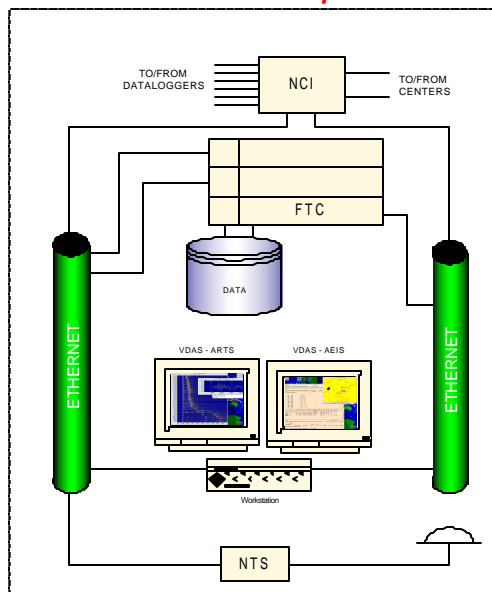


VDAS Data Acquisition Center



Kinematics' VDAC is a commercial-off-the-shelf (COTS) data acquisition center for a Verification Data Acquisition System (VDAS) addressing the special needs of the nuclear treaty verification community. The VDAC is a distributed open-architecture product designed to provide a comprehensive set of environmental monitoring data and processed information. The VDAC provides a fault-tolerant computing environment to address the mission critical aspect of nuclear treaty verification, including the latest developments in real-time data acquisition and signal processing, communication and computer networking technologies. Open-architecture is central to the VDAC because it not only supports current requirements but can also be easily adapted to meet future needs. The VDAC is based on COTS products from high-quality, high-volume manufacturers, resulting in a solution which offers reliability, scalability, flexibility, security, and lowest cost-of-ownership.

VDAS Data Center

The VDAS Data Acquisition Center uses modular, open-architecture consisting of four main parts:

- Network Communication Interface
- Fault Tolerant Computing System
- VDAS-Antelope System Software Package

- System peripherals

The VDAC fully complies with United States Air Force SDAS/OMS specifications.

Network Communication Interface

The Network Communication Interface (NCI) handles all incoming and outgoing data streams, forwarding incoming data to the primary and backup Local Area Network (LAN) from which it is distributed to appropriate computing resources

using TCP/IP socket connections. Optionally, the NCI may have firewall capabilities to secure the Wide Area Network (WAN) communication link.

Fault-Tolerant Computing System

Data acquisition and processing is performed on a Fault-Tolerant Computer (FTC), a triple-redundant Sun UltraSPARC based workstation extending computer system availability beyond 99%. The FTC consists of three independent but identical CPUs with memory. These three hot-pluggable modules run in parallel, and/or clock synchronously. A 3-way voting architecture compares the results between modules. In case of a faulty CPU, the corresponding module is voted out and disabled, while applications continue to run.

A fault-tolerant networking I/O on the FTC is achieved via three Ethernet connections with 3-way failover. Each controller has the same IP address but only one interface

is active. The FTC provides fault-tolerant disk space through independent SCSI connections to a 2-way or optionally 3-way mirrored disk subsystem. All components of the FTC are hot-pluggable and field replaceable.

The reviewing workstation is equipped with two monitors for optimal graphic display of all important control and monitoring Graphic User Interfaces (GUIs). Data processing and review are performed on this workstation, which has one Ethernet interface for each of the two redundant VDAS LANs in order to maintain high availability of this computer on the network.

VDAS- Antelope Software

The VDAS-Antelope consists of two major sub-systems:

- ARTS, the VDAS-Antelope Real-Time System
- AEIS, the VDAS-Antelope Environmental Information System

The VDAS-Antelope Real-Time System provides full functionality for network and array operations and control, including unique features such as:

- The ability to support a wide variety of sensor types and models
- Real time data acquisition to a non-volatile disk ring-buffer
- Ring-buffer on mirrored disks, limited only by maximum file size and available disk space
- Interactive control of field equipment through GUI
- State-of-health monitoring GUI
- Comprehensive calibration functions
- Data and command authentication
- CD-1 data format creation/distribution
- Real-time automated data processing

It also offers interactive and batch processing, information system functions, automated distribution of

data and processed results (e.g., via AutoDRM), and batch mode array processing.

The VDAS-Antelope Environmental Information System uses relational database (RDBMS) formalism. Seismic applications use the CSS v. 3.0 schema for information organization. The relational database resides on a RAID 1, mirrored disk subsystem for high data security, or an optional RAID 5 system. The AEIS comes with all the tools necessary to review seismic, meteorological and other environmental information. Many data format conversion functions are implemented, including conversion from the extended CSS database to CD-1 format (and CD-2 in the future) and vice versa.

VDAS-Antelope runs on Sun Microsystems' Solaris operating system running on SPARC architecture. In addition to providing specific functionality for seismic monitoring systems, Antelope provides a robust and versatile platform to support other non-seismic monitoring applications such as infrasound, hydroacoustic, meteorological and more.

System Peripherals

Two auto-sensing 10/100Base-T hubs provide a flexible Ethernet infrastructure for the primary and secondary LAN. Both hubs and the NCI are connected to a single but redundant power unit with two hot-pluggable power supplies and fans. A GPS network timeserver provides timing accuracy to better than 1 millisecond which is distributed to all components via

the NTP. This allows for correct timing and scheduling of all transactions. An optional UPS subsystem with line conditioning and comprehensive grounding and lightning protection adds to the overall reliability, extending computer system availability beyond 99%.