

TN1U SDH Multiplexer



Powerful and Flexible Multiplexing Solutions

The Lentronics™ TN1U SDH Multiplexer delivers powerful optical networking solutions for critical communications applications. With a wide range of tributary interface units, the TN1U provides both transport and access capabilities for voice, data, IP/Ethernet Wide Area Network (WAN), video and utility teleprotection traffic in a single package. Harsh environment ready, the modular TN1U delivers flexible, secure, and reliable communications.

Key Benefits

- Eliminate complex multi-device equipment solutions with a single integrated package
- High speed fibre optic communications (STM-1, STM-4, STM-16)
- 99.999% 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 the SDH level down to individual 64 kb/s signals
- Comprehensive network management capabilities using VistaNET™
- Secure and dependable transport of critical services

Application Specific Optical Solutions



Energy

- Connecting substations, generation plants, control centres, 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 centres
- 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 centres
- Emergency voice, passenger information and ticketing systems, train control, traction power and security sub-systems



Utility Hardened

- Designed for reliable operation within harsh substation environments with fan-less operation, surge withstand capability, radio frequency immunity and wide temperature ranges
- Reliable operation in extreme temperatures from -20°C to +60°C (-4°F to +140°F)
- 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 voice, IP/Ethernet and utility teleprotection applications
- High-bandwidth optical interfaces from STM-1 to STM-16

Robust & Reliable

- 99.999% system availability with ITU-T 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 SDH payload assignments for each application optimize QoS and security
- Port and VLAN partitioning protect and isolate critical communications applications

SDH Network Access

Facing increasingly complex demands for communications and security, organisations are looking for cost-effective, reliable solutions for managing mission critical operations. The robust design of the GE's Lentronics TN1U SDH Multiplexer makes it the ideal optical networking solution for electric power utility, transportation, pipeline and many industrial requirements.

System Technology

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

The TN1U delivers the benefits of the ITU-T SDH 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 -20°C to +60°C (-4°F



to +140°F). Designed to meet ANSI®/IEEE Surge Withstand Capability (SWC), Radio Frequency Interference (RFI) as well as Zone 4 Earthquake specifications, providing secure performance in harsh environments.

The TN1U is powered by 115 VAC or 24, 48, 130 VDC sources. Its built-in test capabilities can save the cost of purchasing SDH test equipment.

The TN1U can be customised 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.

SDH Network Flexibility

Simply replacing optical transceiver modules allows users to expand an existing TN1U system to a higher capacity, while maintaining their capital investment.

Mixed TN1U access networks of STM-1/STM-4, combined with TN1U backbone rings of STM-4 or STM-16 cost-effectively distribute telecommunications services, allocating bandwidth only where it is needed.

The product also has the flexibility to operate with GE's MDST™ or third party microwave radios and higher capacity STM-n multiplexers.

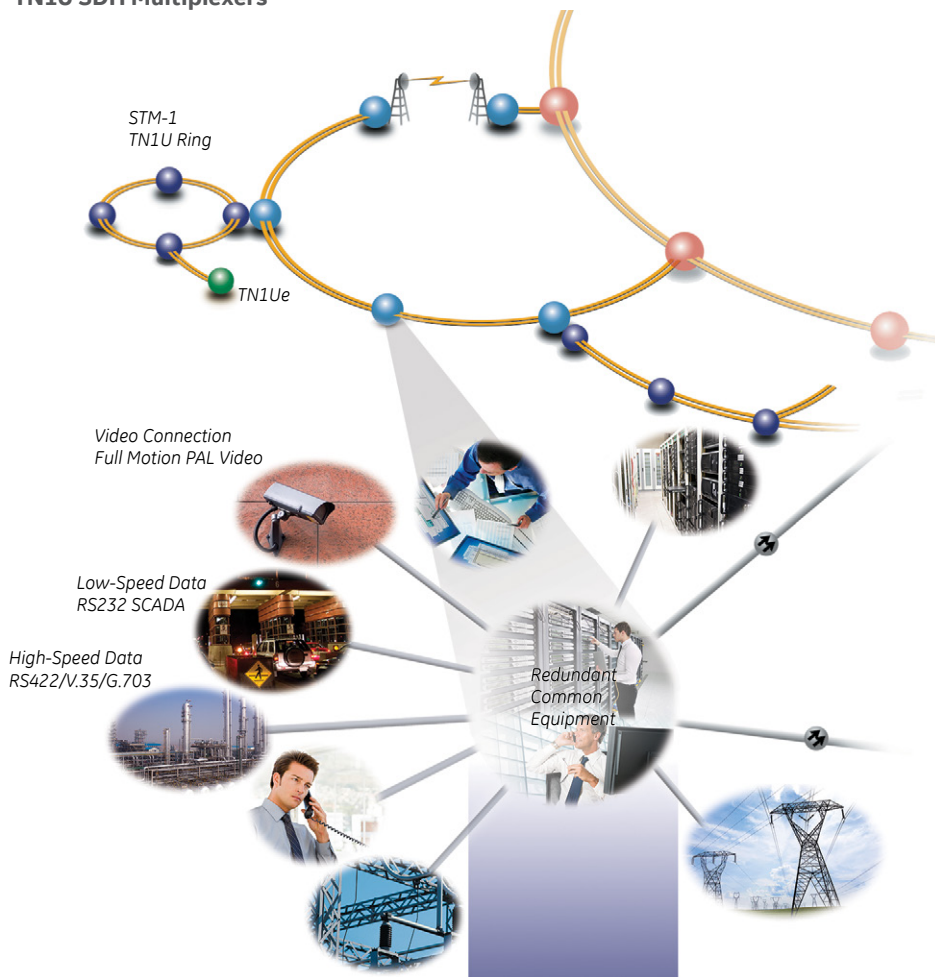
Operations, Administration, Maintenance and Provisioning (OAM&P)

The TN1U takes advantage of the inherent network management capabilities provided by the SDH 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 TN1U equipment, including the 64 kb/s tributary units, improves maintenance response time and saves the operator money.

TN1U SDH Multiplexers



W118/IEEE C57.34

Applications

Electric Power Utilities

Originally designed for the unique needs of utilities, the TN1U 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 ITU-T SDH standards for path switched ring protection architecture.

But the TN1U goes beyond SDH standards, offering the industry's fastest path protection switching (<3 ms), and incorporating special design characteristics that allow it to meet IEC 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 TN1U 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 SDH network.

For applications, such as video surveillance, fare collection, passenger information systems, train control, emergency voice and signalling, the TN1U is the optical communications product of choice.

Pipelines and Industrial Facilities

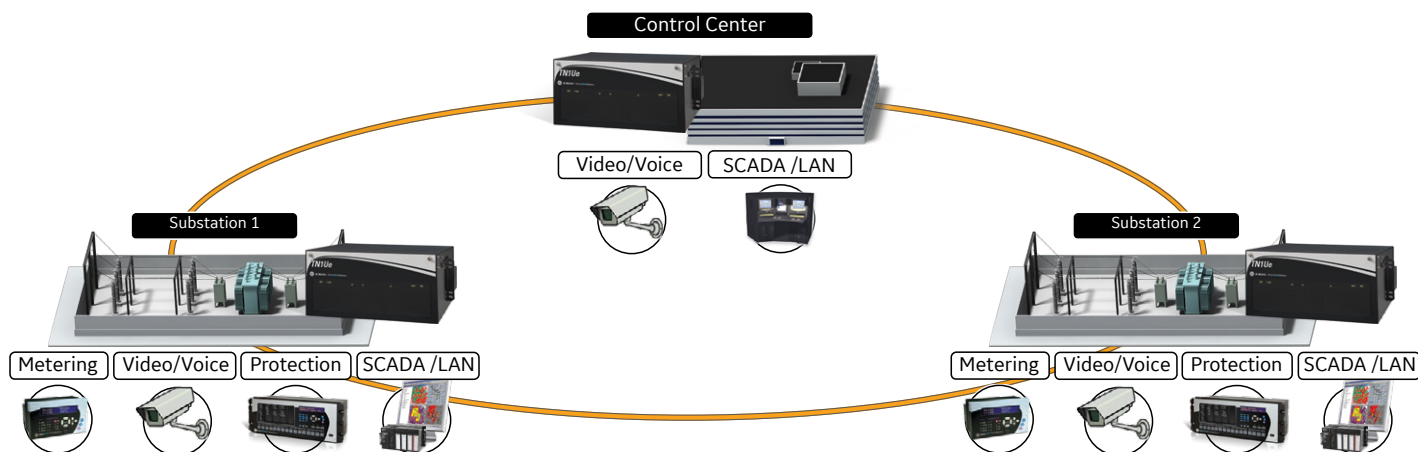
The rugged design, compact size and low power consumption of the TN1U also make it the ideal optical communications solution for oil, gas, refined products, water and slurry

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 TN1U SDH 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.



TN1U SDH Multiplexer Electric Utility Application



Specifications

SIGNALLING RATES AND OPTICAL INTERFACES

STM-1 SIGNAL

Speed	155.52 Mb/s
Line Code	NRZ
Optical Connector	LC
System Gain (singlemode fibre)	
@ 1310 nm	20 dB
Intermediate Reach up to 30 km (19 miles)	
@ 1310 nm	29 dB
Long Reach up to 50 km (31 miles)	
@ 1550 nm	34 dB
Extra Long Reach up to 120 km (75 miles)	
@ 1550 nm	38 dB
Extra Long Reach-2 up to 200 km (125 miles)	
System Gain (multimode fibre)	
@ 1310 nm	12 dB
Intra-office	up to 2 km (1¼ miles)

STM-4 SIGNAL

Speed	622.08 Mb/s
Line Code	NRZ
Optical Connector	LC
System Gain (singlemode fibre)	
@ 1310 nm	14 dB
Intermediate Reach up to 20 km (12.4 miles)	
@ 1310 nm	25 dB
Long Reach up to 40 km (25 miles)	
@ 1550 nm	34 dB
Extra Long Reach up to 120 km (100 miles)	
@ 1550 nm	38 dB
Extra Long Reach-2 up to 160 km (100 miles)	
System Gain (multimode fibre)	
@ 1310 nm	7 dB
Intra-office	up to 1 km (½ mile)

STM-16 SIGNAL

Speed	2.488 Gb/s
Line Code	NRZ
Optical Connector	LC
System Gain (singlemode fibre)	
@ 1310 nm	13 dB
Intermediate reach up to 15 km, (9 miles)	
@ 1310 nm	26 dB
Long reach up to 40 km, (25 miles)	
@ 1550 nm	26 dB
Extra long reach up to 80 km, (50 miles)	
@ 1550 nm	31 dB
Extra long reach up to 120 kms, (75 miles)	

CONFIGURATIONS SUPPORTED

Self healing D-P Rings
Two fibre linear systems
Multiple rings plus spurs
Multiple STM-1/STM-4/STM-16 rings interconnected through synchronous TIE links

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

SYSTEM ALARMS

Major	Form C alarm relays and LED indicators
Minor	Form C alarm relays and LED indicators

ORDERWIRE

64 kb/s voice channel carried in SDH overhead

CHANNEL INTERFACE UNITS

LED status indicators
Teleprotection units have Form C alarm-relays

NODE THROUGH-DELAY

20 µs (STM-1)

D-PR PATH PROTECTION SWITCHING TIME

<3 ms

POWER REQUIREMENTS

24, 48, 130 VDC or 115 VAC optional redundancy

LOW POWER CONSUMPTION:

10 W for add/drop node common equipment
(For individual channel unit power consumption, refer to the technical data sheet for that unit)

RFI/EMC/ISOLATION/SWC

Designed to meet IEEE C37.90.1 and C37.90.2 for reliable operation within harsh substation environments

1/0 CROSS-CONNECT

Optional CDAX Unit provides integrated 168x120 digital cross-connect for grooming 64 kb/s channels and optimizing tributary payloads.

AVAILABILITY

99.9999% for redundant 1+1 protected common equipment (For individual interface unit MTBF figures, refer to the unit interface technical data sheet)

ENVIRONMENTAL

Operating Temperature	-20° to +60°C (+14° to +140°F)
Storage Temperature	-40° to +70°C (-40° to +158°F)
Humidity	5-95% non-condensing

PHYSICAL DATA

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)

VOICE UNITS

4W VF

Standard 600/900 Ω 4W interface with optional E&M signalling operating at standard TX/RX levels

2W VF

Standard 600/900 Ω 2W interface with optional E&M signalling operating at standard TX/RX levels

2W FOREIGN EXCHANGE

Loop start, ground start or PLAR signalling

DATA UNITS

LOW SPEED DATA

Asynchronous V.24/V.28 (RS232) interface, sub-rate multiplexing of four 9.6 kb/s or two 19.2 kb/s or one 38.4 kb/s signal

HIGH SPEED DATA

V.11/RS422, V.35, G.703 interfaces, 56 kb/s or 64 kb/s (Synchronous/Asynchronous)

NX64 KB/S DATA ELECTRICAL INTERFACE

N = 1 to 12 64 kb/s channels
V.35 interface

E1

G.703 2.048 Mb/s E1 interface (75Ω and 120Ω)

ETHERNET

10/100/1000 Mb/s Ethernet Learning Bridges per IEEE 802.3 standard

TELEPROTECTION UNITS

TRANSFER TRIP

Separate transmit and receive units, optional test panel

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 fibre optic connection to protection relays

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