SpectralNet™
## RF Anywhere . . . Over Any IP Network

KRATOS®

SpectralNet™ eliminates the physical distance limitations in RF signal distribution, enabling the optimization of ground infrastructure to improve flexibility, reliability, and reduce costs. SpectralNet performs real-time digitization of RF spectrum, lossless transport over arbitrary distances via private or public IP networks, and faithful analog signal reconstruction after transport. This simple ability to perform long-haul network transport and reconstruction of any RF signal brings disruptive changes to the ground segment architecture and enables significant benefits. SpectralNet's unique capabilities solve operational challenges while lowering capital and operational costs. SpectralNet is the only commercially available product that not only digitizes and transports RF data, but also reconstructs the RF signals, enabling reuse of your existing analog equipment. SpectralNet brings analog RF data to the IP network world, unleashing the power of virtualization and centralization of ground architectures for satellite and range ground systems, teleports, UAV and missile ranges, and ISR data processing.

Any Signal. Any Content. Anywhere

SpectralNet's high-fidelity digital conversion and faithful reconstruction means that any signal, regardless of modulation type, error-correction coding method, encryption, or frequency spread scheme, can be reproduced after transport. This includes all standard and proprietary modulations such as TDMA, CDMA, carrier-in-carrier, frequency agile, PSK, QAM, and many others.

SpectralNet™
Capabilities and Features

Instantaneous Bandwidth Range 10 kHz up to 54 MHz	Input/Output Tuning Range 50-2500 MHz
Faithful Analog Reconstruction	Precision Data Alignment
Lossless Transport	Deterministic Latency

Private or Public IP Network

Simplex or Full Duplex

Signal Processing

SpectralNet Appliances

SpectralNet Appliances

Real-time RF Over Any IP Network

Key Features

- Digitization of up to 54 MHz instantaneous RF spectrum
- Lossless transport over public or private IP networks
- Faithful reconstruction of digitized RF back to analog
- Noiseless signal distribution independent of distance
- Simplex or full duplex transport operation; independent selection in each direction
- Unicast or Multicast
- Input and output frequencies independently tunable from 50 to 2500 MHz
- User-selectable sampling depth from 4 to 12 bits per sample
- IRIG-B, 10 MHz, and 1PPS reference inputs for precision timing and accurate tuning
- Supports reference-less operation
- Industry-standard VITA-49 data format
- Slim 1U rack mount form factor and a small enclosure model
- 1 Gbit Ethernet compatible
- Simple to operate web GUI; enterprise-compatible management and status via SNMP REST API
- Noiseless signal distribution independent of distance
- Deterministic latency across the IP network
- Precision time alignment of multi-source data
- User-selectable bandwidth captures from 10 kHz to 54 MHz in 1kHz steps
- Manual and automatic gain control and output power level control for interfacing with downstream equipment
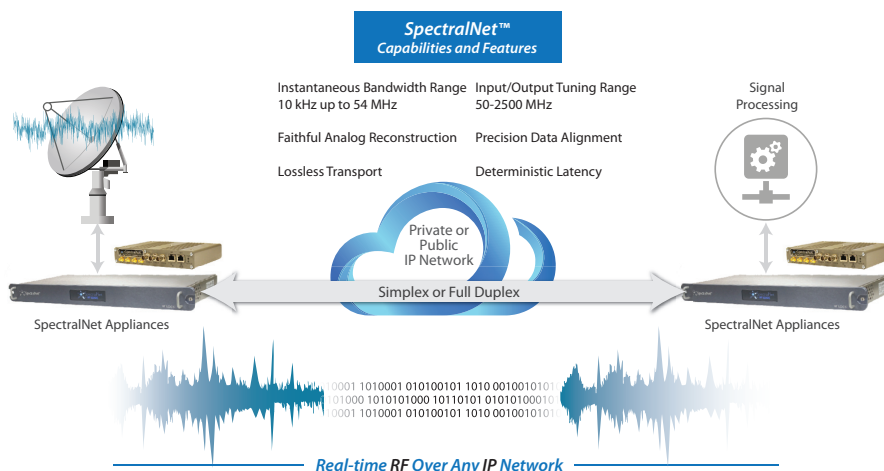
Guaranteed Data Delivery and Timing

The power of IP data and networks can transform your business, but IP networks are notorious for inconsistent delays and dropped packets. This is acceptable for many applications but not for RF delivery, where deterministic timing and signal integrity are critical. SpectralNet's patented pending technology overcomes the limitations of IP network transport, including non-deterministic delay and packet loss, to deliver RF spectrum anywhere over an IP network. SpectralNet can transport your RF spectrum via unicast or multicast with a user-defined, deterministic latency over non-deterministic IP networks. This capability enables the rest of your ground equipment to operate free of the signal degradations associated with coaxial or fiber-based RF transport. SpectralNet guarantees the deterministic and lossless RF transport over IP networks regardless of whether it's your own MPLS infrastructure or the public Internet.

Spectrum and Bandwidth Control

SpectralNet provides multiple tools to put you in control of the amount of bandwidth required to transport the digital IF signals. SpectralNet enables you to transport only the exact spectrum that you want using our Spectral Channel capabilities. Spectral Channels are selectable from 10 kHz to 54 MHz instantaneous bandwidth in 1kHz steps. Precise spectrum selection minimizes the amount network bandwidth required to transport your spectrum.

SpectralNet also allows you to select a sample depth supporting the signal dynamic range required for your particular application while minimizing the transport bandwidth the required. SpectralNet supports sample precision selection between 4 and 12 bits, providing up to 72 dB of dynamic range for the highest possible signal quality.

Precision Data Alignment

SpectralNet can align digital IF signals generated from the same RF source but captured at different locations. This precise data alignment combined with SpectralNet best source selection algorithms enables a host of use cases to minimize the impacts of signal loss at a particular RF reception site.

High Reliability for Your Mission Critical Data

The lightweight 1U rack-mount form factor minimizes space and power requirements. There is also a small enclosure model that takes up less than half of the width of the 1U model. In addition, units can be connected in hot-swap pairs with high-speed (<10 ms) automated error detection and failover, built-in.

Real World Application Examples

The elimination of the physical constraint of RF transport opens up a world of possibilities to optimize your operations and architecture, providing new services to your customers, including:

- Centralization of ground system operations to simplify operations and lower costs
- Effective rain fade mitigation to provide guaranteed service over high frequency satellites
- Unlimited antenna placement flexibility to lower costs and space requirements
- Virtualization of the processing portion of the ground segment to lower costs and increase operational flexibility
- Flexibility in the location of customer premise equipment or specialized processing equipment to enable new services for network customers
- Enabling new backup and disaster recovery scenarios to meet stringent SLA requirements
- Locating antennas in the most advantageous or low cost locations
- Transporting RF with noiseless signal distribution independent of distance