Digital Energy
Lentronics

JungleMUX
SONET Multiplexer

Powerful and Flexible Multiplexing Solutions

The Lentronics JungleMUX SONET Multiplexer delivers powerful optical networking solutions for critical communications applications. With a wide range of tributary interface units, the JungleMUX provides both transport and access capabilities for voice, data, IP/Ethernet WAN, video and utility teleprotection traffic in a single package. Harsh environment ready, the modular JungleMUX delivers flexible, secure and reliable communications.

Key Benefits

• Eliminate complex multi-device equipment solutions with a single integrated package
• Protect capital investment with seamless capacity upgrade from OC-1 to OC-48
• 5x9 system availability with redundant common equipment for path switched ring networks
• Fast path protection switching (<3 ms)
• Reduce connectivity, expansion, and configuration costs with modular solution
• Advanced network visibility from SONET level down to individual DS-0 signals
• Comprehensive network management capabilities using VistaNET
• Secure and dependable transport of critical services

Application Specific Optical Solutions

Energy
• Connecting substations, generation plants, control centers, and administration offices
• Highly secure traffic segmentation
• Teleprotection, SCADA, video surveillance, voice, IP Ethernet WAN

Oil & Gas
• Connecting production platforms, FPSO vessels, and on-shore facilities
• Voice, data, CCTV, IP/Ethernet for SCADA and security sub-systems

Pipelines
• Connecting block valves, metering, pumping / compressor stations and control centers
• Operational communications for voice, data, CCTV, IP/Ethernet WAN, security, safety and SCADA sub-systems

Transportation
• Connecting train platforms, traction power substations, wayside cabinets, maintenance facilities and control centers
• Emergency voice, passenger information and ticketing systems, train control, traction power and security sub-systems

Utility Hardened

• Meets IEEE 1613 specification for communications networking devices in electric power substations
• Reliable operation in extreme temperatures from -4°F to +140°F (-20°C to +60°C)
• Meets Earthquake Risk Zone 4 shock and vibration specification

Scalable Design

• Add/Drop Multiplexer supporting industry standard network topologies
• Optional site specific tributary interfaces for video, voice, IP/Ethernet and utility teleprotection applications
• High-bandwidth optical interfaces from OC-1 to OC-48

Robust & Reliable

• 5x9 System availability with Telcordia standards
• Fast path protection switching (<3 ms)
• Built-in test capabilities
• Designed with redundant common equipment for ring architectures
• VistaNET network management software provides complete system monitoring and diagnostics

Secure & Dependable

• Segregated and dedicated SONET payload assignments for each application optimize QoS and security
• Port and VLAN partitioning isolates and protects critical communications applications
SONET Network Access

Facing increasingly complex demands for communications and security, organizations are looking for cost effective, reliable solutions for managing mission critical operations. The robust design of the GE Lentronics JungleMUX SONET Multiplexer makes it the ideal optical networking solution for electric power utility, transportation, pipeline and many industrial requirements.

System Technology

This powerful SONET multiplexer has a modular design for ease of maintenance, configuration flexibility, and expandability.

The JungleMUX delivers the benefits of the Telcordia SONET telecommunications standards to applications previously serviced by a mix of proprietary and legacy standards based equipment.

The multiplexer provides redundancy for critical modules, with guaranteed performance over an extended ambient temperature range of -4°F to +140°F (-20°C to +60°C). It meets ANSI/EIEEE Surge Withstand Capability (SWC), Radio Frequency Interference (RFI) as well as Earthquake Risk Zone 4 specifications providing secure performance in harsh environments.

The JungleMUX is powered by 115 VAC or 24, 48, 130 VDC sources. Its built-in test capabilities can save the cost of purchasing SONET test equipment.

SONET Network Flexibility

Simply replacing optical transceiver modules allows users to expand an existing JungleMUX system to a higher capacity, while maintaining their capital investment.

Mixed access networks of T1, and OC-1/OC-3, combined with JungleMUX backbone rings of OC-3, OC-12 or OC-48 cost effectively distribute telecommunications services, allocating bandwidth only where it is needed.

The product also has the flexibility to operate with GE MDS and third party SONET microwave radios and higher capacity OC-n multiplexers.

Operations, Administration, Maintenance and Provisioning (OAM&P)

The JungleMUX takes advantage of the inherent network management capabilities provided by the SONET telecommunications standards.

VistaNET NMS software provides network visibility down to the individual circuit level at all nodes. This facilitates remote provisioning, monitoring, and alarm logging of the network from any node. Vistanet software operates on a Windows® based personal computer. An optional SNMP Network Management System (NMS) interface is available. Vistanet is also used for system diagnostics and troubleshooting.

Visibility of all JungleMUX equipment, including the DS-0 tributary units, improves maintenance response time and saves the operator money.
Applications

Electric Power Utilities
Originally designed for the unique needs of utilities, the JungleMUX system supports a wide range of specialty traffic, including teleprotection (direct transfer trip, pilot wire, and IEEE C37.94 optical interface to protection relays), surveillance video, substation automation, Ethernet WAN/IP and telephony.

High system availability is provided through redundant common equipment and compliance with Telcordia SONET standards for path switched ring protection architecture.

But the JungleMUX goes beyond SONET standards, offering the industry’s fastest path protection switching (<3 ms), and incorporating special design characteristics that allow it to meet ANSI/IEEE RFI and SWC standards for operation in harsh utility environments.

Transportation Corridors
For highway, roads, bridges, tunnels, rail transit, freight railway, and airport applications the JungleMUX system cost-effectively integrates services previously provided by proprietary and legacy standards based equipment. Now these services can be combined to receive the full benefits of a SONET network.

For applications such as video surveillance, fare collection, passenger information systems, train control, emergency voice and signalling, the JungleMUX is the optical communications product of choice.

JungleMUX networks support both 48 Mb/s and 12 Mb/s video wide area networks (WANs). Each analog video source (camera, VCR, DVD, etc.) is digitized with a user configurable compression algorithm for bit-rate bandwidth management and then integrated into a shared video WAN.

For incident detection in surveillance applications, intelligent bandwidth allocation allows more bandwidth to be instantly assigned to specific cameras, permitting a higher resolution and more frames per second. When required, audio and data channels may be transported with the video.

The JungleMUX video interface addresses the issues of quality versus bandwidth by efficiently transporting video signals.

An optional remote video interface accessory is also available, which cost effectively extends video capability up to 24.8 miles from a JungleMUX node via fibre optic cable.

Pipelines and Industrial Facilities
The rugged design, compact size and low power consumption of the JungleMUX also make it the ideal optical communications solution for oil, gas, refined products, water and slurry pipelines. Field proven industrial applications include electrical distribution protection and control in mines, as well as SCADA for onshore or offshore oil and gas production fields.

The JungleMUX SONET Multiplexer creates greater value for its user by carrying a multitude of services such as low speed polling data, SCADA, power measurement data, video surveillance, Ethernet WAN/IP and PBX phone drop extensions over a single network.
Specifications

**SIGNALLING RATES AND OPTICAL INTERFACES**

**OC-1 SIGNAL**
- Speed: 51.84 Mb/s
- Channels: 672 DS-0
- System Gain (singlemode fiber): @ 1310 nm 28 dB
- Optical Connector: FCPC

**OC-3 SIGNAL**
- Speed: 155.52 Mb/s
- Channels: 2016 DS-0
- System Gain (singlemode fiber): @ 1310 nm 20 dB (IR), @ 1310 nm 29 dB (LR), @ 1550 nm 34 dB (ELR)
- Optical Connector: LC

**OC-12 SIGNAL**
- Speed: 622.08 Mb/s
- Channels: 8064 DS-0
- System Gain (singlemode fiber): @ 1310 nm 13 dB (IR), @ 1310 nm 25 dB (LR), @ 1550 nm 25 dB (ELR)
- Optical Connector: LC

**OC-48 SIGNAL**
- Speed: 2.488 Gb/s
- Channels: 32.256 DS-0
- System Gain (singlemode fiber): @ 1310 nm 13 dB (IR), @ 1550 nm 31 dB (ELR)
- Optical Connector: LC

**NETWORK MANAGEMENT CAPABILITIES**
- Windows based OMS allowing network access from any node for full system monitoring and diagnostics
- Network visibility of every node, remote provisioning (monitoring and configuration of the network)
- Alarm logging and time stamping
- Simple troubleshooting and network maintenance
- Optional redundant NMS platforms
- Optional interface for SNMP Manager, allowing common NMS integration using IP

**VOICE UNITS**
- 4W VF
- Optional E&M signaling
- Point-to-point and multi-point

**2W VF**
- Optional E&M signaling

**2W FOREIGN EXCHANGE**
- Loop start, ground start or PLAR signalling

**VIDEO**
- NTSC/PAL analog video signal transport
- Dynamically assigned compression scheme
- 56 kbps to 10 Mbps bandwidth
- 1-30 frames/second update rate
- PTZ camera control capable
- Optional multi-service data and contact I/O circuits
- Remote video I/O assembly for fiber optic extension of video capability

**TELEPROTECTION UNITS**
- **TRANSFER TRIP**
  - Separate Transmit and Receive units, optional test panel
- **CURRENT DIFFERENTIAL**
  - HCB, CPD, SPD, RADHL pilot wire relay interfaces
- **CONTACT INPUT/OUTPUT**
  - Transport of contact closure
  - IEEE C37.94 fiber optic connection to protection relays

**ORDERWIRE**
- Party line voice circuit carried on 64 kbps channel of either SONET Transport or Path Overhead

**RELIABILITY**
- Per Telcordia TR-NWT-000332
- Ring system common equipment MTBF of 130,000 hours
- Linear system common equipment MTBF of 50,000 hours
- Refer to Technical Data Sheets for unit MTBFs

**POWER REQUIREMENTS**
- 24, 48, 130 VDC, or 115 VAC

**ENVIRONMENTAL**
- Operating
  - Temperature: -20° to +60° C (-4° to +140° F)
  - Storage: -40° to +70° C (-40° to +158° F)
- Temperature
  - Humidity: 5 - 95% non-condensing
- Power Substation
  - IEEE 1613

**PHYSICAL SIZE**
- **COMMON EQUIPMENT SHELF**
  - Height: 178 mm (7 inches)
  - Width: 483 mm (19 inches)
  - Depth: 423 mm (16.67 inches)
  - Weight: 3.6 kg (8 lbs)
- **CHANNEL EXPANSION SHELF**
  - Height: 134 mm (5.25 inches)
  - Width: 483 mm (19 inches)
  - Depth: 423 mm (16.67 inches)
  - Weight: 2.3 kg (5 lbs)

**POWER CONSUMPTION**
- 10 W for common equipment plus individual tributary unit power

**EMI/RFI**
- Meets ANSI/IEEE C37.90.2 RFI

**ISOLATION**
- Meets ANSI/IEEE C37.90.1 SWC

**VOICE UNITS**
- 4W VF
  - Optional E&M signaling
  - Point-to-point and multi-point

**2W VF**
- Optional E&M signaling

**2W FOREIGN EXCHANGE**
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**EMI/RFI**
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**ISOLATION**
- Meets ANSI/IEEE C37.90.1 SWC

**VOICE UNITS**
- 4W VF
  - Optional E&M signaling
  - Point-to-point and multi-point

**2W VF**
- Optional E&M signaling

**2W FOREIGN EXCHANGE**
- Loop start, ground start or PLAR signalling

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- DTMF signalling

**Tributary Functionality**

**DATA UNITS**
- **LOW SPEED DATA**
  - RS232 interface
  - Sub-rate multiplexing
  - Point-to-point and multi-point

- **HIGH SPEED DATA**
  - 64 (56) kbps rates
  - RS422, V.35, G.703 and OCUDP

- **N X 64 Kbps DATA ELECTRICAL INTERFACE**
  - N = 1 to 12 64 kbps channels
  - V.35 and 10/100 Mb/s Ethernet interfaces

- **DS-1**
  - 1.544 Mbps Data

- **DS-3**
  - 44.736 Mbps Data

**ETHERNET**
- IP connectivity
- LAN/WAN interconnect
- 10/100/1000 Mb/s learning bridge
- IEEE 802.3

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