



LSV 2 ONBOARD DATA ACQUISITION SYSTEM (ODAS)

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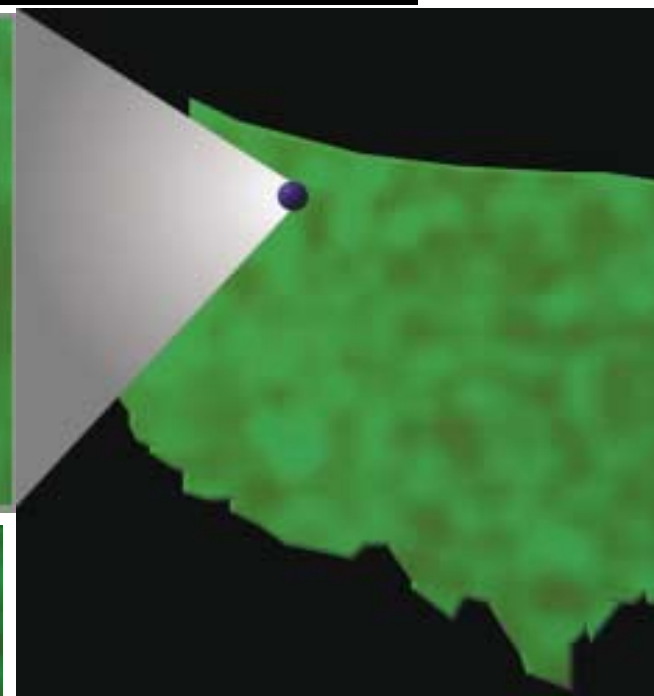
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Acoustic Research Detachment - Bayview, Idaho

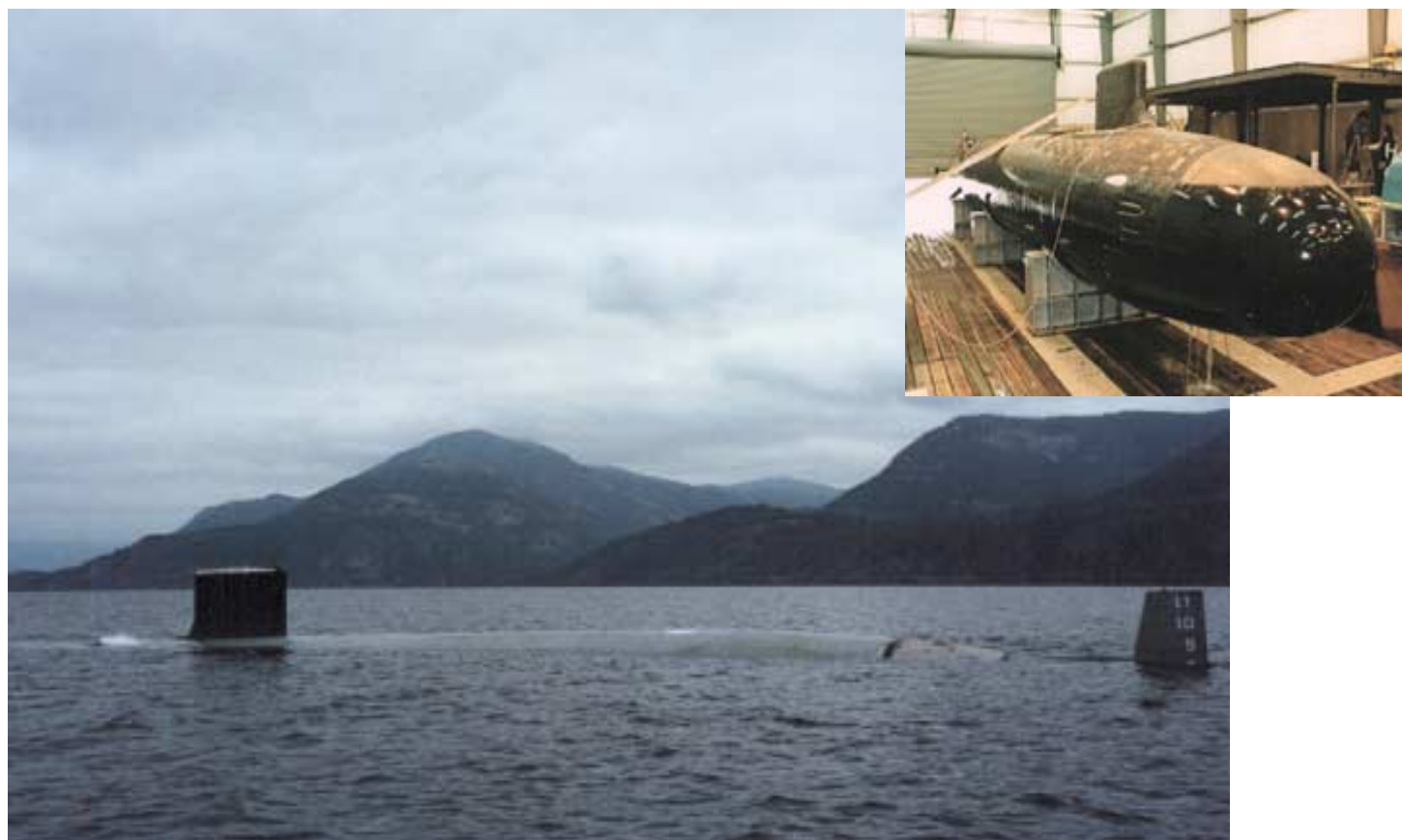


- ❑ **1000' deep, quiet lake**
- ❑ **Technologies supported include:**
 - **Advanced submarine propulsor designs**
 - **Submarine sonar dome designs**
 - **Structural acoustics**
 - **Target strength**
 - **Hull treatments**
 - **Active noise control**
 - **Wide aperture arrays**
 - **Towed arrays**

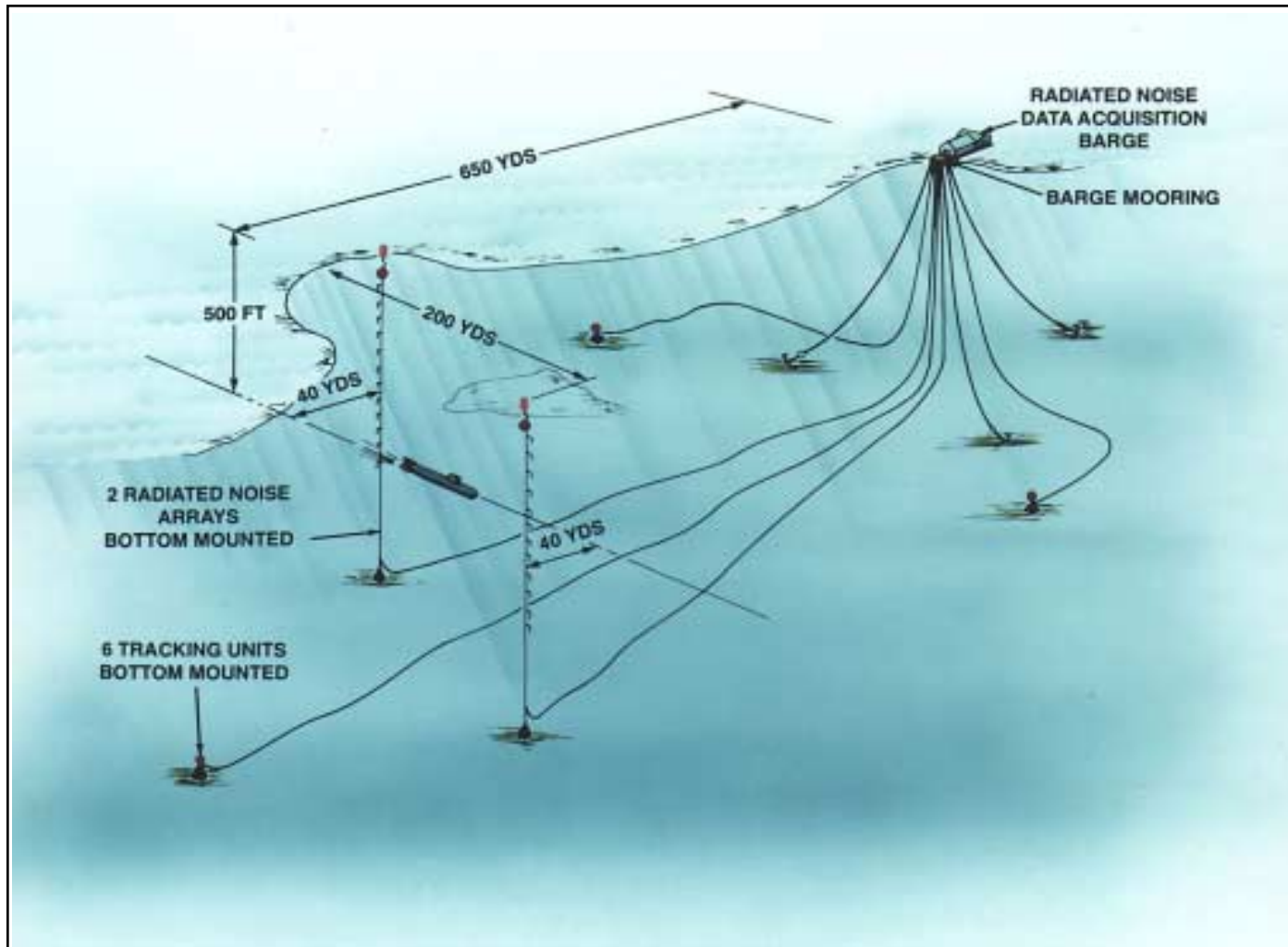




Large Scale Vehicle (LSV) KOKANEE



LSV Radiated Noise Range





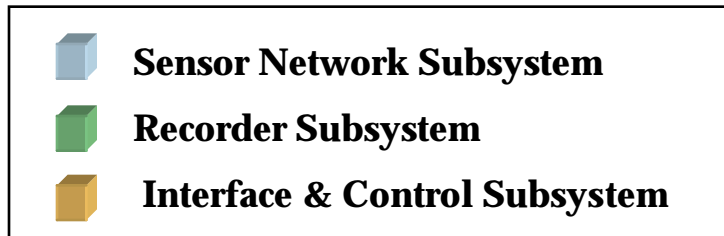
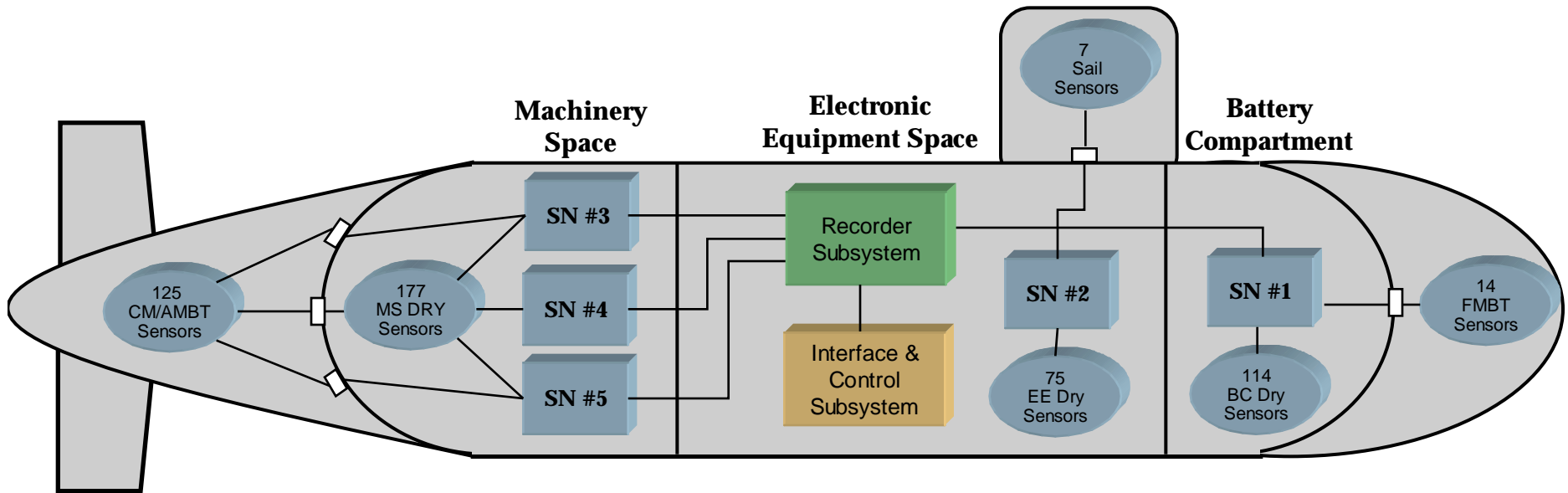
System Overview



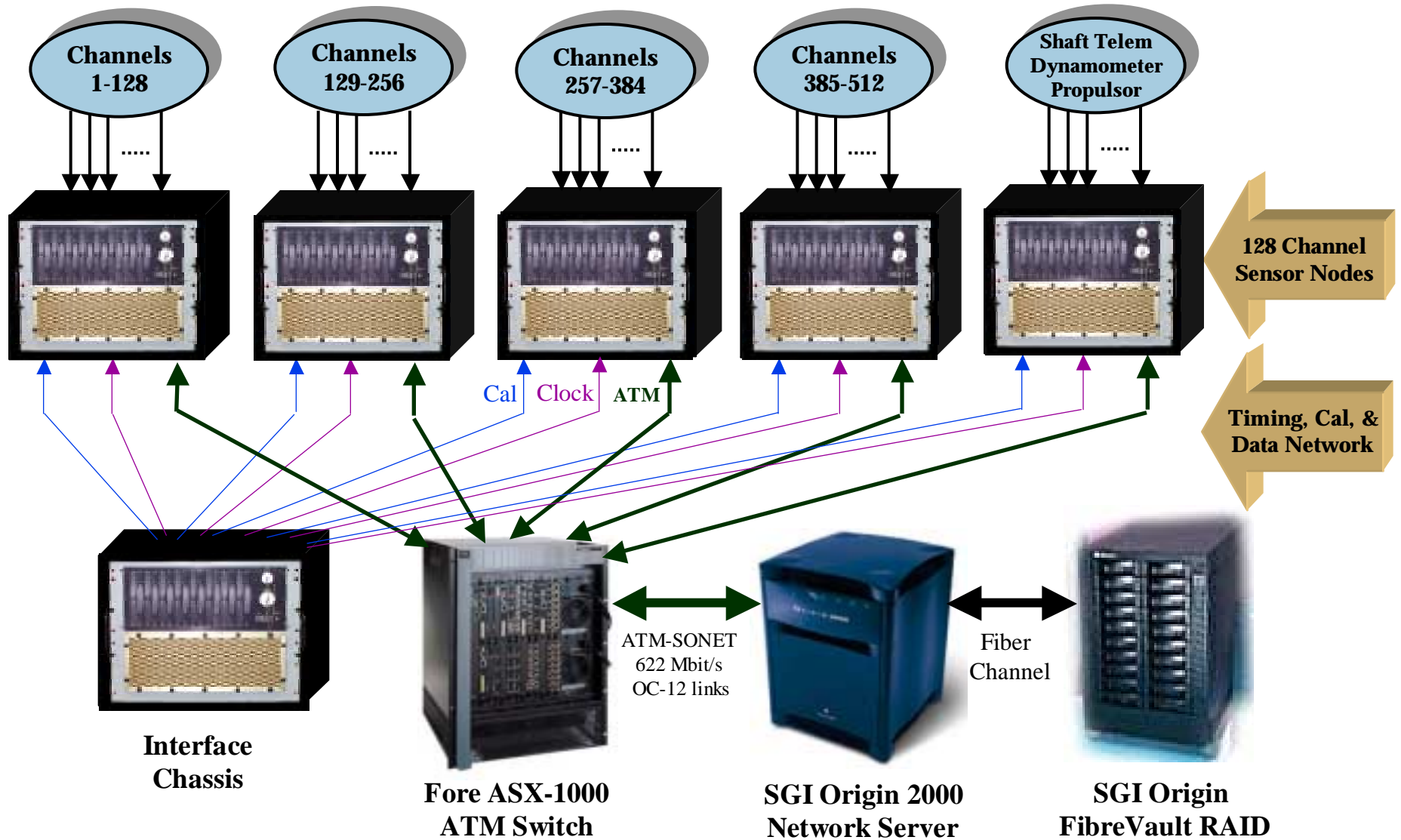
□ Autonomous hydro-dynamic and acoustic data recording system onboard Large Scale Vehicle 2 - CUTTHROAT

- 512 channel analog sensor inputs, analog signal conditioning, A-to-D conversion at variable sample rates up to $F_s = 196.6$ KS/sec
- 80 MB/sec data rate over Asynchronous Transfer Mode (ATM) sensor network (at delivery)
- 80+ MB/sec record rate via COTS Fibre Channel RAID system

ODAS System Laydown



ODAS System Diagram





Design Approach



- ❑ **Leverage recent advances in high-speed computers and interfaces for instrumentation recording**
- ❑ **Modular design permits easy expansion throughout system**
 - **System expandable to 1536 channels**
 - **300 MB/sec. bandwidth**
- ❑ **COTS and Open Architecture maximizes supportability by on-site personnel**
 - **Single Vendor Configuration Management**
 - **Single SW Development Environment**



Design Advantages



❑ **Lowest Risk:**

- **Network Server eliminated potential board-level integration problems**
 - » **Server is a pre-integrated high-speed data handling system with hardware and software support from single vendor**
- **System elements communicate through standard vendor supported interfaces**
 - » **ATM, Fibre Channel, Ethernet**

❑ **Lowest Cost:**

- **Identical development and target systems reduce software cost**
 - » **Standard development environment**
 - » **Short test cycle**
- **Server eliminates component integration costs**
- **Upgrades can utilize future hardware advances**



Sensor Network



- ❑ **Multi-function Signal Conditioning on 6U VME Board**
 - 16 channels/board
 - Power & calibration distribution to various acoustic & hydrodynamic sensors (CVLD, CCLD, & differential or single ended)
 - Gain & Filtering (12 x 5 dB, pre-whitening & anti-alias)

- ❑ **Analog-to-ATM Conversion on Single 6U VME Board**
 - Planning Systems, Inc. AtA-16b-32AD-V1
 - 32 channels/board, OC-3c output
 - 5 operator selected sample rates per channel, Max. $F_s = 196,608$ Sample/sec
 - Converts analog inputs to digital ATM AAL5 Protocol Data Units (PDU's)
 - 53 Byte cells optically telemetered via OC-3c SONET to ATM switch

- ❑ **ATM Switch**
 - Fore Systems ASX-1000
 - Switches OC-3c inputs from Analog-to-ATM boards to Recorder subsystem via OC-12c network modules



Recorder Subsystem

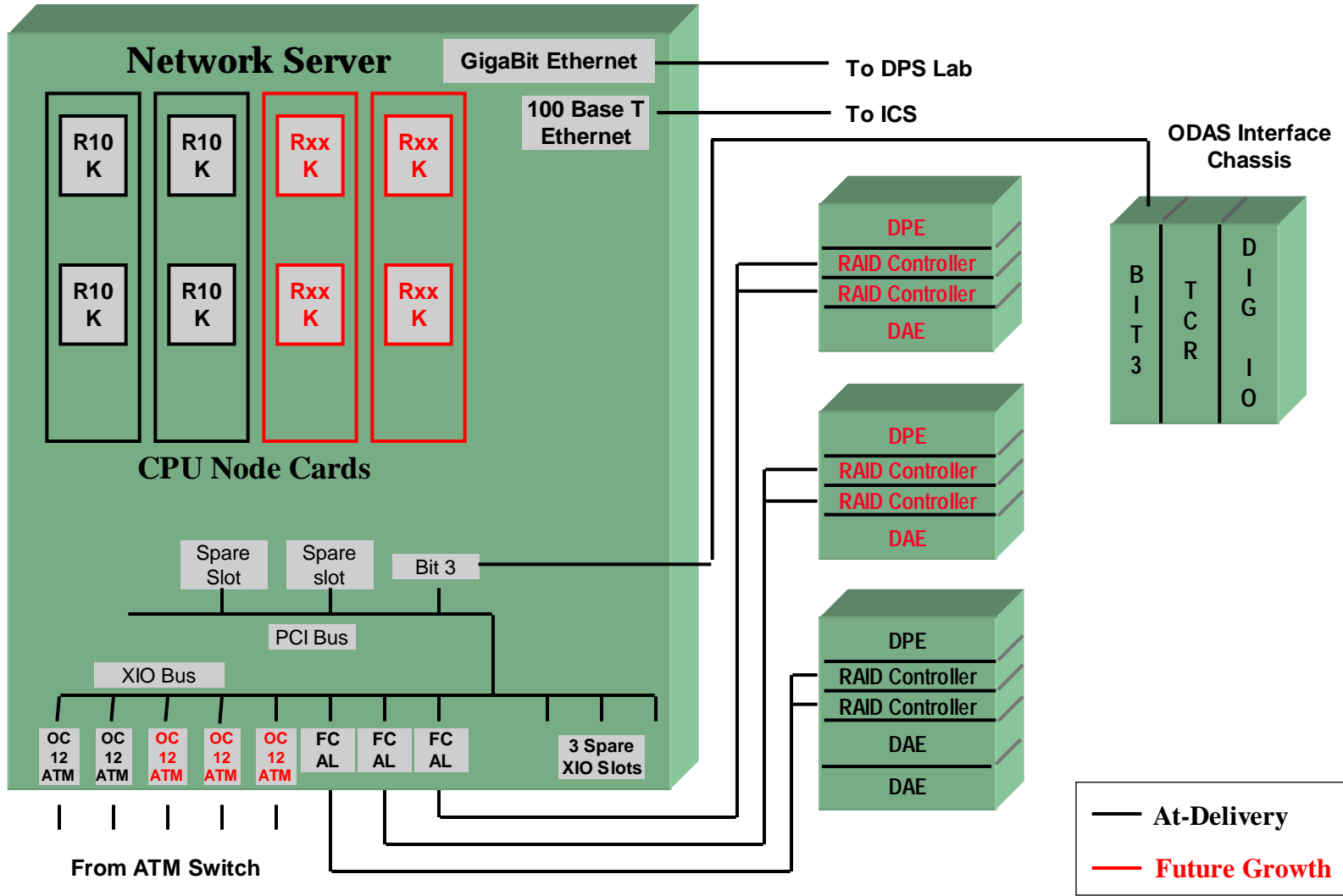


- ❑ **COTS Recording Hardware**
 - **Network Server (SGI Origin 2000)**
 - **Fiber Channel RAID (SGI Origin FibreVault RAID)**

- ❑ **Standards Based High-Speed Interfaces**
 - **Asynchronous Transfer Mode (ATM) OC-3c, OC-12c SONET**
 - **Dual Fibre Channel arbitrated loop**
 - **100baseTx & 1000baseTx Ethernet**

- ❑ **COTS Data Archival/System Backup Hardware**
 - **Dual DLT 7000 drives**

Recorder Block Diagram



Recorder HW Implementation



□ Rack Mountable Origin 2000 Network Server

- **System at Delivery (80 Mbytes/sec)**
 - » 4 R10K processors (2 per node card)
 - » 2 XIO OC-12 ATM card
 - » 1 XIO Dual-AL Fiber Channel Card
 - » 1 PCI card for IRIG Time

- **Full System (300 Mbytes/sec)**
 - » 8 processors (4 R10K + 4 R??K)
 - » 6 XIO 4-port OC-3 or 2 XIO OC-48 ATM card
 - » 3 XIO Dual-AL Fiber Channel cards
 - » 1 PCI card for IRIG Time
 - » 2.56 GB/sec sustained system bus throughput



Recorder HW Implementation

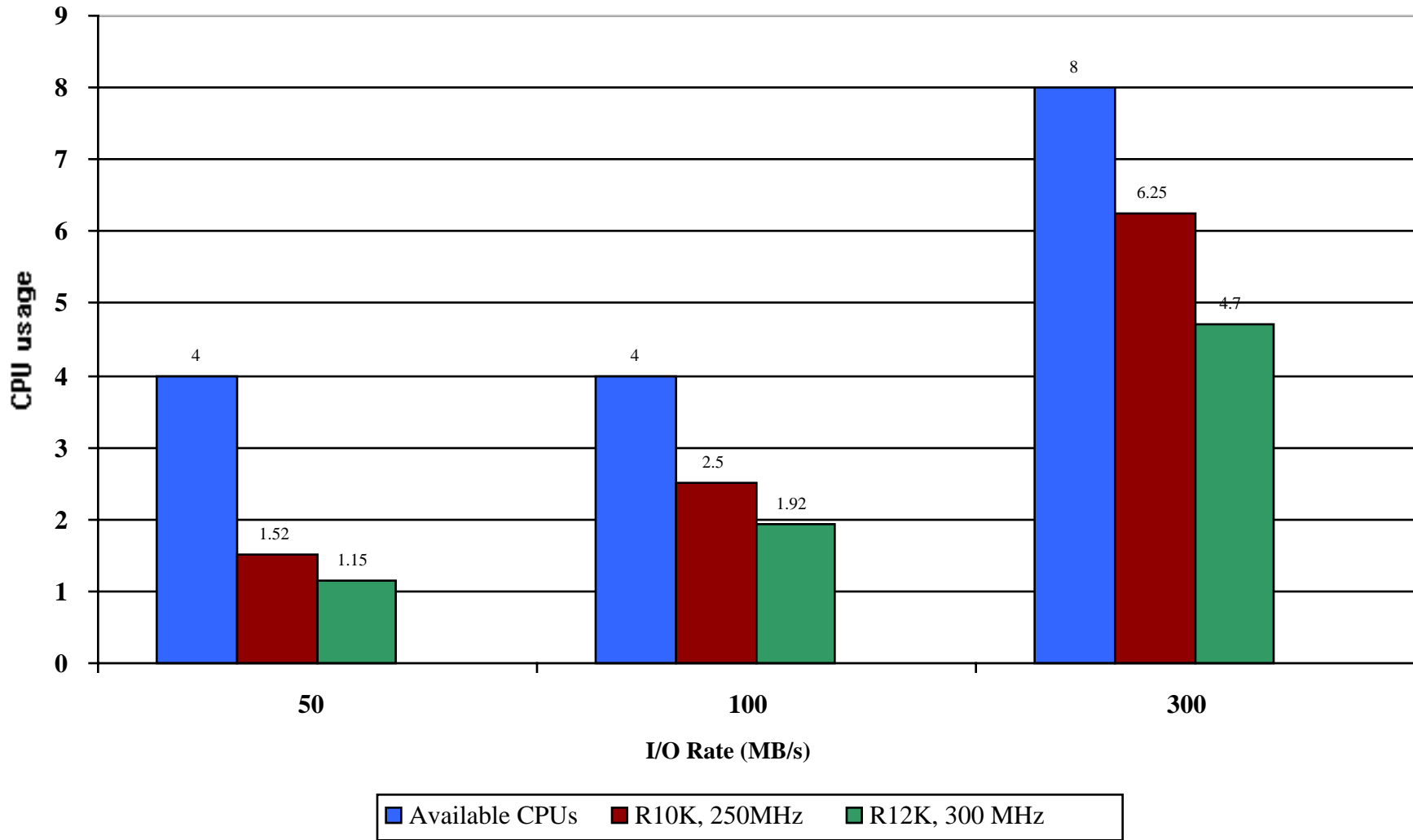


□ Silicon Graphics Fiber Channel RAID System

- RAID Level 3 implementation
- Dual Arbitrated Loop interface with server
- System at delivery (80 MBytes/sec)
 - » 1 Disk Processor Enclosure (DPE)
 - » 2 Disk Array Enclosures (DAE)
 - » 2 RAID Controllers (in the DPE)
 - » 100+ MB/sec throughput, 432 GB capacity
- Full-Up System (300 MBytes/sec)
 - » 3 Disk Processor Enclosures (DPE)
 - » 4 Disk Array Enclosures (DAE)
 - » 6 RAID Controllers (in the DPE's)
 - » 300 MB/sec. throughput, 2.0 TB+ capacity



CPU Utilization





RAID Throughput

