AE9000FW-1600BB
Wideband SIGINT Recorder

Rugged 1.6 GHz Baseband Disk Recorder

- Single channel analogue baseband recorder
- 3.2 GHz sampling frequency
- 1.6 GHz recording bandwidth
- 8-bit recording depth
- SPF/QSPF interface for comms. applications
- Optional input filtering

- 24 TB removable Disk Pack
- Real-time FFT/waterfall display
- Intuitive Graphical User Interface
- Community-standard headers supported
- Data extraction direct to workstation/network or portable media

Figure 1: Avalon AE9000FW-1600BB Disk Recorder (front view).

Technical Overview

The *NEW* **Avalon AE9000FW-1600BB SIGINT Disk Recorder** (Figure 1) is designed to record an analogue baseband signal at a bandwidth of up to 1.6 GHz. The upper half of the unit includes the Analogue signal processing electronics (to the rear) and supporting assemblies and sub-assemblies, including (left to right): LED indicators, USB Port, System Disk (removable), TOC (table of contents) Disk (removable) and Docking Port for a portable Archive Disk. Multi-channel data interfaces are also available. AE9000-FW series recorders also include an SPF/QSPF interface for networking communications, with support for both fibre optic and copper cable. Protocols supported (within the SPF/QSPF specification) include: Ethernet (10Gbits/s 40GBits/s), Fibre Channel and InfiniBand.

The lower half of the unit comprises the digital signal processing, power supply and a pair of removable Disk Packs containing the storage media. The baseline storage configuration comprises twelve 1 TB Multi-level Cell (MLC) solid-state disk drives (SSD) per Disk Pack, giving 24 TB of storage capacity in the most rugged possible package.

AE9000FW-1600BB digitises the analogue baseband output of a communications receiver at a sample rate of 3.2 GHz and a sampling depth of 12-bits. For optimum recording efficiency, the resulting digital sample stream is converted to 8-bit resolution for recording to disk.

The recorder is able to reconstruct the recorded digital samples and output these in their original analogue form. During Stop and Record, the output signal is derived from the Record Input Signal. During Play, the output is derived from the data stored on the disk system.

Unlike previous generations of Avalon disk recorders, AE9000FW-1600BB records data in a standard computer file format, thereby simplifying the selection and copying of critical sections of recorded data. Data selection typically takes place either at the Tables tab or at the Timeline tab. The user may elect to save extracted data to any of the following media targets (see Figure 1): plug-in SATA Archive Disk Drive, attached USB memory device (if permitted), networked disk drive, RAID or SAN. Extracted data files can be saved with community-standard "attached" or "detached" headers.

Graphical User Interface (GUI)

The recorder is controlled from an external pc/laptop using an Avalon-developed GUI application that can be compiled to run under a range of Windows and Linux operating systems. Control is via the recorder's 1Gbit Ethernet control port.

The GUI controls all recorder functions, including: RECORD, PLAY, STOP, Data selection (for extraction/forwarding, etc.), Data handling, including transcription to attached and networked storage media and FFT (waterfall) display. Figures 2-5 show some typical screenshots (taken from a 2-channel variant of AE9000).
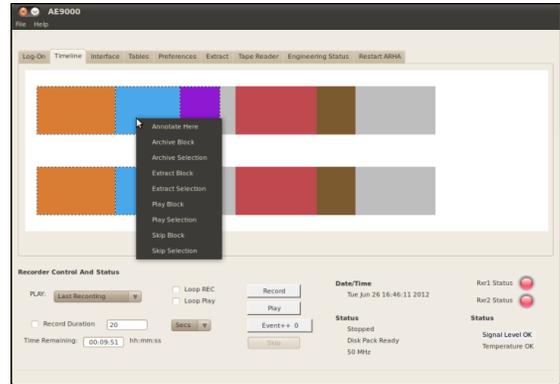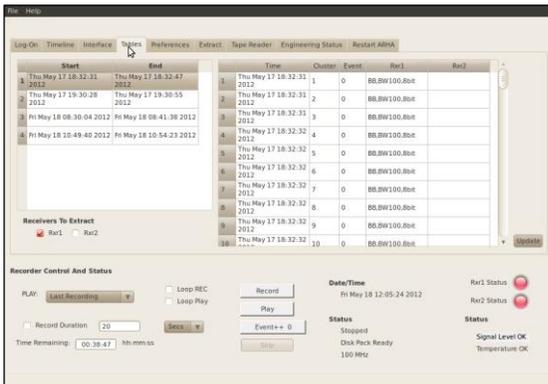

Figure 2: Interface tab.

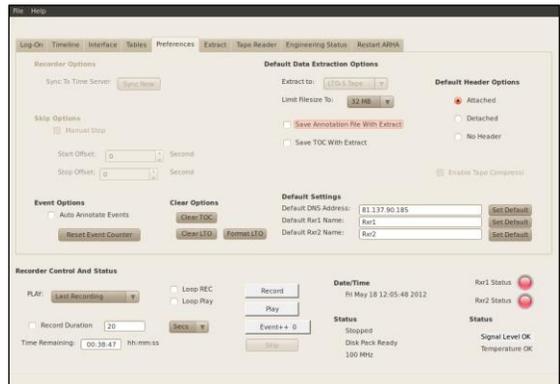

Figure 3: Timeline tab.

Figure 4: Tables tab.

Figure 5: Preferences tab.

Real-time FFT/Waterfall Display

AE9000FW-1600BB features a powerful real-time FFT function that can be used to visualise the incoming signal prior to, while or after recording. Figure 6 shows typical examples of real-time FFTs from our 500MHz IF recorder with matching tuner.
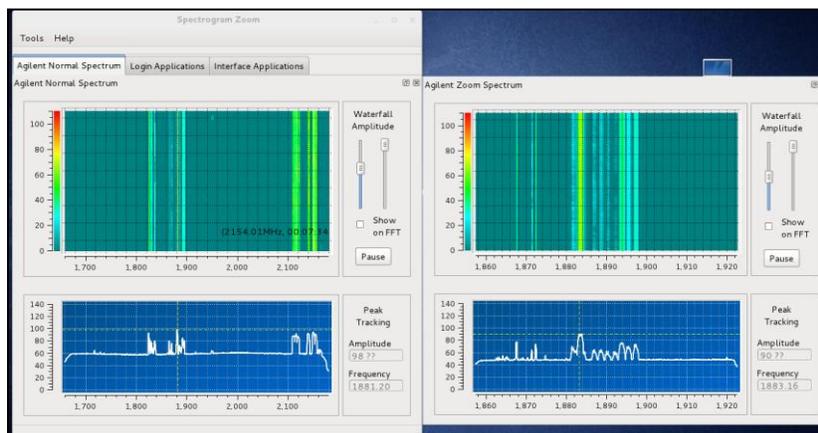

Figure 6: Typical real-time FFT spectra, showing normal plot (left) and 4xzoom plot (right).
Tuning frequency: 1.9 GHz. Bandwidth: 500 MHz

Technical Specifications (AE9000FW-1600BB)

Number of Channels:	1
ADC Sampling Frequency:	3.2 GHz.
Bandwidth:	1.6 GHz (8-bit mode).
Input Filtering:	High precision anti-aliasing filtering is optional.
ADC Resolution:	Sampling is at 12-bits. *Note: The four least significant bits are discarded by rounding after internal signal processing.*
Recording Depth:	8-bits (16-bits at half bandwidth optional).
Record Sample Rate:	3.2 GHz (8-bits).
Recording Duration: (24 TB, no looping)	2 hours (1.6 GHz BW, 8-bits).
Spur-free dynamic range:	>40 dB (8-bit).
Max signal level:	-10 to +10 dBm (typical) for full-scale recording.
Input impedance:	50 Ω (nominal).
Input Coupling:	DC.
Output Level:	0 dBm (typical) from full-scale recording.
Output Impedance:	50 Ohms (nominal).
Output Bandwidth:	1.6 GHz (8-bit mode).
Internal Reference Freq.:	10 MHz +/- 1 ppm after 10 minute warm up. *Note: The internal sampling oscillator is locked to this reference. This internal reference is available for use by other equipment.*
External Reference Freq.:	10 MHz, +10 to +16 dBm, +/- 1 ppm or better to lock the internal reference.
Network Comms. Applications:	SPF/QSPF interface for networking communications. Support for fibre optic or copper cable. Protocols supported (within the SPF/QSPF specification) include Ethernet (10Gbits/s 40GBits/s) , Fibre Channel and InfiniBand.
Data/Control Port:	1 Gb Ethernet (10 Gb Ethernet optional).
Storage Capacity (baseline):	24 TB (24 x 1 TB solid-state disk drives). *Note: Other storage configurations (rotating media, long-life SSD, etc.) optional.*
Media Life:	2,500 hours warranted minimum life at maximum bandwidth. Typical media life in excess of 10,000 hours.
Dimensions:	Full-rack x 4u x 560 mm deep.
Weight:	25 kg.
Power:	100 to 240 Volts, 12 to 6 Amps, 47 to 63 Hz, 600 Watts.
Environmental:	EMC/RFI: Designed to conform to the applicable sections of MIL-STD-461.
	Shock/Vibration: Designed to conform to the applicable sections of MIL-STD-810, and US Navy specifications. Similar construction approved for flight in USAF Rivet Joint and other military and civilian turbo-jet and propeller aircraft.
System Control:	Stand-alone, fully-featured Avalon-designed GUI (graphical user interface) running on an external laptop/PC (via Ethernet port).

These specifications are provisional and subject to change without notice. Please contact Avalon for full technical details.