L3’s is proud to offer the latest high-performance real-time I/O computing platform.

L3 Telemetry & RF Products’ (L3 T&RF) is proud to offer its latest high-performance real-time I/O computing platform, Avalon. Based on the widely successful System 550 product family, Avalon offers the performance of an asymmetric multi-processing platform with a broadcast bus for real-time determinism. All while approaching a PC price range.

This true real-time system provides automatic data merging as well as low latency, deterministic processing for up to 1 million tags.

Avalon runs L3 T&RF’s Java-based Vista™ Enterprise Telemetry Software or Unix-based System 500 Applications Software.

The system is completely modular, allowing solutions to be scaled from a single telemetry or avionics input stream to multiple input streams in a single chassis. General functions include telemetry processing, satellite commanding, avionics acquisition, simulation and processing.

L3 T&RF also offers a large tool set with the Avalon system, including a rich library of standard algorithms, custom algorithm development, data storage & playback, real-time alarms, 2-D and 3-D data displays and Application Programming Interfaces (APIs). time tagging of input data with 1-microsecond resolution for both real-time or playback applications.

FEATURES/BENEFITS

- Mid-range, multi-channel, real-time telemetry/avionics platform for up to 1 M tags
- Real-time deterministic operating system
- State-of-the-art PMC and carrier architecture
- Up to 20 PMC slots in a slim-profile 4U chassis
- Real-time MUXbus broadcasts data to all modules simultaneously
- Extremely low latency multiple I/O data merging with time correlation
- 4-slot bi-directional carrier includes arbitration
- Runs Java-based Vista™ Enterprise Telemetry Software
- Architecturally compatible with System 550
- Full range of PMC and VME-based I/O options
- Fits standard 19 in. rack
APPLICATIONS INCLUDE

- Flight test telemetry
- Launch vehicle control and monitoring
- Packet communications multiplexing and de-multiplexing
- Direct data acquisition from high-performance sensors
- Avionics equipment test and integration
- Manufacturing test

DESIGNED WITH TOMORROW IN MIND

The Avalon™ is designed for high-speed, high-performance real-time data acquisition and processing. It’s portable, rugged and robust for applications from mission control rooms and laboratories to flying test beds and ships. In fact, the Avalon is based on the successful System 550, which is installed at over 800 locations worldwide — no other COTS solution is as fielded or adaptable.

The open architecture of the Avalon system provides a comprehensive range of data I/O that includes PCM telemetry, IRIG time, MIL-STD-1553, ARINC-429, CCSDS, NTDS, voice, analog, digital, and serial streams.

A typical standalone system consists of a front-end chassis with application specific VME and PCI Mezzanine Card (PMC) boards, connected to one or more workstations (UNIX, Linux, and Windows) via a local area network. The workstations interface with the Avalon chassis via the Vista software suite that provides a complete enterprise-level, operating environment for configuring, controlling and monitoring the Avalon system.

Systems can be ordered as complete turn-key solutions or as individual chassis and appropriate I/O boards to be embedded and controlled via the Java-based Applications Programming Interface (API).
AVALON SPECIFICATIONS - BASE SYSTEM CHASSIS

INPUT
Telemetry Receiver/Combiner
PCM Bit Sync
PCM Frame Sync
PCM Decon
MIL-STD-1553
Analog, Digital
Serial
IRIG Time
ARINC 429
Voice
NTDS
Video

MASS STORAGE
SCSI
Fiber Channel

NETWORK
Ethernet
SCRAMNet
Fiber Channel

HARDWARE PROCESSING
Power PC (FPP)
Network Workstations

SOFTWARE PROCESSING
CCSDS

CHASSIS CONFIGURATION
Chassis Dimensions 7 in. high (4U) x 19 in. wide x 20 in. deep (22.5 in. deep with rack slides)
Rear Panel I/O Slots 18 available
Rear I/O Connector Panel 27 application-unique units, 4.8 in. x 0.6 in.
Rack Mounting Standard rack-mount kit
Weight (full modules) 45 lb.
Power Consumption 350 W (maximum configuration); 160 W typical

Operating Environment
Temperature 50 °F to 113 °F (10 °C to 45 °C)
Relative Humidity 10% to 90%
Altitude (unpressurized) 0 to 10,000 ft. (0 to 3,048 m)

Non-Operating Environment
Temperature -40 °F to 140 °F (-40 °C to 60 °C)
Relative Humidity (non-condensing) 0% to 95%
Altitude 0 to 30,000 ft. (0 to 9,144 m)
Input Voltage Range 85 VAC - 264 VAC
Input Frequency Range 47 Hz - 63 Hz
Approvals Pending CE, FCC-A

Application Module Size
MUXbus (9U) 6.80 in. high (160 mm) x 14.4 in. wide (366 mm) W
VMEbus (6U) 6.80 in. high (160 mm) X 9.187 in. wide (233 mm)

Ordering Information
AVALON-R Avalon System Chassis, Rackmount, 6 VME Slots (includes System Controller and VME Mezzanine Carrier with Arbiter)
SCM595 System Controller 5 Module (Spare Only)

AVALON SPECIFICATIONS - AVALON-R MODEL

INTERNAL ARCHITECTURE
MUXbus
Function: High-performance real-time data transfer between modules
Type Data flow, synchronous
Bus Mode Broadcast
Transfer Rate 16 MHz, 96 Mbps (62.5 ns cycle time)
Size 20-bit tag* (address); 32-bit data
Tag Range 1M*
Arbitration Rotating priority
Number of Chassis Supported 1 to 8 chassis, using PMC Gateway Module Set(GWZ533-SET)

VMEbus
Function: Setup and control for all modules; data transfer for selected modules
Type Multi-master, asynchronous
Bus Mode Master/slab
Transfer Rate (VME64) 10 MHz, 80 Mbps (theoretical), 55 Mbps typical
Size 32-bit address (A32); 32-bit data
VME64 32-bit address (A32); 64-bit data
Arbitration Level priority
System Controller
Function: Performs network and module setup and control
CPU See System Controller 5 (SCM595) datasheet
Operating System Wind River VxWorks

Compatibility
SWA500 Applications Software
Vista™ Software

OUTPUT/SIMULATION
PC/Computer
PCM Simulator/Encoder

VMEbus
Function: Setup and control for all modules; data transfer for selected modules
Type Multi-master, asynchronous
Bus Mode Master/slave
Transfer Rate (VME64) 10 MHz, 80 Mbps (theoretical), 55 Mbps typical
Size 32-bit address (A32); 32-bit data
VME64 32-bit address (A32); 64-bit data
Arbitration Level priority
System Controller
Function: Performs network and module setup and control
CPU See System Controller 5 (SCM595) datasheet
Operating System Wind River VxWorks

Compatibility
SWA500 Applications Software
Vista™ Software

HARDWARE PROCESSING
Power PC (FPP)
Network Workstations

SOFTWARE PROCESSING
CCSDS

System Controller
Function: Performs network and module setup and control
CPU See System Controller 5 (SCM595) datasheet
Operating System Wind River VxWorks

Compatibility
SWA500 Applications Software
Vista™ Software

IRIG-106 Chapter 8
IRIG-106 Chapter 10
Standard Algorithms (150+)
Custom Algorithms
Application Programming Interfaces CCSDS

IRIG-106 Chapter 8
IRIG-106 Chapter 10
Standard Algorithms (150+)
Custom Algorithms
Application Programming Interfaces CCSDS

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IRIG-106 Chapter 10
Standard Algorithms (150+)
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CARRIER TECHNOLOGY

PMCs AND CARRIER
L3 T&RF’s movement to the PCI Mezzanine Card (PMC) form factor across its product families began as an IR&D technology insertion capitalizing on all of the speed and interoperability of PCI while adding a high-reliability connector system and mezzanine form factor.

The result is an I/O mezzanine card system that not only enjoys direct silicon support, but also has the muscle to handle the next generation of I/O technologies.

VME CARRIER FEATURES
- Accepts one to four standard PMCs
- Occupies only a single VME system bus slot, yet accommodates up to 4 diverse functions in addition to MUXbus arbitration
- Sustains full onboard PCI bandwidth
- Bridges data between the PMCs and the real-time system bus at full data rates
- Electronically controlled patch panel moves signal streams between PMCs

BENEFITS
- Smaller form factor (increasing system I/O density)
- Reduced costs (reducing prices to customers)
- Reduced parts counts with the movement to FPGA based logic (reducing vendor supplied obsolescence issues)
- Cross-platform capabilities (allowing insertion into PC, VME, cPCI & Multibus hardware architectures)
- High-availability of COTS processor and networking components (adding value when core competencies are to be found in high volume industries)

This highly successful transition has allowed L-3 T&RF to develop a family of PMC I/O cards that service the telemetry, avionics, real-time and data-acquisition communities. These cards form the basis of the I/O capability for the Avalon as well as the System 550 and Vista PC-based product families.

The multi-function VME Mezzanine Carrier (ZCM596) accommodates up to four (4) industry-standard PCI Mezzanine Cards (PMCs), and the VME Mezzanine Carrier with Arbiter (ZCA596) can also perform arbitration for the PMCs. This dramatically increases the functional density of the Avalon chassis more than four-fold, allowing five (5) slots worth of functions to fit into a single VME slot.

PMC modules are defined by the IEEE 1386.1 standard to follow the same electronic design as PCI cards, but in a mezzanine card form factor. One to four 2.9-inch by 5.9-inch (75 by 150 mm) boards attach to the carrier motherboard as daughter cards and occupy a single 9U backplane slot.

The carrier functions as a bridge between the standard PCI bus, connecting the PMCs to the real-time MUXbus and the VMEbus at full rates. Data can also move between PMCs on the MCM at full PCI bus rates or with an onboard “electronic patch panel” to move serial data between PMCs.
The MUXbus™ Advantage

The Avalon is designed to take advantage of industry standards like the VME and PCI buses. This means the Avalon can accommodate industry’s full range of state-of-the-art general and application specific modules. But even the best standards have their limitations, that’s why we added the powerful MUXbus™ capability to the Avalon’s backplane. This exceptionally high-speed real-time data highway provides the backbone for determinism.

The MUXbus (P3 of the VMEbus) features a broadcast data flow architecture and deterministic arbitration design to ensure all specified modules within the system receive data simultaneously, at rates up to 16M words/sec and with latencies under one microsecond. This allows unparalleled performance vs. competing systems using only the P1 and P2 implementation of the VMEbus.

With the incorporation of the latest PMC Carrier II module, four PMC boards with fully independent functions can occupy the same space as a single MUXbus VME module. The result is performance that ensures:

• Latency under a micro second
• Data multiplexed and distributed without processor intervention
• Hardware-driven data flow
• Deterministic throughput, independent of data rates and configurations
• A parallel hardware architecture, whereby adding modules linearly increases I/O and processing performance
ACQUISITION

The Avalon system makes it easy to assemble, modify or merge multiple telemetry, avionics bus, time parallel or serial streams. It’s as easy as selecting the appropriate card/module and adding it to an empty slot.

The Avalon’s powerful data flow architecture lets you easily add new modules or chassis to accommodate additional data streams for increased acquisition capability.

PROCESSING

The Avalon’s data flow architecture is an excellent platform for embedded real-time processing. It provides a scalable, parallel, data-driven and deterministic computing environment, where adding real-time processors linearly increases throughput.

You can often eliminate programming tasks by quickly choosing, linking or chaining algorithms from a large library that includes CCSDS, data compression, statistics, alphanumeric and trigonometric algorithms, as well as those for decommutating large, complex telemetry formats or specialized avionics bus ICDs.

DISPLAY

Vista™ advanced software suite lets you visualize data, any way you choose. Written Java to be completely platform independent, visualizations can be in 2D graphs and alphanumeric formats, 3D aircraft and weapons models, moving maps with terrain features, or design your own from either a library of display objects or custom tailored designs.

Displays can be initiated by events such as out-of-limit events or timers. You can also update these displays on the fly in real-time, or use a “scrolling slider bar” to roll back and review recent past data.

SIMULATION & CONTROL

The Avalon is ideal for training and simulation, systems integration, test applications or satellite command and control. The system offers the ability to produce dynamic data for multiple PCM, MIL-STD-1553, analog and digital streams.

Additionally, the Avalon can simulate virtually any real-time input stream. These streams can be derived from multiple function generators or dynamically change in response to internal algorithms or external stimuli from high-fidelity simulations.
AVALON™ OVERVIEW

DISTRIBUTION
With its broadcast data flow architecture, the Avalon simultaneously delivers output to all modules in the same bus cycle — eliminating overhead or time delays to transfer the data to multiple recipients.

Data can also be distributed by reflective memory schemes or any commercially available network protocol.

APPLICATION PROGRAMMING INTERFACE (API)
The Avalon’s API is a robust Java based direct link between the front-end chassis, servers, workstations and PC’s on your network.

All features and capabilities accessed through the Vista GUIs can be controlled via this API.

Additionally, the API supports the integration of other software and hardware with either Vista or Vista supported products, which can easily be embedded into a larger system.

STORAGE
The Avalon’s storage capabilities are matched to any real-time application. Data can be archived to the workstation directly over the LAN or via SCSI or Fiber Channel to JBODs or RAIDs or any other COTS storage device.

Sophisticated play back software allows precise control of data playback by time or event and can even be run in a batch mode for post-test processing.

SETUP & CONTROL
System setup and control is easy with Vista’s Java based navigator, which allows you to quickly maneuver between system functions.

All functions utilize a point-and-click interface to visualize the entire system, create displays, define module and project set-ups, choose processing algorithms, select parameter attributes and create telemetry or avionics frame descriptions.

Alternatively, you can utilize custom developed software for the control and set-up of the Avalon via the Java based API.
The power and features of the System 550 in a smaller package with a lower price.