

# High Availability Failover Training Session

for the  
HP e3000 MPE/iX 7.0 & 7.5

Jan, 2004



Audio speaker notes.  
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audio.



# Agenda



- Important HAFO doc changes
- Problem description
- Software/hardware caveats
- When or where HAFO is/isn't a good fit
- Configuration setup
- HAFO commands
- HAFO events
- Recovery and troubleshooting



Q & A

# Important HAFO Documentation Changes



- <http://jazz.external.hp.com/mpeha/hafo/32650-90911.pdf>  
<http://www.docs.hp.com/mpeix/pdf/32650-90911.pdf>
- Prerequisites on page 8
- System requirements on page 16
- Configuration planning steps on page 17
- Configuration commands
- Quick Start Guide on page 48



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# Problem Description



hp e3000

high availability failover  
with dual active paths

SCSI Card  
and Cable



XP or VA7x10

Controller



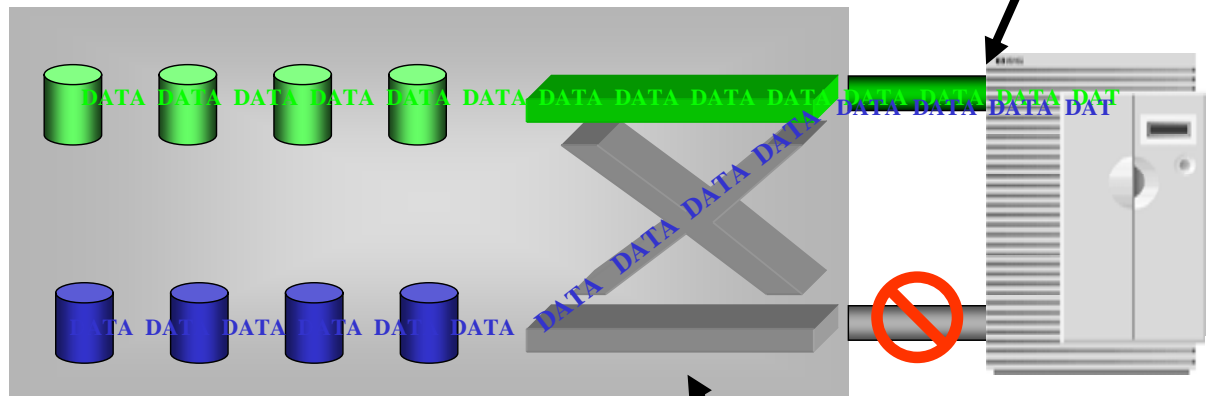
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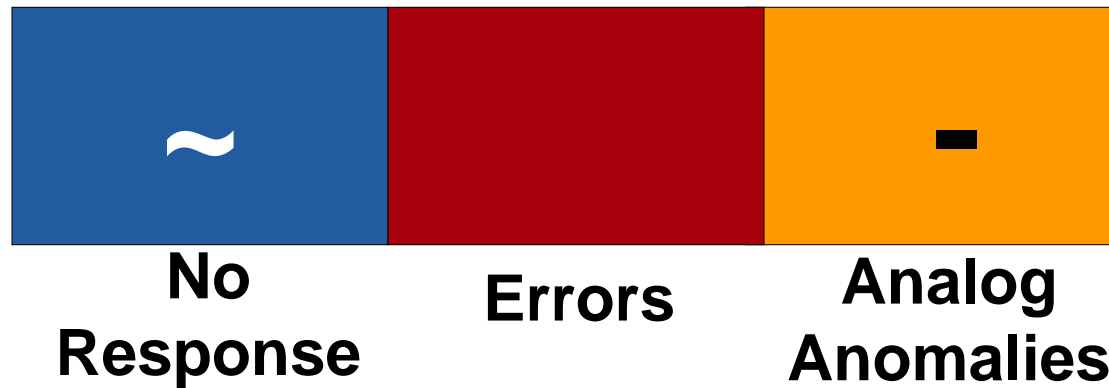


XP or VA7x10

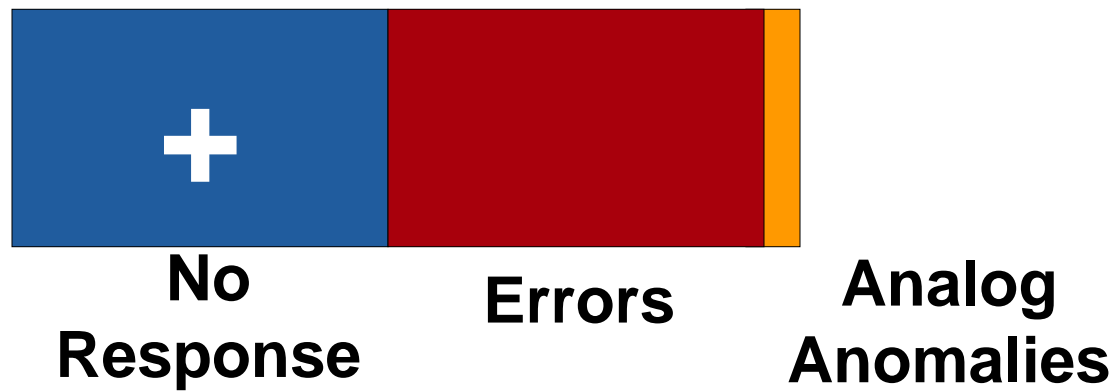
Controller



## SCSI HAFO



## FC HAFO





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# Software/Hardware Caveats



- HAFO and Cluster/iX are not supported (together)
- All Ldevs (luns) on a bus must be configured as HAFO protected
- All HAFO protected Ldevs must use similar connection strategy (switches and paths)
- HAFO is not a fault-tolerant solution  
(unplanned outages are converted to planned outages to fully recover)
- HAFO is dependent on performance expectations  
(false failovers)
- Plan plan plan....



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# HAFO? Is it for you?



- HAFO is not the magic panacea of HA
- HAFO adds complexity to the operation of a system
- Unless there is a good understanding of the I/O characteristics of the system, you will introduce false failovers and reduce the I/O throughput of MPE



# Agenda



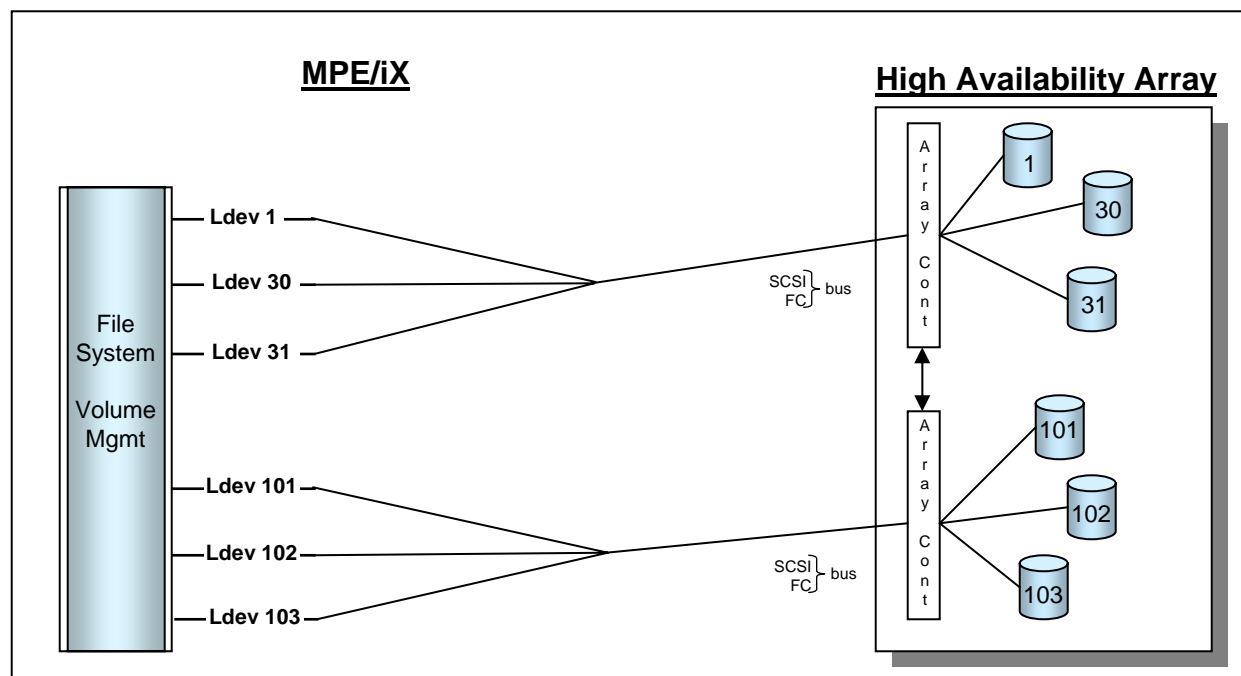
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# Configure the storage array



**Create the Luns on the XP  
so that they are visible to  
MPE from both ports**

**Use Mapper or  
FCSCAN -h to verify  
Lun connection**



# Assigning Luns to Ports



**Port address assigned by the path taken**

**Example:**

**Primary Port ID is 36**

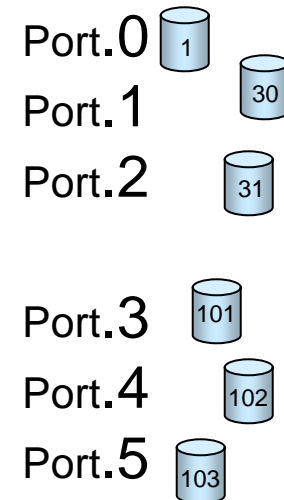
**Secondary Port ID is 28**

**To generate a path to the Ldev 1 take**

**Port + Lun addr = 36.0**

**An alternate path to Ldev 1 is 28.0**

**Lun  
Addr**



# Configuring Ldevs



## Using Sysgen

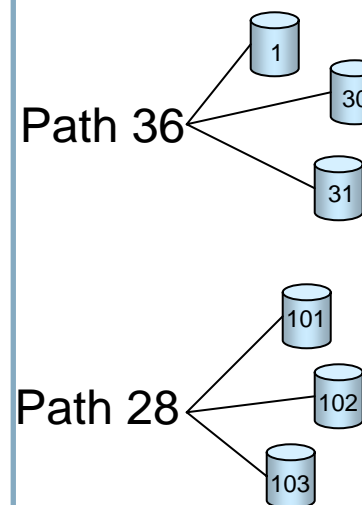
Create a configuration for Ldev 1-31 on path or port 36.

And configure Ldev 101-103 on path or port 28.

### Example:

```
io>ad path=0/0.36.0 Ldev=1      id=HPDARRAY
io>ad path=0/0.36.1 Ldev=30     id=HPDARRAY
io>ad path=0/0.36.2 Ldev=31     id=HPDARRAY
io>ad path=0/0.28.3 Ldev=101    id=HPDARRAY
io>ad path=0/0.28.4 Ldev=102    id=HPDARRAY
io>ad path=0/0.28.5 Ldev=103    id=HPDARRAY
```

**Keep and then reboot**





# Protecting Ldevs with HAFO



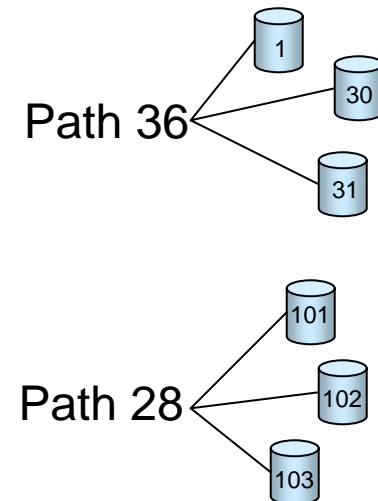
## Using Sysgen

**Enter the HA menu and issue:**

```
ha>ad 1 0/0.36.0 0/0.28
ha>ad 30 0/0.36.1 0/0.28
ha>ad 31 0/0.36.2 0/0.28
ha>ad 101 0/0.28.3 0/0.36
ha>ad 102 0/0.28.4 0/0.36
ha>ad 103 0/0.28.5 0/0.36
```

**Hold and keep**

**Return to HA menu and issue DOHA**



# Creating User Volumes or Adding members to the system vol set



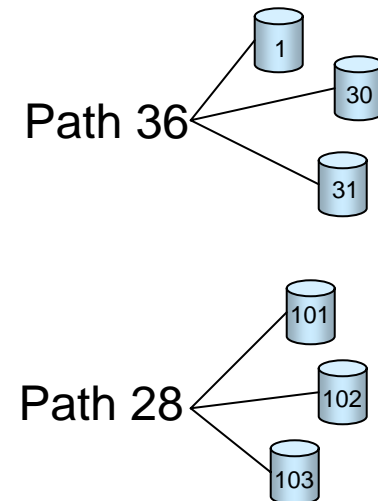
## Using Volutil:

### User Volumes

- Use the Newset and Newvol commands to create you user volume set.
- Then VSCLOSE and VSOPEN the volume set before using.

### Adding to the System Volume Set

- Use the Newvol command.
- **Shutdown and reboot to add HAFO protection**



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# Important HAFO Commands



## ADDCONF

```
addconf (ad) <Ldev> <path> <altpath> <timeout>
```

**Example:**

```
ha>ad 450 0/6/2/1.3.3 0/6/2/0 True
```

### New Feature

Timeout parm defaults to true. This parm allows for storage and server configurations where very poor I/O performance has been identified as the cause of false failovers. Turning this to false disable the timeout detection but increases the risk of encountering other undetectable timer related hangs/problems



# Important HAFO Commands



## LISTCONF

ha>LISTCONF

Ldev	Primary Path	Alternate Path	Timeout
350	0/4/0/0.70954.23	0/6/0/0.73289	True
351	0/4/0/0.70954.24	0/6/0/0.73289	True
352	0/6/0/0.73289.25	0/4/0/0.70954	False
353	0/6/0/0.73289.26	0/4/0/0.70954	False
450	0/6/2/1.3.3	0/6/2/0	True
451	0/6/2/1.3.4	0/6/2/0	True
452	0/6/2/0.3.5	0/6/2/1	False
453	0/6/2/0.3.6	0/6/2/1	False



# Important HAFO Commands



## DOHA

```
ha> doha
```

```
Start of validation for all HAFO configured devices.
```

```
=====
```

```
VALIDATING ** Ldev: 50 Pri path: 8.15.0 Alt path: 48
```

```
~~~~~
```

```
Ldev 50 configuration Validated Successfully
```

```
VALIDATING ** Ldev: 51 Pri path: 8.15.1 Alt path: 48
```

```
~~~~~
```

```
Ldev 51 configuration Validated Successfully
```

```
End of validation for all HAFO configured devices.
```

```
=====
```



# Important HAFO Commands



## **GONEXT**

ha> Go <Ldev>

**After the problem has been repaired, issue the GoNext command to put the Ldevs back on their primary paths.**

**This command should not be used to causes the Ldev to back to a known bad path. To do so may result in a reboot to reinitialize the MPE I/O configuration.**



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# HAFO Event



HIGH AVAILABILITY FAILOVER IS STARTED FOR Ldev# IN DISK ARRAY. NO DATA LOSS OR CORRUPTION. SYSTEM OPERATION WILL CONTINUE.PLEASE PLACE SERVICE CALL SOON.  
ACKNOWLEDGE HAFO FAILOVER IN DISK ARRAY FOR Ldev# (Y/N)?

## Reply to the message

:HASTAT

High Availability Failover Device Status

Ldev	Primary Path	Alternate Path	Pri. Status	Alt. Status
350	0/4/0/0.70954.23	0/6/0/0.73289	Array Failure	Ready
351	0/4/0/0.70954.24	0/6/0/0.73289	Array Failure	Ready
352	0/6/0/0.73289.25	0/4/0/0.70954	Ready	Validated
353	0/6/0/0.73289.26	0/4/0/0.70954	Ready	Validated
450	0/6/2/1.3.3	0/6/2/0	Ready	Validated
451	0/6/2/1.3.4	0/6/2/0	Timeout/No Reply	Ready
452	0/6/2/0.3.5	0/6/2/1	Ready	Validated
453	0/6/2/0.3.6	0/6/2/1	Ready	Validated



# HAFO Event



```
HIGH AVAILABILITY FAILOVER IS STARTED FOR I/O ERROR OR CORRUPTION. SYSTEM OPERATION WILL CONTINUE. ACKNOWLEDGE HAFO FAILOVER IN DISK ARRAY FOR
```

- Ldev 350 and 351 have encountered an array error and have switched over successfully.
- Ldev 451 switched over because of an I/O timeout.

## Reply to the message

```
:HASTAT
```

```
High Availability Failover Device Status
```

Ldev	Primary Path	Alternate Path	Pri. Status	Alt. Status
350	0/4/0/0.70954.23	0/6/0/0.73289	Array Failure	Ready
351	0/4/0/0.70954.24	0/6/0/0.73289	Array Failure	Ready
352	0/6/0/0.73289.25	0/4/0/0.70954	Ready	Validated
353	0/6/0/0.73289.26	0/4/0/0.70954	Ready	Validated
450	0/6/2/1.3.3	0/6/2/0	Ready	Validated
451	0/6/2/1.3.4	0/6/2/0	Timeout/No Reply	Ready
452	0/6/2/0.3.5	0/6/2/1	Ready	Validated
453	0/6/2/0.3.6	0/6/2/1	Ready	Validated



# Recovering from a HAFO Event



## Array Failure Error

- This is a failure in the path of the Ldev and could be either the HBA or array controller or any component in between. Diagnose this problem as you would any other hardware component by collecting system and diagnostic log information.

Only after repairing the part should you use the GoNext command.

- Ldev 350 and 351 have encountered an array error and have switched over successfully.
- Ldev 451 switched over because of an I/O timeout.



# Recovering from a HAFO Event



## Timeout Failover

- Treat this as if it was a hardware failure. Collect system and diagnostic log information. This information along with performance data is needed to prove that the I/O timeout is due only to the fact that the storage array can't keep up with the I/O load of MPE and is not another cause masquerading as Timeout.

- Ldev 350 and 351 have encountered an array error and have switched over successfully.
- Ldev 451 switched over because of an I/O timeout.

Only after proper diagnostic should you attempt to delete Ldev 451 (DELCONF command) and add it back into HAFO using the timeout parameter set to FALSE. **Remember, setting the parm to False decreases HAFO protection.**

