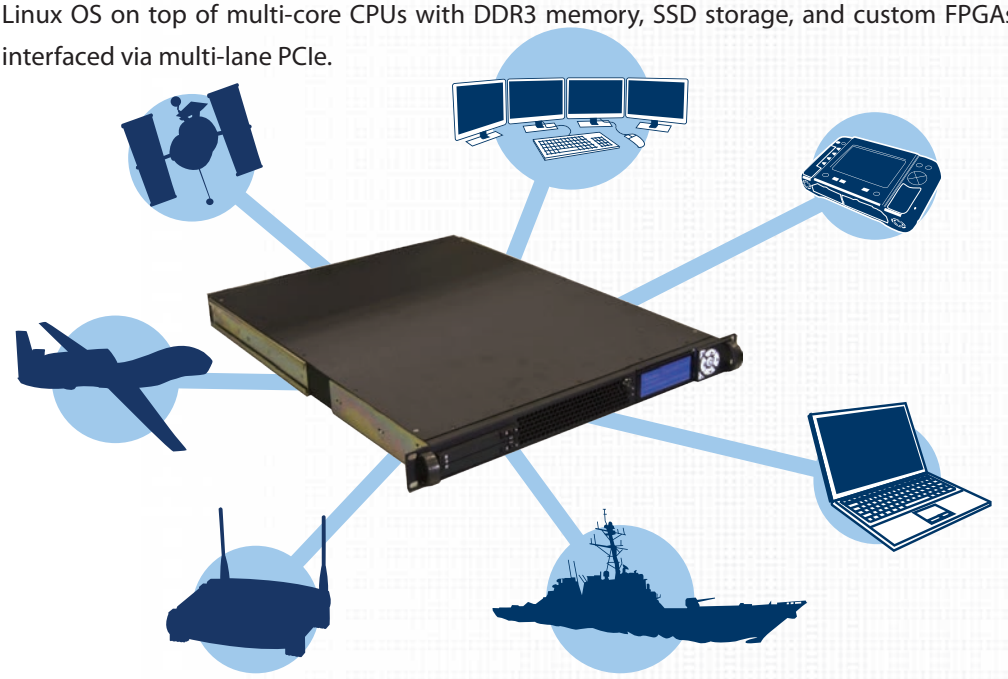
SDL/13-472

SPACE DYNAMICS LABORATORY

DATA NETWORKING GROUP

The Space Dynamics Laboratory's (SDL) Data Networking Group provides cost-effective data network systems and development services to government and military agencies. Our network expertise ranges from low- to high-speed communication solutions, including technologies such as 10 Gb Ethernet and OC-192/STM-64 SONET/SDH. We have also worked extensively in airborne data communications, including CDL over fiber or copper and ATM downlinks.

In addition to network interfaces, our systems typically include embedded processing capability for data analysis. Our platforms leverage COTS components where possible and are readily adaptable to meet customer needs. A typical architecture for our systems is a Linux OS on top of multi-core CPUs with DDR3 memory, SSD storage, and custom FPGAs interfaced via multi-lane PCIe.



SDL couples our deep data networking expertise with an excellent record of on-time, on-budget program execution. When needed, the group draws on the larger SDL organization for additional manpower and expertise. As a non-profit University Affiliated Research Center (UARC), all work is government owned, including production-ready technical data packages. SDL is small enough to maintain intimate contract execution and our ISO 9001 certification is indicative of our commitment to high quality engineering practices.

NETWORK INTERFACES
- PCI, PCIe, PC104
- 10/100/1000 Ethernet (copper)
- 10 Gb Ethernet (optical)
- PoS, ATM, PDH, OTN
- Up to OC-192/STM-64 SONET/SDH
- Many more protocols

AIRBORNE PROTOCOLS
- CDL over fiber & copper
- CDL within ATM & Gb Ethernet

EMBEDDED SOFTWARE
- Custom software
- VxWorks
- Linux
- Web: Java, Javascript, Apache, CSS RESTful, AJAX, PHP
- Databases: SQL, MySQL, PostgreSQL, SQLite

NETWORKED SOFTWARE
- Web or Windows
- Client server software
- Remote device configuration
- SOAP & RESTful interfaces

HARDWARE DEVELOPMENT
- Xilinx, Altera, Lattice, Actel FPGA design
- SERDES design
- Small form factor design
- CPU, microcontroller integration
- Board level design & prototyping
- System integration & test
- Prototype assembly

MECHANICAL/ENVIRONMENTAL
- Mechanical design & 3D modeling
- Thermal modeling & verification
- EMI/EMC, shock/vibration testing
- Full machine shop

Space Dynamics LABORATORY
Utah State University Research Foundation

1695 North Research Park Way • North Logan, Utah 84341 • Phone 435.713.3500 • www.sdl.usu.edu

DATA NETWORKING GROUP

EXAMPLE PROJECTS

SKY LYNX AIRBORNE SENSOR RECEIVER, RECORDER, & SIMULATOR

SKY LYNX 2 FEATURES
- Dual 2.6 GHz multi-core Intel® CPU
- 1U or 2U configurations
- CDL & ATM PCIe I/O boards
- Up to 15 TB storage capacity
- Sensor data record & playback
- Expansion using PCIe add-in cards
- Flexible system w/various expansion options

SENSORS SUPPORTED
- SHARP (CDL)
- ATARS (CDL)
- Global Hawk (CDL)
- ASARS (ATM)
- SYERS (ATM)

Sky Lynx receives, records, and simulates various airborne reconnaissance sensors including both CDL and ATM platforms such as Global Hawk and U2. Sky Lynx translates these sensor protocols into Gb Ethernet for ground station consumption. In addition to data translation, Sky Lynx 2 can support up to 15 TB of disk space allowing up to 30 days of mission storage and playback.

Sky Lynx 2 is a powerful and flexible Linux-based server, offering dual Intel CPUs in a 1U or 2U rack-mount configuration. Its PCIe sensor interface cards can be configured as needed to support multiple sensor types. Additionally, other PCIe expansion cards can be added if necessary for full mission support.

NEXUS NETWORK ANALYSIS DEVICE

NEXUS FEATURES
- 4 core 2 GHz Intel CPU
- PCIe + FPGA architecture
- Blade or 1U configurations
- 4 GB DDR3 & 512 GB SSD for storage
- Client/server system

PROTOCOLS SUPPORTED
- Up to OC-192/STM-64 SONET/SDH
- OTN, PDH
- FEC, enhanced FEC
- 10 Gb Ethernet (optical)
- 1 Gb Ethernet (copper)

SDL's Nexus is a state-of-the-art network analysis system. Nexus is packaged as either an IBM BladeCenter™ blade or 1U rack mount configuration. It implements an Intel i7 CPU connected to SDL's custom-designed network packet processor (NPP) card through a high-speed PCIe architecture.

Nexus connects to the network using both 10 Gb Ethernet and OC-192/STM-64 SONET/SDH interfaces. Internal memory is comprised of 4 GB of DDR3 memory, a hardware CAM, and a removable 2.5" SSD.

Nexus exemplifies SDL's experience in sophisticated digital design, high-speed networking, and hybrid embedded Linux/FPGA/PCIe architectures. Nexus communicates to a remote Windows Graphical User Interface (GUI) via a SOAP or RESTful interface for system command and control, and to report system status and network analysis results.

SDL welcomes all inquiries. To discuss how our Support Hardware Branch can aid your next project, please contact:

Doug Jewell, Branch Head
Brent Carlsen, Program Manager
Matt Cupal, Program Manager

Phone 435.713.3930 • engineeringsupport@sdl.usu.edu

Space Dynamics LABORATORY
Utah State University Research Foundation

1695 North Research Park Way • North Logan, Utah 84341 • Phone 435.713.3500 • www.sdl.usu.edu