

# Wideband Isochronous Serial/Network Gateway™

## APPLICATIONS

- ▶ High-rate mission payload data transport
- ▶ “Bent-pipe” data transfer from remote locations over WANs
- ▶ Low-cost replacement of leased / dedicated lines

## KEY FEATURES

- ▶ 400 Mbps serial-to-IP or serial-to-ATM Conversion
- ▶ 400 Mbps IP-to-serial or ATM-to-serial conversion
- ▶ TCP, UDP, or IP Multicast encapsulation when using IP WAN
- ▶ ATM AAL 5 encapsulation when using ATM WAN
- ▶ Simplex or duplex operation
- ▶ Automatically adapts to changing receive rates
- ▶ Retransmits data out at the originally received rate with rate tracking
- ▶ Identifies lost PDUs or network packets and inserts user fill pattern
- ▶ Built-in network monitoring and Bit Error Rate Test (BERT) capabilities
- ▶ Robust handling of data source and network problems
- ▶ TCP/IP socket interface & SNMP for network monitor and control
- ▶ Intuitive, full-featured GUI



*Seamless, low-cost, precision transport of the most time-dependent wideband isochronous serial data, such as high-rate satellite payload or sensor output, across standard IP or ATM-based network segments.*

**WIDEBAND ISOCHRONOUS SERIAL / NETWORK GATEWAY OVERVIEW** The Avtec Wideband Isochronous Serial / Network Gateway (WING) transparently receives, packages and forwards a wideband isochronous serial data stream for transport across an IP or ATM-based Wide Area Network (WAN). Concurrently, WING unpackages isochronous serial data received via the WAN for retransmission through a high-speed serial interface. WING is ideal for time-dependent isochronous data communications applications such as satellite payload data transport, in which a fast, steady, uninterrupted data stream is of the utmost importance. A configuration of two WINGs, one on each side of a standard IP or ATM network segment, can replace expensive dedicated or leased lines in a distributed satellite ground network.

**HIGH, VARIABLE RATE PAYLOAD DATA TRANSPORT** WING is often deployed to support transport of mission payload data from the ground station to the mission operations center at rates far higher than the standard High-Speed Serial Interface (HSSI) rate of 51 Mbps. In addition to its support of data rates up to 400 Mbps, the

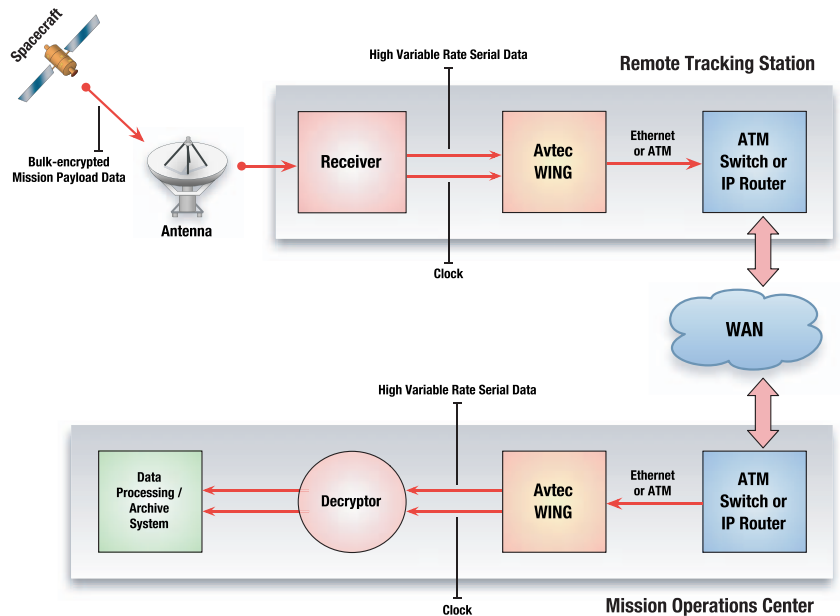
# Wideband Isochronous Serial/Network Gateway™

WING system is designed to accommodate the data rate fluctuation, inherent in satellite downlinks, that most standard network access equipment cannot tolerate.

## BULK-ENCRYPTED PAYLOAD DATA SUPPORT

Sensitive payload data is often bulk-encrypted on the spacecraft before downlink, so it cannot be frame-synchronized or decoded by equipment at the ground station. In this scenario, WING can operate as a “bent pipe,” transparently forwarding encrypted payload data to the mission operations center for decryption prior to processing with a high-speed front-end processor such as Avtec's PTP-EX. At the operations center, a second WING performs reconversion of the data packets/cells to the serial format required by most decryptors.

**SERIAL / IP / SERIAL CONFIGURATION** In the most common IP network configuration, two WINGs are deployed. The first Gateway receives variable high-rate serial data at rates up to 400 Mbps via High-Speed Serial I/O (HSIO) and formats it into fixed-length blocks. These fixed-length blocks are assembled into network packets along with optional sequence and/or received rate information, and are then sent over an IP network using either TCP client/server or IP Class D Multicast. On the destination end, the second Gateway receives the network packets, and if optional sequence information is included, it identifies and fills missing network packets with a user-specified fill pattern. The data is then retransmitted out the



**Common WING deployment scenario** In this “bent-pipe” configuration, two WINGs are deployed on either side of an IP or ATM-based WAN. Encrypted mission payload data is transparently forwarded via IP or ATM to the mission operations center, where it is reconverted to high rate serial data for decryption and processing.

serial interface at a fixed rate, or at the same rate that it was originally received with automatic rate tracking, if optional received rate information was included.

**SERIAL / ATM / SERIAL CONFIGURATION** In the most common ATM network configuration, two WINGs are deployed. The first Gateway receives variable high-rate serial data via HSIO and formats it into fixed-length blocks. These fixed-length blocks are assembled into PDUs (Protocol Data Units) along with optional sequence and/or received rate information, and are then sent over an ATM private virtual circuit (PVC) with a specified VCI/VPI (Virtual Channel Identifier/Virtual Path Identifier). On the destination end, the second Gateway receives the ATM PDUs, and if optional sequence information is included, it identifies and fills missing PDUs with a user-specified fill pattern. The data is then retransmitted out the serial interface at a fixed rate, or at the same rate that it was originally received with automatic rate tracking (if optional received rate information was included).

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**WING SYSTEM ARCHITECTURE** The WING is available in a ruggedized 4U form factor featuring dual Intel Xeon processors and redundant power, cooling, and onboard storage. The base system contains a single High Speed Serial I/O interface, a single Gigabit Ethernet WAN interface, and an optional ATM WAN interface. Application-specific configurations with multiple serial interfaces and/or multiple WAN interfaces in the same unit are also possible. The HSIO interface is Avtec's Monarch-EX card set, which consists of a PCI-6500 base board, and PCI-6550 or PCI-6551 ECL transition modules. The PCI-6550, with Triax connectors, and the PCI-6551, with female SMA connectors, both provide a single ECL differential data/clock pair input and dual ECL differential data/clock pair outputs.

**CONFIGURATION & MANAGEMENT** The WING can be controlled locally or remotely via an intuitive Graphical User Interface. A remote control library is provided for integration with satellite control systems such as OS/COMET and EPOCH 2000, and an SNMP agent is available to facilitate integration with management platforms such as HP OpenView.

## WING SPECIFICATIONS

### Physical Specifications

- 2U CompactPCI rack-mount chassis
- Dual Xeon 3 GHz, 2 GB RAM
- Mirrored, hot-swap 2x80Gb SATA HD
- Redundant power supplies
- Redundant cooling
- DVD+-RW for program load & data storage

### Serial I/O Interface

- Data Rates from 100 bps to 400 Mbps with future expansion to 622 Mbps
- Differential ECL Female Triax connectors with 124-Ohm differential termination on PCI-6550 - capability to 150 Mbps
- Differential ECL Female SMA connectors with 50-Ohm dual single-ended termination to -2V on PCI-6551 - capability to 400 Mbps with future expansion to 622 Mbps
- Transmit clock invert/non-invert selection
- Transmit data invert/non-invert selection
- Receive clock invert/non-invert selection
- Receive data invert/non-invert selection
- Single ECL clock/data reception
- Dual ECL clock/data transmission

### WAN Interface Options (specified at order placement)

- ATM DS-3
- ATM OC-3 (Multimode or Single Mode fiber)
- ATM OC-12 (Multimode or Single Mode fiber)
- 10/100/1000 Gigabit Ethernet (fiber or copper)

### LAN Interface

- 100 Mbps Ethernet Interface for network monitoring & control

### Packetizer / Re-serializer

- Converts 400 Mbps serial to ATM or IP
- Converts ATM or IP to 400 Mbps serial
- TCP Client/Server or IP Class D Multicast when using IP WAN
- Simplex or duplex operation
- Automatically adapts to changing receive rates
- Identifies lost PDUs and inserts user fill pattern
- Retransmits data out via the Monarch-EX High Speed Serial Interface at the originally received rate, with rate tracking
- Inserts user fill pattern on serial output underflow
- Built-in network monitoring and test tools
- Handles data source & network problems robustly

### Onboard Bit Error Rate Tester

- 31 Different pseudo-random patterns
- Pattern depths of 255 bits to 4096 Mbits
- Block Error Injection
- Walking Bit Error Injection
- Continuous Bit Error Injection of specified rate

### Monitoring & Control

- TCP/IP socket interface for network monitoring and control
- Included remote control library for integration with satellite control systems such as OS/COMET and EPOCH 2000,
- SNMP agent for SNMP-based monitoring and control via platforms like HP OpenView
- Full-featured, intuitive graphical user interface

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