

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/IEEE 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.

The JungleMUX can be customized to the user's requirements by equipping each site with specific modules as needed. New modules are added to the product line, as market needs dictate.

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.

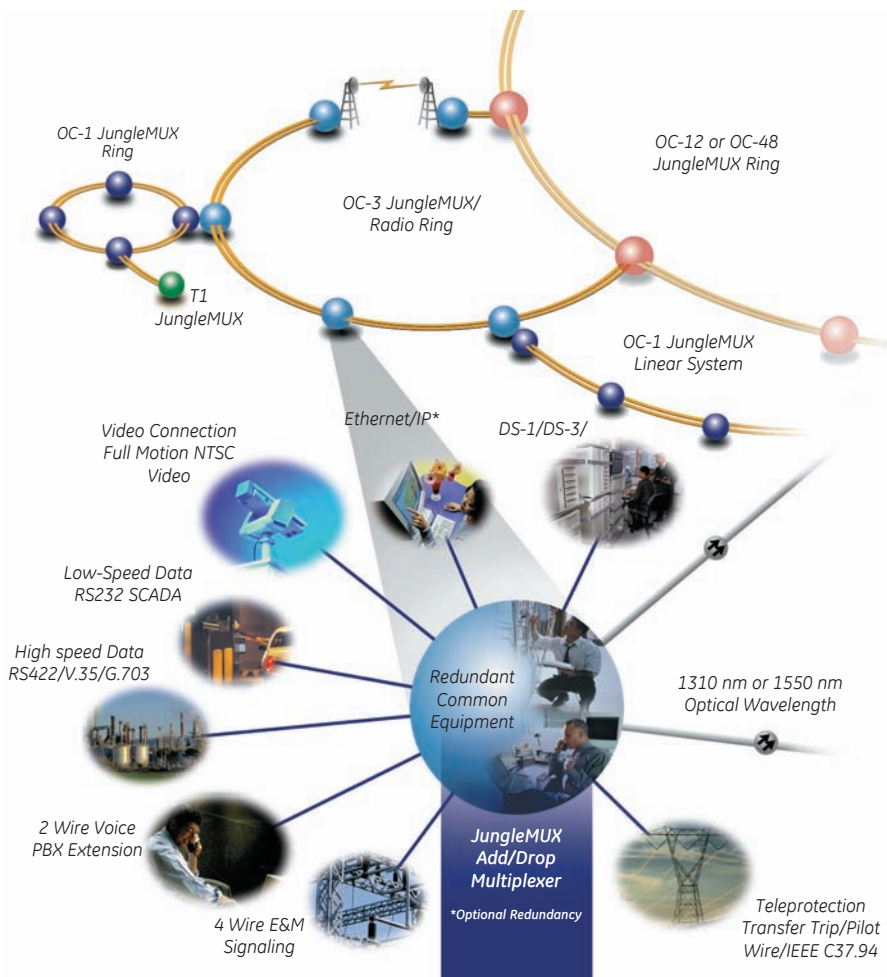
Operations, Administration, Maintenance and Provisioning (OAM&P)

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.

JungleMUX SONET Multiplexers



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.

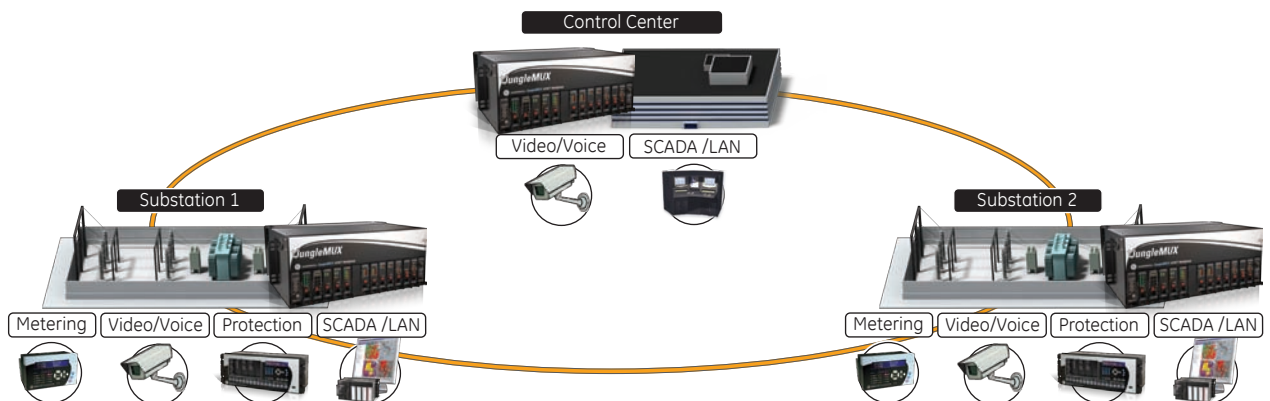
Pipelines and Industrial Facilities

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.



JungleMUX SONET Multiplexer Electric Utility Application



Specifications

SIGNALING RATES AND OPTICAL INTERFACES

OC-1 SIGNAL

| | |
|--------------------------------|------------|
| Speed | 51.84 Mb/s |
| Channels | 672 DS-0 |
| System Gain (singlemode fiber) | |
| @ 1310 nm | 28 dB |
| @ 1550 nm | 40 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) |
| System Gain (multimode fiber) | |
| @ 1310 nm | 11 dB (SR) |
| 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 |

| | |
|--------------------------------|-------------|
| 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) |
| @ 1310 nm | 26 dB (LR) |
| @ 1550 nm | 26 dB (ELR) |
| @ 1550 nm | 31 dB (ELR) |
| Optical Connector | LC |

NETWORK MANAGEMENT CAPABILITIES

Windows based PC NMS 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

EMI/RFI

Meets ANSI/IEEE C37.90.2 RFI

ISOLATION

Meets ANSI/IEEE C37.90.1 SWC

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

POWER CONSUMPTION

10 W for common equipment plus individual tributary unit power

ENVIRONMENTAL

| | |
|-----------------------|----------------------------------|
| Operating Temperature | -20° to +60° C (-4° to +140° F) |
| Storage Temperature | -40° to +70° C (-40° to +158° F) |
| 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) |

Tributary Functionality

DATA UNITS

LOW SPEED DATA

RS232 interface

Sub-rate multiplexing

Point-to-point and multi-point

HIGH SPEED DATA

64 (56) kb/s rates

RS422, V.35, G.703 and OCUDP

N X 64 KB/S DATA ELECTRICAL INTERFACE

N = 1 to 12 64 kb/s channels

V.35 and 10/100 Mb/s Ethernet interfaces

DS-1

1,544 Mb/s Data

DS-3

44,736 Mb/s Data

ETHERNET

IP connectivity

LAN/WAN interconnect

10/100/1000 Mb/s learning bridge

IEEE 802.3

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 kb/s to 10 Mb/s 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

N X 64 KB/S DATA OPTICAL INTERFACE

N = 1 to 12 64 kb/s channels

IEEE C37.94 fiber optic connection to protection relays

ORDERWIRE

Party line voice circuit carried on 64 kb/s channel of either SONET Transport or Path Overhead

DTMF signalling

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