

**HUBBELL®**  
**Power Systems**



# eXmux® 3505 IP Access Multiplier

Solutions for an Evolving World



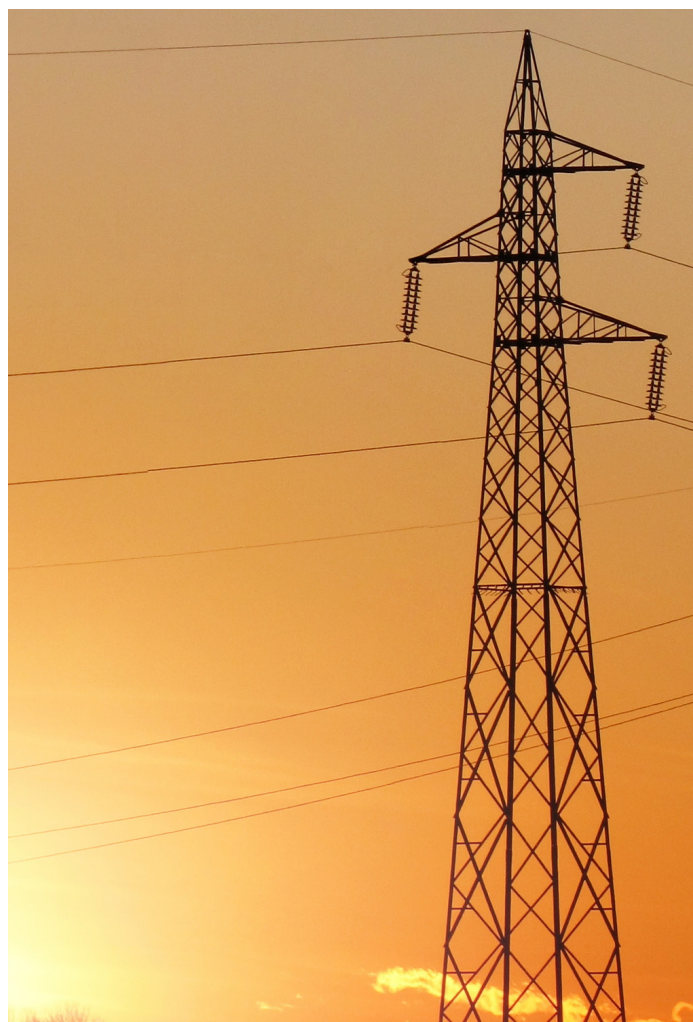
# Your world is changing and so are we.

At RFL, we know your needs change much faster than your infrastructure. Our comprehensive line of solutions meets you wherever you are to help you bridge the gap from yesterday to tomorrow.

We aren't just engineering products. We are continuously innovating to give legacy equipment the advantage of today's technologies. Our highly adaptable solutions offer more features for more flexibility and a custom fit for your specific needs.

When we deliver, we also deliver our reputation. So when you open that box, you're opening a custom-engineered solution, factory-tested and ready for deployment.

And as long as you own that equipment, you own the attention of RFL. We see you as our partner and we want to ensure that our solution is working for you – now and over the long haul. RFL – delivering solutions that work. Period.



## eXmux® 3505

### System Description

The RFL eXmux 3505 is a substation-hardened IP Access Multiplexer engineered for mission critical infrastructures to transport voice, serial, relaying protection, SCADA, video and Ethernet data communications over Ethernet/IP or MPLS networks, providing the flexibility of backward compatibility with legacy devices and forward compatibility with Ethernet devices on the same communications platform. Designed into the eXmux 3505 are features such as “Hitless Switching” for private ring networks with zero-data-loss path recovery technology, dual path communications for routing redundant paths over public networks and a (DACS) function for cross-connecting DSOs between T1/E1 circuits and/or eXmux 3505 interface unit. The product is designed for harsh applications and is available in two chassis configurations; a mission-critical model that offers module hot-swap capabilities for all functional cards and a economical compact model for applications where module hot swap capability is not required.

Both the new 3505 & the 3501 models are interoperable within the same network and are physically interchangeable.



## Key Features & Benefits

### Chassis Configurations/Hot Swap & Compact

For Mission Critical applications the eXmux® 3505 is available with a Hot Swap Module option where all modules of the eXmux 3505 are field replaceable with the unit powered. All interfaces units, power supplies, and switch can be replaced in the field in seconds. The Hot Swap model is a 5RU high 19" rack mount chassis while the compact model is a 3RU high 19" rack mount chassis.

### Legacy Interfaces

Accommodates up to 7 different DSO or T1/E1 legacy interface units; plus a standard T1/E1 interface and a 2-wire telephone service channel.

### Advanced VNMS with DSO Grooming

An advanced Visual Network Management Software for effortless configurations, port mapping, maintenance and remote firmware upgrade that includes an Integrated Digital Access Cross-Connect System (DACCS), allowing individual DSO circuits from any legacy T1/E1 system to be connected to any DSO circuits within the eXmux 3505 network or to another TDM network.

### Interface Units (IU)

Supports legacy IUs such as: RS-232, RS-485, Serial Server, RS-422/530, V.35, X.21, G.703, C37.94, Teleprotection, 2W & 4W E&M, 2W FXO, 2W FXS and T1/E1.

### Teleprotection System

An integrated end-to-end teleprotection function that provides 4 bi-directional transfer trips commands in addition to 2 controlling inputs logic and 2 outputs for alarming & status. It is mid-span compatible with the IMUX 2000 T1/E1 multiplexer MTS Teleprotection System.

### Value

A lower cost solution than SONET/SDH or even T1/E1; Along with a simple and more efficient network that reduces maintenance cost and increases user productivity.

### Cyber Security

SNMPv3 for Authentication and Encryption along with an embedded User Access Management System and other cyber security features meeting NERC requirements.

### Real Time Critical Applications

Designed for real-time critical data applications such as SCADA/RTU, Relaying and Teleprotection with minimum latency.

### Hitless Switching

A field proven path redundancy feature for private ring networks with zero-data-loss, making it ideal for critical infrastructure and protective relay applications.

### Dual-Path Communications

A field-proven path redundancy feature designed for public networks, making it ideal for critical infrastructure and protective relay applications.

### Resilient & Dependable

Enhanced reliability by offering optional redundant power supplies and path redundancy using MSTP (Multiple Spanning Tree Protocol) or RSTP (Rapid Spanning Tree Protocol) technology.

### Bandwidth

Backbone communications is at 10 Gigabit Ethernet (10 GigE) speed, equivalent to the speed of a SONET/SDH OC-192/STM-16.

### Compliance

Designed for harsh environment with Immunity from SWC, ESD & RFI; convection cooling with operating temperature: -30 C to +65 C.

IEEE P1613; IEC61850-3; ANSI C37.90.2; ANSI C37.90.3.

### Technology

Uses TDM over IP technology that allows point-to-point legacy equipment to communicate over an IP network that includes an Integrated Layer 2 Managed Ethernet Switch including two 10GbE Uplink (WAN) Ports and four GigE Ethernet (LAN) ports.

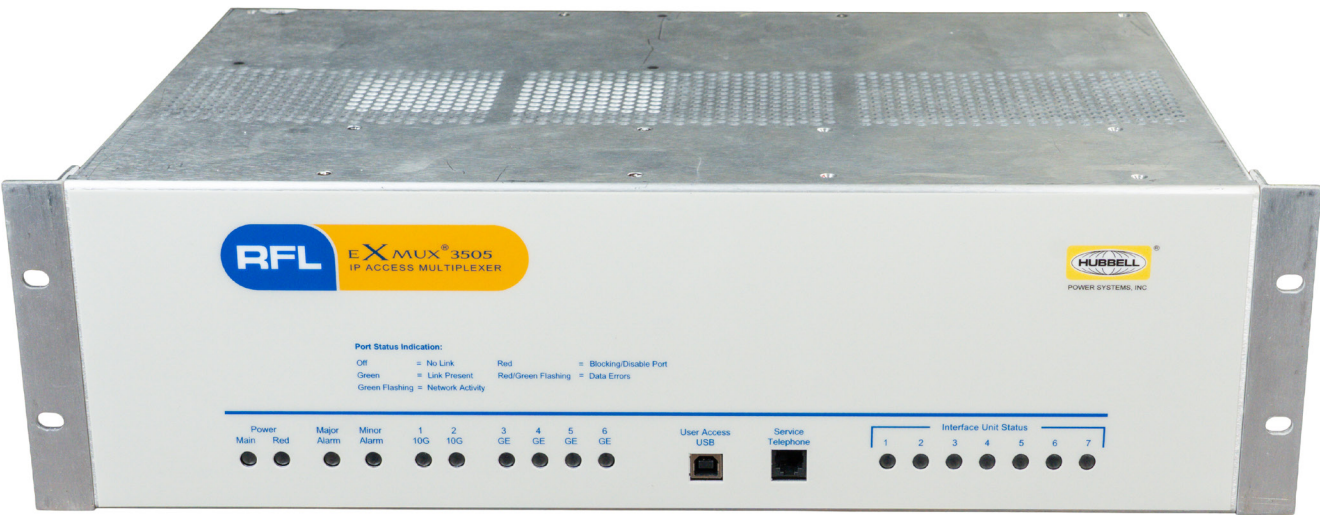
## System Description (continued)

Converging two important traffic types into one infrastructure provides the benefit of connecting traditional Voice, Video, Serial data, and relaying protection circuits over Ethernet networks taking advantage of the simplicity and efficiency of IP routing and Ethernet switching. This proven concept offers a cost-effective and feature-rich solution that bridges the gap between the TDM legacy and the modern IP world, achieving the best of both.

The eXmux® 3505 comes with an advanced Graphical Visual Network Management Software (VNMS) for Operations, Administration, Maintenance and Provisioning (OAM&P). The VNMS is intuitive and user-friendly, making configuration, interface port mapping and diagnostics effortless. VNMS communications uses the latest SNMPv3 for authentication and encryption along with cyber security features meeting NERC-CIP requirements.

The eXmux 3505 can support any network topology such as Linear, Star, Rings and Mesh. When configured in a ring topology over a private network each interface port can be individually configured for “Redundancy”, allowing the device to transmit data to both WAN ports simultaneously. If a failure occurs, data continues to reach its destination with no interruptions. The average port interface latency (back-to-back channel delay) is less than 10 milliseconds (ms). When the eXmux 3505 is setup for optimal configuration, latency can be less than 5ms. The low latency capability and the unique “Hitless Switching” mechanism allow critical real-time applications such as SCADA, Teleprotection and Relaying over an IP network just as they are done today on TDM networks. The eXmux 3505 can support dual path communications for use over a private or public network. By transmitting dual IP addresses from a single WAN port and routing each IP address differently, a backup path will be available at all times without the need for any failover routing.

The eXmux 3505 uses TDM over IP technology and an intergraded Layer 2 Managed Switch, which allows the unit to support Legacy Interfaces such as T1/E1, RS-232, RS 485, Serial Server, RS-530/422, V.35, X.21, G.703, C37.94, Teleprotection and various Voice interfaces, along with native IP solutions. A two-wire telephone service channel is incorporated to provide in-band voice communication to any eXmux 3505 connected to the network, creating the classic feel of a legacy communications device.



**eXmux 3505 3RU Compact Version**

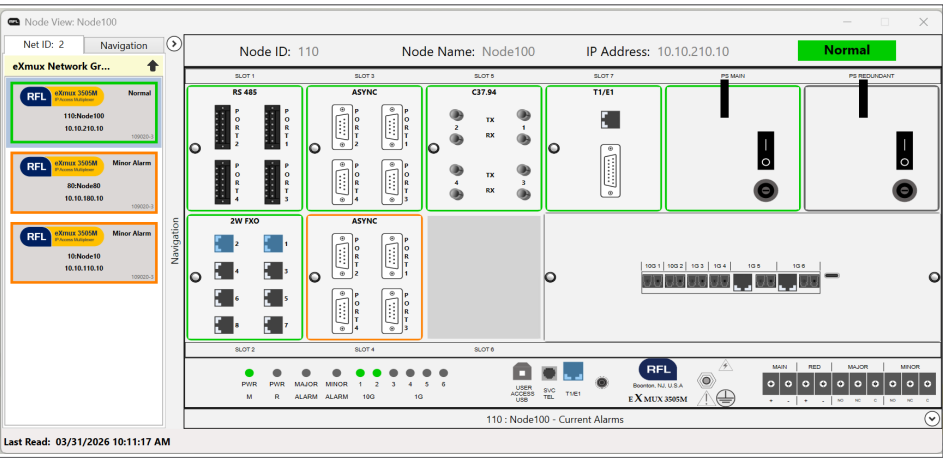
# eXmux® Visual Network Management Software

The eXmux 3505 IP Access Multiplexer comes with an advanced Graphical User Interface (GUI) Network Management Software for Operations, Administration, Maintenance and Provisioning (OAM&P). The intuitive and user friendly eXmux 3505 VNMS is designed to allow the user to manage their eXmux 3505 network, making configuration, port mapping, network monitoring and diagnostics simple and easy.

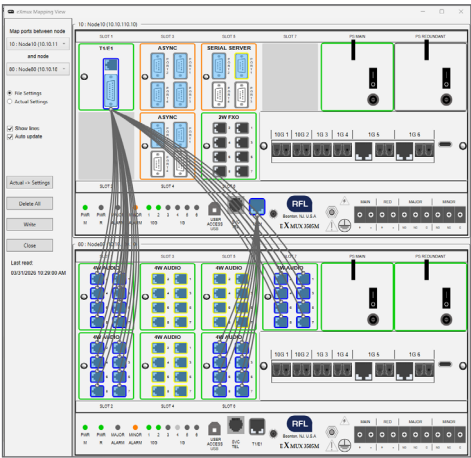
## eXmux Visual Network Management Software Feature Summary

The VNMS communicates using the latest SNMPv3 for authentication and encryption along with cyber security features meeting NERC requirements. The Network view provides the user an overall view of the network and the status of each node in the network and is further enhanced by allowing the user to graphically represent the physical interconnection of each node in the network. The Node view displays a virtual physical view of the unit as configured with real-time status information. Programming details of each module are easily accessible by a simple double click on the module.

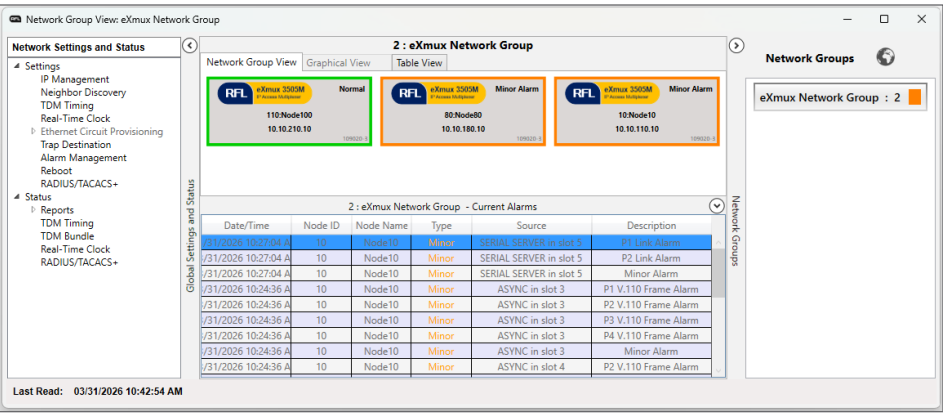
The uniquely designed Port Mapping interface allows the user to easily map any port on any eXmux to any other eXmux on the network by a simple point and click (“Map this Port”) function. The dynamic Current Active Alarm view gives the user specific information as to which node is in alarm, the type of alarm, the source and the description of the alarm so that diagnostic can be straightforward and quick. The “Tooltip” function provides the user “On-demand” information on any setting, status and alarm from any screen without the need for a manual or cumbersome Help function.



Node View

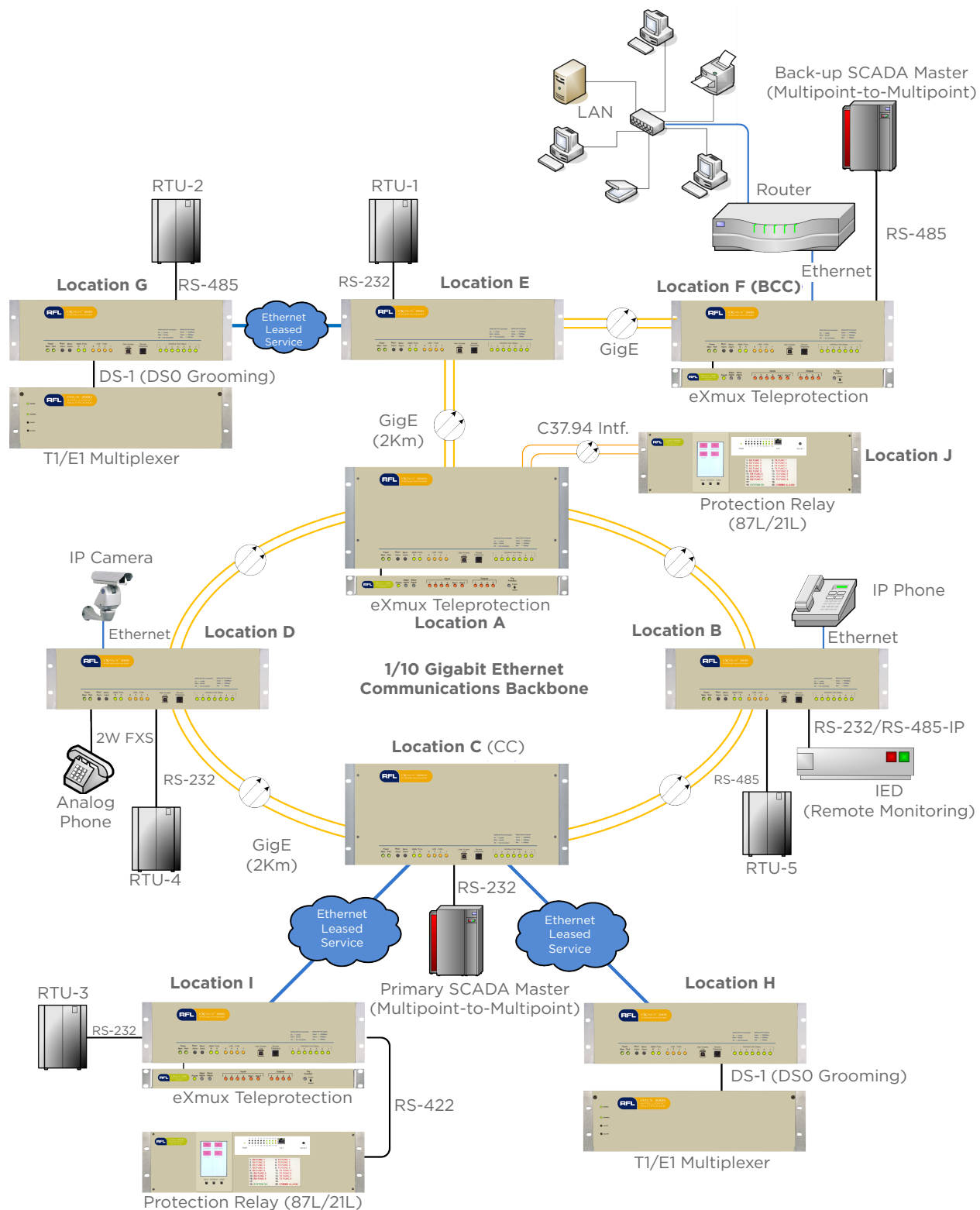


Mapping View



Network Group View

## Network Diagram Example



The above example is a typical communications network using the eXmux® 3505 configured with 1/10 Gigabit Ethernet Fiber Interface for the communication backbone and GigE on the linear and star setups. The communications network is able to transport both existing legacy devices with RS-422, RS-232, RS-485, 2W-FXS, specific DSO's from the DS-1 & C37.94 interfaces, Teleprotection commands and IP devices using the eXmux 3505 common IP platform.

## Technical Specifications

### Interface Units (IU)

#### 4 Port Synchronous Interface

- Protocol supported: RS-422/RS-530, V.35, X.21
- Signal Interconnection: DCE / DTE
- Control line: RTS and CTS
- Connector: DB-25 Female
- Slot(s) occupied: 2
- Data Rates: 56Kbps, Nx64Kbps (N=1 to 31)
- Loopback: Local and Remote

#### 4 Port RS-485 Interface

- Protocol supported: RS-485
- Operating mode: 2 or 4 Wire
- Connector: Compression terminal blocks
- Slot(s) occupied: 1
- Data Rates: 600bps to 38.4Kbps
- Loopback: Local and Remote

#### 4 Port Serial Server Interface

- Protocol supported: Raw socket mode, SSH, Telnet, DNP3-Serial to DNP3-IP
- Application: Point-to-point, PC Client, Multipoint-to-multipoint
- Operating Mode: RS-232 or RS-485 4-Wire
- Connector: DB-9 Female
- Slot(s) occupied: 1
- Data Rates: 300bps to 115Kbps
- Loopback: Local and Remote

#### 4 Port G.703 Co-directional Synchronous Interface

- Signal Interconnection: DCE / DTE
- Connector: DB-15 Female
- Slot(s) occupied: 2
- Data Rate: 64Kbps
- Loopback: Local and Remote

#### 4 Port C37.94 Synchronous Relaying Interface

- Connector: ST
- Slot(s) occupied: 1
- Data Rates: Nx64Kbps (N=1 to 12)
- Conforms to ANSI C37.94
- Loopback: Local and Remote

#### 8 Port Asynchronous Interface

- Protocol supported: RS-232, V.24
- Control line: RTS and DTR
- Connector: DB-9 Female
- Slot(s) occupied: 2
- Data Rates: 600bps to 38.4Kbps
- Loopback: Local and Remote

#### 8 Port 4-Wire & 4 Port 2-Wire E&M Audio Interface

- Coding: PCM
- Signaling: Type I, II, III & V
- Connector: RJ-45
- Slot(s) occupied: 1
- Conforms to AT&T Publication 43801
- Loopback: Local and Remote

#### 8 Port 2-Wire FXO Interface

- Coding: PCM
- Signaling: Loop start
- Connector: RJ-11
- Slot(s) occupied: 1
- Conforms to AT&T Publication 43801

#### 4 Port 2-Wire FXS Interface

- Coding: PCM
- Signaling: Loop start
- REN per Port: 4
- Connector: RJ-11
- Slot(s) occupied: 1
- Conforms to AT&T Publication 43801

### T1/E1 Interfaces

#### Built-in single T1/E1

- Framer type: Electrical T1 or E1
- Framer mode: Pass-thru or DSO grooming
- T1 framer: Conforms to ANSI T1.102-1993, AT&T 62411 & 43801
- E1 framer: Conforms to ITU G.703, G.823 & G.704
- Connector: RJ-48C
- Loopback: Local and Remote

#### Single Port T1/E1 Interface

- Framer type: Electrical T1 or E1
- Framer mode: Pass-thru or DSO grooming
- T1 Mode: Conforms to ANSI T1.102-1993, AT&T 62411 & 43801
- E1 Mode: Conforms to ITU G.703, G.823 & G.704
- Connector: RJ-48C and DB-15
- Loopback: Local and Remote

### Digital Teleprotection System

#### 2 Port eXmux TPS Interface Unit

- Signal Interconnection: RS-485
- Interface Connector: DB-9 Female
- Slot(s) occupied: 1
- Data Rate: Two independent 64Kbps channel
- Records: 1500 SOE records
- SOE synchronization: NTP/SNTP/IEEE 1588
- Loopback: Local and Remote
- Compatibility: IMUX 2000 MTS

## Technical Specifications (Continued)

### eXmux TPS I/O Box

- Interface Connector: DB-9 Male
- Inputs: 4 Optically isolated (voltages: 24V, 48V, 125V or 250V), 2 auxiliary controlling inputs
- Outputs: 4 Solid state or Relay
- Terminal Block: Compression or Screw type
- Status: Inputs, Outputs, Power, and alarms
- Alarms: Minor and Major alarm and form C contacts
- Trip Function Disable Switch

## Layer 2 Managed Ethernet Switch

### 1/10 GbE Ports

- Number of Ports: 2
- Copper SFP: 10/100/1000 Base-TX
- Fiber SFP: 100 Base-FX or 1000 Base-FX or 10000 Base FX Fiber Connector: LC

### GE Ports

- Number of Ports: 4
- [2] RJ-45 Ports: 10/100/1000 Base-TX
- [2] SFP Ports:
  - Copper SFP: 10/100/1000 Base-TX
  - Fiber SFP: 100 Base-FX or 1000 Base-FX Fiber Connector: LC

### Fiber SFP Options

- 1000 Base-FX distance options: 550m (0.34mi), 10km (6.2mi), 20km (12.4mi), 60km (37.3mi), 80km (49.7mi), 120km (74.5mi)
- 10000 Base-FX distance options: 400m (0.25mi), 10km (6.2mi), 40k (24.9mi), 80km (49.7mi), 100km (62.1mi)

### Features

- VLAN, QoS, CoS, ToS/DS, SNMPv3, IGMPv1, v2, v3 Snooping and Querying, Port Mirroring, Broadcast and Multicast Storm Protection, Full duplex w/flow control, 802.1x Port Based Authentication with EAP, MAC Address Base Authentication, supports RSTP, MSTP, and PVST+.

### Standards

- All IEEE 802.1, 802.3 compliant devices are supported

## Power Supply

- 19-32 VDC
- 38-150 VDC / 88-130 VAC
- 200-300 VDC
- 200-275 VAC

## Mechanical

### Standard

- 19" Rack Mount (3RU)
- H: 5.25"(144mm) W: 19"(483mm) D: 11"(279mm)
- Status LEDs (front and rear for either front mount or rear/wall mount)

### Hot Swap

- 19" Rack Mount (5RU)
- H: 8.75" (222mm) W: 19" (483mm) D: 11" (279mm)
- Status LEDs (front and rear for either front mount or rear/wall mount)

### User Interface / Service Channel

- USB Port User Access for IP address setup
- FE/GE port for Visual NMS GUI
- 2-Wire Telephone Service Channel

## Environmental

- Convection cooling (No Fans)
- Operating temperature: -30 C to +65 C (-22 F to +149 F)
- ANSI/IEC SWC, ESD, RFI compliant
- IEEE1613, IEC61850-3 compliant

## Environmental & Safety Compliance

### System and Chassis

- EN 60950: 2002 Safety of information technology equipment
- EN 60825-2: 2004 Safety of laser products — Part 2
- EN 55022: 1998 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
- EN 55024: 1998 Information technology equipment - Immunity characteristics - Limits and methods of measurement IEC 61850-3 Environmental standard
- EN 61000-4-2 (8/15 KV ESD) (front of chassis)
- EN 61000-4-3 / EN 61000-6-4 - Radiated RFI immunity
- EN 61000-4-6 / EN 61000-6-2 - Conducted RFI immunity
- ANSI C37.90.2 - EMI Withstand
- ANSI C37.90.3 - (ESD Withstand, front of chassis)
- IEEE P1613 - (Environmental, ESD, RFI, Shock & Vibration)

### Power Supply and Alarm contacts

- EN 61000-4-4 / ANSI P1613 / ANSI C37.90.1 (4 KV EFT)
- EN 61000-4-5 (Surge withstand)
- EN 60255-5 / ANSI P1613 (5 KV Impulse)
- EN 60255-5 / ANSI P1613 (2.8 KV High Pot)
- EN 60255-22-1 (Damped Oscillatory Disturbance)
- ANSI C37.90.1 / ANSI P1613 (Oscillatory)
- IEC 60834-1 (Power supply disturbance tests)

### Synchronous Data Ports

- All Common Mode Using Capacitive Clamp and Shielded Cable
- EN 61000-4-4 / ANSI P1613 / ANSI C37.90.1 (4 KV EFT)
- EN 60255-22-1 (2.5 KV, 1 MHz Damped Oscillatory)
- ANSI C37.90.1 / ANSI P1613 - (2.5 KV Oscillatory)

# Technical Specifications (Continued)

## Environmental & Safety Compliance (Continued)

### Four Wire Audio Ports, T1/E1 Ports

- EN 61000-4-2 / ANSI C37.90.3 / ANSI P1613 (8/15 KV ESD)
- EN 60255-5 / EN 60834-1 / ANSI P1613 (0.72 KV High Pot, common mode)

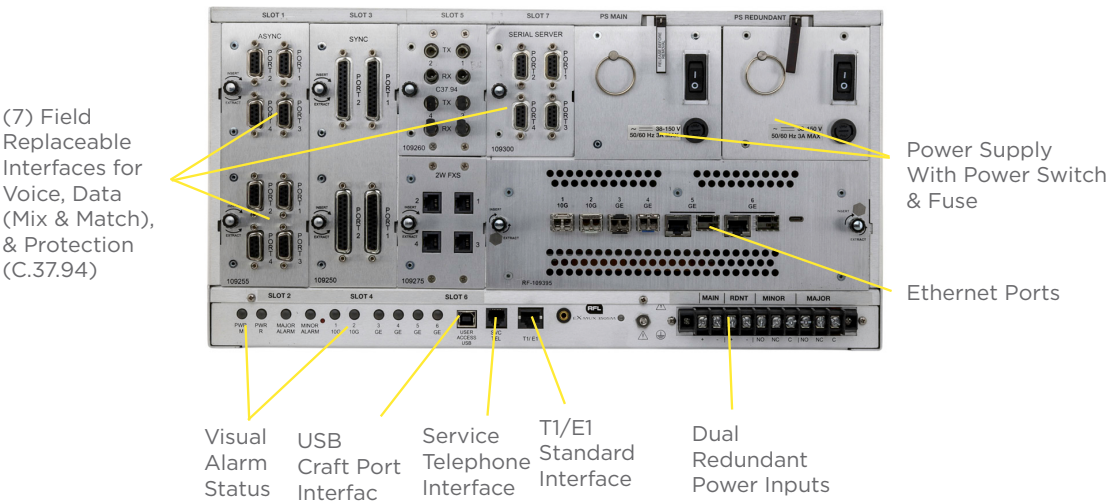
### VF Ports and Asynchronous Ports

- EN 61000-4-2 / ANSI C37.90.3 / ANSI P1613 (8/15 KV ESD)

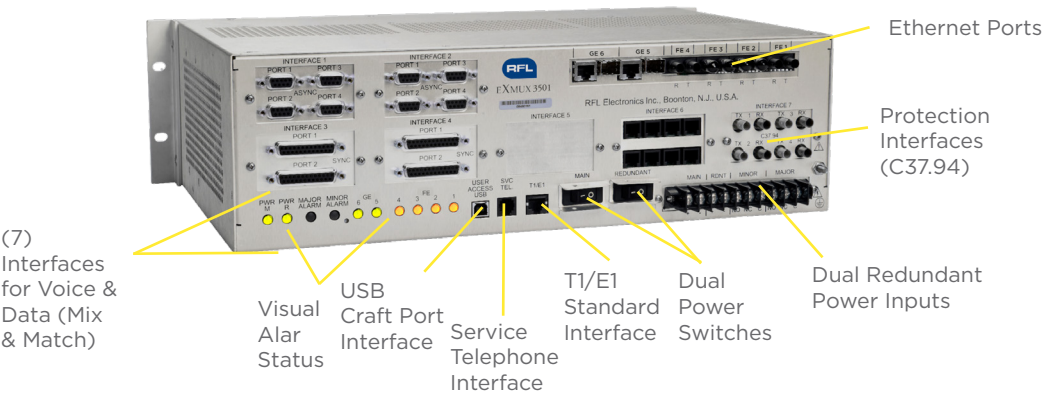
### User Interface Ports

- EN 61000-4-2 / ANSI C37.90.3 / ANSI P1613 (8/15 KV ESD)

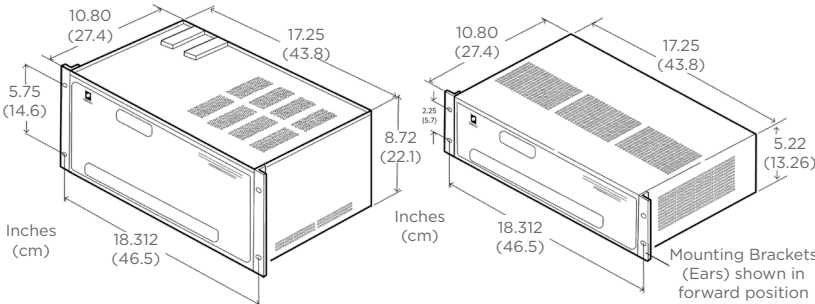
## eXmux® 3505M Chassis Interface Overview



eXmux 3505M Chassis Interface Overview



### Mounting Information



RFL eXmux® 3505/3505M - IP Access Multiplexer

Ordering Information

|                                                            |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
|------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--------|----|----|----|----|----|------|------|-----|-----|-----|-----|----|----|----|----|----|----|----|
| RFL Smart Number Description (fill in blanks):             |  |  |  |  |  |  |  |  |  | EX3505 | CM | TC | MP | RP | FR | 10G1 | 10G2 | GE3 | GE4 | GE5 | GE6 | S3 | S4 | S1 | S2 | S5 | S6 | S7 |
| <b>CHASSIS &amp; MOTHER BOARD STYLE</b>                    |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| Non-Modular                                                |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| Modular Hot-Pluggable                                      |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| <b>TERMINAL STYLE</b>                                      |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| TERMINAL BLOCK                                             |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| COMPRESSION BLOCK                                          |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| <b>MAIN POWER SUPPLY</b>                                   |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| None                                                       |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 24 VDC                                                     |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 38-150VDC / 110VAC                                         |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 200-300VDC                                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 220VAC                                                     |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| <b>REDUNDANT POWER SUPPLY OPTION</b>                       |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| None                                                       |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 24 VDC                                                     |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 38-150VDC / 110VAC                                         |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 200-300VDC                                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 220VAC                                                     |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| <b>FRAMER TYPE APPLICATION</b>                             |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| T1                                                         |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| E1                                                         |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| <b>ETHERNET SWITCH 10GE/GE PORT 1 &amp; 2 SFP Options</b>  |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| No SFP                                                     |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 10000-SR 850nm 400m MM                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 10000-LX 1310nm 10km SM                                |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 10000-FX 1550nm 40kmSM                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 10000-ZX 1550nm 80Km SM                                |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 10000-ZX 1550nm 100km SM                               |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| RJ-45 SFP 10/100/1000                                      |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 1000-SX 850nm 550m MM                                  |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 1000-LX 1310nm 10km SM                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 1000-LX 1310nm 20km SM                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 1000-FX 1550nm 60km SM                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 1000-ZX 1550nm 80km SM                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 1000-ZX 1550nm 120km SM                                |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| <b>ETHERNET SWITCH GE PORT 3, 4, 5 &amp; 6 SFP Options</b> |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| No SFP                                                     |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| RJ-45 SFP 10/100/1000                                      |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 1000-SX 850nm 550m MM                                  |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 1000-LX 1310nm 10km SM                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 1000-LX 1310nm 20km SM                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 1000-FX 1550nm 60km SM                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 1000-ZX 1550nm 80km SM                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| SFP 1000-ZX 1550nm 120km SM                                |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| <b>DS0 INTERFACE UNIT (IU) OPTIONS</b>                     |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| <b>SLOT 1 - 7 DOUBLE AND SINGLE POSITIONS</b>              |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| <b>SLOT(S)</b>                                             |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 4-Port Multi-Protocol Sync IU                              |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 4-Port G.703 Sync. IU                                      |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 8-Port Async. RS-232 IU                                    |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 4-Port C37.94 MM Sync. IU                                  |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 8-Port 4-Wire Audio E&M IU                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 8-Port 2-Wire FXO IU                                       |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 4-Port 2-Wire FXS IU                                       |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 4-Port C37.94 SM Sync. IU                                  |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 4-Port RS-485 IU                                           |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 1-Port T1/E1 IU                                            |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 4-Port RS232/485 Serial SRV IU                             |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 4-Port 2-Wire Audio E&M IU                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 2-Port TPS IU with 1 SS I/O                                |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 2-Port TPS IU with 1 RLY I/O                               |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 2-Port TPS IU with 2 SS I/O                                |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 2-Port TPS IU with 2 RLY I/O                               |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| 2-PRT TPS IU + 1 SS +1 RLY I/O                             |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| None                                                       |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| N Terminal                                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| T Compression                                              |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| P Terminal                                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| U Compression                                              |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| Q Terminal                                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| V Compression                                              |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| R Terminal                                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| W Compression                                              |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| S Terminal                                                 |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| X Compression                                              |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |
| Z                                                          |  |  |  |  |  |  |  |  |  |        |    |    |    |    |    |      |      |     |     |     |     |    |    |    |    |    |    |    |

CM = Chassis & Motherboard Style  
TC = Terminal Connector Style  
MP = Main Power  
RP = Redundant Power  
FR = Frammer Type  
10GX = 10GigE Port X (where X= 1 or 2)  
GEX = GigE Port X (where X= 3, 4, 5 or 6)  
SX = Slot X (where X=1-7)  
D = Can fit double slot moodule (3505 Only: Double slot IUs can only start in S1, S3 or S5)

Note 1: If A, B or C is selected for S1, S2, must be 1  
If A, B or C is selected for S3, S4, must be 1  
If A, B or C is selected for S5, S6, must be 1  
Note 2: Only a maximum of two[2] FXS IU is allowed per chassis  
Note 3: The T1/E1 IU can not be place in S7

## Notes

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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