

FCIP を使用する MDS 間の高度な設定

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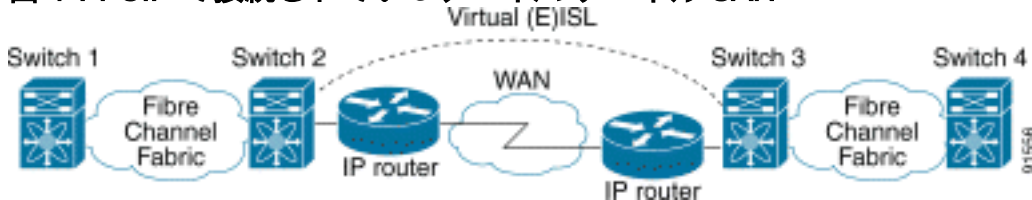
[関連情報](#)

概要

このドキュメントでは、複雑な Fibre Channel Over TCP/IP (FCIP) Multilayer Director Switch (MDS) to MDS の設定例について説明します。

FCIP は、IP ベース ネットワーク上のファイバチャネル (FC) ストレージ エリア ネットワーク (SAN) のアイランドの相互接続が単一の FC ファブリックの統一された SAN を形成できるメカニズムを解説します。FCIP は IP ベース ネットワーク サービスを利用して、ローカル エリア ネットワーク、メトロポリタン エリア ネットワーク、またはワイドエリア ネットワーク上の SAN アイランド間の接続を提供します。

図 1 : FCIP で接続されているファイバチャネル SAN



FCIP はネットワーク層転送としてポート 3225 で Transmission Control Protocol (TCP) を使用します。

前提条件

要件

この設定を行う前に、次の要件が満たされていることを確認します。

- IPバックボーンは動作可能であり、FCIPリンクを介して実行されるアプリケーションをサポートするために必要な帯域幅を提供する必要があります。これは、レイヤ2(L2)またはレイヤ3(L3)トポロジです。
- L3 トポロジの場合、中間ルータまたはマルチレイヤ スイッチをセットアップし、FCIP トンネルの送信元および宛先 IP アドレスの間で IP トラフィックを適切に転送するように設定する必要があります。FCIP ピア間のパスにあるすべてのネットワーク デバイスで Quality of Service (QoS) またはトラフィックシェーピングが実現される場合、マルチレイヤ ディレクタ スイッチ (MDS) FCIP プロファイルで TCP 関連パラメータと機能を設定する前に、IP インフラストラクチャを管理するネットワーク管理者に問い合わせる必要のある詳細を取得する必要があります。
- MDS の IP Storage (IPS; IP ストレージ) サービス モジュールでサブインターフェイスが設定されている場合は、MDS と隣接関係にあるイーサネットのスイッチでは 802.1Q トランキングがサポートされており、さらに、802.1Q トランキングに設定されている必要があります。

使用するコンポーネント

このドキュメントの情報は、次のソフトウェアとハードウェアのバージョンに基づいています。

- バージョン 1.2.(2a) を実行する IPS サービス モジュール (DS-X9308-SMIP) 付きの MDS 9509
- バージョン 1.2.(2a) を実行する IPS サービス モジュール (DS-X9308-SMIP) 付きの MDS 9216
- Catalyst OS (CatOS) 7.4(3) を実行する Catalyst 6509
- Emulex LP9K HBA が搭載された Win2003 Server (HPQ Pro-Liant-P4)
- IBM ストレージ アレイ (ESS-2105-F20)

このドキュメントの情報は、特定のラボ環境にあるデバイスに基づいて作成されました。このドキュメントで使用するすべてのデバイスは、初期 (デフォルト) 設定の状態から起動しています。対象のネットワークが実稼働中である場合には、どのようなコマンドについても、その潜在的な影響について確実に理解しておく必要があります。

表記法

ドキュメント表記の詳細は、『[シスコ テクニカル ティップスの表記法](#)』を参照してください。

背景説明

FCIP は次の仕様で構成されています。

ANSI T11

1. FC-SW-2 は E_Port およびファブリック動作を含む FC スイッチの動作と相互作用を記述します。
2. FC-BB-2 は TCP ネットワーク バックボーンをまたがる FC スイッチド ネットワークの拡張に関するマッピングで、E_Port と B_Port をサポートする参照モデルを定義します。

IETF IPS ワーキンググループ

1. TCP 上の FC は IP ネットワーク上の FC フレームを転送するための TCP/IP 要件に対応します。

2. FC フレーム カプセル化は、一般的なファイバ カプセル化フォーマットを定義します。

FCIP をまたがる 2 台の SAN スイッチまたはファブリック間の相互接続は FCIP リンクと呼ばれ、1 つ以上の TCP 接続を含む場合があります。FCIP リンクの両端は、実装に応じて仮想 E ポート (VE_port) または B_port に関連付けられます。FC-BB と FC-BB-2 は両方の方式の違いを記述します。IPS サービス モジュール (DS-X9308-SMIP) では両方のモードがサポートされていますが、デフォルトでは VE_Port となっています。これは、すべての関連ピアが DS-X9308-SMIP モジュールの場合に推奨されるモードでもあります。次のトポロジ例では、PortChannel 上の FCIP、設定する TCP パラメータ、および FSF (特殊フレーム) の設定パラメータを説明しています。

設定

このセクションでは、このドキュメントで説明する機能を設定するために必要な情報を提供しています。

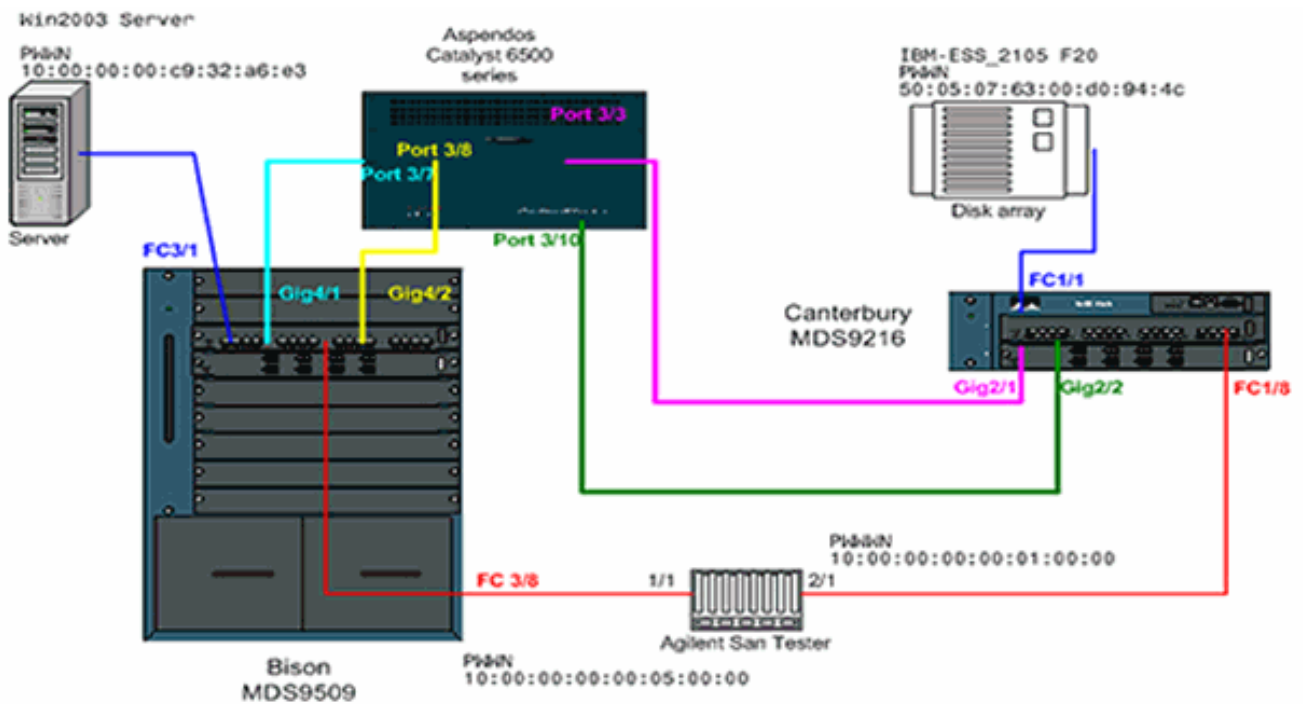
MDS については、両方のプラットフォームの IPS 設定ガイドを熟知する必要があります。最新版のマニュアルは Cisco.com の「[IP ストレージの設定](#)」で入手できます。

注：このドキュメントで使用されているコマンドの詳細を調べるには、[Command Lookup Tool](#) ([登録ユーザ専用](#)) を使用してください。

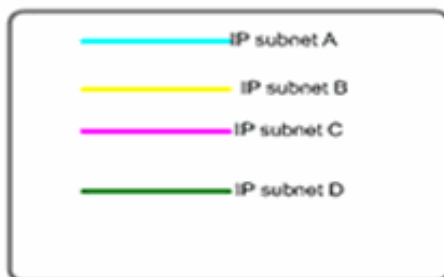
ネットワーク図

このドキュメントでは、次のネットワーク セットアップを使用します。

図 2：トポロジ 3



Topology 3 - PortChannel of two FCIP interfaces



トポロジ 3 は 2 つの個別 FCIP トンネルで形成される 1 つの FCIP ポート チャネルを示します。ピア インターフェイスは IP クラウドをまたがっています。IP クラウドは、サブネット A からサブネット C へ、また、サブネット C からサブネットから A へ (およびサブネット B からサブネット D へ、また、サブネット D からサブネットから A へ) トラフィックをルーティングする 1 台のマルチレイヤ スイッチ (Catalyst 6500) に縮小されます。サブネットは次のように定義されます。

- サブネット A : 100.100.100.0/30 - バイソン int Gig4/1
- サブネット B : 100.100.100.4/30 - バイソン int Gig4/2
- サブネット C : 200.200.200.0/30- カンタベリー Gig2/1
- サブネット D : 200.200.200.4/30 - カンタベリー Gig2/2

トポロジは既知の 100 Mbps の最大帯域幅と 100 Mbps の最小帯域幅を提供します。これは、この IP クラウドを経由して関連する IP トラフィックに対して実行されるプロファイルです。初期設定は FCIP ベースのポート チャネリングおよび TCP のトラフィック状態の側面を示します。後続の項では、FSF、パッシブ TCP インターフェイス、および FCIP タイムスタンプについて詳しく説明します。

設定

このドキュメントでは、次の構成を使用します。

- [IPS-8 モジュールを搭載した MDS 9509 \(バイソン \)](#)

• [IPS-8 モジュールを搭載した MDS 9612 \(カンタベリー \)](#)

IPS-8 モジュールを搭載した MDS 9509 (バイソン)

```
bison# sh ver
Cisco Storage Area Networking Operating System (SAN-OS)
Software
TAC support: http://www.cisco.com/tac
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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.*

- PMTUの詳細については、『[RFC 1191 – パスMTUディスカバリ](#)』を参照してください。
- SACKの詳細は、『[RFC 2018 - TCP Selective Acknowledgement Options](#)』および『[RFC 2883 - An Extension to the Selective Acknowledgement \(SACK\) Option for TCP](#)』を参照してください

IPS-8 モジュールを搭載した MDS 9216 (カンタベリー)


```
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$mtU03/60PRUIfjl.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
```


確認

ここでは、設定が正常に機能しているかどうかを確認します。

[アウトプット インタープリタ ツール \(登録ユーザ専用 \) \(OIT \)](#) は、特定の show コマンドをサポートします。OIT を使用して、show コマンドの出力の分析を表示します。

- `show interface gig x/y` : FCIP プロファイルにバインドされている関連ギガビット インターフェイスのステータスを表示します。
- `show ips stats tcp int gig x/y` : 関連ギガビット インターフェイスの TCP 統計情報とアクティブな接続を表示します。
- `show ips arp int gig x/y` : 関連ギガビット インターフェイスのすべてのアドレス解決プロトコル (ARP) エントリを表示します。ネクスト ホップまたはピアがこのリストに存在する必要があります。
- `show ips ip route int gig x/y` : 関連ギガビット インターフェイスをまたがる特定のルートを表示します。
- `show interface fcip x` : FCIP インターフェイスのステータスとこの FCIP トンネルに関するすべての詳細を表示します。
- `show profile fcip x -` : プロファイルがバインドされた IP アドレスとすべての設定済み TCP パラメータを表示します。
- `show int fcip x counters` : FCIP トンネルを経由して送信されるフレームがあるかどうかを確認するために使用します。
- `show fcdomain vsan x` : すべてのドメイン関連詳細をリスト表示します。ファブリックが FCIP トンネルをまたがって形成されることを確認するために使用します。
- `show fcns da vsan x` : 関連するVSANのすべてのpwwn、FC4タイプ、およびFCIDを表示します。予想されるすべてのエントリが FCIP トンネルをまたがって配信されることを確認するために使用します。

トラブルシューティング

このセクションは、設定のトラブルシューティングを行う際に参照してください。

カウンタ履歴を作成するには、`show` コマンドを複数回発行してください。特定の時点との関連がなく、一度だけ収集されるカウンタはほとんど役に立ちません。

さらに詳細なトラブルシューティングには、次に示す設定を使用してください。

- [MDS 9509 \(バイソン \)](#)
- [MDS 9216 \(カンタベリー \)](#)
- [特別なフレーム設定 \(バイソン \)](#)
- [特別なフレーム設定 \(カンタベリー \)](#)
- [バイソンおよびカンタベリーからの表示 : カンタベリー パッシブ](#)
- [バイソンおよびカンタベリーからの表示 : タイムスタンプ セット](#)

MDS 9509 (バイソン)

```
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
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
0        0
```

```
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
port-channel 1	Downstream	Disabled

MDS 9216 (カンタベリー)

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-  
fcip:init
```

```
0x020001  N      50:05:07:63:00:d0:94:4c  (IBM)     scsi-  
fcip: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.
```

特別なフレーム設定 (バイソン)

```
!--- 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-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
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 WNN 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 WNN is 20:c2:00:05:30:00:7a:de
  Peer port WNN 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 WNN 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 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 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
```

特別なフレーム設定 (カンタベリー)

```
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
  0 Error frames 0 reass frames
```

バイソンおよびカンタベリーからの表示 : カンタベリー パッシブ

```
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
Send-Q  Recv-Q
  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
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
```

バイソンおよびカンタベリーからの表示：タイムスタンプセット

```
!--- 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-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
time-stamp acceptable-diff 1000
special-frame peer-wnn 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-wnn 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
```

関連情報

- [T11 ホームページ](#)
- [Issues in TCP Slow-Start Restart After Idle](#)
- [RFC 1191 - Path MTU discovery](#)
- [RFC 1323 - TCP Extensions for High Performance](#)
- [RFC 2018 - TCP Selective Acknowledgement Options](#)
- [RFC 2883 - An Extension to the Selective Acknowledgement \(SACK\) Option for TCP](#)
- [RFC 3821 - Fibre Channel Over TCP/IP \(FCIP\)](#)
- [テクニカル サポートとドキュメント - Cisco Systems](#)