



***“The future ready Operating System,
continuously delivering mission
critical solution”***

**Specializzazione di Informatica
Infrastruttura Server
OpenVMS Cluster Integrity
“La tecnologia e’ la differenza”**

The Availability Digest – <http://www.availabilitydigest.com>

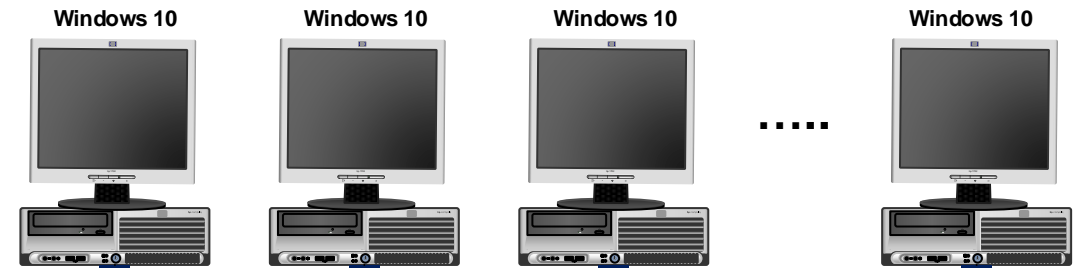
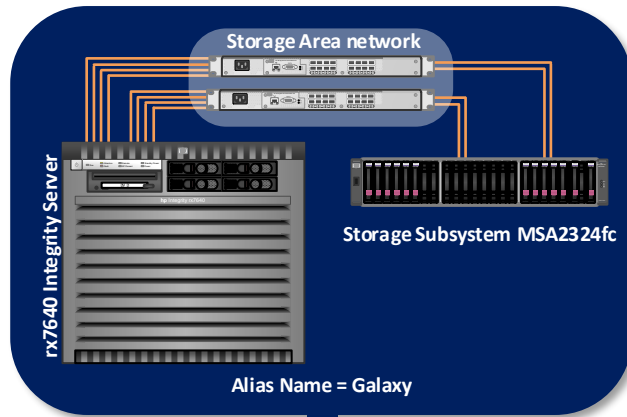
“HP OpenVMS clusters offer a dramatic improvement over contemporary cluster technology. Nodes in an OpenVMS cluster run in an active/active mode in which multiple nodes across multiple sites cooperate in a common application against a common, distributed file system. The recent “Disaster Proof” video from HP,¹ in which a data center was blown up, showed that Open VMS had the fastest recovery time of all the clustering technologies used (HPUX, NonStop, Windows and Linux).

In our earlier article on clusters,² it was pointed out that contemporary clusters do not run in an active/active mode in our sense because a disk volume can be mounted only on one node at a time (unless Oracle RAC is used), and only that node can participate in the application. Consequently, when a node fails, the application has to be started on another node, the volume remounted and repaired, and the users switched. This leads to failover times for contemporary clusters measured in minutes or more.

Like active/active systems, OpenVMS clusters recover in seconds because once a failure is detected, all that must be done to continue operation is to switch the subset of users who were connected to the failed node to surviving nodes at any of the sites. Furthermore, no data is lost following a failure (a Recovery Point Objective, or RPO, of zero is achieved) because the application file system copies are updated synchronously.”

ITT Giorgi (BR) – OpenVMS I64 Lavc Cluster Logical Layout

OpenVMS Cluster I64 Active-Active Architecture



LAN - giorgi.edu DNS Domain Tcp/IP-DecNet-Lat-Last-Mop

OpenVMS Cluster

- Common System Disk
- Single Security Domain
- Single File System Image Vision
- Single System Management Domain
- Sharing All Configuration
- Coordinated Access to any Resource
- Shared Batch and Print Queues
- Distributed Lock Manager
- Cluster Wide Applications
- Automatic Load Balancing
- Clusterwide Data Caching
- Clusterwide Application Caching
- Mixed Cluster Configuration Allowed
- Seem like a Single System from User Side
- Availability 99.999%

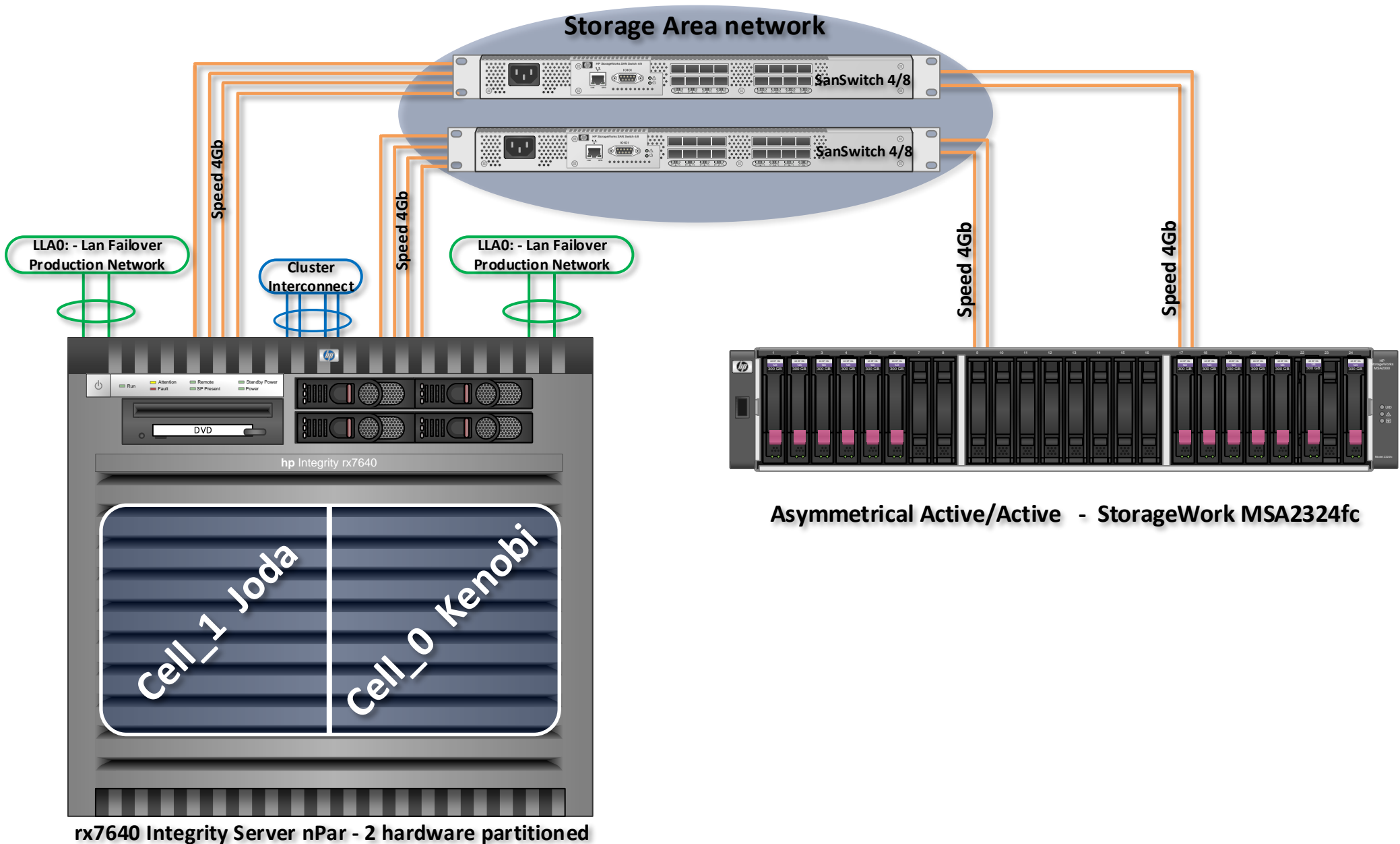
TCP/IP Services

- Automatic Load balancing :
- LoadBroker Server
- Metrics Server
- DNS Server = giorgi.edu
- Portmapper
- NTP Server
- ESNMP Server
- FTP Server/Client
- Rlogin Server
- REXEC and RSH Client
- LPR/LPD Server
- SSH2 Server/Client
- Telnet Server/Client
- POP3 SMTP & IMAP4 Server
- XDM Server

Windows Integration

- Common Internet File System
- Role=PDC
- Domain = GIORGI-VMS
- Lan Manager Integration
- Logon Server
- Personal Share
- Time Sync
- OpenVMS Security
- Automatic Load Balancing
- Automatic Client Failover

ITT Giorgi (B) – OpenVMS I64 Cluster Layout



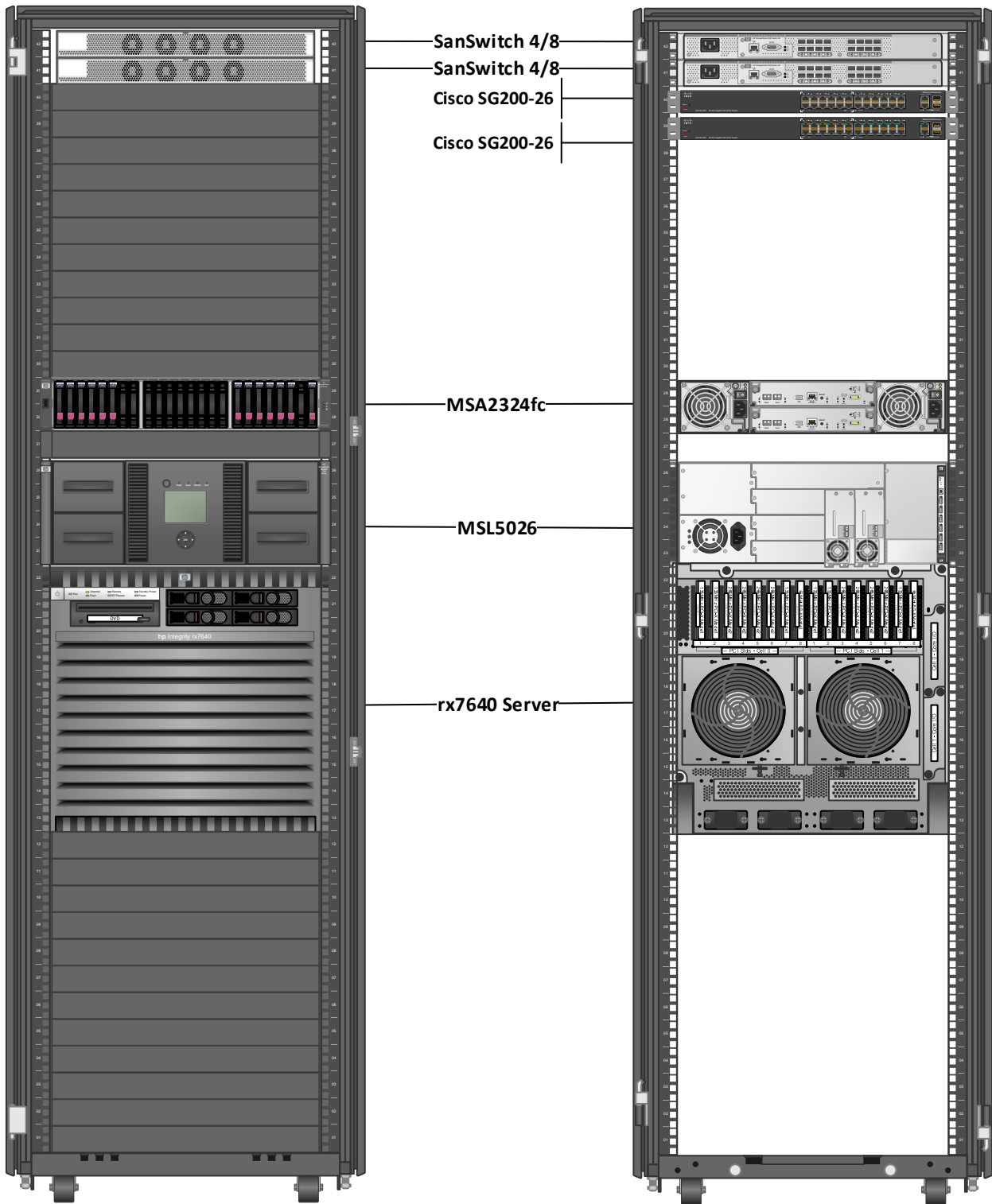
ITT Giorgi (BR) – OpenVMS I64 Cluster Connection Manager

View of Cluster from system ID 10350 node: KENOBI

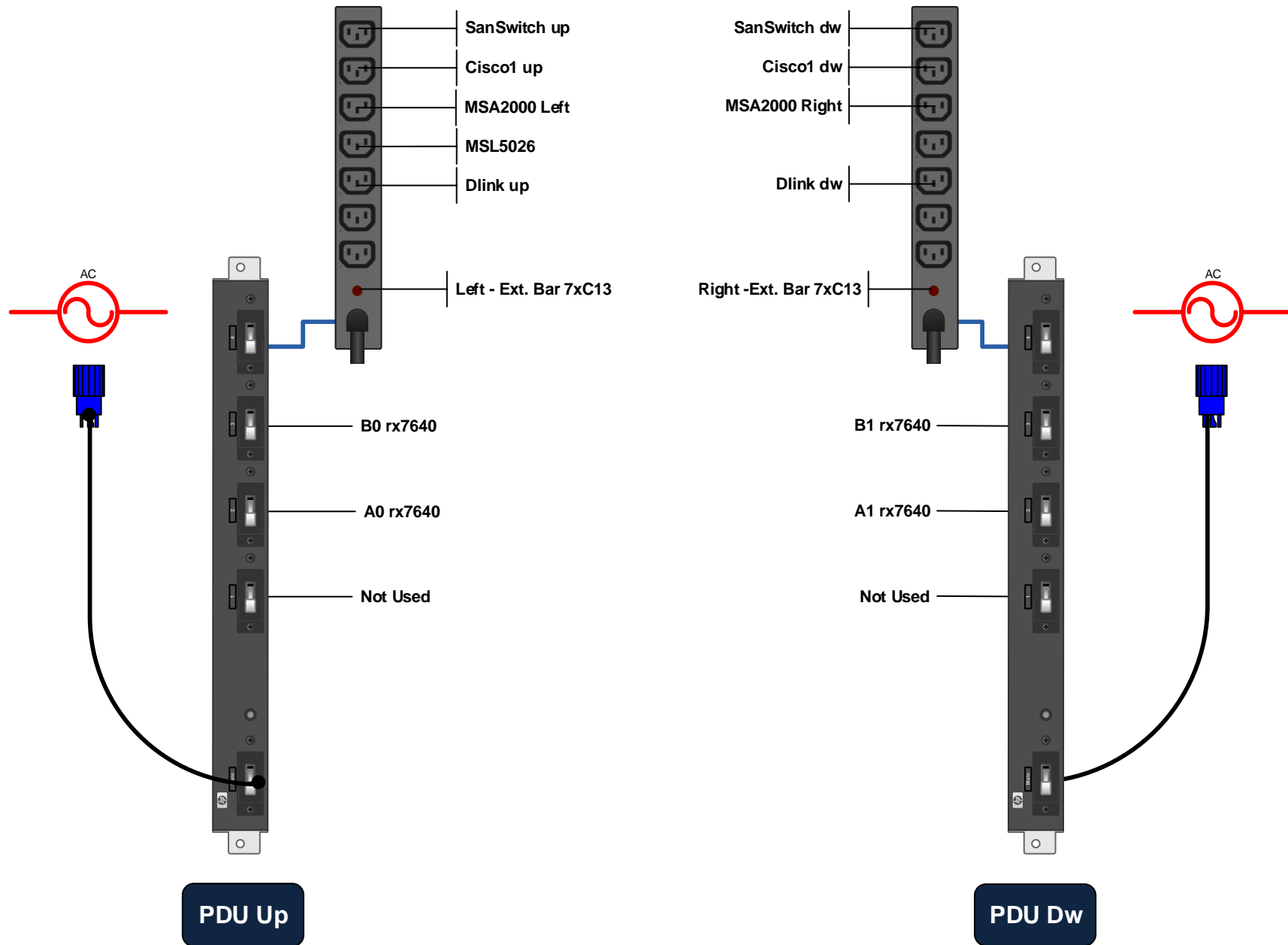
SYSTEMS		MEMBERS				
NODE	SOFTWARE	VOTES	EXPECT	QUORUM	QDVOTES	STATUS
KENOBI	VMS V8.4	1	3	2	1	MEMBER
JODA	VMS V8.4	1	3	2	1	MEMBER

CLUSTER					
CL_EXP	CL_QUORUM	CL_VOTES	QD_NAME		FORMED
3	2	3	\$1\$DGA13		5-NOV-2019 19:35

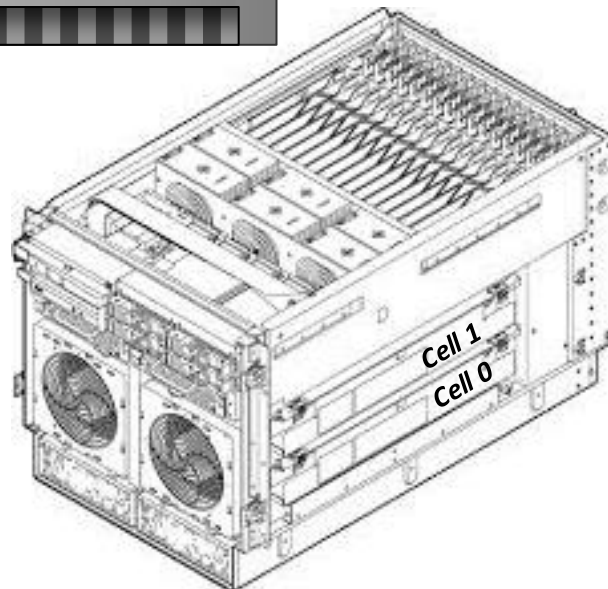
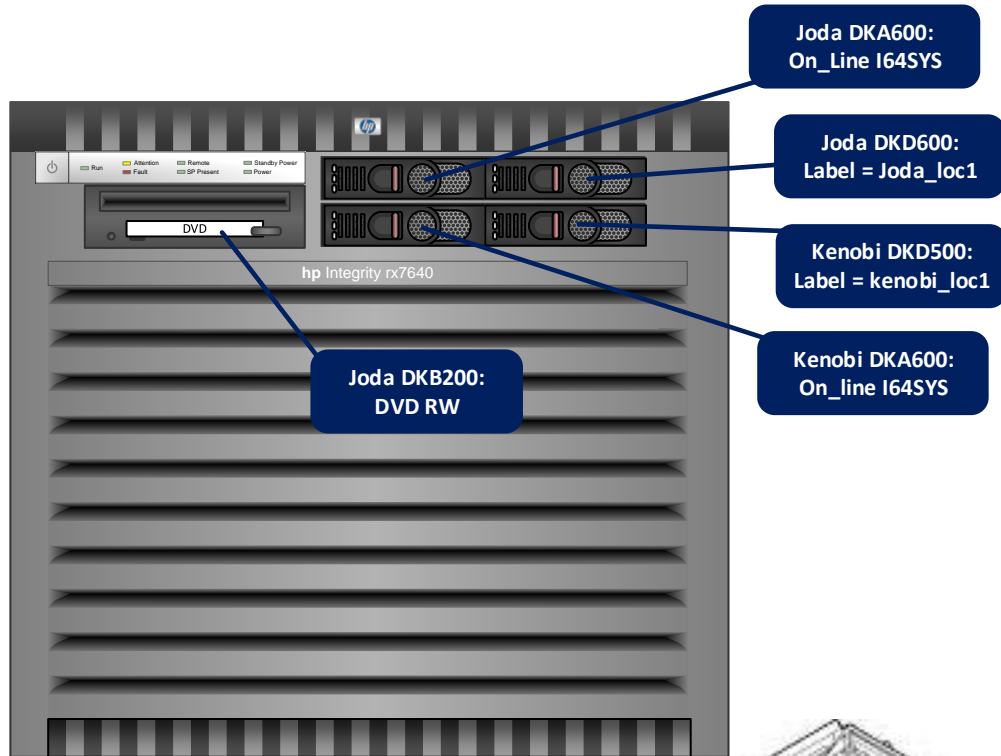
ITT Giorgi (BR) – OpenVMS Project Rack layout



ITT Giorgi (BR) – OpenVMS I64 Project Rack PDU Layout



ITT Giorgi (BR) – Server rx7640 Main Features and Configuration



rx7640 Symmetrical Multiprocessing (SMP) Design
Non Uniform Memory Access Architecture
Support for OpenVMS Resource Affinity Domain
sx2000 Chipset (the same of Superdome)
2N power inputs (dual power grid support)
2 x Core I/O with MP Master/Slave Design
Configured with two hardware partitions (nPartitions)

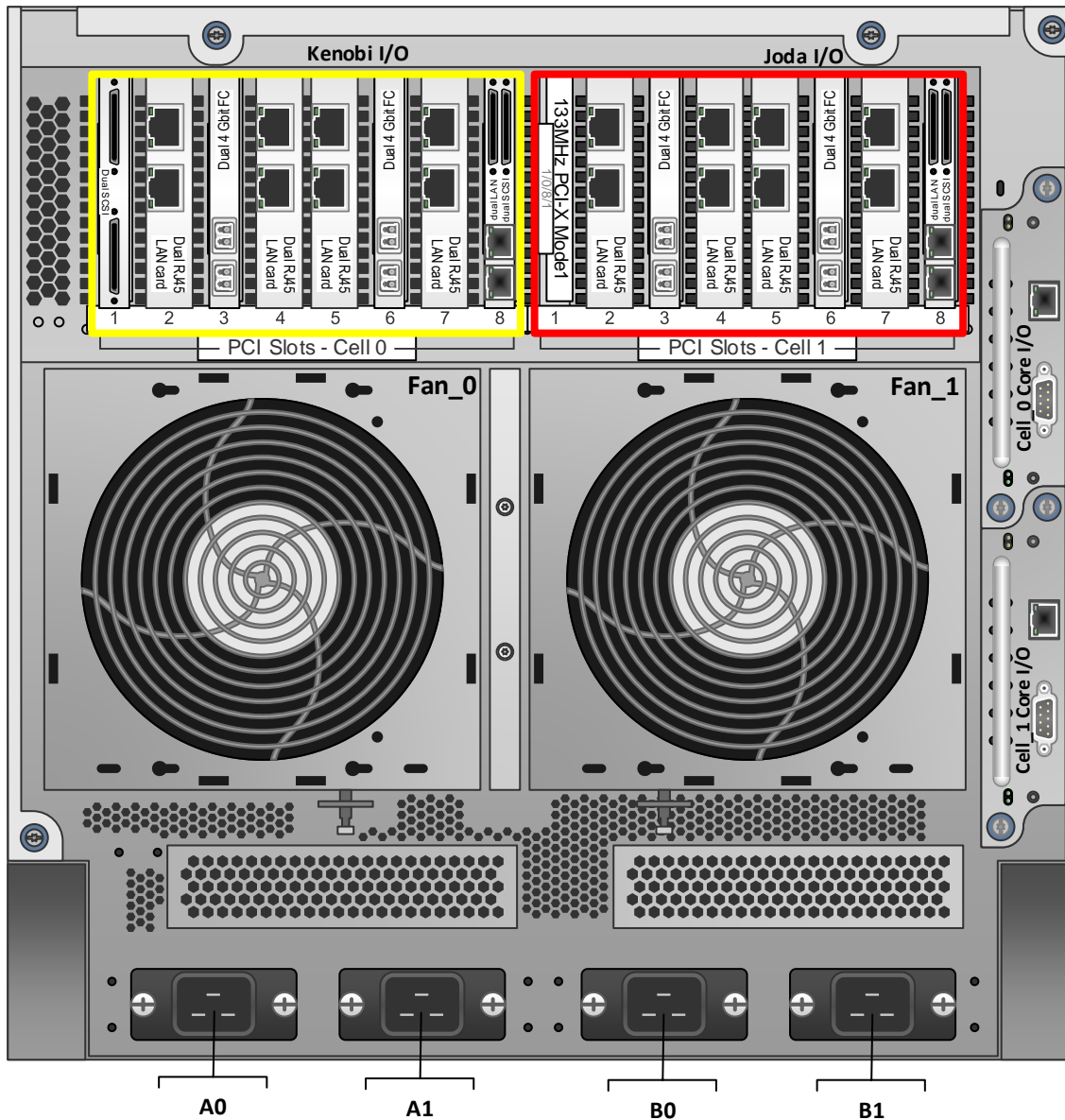
Cell_0 Kenobi :

4 x Intel dual-core Itanium processors
9140N (Montvale) 1.6 GHz 18 MB Level 3 cache
Hyperthreading is Enabled for a total of 16 CPUs
64 Gbyte RAM DDR2 full ECC memory protection
PCI X 2.0 backplane 8 Slots for PCI-X and PCI-E module
5 x NIC dual ports 1Gb with Jumbo Frame support
2 x HBA dual port 4Gbit for San Interconnect
4 x LVD U320 SCSI controllers
2 x 146Gb SCSI Internal HD

Cell_1 Joda :

4 x Intel dual-core Itanium processors
9140N (Montvale) 1.6 GHz 18 MB Level 3 cache
Hyperthreading is Enabled for a total of 16 CPUs
64 Gbyte RAM DDR2 full ECC memory protection
PCI X 2.0 backplane 8 Slots for PCI-X and PCI-E module
5 x NIC dual ports 1Gb with Jumbo Frame support
2 x HBA dual port 4Gbit for San Interconnect
4 x LVD U320 SCSI controllers
2 x 146Gb SCSI Internal HD
1 x Internal DVD RW

ITT Giorgi (BR) – Server rx7640 nPar & Firmware Revision



```

Cabinet firmware revision report

PROGRAMMABLE HARDWARE :

System Backplane :      GPM          EMMUX
                    -----          -----
                    001.002.000      001.000.000

IO Backplane      :      IO_LPM-0     IO_LPM-1
                    -----          -----
                    001.004.000      001.004.000

Core IO           :      CIO-0         CIO-1
                    -----          -----
                    001.002.000      001.002.000

                    CELL_LPM          CELL_JTAG

CELL_PDH
-----

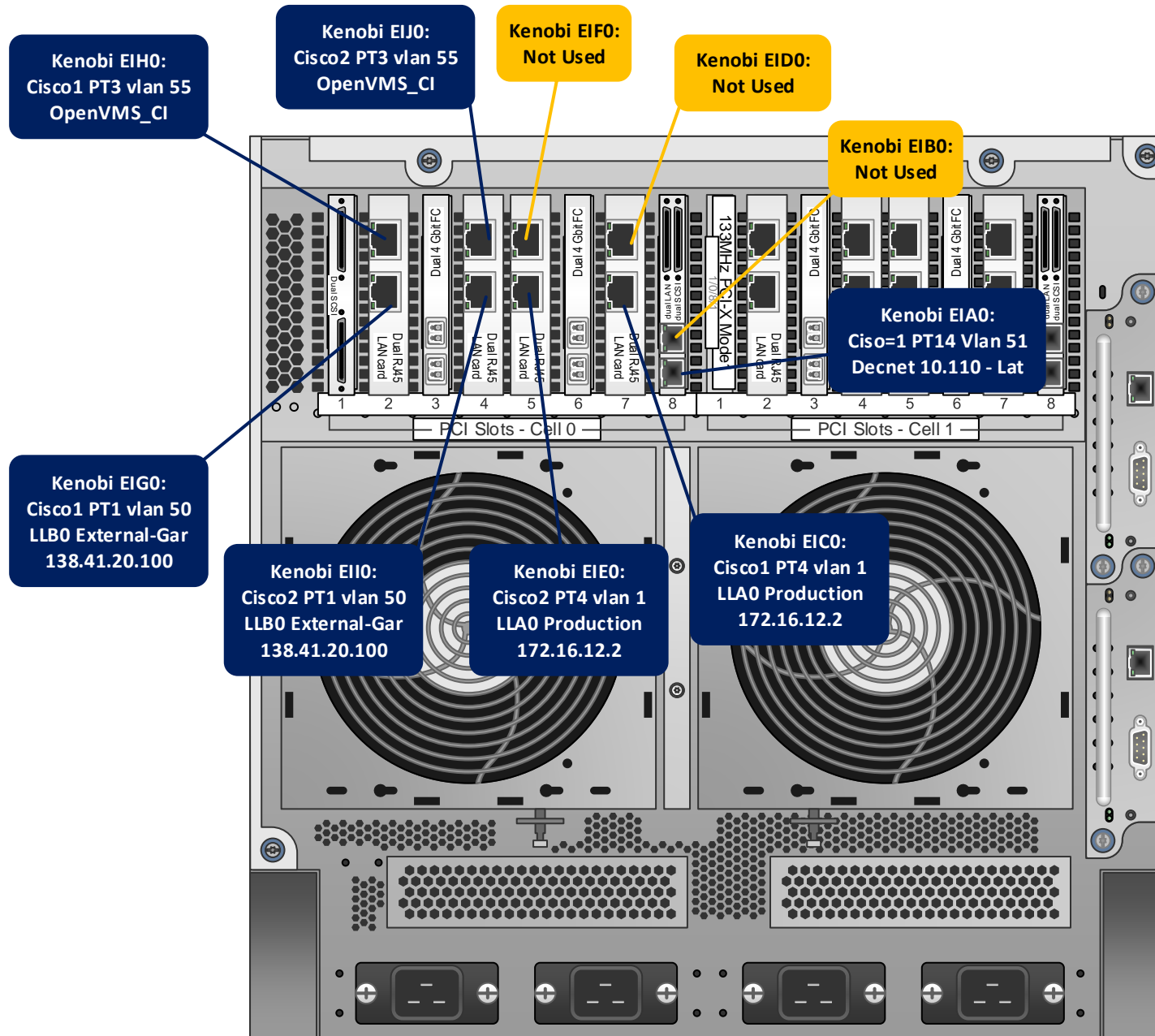
Cell 0 :            001.002.000      001.002.000
001.005.001

Cell 1 :            001.002.000      001.002.000
001.005.001

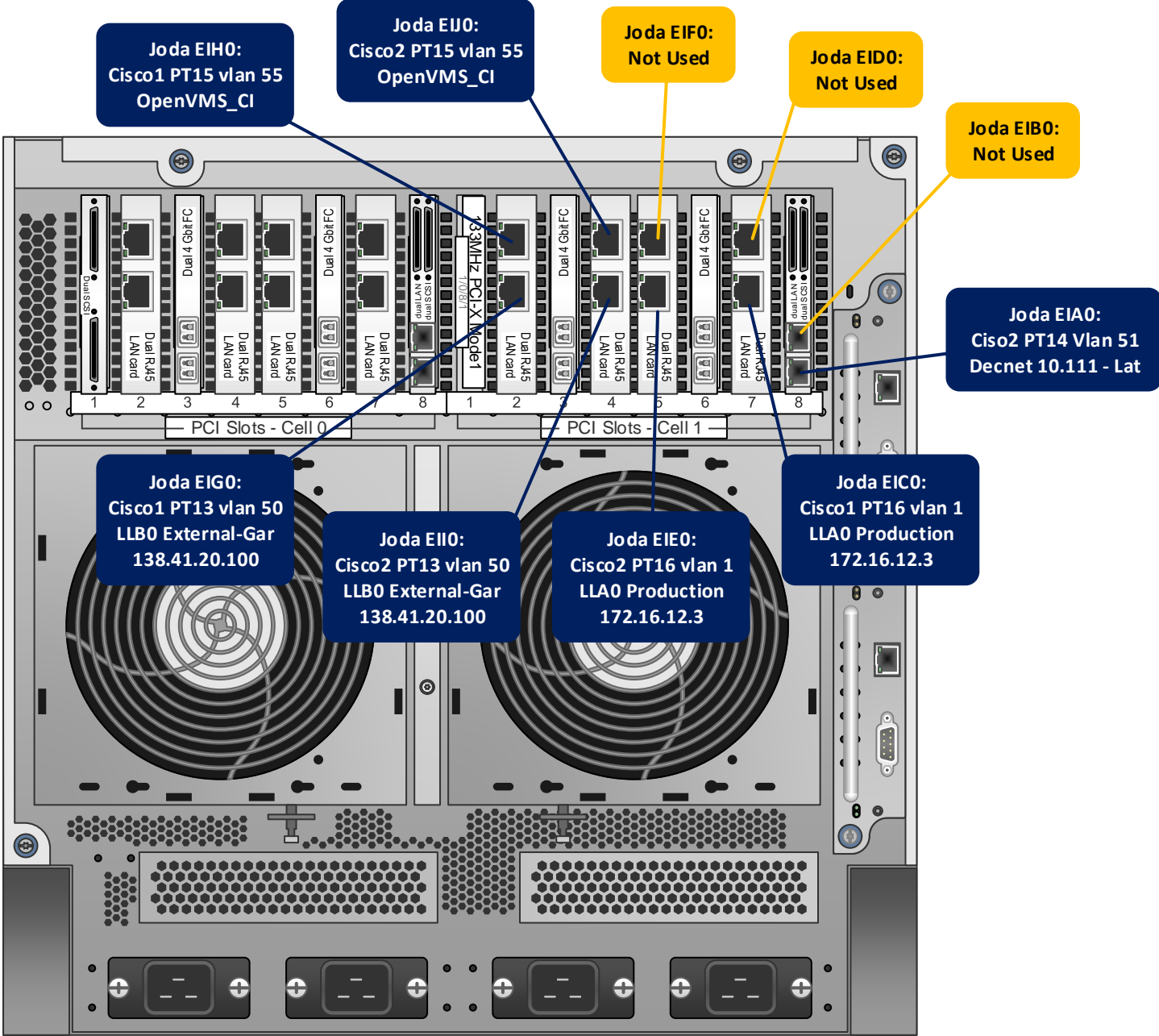
FIRMWARE:

Core IO
MP-0      :      B.004.002.003
ED-0      :           002.011.000
MP-1      :      B.004.002.003
    
```

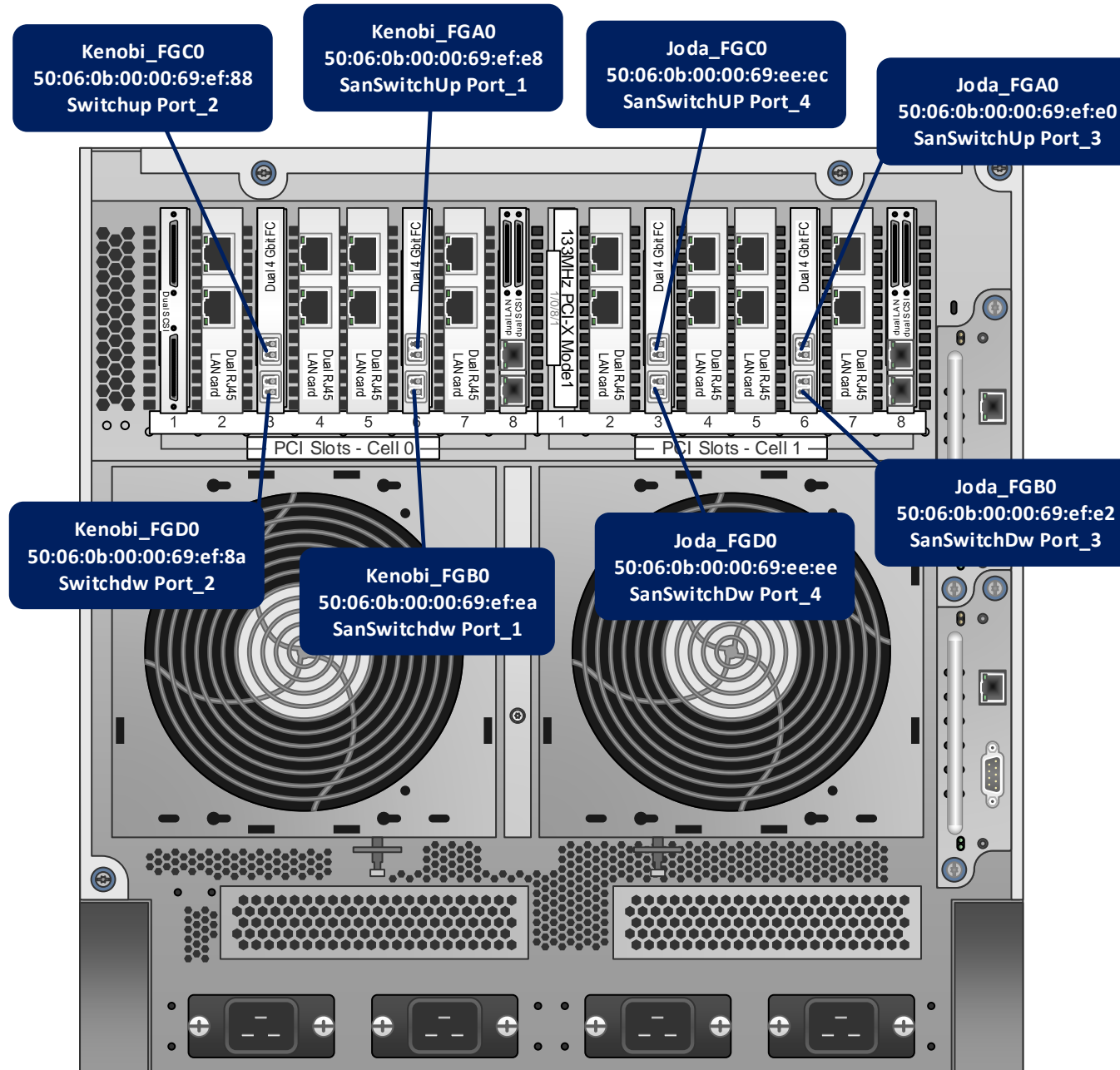

ITT Giorgi (BR) – Server Kenobi rx7640 Lan Interconnet



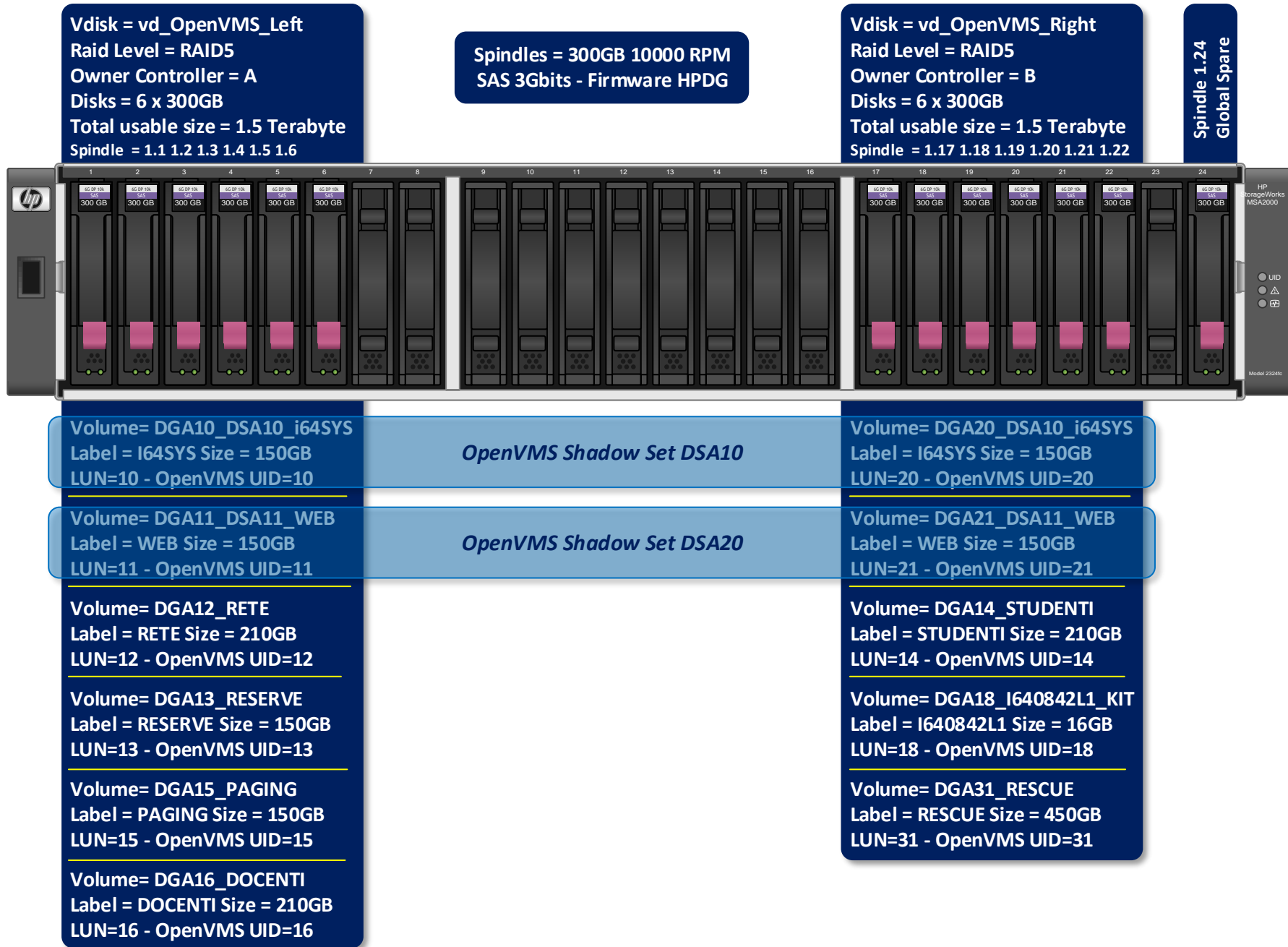
ITT Giorgi (BR) – Server Joda rx7640 Lan Interconnect



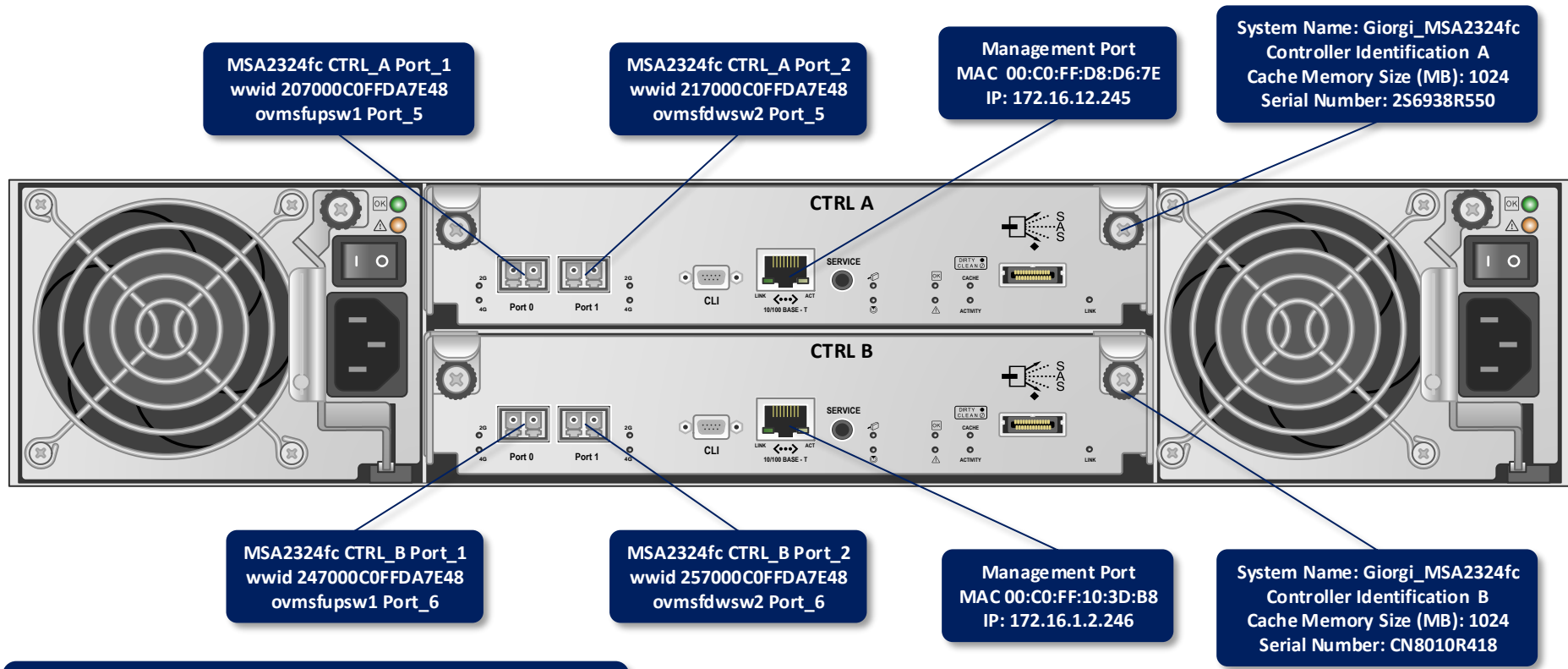
ITT Giorgi (BR) – Servers Kenobi-Joda rx7640 HBA/San Interconnect



ITT Giorgi (BR) – OpenVMS I64 MSA2324fc Front View



ITT Giorgi (BR) – OpenVMS I64 MSA2324fc Rear View



Storage Controller CPU Type: Turion MT32 1800MHz
 Storage Controller Code Version: M114P01
 Memory Controller FPGA Code Version: F300R22
 Storage Controller Loader Code Version: 19.009
 Management Controller Code Version: W441R57
 Management Controller Loader Code Version: 12.015
 Expander Controller Code Version: 1118
 CPLD Code Version: 8
 Hardware Version: 56

ITT Giorgi (BR) – OpenVMS I64 Cluster Volumes

Device Name	Device Status	Error Count	Volume Label	Free Space	Trans Count	Mnt Cnt
DSA10:	Mounted	0	I64SYS	94.74GB	793	2
DSA11:	Mounted	0	WEB	115.01GB	860	2
DSA12:	Mounted	0	WEBRAM	4.47GB	1	2
JODA\$DKA600:	Mounted	0	JODA_LOC1	72.71GB	1	2
JODA\$DKB200:	Online	0				
JODA\$DKD600:	Mounted	0	JODA_LOC2	66.34GB	1	2
KENOBI\$DKA600:	Mounted	0	KENOBI_LOC1	49.18GB	1	2
KENOBI\$DKD500:	Mounted	0	KENOBI_LOC2	55.96GB	1	2
\$1\$DGA10:	(KENOBI) ShadowSetMember	0	(member of DSA10:)			
\$1\$DGA11:	(KENOBI) ShadowSetMember	0	(member of DSA11:)			
\$1\$DGA12:	(KENOBI) Mounted	0	RETE	96.18GB	1	2
\$1\$DGA13:	(KENOBI) Mounted	0	RESERVE	73.66GB	2	2
\$1\$DGA14:	(KENOBI) Mounted	0	STUDENTI	108.66GB	1	2
\$1\$DGA15:	(KENOBI) Mounted	0	PAGING	89.62GB	6	2
\$1\$DGA16:	(KENOBI) Mounted	0	DOCENTI	22.04GB	1	2
\$1\$DGA18:	(KENOBI) Mounted	0	I64084KIT	12.19GB	1	2
\$1\$DGA20:	(KENOBI) ShadowSetMember	0	(member of DSA10:)			
\$1\$DGA21:	(KENOBI) ShadowSetMember	0	(member of DSA11:)			
\$1\$DGA31:	(KENOBI) Mounted	0	RESCUE	2.70GB	1	2
\$1\$MDA110:	(KENOBI) ShadowSetMember	0	(member of DSA12:)			
\$1\$MDA210:	(JODA) ShadowSetMember	0	(member of DSA12:)			

ITT Giorgi (BR) – OpenVMS I64 MSA2324fc Storage Configuration

Host Name: Kenobi_FGA0
 Host WWNN = 50060B00-0069EFE9
 Host WWPN = 50060B00-0069EFE8
 Profile = OpenVMS
 San View: Controller A Port 1
 San View: Controller B Port 1

Host Name: Kenobi_FGC0
 Host WWNN = 50060B00-0069EF89
 Host WWPN = 50060B00-0069EF88
 Profile = OpenVMS
 San View: Controller A Port 1
 San View: Controller B Port 1

Host Name: Joda_FGA0
 Host WWNN = 50060B00-0069EFE1
 Host WWPN = 50060B00-0069EFE0
 Profile = OpenVMS
 San View: Controller A Port 1
 San View: Controller B Port 1

Host Name: Joda_FGC0
 Host WWNN = 50060B00-0069EEED
 Host WWPN = 50060B00-0069EEEC
 Profile = OpenVMS
 San View: Controller A Port 1
 San View: Controller B Port 1

Host Name: Kenobi_FGB0
 Host WWNN = 50060B00-0069EFEB
 Host WWPN = 50060B00-0069EFEA
 Profile = OpenVMS
 San View: Controller A Port 2
 San View: Controller B Port 2

Host Name: Kenobi_FGD0
 Host WWNN = 50060B00-0069EF8B
 Host WWPN = 50060B00-0069EF8A
 Profile = OpenVMS
 San View: Controller A Port 2
 San View: Controller B Port 2

Host Name: Joda_FGB0
 Host WWNN = 50060B00-0069EFE3
 Host WWPN = 50060B00-0069EFE2
 Profile = OpenVMS
 San View: Controller A Port 2
 San View: Controller B Port 2

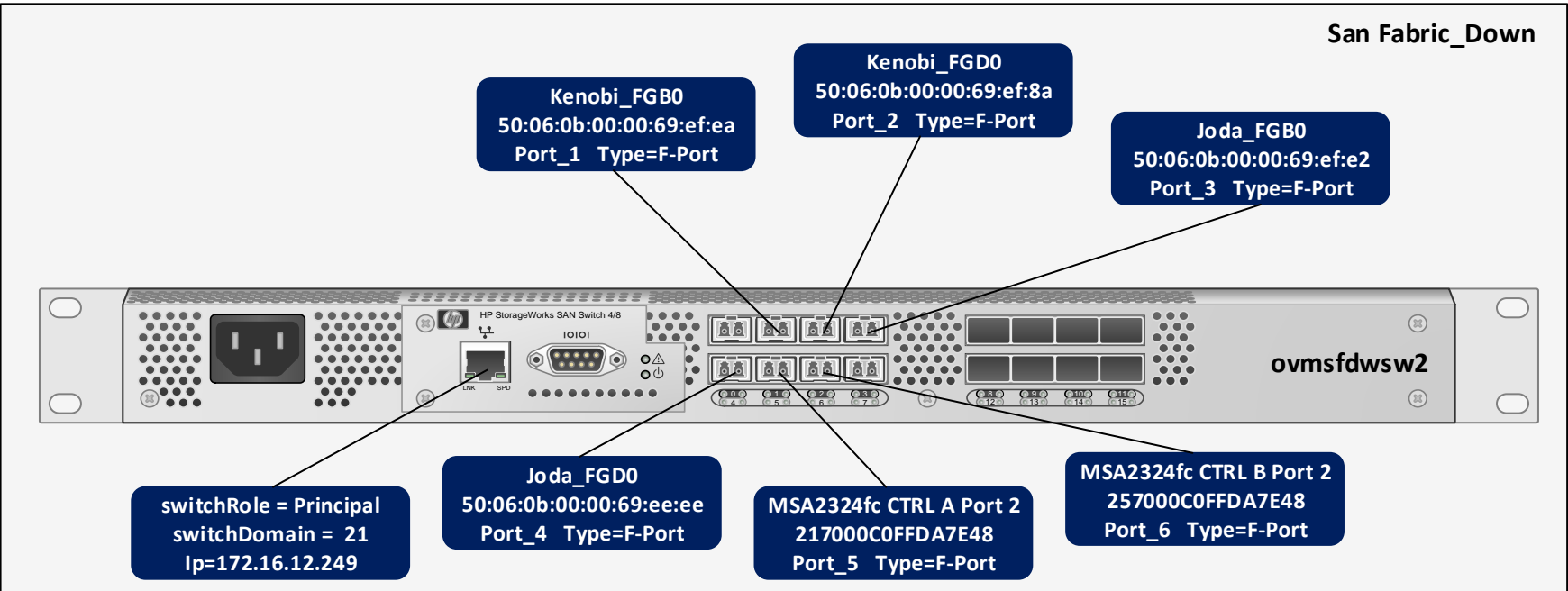
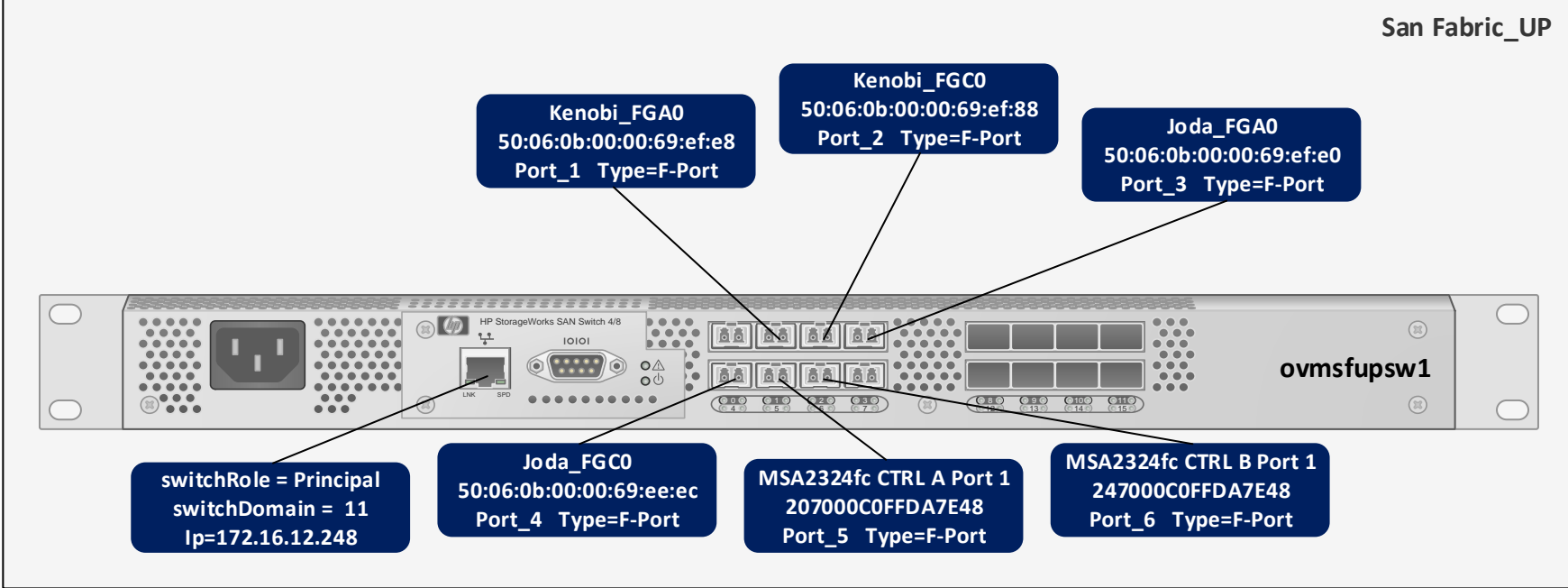
Host Name: Joda_FGD0
 Host WWNN = 50060B00-0069EEEE
 Host WWPN = 50060B00-0069EEEE
 Profile = OpenVMS
 San View: Controller A Port 2
 San View: Controller B Port 2

System Name: ITT_Giorgi
 System Contact: Maurizio De Tommaso (HPE)
 System Location: Laboratorio di Informatica
 Centro Elaborazione Dati
 System Information: Progetto Cluster OpenVMS
 Vendor Name: HP StorageWorks
 Product ID: MSA2324fc
 Product Brand: MSA Storage
 SCSI Vendor ID: HP
 Enclosure Count: 1
 Health: OK

LUN Maps - Ports A1 A2 B1 B2:

Connection	WWPN	Units
Kenobi_FGA0	50060B00-0069EFE8	10, 11, 12, 13, 14, 15, 16, 18 20, 21, 32
Kenobi_FGB0	50060B00-0069EFEA	10, 11, 12, 13, 14, 15, 16, 18 20, 21, 32
Kenobi_FGC0	50060B00-0069EF88	10, 11, 12, 13, 14, 15, 16, 18 20, 21, 32
Kenobi_FGD0	50060B00-0069EF8A	10, 11, 12, 13, 14, 15, 16, 18 20, 21, 32
Joda_FGA0	50060B00-0069EFE0	10, 11, 12, 13, 14, 15, 16, 18 20, 21, 32
Joda_FGB0	50060B00-0069EFE2	10, 11, 12, 13, 14, 15, 16, 18 20, 21, 32
Joda_FGC0	50060B00-0069EEEC	10, 11, 12, 13, 14, 15, 16, 18 20, 21, 32
Joda_FGD0	50060B00-0069EEEE	10, 11, 12, 13, 14, 15, 16, 18 20, 21, 32

ITT Giorgi (BR) – OpenVMS I64 San Switch Connectivity



ITT Giorgi (BR) – OpenVMS I64 San Switch Zone Config

SanSwitchUp - ovmsfupsw1

Defined configuration:

```
cfg: C_prod_OpenVMS_29102019_hpe_mdt
     Z_Joda_FGA0_msa2324fc_ctrl_A1; Z_Joda_FGC0_msa2324fc_ctrl_A1;
     Z_Joda_FGA0_msa2324fc_ctrl_B1; Z_Joda_FGC0_msa2324fc_ctrl_B1;
     Z_Kenobi_FGA0_msa2324fc_ctrl_A1;
     Z_Kenobi_FGC0_msa2324fc_ctrl_A1;
     Z_Kenobi_FGA0_msa2324fc_ctrl_B1;
     Z_Kenobi_FGC0_msa2324fc_ctrl_B1
```

```
alias: A_Joda_FGA0           50:06:0b:00:00:69:ef:e0
alias: A_Joda_FGC0           50:06:0b:00:00:69:ee:c8
alias: A_Kenobi_FGA0        50:06:0b:00:00:69:ef:e8
alias: A_Kenobi_FGC0        50:06:0b:00:00:69:ef:88
alias: A_msa2324fc_ctrl_A1  20:70:00:c0:ff:da:7e:48
alias: A_msa2324fc_ctrl_B1  24:70:00:c0:ff:da:7e:48
```

Effective configuration:

```
cfg: C_prod_OpenVMS_29102019_hpe_mdt
zone: Z_Joda_FGA0_msa2324fc_ctrl_A1
     A_msa2324fc_ctrl_A1; A_Joda_FGA0
zone: Z_Joda_FGA0_msa2324fc_ctrl_B1
     A_msa2324fc_ctrl_B1; A_Joda_FGA0
zone: Z_Joda_FGC0_msa2324fc_ctrl_A1
     A_msa2324fc_ctrl_A1; A_Joda_FGC0
zone: Z_Joda_FGC0_msa2324fc_ctrl_B1
     A_msa2324fc_ctrl_B1; A_Joda_FGC0
zone: Z_Kenobi_FGA0_msa2324fc_ctrl_A1
     A_msa2324fc_ctrl_A1; A_Kenobi_FGA0
zone: Z_Kenobi_FGA0_msa2324fc_ctrl_B1
     A_msa2324fc_ctrl_B1; A_Kenobi_FGA0
zone: Z_Kenobi_FGC0_msa2324fc_ctrl_A1
     A_msa2324fc_ctrl_A1; A_Kenobi_FGC0
zone: Z_Kenobi_FGC0_msa2324fc_ctrl_B1
     A_msa2324fc_ctrl_B1; A_Kenobi_FGC0
```

SanSwitchDw - ovmsfdwsw2

Defined configuration:

```
cfg: C_prod_OpenVMS_29102019_hpe_mdt
     Z_Joda_FGB0_msa2324fc_ctrl_A2; Z_Joda_FGD0_msa2324fc_ctrl_A2;
     Z_Joda_FGB0_msa2324fc_ctrl_B2; Z_Joda_FGD0_msa2324fc_ctrl_B2;
     Z_Kenobi_FGB0_msa2324fc_ctrl_A2;
     Z_Kenobi_FGD0_msa2324fc_ctrl_A2;
     Z_Kenobi_FGB0_msa2324fc_ctrl_B2;
     Z_Kenobi_FGD0_msa2324fc_ctrl_B2
```

```
alias: A_Joda_FGB0           50:06:0b:00:00:69:ef:e2
alias: A_Joda_FGD0           50:06:0b:00:00:69:ee:ee
alias: A_Kenobi_FGB0        50:06:0b:00:00:69:ef:ea
alias: A_Kenobi_FGD0        50:06:0b:00:00:69:ef:8a
alias: A_msa2324fc_ctrl_A2  21:70:00:c0:ff:da:7e:48
alias: A_msa2324fc_ctrl_B2  25:70:00:c0:ff:da:7e:48
```

Effective configuration:

```
cfg: C_prod_OpenVMS_29102019_hpe_mdt
zone: Z_Joda_FGB0_msa2324fc_ctrl_A2
     A_msa2324fc_ctrl_A2; A_Joda_FGB0
zone: Z_Joda_FGB0_msa2324fc_ctrl_B2
     A_msa2324fc_ctrl_B2; A_Joda_FGB0
zone: Z_Joda_FGD0_msa2324fc_ctrl_A2
     A_msa2324fc_ctrl_A2; A_Joda_FGD0
zone: Z_Joda_FGD0_msa2324fc_ctrl_B2
     A_msa2324fc_ctrl_B2; A_Joda_FGD0
zone: Z_Kenobi_FGB0_msa2324fc_ctrl_A2
     A_msa2324fc_ctrl_A2; A_Kenobi_FGB0
zone: Z_Kenobi_FGB0_msa2324fc_ctrl_B2
     A_msa2324fc_ctrl_B2; A_Kenobi_FGB0
zone: Z_Kenobi_FGD0_msa2324fc_ctrl_A2
     A_msa2324fc_ctrl_A2; A_Kenobi_FGD0
zone: Z_Kenobi_FGD0_msa2324fc_ctrl_B2
     A_msa2324fc_ctrl_B2; A_Kenobi_FGD0
```

ITT Giorgi (BR) – OpenVMS I64 Network Switch Connectivity

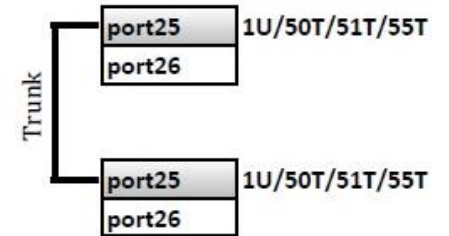


Switch Cisco1 Up Position

P1 vlan50 - Kenobi - EIG0:	P2 vlan 50 - to Gar Network	P3 vlan55 - kenobi EIHO:	P4 vlan1 - kenobi EICO:	P5 rx7640 Mngt
P13 vlan50 - Joda - EIG0:	P14 vlan 51 - Kenobi - EIA0:	P15 vlan55 - Joda EIHO:	P16 vlan1 - Joda EICO:	P17 - SanSwitch up

Switch Cisco2 Down Position

P1 vlan50 - Kenobi - EIIO:	P2 vlan50 - to Gar Network	P3 vlan 55 - kenobi EIJO:	P4 vlan1 - kenobi EIEO:	P5 rx7640 Mngt
P13 vlan50 - Joda - EIIO:	P14 vlan51 - Joda - EIA0:	P15 vlan 55 - Joda EIJO:	P16 vlan1 - Joda EIEO:	P17 - SanSwitch dw



	vlan 50	OpenVMS_External	Tagged
	vlan 51	OpenVMS_Lat_Decnet	Tagged
	vlan 55	OpenVMS_CI	Tagged

SCS protocol is disabled on devices :
LLA0 - LLB0 - EIA0 - EIB0 - EID0 - EIF0

Trunk = Cisco1 P25 - Cisco2 P25
Vlan = 1U/50T/51T/55T

Lan failover device LLA0 EIC0/EIE0 172.16.12.2/3
Lan failover device LLB0 EIG0/EIIO 138.41.20.100 (EIG0 Priority=10)

Cisco1 Firmware 1.3.0.62
Cisco2 Firmware 1.3.0.62

ITT Giorgi (Br) – OpenVMS I64 Kernel Parameters

Sys\$specific parameter file

```
SCSNODE="KENOBI"      ! Node Name "KENOBI"
SCSSYSTEMID=10350    ! DecNet Address 10.110
!
! AGEN$INCLUDE_PARAMS SYS$SYSTEM:MODPARAMS_CLUSTER.DAT
```

Sys\$specific parameter file

```
SCSNODE="JODA"       ! Node Name "JODA"
SCSSYSTEMID=10351    ! DecNet Address 10.111
!
! AGEN$INCLUDE_PARAMS SYS$SYSTEM:MODPARAMS_CLUSTER.DAT
```

Call sys\$common parameter file

Call sys\$common parameter file

```
VAXCLUSTER=2          ! VMScluster systems
VOTES=1               ! Only one vote per system in cluster
EXPECTED_VOTES=3      ! Expected votes to run cluster if one node fails
DISK_QUORUM="$1$DGA13" ! Quorum disk
QDSKVOTES=1           ! Disk Quorum vote 1
NISCS_LOAD_PEA0=1     ! VMScluster LAVC
MSCP_LOAD=1           ! Load MSCP server disk via LAN
MSCP_SERVE_ALL=1      ! Serve all disk in LAVC cluster
NISCS_PORT_SERV=4     ! Enables data compression on all virtual channels
ALLOCLASS=1           ! Allocation class for shared disks
INTERCONNECT="NI"     ! VMScluster LAVC
BOOTNODE="Y"          ! Acts as boot node
DEVICE_NAMING=1       ! Use new port allocation class
CLUSTER_CREDITS=64    ! VMS$VAXcluster to VMS$VAXcluster SYSAP connection
SHADOW_MBR_TMO=8      ! For DR configuration
VHPT_SIZE=0           ! Temp workaround to avoid KTHD_INCONSTATE Crash
WINDOW_SYSTEM=1       ! Load Decwindows driver
PAGEFILE=0            ! No modification at Pagefile size during Autogen
SWAPFILE=0            ! No modification at Swapfile size during Autogen
SHADOWING=2           ! Enable Shadowing Phase II
SHADOW_SYS_DISK=1     ! System Disk will be Shadowed
SHADOW_SYS_UNIT=10    ! Virtual Unit Number of System Disk DSA0:
ACP_REBLDSYSD=0       ! No system disk rebuild at startup
AUTO_DLIGHT_SAV=1     ! Automatically Daylight Saving Time in OpenVMS env.
MIN_GBLSECTIONS=3500  ! Layered Requirements and System Tuning
MIN_CHANNELCNT=32768  ! OpenSource Requirements and System Tuning
MIN_NPAGEDYN=104857600 ! System Tuning (100 MB) 26.08.2018 MDT
MIN_LOCKIDTBL = 131072 ! System Tuning MDT 22-Sep-2015
MIN_MAXBUF = 16384     ! System Tuning MDT 22-Sep-2015
MIN_LNMSHASHTBL = 1024 ! System Tuning MDT 22-Feb-2017 (Autogen Feedback)
MIN_ACP_DINDXCACHE=1404 ! Samba and ACP Cache Tuning 05-Nov-2015 MDT
MIN_ACP_SYSACC=936     ! Samba and ACP Cache Tuning 05-Nov-2015 MDT
MIN_ACP_DIRCACHE=5622 ! Samba and ACP Cache Tuning 05-Nov-2015 MDT
MIN_ACP_HDRCACHE=5622 ! Samba and ACP Cache Tuning 05-Nov-2015 MDT
MIN_ACP_FIDCACHE=384  ! Samba and ACP Cache Tuning 05-Nov-2015 MDT
MIN_ACP_EXTCACHE=256  ! Samba and ACP Cache Tuning 05-Nov-2015 MDT
MIN_ACP_EXTLIMIT=400  ! Samba and ACP Cache Tuning 05-Nov-2015 MDT
ADD_GH_EXEC_DATA=864  ! %SYSBOOT-W-EXEC_DATA_SMALL raising GH_EXEC_DATA to 864 pages
ADD_GH_EXEC_CODE=1032 ! %SYSBOOT-W-EXEC_CODE_SMALL raising GH_EXEC_CODE to 1032 pages
```

ITT Giorgi (Br) – OpenVMS I64 Software Licenses

Product ID	Product	Producer	Units	Rating PCL	Activ	Version	Release	Termination
ABS-SERVER-I64		HP	16	1	0	0.0	(none)	(none)
BASIC		HP	50	0	1	0.0	(none)	(none)
C		HP	50	0	1	0.0	(none)	(none)
COBOL		HP	50	0	1	0.0	(none)	(none)
CXX-V		HP	50	0	1	0.0	(none)	(none)
DFG		HP	16	1	0	0.0	(none)	(none)
DVNETEND		HP	16	1	0	0.0	(none)	(none)
DVNETEXT		HP	16	1	0	0.0	(none)	(none)
DVNETRTG		HP	16	1	0	0.0	(none)	(none)
FORMS		HP	16	1	0	0.0	(none)	(none)
FORTRAN		HP	50	0	1	0.0	(none)	(none)
GKS		HP	16	1	0	0.0	(none)	(none)
NOTES		HP	16	1	0	0.0	(none)	(none)
OPENVMS-I64-HAOE		HP	16	1	0	0.0	(none)	(none)
PASCAL		HP	50	0	1	0.0	(none)	(none)
PHIGS		HP	16	1	0	0.0	(none)	(none)
VAXSET		HP	16	1	0	0.0	(none)	(none)

HPE OpenVMS Educational Program

ITT Giorgi (Br) – OpenVMS I64 Software Products

HP I64VMS VMS	V8.4	Oper System	Installed
HP I64VMS OPENVMS	V8.4	Platform	Installed
HP DWMOTIF	V1.7	Full LP	Installed
HP DWMOTIF_SUPPORT	V8.4	Full LP	Installed
HP AVAIL_MAN_BASE	V8.4	Full LP	Installed
HP AVAIL_MAN_ANA_SRVR	V3.1	Full LP	Installed
HP AVAIL_MAN_COL	V3.1	Full LP	Installed
HP CDSA	V2.4-322	Full LP	Installed
HP DECNET_PHASE_IV	V8.4	Full LP	Installed
HP TCPIP	V5.7ECO5	Full LP	Installed
HP KERBEROS	V3.2-228	Full LP	Installed
HP I64VMS SSL1	V1.0-2R	Full LP	Installed
HP I64VMS SSL	V1.4-503	Full LP	Installed
HP TDC_RT	V2.3-20	Full LP	Installed
HP VMS T4	V4.3-1	Full LP	Installed
HP DCPS	V2.7A	Full LP	Installed
HP I64VMS SAMBA	V1.2-ECO1	Full LP	Installed
HP DFO Disk File Optimizer	V3.1	Full LP	Installed
HP I64 HPBINARYCHECKER	V1.2	Full LP	Installed
HP I64 WBEMCIM	V3.0-3A	Full LP	Installed
HP I64 WBEMPROVIDERS	V2.2-5	Full LP	Installed
HP ABS	V4.5	Full LP	Installed
HP ROBOT	V1.8B	Full LP	Installed
HP I64VMS SMH	V2.2-3	Full LP	Installed
DFU	V3.2	Full LP	Installed
DISKBLOCK	V6.2	Full LP	Installed
OSC	V3.4	Full LP	Installed
HP IA64_NOTES	V2.5	Full LP	Installed

HP DECset Environment Manager	V1.8-ECO3
HP Code Management System	V4.7-0
HP Digital Test Manager	V4.4-1
HP Language-Sensitive Editor	V5.2-0
HP Module Management System	V3.9-1
HP Perfor. and Coverage Analyzer	V5.0-3
HP Source Code Analyzer	V5.1-2

HP BASIC	V1.7	Full LP	Installed
HP I64VMS BLISSI64	V1.12-72	Full LP	Installed
HP C	V7.3-20	Full LP	Installed
HP C++	V7.4-4	Full LP	Installed
HP COBOL	V3.0-6	Full LP	Installed
HP FORMSI	V4.0	Full LP	Installed
HP FORTRAN	V8.2-0	Full LP	Installed
HP PASCAL	V6.1	Full LP	Installed
HP Macro	V8.4	Full LP	Installed
HP I64VMS MSAI	V3.1	Full LP	Installed

HP I64VMS VMS84I_PCSI	V4.0
HP I64VMS VMS84I_UPDATE	V14.0
HP I64VMS VMS84I_FIBRE_SCSI	V9.0
HP I64VMS VMS84I_SYS	V7.0
HP I64VMS VMS84I_CLIUTL	V1.0
HP I64VMS VMS84I_ENCRYPT	V2.0
HP I64VMS VMS84I_LDAP	V4.0
HP I64VMS VMS84I_ACMELDAP	V3.0
HP I64VMS VMS84I_NETACP	V1.0
HP I64VMS VMS84I_IA64_TIE	V1.0
HP I64VMS TCPIP_CVE_PAT	V5.7-ECO5
HP I64VMS TELNET_PAT	V5.7-13ECO5A
HP CSWS MOD_SSL.EXE	V102R_IA64
TOMCAT_CUMULATIVE_SECURITY_PATCH_MARCH16	

ITT Giorgi (Br) – OpenVMS I64 OpenSource Software

HP CSWS	V2.2-1	Full LP Installed
HP CSWS_JAVA	V7.0-29	Full LP Installed
HP CSWS_PERL	V2.1 UPD1	Full LP Installed
HP CSWS_PHP	V5.2-17	Full LP Installed
HP PERL	V5.8-6	Full LP Installed
HP CSWB	V1.1-12	Full LP Installed
HP XML_C	V3.0	Full LP Installed
HP I64VMS JAVA60	V1.6-6	Full LP Installed
HP I64VMS JAVA80	V1.8-0	Full LP Installed
HP WSIT	V3.4-1	Full LP Installed
HP AXIS2	V1.1-1	Full LP Installed
HP GNV	V3.0-1	Full LP Installed
GNV I64VMS BASH	V4.3-30	Full LP Installed
HP IDESERVER	V7.0	Full LP Installed
HP I64VMS SSL1	V1.0-2NA	Full LP Installed
HP I64VMS SSL	V1.4-503	Full LP Installed
HP I64VMS SAMBA	V1.2-ECO1	Full LP Installed
HP KERBEROS	V3.2-228	Full LP Installed
HP CDSA	V2.4-322	Full LP Installed

* Supported by VMS Engineering



JFP PYTHON279	V1.3-0	Full LP Installed
JFP LIBXSLT	V1.1-28	Full LP Installed
JFP LIBXML2	V2.9-1	Full LP Installed
JFP GDCHART	V0.11-4	Full LP Installed
JFP LIBGD	V2.0-35	Full LP Installed
JFP LIBIMAGING	V1.1-6	Full LP Installed
JFP ZLIB	V1.2-8	Full LP Installed
JFP LIBPNG	V1.5-13	Full LP Installed
JFP LIBJPEG	V8.4	Full LP Installed
JFP LIBBZ2	V1.0-6	Full LP Installed
JFP FREETYPE	V2.3-7	Full LP Installed
JFP I64VMS PCCTS	V1.33-13	Full LP Installed
JFP I64VMS SQLITE3	V7.17-1	Full LP Installed
JFP MYSQL051	V46.3-0	Full LP Installed
FREE I64VMS JNA	V3.2-7	Full LP Installed
FREE I64VMS LIBFFI	V3.0-9	Full LP Installed

* JFP kits are supported by Jean-François Piéronne

PHPBB2	V2.0.22	Full Installed
PHPBB3	V3.0.10	Full Installed
Joomla	V2.5.1	Full Installed
IlohaMail	V0814	Full Installed
Pebble	V2.6.4	Full Installed
PHPMYADMIN	V2.11.9.6	Full Installed
WASD	V11.2.0	Full Installed
Soymail	V1.8.3	Full Installed
ZIP	V3.0	Full Installed
UNZIP	V6.0	Full Installed

* WASD and Soymail are supported by Mark Daniel

ITT Giorgi (Br) – OpenVMS I64 Web Services

LLA0:	kenobi.giorgi.edu	172.16.12.2	decnet = 10.110	Lat = kenobi, galaxy
LLA0:	joda.giorgi.edu	172.16.12.3	decnet = 10.111	Lat = joda, galaxy
	www	CNAME	galaxy.giorgi.edu	
	POP3	CNAME	galaxy.giorgi.edu	
	SMTP	CNAME	galaxy.giorgi.edu	
	IMAP4	CNAME	galaxy.giorgi.edu	
	mysql.giorgi.edu	172.16.12.8	FailSafe IP for Open Source applications, generally on kenobi	
	forum.giorgi.edu	CNAME	mysql.giorgi.edu	
	cms.giorgi.edu	CNAME	mysql.giorgi.edu	
	webmail.giorgi.edu	CNAME	mysql.giorgi.edu	
	phpmyadmin.giorgi.edu	CNAME	mysql.giorgi.edu	
LLA0:	galaxy.giorgi.edu	kenobi or joda	LoadBroker / Metric IP Automatic Load Balancing	
<i>Network</i>	172.16.12.x			
<i>Netmask</i>	255.255.0.0			
<i>Gateway</i>	172.16.12.254			
<i>Dns</i>	172.16.12.2/172.16.12.3 (OpenVMS)			

Insight Management Agents	https://kenobi.giorgi.edu:2381
Insight Management Agents	https://joda.giorgi.edu:2381
Apache Web Server	http://www.giorgi.edu:80
WASD	http://galaxy.giorgi.edu:81
TomCat Application Server	http://www.giorgi.edu:8080
Pebble	http://www.giorgi.edu:8080/pebble
PhpMyAdmin	https://mysql.giorgi.edu/phpmyadmin/index.php
PHPBB2	http://forum.giorgi.edu/phpbb2/index.php
PHPBB3	http://forum.giorgi.edu/phpbb3/index.php
Joomla	http://cms.giorgi.edu/joomla/index.php
IlohaMail	http://webmail.giorgi.edu/ilohamail/ilohamail/source/index.php