COMVERSE UNIVERSITY

Storage Data Point (SDP) – Hardware Foundation

Lesson Objectives

By the end of this lesson you will be able to:

- Provide a description of SDP hardware components
- Explain the SDP storage concept
- Monitor hardware connectivity

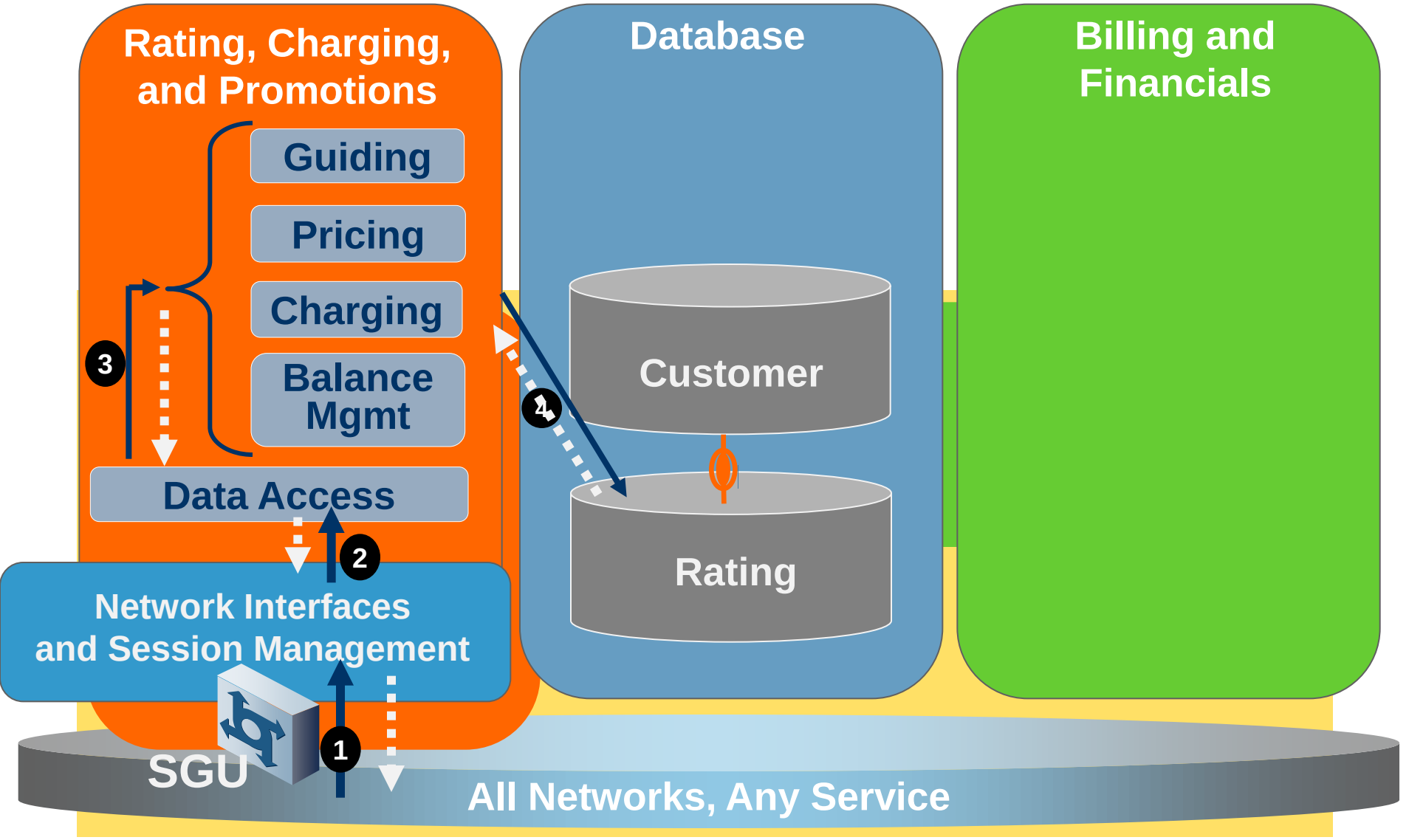
Agenda

- **Introduction to Comverse ONE SDP**
- **SDP Hardware Foundations**
- **Connectivity**
- **SDP Storage Concept**

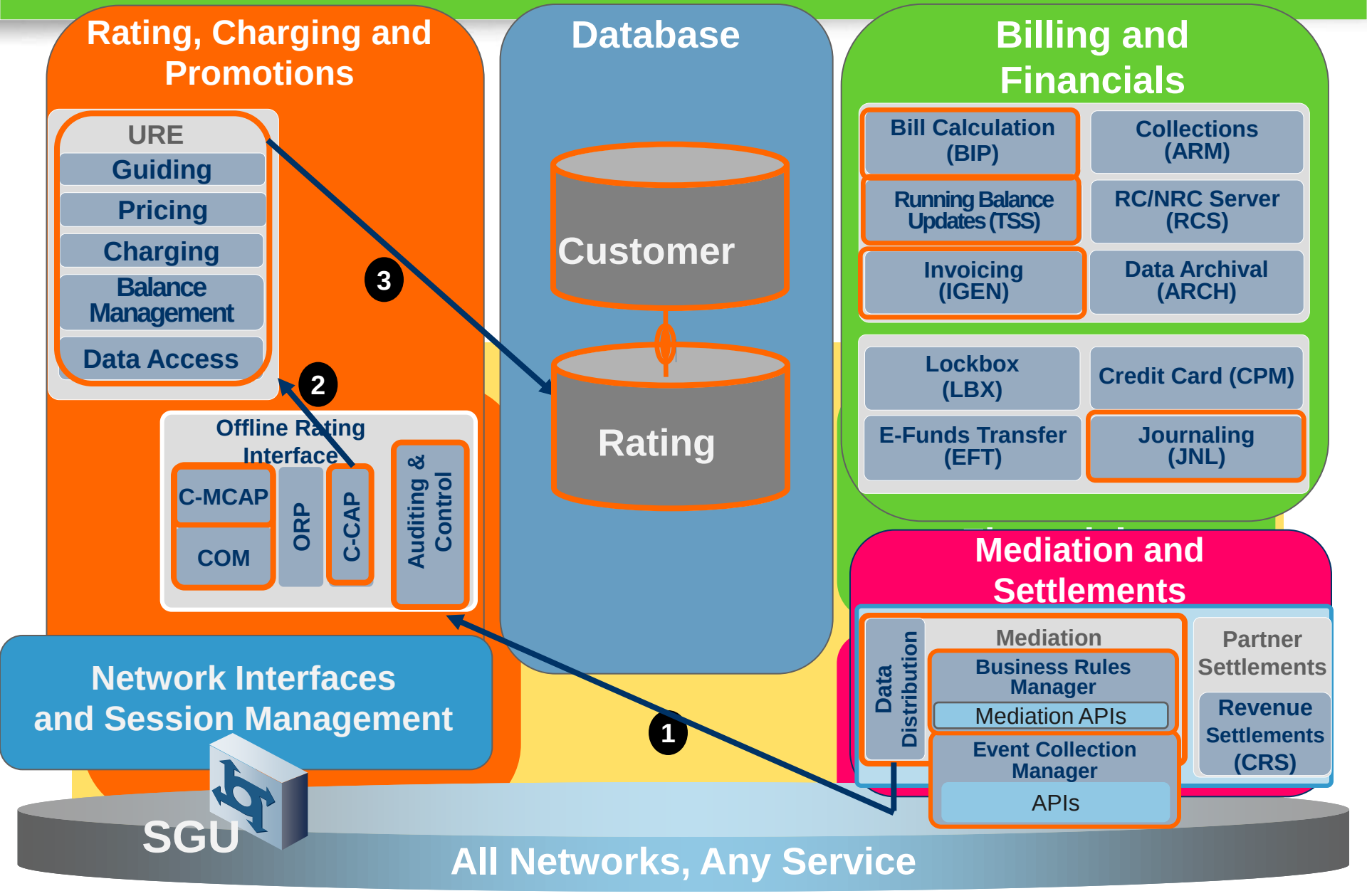
The Service Data Point (SDP)

- The SDP is a powerful database server system used in the rating process.
- The SDP uses advanced database technology and state-of-the-art architecture to deliver the best possible mass data server for IN services.
- It provides high-capacity storage, is fully redundant, and can be scaled to support the most demanding networks and configurations.

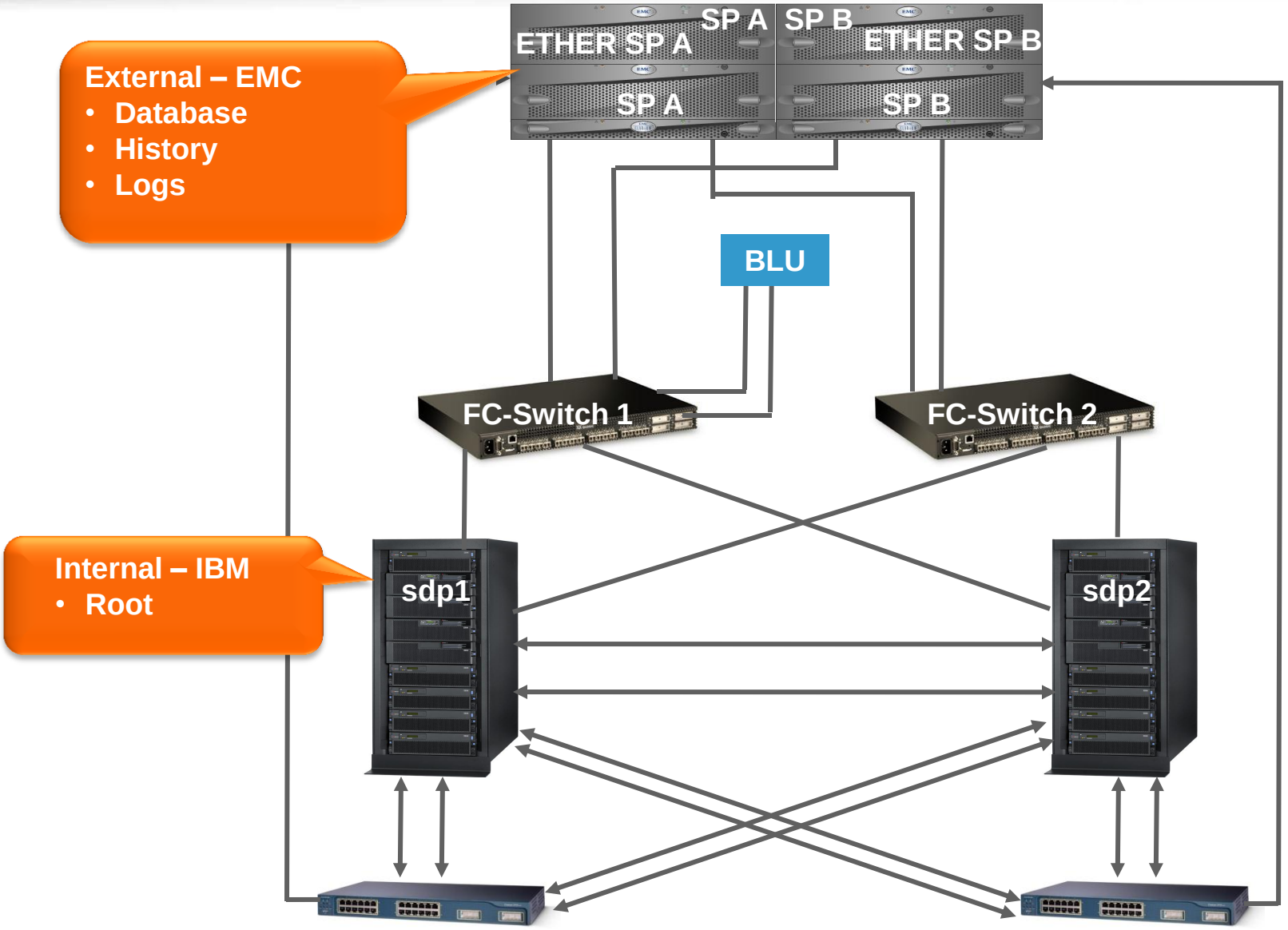
SDP in Online Postpaid – Basic Flow



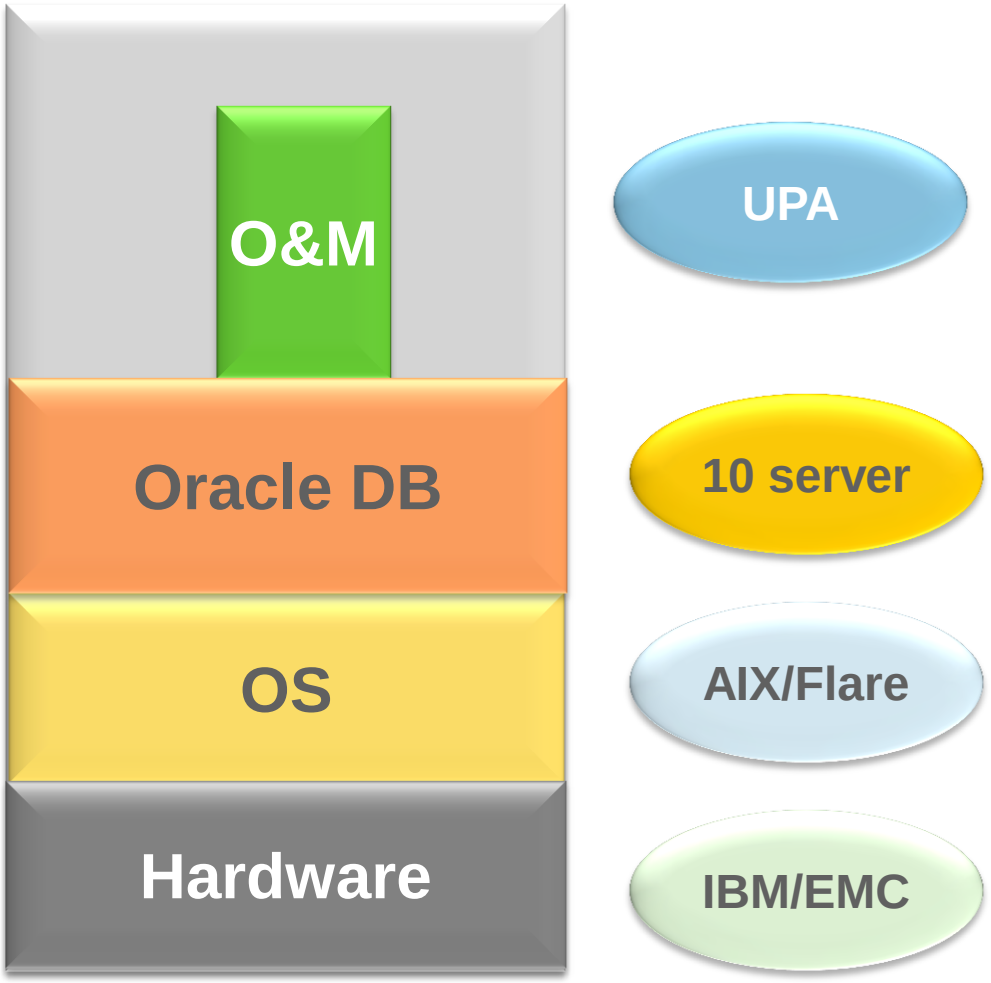
SDP in Offline Postpaid – Basic Flow



SDP – Storage Concept and Interfaces



SDP Logical Architecture



Agenda

- Introduction to Comverse ONE SDP
- **SDP Hardware Foundations**
- Connectivity
- SDP Storage Concept

IBM Platforms

Low End

High End

Low-End and High-End Structure

	Low End	High End
IBM Server Type	IBM P52S	IBM P570
EMC Type	CX3-f20 / CX40-120	CX3-f40 / CX4-480
Fiber Channel	No need	Qlogic 5602
Backup Unit	BDU (Backup Device Unit)	BLU (Backup Library Unit)

The IBM p-52A (Low-End)

- Performance and Capacity:
  - 1.5M BHCE
  - 4.5M subscribers, or 100M vouchers with up to 1.5M subscribers
  - 10M CUG members and 108M IMSI/MIN users
  - 30 days of call history records
- Availability:
  - No single points of failure
  - Redundant paths to/from Hosts to HSBN, Admin LAN and SAN
  - Redundant paths from/to Hosts, FC switches, SPs, DAEs and Disk
  - Automatic switchover to redundant components

The IBM p-570 (High-End)

- Performance and Capacity:
  - 6M BHCE
  - 18M subscribers, or 500M vouchers with up to 12M subscribers
  - 10M CUG members and 108M IMSI/MIN users
  - 30 days of call history records
- Availability:
  - No single points of failure
  - Redundant paths to/from Hosts to HSBN, Admin LAN and SAN
  - Redundant paths from/to Hosts, FC switches, SPs, DAEs and Disks
  - Automatic switchover to redundant components

EMC CLARiiON CX Family Introduction (1)

The CX storage systems are made up of the following modular components:

Disk Array Enclosure (DAE)

3U DAE

3U DAE

3U DAE_OS

Dual Standby Power Supplies (SPS)

1U SPS

Storage Processor Enclosure (SPE)

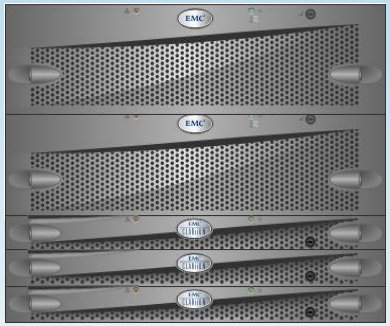
1U SPE

AC Powered System

EMC CLARiiON CX Family Introduction (2)

- CX architecture is based on PCIe I/O interconnect technology
- System supports both Direct Attached (DAS) and Storage Area Network (SAN) environments through FC 4 Gb/s connections

- Fully-redundant architecture:
  - Dual storage processors
  - Dual I/O paths with nondisruptive failover
  - Power, cooling, data paths, standby power supplies



- RAID levels: 0, 1, 10, 3, 5 individual disk support and global hot spare
- Hot swappable storage processors with up to 8GB of memory
- 5-480 drives
- Point-to-point connection to drives
- Online upgrade capability
- AC and DC power options, NEBS Compliant

CX3 Hardware Specification – Summary Table

Feature	CX3-20f (Low-End)	CX3-40f (High-End)
Processors per SP	1 x 2.8GHz	2 x 2.8GHz
Physical Memory per SP	2GB	4GB
Max Cache and Max Write Cache	1053MB 1053MB	3016MB 2500MB
Front-End Ports per SP	6 x 4Gb/s FC	4 x 4Gb/s FC
Back-End Ports per SP	1 x 4Gb/s FC	4 x 4Gb/s FC
Max. Drives per System	120	240

CX4 Hardware Specification – Summary Table

Feature	CX4-120 (Low-End)	CX4-480 (High-End)
Processors per SP	1 x Dual Core 1.2GHz	1 x Dual Core 2.2GHz
Physical Memory per SP	3GB	8GB
Max Write Cache	600MB	4.5GB
Front-End Ports per SP	Up to six	Up to eight
Back-End Ports per SP	1 x 4Gb/s FC	2 x 4Gb/s FC
Max Drives per System	120	480

Introduction to Fiber Channel Switch (in High-End Deployments)

- Qlogic SANbox 5602
- Stackable Fiber Channel Switch
- Eight 4 Gb device ports
- Expansion to sixteen 4 Gb device ports
- Four 10-Gbps full-duplex ports
- Hot-swap dual power supply
- 1U height

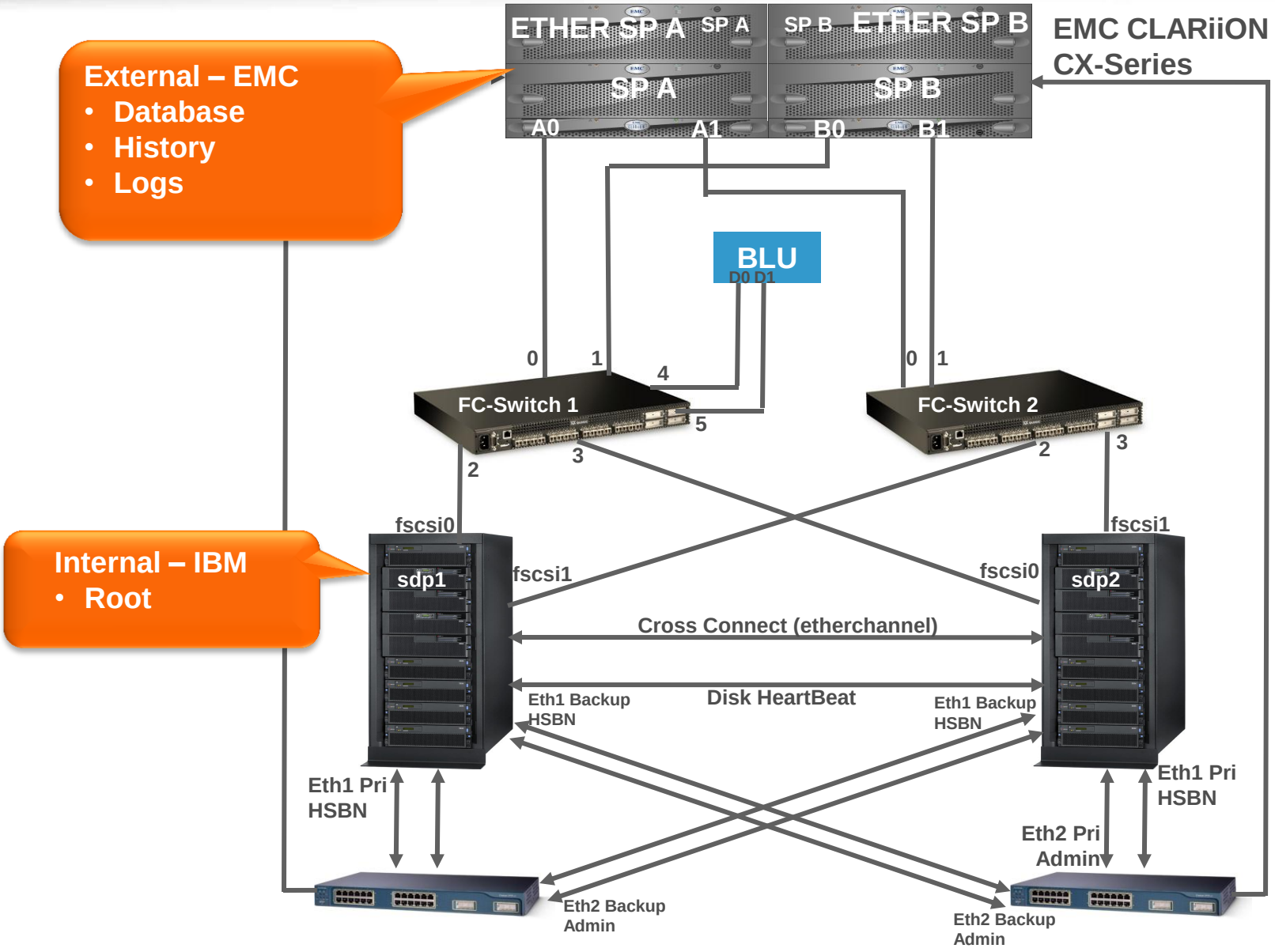
ADIC Specification (in High-End Deployments)

Feature	Specification
Capacity	200 GB, native per cartridge (400 Compressed) 4.8TB for 24 cartridges (Native)
Transfer Rate	252 Gb per hour, native/uncompressed for two drives 35 MB/s per drive
Form Factor	4U, 19” rack mount
LTO-2 Drives	Up to 2 x LTO-2 IBM Ultrium 2 Ultra160 drives
Cleaning Cartridge	1 x cleaning cartridge in slot 23
Cartridges	Up to 24 (Comverse uses 22) cartridges and mail slot
SCSI Interface	SCSI Ultra160 Wide Low Voltage Differential (LVD) SCSI connection: 68-pin
LAN	RJ-45 from RMU module
Serial	Bi-directional RS-232 port (D-type 9 pin) – Library serial
RMU Serial	RS-232 port (D-type 9 pin) – RMU serial

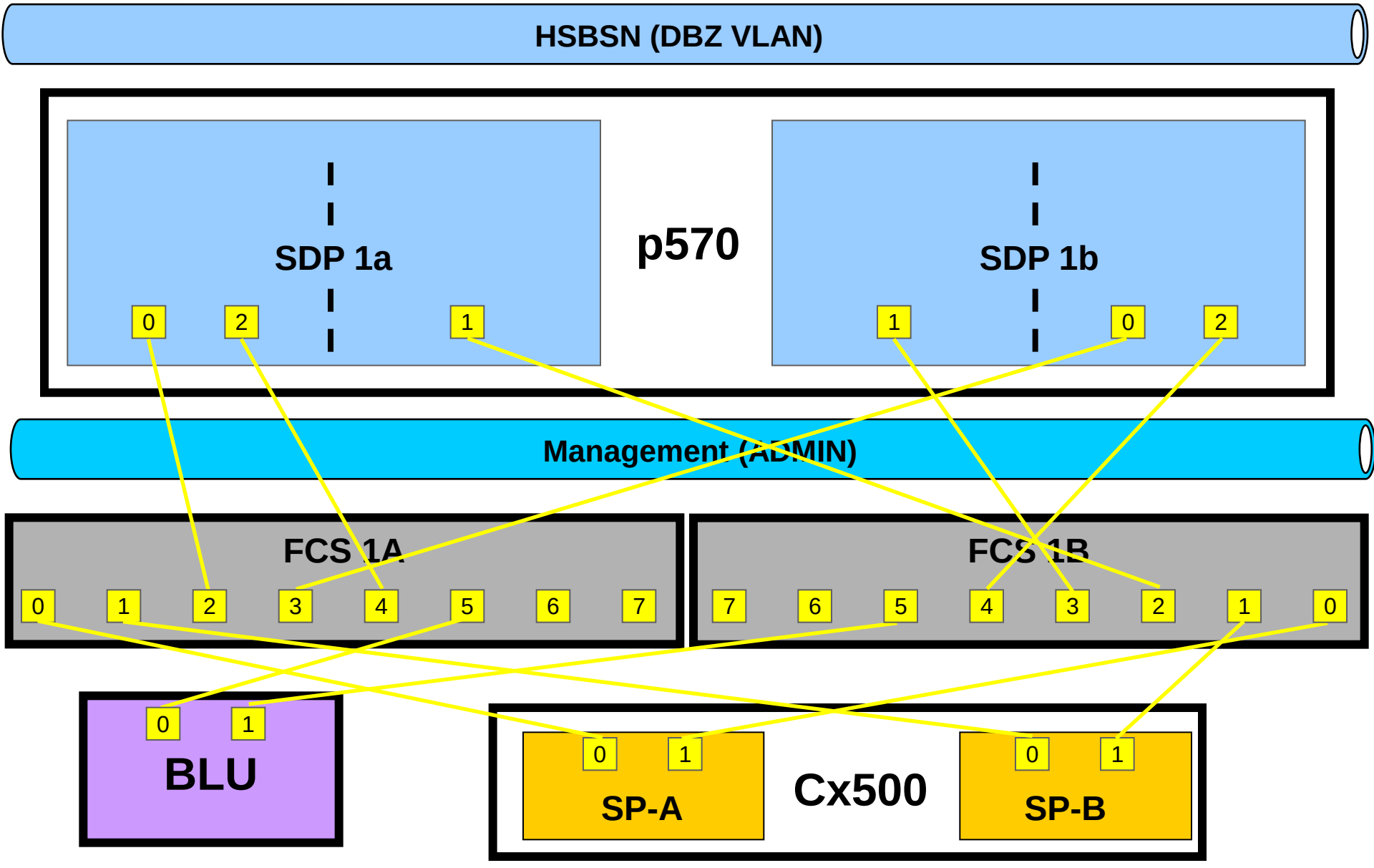
Agenda

- Introduction to Comverse ONE SDP
- SDP Hardware Foundations
- **Connectivity**
- SDP Storage Concept

SDP – High-End Connectivity

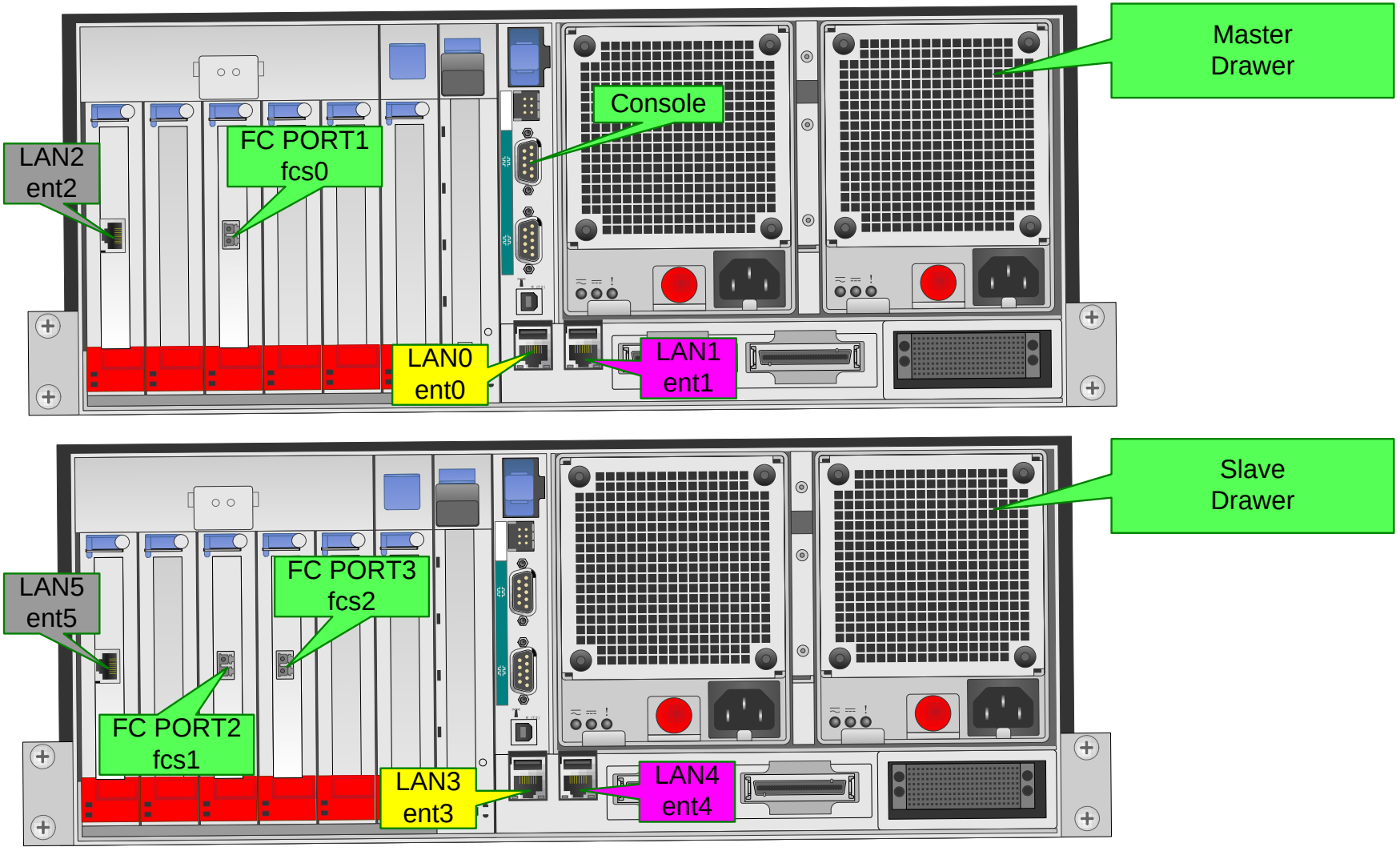


SDP High-End Architecture – Fiber Channels

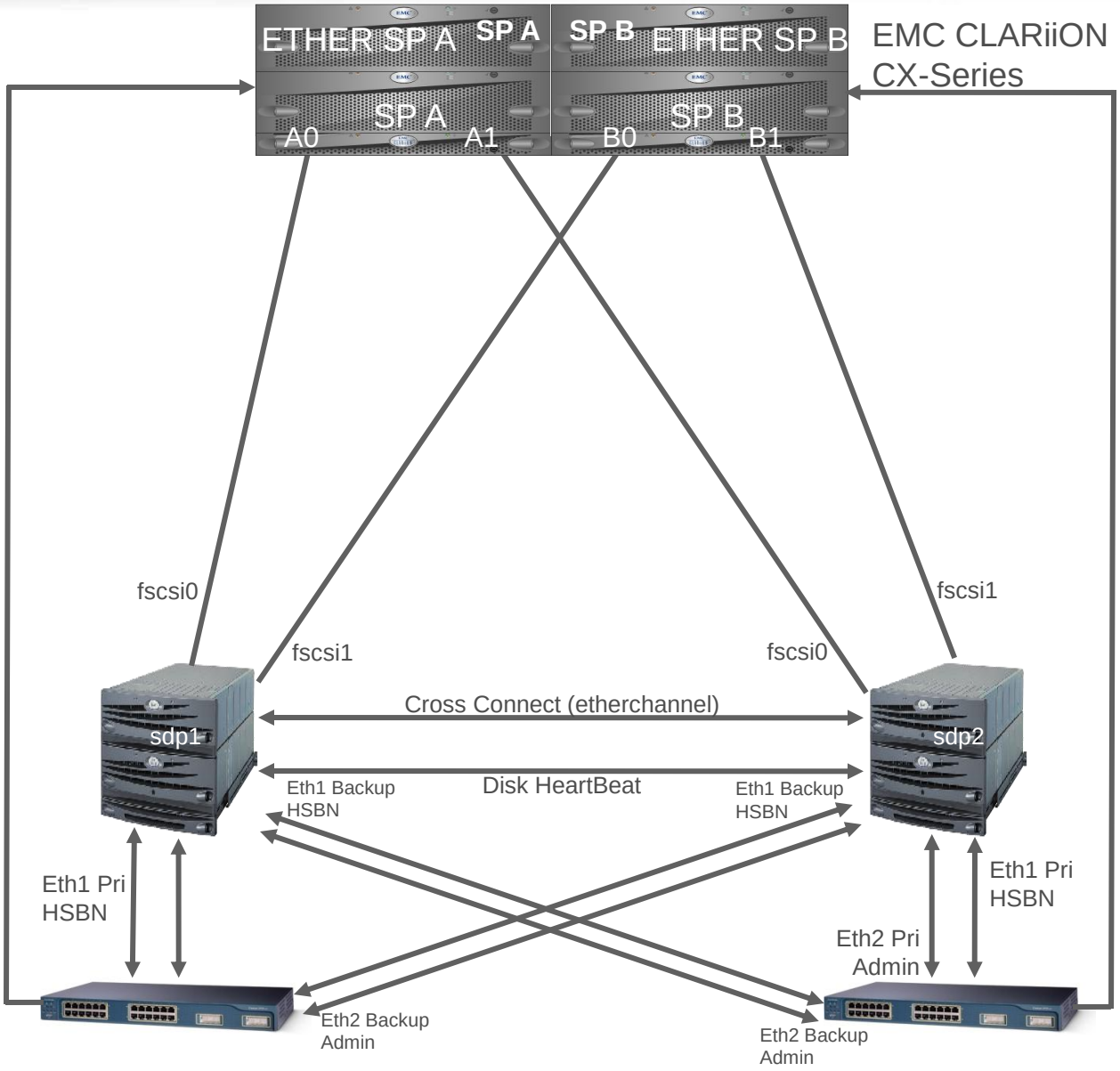


IBM P5 9117-570 (High-End) Rear View

P5 9117-570
I/O Port Assignment

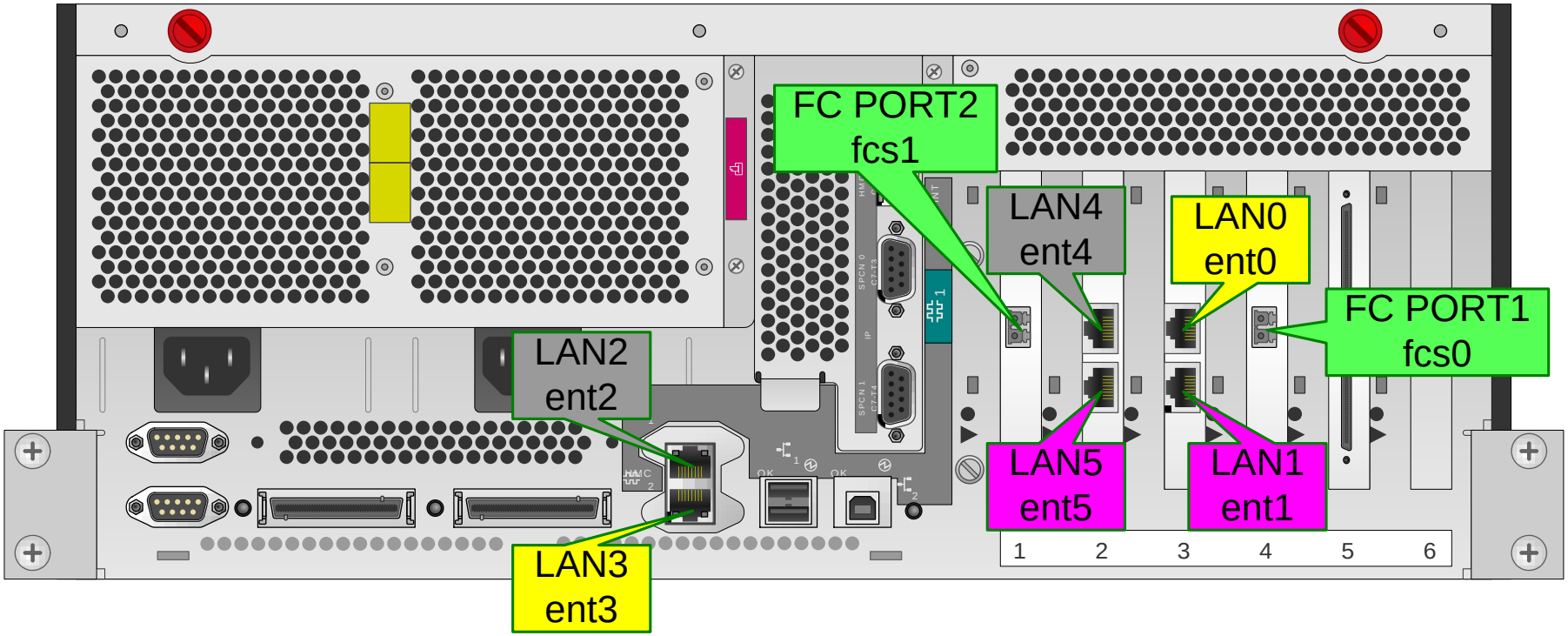


SDP – Low-End Connectivity Structure

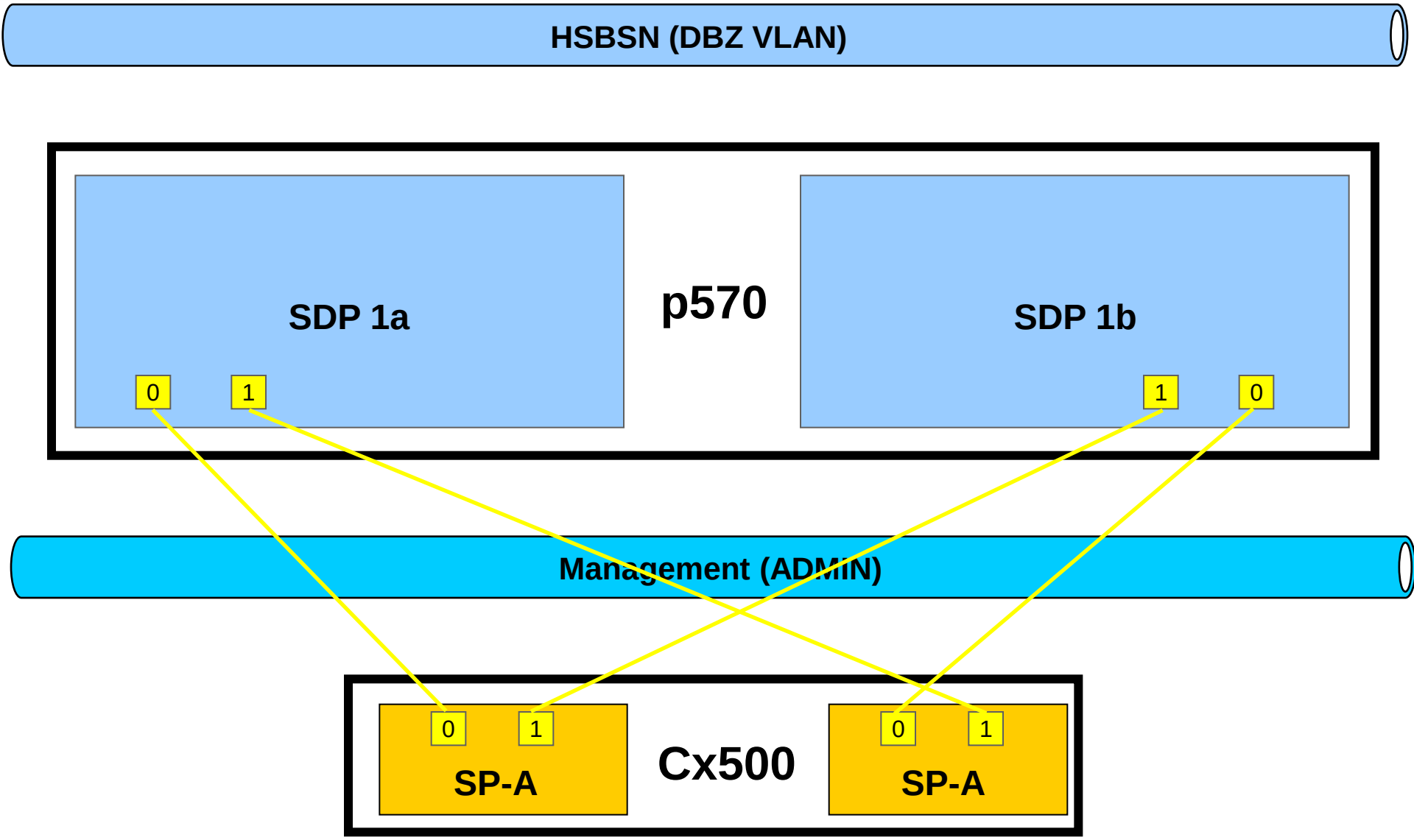


IBM P5 9131-52A (Low-End) Rear View

P5 9131-52A
I/O Port Assignment



SDP Low-End Architecture – FS Channels



Agenda

- Introduction to Comverse ONE SDP
- SDP Hardware Foundations
- Connectivity
- **SDP Storage Concept**

IBM Storage Concept

- Logical Volume Storage concept
  - Physical volumes
  - Volume groups
- PowerPath Concept

Note: The power path is part of IBM

Volume Group

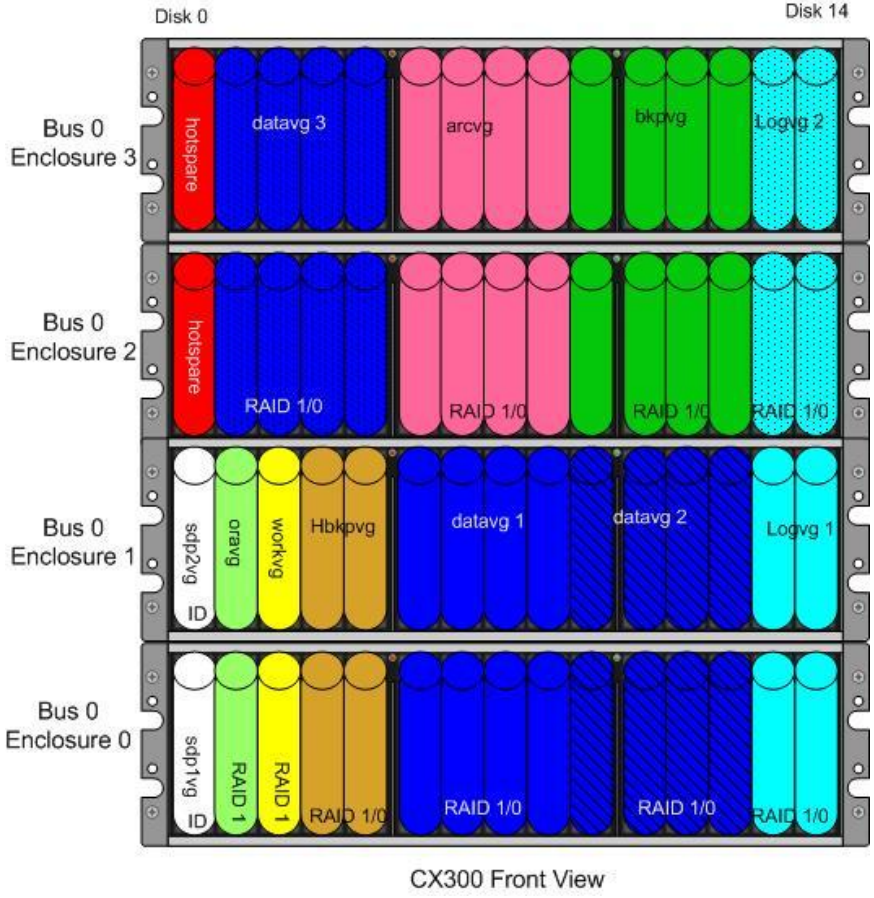
Storage

Lists all Volume Groups known to the system.

```
sdp1:/#lsvg
rootvg
arcvg
logvg
bkpvg
datavg
Hdatavg
Hbkpvg
oravg
workvg
sdp1vg
sdp2vg
```

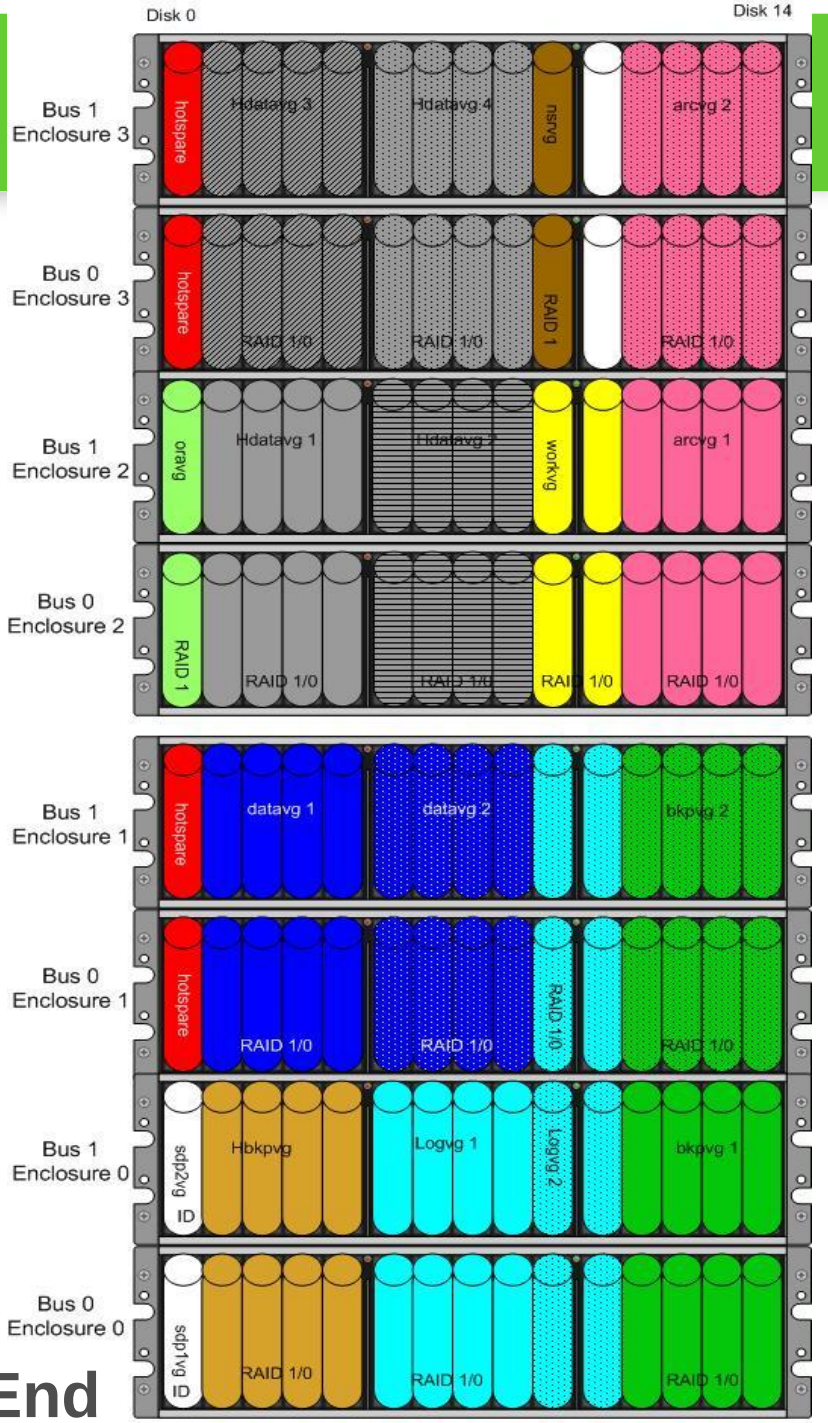
Storage – EMC Disk Layout

Low-End



CX300 Front View

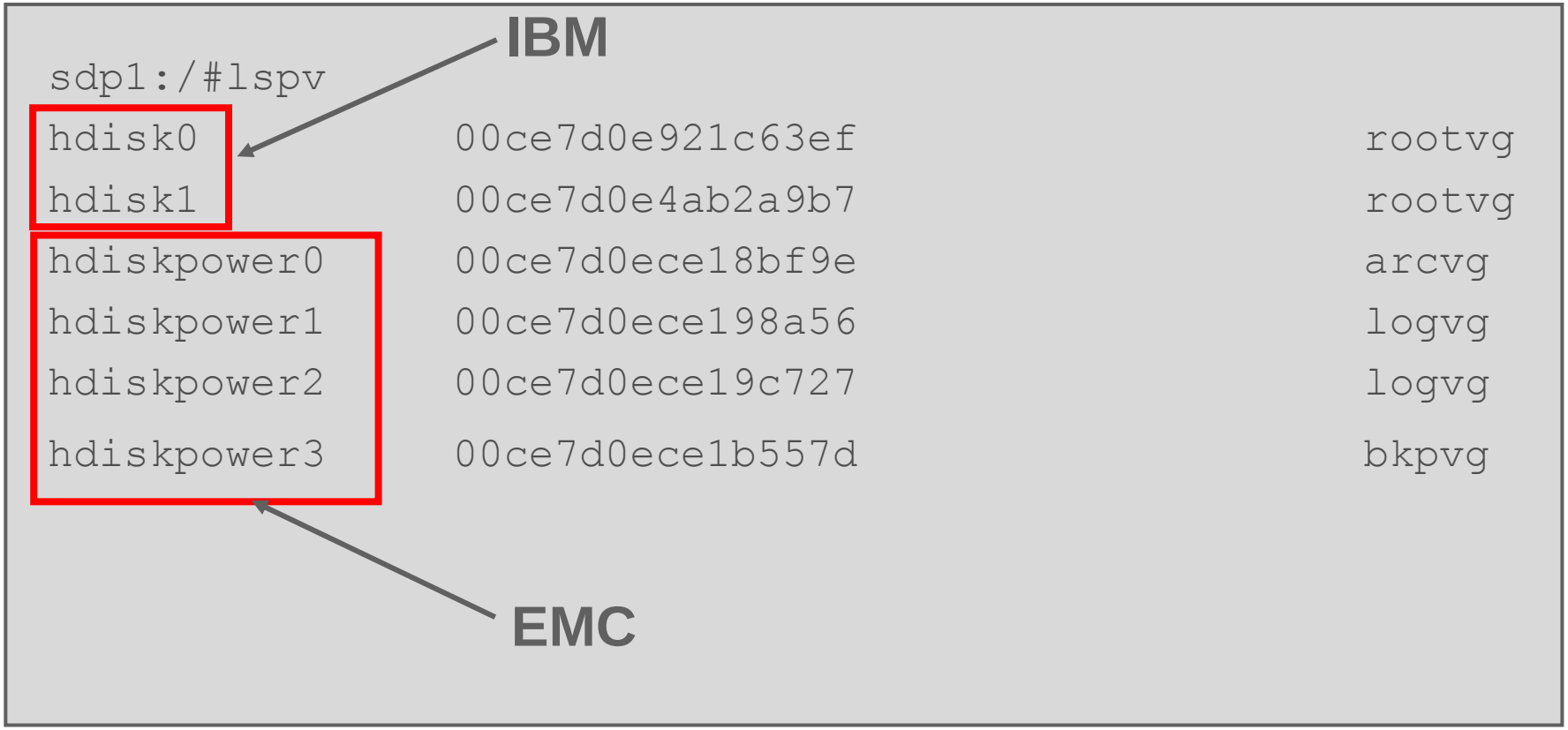
High-End



lspv Command

Storage

Lists physical volumes in the system



PowerPath Concept

Utility resides in the IBM:

- Provides enhanced performance and application availability
- Used to select alternate paths for the data to be routed through:
  - Multiple path I/O capabilities
  - Automatic load balancing
  - Path failover functions
- **powermt** is a utility used to configure and monitor PowerPath.

Monitoring High-End SDP Connectivity (1)

- Command: **powermt display**
- Displays all the FC Controllers controlled on this node

```
sdp1:/#powermt display
Symmetrix logical device count=0
CLARiiON logical device count=17
Hitachi logical device count=0
Invista logical device count=0
HP xp logical device count=0
Ess logical device count=0
HP HSx logical device count=0
================================================================================
----- Host Bus Adapters ---------  ------ I/O Paths -----  ------ Stats ------
###  HW Path                       Summary   Total   Dead  IO/Sec Q-IOs Errors
================================================================================
   0 fscsi0                        optimal      34      0      -     0      0
   1 fscsi1                        optimal      34      0      -     0      0
```

Monitoring High-End SDP Connectivity (2)

- Command: **powermt display dev=all**
- Displays all the Storage End Points (LUNs) managed by PowerPath and the status of each Path to LUN

```
sdp1:/#powermt display dev=all
Pseudo name=hdiskpower9
CLARiiON ID=CK200080200263 [oracle]
Logical device ID=60060160D3221B00049FE7F859E9DC11 [LUN 51]
state=alive; policy=CLAROpt; priority=0; queued-IOs=0
Owner: default=SP B, current=SP A
==============================================================================
---------------- Host ---------------   - Stor -   -- I/O Path -  -- Stats ---
###  HW Path                I/O Paths    Interf.   Mode    State  Q-IOs Errors
==============================================================================
   0 fscsi0                   hdisk24    SP B0     active  alive      0      0
   1 fscsi1                   hdisk41    SP A1     active  alive      0      0
   1 fscsi1                   hdisk58    SP B1     active  alive      0      0
   0 fscsi0                   hdisk7     SP A0     active  alive      0      0
```

Monitoring Low-End SDP Connectivity (1)

- Command: **powermt display**
- Displays all the FC Controllers controlled on this node

```
sdp1:/#powermt display
Symmetrix logical device count=0
CLARiiON logical device count=17
Hitachi logical device count=0
Invista logical device count=0
HP xp logical device count=0
Ess logical device count=0
HP HSx logical device count=0
==============================================================================
----- Host Bus Adapters ---------  ------ I/O Paths -----  ------ Stats ------
###  HW Path                       Summary   Total   Dead  IO/Sec Q-IOs Errors
==============================================================================
   0 fscsi0                        optimal      34      0      -     0      0
   1 fscsi1                        optimal      34      0      -     0      0
```

Monitoring Low-End SDP Connectivity (2)

- Command: **powermt display dev=all**
- Displays all the Storage End Points (LUNs) managed by PowerPath and the status of each Path to LUN

```
sdp1:/#powermt display dev=all
Pseudo name=hdiskpower9
CLARiiON ID=CK200080200263 [oracle]
Logical device ID=60060160D3221B00049FE7F859E9DC11 [LUN 51]
state=alive; policy=CLAROpt; priority=0; queued-IOs=0
Owner: default=SP B, current=SP A
==============================================================================
---------------- Host ---------------   - Stor -   -- I/O Path -  -- Stats ---
###  HW Path                I/O Paths    Interf.   Mode    State  Q-IOs Errors
==============================================================================
   0 fscsi0                   hdisk24    SP B0     active  alive      0      0
   1 fscsi1                   hdisk41    SP A1     active  alive      0      0
   1 fscsi1                   hdisk58    SP B1     active  alive      0      0
   0 fscsi0                   hdisk7     SP A0     active  alive      0      0
```

AIX Commands – Powermt Command

Storage

sdp1:/#powermt display dev=all |more

```
Pseudo name=hdiskpower7
CLARiiON ID=CK200060400796 [oracle]
Logical device ID=60060160AD16180001246C58A0EADA11 [LUN 190]
state=alive; policy=CLAROpt; priority=0; queued-IOs=0
Owner: default=SP A, current=SP A
==============================================================================
---------------- Host ----------------   - Stor -   -- I/O Path -  -- Stats ---
### HW Path                I/O Paths    Interf.   Mode    State  Q-IOs Errors
==============================================================================
  0 fscsi0                hdisk17      SP A0     active  dead       0      0
  0 fscsi0                hdisk34      SP B0     active  alive      0      0
  1 fscsi1                hdisk51      SP A1     active  alive      0      0
  1 fscsi1                hdisk68      SP B1     active  alive      0      0
```

AIX Commands – Powermt Command

Storage

sdp1:/#powermt display dev=all |more

```
Pseudo name=hdiskpower7
CLARiiON ID=CK200060400796 [oracle]
Logical device ID=60060160AD16180001246C58A0EADA11 [LUN 190]
state=alive; policy=CLAROpt; priority=0; queued-IOs=0
Owner: default=SP A, current=SP A
==============================================================================
---------------- Host ---------------   - Stor -   -- I/O Path -  -- Stats ---
### HW Path                I/O Paths    Interf.    Mode    State  Q-IOs Errors
==============================================================================
   0 fscsi0                 hdisk17    SP A0     active  dead       0      0
   0 fscsi0                 hdisk34    SP B0     active  alive      0      0
   1 fscsi1                 hdisk51    SP A1     active  alive      0      0
   1 fscsi1                 hdisk68    SP B1     active  alive      0      0
```

AIX Commands – NAVICLI Commands: EMC Commands (1)

Examples of basic NaviCLI commands:

- **getall** returns an extensive list of storage-system information
  - For example: **./navicli -h <SP_A IP> getall -lun -rg -sg**

    Retrieves the status of LUNs, RAID Groups and Storage Groups

- **storagegroup** lets you create and manage shared storage systems
  - For example: **./navicli -h <SP_A IP> storagegroup -list**

    Retrieves the list of all Storage Groups that have been defined

- **getlun** returns information about a LUN
  - For example: **./navicli -h <SP_A IP> getlun -name**

    Retrieves all LUNs names

AIX Commands – NAVICLI Commands: EMC Commands (2)

- **getrg** returns information about the specified RAID Group
  - For example: **./navicli -h <SP_A IP> getrg |grep “RaidGroup ID”**
    Retrieves all Raid Groups IDs

- **networkadmin -get** lists network name and address information
  - For example: **./navicli -h <SP_A IP> networkadmin -get**
    Retrieves the network configuration for SP A

Summary

This lessons has covered:

- Introduction to Comverse ONE SDP
- SDP hardware foundations
- Connectivity
- SDP storage concept