MDS zu MDS Beispielkonfiguration mit FCIP

## Inhalt

Einführung

Dieses Dokument enthält eine Beispielkonfiguration für einen detaillierten Fibre Channel Over TCP/IP (FCIP) Multilayer Director Switch (MDS) to MDS.

FCIP beschreibt Mechanismen, die die Verbindung von Fibre Channel (FC) Storage Area Networks (SANs) mit IP-basierten Netzwerken ermöglichen, um ein einheitliches SAN in einer einzigen FC-Fabric zu bilden. FCIP nutzt IP-basierte Netzwerkservices, um die Verbindungen zwischen den SAN-Inseln über lokale Netzwerke, Metropolitan Area Networks oder Wide Area Networks bereitzustellen.

Abbildung 1: Fibre Channel-SANs, die über FCIP verbunden sind
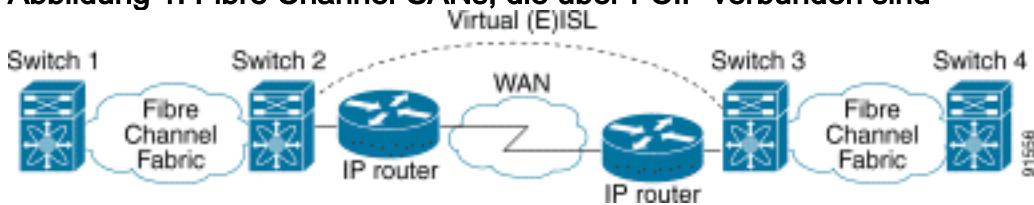
FCIP verwendet das Transmission Control Protocol (TCP) an Port 3225 als Transport auf Netzwerkebene.

Voraussetzungen

Anforderungen

Stellen Sie sicher, dass Sie diese Anforderungen erfüllen, bevor Sie versuchen, diese Konfiguration durchzuführen:

- Der IP-Backbone muss betriebsbereit sein und die erforderliche Bandbreite bereitstellen, um die Anwendungen zu unterstützen, die über die FCIP-Verbindungen ausgeführt werden. Dies kann eine Layer-2- (L2-) oder Layer-3-Topologie (L3) sein.
- Wenn es sich um eine L3-Topologie handelt, müssen die zwischengeschalteten Router oder Multilayer-Switches eingerichtet und konfiguriert werden, um den IP-Datenverkehr zwischen Quell- und Ziel-IP-Adressen der FCIP-Tunnel entsprechend weiterzuleiten. Wenn Quality of Service (QoS) oder Traffic Shaping auf einem Netzwerkgerät im Pfad zwischen den FCIP-Peers durchgesetzt wird, sollte der Netzwerkmanager, der die IP-Infrastruktur verwaltet, konsultiert werden, um die erforderlichen Details zu erhalten, bevor TCP-bezogene Parameter und Funktionen in den FCIP-Profilen des Multilayer Director Switch (MDS) konfiguriert werden.
- Die an die MDS angrenzenden Ethernet-Switches müssen 802.1Q-Trunking unterstützen und konfiguriert werden, wenn Subschnittstellen auf dem MDS IP Storage (IPS)-Dienstmodul konfiguriert werden.

Verwendete Komponenten

Die Informationen in diesem Dokument basieren auf den folgenden Software- und Hardwareversionen:

- MDS 9509 mit IPS-Servicemodul (DS-X9308-SMIP), das Version 1.2.(2a) ausführt
- MDS 9216 mit IPS-Servicemodul (DS-X9308-SMIP), das Version 1.2.(2a) ausführt
- Catalyst 6509 mit Catalyst OS 7.4(3)
- Win2003-Server (HPQ Pro-Liant-P4) mit Emulex LP9K HBA
- IBM Storage Array (ESS-2105-F20)

Die Informationen in diesem Dokument wurden von den Geräten in einer bestimmten Laborumgebung erstellt. Alle in diesem Dokument verwendeten Geräte haben mit einer leeren (Standard-)Konfiguration begonnen. Wenn Ihr Netzwerk in Betrieb ist, stellen Sie sicher, dass Sie die potenziellen Auswirkungen eines Befehls verstehen.

Konventionen

Weitere Informationen zu Dokumentkonventionen finden Sie unter Cisco Technical Tips Conventions (Technische Tipps zu Konventionen von Cisco).

Hintergrundinformationen

Das FCIP umfasst folgende Spezifikationen:

ANSI T11

1. FC-SW-2 beschreibt den Betrieb und die Interaktion von FC-Switches einschließlich E_Port und Fabric-Betrieb.
2. FC-BB-2 ist eine Zuordnung, die sich auf die Erweiterung von FC-Switched-Netzwerken über einen TCP-Netzwerk-Backbone bezieht und Referenzmodelle definiert, die E_Port und B_Port unterstützen.

1. FC over TCP deckt die TCP/IP-Anforderungen für die Übertragung von FC-Frames über ein IP-Netzwerk ab.
2. Die FC-Frame-Kapselung definiert das übliche Format für die Glasfaserverkapselung.

Eine Verbindung zwischen zwei SAN-Switches oder Fabrics über FCIP wird als FCIP-Link bezeichnet und kann eine oder mehrere TCP-Verbindungen enthalten. Jedes Ende einer FCIP-Verbindung ist je nach Implementierung mit einem virtuellen E-Port (VE_port) oder einem B_port verknüpft. FC-BB und FC-BB-2 beschreiben die Unterschiede zwischen beiden Ansätzen. Das IPS-Servicemodul (DS-X9308-SMIP) unterstützt beide Modi, wird jedoch standardmäßig auf VE_Port zurückgesetzt. Dies ist auch der empfohlene Modus, wenn alle relevanten Peers DS-X9308-SMIP-Module sind. In dieser Beispieltopologie werden FCIP over PortChannels, zu konfigurierende TCP-Parameter und FSF-Konfigurationsparameter (spezieller Frame) erläutert.

Konfigurieren

In diesem Abschnitt erhalten Sie Informationen zum Konfigurieren der in diesem Dokument beschriebenen Funktionen.

Auf den MDSs müssen Sie sich mit den IPS-Konfigurationsleitfäden für beide Plattformen vertraut machen. Die aktuelle Version der Handbücher finden Sie unter [Konfigurieren von IP-Speicher](#) auf Cisco.com.

Hinweis: Verwenden Sie das [Command Lookup Tool](#) (nur [registrierte](#) Kunden), um weitere Informationen zu den in diesem Dokument verwendeten Befehlen zu erhalten.

Netzwerkdiagramm

In diesem Dokument wird die folgende Netzwerkeinrichtung verwendet:

Abbildung 2: Topologie 3
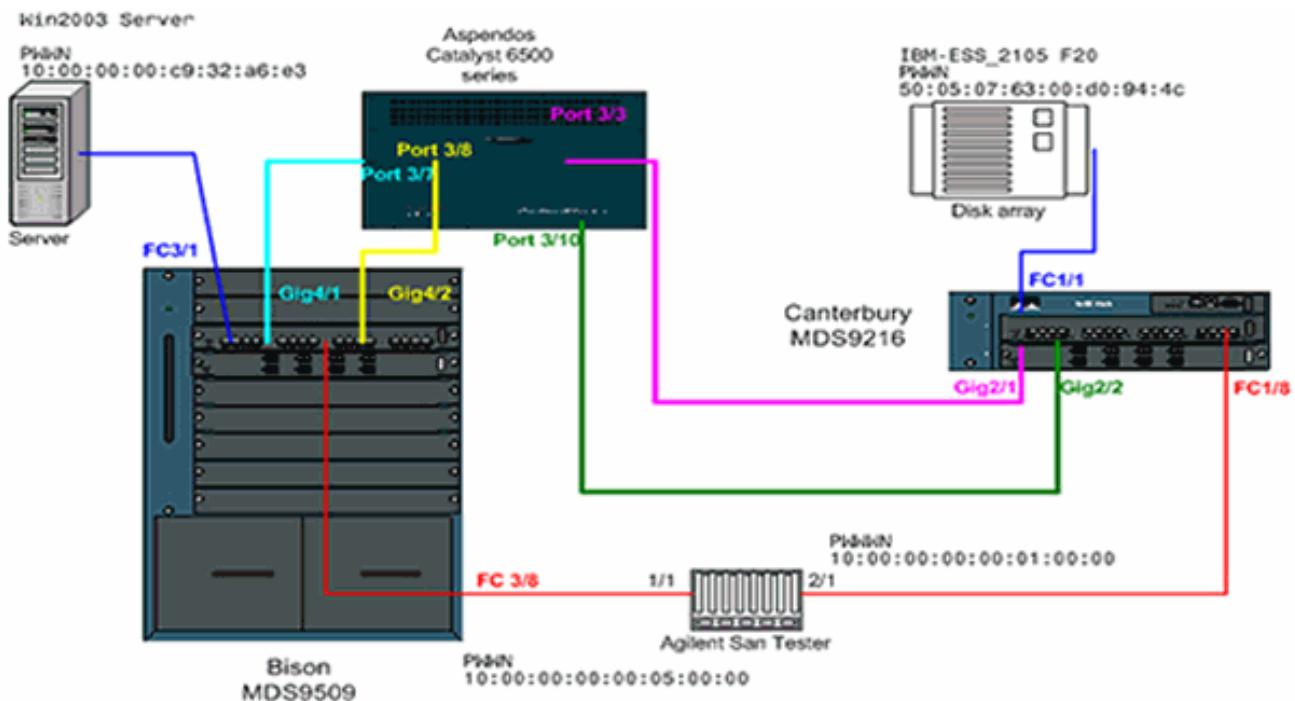
Topology 3 - PortChannel of two FCIP interfaces
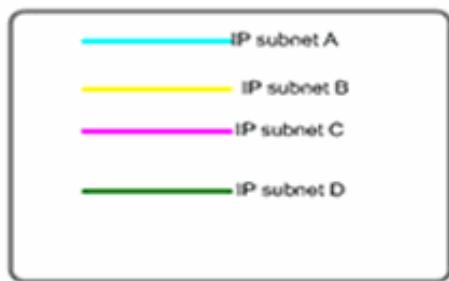
Topologie 3 zeigt einen FCIP-Port-Channel, der aus zwei einzelnen FCIP-Tunneln besteht. die Peer-Schnittstellen sich über eine IP-Cloud erstrecken. Die IP-Cloud wird zu einem Multilayer-Switch (Catalyst 6500) zusammengefasst, der Datenverkehr von Subnetz A an Subnetz C und von Subnetz C an Subnetz A (und von Subnetz B an Subnetz D und von Subnetz D an Subnetz A) weiterleitet. Subnetze sind wie folgt definiert:

- Subnetz A: 100.100.100.0/30 - Bison int Gig4/1
- Subnetz B: 100.100.100.4/30 - Bison int Gig4/2
- Subnetz C: 200.200.200.0/30- Canterbury Gig2/1
- Subnetz D: 20.200.200.4/30 - Canterbury Gig2/2

Die Topologie bietet eine bekannte **maximale Bandbreite von 100 Mbit/s** und eine **Mindestbandbreite von 100 Mbit/s**, das Profil, das für unseren relevanten IP-Datenverkehr über diese IP-Cloud ausgeführt wird. Die Erstkonfiguration zeigt die Aspekte des FCIP-basierten Port Channeling- und TCP-Datenverkehrs-Conditioning. In den folgenden Abschnitten werden FSF, passive TCP-Schnittstellen und FCIP-Zeitstempel genauer erläutert.

Konfigurationen

In diesem Dokument werden folgende Konfigurationen verwendet:

- MDS 9509 (Bison) mit IPS-8-Modul
- MDS 9612 (Canterbury) mit IPS-8-Modul

MDS 9509 (Bison) mit IPS-8-Modul

```
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.
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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.
```

- Weitere Informationen zu PMTU finden Sie in [RFC 1191 - Path MTU Discovery](#) .
- Weitere Informationen zu SACK finden Sie unter [RFC 2018 - TCP Selective Acknowledgement Options](#) und [RFC 2883 - An Extension to the Selective Acknowledgement (SACK) Option for TCP](#)

MDS 9216 (Canterbury) mit IPS-8-Modul

```
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
```

Überprüfen

In diesem Abschnitt überprüfen Sie, ob Ihre Konfiguration ordnungsgemäß funktioniert.

Das Output Interpreter Tool (nur registrierte Kunden) (OIT) unterstützt bestimmte **show**-Befehle. Verwenden Sie das OIT, um eine Analyse der **Ausgabe des** Befehls **show anzuzeigen**.

- **show interface gig** *x/y*: **Zeigt den** Status der relevanten Gigabit-Schnittstelle an, die an das FCIP-Profil gebunden ist.
- **show ips stats tcp int gig** *x/y*: Zeigt TCP-Statistiken und aktive Verbindungen für die entsprechende Gigabit-Schnittstelle an.
- **show ips arp int gig** *x/y*: Zeigt alle ARP-Einträge (Address Resolution Protocol) für die **entsprechende Gigabit-Schnittstelle an.** der nächste Hop oder Peer sollte in dieser Liste vorhanden sein.
- **show ips ip route int gig** *x/y*: Zeigt die spezifischen Routen an, die über die entsprechende Gigabit-Schnittstelle verlaufen.
- **show interface fcip** *x*: Zeigt den FCIP-Schnittstellenstatus und alle Details zu diesem FCIP-Tunnel an.
- **show profile fcip** *x*: Zeigt die IP-Adresse an, an die das Profil gebunden ist, sowie alle konfigurierten TCP-Parameter.
- **show int fcip** *x* **counter** - Wird verwendet, um zu überprüfen, ob Frames den FCIP-Tunnel durchlaufen.
- **show fcdomain vsan** *x*: Enthält eine Liste aller domänenbezogenen Details. wird verwendet, um zu überprüfen, ob die Fabric über die FCIP-Tunnel(s) gebildet wird.
- **show fcns da vsan** *x*: Zeigt alle Pwwn, FC4-Typen und FCIDs des relevanten VSAN an. wird verwendet, um zu überprüfen, ob alle erwarteten Einträge über die FCIP-Tunnel verteilt sind.

Fehlerbehebung

In diesem Abschnitt finden Sie eine Fehlerbehebung für Ihre Konfiguration.

Stellen Sie sicher, dass Sie die **Befehle show** mehrmals ausgeben, um einen Zählerverlauf zu erstellen. Zähler, die nicht mit einem bestimmten Zeitpunkt zusammenhängen und nur einmal gesammelt wurden, sind meist nutzlos.

Verwenden Sie zur weiteren Fehlerbehebung die unten aufgeführten Konfigurationen.

- MDS 9509 (Bison)
- MDS 9216 (Canterbury)
- Spezielle Frame-Konfiguration (Bison)
- Spezielle Frame-Konfiguration (Canterbury)
- Anzeige von Bison und Canterbury - passiv in Canterbury
- Anzeige von Bison und Canterbury - Zeitstempel-Set

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

Spezielle Frame-Konfiguration (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-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-wwn 20:00:00:0c:30:6c:24:40 profile-
```

```
id 201

!--- The peer-wwn 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 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
```

Spezielle Frame-Konfiguration (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
          0 Error frames 0 reass frames
```

Anzeige von Bison und Canterbury - passiv in Canterbury

```
interface fcip1
channel-group 2 force
no shutdown
use-profile 200
passive-mode
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
passive-mode
peer-info ipaddr 100.100.100.5
special-frame peer-wwn 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
```

Anzeige von Bison und Canterbury - Zeitstempel-Set

!--- 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
```

Zugehörige Informationen

- T11-Startseite
- Probleme beim verzögerten Neustart des TCP nach dem Leerlauf
- RFC 1191 - MTU-Pfaderkennung
- RFC 1323 - TCP-Erweiterungen für hohe Leistung
- RFC 2018 - Optionen für selektive TCP-Bestätigung
- RFC 2883 - Erweiterung der SACK-Option (Selective Acknowledgement) für TCP
- RFC 3821 - Fibre Channel Over TCP/IP (FCIP)
- Technischer Support und Dokumentation - Cisco Systems