OC-3/T3, STM-1, STS-1/STM-0, T3, T1, E1 Interfaces

Add/Drop User-Selected PDH Signals to/from an OC-3/STM-1 or STS-1/STM-0

Add/Drop STS-1 to/from OC-3 or STM-0 to/from STM-1

Generate and Monitor SONET or SDH Alarms and Errors

Internally generate BERT patterns in all framing modes

DS0, DS1 or E1 Test and Analysis with GL’s Ultra T1 or E1 Cards

DS3 Test and Analysis option

Multiple OC-3/STM-1 Channels in a system

Supports M23 and C-bit Framing Format

DS3/DS1/DS0 Test and Analysis with UltraT1/E1

T3 line frequency and level Measurement

Non-Intrusive Monitor for Alarms and Errors

Drop and Insert User Selected T1/E1

Broadcast or Looped back individual DS1/E1

Decode and Simulate FEAC And FDL Messages

Compatible with PCAP protocol

OC3T3 19” rackmount TELCO NETWORK ANALYZER, OC-3/T3, STM-1, T1, E1 Analysis System

**TNA OC-3/T3 System Overview**

OC3T3 analyzer system is rugged a multichannel data/protocol analyzer emulator turnkey solution utilizing gl communications and other third party vendor components carefully assembled and packaged for analyzing, testing, simulating, and monitoring OC-3/T3/STM-1 and STS-1/STM-0 signals. The system can add and drop T1, E1, T3, or STS-1/STM-0 signals to and from an OC-3/STM-1 signal or T1 and E1 signals to and from an STS-1/STM-0 signal. The OC3T3 can also generate BERT patterns, internally in all framing modes. Accompanying Windows NT/2000/XP software affords easy operation. It is ideally suited for installation, maintenance, commissioning, verification and manufacturing of SONET/SDH transport networks and network equipment.

**Benefits:**

>**Cost Effective:** Most cost effective and expandable solution for SONET/SDH testing.

>**Comprehensive:** The OC-3/STM-1 and STS-1/STM-0 receivers monitor SONET/SDH signals and present in real-time comprehensive diagnostics of SONET/SDH alarms, errors and pointer justifications.

>**PC Based:** Open architecture, based on industry standard Windows O/S and easy to operate and do SONET/SDH analysis, testing, simulating, and monitoring platform. This will maximize the returns from your current investment on network testing.

>**Complete Solution:** 100% compatible with GL’s Ultra T1 Card, Ultra E1 Card and Ultra T3 boards., the OC3T3 system provides a complete OC-3/STM-1, DS3, DS1, E1 and DS0 testing solution.

>**Flexible:** Use multiple channels or ports with a single central controlled by the same software, thereby providing the most flexible solution for your unique testing needs.

**Features:**

+**Easy** to use, familiar, windows based, Graphical User Interface

+**Internally** generate BERT patterns in all framing modes and perform stress test and performance analysis.

+**Add/Drop** T1, E1, T3, STS-1/STM-0 to/from OC-3/STM-1

+**SONET/SDH** overhead monitoring and control

**SONET/SDH** Alarm and Error generation/detection

**Transmit** user-selected T1 (or E1) while remaining T1s (or E1s) are looped back or broadcast, and transmit user-selected STS-1/STM-0 within OC-3/STM-1 while remaining STS-1s/STM-0s are broadcast or looped back

**Internal, External,** and Recovered clock sources

**Remote control,** scripting & automation using Client-Server technology

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## OC3T3 SPECIFICATIONS

### Physical Interfaces

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### OC3T3 Line Interface

- **Physical Interface**: SC Connector
- **Fiber Pigtail**: Single mode, 1310 nm
- **Pulse Mask**: Meets ITU-T G.957 and Bellcore DR-253-CORE
- **Line Code**: NRZ
- **Output Clock Reference**: Recovered OC-3 Clock, External 19.44 MHz, or Internally Generated 155.52MHz ± 4.6ppm
- **Rx Sensitivity**: -31 dBm

### STS-1/STM-0 Line Interface

- **Physical Interface**: BNC Male Connectors
- **Output Clock Reference**: Recovered STS-1/STM-0 Clock, External 19.44 MHz, or Internally Generated 51.84MHz ± 4.6ppm

### T3 Line Interface

- **Physical Interface**: BNC Male Connectors
- **Line Code Format**: B3ZS
- **Input Frequency**: 44.736 Mbps
- **Receiver Interface**: DSX-3 (Terminate or Monitor)
- **Input Impedance**: 75 Ohms
- **Input Level**: Terminate- 0.09 Vp – 0.85 Vp
  
  Monitor 0.025 – 0.08 Vp (Up to 26 dB flat loss relative to nominal DSX)

  **Output Level**: DSX- Per TR-TSY-0004999, 0.75 to 0.85 Vp

### T1/E1 Line Interface

- **Physical Interface**: RJ48c Connector
- **Line Code Format**: AMI or B8ZS (T1), HDB3 (E1)
- **Input Frequency**: 1.544 Mbps (T1) or 2.048 Mbps (E1)
- **Receiver Interface**: Terminate
- **Input Impedance**: 100 Ohms (T1), 120 Ohms (E1)
- **Input Level**: +75 mV to 6.0 V base to peak or –30 dBsX to +6 dBsX
- **Output Level**: +3.0 +/-0.2 Base to Peak Selectable 0 to 655 ft. Pulse Equalization Setting for T1 Short Haul, or line build outs for 0 dB to –22.5 dB (T1 Long Haul)

### External Clock Interface

- **Physical Interface**: MCX Connector
- **Electrical Standard**: RS485/RS422

### SONET/SDH Framing Formats

- **SONET**: STS-3, STS-3c, STS-1
- **SDH**: STM-1 (AU-3, AU-4)

### Payload Mappings

- **SONET**
  - STS-3c (Bulk Filled) → OC-3
  - STS-1 → OC-3 (Add/Drop)
  - STS-1 (Bulk Filled) → STS-1
  - T3 → OC-3 (Internal and Add/Drop)
  - T3 → STS-1 (Internal only)
  - E1 → VT-2 → STS-1 (Internal and Add/Drop)
  - E1 → VT-2 → OC-3 (Internal and Add/Drop)
  - T1 → VT-1.5 → STS-1 (Internal and Add/Drop)
  - T1 → VT-1.5 → OC-3 (Internal and Add/Drop)
**SDH**
- VC-4 (Bulk filled) → AU-4 → STM-1
- STM-0 → AU-3 → STM-1 (Add/Drop)
- VC-3 (Bulk Filled) → AU-3 → STM-1
- T3 → AU-3 → STM-1 (Internal and Add/Drop)
- T3 → AU-3 → STM-0 (Internal only)
- E1 → TU-12 → TUG-2 → AU-3 → STM-0
- E1 → TU-12 → TUG-2 → AU-3 → STM-1
- T1 → TU-11 → TUG-2 → AU-3 → STM-0
- T1 → TU-11 → TUG-2 → AU-3 → STM-1
- T1 → TU-12 → TUG-2 → AU-3 → STM-0
- T1 → TU-12 → TUG-2 → AU-3 → STM-1
- T1 → TU-12 → TUG-2 → TUG-3 → AU-4 → STM-1

[All the E1 and T1 mappings support internal generation and Add/Drop]

**Transmit Capabilities**

**Payload Source:**
Internally generated User Selected Pattern, Added from external source or looped back from receive signal

**Payload test patterns (Inverted or Non-inverted):**
- STS-1/STS-3c Bulk: $2^{21}-1$ PRBS
- VC-3/VC-4 Bulk: $2^{21}-1$ PRBS
- T3: $2^9-1$ PRBS, $2^{11}-1$ PRBS, $2^{15}-1$ PRBS, $2^{20}-1$ PRBS, $2^{23}-1$ PRBS
- E1/T1: QRSS, $2^{11}-1$ PRBS, $2^{15}-1$ PRBS, $2^{20}-1$ PRBS

**Alarm Generation**
- SDH: LOS, LOF, MS-AIS, MS-RDI, AU-LOP, AU-AIS, HP-RDI, HP-UNEQ, H4-LOM, TU-LOP, TU-AIS, LP-RDI, LP-UNEQ
- PDH: T1: AIS, RAI  E1: LOF, AIS, RAI  T3: LOS, AIS, IDLE

**Error Insertion**
- SONET: Framing error, CV-S, CV-L, REI-L, CV-P, REI-P, BERT errors (Single or periodic error insertion capability)
- SDH: Framing error, B1 BIP, B2 BIP, MS-REI, B3 BIP, HP-REI, BERT errors

**Signal Traces and Labels:**
- **SONET:** Section trace (J0), Path trace (J1), Section sync status (S1), Path signal label (C2), VT Path signal label (C5)
- **SDH:** Regenerator Section trace (J0), Higher Order trail trace (J1), Section sync status (S1), HP Path label (C2), LP Path label (V5)

**Background Channel settings:** Same as Foreground (Broadcast), Same as Received (Loopback), Unequipped or User Selected Pattern (Background VT payload)

**Other capabilities:** Set APS messages (K1 and K2), Monitor outgoing SPE/AU pointers

**Receive Capabilities:**

**Alarm Detection:**

**Error Counting:**

**Signal Traces and Labels:**
Section trace (J0), Path trace (J1), Section sync status (S1), Path signal label (C2), VT Path signal label (C5)
Other capabilities: Monitor incoming TOH, POH. Monitor incoming APS messages (K1 and K2), Monitor incoming SPE pointers, Count Pointer Justifications, Detect NDF (New Data Flag) etc.

**SDH**

Alarm Detection: LOS, LOF, MS-AIS, MS-RDI, AU-LOP, AU-AIS, HP-RDI, HP-UNEQ, H4-LOM, TU-LOP, TU-AIS, LP-RDI, LP-UNEQ

Error Counting: Framing error, B1 BIP, B2 BIP, MS-REI, B3 BIP, HP-REI, BERT errors

Signal Traces and Labels: Regenerator Section trace (J0), Higher Order trail trace (J1), Section sync status (S1), Path signal label (C2), LP Path label (V5)

Other capabilities: Monitor incoming RS-OH, MS-OH and HO-POH, Monitor incoming APS messages (K1 and K2), Monitor incoming AU pointers. Count Pointer Justifications, Detect NDF (New Data Flag) etc.

**PDH**

Alarm Detection: **T1:** AIS, OOF, RAI **E1:** AIS, OOF, RAI, CAS-MFL, RMFAI **T3:** LOS, FERF, OOF, AIS, IDLE, RED

**Add/Drop Capabilities: SONET**

Add/Drop to/from OC-3: STS-1, T3, E1 or T1
Add/Drop to/from STS-1: T1 or E1

**SDH**

Add/Drop to/from STM-1: STM-0, T3, E1 or T1
Add/Drop to/from STM-0: T1 or E1

**Frequency Measurements**

**SONET:** OC-3 or STS-1 with 1Hz discrimination, 4.6ppm accuracy

**SDH:** STM-1 or STM-0 with 1Hz discrimination, 4.6ppm accuracy

**PDH Framing Formats**

DS3/T3: C-bit Parity, M23
DS1/T1: Unframed, D4, ESF
E1: Unframed, PCM30, PCM30CRC, PCM31, PCM31CRC

**Alarm and Error Logging**

Alarms and Errors can be logged continuously to a file.

**Coupled or Independent Settings**

Transmit and Receive settings can be set as coupled to change them simultaneously or they can be set as independent.

**Ordering Information**

UT401 – Ultra OC-3 Card hardware (Option UT4010 and/or UT4020 required)
UT4010 – OC-3 Analysis Software
UT4020 – STM-1 Analysis Software

*Specifications and features subject to change without notice.*