1 Mechanical Design & Packaging

Overview of the System

▲ Layout
▲ AC and DC power distribution

FRUs

▲ PCI Cards
▲ Assemblies
▲ Cables

Standard / Supported Configurations

System Cabling
M2000 Subassemblies

M2000 System Layout
Overview of the System

Power Base
▲ One or two Power Shelves
▲ AC power distribution
▲ Bulk Power Supplies (same as NS8000 and NS7000/800)
  – Convert AC power to -48 VDC for distribution to local DCCs
    (DC Converters)

HDDAs
▲ Same HDDA as NS8000 and NS7000/800
▲ New disk drawer with daisy-chain capability
▲ Environmental Monitoring
  – HDDA LON card in rear
  – PIC microcontroller in disk drawer

E-Box (NPFSP)
▲ Custom Intel-architecture motherboard
▲ 7 PCI Card slots / 2 PCI buses
▲ Environmental Monitoring & display panel
▲ Logic DCC (local power supply)

Host Processor
▲ Third-party assembly
▲ Sun AXi motherboard w/ 270 MHz Ultra-Sparc IIi CPU module
▲ Host DCCs (redundant DC power supplies with -48 VDC input)
▲ Sun OpenBoot Prom Environment Monitor
AC & DC Power Distribution
AC and DC Power Distribution

Two Power Shelves (most configurations)

AC Power Input, -48 Volts DC output

▲ Bottom Power Shelf:
- Input is AC Power Cord #1
- Output is to Host, EBox, HDDA #1 (i.e., Bottom HDDA)
- Three Bulk Power Supplies
- N+1 Redundancy

▲ Top Power Shelf:
- Only needed if more than one HDDA
- Input is AC Power Cord #2
- Output is to HDDAs #2 and #3
- # of Bulk P/S = (# of HDDAs connected to output) + 1
- N+1 Bulk Power Supply Redundancy

▲ 48 VDC power cables do not cross stack boundaries
M2000 Rear View
Back of System

Power Shelves

▲ PDUs

– AC Power Cord Inlet Connector (mates with IEC 320-C19 cordset)
– AC Main Circuit Breakers (One per PDU)
– AC Power Distribution to Bulk Power Supplies
– DC Output Connectors (each is individually fused)

▲ Power Shelf EM LON card

HDDAs

▲ Same chassis as NS8000
▲ HDDA LON EM card

NPFSP (a.k.a. E-Box)

▲ EM Transceivers
▲ PCI Slots
▲ Serial Ports
▲ Logic DCC
▲ “Cable Cubby”

– Modem hideaway
– Service loop storage

Host Processor
Figure 2-15. SCI cabling ring
SCI Ring Cabling

1 meter long cable (450326): Used within a stack
5 meter long cable (450369): Used between any 2 stacks

Cable from “SCI OUT” of one SCI Node to “SCI IN” of next SCI Node.

PCI Cards

E-Box:

- PCA, PCI QUAD ENET ADAPTER
- PCA,PCI,3CH,64MB,U2,RAID
- PCA,PCI-SCI,CLUSTER ADAPTER 2
- PCA,PCI,DUAL,U-SCSI,DIFF,ADPTR
- PCA,PCI-FDDI,SAS-FIBRE
- PCA,PCI-FDDI,DAS-FIBRE
- PCA,PCI,GIGABIT E-NET

Host:

- PCA,PCI,4MBSVGA,ADPTR
- PCA,PCI-SCI,CLUSTER ADAPTER 2
- PCA,PCI,DIFF, U-SCSI 1-CH
Figure 2-21. EM-Net cabling ring
Environmental Monitor Cabling

Ring topology

All EM Nodes in a ring

E-Box to Host via serial cable (Y-Cable)

“EM Master Node” in M2000 Node 0

“EM Slave Nodes” in all other M2000 Nodes
<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>MFG</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>500817</td>
<td>ASSY, ECHAP W/EBOX ENCL</td>
<td></td>
</tr>
<tr>
<td>650025</td>
<td>POWER SUPPLY, LOGIC DCC-2</td>
<td></td>
</tr>
<tr>
<td>600063</td>
<td>PCA,VRM8,P6, DC-DC,5V,IN</td>
<td></td>
</tr>
<tr>
<td>600077</td>
<td>PCA,DIMM,DRAM,16x72,60NS,3.3V (128MB)</td>
<td></td>
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<tr>
<td>600080</td>
<td>PCA, PCI QUAD ENET ADAPTER</td>
<td></td>
</tr>
<tr>
<td>600098</td>
<td>PCA,PCI,3CH,64MB,U2,RAID</td>
<td></td>
</tr>
<tr>
<td>600093</td>
<td>PCA,PCI-SCI,CLUSTER ADAPTER 2</td>
<td></td>
</tr>
<tr>
<td>600086</td>
<td>PCA,PCI,DUAL,U-SCSI,DIFF,ADPTR</td>
<td></td>
</tr>
<tr>
<td>670013</td>
<td>ASSY,FAN,4.687x1.5 W/CONN,9&quot;W</td>
<td></td>
</tr>
<tr>
<td>600104</td>
<td>PCA,PCI-FDDI,SAS-FIBRE</td>
<td></td>
</tr>
<tr>
<td>600105</td>
<td>PCA,PCI-FDDI,DAS-FIBRE</td>
<td></td>
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<tr>
<td>600101</td>
<td>PCA,PCI,GIGABIT E-NET</td>
<td></td>
</tr>
<tr>
<td>100176</td>
<td>ASSY,PCA,AFX8000</td>
<td></td>
</tr>
<tr>
<td>640154</td>
<td>POWER SUPPLY,CHASSIS,3-SLOT</td>
<td></td>
</tr>
<tr>
<td>650024</td>
<td>POWER SUPPLY MODULE,48VDC,600W</td>
<td></td>
</tr>
<tr>
<td>690006</td>
<td>PDU,115/230 VAC,20A/10A</td>
<td></td>
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<tr>
<td>380082</td>
<td>BATTERY,1.5V,ALKALINE,AA</td>
<td></td>
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<tr>
<td>640185</td>
<td>MONITOR,SVGA, 17 INCH</td>
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<td>640160</td>
<td>KEYBOARD,104KEY,PS/2</td>
<td></td>
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<td>640161</td>
<td>MOUSE,3BUTTON,PS/2</td>
<td></td>
</tr>
<tr>
<td>500705</td>
<td>ASSY, CHASSIS, HDDA</td>
<td></td>
</tr>
<tr>
<td>500913</td>
<td>ASSY,DRAWER, HDDA</td>
<td></td>
</tr>
<tr>
<td>500782</td>
<td>ASSY,DISK DRIVE,9GB,HH,HDDA</td>
<td></td>
</tr>
<tr>
<td>500880</td>
<td>ASSY,DISK DRIVE,18GB,HDDA</td>
<td></td>
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<tr>
<td>500783</td>
<td>POWER SUPPLY, DC/DC,130W</td>
<td></td>
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<tr>
<td>500706</td>
<td>ASSY,FAN,HDDA</td>
<td></td>
</tr>
<tr>
<td>360013</td>
<td>FUSE,5A,125V,SUBMINIATURE</td>
<td></td>
</tr>
<tr>
<td>100158</td>
<td>PCA,DRV ARRAY ENV MON LON</td>
<td></td>
</tr>
<tr>
<td>500749</td>
<td>LCD MOUNT, NP EBOX</td>
<td></td>
</tr>
<tr>
<td>500866</td>
<td>ASSY,LCD MOUNT EBOX EXP</td>
<td></td>
</tr>
<tr>
<td>100166</td>
<td>PCA,E-LP,TRANSCIEVER</td>
<td></td>
</tr>
<tr>
<td>100157</td>
<td>PCA,ECHAP,TRANSCIEVER</td>
<td></td>
</tr>
<tr>
<td>100165</td>
<td>PCA,POWER SHELF,LON ASSY</td>
<td></td>
</tr>
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</table>
FRUs

FRU Listing
### M2000 FRU List

<table>
<thead>
<tr>
<th>CABLES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>450321 PWR CORD,16A,IEC309</td>
<td></td>
</tr>
<tr>
<td>450322 PWR CORD,2.5M,NEMA 5-20</td>
<td></td>
</tr>
<tr>
<td>450323 PWR CORD,2.5M,16A,CEE7/7&quot;</td>
<td></td>
</tr>
<tr>
<td>450324 PWR CORD,2.5M,13A,UK</td>
<td></td>
</tr>
<tr>
<td>450373 ASSY,CA,68P,VHDC,INDIR,49.2 IN</td>
<td></td>
</tr>
<tr>
<td>450361 ASSY,CA,68P,VHDC,2 METER</td>
<td></td>
</tr>
<tr>
<td>450314 ASSY,CA,PWR,HDDA,1M</td>
<td></td>
</tr>
<tr>
<td>450315 ASSY,CA,PWR, EBOX, 1M</td>
<td></td>
</tr>
<tr>
<td>450326 CA,SCI,50P,VHDCI,1 METER</td>
<td></td>
</tr>
<tr>
<td>450369 CA,SCI,50P,VHDCI,5 METER</td>
<td></td>
</tr>
<tr>
<td>450376 CA,SCSI,68P TO VHDC,75FT</td>
<td></td>
</tr>
<tr>
<td>450377 CA,SCSI,68P TO VHDC,12FT</td>
<td></td>
</tr>
<tr>
<td>450370 CA,RJ45,CT5,14FT,BLK</td>
<td></td>
</tr>
<tr>
<td>450372 ASSY,CA,PWR,HDDA,75 CM</td>
<td></td>
</tr>
<tr>
<td>450330 CA,RJ45,CT5,2FT,BLK</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HOST PARTS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>790131 SUBASSY,AXI,HOST,FRU</td>
<td></td>
</tr>
<tr>
<td>650029 POWER SUP MOD,48DC,300W</td>
<td></td>
</tr>
<tr>
<td>600099 PCA,DIMM,60NS,8x72,EDO</td>
<td></td>
</tr>
<tr>
<td>600097 PCA,PCI,4MBSVGA,ADPTR</td>
<td></td>
</tr>
<tr>
<td>670018 ASSY,CPU,HOST,10K</td>
<td></td>
</tr>
<tr>
<td>500933 ROOT DRIVE ASSY</td>
<td></td>
</tr>
<tr>
<td>500936 CD-ROM ASSY</td>
<td></td>
</tr>
<tr>
<td>670019 FAN.CHASSIS</td>
<td></td>
</tr>
<tr>
<td>450374 ASSY,CA,PWR,HOST,1.5M</td>
<td></td>
</tr>
<tr>
<td>450375 CABLE,Y-SERIAL</td>
<td></td>
</tr>
<tr>
<td>640188 MODEM,56B,EXTERNAL</td>
<td></td>
</tr>
<tr>
<td>600107 PCA,PCI,DIFF, U-SCSI 1-CH</td>
<td></td>
</tr>
</tbody>
</table>
## Supported Configurations:

### Supported NIC Combinations

<table>
<thead>
<tr>
<th>Max E-Net NICs</th>
<th>Max Gbit NICs</th>
<th>Max FDDI NICs</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
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<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
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### Capacity Tradeoffs: Storage vs Networks

<table>
<thead>
<tr>
<th>NICs</th>
<th>Mylex SCSI</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 NIC</td>
<td>28 disk 504 GB</td>
<td>28 disk 504 GB 2 NICs</td>
<td>28 disk 504 GB 3 NICs</td>
</tr>
<tr>
<td>2</td>
<td>1 TB 1 NIC</td>
<td>56 disk 1 TB 2 NICs</td>
<td>56 disk 1 TB 2 NICs</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1.5 TB 1 NIC</td>
<td>84 disks</td>
<td></td>
<td></td>
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</table>
1. **NS10 K Power Configuration Rules:**

<table>
<thead>
<tr>
<th>Stack Contents</th>
<th>Power Base Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host 790114</td>
<td>Crate Power Shelf PDU Power</td>
</tr>
<tr>
<td>Ebox 500757</td>
<td>w/casters Shelf 3-Slot Cords Bulk P/S</td>
</tr>
<tr>
<td>HDDA</td>
<td>640154 690006 650024</td>
</tr>
<tr>
<td>0 or 1</td>
<td>1 1 1 1 3</td>
</tr>
<tr>
<td>0 or 1</td>
<td>2 2 2 5</td>
</tr>
<tr>
<td>0 or 1</td>
<td>2 2 2 6</td>
</tr>
</tbody>
</table>

Each stack has power configured independently, according to the above rules.

2. **Mylex RAID Controller STANDARD Configurations:**

<table>
<thead>
<tr>
<th>Number of HDDAs in Stack</th>
<th>Mylex Cards</th>
<th>SCSI point-point cables</th>
<th>SCSI daisy chain cables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

3. **ECHaP PCI Card Configuration Standards**

<table>
<thead>
<tr>
<th>SLOT</th>
<th>CARD</th>
<th>PCI Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Diff SCSI (Tape)</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Mylex 3 or NIC 2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Mylex 2 or NIC 3</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Mylex 1</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>AFX8000</td>
<td>0, 1</td>
</tr>
<tr>
<td>6</td>
<td>SCI</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>NIC 1</td>
<td>0</td>
</tr>
</tbody>
</table>

* Every system must have at least one of each of the following cards: Mylex, NIC, SCI, AFX 8000
Diff-SCSI tape card is optional on the Ebox and/or Host.
4. Memory Options:

<table>
<thead>
<tr>
<th></th>
<th>MB</th>
<th>Qty</th>
<th>DIMM Size</th>
<th>P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECHaP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td>256</td>
<td>2</td>
<td>128 MB</td>
<td>600077-001</td>
</tr>
<tr>
<td>Option 1</td>
<td>512</td>
<td>4</td>
<td>128 MB</td>
<td>600077-001</td>
</tr>
<tr>
<td>Option 2</td>
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<td>600077-001</td>
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<tr>
<td>Host</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td>128</td>
<td>2</td>
<td>64 MB</td>
<td>600099</td>
</tr>
<tr>
<td>Option 1</td>
<td>256</td>
<td>4</td>
<td>64 MB</td>
<td>600099</td>
</tr>
<tr>
<td>Option 2</td>
<td>512</td>
<td>8</td>
<td>64 MB</td>
<td>600099</td>
</tr>
</tbody>
</table>

Mylex | 64MB only
AFX8000 | 128 MB only

**NOTE:** ECHaP requires at least 512MB for multi-node operation.
EM Cables

Figure 2-22. EM-Net cable connections—single node (rear view)

Figure 2-23. EM-Net cable connections—multi-node (rear view)
Cables

EM-Network cables

Cables connect in “waterfall” fashion - from top to bottom

Bottom EM port cables to top of stack to complete the ring

(Multi-node systems: bottom of one stack to top of the next stack)

Host Serial Y-Cable

Service Modem connection (Host TTY-A)

Serial Connection to E-Box for EM Data

Figure 2-27. Modem Y-cable connections (rear view)
SCI Ring Cabling

Figure 2-16. SCI cable connections—single node (rear view)

Figure 2-17. SCI cable connections—multi-node (rear view)
SCI Cables:
Figure 2-10. Power cable connections with three HDDA chassis (rear view)
DC Power Cables

450314 Power Cable, 50 cm (Bottom 2 HDDAs)

450372 Power Cable, 75 cm (3rd HDDA only)

450315 Power Cable (E-Box)

450374 Power Cable, Host
SCSI Daisy-Chain

Figure 2: Daisy-chain SCSI ID and termination

T = Terminator  R = SCSI Repeater
SCSI Cables

Daisy-Chained Disk Drawers

▲ New Disk Drawer p/n 500913 is daisy-chain capable
  – Jumper = High SCSI Addresses (8-14)
  – No Jumper = Low SCSI Addresses (0-6)

Standard Controller to HDDA cabling method
Standard HDDA SCSI Cabling