieden via lokale gebiedsnetwerken, metropolitane gebiedsnetwerken of brede gebiedsnetwerken.

Afbeelding 1 - Fibre Channel SAN's verbonden door FCIP



FCIP gebruikt Transmission Control Protocol (TCP) op poort 3225 als een netwerklaagtransport.

## Voorwaarden

## Vereisten

Zorg ervoor dat u aan deze vereisten voldoet voordat u deze configuratie probeert:

- De IP-backbone moet operationeel zijn en de gewenste bandbreedte leveren om de toepassingen te ondersteunen die op de FCIP-koppelingen draaien: dit kan een Layer 2 (L2) of Layer 3 (L3) topologie zijn.
- Als het een L3-topologie is, moeten de intermediaire routers of meerlaagse switches worden ingesteld en ingesteld om IP-verkeer tussen bron- en doeladressen van de FCIP-tunnels correct door te sturen. Als Quality of Service (QoS) of traffic shaping op elk netwerkapparaat in het pad tussen de FCIP-peers wordt afgedwongen, moet de netwerkbeheerder die de IP-infrastructuur beheert worden geraadpleegd om de benodigde details te verkrijgen voordat hij TCP-gerelateerde parameters en functies configureren in het FCIP-profiel (MDS) van de Multilayer Director-Switch (MDS).
- De Ethernet switches die naast de MDS's staan, moeten ondersteuning bieden en worden geconfigureerd voor 802.1Q trunking als subinterfaces zijn geconfigureerd op de MDS IP Storage (IPS) servicemodule.

## Gebruikte componenten

De informatie in dit document is gebaseerd op de volgende software- en hardware-versies:

- MDS 9509 met IPS-servicemodule (DS-X9308-SMIP) voor versie 1.2.2(2a)
- MDS 9216 met IPS-servicemodule (DS-X9308-SMIP) voor versie 1.2.2(2a)
- Catalyst 6509 met Catalyst OS (CatOS) 7.4(3)
- Win2030 Server (HPQ Pro-Liant-P4) met Emulex LP9K HBA
- IBM-opslagarray (ESS-2105-F20)

De informatie in dit document is gebaseerd op de apparaten in een specifieke laboratoriumomgeving. Alle apparaten die in dit document worden beschreven, hadden een opgeschoonde (standaard)configuratie. Als uw netwerk live is, moet u de potentiële impact van elke opdracht begrijpen.

## Conventies

Raadpleeg [Cisco Technical Tips Conventions \(Conventies voor technische tips van Cisco\) voor meer informatie over documentconventies.](#)

## Achtergrondinformatie

FCIP bestaat uit deze specificaties:

### ANSI T11

1. FC-SW-2 beschrijft de werking en interactie van FC-switches, waaronder E\_Port- en fabricagebewerkingen.
2. FC-BB-2 is een mapping die betrekking heeft op de uitbreiding van FC-geschakelde netwerken over een TCP-netwerkbackbone, en definieert referentiemodellen die E\_Port en B\_Port ondersteunen.

### IETF IPS-werkgroep

1. FC over TCP bestrijkt de TCP/IP-vereisten voor het transport van FC-frames via een IP-netwerk.
2. FC de kaderinsluiting definieert het gebruikelijke insluitingsformaat voor glasvezel.

Een verbinding tussen twee SAN-switches of weefsels via FCIP wordt een FCIP-link genoemd en kan een of meer TCP-verbindingen bevatten. Elk eind van een verbinding van FCIP wordt geassocieerd met een Virtuele haven E (VE\_port) of een B\_port, afhankelijk van de implementatie. FC-BB en FC-BB-2 beschrijven de verschillen tussen beide benaderingen. De IPS-servicemodule (DS-X9308-SMIP) ondersteunt beide modi maar is standaard gericht op VE\_Port, wat ook de aanbevolen modus is om te draaien als alle relevante peers DS-X9308-SMIP-modules zijn. In deze voorbeeldtopologie, wordt FCIP over PortChannel, te configureren TCP parameters en de FSF (speciaal frame) configuratieparameters besproken.

## Configureren

Deze sectie bevat informatie over het configureren van de functies die in dit document worden beschreven.

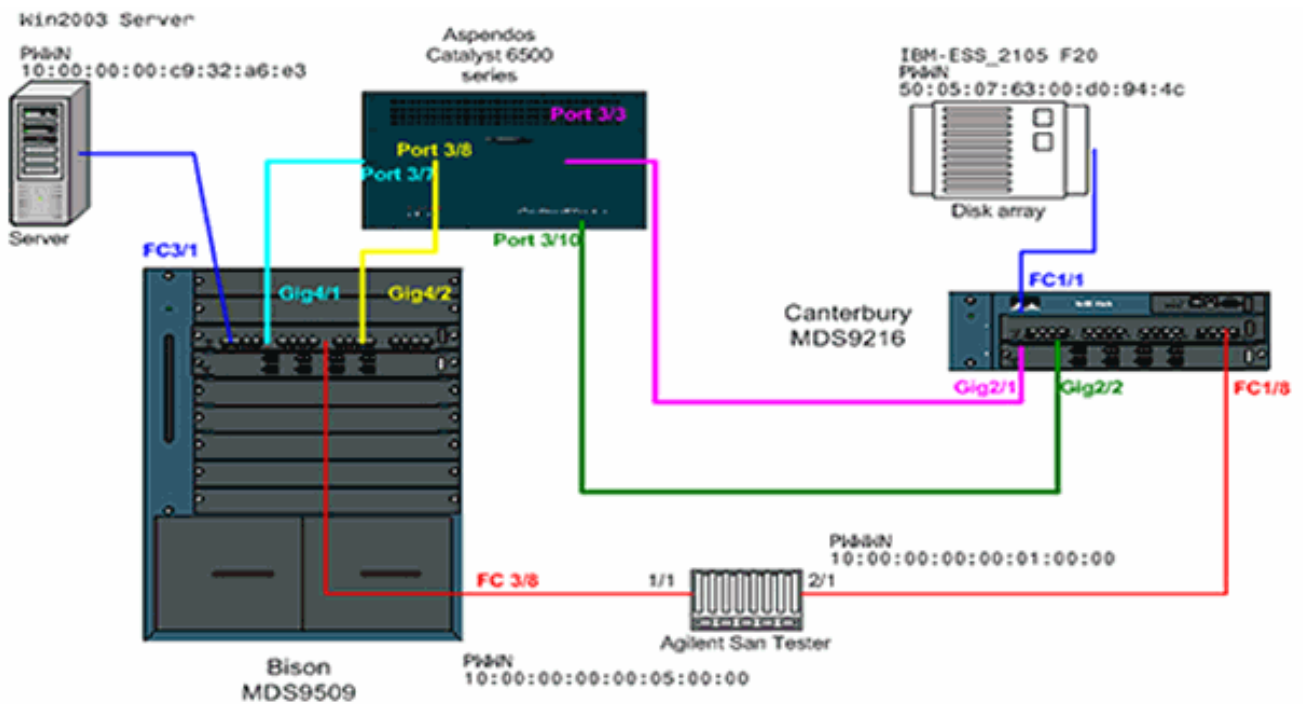
Op de MDSs, moet u jezelf met de IPS configuratiegidsen voor beide platforms vertrouwd maken. U vindt de meest recente versie van de handleidingen bij het [configureren van IP-opslag](#) op Cisco.com.

**N.B.:** Gebruik het [Opdrachtupgereedschap](#) ([alleen geregistreerde](#) klanten) om meer informatie te vinden over de opdrachten die in dit document worden gebruikt.

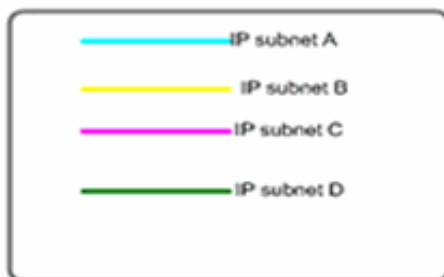
## Netwerkdigram

Het netwerk in dit document is als volgt opgebouwd:

**Afbeelding 2 - Topologie 3**



**Topology 3 - PortChannel of two FCIP interfaces**



Topologie 3 toont één FCIP-poortkanaal gevormd door twee afzonderlijke FCIP-tunnels; De peer interfaces zijn over een IP-cloud verspreid. De IP wolk wordt ingestort in één meerlaagse switch (Catalyst 6500) die verkeer van netto A naar Subnet C en van Subnet C naar Subnet A (en van Subnet B naar Subnet D en van Subnet D naar Subnet A) leidt. Subnetten zijn als volgt gedefinieerd:

- Subnet A : 100.100.100.0/30 - Bison int Gig4/1
- Subnet B: 100.100.100.4/30 - Bison int Gig4/2
- Subnet C: 200.200.200.0/30- Canterbury Gig2/1
- Subnet D: 200.200.200.4/30 - Canterbury Gig2/2

De topologie biedt een bekende **maximale bandbreedte van 100 Mbps** en een **minimale bandbreedte van 100 Mbps**, het profiel dat voor ons relevante IP-verkeer door deze IP-cloud wordt uitgevoerd. De eerste configuratie toont de aspecten van op FCIP gebaseerde poortkanalisatie en TCP-traffic conditionering. In volgende secties FSF, passieve TCP interfaces, en FCIP timestamp zullen verder worden uitgelegd.

## [Configuraties](#)

Dit document gebruikt deze configuraties:

- [MDS 9509 \(Bison\) met IPS-8 module](#)
- [MDS 9612 \(Canterbury\) met IPS-8 module](#)

## MDS 9509 (Bison) met IPS-8 module

```
bison# sh ver
Cisco Storage Area Networking Operating System (SAN-OS)
Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2002-2003 by Cisco Systems, Inc. All
rights reserved.
The copyright for certain works contained herein are
owned by
Andiamo Systems, Inc. and/or other third parties and are
used and
distributed under license.
```

```
Software
BIOS: version 1.0.8
loader: version 1.2(2)
kickstart: version 1.2(2a)
system: version 1.2(2a)
```

```
BIOS compile time: 08/07/03
kickstart image file is: bootflash:/k122a
kickstart compile time: 9/23/2003 11:00:00
system image file is: bootflash:/s122a
system compile time: 10/8/2003 18:00:00
```

```
Hardware
RAM 1024584 kB
```

```
bootflash: 500736 blocks (block size 512b)
slot0: 0 blocks (block size 512b)
```

```
bison uptime is 1 days 15 hours 45 minute(s) 44
second(s)
```

```
Last reset
Reason: Unknown
System version: 1.2(2a)
Service:
```

```
bison# sh run
```

```
Building Configuration ...
fcip profile 1
ip address 100.100.100.1
tcp max-bandwidth-mbps 100 min-available-bandwidth-mbps
100 round-trip-time-ms 10
!--- TCP bandwidth parameters defined specifically for
this FCIP tunnel. !--- Restricted to 100 Mbps max and
min. See the Note on TCP Parameters !--- comment section
in this table below for more details. fcip profile 2 ip
address 100.100.100.5 tcp max-bandwidth-mbps 100 min-
available-bandwidth-mbps 100 round-trip-time-ms 10 !---
TCP max and min bandwidth parameter are configured here
exactly the !--- same as for FCIP 1 because both tunnels
are combined in one PortChannel !--- interface and are
subject to the same bandwidth restrictions in the IP
core. vsan database vsan 600 vsan 601 fcdomain domain 1
preferred vsan 600 fcdomain domain 1 preferred vsan 601
interface port-channel 1 switchport trunk allowed vsan
600-601 interface fcip1 channel-group 1 force no
shutdown use-profile 1 peer-info ipaddr 200.200.200.1 !---
Interface FCIP 1 is a member of channel-group 1. The
```

```
force keyword makes it !--- adopt the specific settings
configured on interface port-channel 1. interface fcip2
channel-group 1 force no shutdown use-profile 2 peer-
info ipaddr 200.200.200.5 !--- Interface FCIP 2 is also
member of channel-group 1. boot system bootflash:/s122a
sup-1 boot kickstart bootflash:/k122a sup-1 boot system
bootflash:/s122a sup-2 boot kickstart bootflash:/k122a
sup-2 ip domain-name cisco.com ip name-server
144.254.10.123 ip route 200.200.200.0 255.255.255.252
100.100.100.2 distance 2 ip route 200.200.200.4
255.255.255.252 100.100.100.6 distance 2 !--- FCIP
interfaces are on separate IP subnets, so in order to
reach the FCIP !--- peer IP address, you need adequate
static routes to an L3 device that !--- knows how to
forward the packets to the final destination. Multiple
routes !--- to the same destination IP subnet are
allowed, and the distance parameter !--- can be used to
specify a preferred next hop. Multiple next hops would
!--- require a subnet mask providing for a larger number
of host; for example, !--- a 28-bit subnet mask. ssh key
dsa 768 force ssh server enable switchname bison zone
default-zone permit vsan 600-601 interface
GigabitEthernet4/1 ip address 100.100.100.1
255.255.255.252 switchport mtu 3000 no shutdown !--- MTU
size is defined as 3000 bytes. Make sure that all
intermediate network !--- devices between this interface
and the peer IP address are capable of !--- switching
and routing Jumbo frames. In order to avoid FC Frame
split, !--- an MTU value of 2300 is required; 3000 is
used in the configuration example !--- for simplicity.
FCIP TCP segments will normally never exceed 2264 bytes
for !--- TE ports or 2256 bytes for E ports, regardless
of the configured MTU size. interface GigabitEthernet4/2
ip address 100.100.100.5 255.255.255.252 switchport mtu
3000 no shutdown interface fc3/1 interface fc3/2
interface fc3/3 interface fc3/4 interface fc3/5
interface fc3/6 interface fc3/7 interface fc3/8
interface fc3/9 interface fc3/10 interface fc3/11
interface fc3/12 interface fc3/13 interface fc3/14
interface fc3/15 interface fc3/16 interface mgmt0 ip
address 10.48.69.151 255.255.255.128 !--- Note on TCP
Parameters !--- The following TCP parameters can be
individually configured per FCIP profile:
```

```
bison(config-profile)# tcp ?
```

```
cwm Enable congestion window monitoring
keepalive-timeout Set keep alive timeout in sec
max-bandwidth-kbps Configure maximum available path
bandwidth in Kbps
max-bandwidth-mbps Configure maximum available path
bandwidth in Mbps
max-retransmissions Maximum number of retransmissions
min-retransmit-time Set minimum retransmit time in
millisecond
pmtu-enable Enable PMTU Discovery
sack-enable Enable SACK option for TCP
send-buffer-size Send buffer size in KBytes
!--- The CWM parameter default value is 10K and should
be left untouched under !--- normal conditions.
Congestion window monitoring (CWM) is a way of !---
controlling burstiness after long idle times or loss of
Acks.
```

*!--- The **keepalive-timeout** is the TCP keepalive timeout value and is !--- set to 60 seconds by default, though it can range between 1 and 7200 seconds.*

*!--- The **max-** and **min-bandwidth** parameters program the TCP Maximum Window Size !--- (scaling factor) and engages an internal "shaper" functionality. !--- These values should be carefully chosen and requires understanding of the !--- intermediate network's end-to-end topology. The default values are to be !--- changed according to the aforementioned requirements. !--- The Round-trip-time can be derived once you have your FCIP tunnel up and !--- running by issuing the following command:*

```
bison# ips measure 200.200.200.1 interface  
gigabitethernet 4/1
```

Round trip time is 53 micro seconds (0.05 milliseconds )

*!--- Always add an additional margin of at least a few microseconds to this value. !--- The **max-retransmissions counter** is set to 4 by default. In a healthy network !-- - environment, this value should be left unchanged.*

*!--- The **max-retransmission timer** is set to 200 milliseconds. If you experience !--- extremely high retransmission counters, this value can be increased; but, !--- in general, changing this parameter is not required unless the RTT is !--- above 200 milliseconds.*

*!--- The **PMTU** (Path MTU discovery) is enabled by default. Best practice is to know !--- what is the maximum MTU size supported by all interfaces along the logical !--- path between both peers.*

*!--- The **SACK** feature (Selective Acknowledgment) is not enabled by default. !--- Consider enabling it when you have a lot of retransmissions occurring between !--- the two peers. SACK allows selective retransmissions of your window, which is !--- beneficial if larger maximum window sizes are configured and retransmissions !--- occur frequently. It is enabled in this sample configuration; when you do so, !--- make sure that it is enabled at both sides of the link.*

*!--- The **send-buffer-size** is the amount of buffers in addition to the TCP window !--- that are allowed to be transmitted out before starting to flow control the FC !--- sources. The default value is set to 0.*

- Raadpleeg voor meer informatie over PMTU [RFC 1191 - Path MTU discovery](#) .
- Voor meer informatie over SACK, raadpleeg [RFC 2018 - TCP-selectieopties](#) en [RFC 2883 - Een uitbreiding van de optie Selectieve Erkenning \(SACK\) voor TCP](#)

## MDS 9216 (Canterbury) met IPS-8 module

```
canterbury# sh run
```

```
Building Configuration ...  
fcip profile 200  
ip address 200.200.200.1
```

```

tcp max-bandwidth-mbps 100 min-available-bandwidth-mbps
100 round-trip-time-ms 10

fcip profile 201
ip address 200.200.200.5
tcp max-bandwidth-mbps 100 min-available-bandwidth-mbps
100 round-trip-time-ms 10
!--- The TCP parameters are identical to what is
configured on the peering !--- FCIP interfaces. Only in
very specific cases should different values be !---
considered, for example, if the return-path(s) are
running across a different !--- part of the network or
if the application dictates asymmetrical values. vsan
database vsan 600 vsan 601 fcdomain domain 2 preferred
vsan 600 fcdomain domain 2 preferred vsan 601 interface
port-channel 2 switchport trunk mode auto switchport
trunk allowed vsan 600-601 interface fcip1 channel-group
2 force no shutdown use-profile 200 peer-info ipaddr
100.100.100.1 interface fcip2 channel-group 2 force no
shutdown use-profile 201 peer-info ipaddr 100.100.100.5
!--- Both FCIP 1 and FCIP 2 are bound to the same
channel-group 2. Also note that !--- there is no strict
relationship between profile-id and FCIP interface !---
numbering here, as this is not a requirement. From a
management and !--- troubleshooting perspective,
however, a "strict" relationship of both values !--- is
recommended. vsan database vsan 600 interface fc1/1 vsan
601 interface fc1/8 boot system bootflash:/s122a boot
kickstart bootflash:/k122a ip domain-name cisco.com ip
name-server 144.254.10.123 ip default-gateway
10.48.69.129 ip route 100.100.100.0 255.255.255.252
200.200.200.2 distance 2 ip route 100.100.100.4
255.255.255.252 200.200.200.6 distance 2 !--- IP routes
are defined for both FCIP peer IP addresses. The next
hop must be !--- aware of the best route to the peer's
addresses or to the relevant IP subnets. ssh key dsa 768
force ssh server enable switchname canterbury system
default switchport trunk mode auto username admin
password 5 $1$KcCrqxlu$mtU03/60PRUIfj1.aeEEc0 role
network-admin zone default-zone permit vsan 600-601
zoneset distribute full vsan 1-4093 interface
GigabitEthernet2/1 ip address 200.200.200.1
255.255.255.252 switchport mtu 3000 no shutdown
interface GigabitEthernet2/2 ip address 200.200.200.5
255.255.255.252 switchport mtu 3000 no shutdown
interface GigabitEthernet2/3 interface
GigabitEthernet2/4 interface GigabitEthernet2/5
interface GigabitEthernet2/6 interface
GigabitEthernet2/7 interface GigabitEthernet2/8
interface fc1/1 interface fc1/2 interface fc1/3
interface fc1/4 interface fc1/5 interface fc1/6
interface fc1/7 interface fc1/8 interface fc1/9
interface fc1/10 interface fc1/11 interface fc1/12
interface fc1/13 interface fc1/14 interface fc1/15
interface fc1/16 interface mgmt0 ip address 10.48.69.156
255.255.255.128 interface iscsi2/1 interface iscsi2/2
interface iscsi2/3 interface iscsi2/4 interface iscsi2/5
interface iscsi2/6 interface iscsi2/7 interface iscsi2/8

```

## Verifiëren

Gebruik dit gedeelte om te bevestigen dat de configuratie correct werkt.



Het [Uitvoer Tolk](#) ([uitsluitend geregistreerde](#) klanten) (OIT) ondersteunt bepaalde **show** opdrachten. Gebruik de OIT om een analyse van **tonen** opdrachtoutput te bekijken.

- **Geef de interface x/y**-status weer van de relevante Gigabit-interface die aan het FCIP-profiel is gebonden.
- **toon IPS stats tcp int gig x/y**—Hiermee geeft u TCP-statistieken en actieve verbindingen weer voor de relevante Gigabit-interface.
- **tonen IPS arp int gig x/y**-Hiermee geeft u alle ARP-items van de adresresolutie weer voor de relevante Gigabit-interface; de volgende hop of peer moet in deze lijst voorkomen .
- **tonen IP route om x/y te geven** - Hiermee geeft u de specifieke routes die over de relevante Gigabit-interface gaan weer.
- **toon interface fcip x**-Hiermee geeft u de FCIP-interfacestatus en alle informatie die betrekking heeft op deze FCIP-tunnel weer.
- **Geef het profiel fcip x** - weer geeft het IP-adres weer waaraan het profiel is gebonden en alle geconfigureerde TCP-parameters.
- **Laat fcip x tellers zien** - gebruikt om te controleren of er frames zijn die door de FCIP tunnel gaan.
- **fcdomain vsan x**—Toont alle domeingerelateerde details; gebruikt om te controleren of het materiaal gevormd wordt door de FCIP-tunnel(s).
- **Fcns da vsan x**-displays alle poot, FC4-types en FCID's van de betreffende VSAN's laten zien; gebruikt om te verifiëren dat alle verwachte items zijn verdeeld over de FCIP-tunnel(s).

## [Problemen oplossen](#)

Gebruik dit gedeelte om de configuratie van het probleem op te lossen.

Vergeet niet de opdrachten van de **show** meerdere keren uit te geven om een tegengeschiedenis te bouwen. Tellers die niet op een bepaald moment in de tijd zitten en slechts één keer worden verzameld, zijn meestal nutteloos.

Gebruik de onderstaande configuraties voor meer informatie over de probleemoplossing.

- [MDS 9509 \(Bison\)](#)
- [MDS 9216 \(Canterbury\)](#)
- [Speciale frame-configuratie \(Bison\)](#)
- [Speciale frame-configuratie \(Canterbury\)](#)
- [Vertoon van Bison and Canterbury - passief Canterbury](#)
- [Weergave van Bison en Canterbury - Time-stempel](#)

### **MDS 9509 (Bison)**

```
bison# sh int gig 4/1

GigabitEthernet4/1 is up
  Hardware is GigabitEthernet, address is
0005.3000.a85a
  Internet address is 100.100.100.1/30
  MTU 3000 bytes
  Port mode is IPS
  Speed is 1 Gbps
```

```
Beacon is turned off
Auto-Negotiation is turned on
5 minutes input rate 312 bits/sec, 39 bytes/sec, 0
frames/sec
5 minutes output rate 312 bits/sec, 39 bytes/sec, 0
frames/sec
8685 packets input, 976566 bytes
0 multicast frames, 0 compressed
0 input errors, 0 frame, 0 overrun 0 fifo
8679 packets output, 972382 bytes, 0 underruns
0 output errors, 0 collisions, 0 fifo
0 carrier errors
```

bison# **sh int gig 4/2**

```
GigabitEthernet4/2 is up
Hardware is GigabitEthernet, address is
0005.3000.a85b
Internet address is 100.100.100.5/30
MTU 3000 bytes
Port mode is IPS
Speed is 1 Gbps
Beacon is turned off
Auto-Negotiation is turned on
5 minutes input rate 16 bits/sec, 2 bytes/sec, 0
frames/sec
5 minutes output rate 16 bits/sec, 2 bytes/sec, 0
frames/sec
590 packets input, 46496 bytes
0 multicast frames, 0 compressed
0 input errors, 0 frame, 0 overrun 0 fifo
547 packets output, 30898 bytes, 0 underruns
0 output errors, 0 collisions, 0 fifo
0 carrier errors
```

bison# **sh ips stats tcp int gig 4/1**

```
TCP Statistics for port GigabitEthernet4/1
Connection Stats
14 active openings, 4 accepts
4 failed attempts, 0 reset received, 14
established
Segment stats
8897 received, 8505 sent, 0 retransmitted
0 bad segments received, 0 reset sent
```

TCP Active Connections

Local Address	Remote Address	State
Send-Q Recv-Q		
100.100.100.1:65480	200.200.200.1:3225	ESTABLISH
0	0	
100.100.100.1:65482	200.200.200.1:3225	ESTABLISH
0	0	
100.100.100.1:3225	0.0.0.0:0	LISTEN
0	0	

bison# **sh ips stats tcp int gig 4/2**

```
TCP Statistics for port GigabitEthernet4/2
Connection Stats
2 active openings, 0 accepts
0 failed attempts, 0 reset received, 2 established
Segment stats
598 received, 43 sent, 0 retransmitted
```

0 bad segments received, 0 reset sent

TCP Active Connections

	Local Address	Remote Address	State
Send-Q	Recv-Q		
0	0	100.100.100.5:65531 200.200.200.5:3225	ESTABLISH
0	0	100.100.100.5:65533 200.200.200.5:3225	ESTABLISH
0	0	100.100.100.5:3225 0.0.0.0:0	LISTEN

bison# **sh int fcip1-2**

fcip1 is trunking

Hardware is GigabitEthernet  
Port WWN is 20:c2:00:05:30:00:7a:de  
Peer port WWN is 20:42:00:0c:30:6c:24:40  
Admin port mode is auto, trunk mode is on  
Port mode is TE  
vsan is 1

**Belongs to port-channel 1**

Trunk vsans (allowed active) (600-601)  
Trunk vsans (operational) (600-601)  
Trunk vsans (up) (600-601)  
Trunk vsans (isolated) ()  
Trunk vsans (initializing) ()  
Using Profile id 1 (interface GigabitEthernet4/1)

Peer Information

Peer Internet address is 200.200.200.1 and port is 3225

Special Frame is disabled  
Maximum number of TCP connections is 2  
Time Stamp is disabled  
QOS control code point is 0  
QOS data code point is 0  
B-port mode disabled

TCP Connection Information

2 Active TCP connections  
Control connection: Local 100.100.100.1:65480,  
Remote 200.200.200.1:3225  
Data connection: Local 100.100.100.1:65482, Remote 200.200.200.1:3225

28 Attempts for active connections, 7 close of connections

TCP Parameters

Path MTU 3000 bytes  
Current retransmission timeout is 200 ms  
Round trip time: Smoothed 5 ms, Variance: 6

**Advertized window: Current: 118 KB, Maximum: 118**

**KB, Scale: 1**

**Peer receive window: Current: 118 KB, Maximum: 118**

**KB, Scale: 1**

**Congestion window: Current: 10 KB, Slow start threshold: 118 KB**

5 minutes input rate 120 bits/sec, 15 bytes/sec, 0 frames/sec

5 minutes output rate 120 bits/sec, 15 bytes/sec, 0 frames/sec

4077 frames input, 379836 bytes  
4071 Class F frames input, 379100 bytes  
6 Class 2/3 frames input, 736 bytes  
0 Error frames timestamp error 0  
4077 frames output, 381064 bytes

```
4071 Class F frames output, 380364 bytes
6 Class 2/3 frames output, 700 bytes
0 Error frames 0 reass frames
```

fcip2 is trunking

```
Hardware is GigabitEthernet
Port WWN is 20:c6:00:05:30:00:7a:de
Peer port WWN is 20:46:00:0c:30:6c:24:40
Admin port mode is auto, trunk mode is on
Port mode is TE
vsan is 1
```

**Belongs to port-channel 1**

```
Trunk vsans (allowed active) (600-601)
Trunk vsans (operational) (600-601)
Trunk vsans (up) (600-601)
Trunk vsans (isolated) ()
Trunk vsans (initializing) ()
Using Profile id 2 (interface GigabitEthernet4/2)
```

Peer Information

```
Peer Internet address is 200.200.200.5 and port is
3225
```

```
Special Frame is disabled
Maximum number of TCP connections is 2
Time Stamp is disabled
QOS control code point is 0
QOS data code point is 0
B-port mode disabled
```

TCP Connection Information

```
2 Active TCP connections
Control connection: Local 100.100.100.5:65531,
Remote 200.200.200.5:3225
Data connection: Local 100.100.100.5:65533, Remote
200.200.200.5:3225
```

```
2 Attempts for active connections, 0 close of
connections
```

TCP Parameters

```
Path MTU 3000 bytes
Current retransmission timeout is 200 ms
Round trip time: Smoothed 0 ms, Variance: 0
```

**Advertized window: Current: 118 KB, Maximum: 118**

**KB, Scale: 1**

**Peer receive window: Current: 118 KB, Maximum: 118**

**KB, Scale: 1**

```
Congestion window: Current: 8 KB, Slow start
threshold: 118 KB
```

```
5 minutes input rate 32 bits/sec, 4 bytes/sec, 0
frames/sec
```

```
5 minutes output rate 32 bits/sec, 4 bytes/sec, 0
frames/sec
```

```
8 frames input, 1232 bytes
8 Class F frames input, 1232 bytes
0 Class 2/3 frames input, 0 bytes
0 Error frames timestamp error 0
8 frames output, 1228 bytes
8 Class F frames output, 1228 bytes
0 Class 2/3 frames output, 0 bytes
0 Error frames 0 reass frames
```

bison# **sh fcip pro 1**

FCIP Profile 1

```
Internet Address is 100.100.100.1 (interface
GigabitEthernet4/1)
Listen Port is 3225
```

```
TCP parameters
  SACK is enabled
  PMTU discovery is enabled, reset timeout is 3600 sec
  Keep alive is 60 sec
  Minimum retransmission timeout is 200 ms
  Maximum number of re-transmissions is 4
  Send buffer size is 0 KB
Maximum allowed bandwidth is 100000 kbps
Minimum available bandwidth is 100000 kbps
  Estimated round trip time is 10000 usec
  Congestion window monitoring is enabled, burst size
is 10 KB
```

```
bison# sh fcip pro 2
```

```
FCIP Profile 2
  Internet Address is 100.100.100.5 (interface
GigabitEthernet4/2)
  Listen Port is 3225
```

```
TCP parameters
  SACK is enabled
  PMTU discovery is enabled, reset timeout is 3600 sec
  Keep alive is 60 sec
  Minimum retransmission timeout is 200 ms
  Maximum number of re-transmissions is 4
  Send buffer size is 0 KB
Maximum allowed bandwidth is 100000 kbps
Minimum available bandwidth is 100000 kbps
  Estimated round trip time is 10000 usec
  Congestion window monitoring is enabled, burst size
is 10 KB
```

```
bison# sh int port-channel 1
```

```
port-channel 1 is trunking
  Hardware is Fibre Channel
  Port WWN is 24:01:00:05:30:00:7a:de
  Admin port mode is auto, trunk mode is on
  Port mode is TE
  Port vsan is 1
  Speed is 2 Gbps
Trunk vsans (admin allowed and active) (600-601)
Trunk vsans (up) (600-601)
  Trunk vsans (isolated) ()
  Trunk vsans (initializing) ()
  5 minutes input rate 120 bits/sec, 15 bytes/sec, 0
frames/sec
  5 minutes output rate 120 bits/sec, 15 bytes/sec, 0
frames/sec
  3969 frames input, 369812 bytes
    3963 Class F frames input, 369076 bytes
    6 Class 2/3 frames input, 736 bytes
    0 Error frames timestamp error 0
  3969 frames output, 371040 bytes
    3963 Class F frames output, 370340 bytes
    6 Class 2/3 frames output, 700 bytes
    0 Error frames 0 reass frames
Member[1] : fcip1
Member[2] : fcip2
```

```
bison# sh ips ip route interface gigabitethernet 4/1
```

```
Codes: C - connected, S - static
No default gateway
```

```
S 200.200.200.0/30 via 100.100.100.2, GigabitEthernet4/1
C 100.100.100.0/30 is directly connected,
GigabitEthernet4/1
```

```
bison# sh ips ip route interface gigabitethernet 4/2
```

```
Codes: C - connected, S - static
```

```
No default gateway
```

```
S 200.200.200.4/30 via 100.100.100.6, GigabitEthernet4/2
C 100.100.100.4/30 is directly connected,
GigabitEthernet4/2
```

```
bison# sh ips arp int gig 4/1
```

```
Protocol      Address      Age (min)    Hardware Addr
Type  Interface
Internet  100.100.100.2      8      0008.e21e.c7bc
ARPA  GigabitEthernet4/1
```

```
!--- Verify that the hardware address listed belongs to
the !--- next hop networking device.
```

```
bison# sh ips arp
int gig 4/2
```

```
Protocol      Address      Age (min)    Hardware Addr
Type  Interface
Internet  100.100.100.6      5      0008.e21e.c7bc
ARPA  GigabitEthernet4/2
```

```
bison# sh int port-channel 1 trunk vsan 600-601
```

```
port-channel 1 is trunking
```

```
Vsan 600 is up, FCID is 0x010000
```

```
Vsan 601 is up, FCID is 0x010000
```

```
bison# sh fcdomain vsan 600
```

```
The local switch is the Principal Switch.
```

```
Local switch run time information:
```

```
State: Stable
```

```
Local switch WWN: 22:58:00:05:30:00:7a:df
```

```
Running fabric name: 22:58:00:05:30:00:7a:df
```

```
Running priority: 2
```

```
Current domain ID: 0x01(1)
```

```
Local switch configuration information:
```

```
State: Enabled
```

```
FCID persistence: Disabled
```

```
Auto-reconfiguration: Disabled
```

```
Contiguous-allocation: Disabled
```

```
Configured fabric name: 20:01:00:05:30:00:28:df
```

```
Configured priority: 128
```

```
Configured domain ID: 0x01(1) (preferred)
```

```
Principal switch run time information:
```

```
Running priority: 2
```

```
Interface      Role      RCF-reject
```

```
-----  
port-channel 1  Downstream  Disabled  
-----
```

```
bison# sh fcdomain vsan 601
```

The local switch is the Principal Switch.

Local switch run time information:

State: Stable  
Local switch WWN: 22:59:00:05:30:00:7a:df  
Running fabric name: 22:59:00:05:30:00:7a:df  
Running priority: 2  
Current domain ID: 0x01(1)

Local switch configuration information:

State: Enabled  
FCID persistence: Disabled  
Auto-reconfiguration: Disabled  
Contiguous-allocation: Disabled  
Configured fabric name: 20:01:00:05:30:00:28:df  
Configured priority: 128  
Configured domain ID: 0x01(1) (preferred)

Principal switch run time information:

Running priority: 2

Interface	Role	RCF-reject
-----	-----	-----
<b>port-channel 1</b>	<b>Downstream</b>	<b>Disabled</b>
-----	-----	-----

## MDS 9216 (Canterbury)

```
canterbury# sh int gig 2/1-2
```

GigabitEthernet2/1 is up

Hardware is GigabitEthernet, address is  
0005.3000.ade6  
Internet address is 200.200.200.1/30  
MTU 3000 bytes  
Port mode is IPS  
Speed is 1 Gbps  
Beacon is turned off  
Auto-Negotiation is turned on  
5 minutes input rate 320 bits/sec, 40 bytes/sec, 0  
frames/sec  
5 minutes output rate 320 bits/sec, 40 bytes/sec, 0  
frames/sec  
8844 packets input, 993118 bytes  
0 multicast frames, 0 compressed  
0 input errors, 0 frame, 0 overrun 0 fifo  
8855 packets output, 994686 bytes, 0 underruns  
0 output errors, 0 collisions, 0 fifo  
0 carrier errors

GigabitEthernet2/2 is up

Hardware is GigabitEthernet, address is  
0005.3000.ade7  
Internet address is 200.200.200.5/30  
MTU 3000 bytes  
Port mode is IPS  
Speed is 1 Gbps  
Beacon is turned off  
Auto-Negotiation is turned on  
5 minutes input rate 16 bits/sec, 2 bytes/sec, 0  
frames/sec  
5 minutes output rate 8 bits/sec, 1 bytes/sec, 0

```
frames/sec
  634 packets input, 39538 bytes
    0 multicast frames, 0 compressed
    0 input errors, 0 frame, 0 overrun 0 fifo
  610 packets output, 47264 bytes, 0 underruns
    0 output errors, 0 collisions, 0 fifo
    0 carrier errors
```

```
canterbury# sh ips stats tcp int gig 2/1
```

```
TCP Statistics for port GigabitEthernet2/1
```

```
Connection Stats
```

```
  18 active openings, 10 accepts
  14 failed attempts, 0 reset received, 8
```

```
established
```

```
Segment stats
```

```
  8919 received, 8923 sent, 0 retransmitted
  0 bad segments received, 0 reset sent
```

```
TCP Active Connections
```

Local Address	Remote Address	State
Send-Q Recv-Q		
200.200.200.1:3225	100.100.100.1:65480	ESTABLISH
0	0	
200.200.200.1:3225	100.100.100.1:65482	ESTABLISH
0	0	
200.200.200.1:3225	0.0.0.0:0	LISTEN
0	0	

```
canterbury# sh ips stats tcp int gig 2/2
```

```
TCP Statistics for port GigabitEthernet2/2
```

```
Connection Stats
```

```
  498 active openings, 2 accepts
  498 failed attempts, 0 reset received, 2
```

```
established
```

```
Segment stats
```

```
  556 received, 579 sent, 0 retransmitted
  0 bad segments received, 0 reset sent
```

```
TCP Active Connections
```

Local Address	Remote Address	State
Send-Q Recv-Q		
200.200.200.5:3225	100.100.100.5:65531	ESTABLISH
0	0	
200.200.200.5:3225	100.100.100.5:65533	ESTABLISH
0	0	
200.200.200.5:3225	0.0.0.0:0	LISTEN
0	0	

```
canterbury# sh int fcip 1-2
```

```
fcip1 is trunking
```

```
Hardware is GigabitEthernet
```

```
Port WWN is 20:42:00:0c:30:6c:24:40
```

```
Peer port WWN is 20:c2:00:05:30:00:7a:de
```

```
Admin port mode is auto, trunk mode is auto
```

```
Port mode is TE
```

```
vsan is 1
```

```
Belongs to port-channel 2
```

```
Trunk vsans (allowed active) (600-601)
```

```
Trunk vsans (operational) (600-601)
```

```
Trunk vsans (up) (600-601)
```

```
Trunk vsans (isolated) ()
```



```
Trunk vsans (initializing) ()
Using Profile id 200 (interface GigabitEthernet2/1)
Peer Information
  Peer Internet address is 100.100.100.1 and port is
3225
  Special Frame is disabled
  Maximum number of TCP connections is 2
  Time Stamp is disabled
  QOS control code point is 0
  QOS data code point is 0
  B-port mode disabled
TCP Connection Information
  2 Active TCP connections
  Control connection: Local 200.200.200.1:3225,
Remote 100.100.100.1:65480
  Data connection: Local 200.200.200.1:3225, Remote
100.100.100.1:65482
  18 Attempts for active connections, 2 close of
connections
TCP Parameters
  Path MTU 3000 bytes
  Current retransmission timeout is 200 ms
  Round trip time: Smoothed 5 ms, Variance: 6
  Advertized window: Current: 118 KB, Maximum: 118
KB, Scale: 1
  Peer receive window: Current: 118 KB, Maximum: 118
KB, Scale: 1
  Congestion window: Current: 10 KB, Slow start
threshold: 112 KB
  5 minutes input rate 136 bits/sec, 17 bytes/sec, 0
frames/sec
  5 minutes output rate 136 bits/sec, 17 bytes/sec,
0 frames/sec
  4189 frames input, 391368 bytes
    4183 Class F frames input, 390668 bytes
    6 Class 2/3 frames input, 700 bytes
    0 Error frames timestamp error 0
  4189 frames output, 390140 bytes
    4183 Class F frames output, 389404 bytes
    6 Class 2/3 frames output, 736 bytes
    0 Error frames 0 reass frames

fcip2 is trunking
Hardware is GigabitEthernet
Port WWN is 20:46:00:0c:30:6c:24:40
Peer port WWN is 20:c6:00:05:30:00:7a:de
Admin port mode is auto, trunk mode is auto
Port mode is TE
vsan is 1
Belongs to port-channel 2
Trunk vsans (allowed active) (600-601)
Trunk vsans (operational) (600-601)
Trunk vsans (up) (600-601)
Trunk vsans (isolated) ()
Trunk vsans (initializing) ()
Using Profile id 201 (interface GigabitEthernet2/2)
Peer Information
  Peer Internet address is 100.100.100.5 and port is
3225
  Special Frame is disabled
  Maximum number of TCP connections is 2
  Time Stamp is disabled
  QOS control code point is 0
  QOS data code point is 0
```

```
B-port mode disabled
TCP Connection Information
  2 Active TCP connections
  Control connection: Local 200.200.200.5:3225,
Remote 100.100.100.5:65531
  Data connection: Local 200.200.200.5:3225, Remote
100.100.100.5:65533
  498 Attempts for active connections, 0 close of
connections
  TCP Parameters
  Path MTU 3000 bytes
  Current retransmission timeout is 200 ms
  Round trip time: Smoothed 10 ms, Variance: 5
  Advertized window: Current: 118 KB, Maximum: 118
KB, Scale: 1
  Peer receive window: Current: 118 KB, Maximum: 118
KB, Scale: 1
  Congestion window: Current: 8 KB, Slow start
threshold: 112 KB
  5 minutes input rate 0 bits/sec, 0 bytes/sec, 0
frames/sec
  5 minutes output rate 0 bits/sec, 0 bytes/sec, 0
frames/sec
  8 frames input, 1228 bytes
  8 Class F frames input, 1228 bytes
  0 Class 2/3 frames input, 0 bytes
  0 Error frames timestamp error 0
  8 frames output, 1232 bytes
  8 Class F frames output, 1232 bytes
  0 Class 2/3 frames output, 0 bytes
  0 Error frames 0 reass frames
```

```
canterbury# sh int port 2
```

```
port-channel 2 is trunking
  Hardware is Fibre Channel
  Port WWN is 24:02:00:0c:30:6c:24:40
  Admin port mode is auto, trunk mode is auto
  Port mode is TE
  Port vsan is 1
  Speed is 2 Gbps
  Trunk vsans (admin allowed and active) (600-601)
  Trunk vsans (up) (600-601)
  Trunk vsans (isolated) ()
  Trunk vsans (initializing) ()
  5 minutes input rate 120 bits/sec, 15 bytes/sec, 0
frames/sec
  5 minutes output rate 120 bits/sec, 15 bytes/sec, 0
frames/sec
  4213 frames input, 394068 bytes
  4207 Class F frames input, 393368 bytes
  6 Class 2/3 frames input, 700 bytes
  0 Error frames timestamp error 0
  4213 frames output, 392844 bytes
  4207 Class F frames output, 392108 bytes
  6 Class 2/3 frames output, 736 bytes
  0 Error frames 0 reass frames
Member[1] : fcip1
Member[2] : fcip2
```

```
canterbury# sh ips ip route interface gig 2/1
```

```
Codes: C - connected, S - static
No default gateway
```

```
S 100.100.100.0/30 via 200.200.200.2, GigabitEthernet2/1
C 200.200.200.0/30 is directly connected,
GigabitEthernet2/1
```

```
canterbury# sh ips ip route interface gig 2/2
```

```
Codes: C - connected, S - static
```

```
No default gateway
```

```
S 100.100.100.4/30 via 200.200.200.6, GigabitEthernet2/2
C 200.200.200.4/30 is directly connected,
GigabitEthernet2/2
```

```
canterbury# sh fcns da
```

```
VSAN 600:
```

```
-----
FCID      TYPE  PWWN                                (VENDOR)  FC4-
TYPE:FEATURE
-----
0x010001  N     10:00:00:00:c9:32:a6:e3  (Emulex)  scsi-
fcf:init
0x020001  N     50:05:07:63:00:d0:94:4c  (IBM)     scsi-
fcf:target fc..
```

```
Total number of entries = 2
```

```
VSAN 601:
```

```
-----
FCID      TYPE  PWWN                                (VENDOR)  FC4-
TYPE:FEATURE
-----
0x010100  N     10:00:00:00:00:05:00:00
0x020100  N     10:00:00:00:00:01:00:00
```

```
!--- Always verify that the fabric has formed with the
expected neighbor(s) !--- through FCIP E or TE port when
the configuration is completed.
```

## Speciale frame-configuratie (Bison)

```
!--- Special frames are used to improve security. !---
Before user-data is transmitted across an FCIP tunnel,
FSF verifies that !--- the peer is defined on the
configured wwn. interface fcip1 channel-group 1 force no
shutdown use-profile 1 peer-info ipaddr 200.200.200.1
special-frame peer-wnn 20:00:00:0c:30:6c:24:40 profile-
id 200
```

```
interface fcip2
channel-group 1 force
no shutdown
use-profile 2
peer-info ipaddr 200.200.200.5
special-frame peer-wnn 20:00:00:0c:30:6c:24:40 profile-
id 201
```

```
!--- The peer-wnn is derived from the peer MDS by
```

issuing the following command: canterbury# **sh wwn switch**

Switch WWN is 20:00:00:0c:30:6c:24:40

*!--- This value is significant per peer switch, so it is used for all tunnels !--- towards this switch. This configuration shows the following:* bison# **sh int fcip 1-2**

fcip1 is trunking

Hardware is GigabitEthernet

Port WWN is 20:c2:00:05:30:00:7a:de

Peer port WWN is 20:42:00:0c:30:6c:24:40

Admin port mode is auto, trunk mode is on

Port mode is TE

vsan is 1

Belongs to port-channel 1

Trunk vsans (allowed active) (600-601)

Trunk vsans (operational) (600-601)

Trunk vsans (up) (600-601)

Trunk vsans (isolated) ()

Trunk vsans (initializing) ()

Using Profile id 1 (interface GigabitEthernet4/1)

Peer Information

Peer Internet address is 200.200.200.1 and port is 3225

**Special Frame is enabled**

**Peer switch WWN is 20:00:00:0c:30:6c:24:40**

**Peer profile id is 200**

Maximum number of TCP connections is 2

Time Stamp is disabled

QOS control code point is 0

QOS data code point is 0

B-port mode disabled

TCP Connection Information

2 Active TCP connections

Control connection: Local 100.100.100.1:65372,

Remote 200.200.200.1:3225

Data connection: Local 100.100.100.1:65374, Remote

200.200.200.1:3225

82 Attempts for active connections, 9 close of connections

TCP Parameters

Path MTU 3000 bytes

Current retransmission timeout is 200 ms

Round trip time: Smoothed 2 ms, Variance: 1

Advertized window: Current: 118 KB, Maximum: 118

KB, Scale: 1

Peer receive window: Current: 118 KB, Maximum: 118

KB, Scale: 1

Congestion window: Current: 106 KB, Slow start

threshold: 118 KB

5 minutes input rate 46128 bits/sec, 5766 bytes/sec, 19 frames/sec

5 minutes output rate 194867736 bits/sec, 24358467 bytes/sec, 20732 frames/sec

5841 frames input, 1729836 bytes

4575 Class F frames input, 429444 bytes

1266 Class 2/3 frames input, 1300392 bytes

0 Error frames timestamp error 0

6339146 frames output, 7447938520 bytes

4576 Class F frames output, 431800 bytes

6334570 Class 2/3 frames output, 7447506720

bytes

0 Error frames 0 reassign frames

```

fcip2 is trunking
  Hardware is GigabitEthernet
  Port WWN is 20:c6:00:05:30:00:7a:de
  Peer port WWN is 20:46:00:0c:30:6c:24:40
  Admin port mode is auto, trunk mode is on
  Port mode is TE
  vsan is 1
  Belongs to port-channel 1
  Trunk vsans (allowed active) (600-601)
  Trunk vsans (operational) (600-601)
  Trunk vsans (up) (600-601)
  Trunk vsans (isolated) ()
  Trunk vsans (initializing) ()
  Using Profile id 2 (interface GigabitEthernet4/2)
  Peer Information
    Peer Internet address is 200.200.200.5 and port is
3225
Special Frame is enabled
Peer switch WWN is 20:00:00:0c:30:6c:24:40
Peer profile id is 201
  Maximum number of TCP connections is 2
  Time Stamp is disabled
  QOS control code point is 0
  QOS data code point is 0
  B-port mode disabled
  TCP Connection Information
    2 Active TCP connections
    Control connection: Local 100.100.100.5:3225,
Remote 200.200.200.5:64535
    Data connection: Local 100.100.100.5:3225, Remote
200.200.200.5:64537
    58 Attempts for active connections, 1 close of
connections
  TCP Parameters
    Path MTU 3000 bytes
    Current retransmission timeout is 200 ms
    Round trip time: Smoothed 2 ms, Variance: 1
    Advertized window: Current: 118 KB, Maximum: 118
KB, Scale: 1
    Peer receive window: Current: 118 KB, Maximum: 118
KB, Scale: 1
    Congestion window: Current: 106 KB, Slow start
threshold: 112 KB
    5 minutes input rate 0 bits/sec, 0 bytes/sec, 0
frames/sec
    5 minutes output rate 0 bits/sec, 0 bytes/sec, 0
frames/sec
    415 frames input, 398160 bytes
      16 Class F frames input, 2460 bytes
      399 Class 2/3 frames input, 395700 bytes
      0 Error frames timestamp error 0
    6078322 frames output, 7147327176 bytes
      16 Class F frames output, 2460 bytes
      6078306 Class 2/3 frames output, 7147324716
bytes
      0 Error frames 0 reass frames

```

### Speciale frame-configuratie (Canterbury)

```

interface fcip1
channel-group 2 force
no shutdown

```

```

use-profile 200
peer-info ipaddr 100.100.100.1
special-frame peer-wwn 20:00:00:05:30:00:7a:de profile-
id 1

interface fcip2
channel-group 2 force
no shutdown
use-profile 201
peer-info ipaddr 100.100.100.5
special-frame peer-wwn 20:00:00:05:30:00:7a:de profile-
id 2

canterbury# sh int fcip 1

fcip1 is trunking
  Hardware is GigabitEthernet
  Port WWN is 20:42:00:0c:30:6c:24:40
  Peer port WWN is 20:c2:00:05:30:00:7a:de
  Admin port mode is auto, trunk mode is auto
  Port mode is TE
  vsan is 1
  Belongs to port-channel 2
  Trunk vsans (allowed active) (600-601)
  Trunk vsans (operational) (600-601)
  Trunk vsans (up) (600-601)
  Trunk vsans (isolated) ()
  Trunk vsans (initializing) ()
  Using Profile id 200 (interface GigabitEthernet2/1)
  Peer Information
    Peer Internet address is 100.100.100.1 and port is
3225
Special Frame is enabled
Peer switch WWN is 20:00:00:05:30:00:7a:de
Peer profile id is 1
  Maximum number of TCP connections is 2
  Time Stamp is disabled
  QOS control code point is 0
  QOS data code point is 0
  B-port mode disabled
  TCP Connection Information
    2 Active TCP connections
    Control connection: Local 200.200.200.1:3225,
Remote 100.100.100.1:65372
    Data connection: Local 200.200.200.1:3225, Remote
100.100.100.1:65374
    2 Attempts for active connections, 0 close of
connections
  TCP Parameters
    Path MTU 3000 bytes
    Current retransmission timeout is 200 ms
    Round trip time: Smoothed 2 ms, Variance: 1
    Advertized window: Current: 118 KB, Maximum: 118
KB, Scale: 1
    Peer receive window: Current: 118 KB, Maximum: 118
KB, Scale: 1
    Congestion window: Current: 10 KB, Slow start
threshold: 112 KB
    5 minutes input rate 94347400 bits/sec, 11793425
bytes/sec, 10031 frames/sec
    5 minutes output rate 144 bits/sec, 18 bytes/sec,
0 frames/sec
    3985861 frames input, 4685834196 bytes
    219 Class F frames input, 25228 bytes

```

```
3985642 Class 2/3 frames input, 4685808968 bytes
0 Error frames timestamp error 0
1043 frames output, 866780 bytes
218 Class F frames output, 23448 bytes
825 Class 2/3 frames output, 843332 bytes
0 Error frames 0 reass frames
```

```
canterbury# sh int fcip 2
```

```
fcip2 is trunking
Hardware is GigabitEthernet
Port WWN is 20:46:00:0c:30:6c:24:40
Peer port WWN is 20:c6:00:05:30:00:7a:de
Admin port mode is auto, trunk mode is auto
Port mode is TE
vsan is 1
Belongs to port-channel 2
Trunk vsans (allowed active) (600-601)
Trunk vsans (operational) (600-601)
Trunk vsans (up) (600-601)
Trunk vsans (isolated) ()
Trunk vsans (initializing) ()
Using Profile id 201 (interface GigabitEthernet2/2)
Peer Information
Peer Internet address is 100.100.100.5 and port is
3225
Special Frame is enabled
Peer switch WWN is 20:00:00:05:30:00:7a:de
Peer profile id is 2
Maximum number of TCP connections is 2
Time Stamp is disabled
QOS control code point is 0
QOS data code point is 0
B-port mode disabled
TCP Connection Information
2 Active TCP connections
Control connection: Local 200.200.200.5:64535,
Remote 100.100.100.5:3225
Data connection: Local 200.200.200.5:64537, Remote
100.100.100.5:3225
500 Attempts for active connections, 0 close of
connections
TCP Parameters
Path MTU 3000 bytes
Current retransmission timeout is 300 ms
Round trip time: Smoothed 10 ms, Variance: 5
Advertized window: Current: 118 KB, Maximum: 118
KB, Scale: 1
Peer receive window: Current: 118 KB, Maximum: 118
KB, Scale: 1
Congestion window: Current: 8 KB, Slow start
threshold: 118 KB
5 minutes input rate 94399712 bits/sec, 11799964
bytes/sec, 10034 frames/sec
5 minutes output rate 0 bits/sec, 0 bytes/sec, 0
frames/sec
9769115 frames input, 11486944196 bytes
16 Class F frames input, 2460 bytes
9769099 Class 2/3 frames input, 11486941736
bytes
0 Error frames timestamp error 0
415 frames output, 398160 bytes
16 Class F frames output, 2460 bytes
399 Class 2/3 frames output, 395700 bytes
```

**Vertoon van Bison and Canterbury - passief Canterbury**

```
interface fcip1
channel-group 2 force
no shutdown
use-profile 200
passive-mode
peer-info ipaddr 100.100.100.1
special-frame peer-wnn 20:00:00:05:30:00:7a:de profile-
id 1
```

```
interface fcip2
channel-group 2 force
no shutdown
use-profile 201
passive-mode
peer-info ipaddr 100.100.100.5
special-frame peer-wnn 20:00:00:05:30:00:7a:de profile-
id 2
```

```
canterbury# sh ips stats tcp int gig 2/1
```

```
TCP Statistics for port GigabitEthernet2/1
```

```
Connection Stats
```

```
20 active openings, 14 accepts
```

```
14 failed attempts, 0 reset received, 14
```

```
established
```

```
Segment stats
```

```
12042719 received, 3181301 sent, 0 retransmitted
```

```
0 bad segments received, 0 reset sent
```

```
TCP Active Connections
```

Local Address	Remote Address	State
200.200.200.1:3225	100.100.100.1:65368	ESTABLISH
0	0	
200.200.200.1:3225	100.100.100.1:65370	ESTABLISH
0	0	
200.200.200.1:3225	100.100.100.1:65372	TIME_WAIT
0	0	
200.200.200.1:3225	0.0.0.0:0	LISTEN
0	0	

*!--- Both FCIP interfaces for Canterbury are configured to be passive; this !--- results in the above TCP statistics where Canterbury, despite being !--- configured with the highest IP addresses for both tunnels, did not !--- initiate the TCP connections. Its peer, Bison, initiates.*

```
canterbury# sh ips stats tcp int gig 2/2
```

```
TCP Statistics for port GigabitEthernet2/2
```

```
Connection Stats
```

```
500 active openings, 4 accepts
```

```
498 failed attempts, 0 reset received, 6
```

```
established
```

```
Segment stats
```

```
11933351 received, 3144627 sent, 0 retransmitted
```

```
0 bad segments received, 0 reset sent
```



TCP Active Connections			
	Local Address	Remote Address	State
Send-Q	Recv-Q		
0	0	200.200.200.5:3225 100.100.100.5:65415	ESTABLISH
0	0	200.200.200.5:3225 100.100.100.5:65417	ESTABLISH
0	0	200.200.200.5:64535 100.100.100.5:3225	TIME_WAIT
0	0	200.200.200.5:3225 0.0.0.0:0	LISTEN
0	0		

## Weergave van Bison en Canterbury - Time-stempel

*!--- FCIP Time Stamp is enabled to allow the peer to drop FCIP userdata if it !--- exceeds the specified time-difference. The time difference is the maximum !--- value in transit of user data frames between two peer FCIP entities.* bison(config-if)# **time-stamp acceptable-diff 1000**

Please enable NTP with a common time source on both MDS Switches that are on either side of the FCIP link

*!--- Note that the value specified is in milliseconds and, because a !--- time difference is specified, both ends of the FCIP tunnel must have access !--- to the same clock source through NTP.* interface fcip1 channel-group 1 force no shutdown use-profile 1 peer-info ipaddr 200.200.200.1 **time-stamp acceptable-diff 1000** special-frame peer-wwn 20:00:00:0c:30:6c:24:40 profile-id 200

```
interface fcip2
channel-group 1 force
no shutdown
use-profile 2
peer-info ipaddr 200.200.200.5
time-stamp acceptable-diff 1000
special-frame peer-wwn 20:00:00:0c:30:6c:24:40 profile-id 201
```

bison# **sh int fcip 1**

```
fcip1 is trunking
  Hardware is GigabitEthernet
  Port WWN is 20:c2:00:05:30:00:7a:de
  Peer port WWN is 20:42:00:0c:30:6c:24:40
  Admin port mode is auto, trunk mode is on
  Port mode is TE
  vsan is 1
  Belongs to port-channel 1
  Trunk vsans (allowed active) (600-601)
  Trunk vsans (operational) (600-601)
  Trunk vsans (up) (600-601)
  Trunk vsans (isolated) ()
  Trunk vsans (initializing) ()
  Using Profile id 1 (interface GigabitEthernet4/1)
  Peer Information
    Peer Internet address is 200.200.200.1 and port is
3225
    Special Frame is enabled
```

```
Peer switch WWN is 20:00:00:0c:30:6c:24:40
Peer profile id is 200
Maximum number of TCP connections is 2
Time Stamp is enabled, acceptable time difference
1000 ms
QOS control code point is 0
QOS data code point is 0
B-port mode disabled
TCP Connection Information
  2 Active TCP connections
  Control connection: Local 100.100.100.1:65368,
Remote 200.200.200.1:3225
  Data connection: Local 100.100.100.1:65370, Remote
200.200.200.1:3225
  84 Attempts for active connections, 10 close of
connections
TCP Parameters
  Path MTU 3000 bytes
  Current retransmission timeout is 200 ms
  Round trip time: Smoothed 2 ms, Variance: 3
  Advertized window: Current: 118 KB, Maximum: 118
KB, Scale: 1
  Peer receive window: Current: 118 KB, Maximum: 118
KB, Scale: 1
  Congestion window: Current: 10 KB, Slow start
threshold: 118 KB
  5 minutes input rate 0 bits/sec, 0 bytes/sec, 0
frames/sec
  5 minutes output rate 0 bits/sec, 0 bytes/sec, 0
frames/sec
  5988 frames input, 1743840 bytes
    4719 Class F frames input, 443184 bytes
    1269 Class 2/3 frames input, 1300656 bytes
    0 Error frames timestamp error 0
  15337275 frames output, 18028320932 bytes
    4720 Class F frames output, 445544 bytes
    15332555 Class 2/3 frames output, 18027875388
bytes
    0 Error frames 0 reass frames

canterbury(config-if)# time-stamp acceptable-diff 1000

Please enable NTP with a common time source on both MDS
Switches that are on
either side of the FCIP link

interface fcip1
channel-group 2 force
no shutdown
use-profile 200
passive-mode
peer-info ipaddr 100.100.100.1
time-stamp acceptable-diff 1000
special-frame peer-wwn 20:00:00:05:30:00:7a:de profile-
id 1

interface fcip2
channel-group 2 force
no shutdown
use-profile 201
passive-mode
peer-info ipaddr 100.100.100.5
time-stamp acceptable-diff 1000
special-frame peer-wwn 20:00:00:05:30:00:7a:de profile-
```

```
id 2
canterbury# sh int fcip 1

fcip1 is trunking
  Hardware is GigabitEthernet
  Port WWN is 20:42:00:0c:30:6c:24:40
  Peer port WWN is 20:c2:00:05:30:00:7a:de
  Admin port mode is auto, trunk mode is auto
  Port mode is TE
  vsan is 1
  Belongs to port-channel 2
  Trunk vsans (allowed active) (600-601)
  Trunk vsans (operational) (600-601)
  Trunk vsans (up) (600-601)
  Trunk vsans (isolated) ()
  Trunk vsans (initializing) ()
  Using Profile id 200 (interface GigabitEthernet2/1)
  Peer Information
    Peer Internet address is 100.100.100.1 and port is
3225
    Passive mode is enabled
    Special Frame is enabled
    Peer switch WWN is 20:00:00:05:30:00:7a:de
    Peer profile id is 1
    Maximum number of TCP connections is 2
    Time Stamp is enabled, acceptable time difference
1000 ms
    QOS control code point is 0
    QOS data code point is 0
    B-port mode disabled
  TCP Connection Information
    2 Active TCP connections
    Control connection: Local 200.200.200.1:3225,
Remote 100.100.100.1:65368
    Data connection: Local 200.200.200.1:3225, Remote
100.100.100.1:65370
    2 Attempts for active connections, 0 close of
connections
  TCP Parameters
    Path MTU 3000 bytes
    Current retransmission timeout is 200 ms
    Round trip time: Smoothed 6 ms, Variance: 6
    Advertized window: Current: 118 KB, Maximum: 118
KB, Scale: 1
    Peer receive window: Current: 118 KB, Maximum: 118
KB, Scale: 1
    Congestion window: Current: 10 KB, Slow start
threshold: 112 KB
    5 minutes input rate 0 bits/sec, 0 bytes/sec, 0
frames/sec
    5 minutes output rate 0 bits/sec, 0 bytes/sec, 0
frames/sec
    9427366 frames input, 11084654892 bytes
      295 Class F frames input, 32716 bytes
    9427071 Class 2/3 frames input, 11084622176
bytes
    145359 Error frames timestamp error 145359
    1122 frames output, 874528 bytes
      294 Class F frames output, 30932 bytes
      828 Class 2/3 frames output, 843596 bytes
    0 Error frames 0 reass frames
```

## Gerelateerde informatie

- [T11 startpagina](#)
- [Problemen met TCP langzame herstart na inactiviteitsperiode](#)
- [RFC 1911 - ontdekking van padMTU](#)
- [RFC 1323 - TCP-uitbreidingen voor hoogwaardige prestaties](#)
- [RFC 2018 - TCP-selectieopties voor bevestiging](#)
- [RFC 2883 - Een uitbreiding met de optie Selectieve Erkenning \(SACK\) voor TCP](#)
- [RFC 3821 - Fibre Channel over TCP/IP \(FCIP\)](#)
- [Technische ondersteuning en documentatie – Cisco Systems](#)