

ICS Control Room and Central Computing Equipment Description
(Rev. 4/12/99)

The SNS Integrated Control System (WBS 1.9) is responsible for providing both control room console equipment and control-related central computing systems. A description of the baseline set of equipment is presented below.

1. Control Room Equipment (WBS 1.9.2.5)

See the following URL for figures showing two possible layouts for the central control room. (The figures are listed under item # 1.6 of the long list of documents on this web page).

<http://www.ornl.gov/~nns/ProjectInformation/SNSStems/Controls/Controls.html>

Current plans are to have 12 workstations with two CRTs each. There will also be some local control rooms for start-up and trouble shooting. Table 1.1 summarizes the control room equipment to be provided.

The prototypical operator interface (OPI) is a Sun Ultra 5 with two 21" CRTs. Specifications for this workstation are attached as Appendix A.1. For local control rooms, a local file server provides one operator interface.

Table 1.1 Control Room Workstations

Control Room	No. of Workstations	No. of CRTs	Workstation Type
Central	12	24	Sun Ultra 5
Front End	1	2	Sun Ultra 10*
Ring	2	4	1 ea. Sun Ultra 5 1 ea. Sun Ultra 10*
Target	2	4	1 ea. Sun Ultra 5 1 ea. Sun Ultra 10*
Utility Building	<u>1</u>	<u>1</u>	1 ea. Sun Ultra 10*
Totals	14	28	Sun Ultra 5's
	4	7	Sun Ultra 10's*

*Costed under WBS 1.9.2.7 Computing Systems

In addition to permanent OPI installations, portable OPIs will be available for temporary use (e.g. for start-up and trouble-shooting). Plans are to put a network connection for a temporary OPI at each IOC cabinet. Prototypical temporary OPIs could be portable PCs running X-windows software, small Sun workstations, or both. (Since the unit cost of either of these options is approximately the same this selection can be postponed to a later date). Table 1.2 lists the quantities of temporary OPIs expected to be purchased.

Table 1.2 Portable / Temporary Operator Interfaces

Subsystem	No. of OPIs
Front end	1
Linac	4
Ring	4
Target	2
Conventional Facilities	2
General use	<u>12</u>
Total	25

[Where does the cost of the “scoreboards” in the instrument hall go? These would show beam current and maybe other critical parameters. Probably should be programmable.]

[Do we want to throw in cost for large-screen displays in the central control room?]

[Where is the cost of CCTV-style displays showing critical parameters to people at guest house, lobby, etc.? One can imagine a facility-wide broadband network, with one channel assigned to this function.]

2. Computing Systems (WBS 1.9.2.7)

The following server functions have been identified as part of the ICS:

- EPICS boot server. A primary function is to download IOC programs. These may also serve as OPIs in local control rooms. Current thinking is that this function should be distributed, with one per major subsystem. The prototypical boot server has been designated as a Sun Ultra 10.
- EPICS “production” server. [Is there a better name? Somebody please help flesh out the text here.] Functions include:
 - Primary repository for the EPICS software used for operations.
 - Database functions (such as for signal names, IOC configurations, cabling, equipment, etc.)
 - Data archiving functions.

See specs listed in Appendix A.3. (Note that development system hardware is not included under this WBS).

- Model server. [Runs accelerator model ... Help me out here.] Designated as a Sun Enterprise 450 loaded with high-availability features. (See specs listed in Appendix A.3).
- Process Variable Gateway. (Sometimes called “channel access gateway”). APS uses a Sun Ultra 20 for this function, so assume this model will be used for SNS as well.

- [Any others? Public WWW? email? anon FTP?]

Table 2.1 – Summary of ICS Servers

Server	Qty.	Model Type	Location
EPICS boot server (Front end, Linac, Ring, Target, Conventional Facilities, spare)	6	Sun Ultra 10	At local control room
EPICS “production” server	1	Sun Enterprise 450	Central Control Bldg. computer equip. room
Model server	1	Sun Enterprise 450	ditto
Process variable gateway	1	Sun Ultra 20	ditto

Servers in the Central Control Building computer equipment room will be provided with a single rack-mounted CRT. Normal access to these workstations will be via remote workstations.

APPENDIX A.1 – TYPICAL OPI

[This text was (a) cut-and-pasted from the Sun web site, and (b) edited to show my guess as to the options we want.]

[Brackets show options not selected.]

Sun Enterprise Ultra 5S Server with 2 ea. 21-inch monitor

Specifications:

Processor:

Architecture: 333-MHz UltraSPARC-III [vs. 270-MHz UltraSPARC-III]

Cache: 2-MB external [vs. 256-KB external]

Main Memory:

512 MB [I picked the maximum]

Standard Interfaces:

Expansion bus:

Three 32-bit PCI slots, two full size, one short, 33 MHz, 5 volt

Network:

Ethernet/Fast Ethernet, twisted pair standard

(10-BaseT and 100-BaseT), self-sensing

Serial

One D-Sub 25-pin connector,
synchronous/asynchronous

One D-Sub 9-pin connector, asynchronous

Parallel

One D-Sub 25-pin connector, IEEE 1294
(bidirectional)

Mass Storage and Media

Internal disk

4.3 GB, 3.5-in. Enhanced IDE HDD, 7200 rpm
[vs. 9.1 GB available on the 333MHz ONLY]

Internal CD

32X-speed CD-ROM

Internal floppy disk

One 3.5-in., 1.44-MB floppy

PCMCIA

One front-access bay for third-party options

Software

Operating system

Solaris 7 [vs. Solaris 2.5.1, Solaris 2.6 and Solaris for Intranets]

Languages

C++ [vs. C, Cobol, FORTRAN, Java(tm), Pascal]

Networking

NFS(tm), TCP/IP

[Do we need any of this?: ONC+(tm), , IPX/SPX,
SunLink(tm), OSI, MHS, DEC, DNI, SNA, X.25,

PPP, XTL, Frame Relay]

Options

None

[vs. offered:

External storage

- Disk: 9-GB Sun(tm) StorEdge(tm)
- 50-GB Sun StorEdge (12 drives, 4.2 or 2.1 GB per drive)
- 54-GB Sun StorEdge (6 drives, 9.2 GB per drive)
- Tape: 4- to 8-GB SLR Sun StorEdge
- 20- to 40-GB 8-mm Sun StorEdge
- 12- to 24-GB 4-mm DDS-3 Sun StorEdge
- 72- to 144-GB 4-mm DDS-3 Sun StorEdge autoloader
- 20- to 40-GB Sun StorEdge DLT(tm) 4000
- 35- to 70-GB Sun StorEdge DLT 7000
- 400-GB Sun StorEdge L400
- A1000/D1000

PCI I/O Options

100/100-MB/sec Ethernet, Token Ring, FDDI single attach, FDDI dual attach, high-speed serial, Ultra(tm) SCSI with 10/100-MB/sec Ethernet, dual-channel single-ended Ultra SCSI, dual-channel differential Ultra SCSI

end options offered]

APPENDIX B - TYPICAL MEDIUM-DUTY SERVER

[This text was (a) cut-and-pasted from the Sun web site, and (b) edited to show my guess as to the options we want.]

[Brackets show options not selected.]

Sun Enterprise Ultra 10S Server

Specifications:

Processor

Architecture

333-MHz UltraSPARC-IIi

Cache

2 MB external

Memory

Four DIMM slots, 60ns 168-pin EDO JEDEC DIMMs 1 GB maximum

Standard Interfaces

Network

Ethernet/Fast Ethernet, twisted pair standard (10/100-BaseT)

Serial

One D-Sub 25-pin connector, synchronous/asynchronous
One D-Sub 9-pin connector, asynchronous

Parallel

One D-Sub 25-pin connector, IEEE 1294 (bidirectional) VGA I/O

System I/O

PCI-IDE DMA master controller

Expansion

Four 32-bit PCI, 33-MHz slots (full size)

Mass Storage and Media

Internal disk

3.5-in. Enhanced IDE HDD, 9.1-GB, 7200 rpm;
bay for optional second 9.1-GB drive

Internal CD

One 1.6-in. 32X CD-ROM

Internal floppy disk

One 3.5-in. 1.44-MB floppy

PCMCIA

One front-access bay for third-party options

Console Options

Monitor

21-in. color [vs. 17- or 19-]

Frame buffer

1024 x 768, 16-color PCI graphics card

Keyboard and mouse

Standard Sun keyboard and mouse

PCI I/O Options

None taken

[I assume we don't need any of these, since I assume ethernet comes as part of the standard package:

10/100-Mb/sec Ethernet, Token Ring, FDDI single attach, FDDI dual attach, high-speed serial, eight-line serial, UltraSCSI with 10/100-Mb/sec Ethernet, dual-channel single-ended UltraSCSI, dual-channel differential UltraSCSI

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Software

Operating system

Solaris 7 [vs. Solaris 2.5.1, Solaris 2.6 and Solaris for Intranets]

Languages

C++ [vs. C, Cobol, FORTRAN, JavaTM, Pascal]

Networking

NFS, TCP/IP [Do we need any of these?: ONC+, IPX/SPX, SunLink OSI, MHS, DCE, DNI, SNA, X.25, PPP, XTL, Frame Relay

System and Network Management

[Do we need any of these?

Solstice JumpStartTM, Solaris Web Start, Solstice AdminSuiteTM, Solstice DiskSuiteTM, Solstice Backup

]

Options

- 12- to 24-GB 4-mm DDS-3 Sun StorEdge

[I assume we don't need any of this:

Internal storage

9.1-GB EIDE drive

External storage

- Disk: 9-GB Sun StorEdge™
- 50-GB Sun StorEdge MP (12 drives, 4.1 or 2.1 GB per drive)
- 54-GB Sun StorEdge MP (6 drives, 9.1 GB per drive)
- Tape: 4- to 8-GB SLR Sun StorEdge
- 20- to 40-GB 8-mm Sun StorEdge
- 12- to 24-GB 4-mm DDS-3 Sun StorEdge
- 72- to 144-GB 4-mm DDS-3 Sun StorEdge FP autoloader
- 20- to 40-GB Sun StorEdge DLT 4000
- 35- to 70-GB Sun StorEdge DLT 7000
- 400-GB Sun StorEdge L400
- A1000/D1000

]

APPENDIX C - TYPICAL HEAVY-DUTY SERVER

[This text was cut-and-pasted from the Sun web site.]

[Highlighted text shows options selected. In general, I arbitrarily selected the middle-of-the road.]

Sun Enterprise 450

System Specifications

Processor

Number

From one to four processor modules. **Say 2 processor modules.**

Type

250-, **300-** or 400-MHz UltraSPARC-II modules with onboard E-cache

Cache memory

16-KB I-cache, 16-KB D-cache per processor

1-MB external cache per processor with 250-MHz CPU

2-MB external cache per processor with 300-MHz CPU

4-MB external cache per processor with 400-MHz CPU

Datapath

Two independent, buffered 144-bit UPA buses; 128 bits data, 16 bits ECC; two processors per bus

UPA operates at 83.3-MHz with 250-MHz processors and 100-MHz with 300-MHz or 400-MHz processors

Main Memory

Capacities

16 DIMM module slots; four banks of four slots

Accepts 32-, 64-, 128-MB or 256-MB DIMMs

128 MB to 4 GB total memory capacity. **Say 2 GB.**

Memory type

144-pin 5V 60-ns memory modules

Datapath

576 bits wide; 512 bits data, 64 bits ECC

Up to 1.78-GB/sec throughput

Standard Interfaces

Serial

Two EIA-232D or EIA-423 serial ports, DB25 (requires Y-type splitter cable); one 50 to 384 Kbps synchronous, one 50 to 460.8 Kbaud asynchronous

Parallel

2-MB/sec Centronics compatible bidirectional EPP port; DB25

Ethernet

One 10/100-Mb/sec autoselect port; RJ45 or MII

Keyboard and mouse

One standard keyboard/mouse port; mini DIN-8

PCI

Three slots for 32-bit 33-MHz 5V PCI cards

Four slots for 32- or 64-bit 33-MHz 5V PCI cards

Three slots for 32- or 64-bit 33- or 66-MHz 3.3V PCI cards

SCSI

One, **three**, or five 40-MB/sec UltraSCSI-3 buses for internal disks

One 20-MB/sec Fast/Wide SCSI-2 bus for CD-ROM and tape; 68-pin external connector

Internal Mass Storage

Disk bays

Four, **twelve**, or twenty hot-swap disk bays

Disk controllers

One, **three**, or five 40-MB/sec UltraSCSI-3 channels;
maximum four drives per channel

Disks

Up to twenty 4.2-GB or 9.1-GB 3.5- x 1-in.
hot-swap UltraSCSI-3 drives (max. 182 GB) **Say 6 ea. 9.1-GB hot-swap**

with disk mirroring.

CD-ROM

SunCDTM32 644-MB SCSI CD-ROM (standard)

Floppy

1.44-MB 3.5-in. floppy drive (standard)

Tape

One bay available for optional 5.25- x 1.6-in. SCSI
tape drive; 8-mm or 4-mm DDS-3, or SLR

External Mass Storage

Host adapters

Supports up to ten single- or dual-channel, single-ended
or differential, fast/wide or UltraSCSI PCI host
adapters; up to 8 100-MB/sec FC-AL host bus
adapters

Disk

Supports up to twenty 108-GB SPARCstorageTM
MultiPackTM systems (2-TB)

Supports up to; 14 A1000/D1000s, 2 A3500s, 16
A5000s, 1 A7000

Tape

Supports up to four SCSI tape devices from onboard
SCSI

Supports up to 16 SCSI tape devices, total 8-mm,
4-mm DDS-2, DDS-3, DLT, QIC, SLR

Console Options

Monitor

17-, 19-, **21- [or largest you can rack mount]**, or 24-in. color

Frame buffer

256-color PGX graphics card

Keyboard and mouse

Standard SunTM keyboard and mouse

PCI I/O Options

10/100-Mb/sec Ethernet, QuadFastEthernet, Gigabit Ethernet, Token Ring, FDDI single attach, FDDI dual attach, ATM-155, ATM-622, high-speed serial, eight-line serial, UltraSCSI with 10/100 Mb/sec Ethernet, dual-channel single-ended UltraSCSI, dual-channel differential UltraSCSI, 100-MB/sec FCAL

Power Supplies

Type

One, two, or three modular, N+1 redundant, hot swap, universal input (two supplies standard)

Output

1120W maximum, 560W maximum each supply

Power bus

Common, load-sharing

Software

Operating system

Solaris 2.5.1 Nov 97 Release, Solaris 2.6 May 98 or Solaris 7

Languages

C, C++, Cobol, FORTRAN, JavaTM, Pascal

Networking

Do we need any of this?

ONC+TM, NFSTM, TCP/IP, IPX/SPX, SunLinkTM
OSI, MHS, DCE, DNI, SNA, X.25, PPP, XTL,
Frame Relay

System monitoring

Do we need any of this?

SolsticeTM SyMONTM

System and Network Management

Do we need any of this?

Solstice JumpStartTM, Solaris Web Start, Solstice AdminSuiteTM, Solstice DiskSuiteTM, Solstice BackupTM (single server), and other Solstice products