VSM4 and 5

Update Guide

E28145-01

Revision 01

VSM4 and 5 Update Guide

E28145-01

Preface

Audience

This guide is for Sun StorageTek or customer personnel who are responsible for installing and maintaining VSM4s and VSM5s and the associated software and microcode.

About This Book

VSM4 and 5 Update Guide provides update information about the following enhancements to the VSM4 and VSM5:

Contents

CHAPTER 1

VTSS Native IP Support

The VTSS native IP connection feature lets you use TCP/IP protocol to connect two VTSSs for VTV replication. Each VTSS has IFF3 cards with Ethernet ports for connection to the TCP/IP network. Previously, you were limited to ESCON or FICON connections for replication. Using TCP/IP for CLINKs can provide improved replication performance over ESCON or FICON protocols and, if so desired, allows the existing ESCON or FICON ports to be used exclusively for RTD and host connections.

Native IP applies to only VSM5s. Configuring native IP consists of the following:

- "Satisfying Prerequisites" on page 2
- "The TCP/IP Environment" on page 4
- "Replacing IFF2 Cards with IFF3 Cards" on page 5
- "Configuring the IFF3 IP Addresses" on page 10
- "Configuring VTCS" on page 19

Also see "Changing the IP Address of an IFF3 Card" on page 25 for this procedure.

Satisfying Prerequisites

The following are prerequisites and recommendations for Native IP:

- VTSS microcode level H02.08 (for Models VSM5-45TB-IFF3, VSM5-68TB-IFF3, and VSM5-90TB-IFF3) or D02.08 (for all other models) is required.
- Network Infrastructure Requirements:
  - Gigabit Ethernet protocol is required on all network switches and routers that are directly attached to the IFF3 cards. The IFF3 card will only do speed negotiation to the 1 Gb speed.
  - StorageTek recommends a private Ethernet network for native IP connections.
  - Switches and Routers should support Jumbo(mtu=9000) packets for best performance.
  - Check that you are using the proper Ethernet cables:
    - CAT5 cables and below are **not** acceptable for GigE transmission from a VTSS.
    - CAT5E cable 90 meters is acceptable if run through a patch panel, 100 meters if straight cable.
    - CAT6 cable 100 meters is acceptable regardless of patch panel configuration.
- Each VTSS must have installed 4 IFF3 cards, each of which supports a 1gigabit RJ-45 ethernet connector. Each IFF3 can be configured to support up to 4 IP CLINK connections up to a maximum of 16 IP CLINKs per VTSS. Configurations can also include a mixture of ESCON/FICON and Native IP CLINKs.
- CDSLEVEL F and above is required, with the following PTFs:
  - For 6.1:
    - L1H14II - SMS6100
    - L1H14IJ - SOS6100
    - L1H14IK - SWS6100
  - For 6.2:
    - L1A00P7 - SMC6200
    - L1H14IM - SMS6200
    - L1H14O2 - SOS6200
    - L1H14IL - SWS6200
  - For 7.0, L1H150G (SES7000)
  - For 7.1, support is included in the base.

Note –

- The term “Jumbo“ indicates supporting frame sizes greater that 1500 bytes Maximum Transmission Unit (MTU). MTU refers to the number of bytes of the largest protocol data unit (PDU) that a communications protocol layer can pass onwards to the other layers. A higher MTU means better efficiency since each packet carries more user data while protocol overheads (headers, and so forth) remain the same for each packet. So if the link supports larger packets with Jumbo MTU that means higher throughput. To achieve the optimal performance, the transfer of data requires frame sizes greater that 1500. Initially for native IP, it will be using an MTU size of 4880 bytes. To further increase performance the MTU size must increase to 9000 bytes.

? The Path Maximum Transmission Unit Discovery (PMTUD) feature is required to let the VTSS IP know if a component in the network infrastructure can or cannot support the greater than 1500 frame size. For a router that does **not** support Jumbo/PMTUD, VTSS would send the router a Jumbo frame and the router would **not** let VTSS know that it cannot process that size and the frame would be would be discarded by the router. If the router supports PMTUD, it returns a message indicating that it cannot process that particular large frame size and VTSS resizes the Jumbo frame into the 1500 bytes (standard) size.The result is that the transmission is successful but at a lower performance. So for VTSS Native IP, the switch/router in the configuration must support JUMBO frames (Ethernet sends frames and IP sends packets) and PMTUD.

The TCP/IP Environment

TCP/IP attached CLINKs perform the same function as FICON or ESCON channel attached CLINKs, TIP/IP CLINKs originate from an Ethernet port on the IFF3 interface card instead of the ESCON or FICON ports on an ICE or VCF channel interface card. The TCP/IP connection is a standard copper Ethernet connector and must be attached either directly to another IFF3 card or a 1 Gb port on an Ethernet switch or router (connections at less than 1 Gb cannot perform replication). FIGURE 1-1 shows Peer VTSSs, each with 3 IFF3 cards. The Ethernet cables from the IFF3 cards attach to Local Area Networks (LANs, one for each VTSS) and the LANs are connected via a Wide Area Network (WAN).

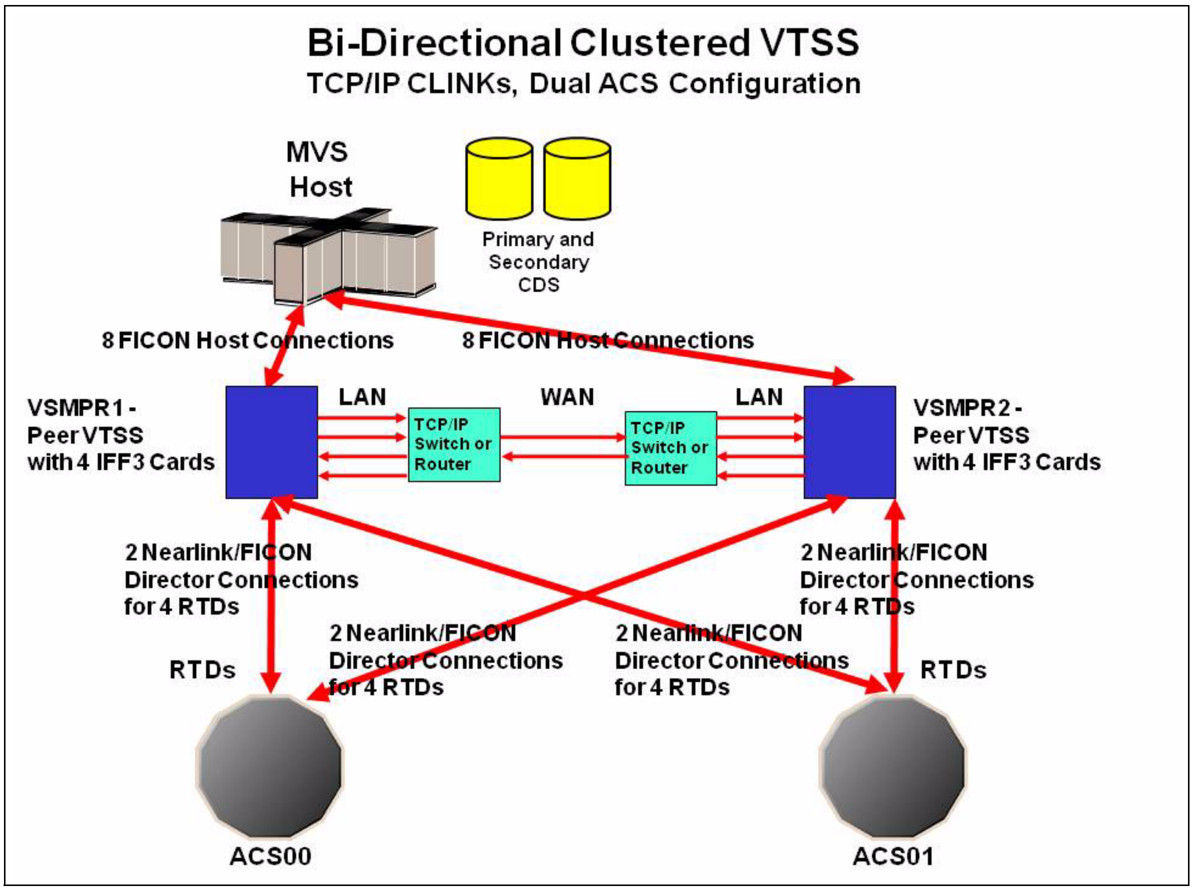


FIGURE 1-1 The TCP/IP Environment with IFF3 Cards for TCP/IP CLINKs

Replacing IFF2 Cards with IFF3 Cards

Note – IF the VSM5 came from factory with IFF3 cards installed skip to step 8

To replace IFF2 Cards with IFF3 cards:

1. **Power off the VTSS, disconnect the Fibre Channel cables, and remove the IFF2 cards.**
2. **Install the new IFF3 cards.**

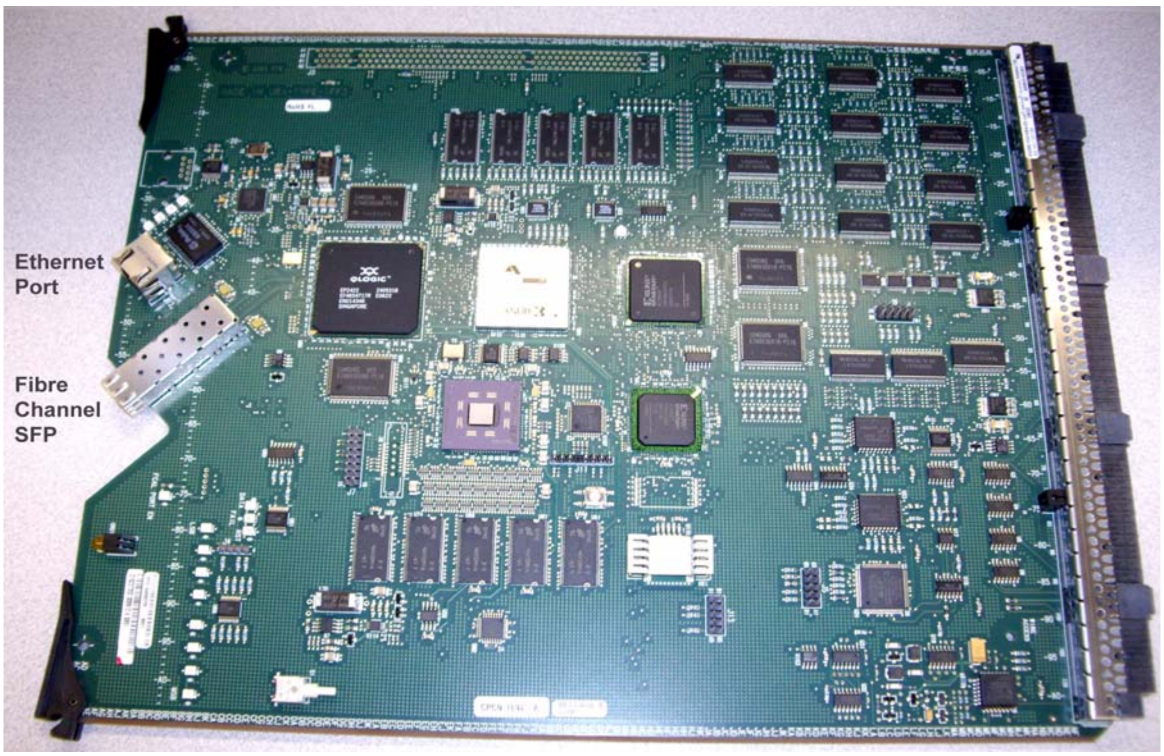


FIGURE 1-2 IFF3 Card

As shown in FIGURE 1-2, each IFF3 card has one Ethernet port and one Fibre Channel SFP. **Also note** the **LED Status Indicators**, which are the small white squares above the Ethernet port. The **LEDs** have the following labels in white letters:

- **INT** - Interrupt to PPC440GX (Int 3), which is the LED furthest from the card edge. It comes on when the interrupt asserts, however in normal operation you cannot see it come on, because it is not on long enough.
- **LS2** - Link State 2.
- **LS1** - Link State.
- **ATN** - Activity LED, which is the LED closest to the card edge. It blinks when frames are coming or going.

TABLE 1-1 shows the meaning of the combination of the LS1 and LS2 LEDs.

TABLE 1-1 LS1 and LS2 LED Combinations

LS1 State	LS2 State	Meaning
OFF	OFF	No Link
OFF	ON	100Base-Tx
ON	OFF	10Base-T
ON	ON	1000Base-T

3. **Connect the Ethernet cables and Fibre Channel Cables as shown in** FIGURE 1-3**.**

   Note that in FIGURE 1-3, the **white** cables from the wiring harness connect to the Ethernet port on each card, while the black cables connect to the Fibre Channel SFP on each card.

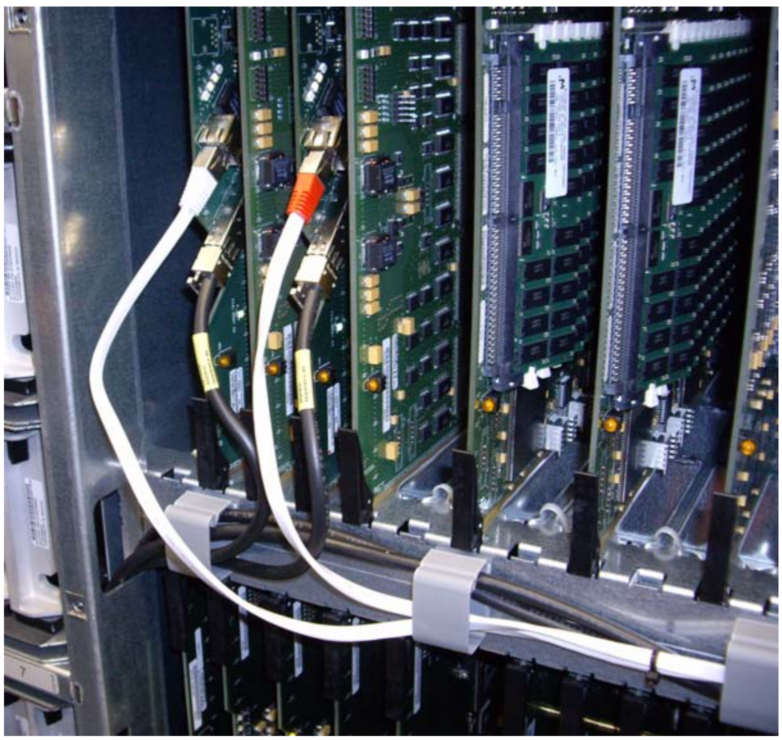


FIGURE 1-3 IFF3 Card Connections

4. **Ensure that the VTSS is connected with Ethernet cable to the TCP/IP network via the IFF3 port at the bottom of the frame as shown in FIGURE 1-4.**

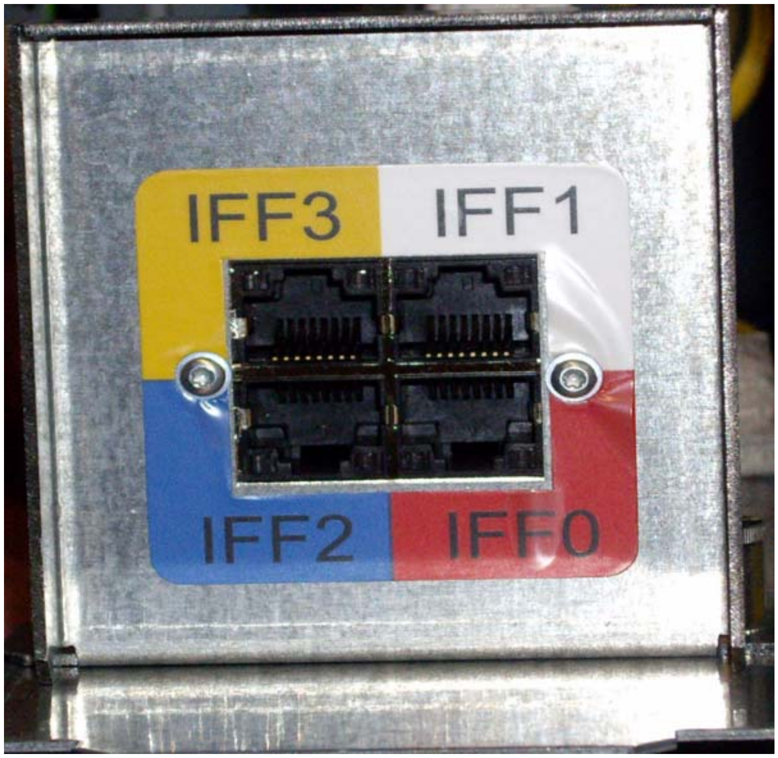


FIGURE 1-4 IFF3 Ethernet Port for Connection to TCP/IP Network

5. **Power on the VTSS and IML VIP.**

6. **Upgrade the VTSS microcode to D02.08.00.00.**

   The '6 MAC Feature' must be enabled before proceeding. This can be checked or enabled using Step 7.

7. **Set the '6 MAC feature' in the ACMB Frudata:**

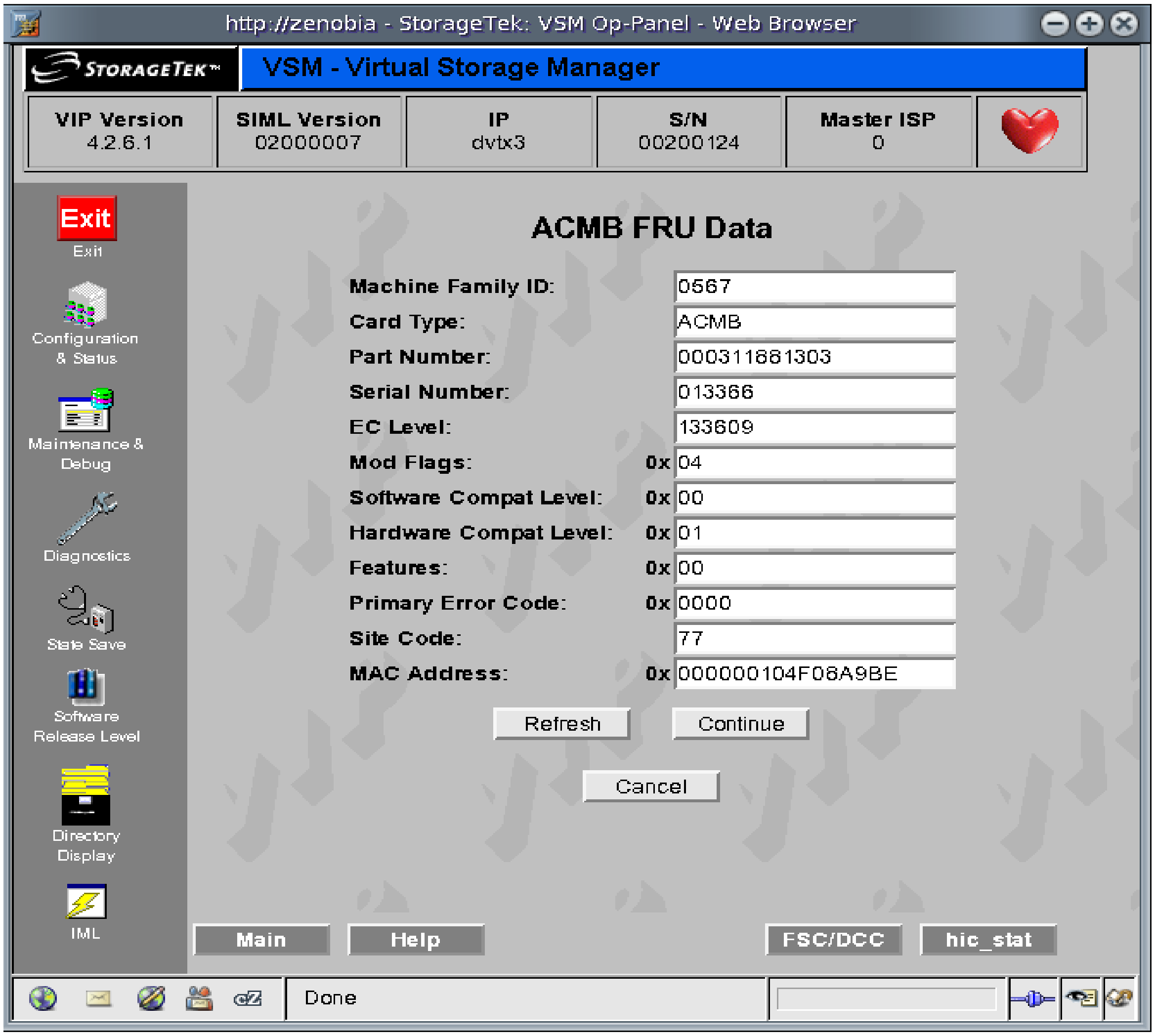
   a. **Select 'Subsystem Debug, Fru ID, ACMB.**

      If MOD FLAGS=0x04, skip to Step 8. Otherwise, continue with Step b.

   b. **Set MOD FLAGS to 0x04.**

   c. **Set new MAC address provided with Conversion Bill or from NPDC.**

d. Press the 'Continue' button and verify that the new data is recorded.



8. **IML the D02.08.00.00 level VTSS Microcode.**
9. **Ensure that the ClusterVTSS StorageKey is installed.**

   For more information, see *VSM5 Installation and Service Guide*, Chapter 1.
10. **Install the IPCluster StorageKey.**

    For more information, see *VSM5 Installation and Service Guide*, Chapter 1.
11. **Obtain from the customer/network administrator:**
    - IP addresses for Primary and Secondary VTSS - IFF0-3.
    - Gateway addresses (if required) for Primary and Secondary VTSS - IFF0-3.
    - Subnet Mask for Primary and Secondary VTSS - IFF0-3.
    - IFF card Ethernet Port Target Addresses for Primary and Secondary VTSS - IFF0-3.

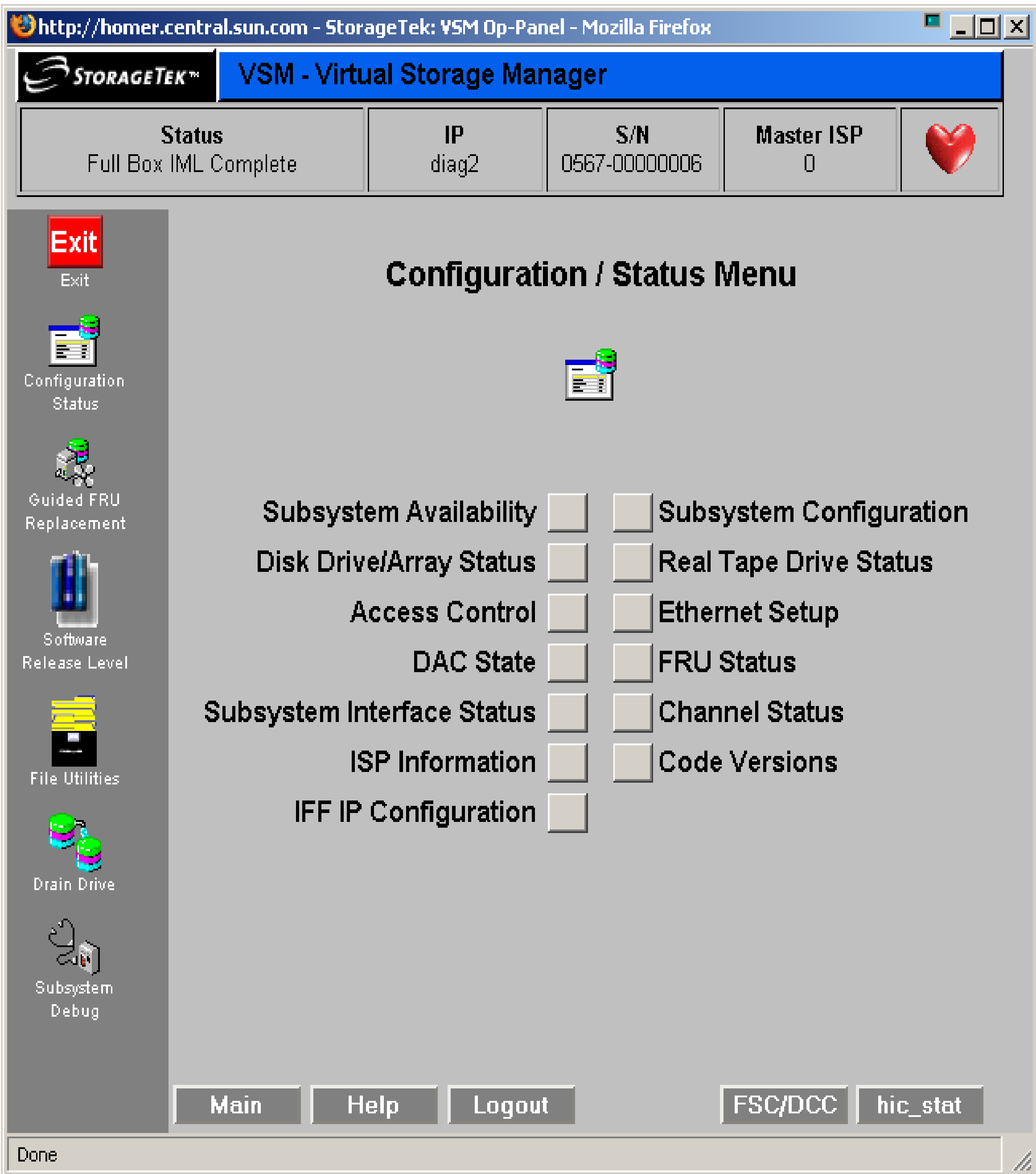
Note – For optimum throughput and redundancy, StorageTek recommends the following for Target Addresses:

- Allocate IP addresses to all Targets on all IFF cards. Even if you are not currently using all IFF cards for Native IP replication, this ensures that you have these addresses available for future expansion.
- If each card is on a different physical network, allocate different IP addresses to the same target on different IFF cards. If each IFF card is on the same physical network, you can use the same IP address for the same target on different IFF cards.

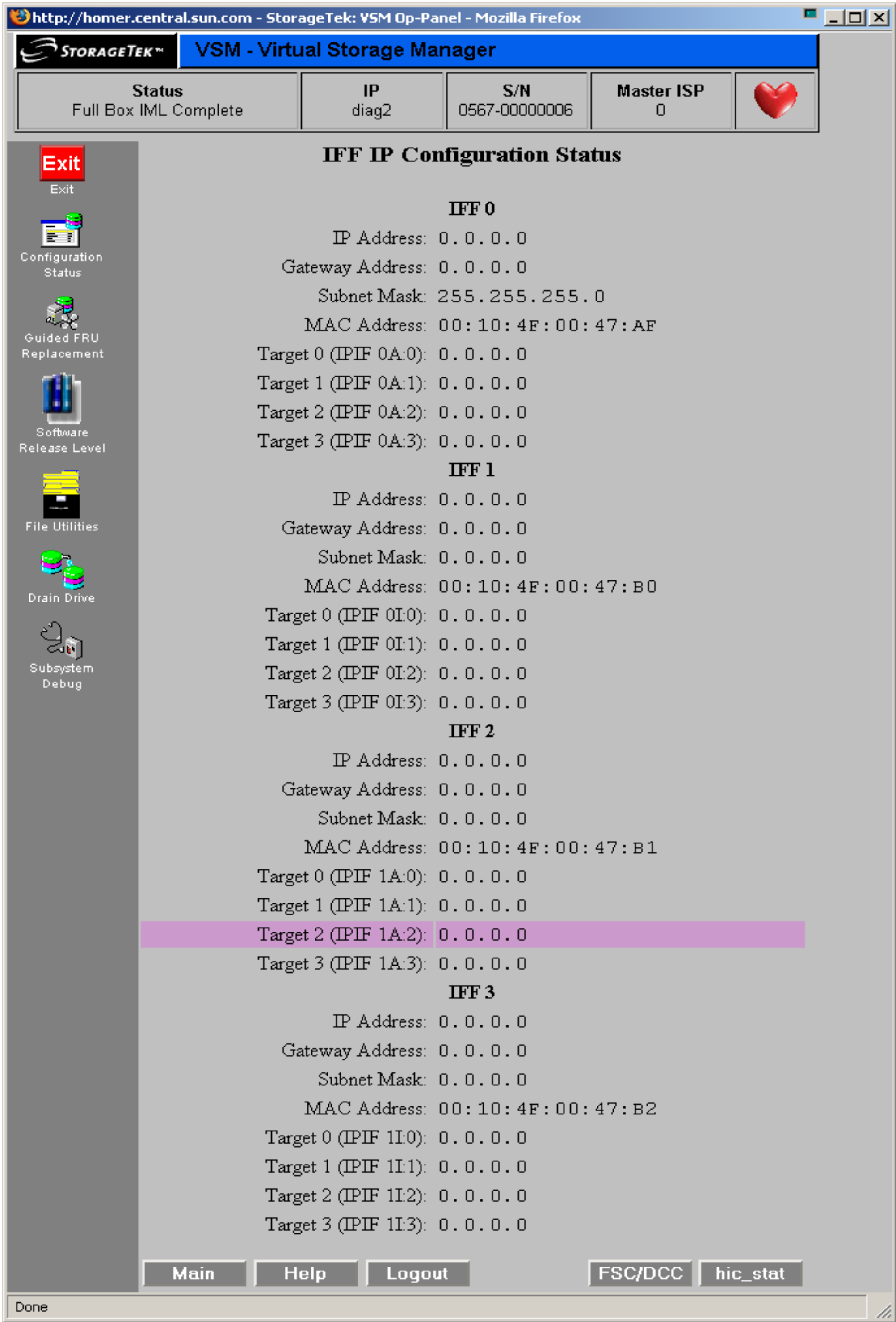
Configuring the IFF3 IP Addresses

To configure the VTSSs:

1. **From DOP 'Configuration/Status' screen, select 'IFF IP Configuration'.**



2. **From IFF IP Configuration screen you will configure each IFF card: IP address, Gateway Address, Subnet Mask, and Secondary Target IPs. You can also view the MAC Address assigned to each IFF ethernet port.**



3. **Hover the cursor over the IFF0 IP Address field to modify (field will highlight) and left click mouse.**

   This will bring up the data entry screen for IP Address. Fill in the IP address using the customer supplied IP then hit the `Continue` button. You will get a screen showing Success or Failure. Hit `Continue` button to take you back to the IFF IP Configuration screen for next entry.


http://homer.central.sun.com - StorageTek: VSM Op-Panel - Mozilla Firefox
StorageTek
VSM - Virtual Storage Manager
Status
Full Box IML Complete
IP
diag2
S/N
0567-00000006
Master ISP
0
Exit
Exit
Configuration Status
Guided FRU Replacement
Software Release Level
File Utilities
Drain Drive
Subsystem Debug
The IFF IP configuration was successfully updated
Continue
Main
Help
Logout
FSC/DCC
hic_stat
Done

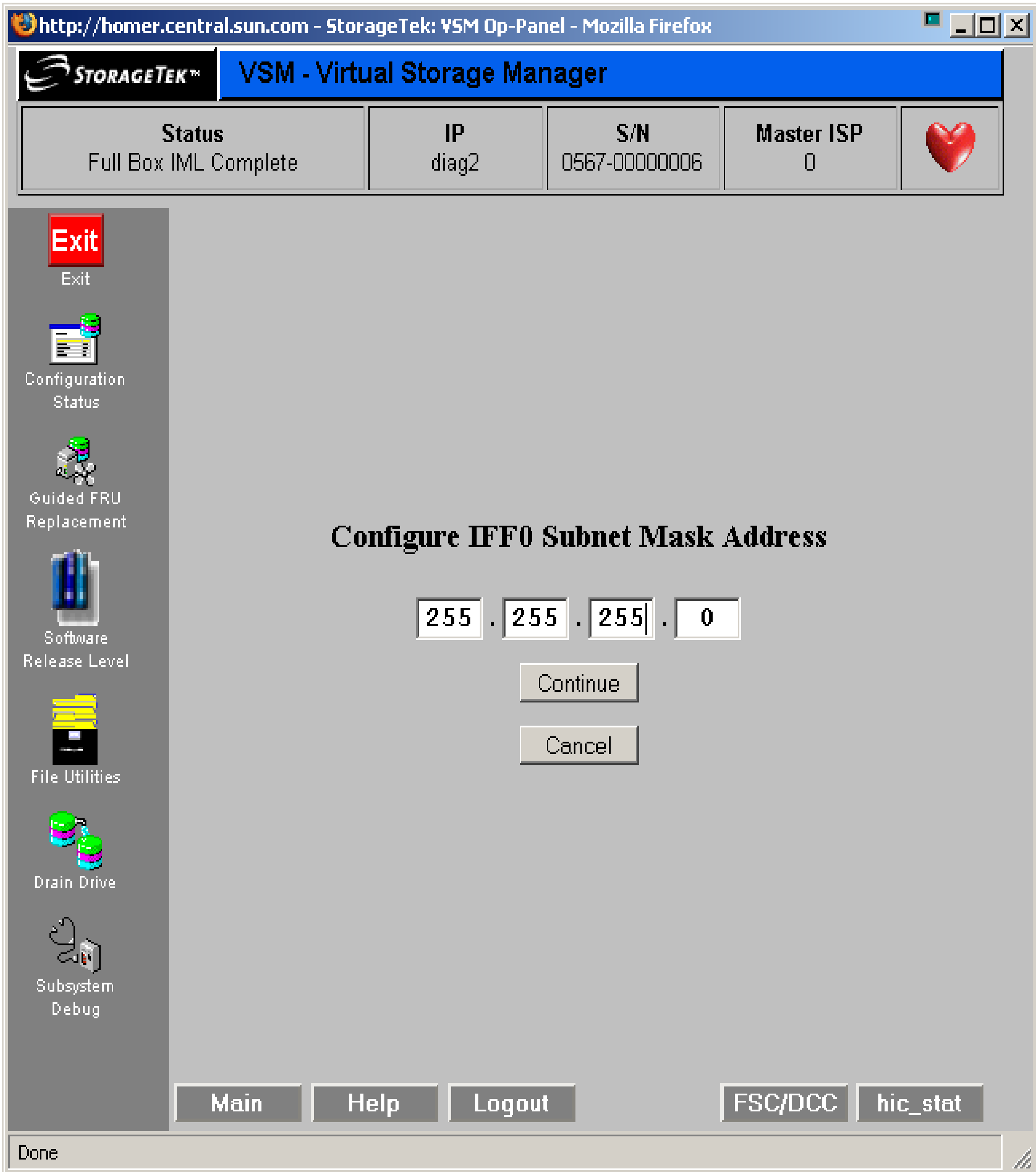
OR

4. **Hover the cursor over the Gateway Address field to modify (field will highlight) and left click mouse.**

This will bring up the data entry screen for Gateway Address. Fill in the Gateway address using the customer supplied IP then hit the `Continue` button. You will get a screen showing Success or Failure. Hit `Continue` button to take you back to the IFF IP Configuration screen for next entry.

5. **Hover the cursor over the Subnet Address field to modify (field will highlight) and left click mouse.**

   This will bring up the data entry screen for Subnet Address. Fill in the Subnet address using the customer supplied IP then hit the `Continue` button. You will get a screen showing Success or Failure. Hit `Continue` button to take you back to the IFF IP Configuration screen for next entry.



6. **Hover the cursor over the Subnet Address field to modify (field will highlight) and left click mouse.**

   This will bring up the data entry screen for Subnet Address. Fill in the Subnet address using the customer supplied IP then hit the `Continue` button. You will get a screen showing Success or Failure. Hit `Continue` button to take you back to the IFF IP Configuration screen for next entry.

7. **Hover the cursor over the Target Address field to modify (field will highlight) and left click mouse.**

   This will bring up the data entry screen for Target Address. Fill in the Target address using the customer supplied IP then hit the `Continue` button. You will get a screen showing Success or Failure.

8. **Hover the cursor over the Target Address field to modify (field will highlight) and left click mouse.**

   This will bring up the data entry screen for Target Address. Fill in the Target address using the customer supplied IP then hit the `Continue` button. You will get a screen showing Success or Failure.

   If the Source and Target are fully cabled you can use the "Validate" button to send a test to the Target. If the validate is successful you will get a screen display showing the Target's Family ID and Serial Number. If the Validate is not successful you will get a message indicating to check Hic_Stat for failing FSC.

   Hit `Continue` button to take you back to the IFF IP Configuration screen for next entry.
   Repeat for Target 1, 2, and 3.

9. **Repeat Step 3 through Step 8 for IFF1, IFF2, IFF3.**
10. **Repeat Step 1 through Step 9 for Secondary VTSS unit.**

Configuring VTCS

CONFIG Utility Changes

The CONFIG CLINK statement now provides for two types of VTSS-to-VTSS connections via the following parameters:

CLINK CHANIF=*nn* or *nn:n*

existing parameter; allows connection of two FICON (or ESCON) ports.

CLINK IPIF=*nn:n*

new parameter; allows Ethernet connection of two Native IP ports, where the *nn:n* values are shown in parentheses *before* each Target IP Address on the IFF IP Configuration Status screen for each IFF ethernet port (see Step 2 on on page 11).

For example, IPIF=0A:0 corresponds to the IP address for Target 0 on IFF0.

Note – CLINK statement must contain either the `CHANIF` or the `IPIF` parameter, but not both.

Example: Clustered VTSS with TCP/IP CLINKs

FIGURE 1-5 shows an example of a Clustered VTSS configuration with TCP/IP CLINKs.

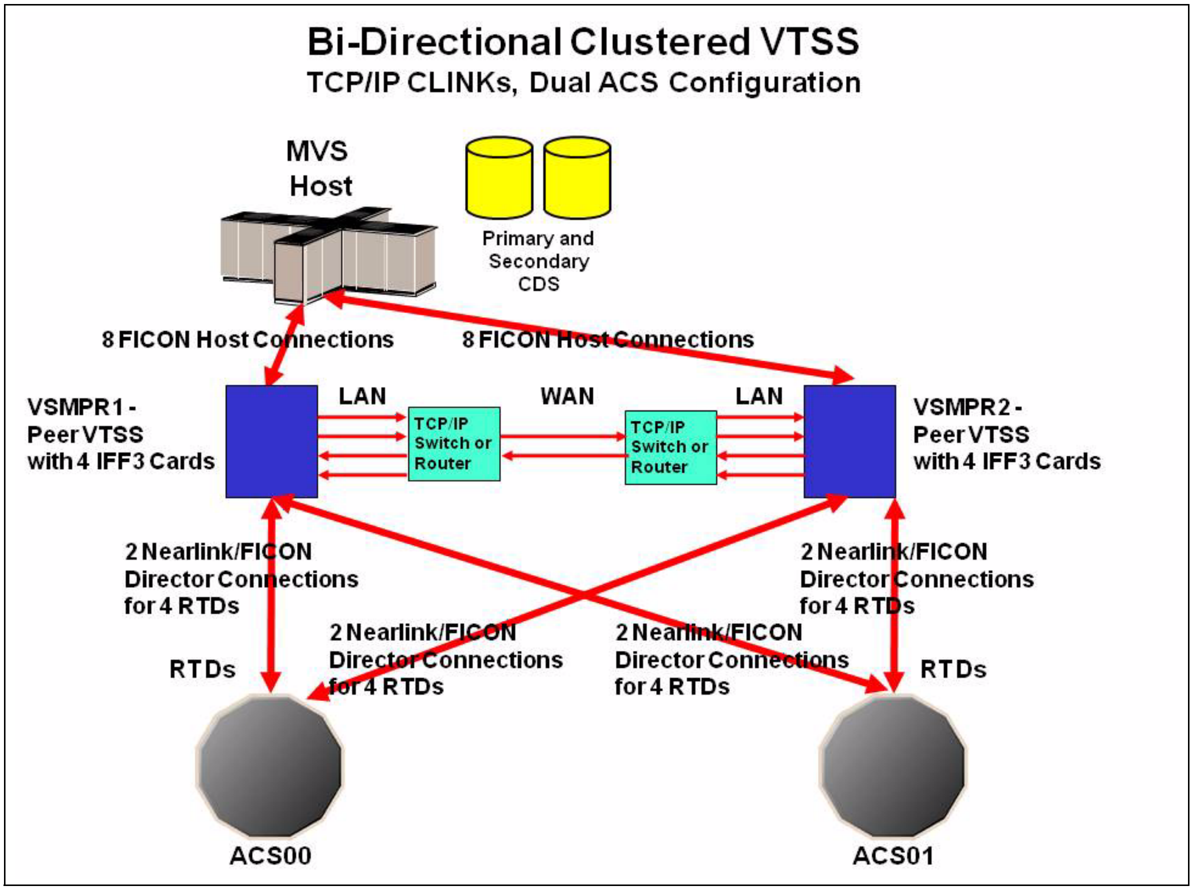


FIGURE 1-5 Clustered VTSS with TCP/IP IP CLINKs

In FIGURE 1-5 on page 20, assume that initially you will *only* use IFF0 on each VTSS for Native IP replication. In this situation, you would allocate all IP addresses for all Targets on all IFF cards, but would only code IPIF parameters for the four Targets on IFF0, as shown in TABLE 1-2 and TABLE 1-3.

TABLE 1-2 CLINK IPIF Values for IFF0, VSMPR1

IFF0 Target Number	Example IP	Corresponding CLINK IPIF
Target 0	`128.0.1.1`	`0A:0`
Target 1	`128.0.2.1`	`0A:1`
Target 2	`128.0.3.1`	`0A:2`
Target 3	`128.0.4.1`	`0A:3`

TABLE 1-3 CLINK IPIF Values for IFF0, VSMPR2

IFF0 Target Number	Example IP	Corresponding CLINK IPIF
Target 0	`128.0.1.2`	`0A:0`
Target 1	`128.0.2.2`	`0A:1`
Target 2	`128.0.3.2`	`0A:2`
Target 3	`128.0.4.2`	`0A:3`

FIGURE 1-6 shows example `CONFIG` JCL to define the configuration shown in FIGURE 1-5 on page 20 with the values shown in TABLE 1-2 and TABLE 1-3.

```
//CREATECF  EXEC PGM=SLUADMIN,PARM='MIXED'
//STEPLIB    DD DSN=hlq.SEALINK,DISP=SHR
//SLSCNTL    DD DSN=FEDB.VSMLMULT.DBASEPRM,DISP=SHR
//SLSCNTL2   DD DSN=FEDB.VSMLMULT.DBASESEC,DISP=SHR
//SLSSTBY    DD DSN=FEDB.VSMLMULT.DBASETBY,DISP=SHR
//SLSPRINT   DD   SYSOUT=*
//SLSIN      DD   *
 CONFIG CDSLEVEL(V61ABOVE)
GLOBAL MAXVTV=32000 MVCFREE=40 VTVATTR=SCRATCH RECALWER=YES
LOCKSTR=VTCS_LOCKS REPLICAT=ALWAYS VTVPAGE=LARGE INITMVC=YES
SYNCHREP=YES MAXRTDS=16 FASTMIGR=YES
RECLAIM     THRESHLD=70 MAXMVC=40  START=35
VTSS NAME=VSMPR1 LOW=70 HIGH=80 MAXMIG=8 MINMIG=4 RETAIN=5
RTD  NAME=VPR12A00 DEVNO=2A00 CHANIF=0C:0
 RTD  NAME=VPR12A01 DEVNO=2A01 CHANIF=0C:1
 RTD  NAME=VPR12A02 DEVNO=2A02 CHANIF=0C:2
 RTD  NAME=VPR12A03 DEVNO=2A03 CHANIF=0C:3
 RTD  NAME=VPR12A04 DEVNO=2A04 CHANIF=0G:0
 RTD  NAME=VPR12A05 DEVNO=2A05 CHANIF=0G:1
 RTD  NAME=VPR12A06 DEVNO=2A06 CHANIF=0G:2
 RTD  NAME=VPR12A07 DEVNO=2A07 CHANIF=0G:3
VTD LOW=9900 HIGH=99FF
VTSS NAME=VSMPR2 LOW=70 HIGH=80 MAXMIG=8 MINMIG=4 RETAIN=5
RTD  NAME=VPR22B00 DEVNO=2B00 CHANIF=0C:0
 RTD  NAME=VPR22B01 DEVNO=2B01 CHANIF=0C:1
 RTD  NAME=VPR22B02 DEVNO=2B02 CHANIF=0C:2
 RTD  NAME=VPR22B03 DEVNO=2B03 CHANIF=0C:3
 RTD  NAME=VPR22B04 DEVNO=2B04 CHANIF=0G:0
 RTD  NAME=VPR22B05 DEVNO=2B05 CHANIF=0G:1
 RTD  NAME=VPR22B06 DEVNO=2B06 CHANIF=0G:2
 RTD  NAME=VPR22B07 DEVNO=2B07 CHANIF=0G:3
VTD LOW=9900 HIGH=99FF
 CLUSTER NAME=CLUSTER1 VTSSs(VSMPR1,VSMPR2)
 CLINK VTSS=VSMPR1 IPIF=0A:0
 CLINK VTSS=VSMPR1 IPIF=0A:1
CLINK VTSS=VSMPR1 IPIF=0A:2
 CLINK VTSS=VSMPR1 IPIF=0A:3
CLINK VTSS=VSMPR2 IPIF=0A:0
 CLINK VTSS=VSMPR2 IPIF=0A:1
CLINK VTSS=VSMPR2 IPIF=0A:2
 CLINK VTSS=VSMPR2 IPIF=0A:3
```

FIGURE 1-6 CONFIG example: Clustered VTSS with TCP/IP IP CLINKs

Other VTCS Changes

DECOM

The `DECOM` utility now outputs the IPIF parameter of the CLINK statement if the CLINK is on a Native IP interface.

DISPLAY CLINK

The `DISPLAY` CLINK command now displays the CLINK interface address with a prefix to show whether the CLINK is on an IP or FICON interface. For example:

```
SLS6603I Clink information:  141

VTSS     Id  IF     Status    Usage       Host

VTSS0001 00 C0M:0  Online    Free

         01 C1M:0  Online    Free

VTSS0002 00 C0M:1  Online    Free

         01 C0M:1  Online    Free

         02 I0A:3  Online    Free

         03 I1I:2  Online    Free

SLS5013I Command completed (0)
```

DISPLAY VTSS DETAIL

`DISPLAY VTSS DETAIL` displays if the VTSS supports IP replication over IP.

XML Processing

A new tag <ipif_id> display the interface address of a CLINK attached to an IP interface.

Messages

The following messages are updated.

`SLS6751I`

CLINK CLINKID ON VTSS XXXXXXXX iftype ifaddr RETURNED ECAM ERROR CC=CCC RC=RRRRRRRR

`SLS6754I`

CLINK CLINKID iftype ifaddr XXXXXXXX FAILED TO DISMOUNT VTV VVVVVV

`SLS6755I`

CONFIGURING CLINK CLINKID iftype Ifaddr VTSS XXXXXXXX

`SLS6756E`

CLINK CLINKID iftype ifaddr VTSS XXXXXXXX CONFIGURATION MISMATCH ifid1:ifid2 ifaddr1:ifaddr2

`SLS6757I`

CLINK CLINKID iftype ifaddr VTSS XXXXXXXX FAILED INITIAL CONFIGURATION WITH CC=CCC RC=RRRRRR

`SLS6758I`

CLINK CLINKID iftype ifaddr VTSS XXXXXXXX FAILED TO REPLICATE VTV VVVVVV

`SLS6759I`

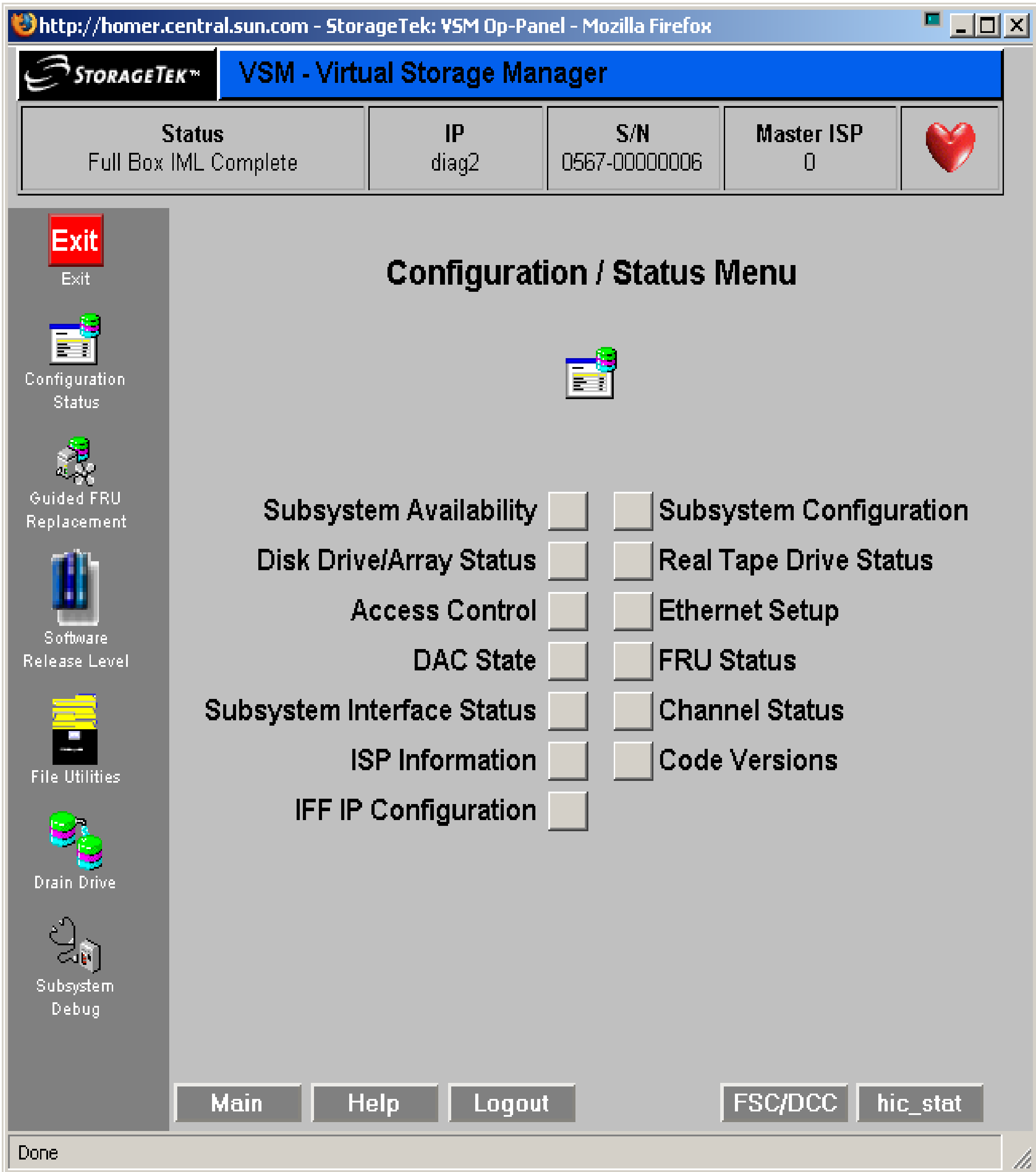
CLINK CLINKID iftype ifaddr VTSS XXXXXXXX NOW ONLINE:

Changing the IP Address of an IFF3 Card

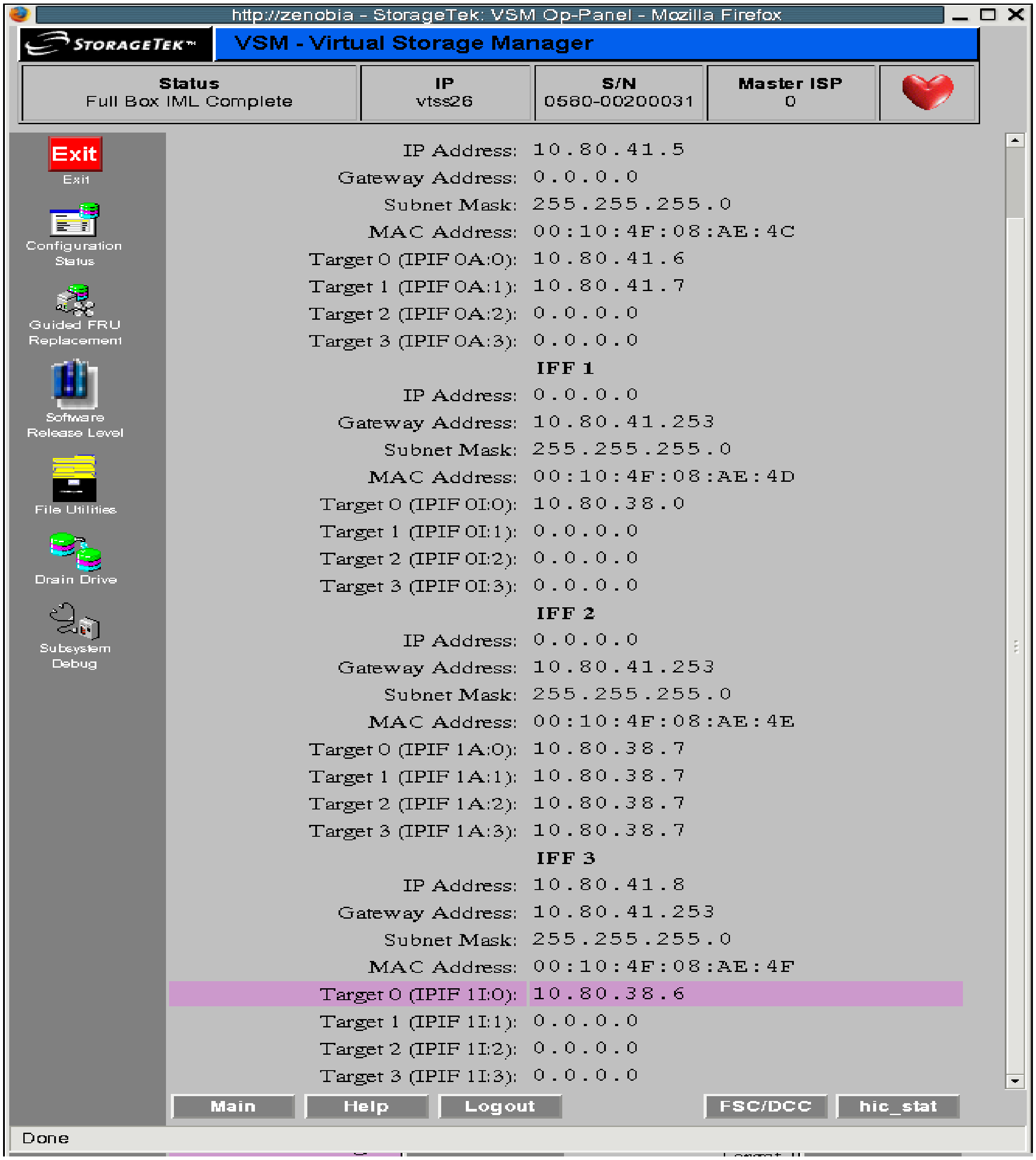
As an example, the following procedure changes the IP address of Target 0 on IFF 3 from 10.80.38.6 to 10.80.38.5. **Note that** this changes **only** the IP address; it is not necessary to update the `CONFIG CLINK` statement that corresponds to this IP address.

To change the IP address of an IFF3 card:

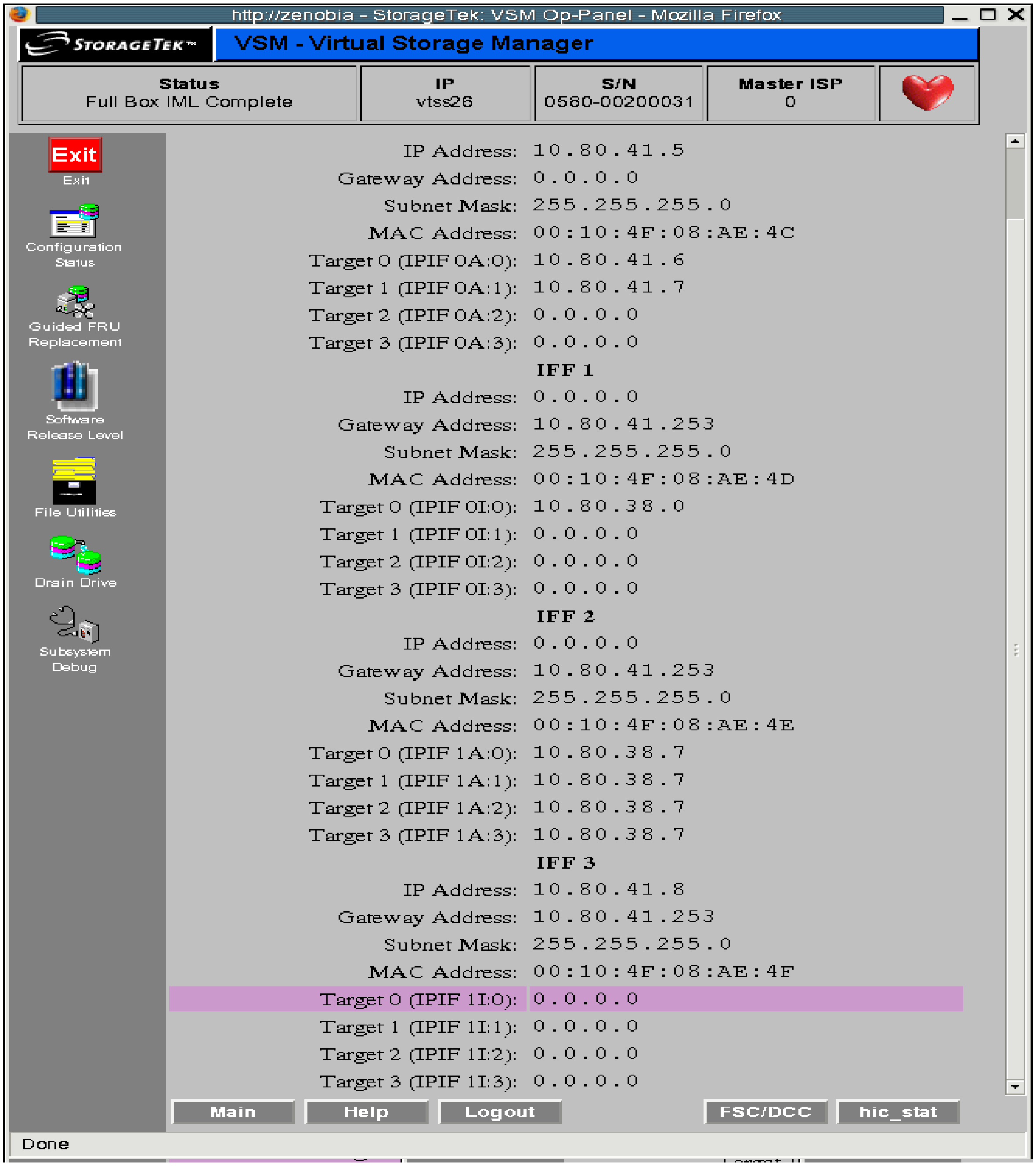
1. **From DOP 'Configuration/Status' screen, select 'IFF IP Configuration'.**



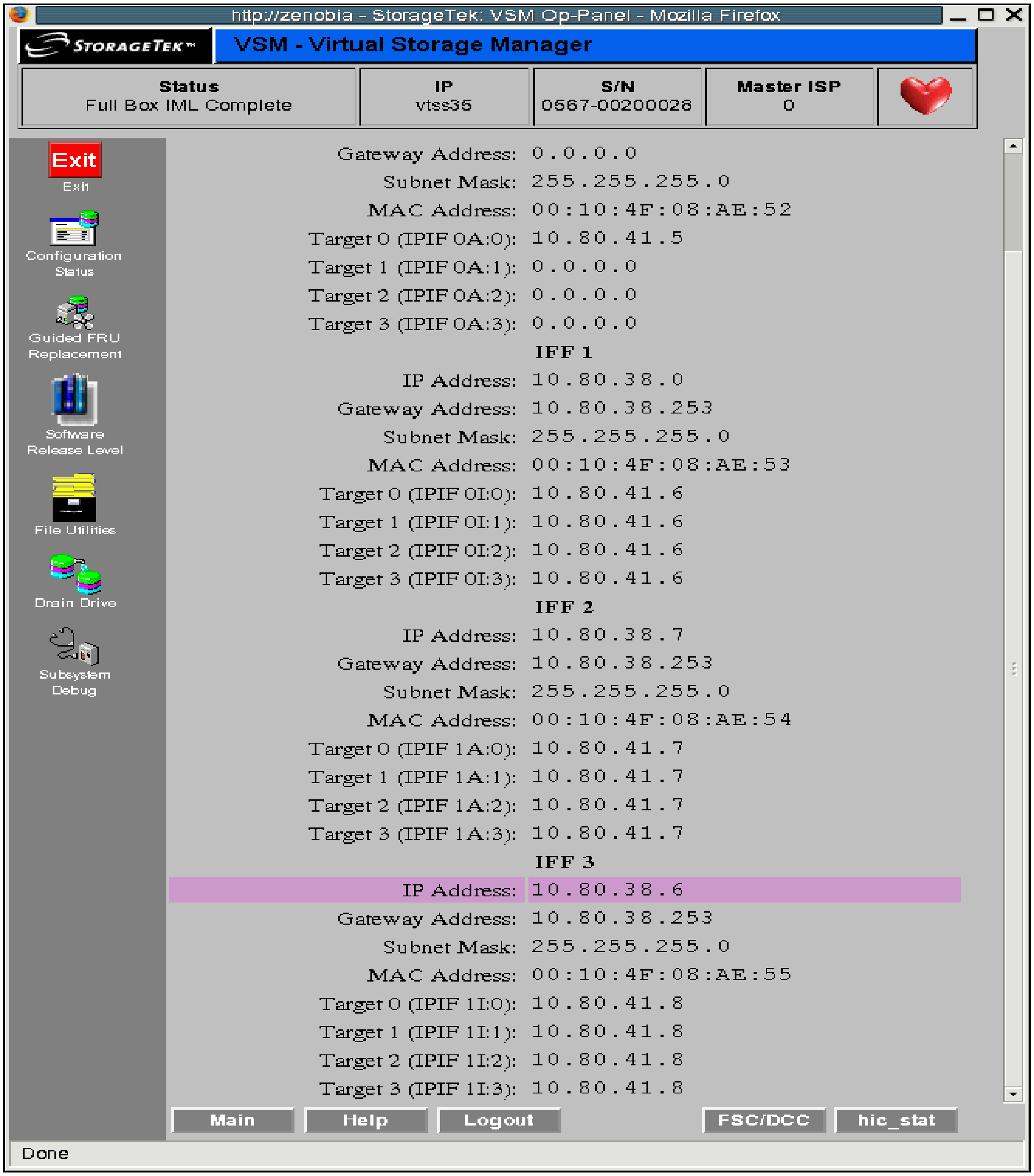
2. **The following shows the IFF IP Configuration screen with Target 0 on IFF 3 initially set to 10.80.38.6.**



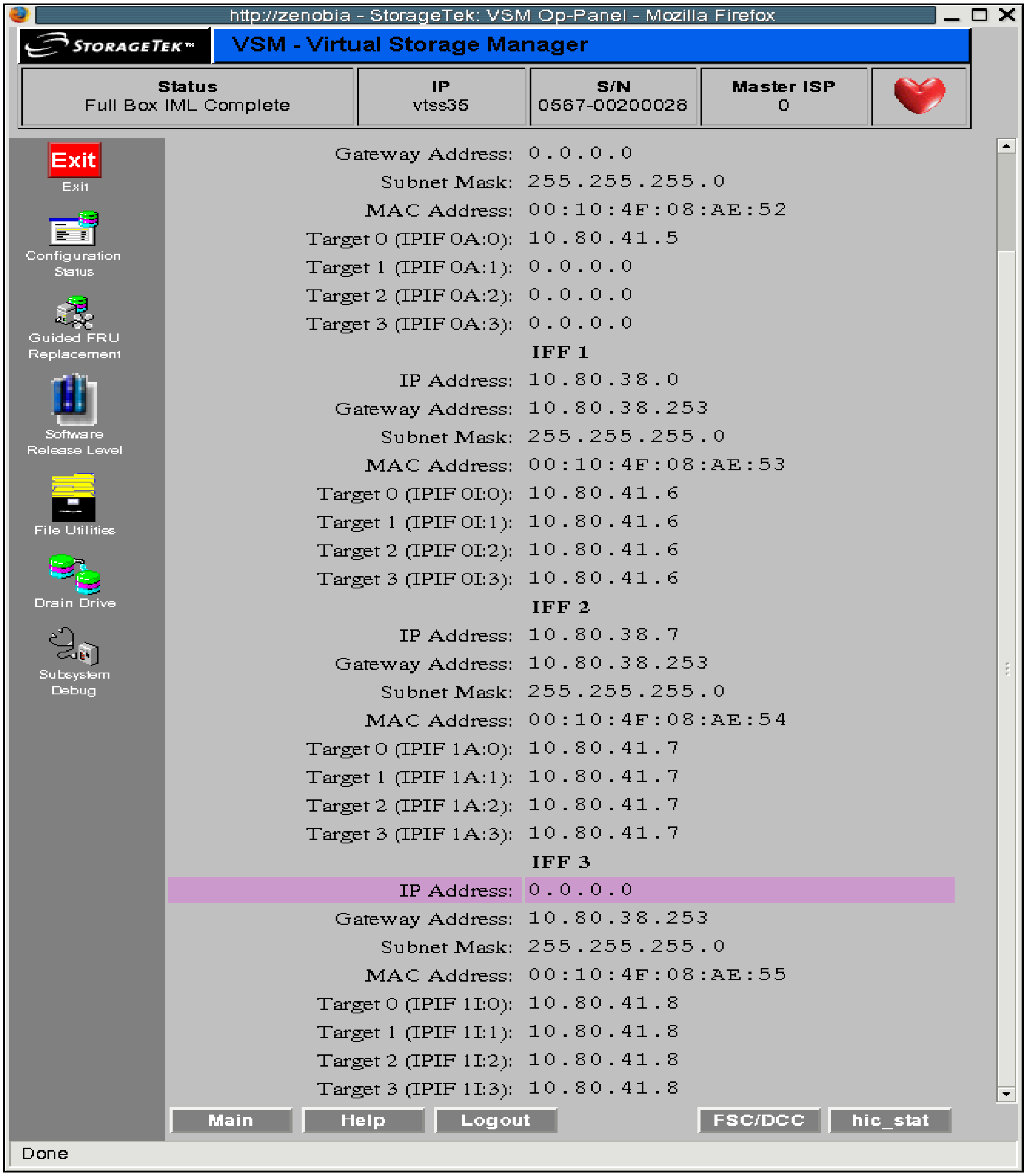
3. **Change Target 0 on IFF 3 to 0.0.0.0 as shown below.**



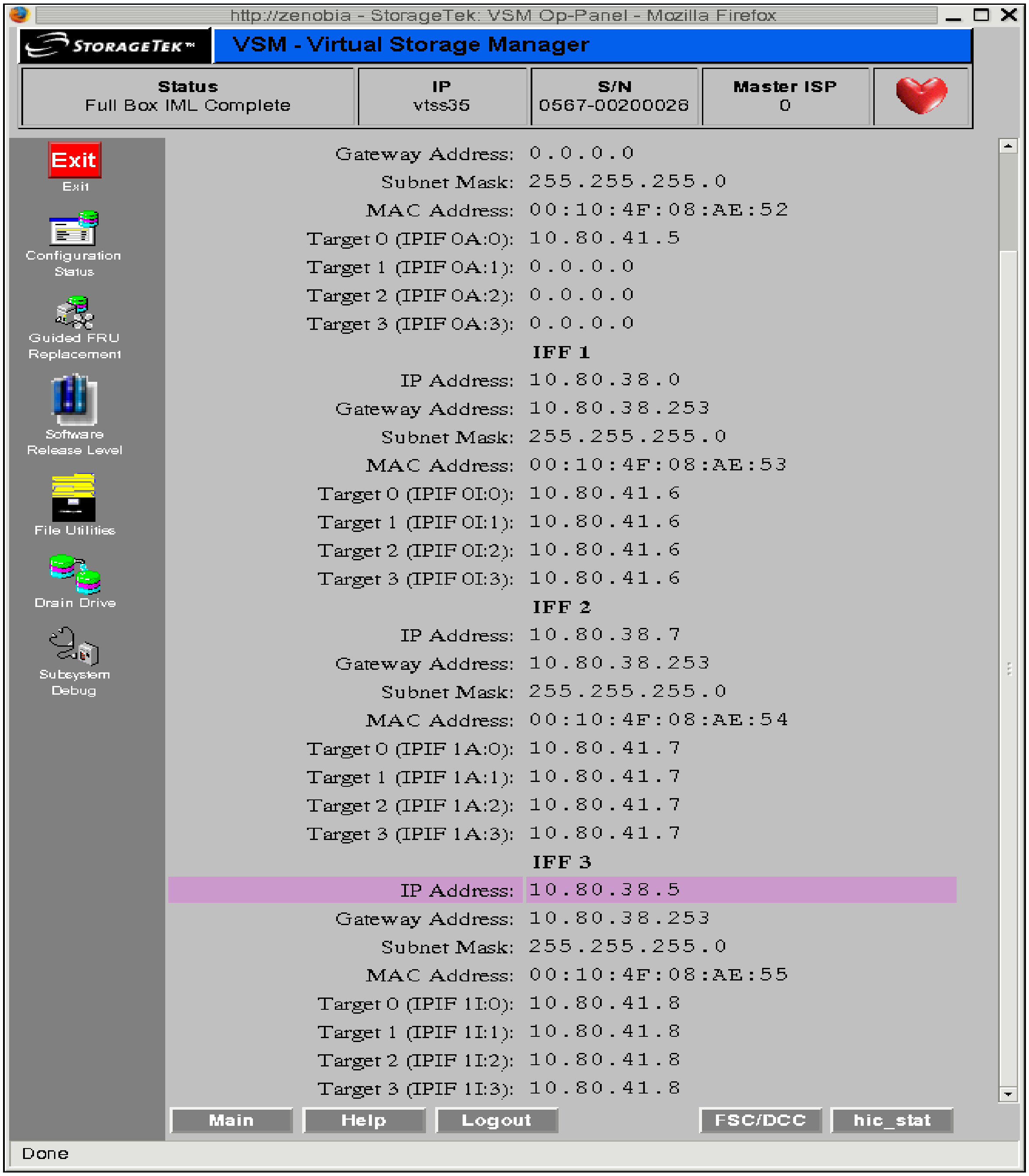
4. **The IP Address of IFF 3 is initially set to 10.80.38.6 as shown below.**



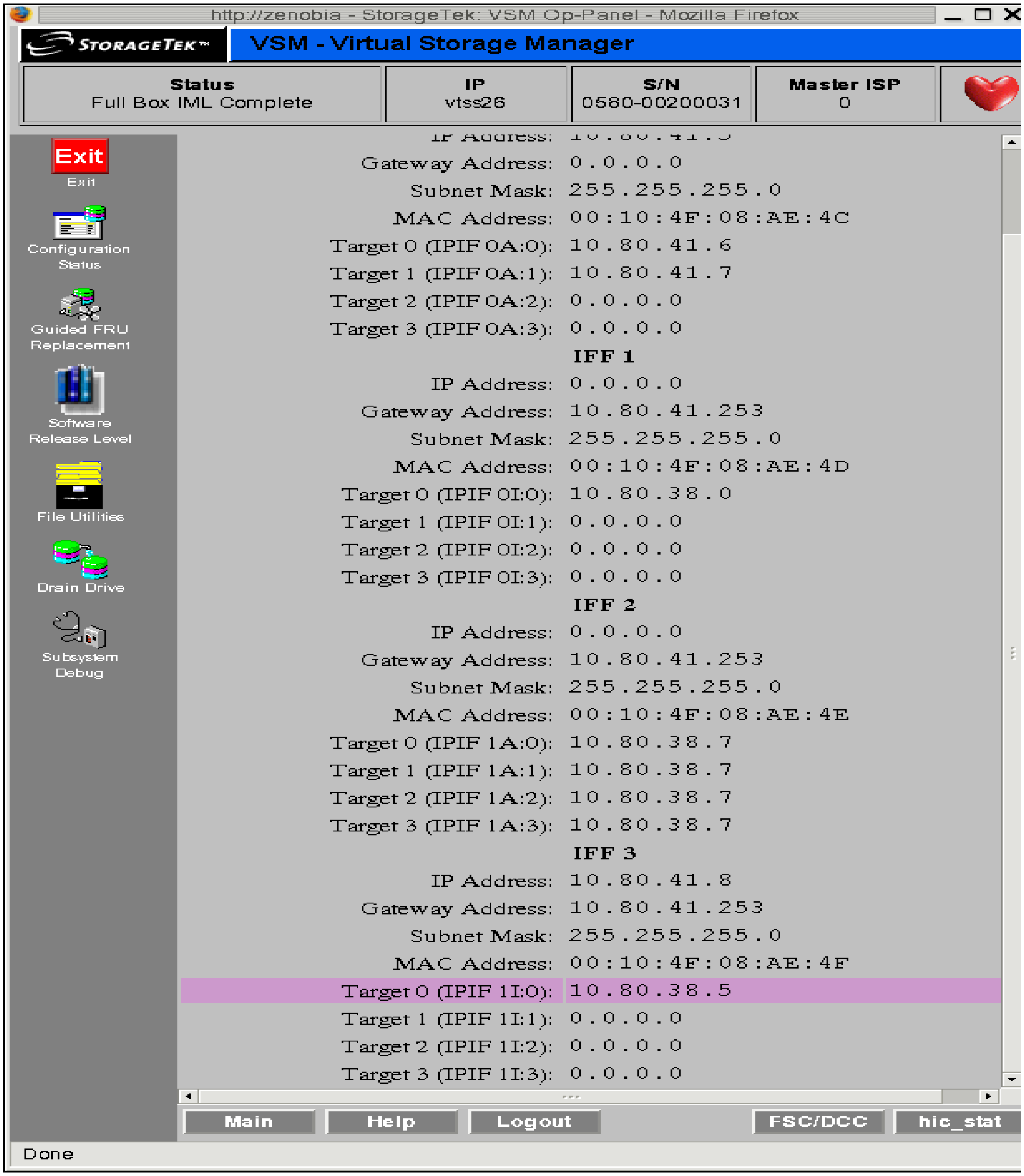
5. **Change the IP Address of IFF 3 to 0.0.0.0 as shown below.**



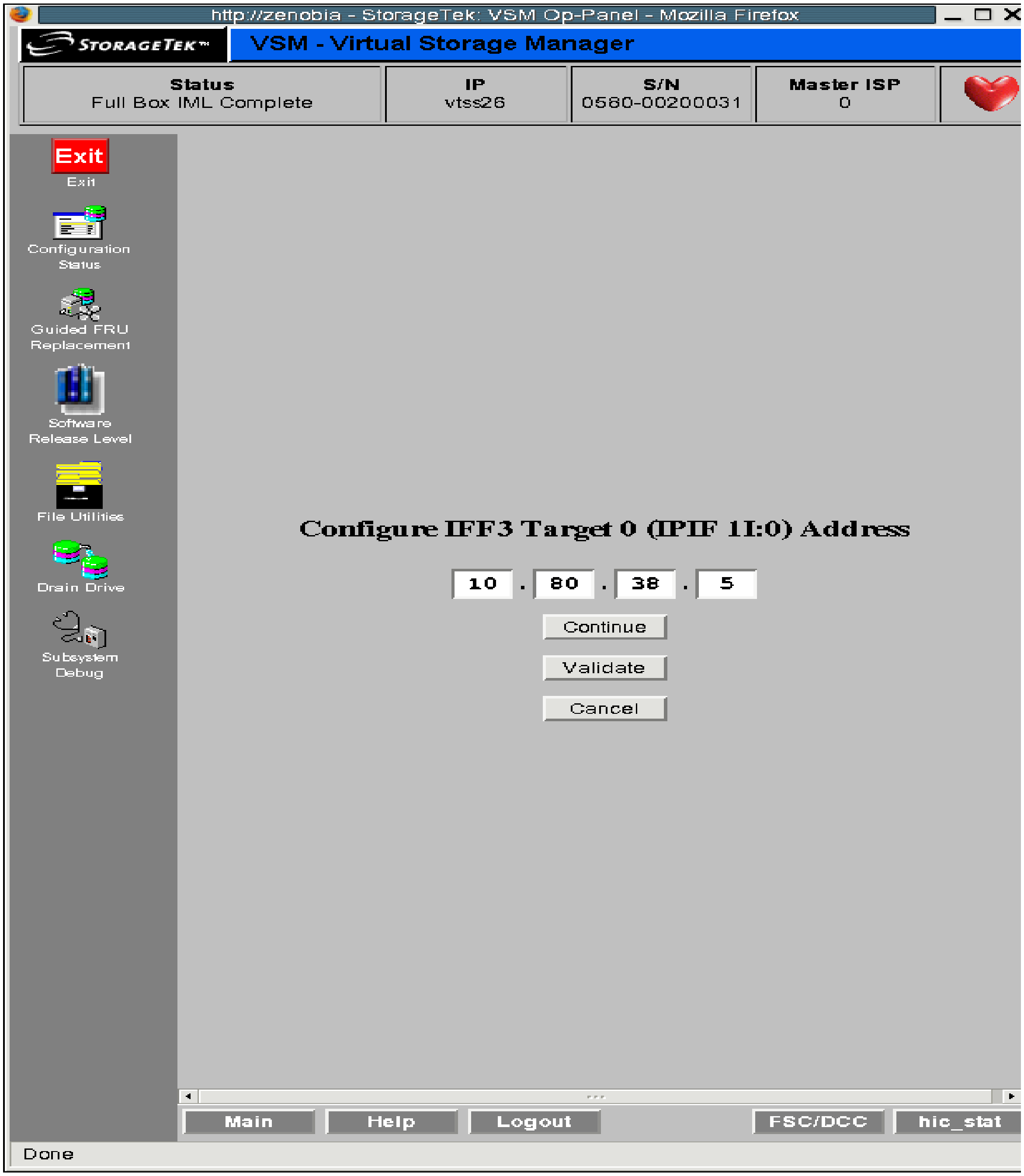
6. **Change the IP address of the IFF3 card from 0.0.0.0 to 10.80.38.5. as shown below.**



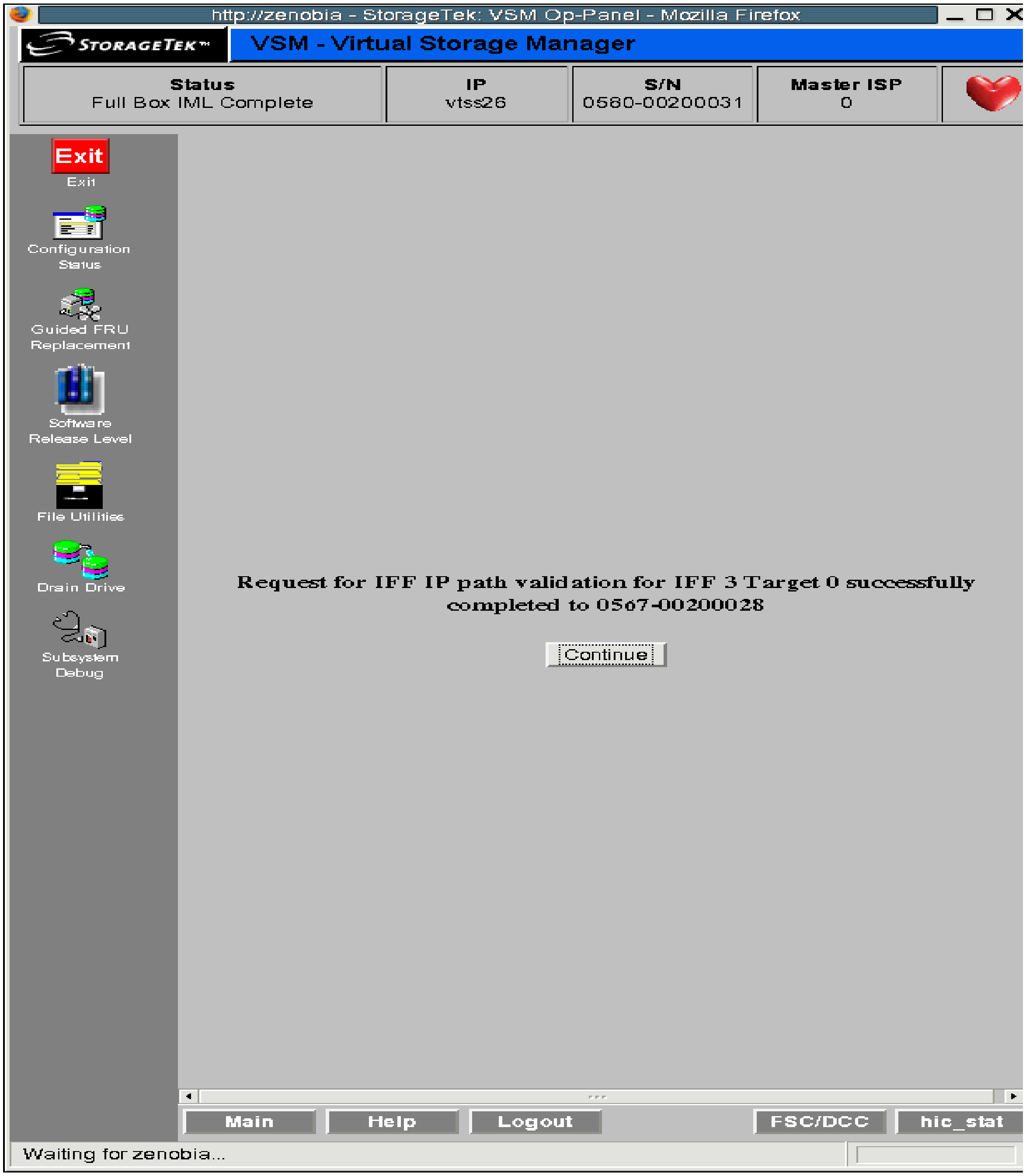
7. **Change Target 0 on IFF 3 from 0.0.0.0 to 10.80.38.5 as shown below.**



8. **For the target just changed, press the "Validate" button.**



9. **You should get a confirmation message as shown below.**



CHAPTER 2

Tapeless VSM

"Tapeless VSM" basically means that you can have a VTSS without any RTDs directly attached to the VTSS; in the `CONFIG` deck, there are no `RTD` statements for the tapeless VTSS. Tapeless VSM applies to VSM4s and VSM5s with the following PTFs installed:

- For 6.2:
  - L1H14XS - SMS6200
  - L1H14XT - SOS6200
  - L1H14Y7 - SWS6200
- For 7.0, L1H150Z - SES7000

How Does Tapeless VSM Work?

Configuring and managing a Tapeless VSM works as follows:

1. In the `CONFIG` deck, there are no `RTD` statements for the Tapeless VTSS.

Note – For clustered VTSS configurations, **all** VTSSs in the cluster must be Tapeless or **all** VTSSs in the cluster must have RTDs attached. You **cannot** mix Tapeless VTSSs and VTSSs with RTDs attached within a cluster.

---

2. The new `MGMTCLAS NOMIGRAT` parameter specifies that VTVs in the Management Class **are not** candidates for migration, consolidation or export, but **are** candidates to reside on a tapeless VTSS.

   VTSS selection is changed to prefer Tapeless VTSSs for VTVs in Management Classes with `NOMIGRAT`, and to disallow VTVs without `NOMIGRAT` from VTSSs with no RTDs.

   `NOMIGRAT` parameter is mutually exclusive with the `ACSLIST, IMMEDMIG, DUPLEX, MIGPOL, ARCHAGE, ARCHPOL, RESTIME, CONSRC` and `CONTGT` parameters.

3. A Management Class can specify `DELSCR(YES)`, which is a proactive method to cause VSM to delete scratched VTVs, which frees VTSS buffer space and (logically) deletes any VTV copies from MVCs so that MVC space can be reclaimed. As an alternative, you can specify `DELSCR(NO)` and use the `DELETSCR` utility (which now provides a `VTSS` parameter to scratch VTVs on a per VTSS basis) to do demand deletes of scratched VTVs.

For two sample configurations, see:

- "Example 1: Mixed Tapeless VSM" on page 37
- "Example 2: Mixed Tapeless VSM with CTR" on page 41

Note – If you have an environment that is completely Tapeless (no RTDs attached to any VTSS system), then in your LIBGEN you need to code a dummy ACS as shown in the example in "LIBGEN Example for Tapeless ACS" on page 48.

Example 1: Mixed Tapeless VSM

FIGURE 2-1 shows two VTSSs (`VTSS1` and `VTSS2`) where `VTSS1` has no RTDs attached.

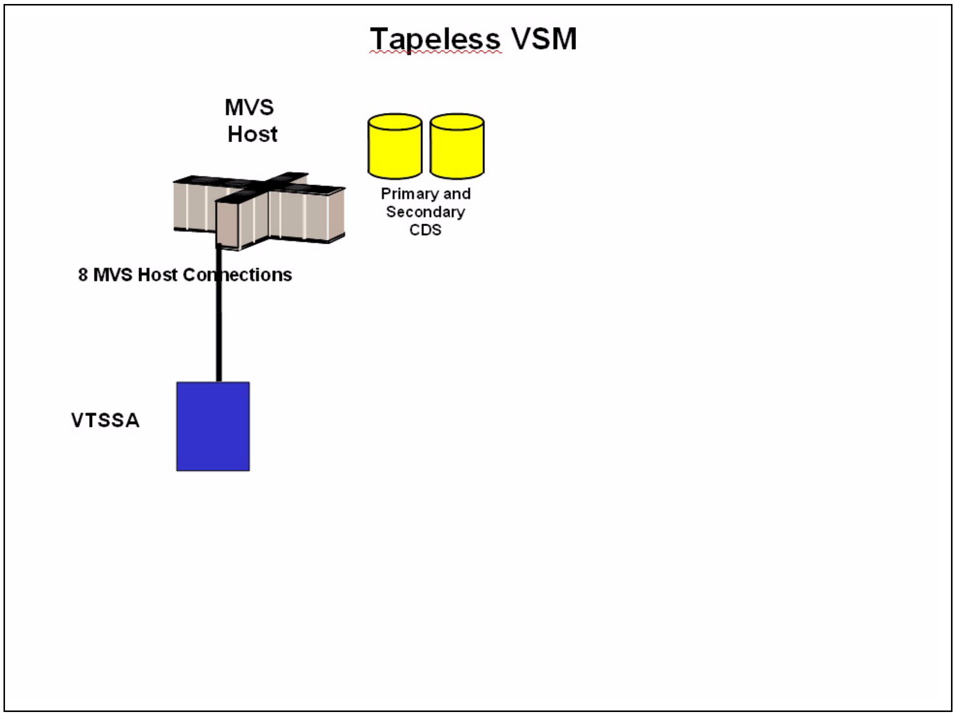


FIGURE 2-1 Mixed Tapeless VSM

? Configuring the System

To configure the example CTR system shown in FIGURE 2-1 on page 37**, do the following:**

1. **Code a CONFIG deck as shown in** FIGURE 2-2**.**

   In this figure, **note that** there are no `RTD` statements for `VTSS1` because it is Tapeless.

```
//CREATECF                         EXEC PGM=SWSADMIN,PARM='MIXED'
//STEPLIB                           DD DSN=hlq.SLSLINK,DISP=SHR
//SLSCNTL                           DD DSN=FEDB.VSMLMULT.DBASEPRM,DISP=SHR
//SLSCNTL2                          DD DSN=FEDB.VSMLMULT.DBASESEC,DISP=SHR
//SLSSTBY                           DD DSN=FEDB.VSMLMULT.DBASETBY,DISP=SHR
//SLSPRINT                          DD   SYSOUT=*
//SLSIN                             DD   *
 CONFIG RESET CDSLEVEL(V62ABOVE)
GLOBAL MAXVTV=32000 MVCFREE=40 VTVATTR=SCRATCH RECALWER=YES LOCKSTR=VTCS_LOCKS
REPLICAT=CHANGED VTVPAGE=LARGE MAXRTDS=32
RECLAIM THRESHLD=70 MAXMVC=40  START=35
 VTVVOL LOW=905000 HIGH=999999 SCRATCH
 VTVVOL LOW=C00000 HIGH=C25000 SCRATCH
 VTVVOL LOW=RMM000 HIGH=RMM020 SCRATCH
 MVCVOL LOW=N25980 HIGH=N25989
 MVCVOL LOW=N35000 HIGH=N35999
VTSS NAME=VTSS1
VTD LOW=8900 HIGH=89FF
VTSS NAME=VTSS2 LOW=70 HIGH=80 MAXMIG=8 MINMIG=4 RETAIN=5
RTD  NAME=VPR22B00 DEVNO=2B00 CHANIF=0C:0
 RTD  NAME=VPR22B01 DEVNO=2B01 CHANIF=0C:1
 RTD  NAME=VPR22B02 DEVNO=2B02 CHANIF=0C:2
 RTD  NAME=VPR22B03 DEVNO=2B03 CHANIF=0C:3
 RTD  NAME=VPR22B04 DEVNO=2B04 CHANIF=0G:0
 RTD  NAME=VPR22B05 DEVNO=2B05 CHANIF=0G:1
 RTD  NAME=VPR22B06 DEVNO=2B06 CHANIF=0G:2
 RTD  NAME=VPR22B07 DEVNO=2B07 CHANIF=0G:3
 RTD  NAME=VPR22B08 DEVNO=2B08 CHANIF=0K:0
 RTD  NAME=VPR22B09 DEVNO=2B09 CHANIF=0K:1
 RTD  NAME=VPR22B0A DEVNO=2B0A CHANIF=0K:2
 RTD  NAME=VPR22B0B DEVNO=2B0B CHANIF=0K:3
RTD  NAME=VPR23B00 DEVNO=3B00 CHANIF=1C:0
 RTD  NAME=VPR23B01 DEVNO=3B01 CHANIF=1C:1
RTD  NAME=VPR23B02 DEVNO=3B02 CHANIF=1C:2
 RTD  NAME=VPR23B03 DEVNO=3B03 CHANIF=1C:3
 RTD  NAME=VPR23B04 DEVNO=3B04 CHANIF=1G:0
 RTD  NAME=VPR23B05 DEVNO=3B05 CHANIF=1G:1
 RTD  NAME=VPR23B06 DEVNO=3B06 CHANIF=1G:2
 RTD  NAME=VPR23B07 DEVNO=3B07 CHANIF=1G:3
 RTD  NAME=VPR23B08 DEVNO=3B08 CHANIF=1K:0
 RTD  NAME=VPR23B09 DEVNO=3B09 CHANIF=1K:1
 RTD  NAME=VPR23B0A DEVNO=3B0A CHANIF=1K:2
 RTD  NAME=VPR23B0B DEVNO=3B0B CHANIF=1K:3
VTD LOW=9900 HIGH=99FF
```

FIGURE 2-2 CONFIG example: Mixed Tapeless VSM

? Defining Policies

To define policies for the example system shown in FIGURE 2-1 on page 37, do the following:

1. **Enable the Advanced Management Feature.**
2. **Create the Storage Classes for VTSS2.**

```
STOR NAME(REMOTE1)
STOR NAME(REMOTE2)
```

FIGURE 2-3 VTSS2 Storage Classes

3. **Create the Management Classes that point to the Storage Classes in Step 2.**

```
MGMT NAME(REM1) STOR(REMOTE1)DELSCR(YES)
MGMT NAME(REM2) STOR(REMOTE2)DELSCR(YES)
MGMT NAME(TAPEL) NOMIGRAT DELSCR(YES)
```

FIGURE 2-4 Management Classes

In FIGURE 2-4 we created two Management Classes which point to the corresponding Storage Classes created in Step 2. Note that we also created a "Tapeless" Management Class for VTVs that permanently reside on `VTSS1` or `VTSS2`.

Note – Each Management Class in FIGURE 2-4 specifies `DELSCR(YES)`, which is a proactive method to cause VSM to delete scratched VTVs, which frees VTSS buffer space and (logically) deletes any VTV copies from MVCs so that MVC space can be reclaimed. As an alternative, you can specify `DELSCR(NO)` and use the `DELETSCR` utility (which now provides a `VTSS` parameter to scratch VTVs on a per VTSS basis) to do demand deletes of scratched VTVs.

---

4. **Create SMC Policies that specify virtual media and assign the Management Classes created in Step 2.**

```
POLICY NAME(PPAY) MEDIA(VIRTUAL) MGMT(REM1)
POLICY NAME(PTEST) MEDIA(VIRTUAL) MGMT(REM2)
POLICY NAME(PTAPEL) MEDIA(VIRTUAL) MGMT(TAPEL)
```

5. **Create** `TAPEREQ` **statements to route three types of critical data to VSM and assign corresponding Policies to the data.**

```
TAPEREQ DSN(*.PAYROLL.**) POLICY(REM1)
TAPEREQ DSN(*.TEST.**) POLICY(REM2)
TAPEREQ DSN(*.HR.**) POLICY(PTAPEL)
```

FIGURE 2-5 TAPEREQ Statement to Route Data, Assign Policies

In FIGURE 2-5, the TAPEREQ statement specifies:

- Route data sets with HLQ mask `*.PAYROLL.**` to VSM and assign Policy `PPAY`.
- Route data sets with HLQ mask `*.TEST.**` to VSM and assign Policy `PTEST`.
- Route data sets with HLQ mask `*.HR.**` to VSM and assign Policy `PTEST`.

Note – Also note the following:

- Although you can use SMC policies to direct your migrations to a specific esoteric, Sun StorageTek recommends using **only** `MGMTCLAS` so that the SMC/VTCS allocation influencing can use any VTSS that supports the `MGMTCLAS` requirements.
- You can use the `EEXPORT` command to do manual CTR. For more information, see *SMC/HSC/VTCS Command, Control Statement, and Utility Reference*.

6. **Check your SYS1 PARMLIB options to ensure that subtype 28 records are enabled.**

   If enabled, VTSS writes a subtype 28 record that includes the target VTSS name for each CTR event.

Example 2: Mixed Tapeless VSM with CTR

FIGURE 2-6 shows an example of a Cross-Tapeplex Replication (CTR) Configuration with Tapeless VSM. In this system, VTSSs `VMSPA1` and `VSMPA2` reside in TapePlex `TMVSA` and have “partner” CLINKS to VTSS `VMSPA3` in TapePlex `TMVSB`. VTVs replicated to `VSMPA3` are now resident in `TMVSB`’s CDS, as are the MVCs to which the VTVs are subsequently migrated. That is, VTVs are replicated across TapePlexes, then migrated locally. VTSSs in the sending TapePlex (which are Tapeless) **cannot have connections** to RTDs in the receiving TapePlex.

Note – The following example shows a uni-directional cross-tapeplex replication. To do a bi-directional cross-tapeplex replication, you simply define the configuration and SMC client/server control statements the same way on both tapeplexes. Note that a single tapeplex can also receive VTVs from multiple other tapeplexes. To define a configuration where one tapeplex is receiving data from multiple other tapeplexes, you simply add additional tapeplex names to the `CONFIG` of `TMVSB`.

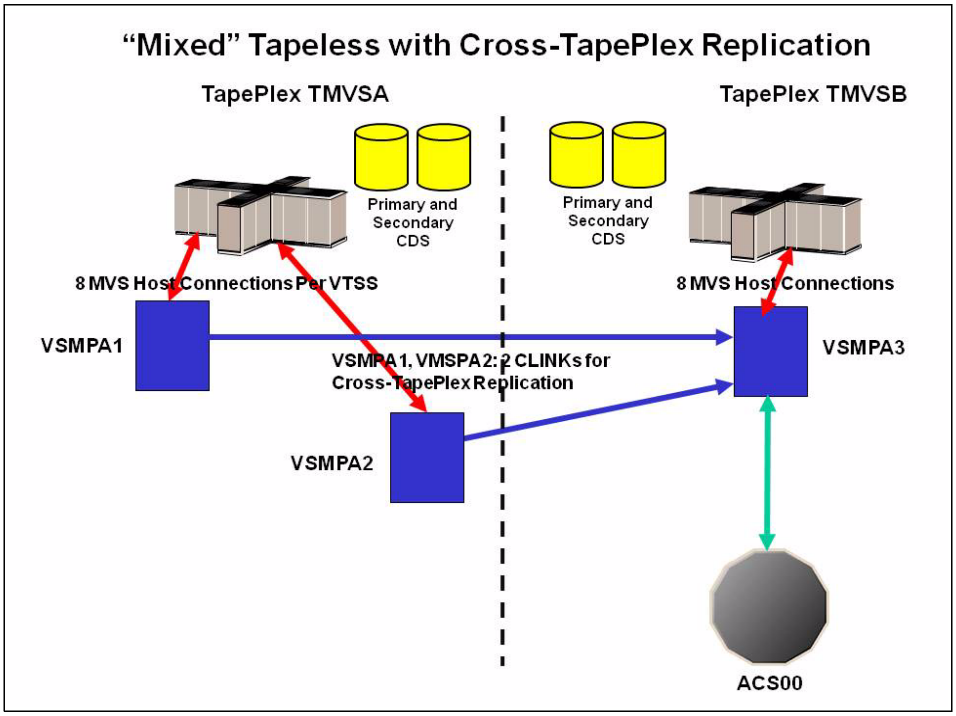


FIGURE 2-6 CTR Tapeless Configuration

? Configuring and Starting the System

To configure and start the example CTR system shown in FIGURE 2-6 on page 41**, do the following:**

1. **Ensure that your system has the Clustered VTSS prerequisites.**
2. **Start the HTTP server under the SMC running on TMVSB.**

   You may want to do this in your SMC `CMDS` file. For example:

   ```
   HTTP START PORT(999)
   ```

3. **Define your TAPEPLEX and SERVER commands on TMVSA.**

   Again, you may want to do this in your SM `CMDS` file. For example:

   ```
   TAPEPLEX NAME(TMVSA) LOCSUB(HSCA)
   TAPEPLEX NAME(TMVSB)
   SERVER NAME(REMB) TAPEPLEX(TMVSB) HOSTNAME(TMVSB) PORT(999)
   ```

Note – VTCS uses the services of the SMC TCP/IP feature to send metadata between the TapePlexes.

---

4. **Code a CONFIG deck for TapePlex A, as shown in** FIGURE 2-7 on page 43**.**

   In this figure, note:

   - The `TAPEPLEX` statement, which defines this TapePlex and the receiving TapePlex
   - The `CLINK` statements:
     - Define the CLINKs that are used for CTR from `VSMPA1` to `VSMPA3` and from `VSMPA2` to `VSMPA3`.
     - Include a `REMPLEX` parameter that specify that `VSMPA3` is part of `TMVSB`.
   - The Conditional Replication setting on the `CONFIG GLOBAL` statement is `CHANGED` for `TMVSA`.
   - There are no `RTD` statements for `VSMPA1` and `VSMPA2` because they are Tapeless.

5. **Code a CONFIG deck for TapePlex B, as shown in** FIGURE 2-8 on page 44**.**

   In this figure, note:

   - The `TAPEPLEX` statement **does not** include a `RECVPLEX` parameter because `TMVSB` only receives VTVs from `TMVSA`.
   - There are no `CLINK` statements, because the CLINKs are defined in the `CONFIG` deck for `TMVSA`.

```
//CREATCFG                              EXEC PGM=SLUADMIN,PARM='MIXED'
//STEPLIB                           DD DSN=hlq.SEALINK,DISP=SHR
//SLSCNTL                           DD DSN=hlq.TMVSA.DBASEPRM,DISP=SHR
//SLSCNTL2                          DD DSN=hlq.TMVSA.DBASESEC,DISP=SHR
//SLSSTBY                           DD DSN=hlq.TMVSA.DBASESBY,DISP=SHR
//SLSPRINT                          DD   SYSOUT=*
//SLSIN                             DD   *
 CONFIG RESET CDSLEVEL(V62ABOVE)
 GLOBAL MAXVTV=65000 MVCFREE=60 VTVATTR=SCRATCH RECALWER=YES
 LOCKSTR=STK_VTCS_LOCKS VTVPAGE=LARGE REPLICAT=CHANGED
 RECLAIM THRESHLD=70 MAXMVC=30 START=40 CONMVC=5
TAPEPLEX THISPLEX=TMVSA
VTSS NAME=VSMPA1
VTD LOW=7900 HIGH=79FF
VTSS NAME=VSMPA2
VTD LOW=8900 HIGH=89FF
CLINK VTSS=VSMPA1 CHANIF=0G REMPLEX=TMVSB PARTNER=VSMPA3
 CLINK VTSS=VSMPA1 CHANIF=0O REMPLEX=TMVSB PARTNER=VSMPA3
 CLINK VTSS=VSMPA2 CHANIF=0G REMPLEX=TMVSB PARTNER=VSMPA3
 CLINK VTSS=VSMPA2 CHANIF=0O REMPLEX=TMVSB PARTNER=VSMPA3
```

FIGURE 2-7 CONFIG for Tapeless CTR Example - TapePlex TMVSA

```
//CREATCFG                        EXEC PGM=SLUADMIN,PARM='MIXED'
//STEPLIB                         DD DSN=hlq.SEALINK,DISP=SHR
//SLSCNTL                         DD DSN=hlq.TMVSB.DBASEPRM,DISP=SHR
//SLSCNTL2                        DD DSN=hlq.TMVSB.DBASESEC,DISP=SHR
//SLSSTBY                         DD DSN=hlq.TMVSB.DBASESBY,DISP=SHR
//SLSPRINT                        DD   SYSOUT=*
//SLSIN                           DD   *
 CONFIG RESET CDSLEVEL(V62ABOVE)
 GLOBAL MAXVTV=65000 MVCFREE=60 VTVATTR=SCRATCH RECALWER=YES
 LOCKSTR=STK_VTCS_LOCKS VTVPAGE=LARGE
 RECLAIM THRESHLD=70 MAXMVC=30 START=40 CONMVC=5
TAPEPLEX THISPLEX=TMVSB RECVPLEX=TMVSA
VTSS NAME=VSMPA3 LOW=70 HIGH=80 MAXMIG=8 MINMIG=4 RETAIN=5
 RTD  NAME=PA33A00 DEVNO=3A00 CHANIF=0C
 RTD  NAME=PA33A01 DEVNO=3A01 CHANIF=0D
 RTD  NAME=PA33A02 DEVNO=3A02 CHANIF=0K
 RTD  NAME=PA33A03 DEVNO=3A03 CHANIF=0L
 RTD  NAME=PA34A08 DEVNO=4A08 CHANIF=1C
 RTD  NAME=PA34A09 DEVNO=4A09 CHANIF=1D
 RTD  NAME=PA34A0A DEVNO=4A0A CHANIF=1K
 RTD  NAME=PA34A0B DEVNO=4A0B CHANIF=1L
```

FIGURE 2-8 CONFIG for Tapeless CTR Example - TapePlex TMVSB

? Defining Policies

? Policies for the Sending TapePlex

To define policies for the sending TapePlex (TMVSA) of the example CTR system shown in FIGURE 2-6 on page 41, do the following:

1. **Enable the Advanced Management Feature.**
2. **For TMVSA, code VTSSLST statements that select only VSMPA1 or VSMPA2.**

```
VTSSLST NAME(1ONLY) VTSS(VSMPA1) PRI(9)
VTSSLST NAME(2ONLY) VTSS(VSMPA2) PRI(9)
```

FIGURE 2-9 TMVSA VTSSLST Statements

3. **For TMVSA, create the Storage Classes for the CTR Storage Classes.**

```
STOR NAME(EEPA1) TAPEPLEX(TMVSB) FROMLST(1ONLY)
STOR NAME(EEPA2) TAPEPLEX(TMVSB) FROMLST(2ONLY)
```

FIGURE 2-10 TMVSA Storage Classes

In FIGURE 2-10, the STORclas statements define Storage Classes `EEPA1` and `EEPA2`, which specify the receiving TapePlex (`TMVSB`), and a list of the sending VTSSs (`FROMLST`, which points to a `VTSSLST` statement). In this case, we wrote a `VTSSLST` statement that restricts each Storage Class to export from a single VTSS (`VSMPA1` for `EEPA1`, and `VSMPA2` for `EEPA2`). This way, we have a separate Storage Class for the exported VTVs from each VTSS. Note that each Storage Class points to its corresponding `VTSSLST` statement from Step 2.

4. **Create the Management Classes that point to the Storage Classes in Step 3.**

```
MGMT NAME(REMEX1) EEXPOL(EEPA1) DELSCR(YES)
MGMT NAME(REMEX2) EEXPOL(EEPA2) DELSCR(YES)
MGMT NAME (TAPEL) NOMIGRAT DELSCR(YES)
```

FIGURE 2-11 Management Classes for Replication

In FIGURE 2-11 we created two Management Classes, one for `VSMPA1` and one for `VSMPA2`, which point to the corresponding Storage Classes created in Step 3. Note that we also created a “Tapeless” Management Class for VTVs that permanently reside on `VSMPA1` or `VSMPA2`.

Note – Each Management Class in FIGURE 2-11 specifies `DELSCR(YES)`, which is a proactive method to cause VSM to delete scratched VTVs, which frees VTSS buffer space and (logically) deletes any VTV copies from MVCs so that MVC space can be reclaimed. As an alternative, you can specify `DELSCR(NO)` and use the `DELETSCR` utility (which now provides a `VTSS` parameter to scratch VTVs on a per VTSS basis) to do demand deletes of scratched VTVs.

---

5. **Create SMC Policies that specify virtual media and assign the Management Classes created in Step 3.**

```
POLICY NAME(PPAY) MEDIA(VIRTUAL) MGMT(REMEX1)
POLICY NAME(PTEST) MEDIA(VIRTUAL) MGMT(REMEX2)
POLICY NAME(PTAPEL) MEDIA(VIRTUAL) MGMT(TAPEL)
```

6. **Create `TAPEREQ` statements to route three types of critical data to VSM and assign corresponding Policies to the data.**

```
TAPEREQ DSN(*.PAYROLL.**) POLICY(PPAY)
TAPEREQ DSN(*.TEST.**) POLICY(PTEST)
TAPEREQ DSN(*.HR.**) POLICY(PTAPEL)
```

FIGURE 2-12 TAPEREQ Statement to Route Data, Assign Policies

In FIGURE 2-12, the TAPEREQ statement specifies:

- Route data sets with HLQ mask `*.PAYROLL.**` to VSM and assign Policy `PPAY`.
- Route data sets with HLQ mask `*.TEST.**` to VSM and assign Policy `PTEST`.
- Route data sets with HLQ mask `*.HR.**` to VSM and assign Policy `PTEST`.

Note – Also note the following:

- Although you can use SMC policies to direct your CTRs to a specific esoteric, Sun StorageTek recommends using **only** `MGMTCLAS` so that the SMC/VTCS allocation influencing can use any VTSS that supports the `MGMTCLAS` requirements.
- You can use the `EEXPORT` command to do manual CTR. For more information, see *SMC/HSC/VTCS Command, Control Statement, and Utility Reference*.

7. **Check your SYS1 PARMLIB options to ensure that subtype 28 records are enabled.**

   If enabled, VTSS writes a subtype 28 record that includes the target VTSS name for each CTR event.

? Policies for the Receiving TapePlex

To define policies for the receiving TapePlex (TMVSB) of the example CTR system shown in FIGURE 2-6 on page 41, do the following:

1. **Enable the Advanced Management Feature.**

2. **Ensure that your POOLPARM/VOLPARM statements include the VTV volsers that are received from TMVSA.**

   Modify your `POOLPARM/VOLPARM` parameters to include the range of VTVs that will be replicated from tapeplex `TMVSA`. In order to ensure that these volumes are never selected as scratch volumes by `TMVSB`, Sun recommends that you specify both a “dummy” scratch subpool name as well as a “dummy” host ID. For example:

   ```
   POOLPARM NAME(FROMTMVSA) TYPE(SCRATCH) HOSTID(NOSCRTCH)
   VOLPARM VOLSER(A10000-A19999) MEDIA(VIRTUAL)
   ```

3. **For TMVSB, create the Storage Classes for local migration.**

```
STOR NAME(TMVSA1) ACS(00) MEDIA(STK1R)
STOR NAME(TMVSA2) ACS(00) MEDIA(STK1R)
```

FIGURE 2-13 Storage Classes for Local and Remote Migrated VTVs

In FIGURE 2-10, the STORclas statements define Storage Classes `TMVSA1` and `TMVSA2` for local migration. The Storage Class names allow us to segregate this work from the `TMVSB` local work.

4. **Create the Management Classes that point to the Storage Classes in Step 3.**

```
MGMT NAME(REMEX1) MIGPOL(TMVSA1)DELSCR(YES)
MGMT NAME(REMEX2) MIGPOL(TMVSA2)DELSCR(YES)
```

FIGURE 2-14 Management Classes for Replication

Note that we are using the same Management Class names that we used on `TMVSA` (these Management Classes are specified in the VTV metadata that is sent from the VTSS on `TMVSA`), but we reference the Storage Classes for local migration. The definitions of the Management and Storage Classes on `TMVSB` can use any parameters including `EEXPOL` to replicate to a third TapePlex.

Note – Each Management Class in FIGURE 2-14 specifies `DELSCR(YES)`, which is a proactive method to cause VSM to delete scratched VTVs, which frees VTSS buffer space and (logically) deletes any VTV copies from MVCs so that MVC space can be reclaimed. As an alternative, you can specify `DELSCR(NO)` and use the `DELETSCR` utility (which now provides a `VTSS` parameter to scratch VTVs on a per VTSS basis) to do demand deletes of scratched VTVs.

LIBGEN Example for Tapeless ACS

FIGURE 2-15 and FIGURE 2-16 on page 49 show a LIBGEN example for a Tapeless ACS, where the `SLISTATN ADDRESS=(0032)` statement denotes a dummy ACS.

```
*
* LABELS WILL BE GENERATED IN THE OUTPUT LIBGEN AS FOLLOWS:
* ACS     - "ACSXX"    WHERE "XX" IS THE HEX ACS NUMBER 00-FF
*                      STARTING WITH ZERO
* LSM     - "LSMXXYY"  WHERE "XX" IS THE HEX ACS NUMBER OF THIS LSM
*                     AND "YY" IS THE HEX LSM NUMBER (00-FF) IN THAT
*                      ACS, STARTING AT ZERO FOR EACH NEW ACS
* STATION - "STXXH"    WHERE "XX" IS THE HEX ACS NUMBER AND H IS THE
*                      HOST INDEX IN HEX (0-F)
* PANEL   - "PXXYYPP"  WHERE "XX" IS THE HEX ACS NUMBER, YY IS THE HEX
*                     LSM NUMBER, AND PP IS THE DECIMAL PANEL NUMBER
*                      OF THE DRIVE PANEL
* DRIVE   - "DXXYYPPH" WHERE "XX" IS THE HEX ACS NUMBER, YY IS THE HEX
*                     LSM NUMBER, PP IS THE DRIVE PANEL NUMBER IN DEC
*                      IMAL, AND H IS THE HOST INDEX IN HEX
*
LIBGEN   SLIRCVRY TCHNIQE=NONE
*
        SLILIBRY SMF=231,                                              X
              ACSLIST=ACSLIST,                                         X
              HOSTID=(EC20,EC21),                                      X
              MAJNAME=STKALSQN,                                        X
              CLNPRFX=CLN,                                             X
              COMPRFX=!,                                               X
              DRVHOST=,                                                X
               SCRLABL=SL
*
ACSLIST  SLIALIST ACS00
*
ACS00   SLIACS LSM=(LSM0000,LSM0001,LSM0002,LSM0003),                  X
               STATION=(ST000,ST001)
*
ST000    SLISTATN ADDRESS=(0032)
ST001    SLISTATN ADDRESS=(0032)
*
LSM0000  SLILSM PASTHRU=((0,M),(0,M),(0,M)),                           X
              ADJACNT=(LSM0001,LSM0002,LSM0003),                       X
              DRIVE=(1),                                               X
              DRVELST=(P000001),                                       X
              TYPE=8500,                                               X
               DOOR=8500-2
*
```

FIGURE 2-15 LIBGEN Example for Tapeless ACS (Part 1)

```
P000001  SLIDLIST HOSTDRV=(D0000010,D0000010)
*
D0000010 SLIDRIVS ADDRESS=(,,,,,,,,,,,,,,,)
*
LSM0001  SLILSM PASTHRU=((0,S),(0,M),(0,M)),                              X
              ADJACNT=(LSM0000,LSM0002,LSM0003),                          X
               DRIVE=(1),                                                 X
               DRVELST=(P000101),                                         X
               TYPE=8500,                                                 X
                DOOR=8500-2
*
P000101  SLIDLIST HOSTDRV=(D0001010,D0001010)
*
D0001010 SLIDRIVS ADDRESS=(,,,,,,,,,,,,,,,)
*
LSM0002  SLILSM PASTHRU=((0,S),(0,S),(0,M)),                              X
              ADJACNT=(LSM0000,LSM0001,LSM0003),                          X
               DRIVE=(1),                                                 X
               DRVELST=(P000201),                                         X
               TYPE=8500,                                                 X
                DOOR=8500-2
*
P000201  SLIDLIST HOSTDRV=(D0002010,D0002010)
*
D0002010 SLIDRIVS ADDRESS=(,,,,,,,,,,,,,,,)
*
LSM0003  SLILSM PASTHRU=((0,S),(0,S),(0,S)),                              X
              ADJACNT=(LSM0001,LSM0002,LSM0000),                          X
               DRIVE=(1),                                                 X
               DRVELST=(P000301),                                         X
               TYPE=8500,                                                 X
                DOOR=8500-2
*
P000301  SLIDLIST HOSTDRV=(D0003010,D0003010)
*
D0003010 SLIDRIVS ADDRESS=(,,,,,,,,,,,,,,,)
*
         SLIENDGN ,
```

FIGURE 2-16 LIBGEN Example for Tapeless ACS (Part 2)

CHAPTER 3

VSM5 New Models

The VSM5 provides new models that offer the capacities shown in TABLE 3-1.

TABLE 3-1 VSM5 New Model Capacities

Drive Capacity	1-Array TBE	2-Arrays TBE	3-Arrays TBE	4-Arrays TBE	VSM Model	Product Family ID
450GB		45			VSM5-45TB-IFF3	580
450GB			68		VSM5-68TB-IFF3	580
450GB				90	VSM5-90TB-IFF3	580
146GB		7.5/11/14			VSM5-1.25TB-IFF3	567
146GB			16/18/21		VSM5-16TB-IFF3	567
146GB				23/25/28	VSM5-23TB-IFF3	567
146GB	.8/1.25				VSM5E -.8TB	567

Note –

- TBE =The approximate maximum effective capacity in Terabytes (TB).
- Models VSM5-45TB-IFF3, VSM5-68TB-IFF3, and VSM5-90TB-IFF3 require the following PTFs:
  - For 6.2:
    - L1A00Q4 - SMC6200
    - L1H14UL - SMS6200
    - L1H14UK - SWS6200
  - For 7.0, L1H14UN (SES7000)
  - These models can contain a maximum of 500,000 VTVs
- VSM5 new models require the following VTSS microcode:
  - **For Models VSM5-45TB-IFF3, VSM5-68TB-IFF3, and VSM5-90TB-IFF3 only**, VTSS microcode level H02.07.
  - **For all other Models**, VTSS microcode level D02.07.
  - Models VSM5-1.25TB-IFF3, VSM5-16TB-IFF3, and VSM5-23TB-IFF3 support ESCON channel cards. For more information, see "VSM5 ESCON/FICON Configurations" on page 53.

TABLE 3-2 shows the supported channel card configurations for:

- VSM5 - All models **including** VSM5c but **not including** VSM5e and VSM5escon. For information on VSM5escon, see "VSM5 ESCON/FICON Configurations" on page 53.
- VSM5e.

TABLE 3-2 VSM5 New Model Supported Channel Card Configurations

VSM Model	Storage Cluster 0				Storage Cluster 1			
	2	3	4	5	12	13	14	15
5	VCF		VCF		VCF		VCF	
	VCF	VCF	VCF		VCF	VCF	VCF	
	VCF	VCF	VCF	VCF	VCF	VCF	VCF	VCF
5e	VCF		VCF		VCF		VCF	
	ICE		ICE		ICE		ICE	

CHAPTER 4

VSM5 ESCON/FICON Configurations

TABLE 4-1 summarizes the supported VCF (FICON) and ICE (ESCON) card configurations for VSM5. VSM5 ESCON support requires microcode level D02.07.00.00 or H01.07.00.00.

TABLE 4-1 Supported Card Configurations for VSM5 ESCON/FICON

VCF Cards	FICON Ports	ICE Cards	ESCON Ports	Total Ports	Total Logical Paths (16 per ICE Port, 64 per VCF Port)
0	0	8	32	32	512
4	8	4	16	24	768

VSM5 ICE/VCF Card Options

VSM5 supports the following ICE/VCF card options:

- FIGURE 4-1 shows a VSM5 with 8 ICE cards.
- FIGURE 4-2 on page 55 shows a VSM5 with 4 ICE cards, 4 VCF cards.

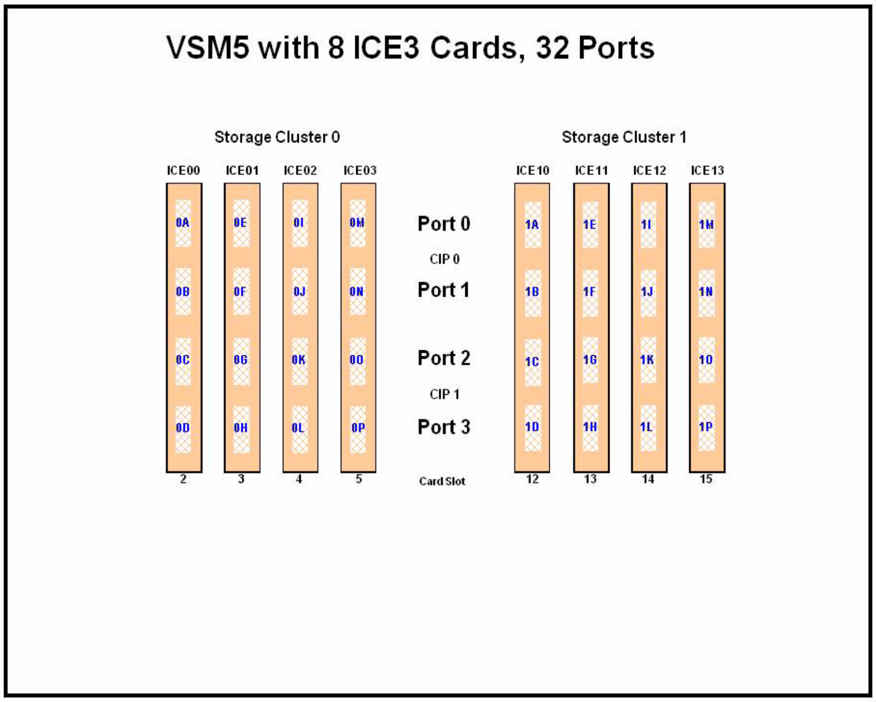


FIGURE 4-1 VSM5 with 8 ICE cards

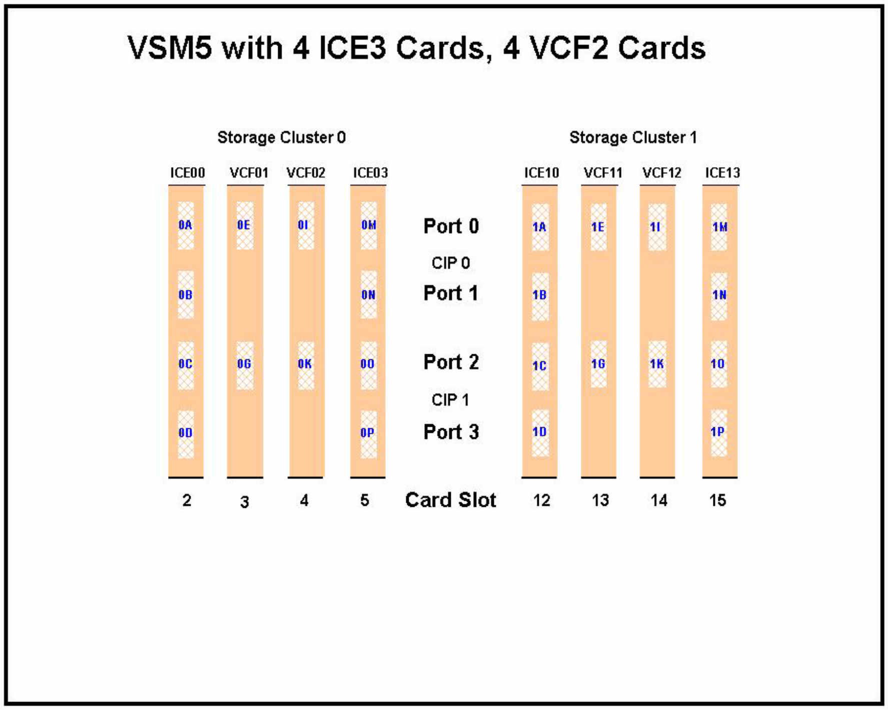


FIGURE 4-2 VSM5 with 4 ICE cards, 4 VCF cards

Note –

- In FIGURE 4-2 on page 55, the VCF cards must go in: Slots 3, 4, 13, and 14 in a four-VCF card configuration.
- FICON ports are controlled by a FICON Interface processor (FIP), ESCON ports are controlled by a CIP. Regardless of the card configuration, there can be only a total of 14 Nearlink FIPs and/or CIPs.

Note – With microcode level D02.06.00.00 or higher, multiple Nearlink device connections via a FICON or ESCON switch or Director on the same port now allow:

- **Up to a total of 16 simultaneous NearLink I/O transfers**, which can be spread across multiple targets on as many as 14 NearLink ports.
- **Up to a total of 2 simultaneous NearLink I/O transfer**s are allowed per port.

- All FICON ports can be configured as either a Host port or Nearlink (RTD/CLINK origination) port. All ESCON ports continue to be configurable as host or Nearlink ports in pairs on a per CIP basis.
- As shown in FIGURE 4-1 on page 54 and FIGURE 4-2 on page 55, the ports are shown with their channel interface identifiers. These channel interface identifiers are the values that are required for the CHANIF values that you code for the CONFIG utility. Each value is two characters in length and has a value from 0A to 1O. The first digit is the VTSS cluster ID (valid values are 0 or 1). The second digit is the group or adapter ID (valid values are A to P).

  Each FICON port can attach to four RTDs, or two CLINKs, or an RTD/CLINK combination via a FICON director or supported switch (in FICON mode). **Note that**, as shown in these figures, **for RTDs only**, each FICON port has two CHANIF values **only if** the port is connected to a FICON director which is then connected to two RTDs. Nearlink RTD connections that are paired via a FICON switch or director on the same port dynamically alternate between both RTDs for atomic operations such as mount, migrate VTV, recall VTV, etc.
- **Each ICE card** contains two pairs of ESCON ports. Each pair is controlled by its own Channel Interface Processor (CIP). Each CIP switches between the two ports, so that **only one port** can transfer data at a time, which emulates a FICON port attached to a director attached to RTDs.
- Each host FICON channel supports 64 logical paths (times 16 logical units). However, in HCD:
  - From a single MVS host, you can only define 8 channels (CHPIDs) running to a single control unit (single VSM5).
  - You use the CNTLUNIT statement to define each VSM5 as 16 3490 control unit images.
  - You use the IODEVICE statement to define the 16 VTDs that are associated with each 3490 control unit image.
- For a VSM5, each ESCON CIP or FICON FIP can operate with only *one* of two modes, which is set at the VTSS DOP:
  - *Host Mode*. In Host Mode, ports can connect to the host CPU channels, including via Director(s) or channel extenders. A port in Host Mode can also serve as a CLINK terminator.

Also note that for ESCON ports, you can have two physical paths from the same LPAR to the same CIP, as long as the two physical paths address different (not overlapping) logical control units. For example, a single host LPAR can address logical control units 0-7 on one CIP port, and 8-F on the other CIP port of the same CIP.

- *Nearlink Mode*. In Nearlink Mode, ports can connect to an RTD. A port in Nearlink Mode can also serve as a CLINK originator.

Caution – In bi-directional clustering, each CLINK **must be** attached to **the same Storage Cluster** on each VTSS, **which is a requirement**. Failure to configure in this manner can produce Replicate, Channel, and Communication errors!

In both FICON and ESCON, what are Best Practices for optimizing port operations? See TABLE 4-2...

TABLE 4-2 Optimizing VSM5 FICON/ESCON Port Operations

Configuration - Two ESCON Ports on a CIP (ICE) or FICON port attached to a FICON Director (VCF)	Best Practices
Multiple CLINKs (up to 4)	**Attach a maximum of 2** ....because each port allows two active operations. **Note, however**, that these operations share the bandwidth of the port.
CLINK and RTD combinations	**An advantage** if you attach one CLINK originator/one RTD per director, because both can be active.
Up to 4 RTDs	**An advantage** for the following: **Optimize use of local and remote RTDs**. During busy shifts, use only local RTDs on the FIP. During quiet periods, switch to remote RTDs for deep archive and DR work. Because you can have two active devices, you can also simultaneously run one local and one remote RTD. **Note, however**, that these operations share the bandwidth of the port. **Optimize use of different drive technologies**. As described in the previous bullet, use a T9840 as a local RTD, then switch to a T9940 for deep archive. You can also use this feature to migrate from older drive technology (such as 9490) to newer technology (such as 9840). Use Management and Storage Classes to read in data from older media, then switch to the newer technology drive to place data on new media. This technique effectively gives you greater physical connectivity to different drive technologies without incurring the overhead of full time, real time FICON connections to each drive type. Also as above, because you can have two active devices, you can also simultaneously run two RTDs with different drive technologies. **Note, however**, that these operations share the bandwidth of the port.

VSM5 Configuration Example: 8 ICE Cards, 16 Host Ports, 16 RTD Ports

FIGURE 0-1 shows CONFIG channel interface identifiers of 16 for hosts, 16 for RTDs for a VSM5.

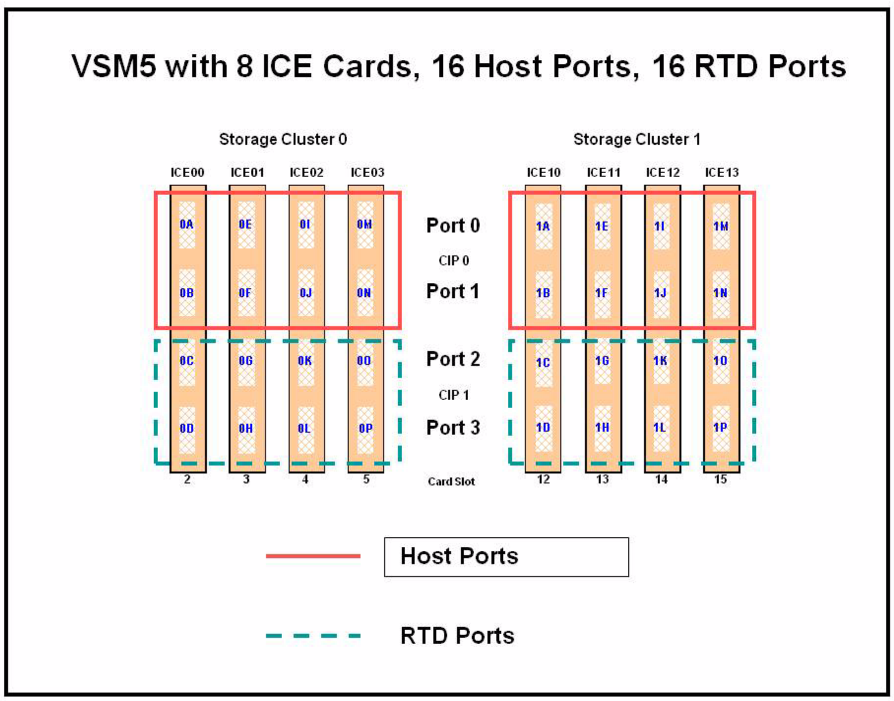


FIGURE 0-1 VSM5 with 16 Host Ports, 16 RTD Ports

CONFIG Example for VSM5 with 16 Host Ports, 16 RTD Ports

FIGURE 0-2 shows example CONFIG JCL to define the VSM5 configuration shown in FIGURE 0-1 on page 59.

```
//CREATECF EXEC PGM=SLUADMIN,PARM='MIXED'
//STEPLIB   DD DSN=hlq.SEALINK,DISP=SHR
//SLSCNTL   DD DSN=hlq.DBASEPRM,DISP=SHR
//SLSCNTL2  DD DSN=hlq.DBASESEC,DISP=SHR
//SLSSTBY   DD DSN=hlq.DBASETBY,DISP=SHR
//SLSPRINT  DD   SYSOUT=*
//SLSIN     DD   *
 CONFIG
 GLOBAL    MAXVTV=32000MVCFREE=40
 RECLAIM   THRESHLD=70MAXMVC=40  START=35
VTSS NAME=VSM501 LOW=70 HIGH=80 MAXMIG=8 RETAIN=5
 RTD  NAME=VSM52A00 DEVNO=2A00 CHANIF=0C
 RTD  NAME=VSM52A01 DEVNO=2A01 CHANIF=0D
 RTD  NAME=VSM52A02 DEVNO=2A02 CHANIF=0G
 RTD  NAME=VSM52A03 DEVNO=2A03 CHANIF=0H
 RTD  NAME=VSM52A04 DEVNO=2A04 CHANIF=0K
 RTD  NAME=VSM52A05 DEVNO=2A05 CHANIF=0L
 RTD  NAME=VSM52A06 DEVNO=2A06 CHANIF=0O
 RTD  NAME=VSM52A07 DEVNO=2A07 CHANIF=0P
 RTD  NAME=VSM52A08 DEVNO=2A08 CHANIF=1C
 RTD  NAME=VSM52A09 DEVNO=2A09 CHANIF=1D
 RTD  NAME=VSM52A0A DEVNO=2A0A CHANIF=1G
 RTD  NAME=VSM52A0B DEVNO=2A0B CHANIF=1H
 RTD  NAME=VSM52A0C DEVNO=2A0C CHANIF=1K
 RTD  NAME=VSM52A0D DEVNO=2A0D CHANIF=1L
 RTD  NAME=VSM52A0E DEVNO=2A0E CHANIF=1O
 RTD  NAME=VSM52A0F DEVNO=2A0F CHANIF=1P
 VTD LOW=9900 HIGH=99FF
```

FIGURE 0-2 CONFIG example: VSM5 with 16 Host Ports, 16 RTD Ports

IOCP Example for Single MVS Host Connected to a VSM5 Via ESCON Directors

FIGURE 0-3 shows a configuration diagram for a single MVS host connected to a VSM5 via ESCON Directors, and FIGURE 0-4 on page 62 shows example IOCP statements for this configuration. **Note that**:

- From MVSA, you define 8 CHPIDs, with each path switched in the ESCON Director, for a total of 8 channels running to the VSM5.
- You code 16 CNTLUNIT statements to define the VSM5 as 16 3490 images.
- You code IODEVICE statement to define the 16 VTDs that are associated with each 3490 image.

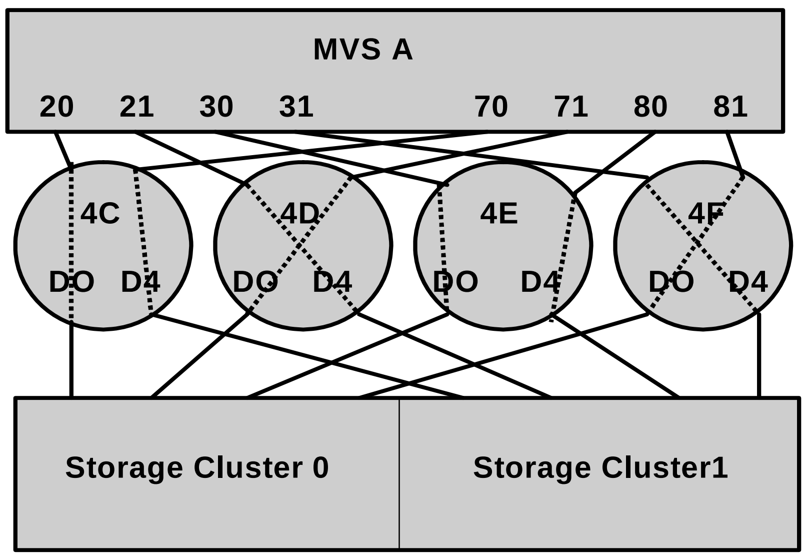


FIGURE 0-3 Configuration Diagram: Single MVS Host Connected to a VSM5 via ESCON Directors

```
ESCD4C CHPID PATH=(20,70),TYPE=CNC,SWITCH=4C
ESCD4D CHPID PATH=(21,71),TYPE=CNC,SWITCH=4D
ESCD4E CHPID PATH=(30,80),TYPE=CNC,SWITCH=4E
ESCD4F CHPID PATH=(31,81),TYPE=CNC,SWITCH=4F

CU1    CNTLUNIT CUNUMBR=001,
                PATH=(20,21,30,31,70,71,80,81),
                LINK=(D0,D4,D0,D4,D4,D0,D4,D0),
                UNIT=3490,CUADD=0,
                UNITADD=((00,16))

STRING1  IODEVICE ADDRESS=(0500,16),
           CUNUMBER=(001),
             UNIT=3490,
          UNITADD=00,STADET=Y

CU2    CNTLUNIT CUNUMBR=002,
                PATH=(20,21,30,31,70,71,80,81),
                LINK=(D0,D4,D0,D4,D4,D0,D4,D0),
                UNIT=3490,CUADD=1,
            UNITADD=((00,16))

STRING2  IODEVICE ADDRESS=(0510,16),
                 CUNUMBER=(002),
               UNIT=3490,
          UNITADD=00,STADET=Y
          .
          .
          .
CU15   CNTLUNIT CUNUMBR=015,
                PATH=(20,21,30,31,70,71,80,81),
                LINK=(D0,D4,D0,D4,D4,D0,D4,D0),
                UNIT=3490,CUADD=E,
                  UNITADD=((00,16))

STRING15  IODEVICE ADDRESS=(05E0,16),
                 CUNUMBER=(015),
              UNIT=3490,
          UNITADD=00,STADET=Y

CU16   CNTLUNIT CUNUMBR=016,
                PATH=(20,21,30,31,70,71,80,81),
                LINK=(D0,D4,D0,D4,D4,D0,D4,D0),
                UNIT=3490,CUADD=F,
                  UNITADD=((00,16))

STRING16  IODEVICE ADDRESS=(05F0,16),
              CUNUMBER=(016),
               UNIT=3490,
          UNITADD=00,STADET=Y
```

FIGURE 0-4 IOCP Example: Single MVS Host Connected to a VSM5 via ESCON Directors