# Giga Plus™ *DATASHEET*

## 6 - 40 GHz
## Professional-Grade | Licensed | Split-Mount

*MICROWAVE BACKHAUL SYSTEM*


*PART OF*
Plus™ Series

TRANGO SYSTEMS

# Giga Plus™ Overview

Apex Plus offers network operators an easy means of migrating from TDM connectivity through STM-1, OC-3, T1 and E1 interfaces or hybrid mixed TDM/IP traffic to native IP (Ethernet) backhaul via GigE and fiber interfaces.

The point-to-point backhaul system includes PDH native T1/E1 connectivity to support base station synchronization requirements. Full duplex capacities from 100 Mbps to 750 Mbps FDX (with key and 2+0) can be achieved in licensed 6-40 GHz bands with robust features including excellent system gain, ACM (Adaptive Coding and Modulation), VLAN tagging, traffic shaping and advanced QOS with DSCP support.

## Innovative Design

The Giga Plus innovative design protects your microwave backhaul investment. Remotely activated software keys enable the baseline 100+ Mbps Ethernet capacity to be increased or TDM Support added as you need it. This scalability allows the network operator to support up to 8 native T1/E1 circuits now and add packet-based capacity up to 375 Mbps as the network grows. The TDM capacity can be reclaimed as legacy devices are phased out and the network migrates to all-IP 4G architectures. The four GigE ports have individual controls for VLAN tagging, traffic shaping and QOS, allowing greater control of the network.

## Applications

- LTE / WiMAX / 3G / 4G Backhaul
- Private / Enterprise
- Fixed Wireless / ISP
- Public Safety / Video Surveillance
- Broadcast

## Features

### Performance

- Capacity up to 750 Mbps in a 56 MHz wide channel (375 Mbps full duplex)
- Industry leading system gain over 6-40 GHz
- 3.5-56 MHz Channel Bandwidth
- Support for up to 4 Classes of Service (CoS)
- 2+0 and 4+0 support via link aggregation

### Advanced Networking

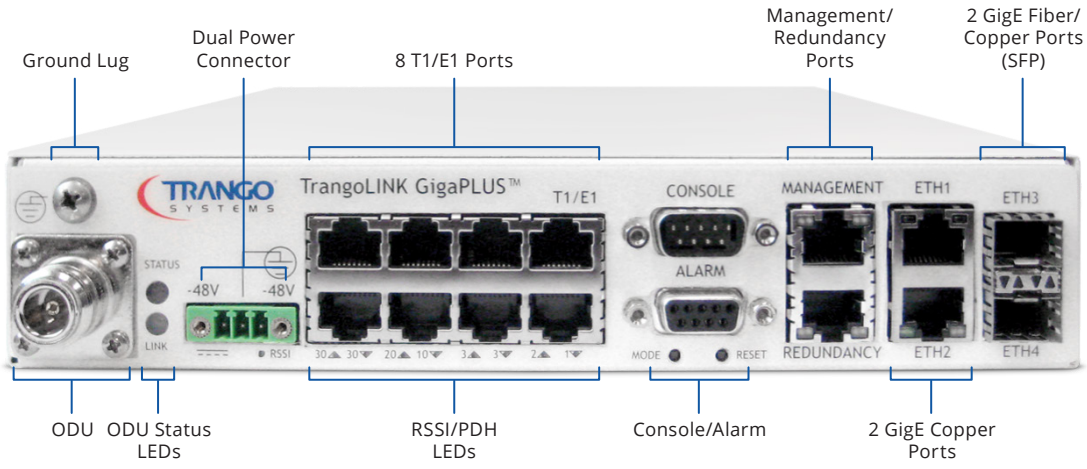
- Hitless Adaptive Code Modulation (ACM)
- 1+1 Hot Standby (HSB) support

### Interface & Management

- 2x GigE Copper Ports, 2x GigE Fiber / Copper Ports, 8x T1/E1 Ports
- 2x CMOS Inputs & 2x Dry Contact Outputs
- Bandwidth shaping per port
- In-Band and Out-of-Band management

### Mechanical

- Split-Mount, rugged, durable and compact form factor with separate IDU (Modem) & ODU (Transceiver)
- Industry's highest temp spec - up to +65°C (149°F)
- FCC/ETSI, NEBS, NTIA Compliant
- Standard 1-Year Manufacturer's Warranty



# System Specifications

| General Parameters | | | |
|---|---|---|---|
| **Model Numbers** | IDU: Giga Plus-IDU-1, ODU: WaveLab Advantage Series ODU | | |
| **Frequency Support** | 6-40 GHz Frequency Division Duplex (FDD) | | |
| **Channel Size** ‡ | 3.5, 5, 7, 8.33, 10, 12.5, 13.75/14, 20, 25, 28, 30, 40, 50, 55/56, 80 MHz | | |
| **Modulation Format** | Selectable: QPSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, ACM & non-ACM | | |
| **Max Capacity** | 375 Mbps full duplex – Varies by modulation and bandwidth selected | | |
| **Payload Latency** | 100 µs typical | | |
| **Payload Types** | Ethernet (IPv4 and IPv6 compatible), T1/E1 | | |
| **Features** | ATPC (Automatic Transmit Power Control)<br>Hitless ACM (Adaptive Coding and Modulation)<br>Modulation Shifting<br>Forward Error Correction<br>LDPC | | |
| **Regulatory Compliance** ‡ | FCC CFR47 Part 101<br>ETSI EN 302 217-1<br>ETSI EN 302 217-2<br>ETSI EN 301 489-1 EMC<br>ETSI EN 301 489-4 EMC<br>CANADA SRSP<br>FCC/ANSI: FCC Part 15 Class A Unintentional Radiator<br>RoHS | T1: ITU-T.G824<br>GR-499-CORE | E1: ITU-T G.703<br>G.823 |
| **Safety** | EN60950-1 | | |
| **MTBF** | > 18 years | | |

| Ethernet Parameters | |
|---|---|
| **Packet Size** | 64-9600 bytes |
| **Ring Protection** | RSTP, MSTP |
| **Link Aggregation** | 802.3ad |
| **Quality of Service (QoS)** | 802.1p Port prioritization<br>Diffserv (DSCP)<br>Port mapping for traffic<br>Support for up to 4 Classes of Service (CoS)<br>Port rate limiting per port |

| Management | |
|---|---|
| **Security / Authentication** | 2 level password (Read only, read/write) |
| **Configuration & Management** | Telnet, SSH, HTTPS, Serial Console (RS232-115200, N, 8, 1), SNMPv2 |
| **Remote Firmware Update** | FTP client, TFTP server in radio unit |

| Interfaces | Indoor Unit | Outdoor Unit (Without Antenna) |
|---|---|---|
| **Indicators** | Ethernet speed and activity for each port<br>Multiplexed LED displays for RSSI, T1/E1<br>2 status LEDs per ODU | N/A |
| **Payload Interfaces** | 2x GigE RJ45 (10/100/1000BaseT)<br>2x GigE Fiber/Copper SFP<br>8x T1/E1 RJ45 | TX IF, RX IF, Telemetry |
| **Out-of-Band Management** | Ethernet port RJ45 | Via IDU IF cable |
| **1+1 Hot Standby** | RJ45 | N/A |
| **Alarms** | 2 inputs – CMOS; 2 outputs – Dry contact closure isolated 50V 1A | Loss of lock |
| **Power Connector** | 3 Pin Terminal Block to support redundant power supplies | Provided by IDU |
| **Console** | DB9 RS232-115200, N, 8, 1 | Via IDU IF cable |

| Power | Indoor Unit | Outdoor Unit (Without Antenna) |
|---|---|---|
| **Power Input** | -40 to -72 Vdc Dual input | -24 to -72 Vdc |
| **Power Consumption** | < 35 Watts (All ports active) | < 35 Watts per ODU |

‡ Legal regulations for specific frequencies vary from region to region. Users are responsible for complying with their local regulations.

| Mechanical & Environmental | Indoor Unit | Outdoor Unit (Without Antenna) |
|---|---|---|
| Enclosure | 8.75-inch half rackmount, 1U height | Cast Aluminum |
| ODU IF / Power / Control Connection | N-Female | N-Female (TX IF, RX IF, Telemetry)<br>BNC-F for RSSI (Wavelab ODU) |
| Dimensions (Height x Width x Length) | 1.75 x 8.75 x 11.25 in. / 4.4 x 22.2 x 28.5 cm | 9.4 x 10.9 x 3.6 in. / 23.9 x 27.7 x 9.1 cm (WaveLab ODU) |
| Weight | 4.8 lbs / 2.2 kg | ≤ 9.5 lbs / 4.3 kg (WaveLab ODU) |
| Temperature Range | 14° to 131° F / -10° to +55° C | -40° to 131° F / -40° to +55° C (Spec compliant)<br>-40° to 149° F / -40° to +65° C (Operational) |
| Humidity | 95% non condensing | 100% condensing |

## Link Capacity (Mbps) at Layer 2

| BW (MHz) | QPSK | 16 QAM | 32 QAM | 64 QAM | 128 QAM | 256 QAM |
|---|---|---|---|---|---|---|
| 3.5 | 6 | 9 | 15 | 18 | 21 | 23 |
| 5 | 8 | 12 | 19 | 24 | 27 | 31 |
| 7 | 10 | 20 | 25 | 31 | 36 | 40 |
| 8.33 | 13 | 26 | 33 | 40 | 46 | 52 |
| 10 | 15 | 30 | 37 | 46 | 53 | 60 |
| 12.5 | 20 | 40 | 49 | 60 | 70 | 78 |
| 13.75/14 | 22 | 45 | 55 | 67 | 78 | 88 |
| 20 | 31 | 63 | 78 | 96 | 111 | 126 |
| 25 | 39 | 80 | 99 | 120 | 140 | 160 |
| 28 | 47 | 95 | 118 | 142 | 167 | 192 |
| 30 | 47 | 95 | 118 | 142 | 167 | 192 |
| 40 | 63 | 128 | 159 | 192 | 225 | 256 |
| 50 | 78 | 157 | 195 | 238 | 277 | 318 |
| 55/56 | 90 | 181 | 225 | 275 | 320 | 365 |
| 80 | 90 | 181 | 225 | 275 | 320 | 375 |

## Max Tx Power by Frequency (dBm)

| Mod | 6, 7, 8 GHz | 10 GHz | 11 GHz | | 13, 15 GHz | | 18-26 GHz | | 28-40 GHz |
|---|---|---|---|---|---|---|---|---|---|
| QPSK | 30 | 26.5 | 28 | | 26 | | 25 | | 23 |
| 16QAM | 28 | 22.5 | 26 | | 22 | 25 | 22 | 23 | 21 |
| 32QAM | 28 | 22.5 | 26 | | 22 | 25 | 22 | 23 | 21 |
| 64QAM | 25 | 20.5 | 22 | 25 | 21 | 24 | 20 | 22 | 17 |
| 128QAM | 25 | 20.5 | 22 | 25 | 21 | 24 | 20 | 22 | 17 |
| 256QAM | 24 | 18.5 | 21 | 24 | 20 | 23 | 19 | 21 | 16 |

| |
|---|
| Basic Package = 118 Mbps Max |
| License Key 1 = 225 Mbps Max* |
| License Key 2 = 375 Mbps Max* |
| License Key 3 = AP1 Models Only* |

* Based on purchasable option key. Contact sales for more information.

## Receive Sensitivity In dBm (6-26 GHz)

| Channel Width (MHz) | QPSK | 16 QAM | 32 QAM | 64 QAM | 128 QAM | 256 QAM |
|---|---|---|---|---|---|---|
| 3.5 | -96.6 | -90.4 | -86.4 | -84.0 | -80.9 | -77.9 |
| 5 | -94.4 | -88.8 | -84.8 | -82.1 | -79.0 | -76.0 |
| 7 | -93.3 | -87.7 | -83.7 | -81.3 | -78.2 | -75.2 |
| 8.33 | -92.7 | -86.5 | -82.5 | -80.3 | -77.5 | -74.4 |
| 10 | -92.2 | -86.0 | -82.0 | -79.6 | -76.5 | -73.5 |
| 12.5 | -91.3 | -85.4 | -81.1 | -78.7 | -75.4 | -72.4 |
| 14 | -90.5 | -84.3 | -80.3 | -77.9 | -74.8 | -71.8 |
| 20 | -89.0 | -82.8 | -78.8 | -76.4 | -73.3 | -70.3 |
| 25 | -88.1 | -82.0 | -78.0 | -75.4 | -72.3 | -69.3 |
| 28/30 | -87.3 | -81.1 | -77.1 | -74.7 | -71.6 | -68.6 |
| 40 | -86.0 | -79.8 | -75.8 | -73.4 | -70.3 | -67.3 |
| 50 | -85.1 | -78.9 | -74.9 | -72.5 | -69.4 | -66.4 |
| 55/56 | -84.5 | -78.3 | -74.3 | -71.9 | -68.8 | -65.8 |
| 80 | -84.5 | -78.3 | -74.3 | -71.9 | -68.8 | -63.8 |

## Receive Sensitivity In dBm (28-40 GHz)

| Channel Width (MHz) | QPSK | 16 QAM | 32 QAM | 64 QAM | 128 QAM | 256 QAM |
|---|---|---|---|---|---|---|
| 3.5 | -93.6 | -87.4 | -83.4 | -81.0 | -77.9 | -74.9 |
| 5 | -91.4 | -85.8 | -81.8 | -79.1 | -76.0 | -73.0 |
| 7 | -90.9 | -84.7 | -80.7 | -78.3 | -75.2 | -72.2 |
| 8.33 | -89.7 | -83.5 | -79.5 | -77.3 | -74.5 | -71.4 |
| 10 | -89.2 | -83.0 | -79.0 | -76.6 | -73.5 | -70.5 |
| 12.5 | -88.3 | -82.4 | -78.1 | -75.7 | -72.4 | -69.4 |
| 14 | -87.5 | -81.3 | -77.3 | -74.9 | -71.8 | -68.8 |
| 20 | -86.0 | -79.8 | -75.8 | -73.4 | -70.3 | -67.3 |
| 25 | -85.1 | -79.0 | -75.0 | -72.4 | -69.3 | -66.3 |
| 28/30 | -84.4 | -78.1 | -74.1 | -71.7 | -68.6 | -65.6 |
| 40 | -83.0 | -76.8 | -72.8 | -70.4 | -67.3 | -64.3 |
| 50 | -82.1 | -75.9 | -71.9 | -69.5 | -66.4 | -63.4 |
| 55/56 | -81.5 | -75.3 | -71.3 | -68.9 | -65.8 | -62.8 |
| 80 | -81.5 | -75.3 | -71.3 | -68.9 | -65.8 | -60.8 |

## ETSI System T/R Spacings

| 6 GHz | 7 GHz | 8 GHz | 11 GHz | 13 GHz | 15 GHz |
|---|---|---|---|---|---|
| 240, 252.04, 340 | 154, 160, 161, 168, 196, 245 | 119, 126, 151.614, 208, 266, 311.32 | 490, 500, 530 | 266 | 315, 420, 475, 490, 640, 644, 728 |

| 18 GHz | 23 GHz | 26 GHz | 28 GHz | 32 GHz | 38 GHz |
|---|---|---|---|---|---|
| 1010 | 1008, 1232 | 800, 1008 | 1008 | 812 | 700, 1260 |

## ANSI System T/R Spacings

| 6 GHz | 7 GHz | 11 GHz | 13 GHz | 15 GHz | 18 GHz | 23 GHz | 38 GHz |
|---|---|---|---|---|---|---|---|
| 160, 170, 252.04, 340 | 150 | 490, 500 | 225 | 475, 640 | 1560 | 1200, 1232 | 700 |