Siklu
BY CERAGON

MULTIHAUL™ TG T280

PRODUCT DESCRIPTION

Edition: A1, July 2023

Contents

Document Information

Revision	Date	Author	Revision notes
A1	July 2023	SH	Update technical information.
A0	June 2021	SH	First Release.

Intended Audience

- Solution architects and network planning staff
- Telecom backhaul engineers
- Wireless service providers, business connectivity and wireless networks pre-sale engineers

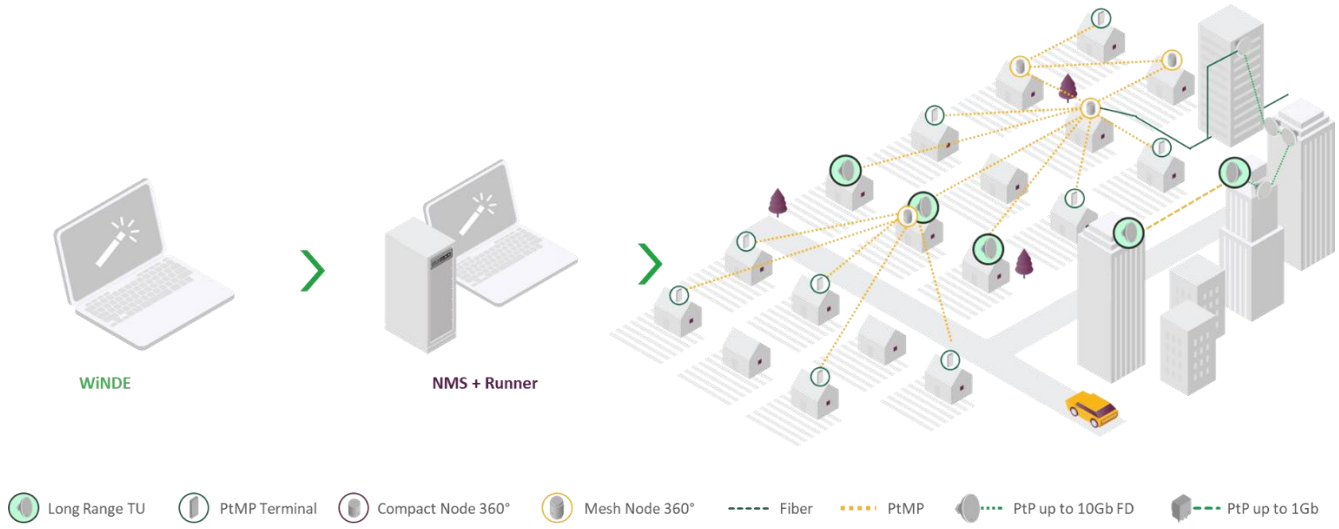
Terminology used in this document assumes audience familiarity with millimeter wave radio communication and networking technologies.

References

- MULTIHAUL™ TG SERIES - GENERIC SYSTEM DESCRIPTION

Introduction

MultiHaul™ TG family is an advanced solution for fixed wireless delivery of multi-Gigabit services to homes, businesses and within Smart cities Broadband IoT applications. It is complemented by additional Siklu solutions for the design and operations of the network, the SmartHaul™ suite of SaaS applications and services, together with EtherHaul™, a series of very high capacity PtP wireless links.



This document describes the MultiHaul™ TG T280. It expands the Generic System Description with the product specific information. The 2 documents can be reviewed in the order suitable to the reader.

MultiHaul™ TG T280 Main Features

MultiHaul™ TG Long Range Terminal Unit (PtMP)

MultiHaul™ TG T280 is a long range terminal unit (TU) in the TG series. TUs are the edge of the fixed wireless network, serving one or more homes and businesses, Wi-Fi Access Points or Small Cells. T280 can achieve a longer range with a field-installable dish antenna.

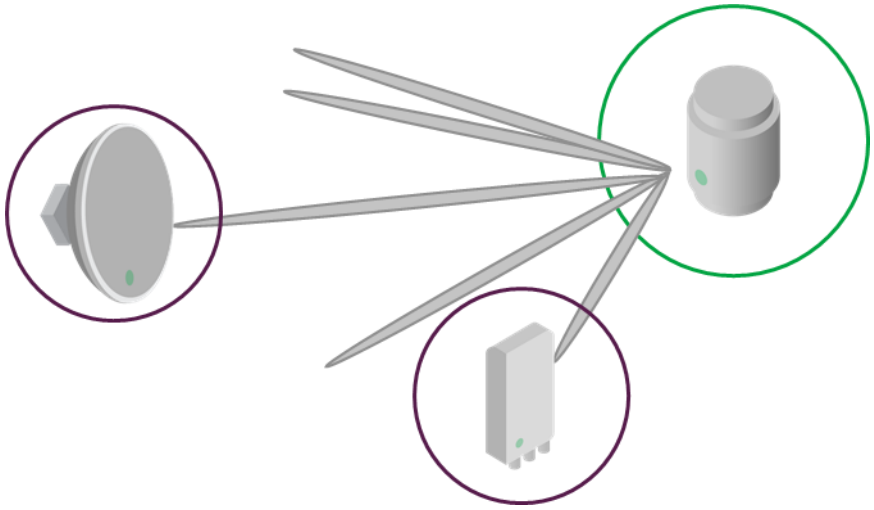


Figure 1: Mixed-use Sector

Benefits

- T280 models feature a similar and consistent operational experience with the MultiHaul™ TG series of units, reducing the cost to deploy and operate the fixed wireless network.
- The long range of the T280 simplifies the design of the network when few hub sites can reach to longer distances
- The MultiHaul™ TG T280 operates side by side with other TUs in the same sector, no need to dedicate sectors to applications
- With automatic alignment on the side the node, a single person is required for the installation of the T280 in PtMP topology

MultiHaul™ TG Long Range PtP Link

MultiHaul™ TG T280 can operate in PtP configuration, 2x T280s in a link, for extra long range configuration with their field-installable dish antennas.

Figure 2: PtP Link

Benefits

- T280 in PtP configuration extend the flexibility of the Terragraph capabilities to more applications and longer distances

MultiHaul™ TG Range Extension for Self-Backhaul Links (PtMP or PtP)

MultiHaul™ TG T280 can backhaul a remote mesh node at distances longer than direct RF links between mesh nodes, with 1 or 2 T280 in the backhaul link, depending on the target distance. The capacity of this type of SBH link is the same as a direct RF link, and the distance or availability are greatly enhanced, allowing to cover larger service areas with fewer hub sites (compared to using only node-node links), reducing the time to market (TTM, when fewer hub-sites need to be acquired and installed) and the cost per home passed, as well as the on-going OPEX when fewer sites need on-going monitoring, operations and troubleshooting.

Two configurations are supported:

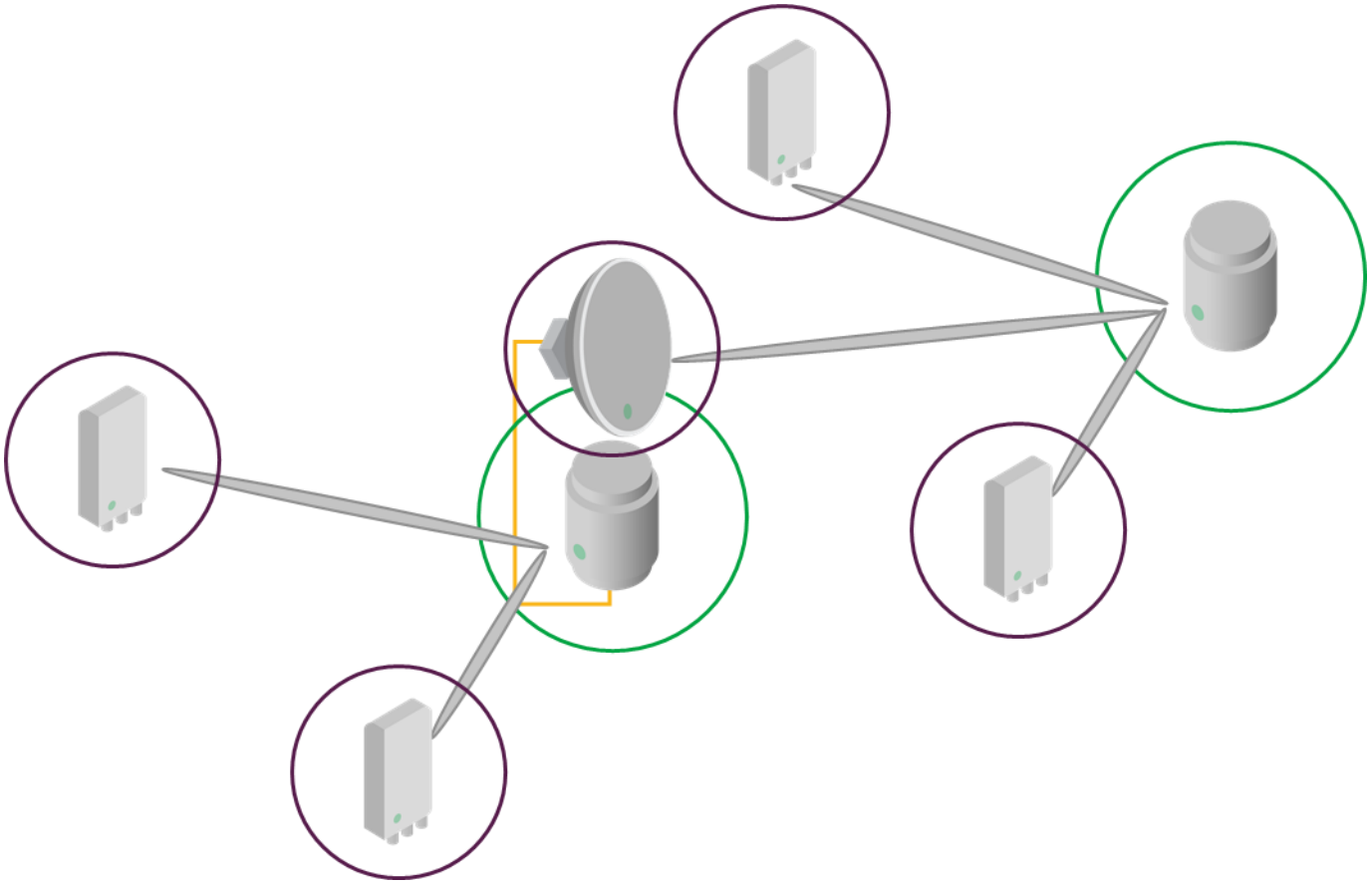


Figure 3: One-sided Range extension for SBH Link

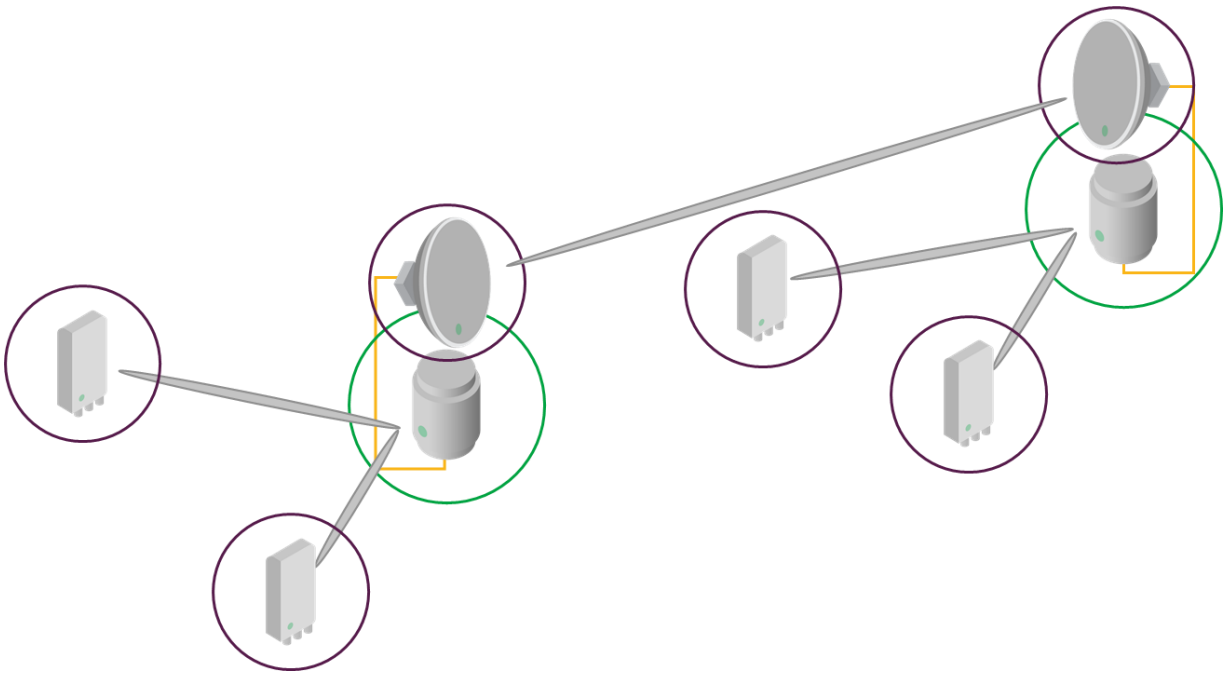


Figure 4: Dual-sided Range extension for SBH Link

Benefits

- Range for SBH Link between mesh nodes is improved, with no degradation in capacity or availability)
- Faster TTM for a large service area
- Lower home passed cost
- Lower OPEX

Terragraph certified

MultiHaul™ TG T280 is Terragraph certified, and apply the most advanced and modern radio physical and MAC layers for long range access in the 60GHz spectrum.

Standard compliance

- IEEE 802.11ay - Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications--Amendment: Enhanced Throughput for Operation in License-Exempt Bands Above 45 GHz

Benefits

- Wireless network is built upon a modern future-proof wireless interface, designed from the ground up for the unique characteristics of the 60GHz spectrum.
- A well thought feature-rich wireless interface, supporting the needs of many different applications.

Flexible Channel Plans

MultiHaul™ TG T280 can operate on any of 4 standard 2.16GHz wide channels, per IEEE 802.11ay, and will automatically identify the channel used by the serving node, no configuration needed. This allows utmost in flexibility for the design of the fixed wireless network.

Channel	Center Frequency [GHz]
1	58.32
2	60.48
3	62.64
4	64.80

Benefits

- Optimization of the channel plan to suit the performance targets of the organization.
- No configuration in the Terminal Unit.

Adaptive Coding and Modulation (ACM)

Please refer to the heading by the same name in the Generic System Description.

Adaptive Transmit Power Control (ATPC)

Please refer to the heading by the same name in the Generic System Description.

Time Division Multiple Access (TDMA MAC)

Please refer to the heading by the same name in the Generic System Description.

MultiHaul™ TG T280 Networking Features

Integrated Ethernet switch

MultiHaul™ TG NT280 includes an integrated multi Gigabit Ethernet switch with 3 ports:

- Eth1: 100M, 1 / 2.5 / 5GbE copper (802.3bz/an) with PoE-in
- Eth2: 1GbE copper with PoE-Out
- Eth3: 1/10GbE SFP+

Each port can be configured to support:

- Auto negotiation enabled/disabled (RJ-45 connectors only, always on for speeds above 1Gbps)
- Speeds: 100/1,000/2,500/5,000 Mbps (port and model dependent).
- Full-duplex / half-duplex
- Delivery of data and/or management traffic

Benefits

3 Ethernet ports on the T280 are an ideal number of interfaces at a service site, where the ports connected can match the network needs flexibly. This enables:

- Direct connection to a fiber drop (10GbE or 1GbE FD), the utmost in protection for the expensive network equipment under the pole/roof
- Services to multiple local users or devices, without additional equipment
- Integrated multi Gigabit Ethernet switch with advanced networking features allows all outdoor installation

Transparent Bridge (IEEE 802.1d)

Please refer to the heading by the same name in the Generic System Description.

Virtual LAN (VLAN, IEEE 802.1q)

Please refer to the heading by the same name in the Generic System Description.

Provider Bridge (IEEE 802.1ad)

Please refer to the heading by the same name in the Generic System Description.

MultiHaul™ TG T280 OAM and Management Concepts

Please refer to the heading by the same name in the Generic System Description.

MultiHaul™ TG T280 Power

PoE-In

MultiHaul™ TG T280 simplifies powering by leveraging the data cable for power, with the standard Power Over Ethernet concept, 802.3bz. Power draw varies with the configuration and or the application:

- Without PoE-Out: 25W.
- With PoE-Out: 90W.

Standard compliance

- IEEE 802.3bt - Physical Layer and Management Parameters for Power over Ethernet over 4 pairs (PoE-in/out, PSE, PD).

Benefits

Thanks to the efficient system design and high integration, MultiHaul TG T280:

- Reduces the power consumption and accordingly the associated energy costs.
- Simplifies the installation scenario, by enabling use of a single cable for both power and data.
- “Power-less operation”, when the MultiHaul TG unit can be powered from a 3rd party switch aggregating several functions in the site.

48VDC Power

MultiHaul™ TG T280 can optionally be powered with a simple 48VDC feed, for example in those sites where 48VDC is the common power. An adaptor is required for this application, available from Siklu as EH-PoE-DC-adaptor. Power draw varies with the configuration and or the application:

- Without PoE-Out: 25W.
- With PoE-Out: 90W.

Benefits

- Operations from standard Telco grade power.

PoE-Out

MultiHaul™ TG T280 supports standard PoE-Out on Eth2 (model dependent), toward other TG series radios or 3rd party devices such as Wi-Fi Access Points, Small Cells or CCTV / PTZ cameras:

- Max power out: 65W (effective power controlled according to IEEE 802.3bt).

Standard compliance

- IEEE 802.3bt - Physical Layer and Management Parameters for Power over Ethernet over 4 pairs.

Benefits

- Simplifies the installation of other devices when their power supply can be eliminated.
- Improves availability of the service, when the most failure prone element, the power-supply, can be eliminated.

MultiHaul™ TG T280 – Detailed Specifications

Topologies	Point to Point, Point to Multi-point, Daisy-chain, L2 SDN Mesh
Frequency & Duplexing	57-66GHz, TDD/TDMA, 4 channels.
Channel Bandwidth, Modulation & Adaptive Coding, TPC	2160MHz, BPSK to QAM16, up to 10 levels of hitless adaptive bandwidth, coding and modulation – boost gain by over 29dB. Automatic Transmit Power Control (ATPC), per link.
Radio OTA Rate (over the air) / Throughput	OTA up to 4,600Mbps (future SW release 9,200Mbps with channel bonding) / Throughput up to 3800 Mbps aggregate (future SW release up to 5,500 Mbps aggregate).
Antenna Options	0.5ft – 36dBi or 1ft – 42dBi, field installable / replaceable (FRU). Effective distances, capacity and availability can be calculated with Siklu Link Budget Calculator lbc.siklu.com
Transmit power	Up to +13dBm at the antenna port (note: transmit power is backed off above MCS9)
Interfaces (3 ports)	1x RJ-45 5G/2.5/1GbE with PoE-In, 1x RJ-45 1GbE with PoE-Out (up to 81W), 1x SFP+ 10GbE.
Ethernet Features	IEEE 802.1d transparent bridging, VLAN tagging and isolation, Provider bridge - VLAN stacking.
Security	AES 128-bits OTA, GUI over HTTPS, CLI over SSH, file transfer over SSH. IP-less operations.
Out of the Box	Factory configuration PtMP mode (N36x <> T280), Field configuration to PtP mode (T280 <> T280).
Management & Provisioning	In-band, Out-of-band management, Web GUI (one-pane configuration of local and remote units) & Embedded CLI, NETCONF, SNMP.
PoE-Out	1 port, 81W POE-Out (IEEE 802.3bt; * cable loss may affect power delivered to the PD).
Conformance	Radio: US FCC 47 CFR Part 15.255; EN 303 722, EMC: US FCC 47 CFR Part 15; EN 301 489, Safety: UL/IEC 62368-1; UL/IEC 60950-22.
Terragraph	Terragraph certified.
Power Supply	PoE-In (IEEE 802.3bt or passive), or 48V DC (via RJ-45 adaptor), 19W no POE-Out, up to 90W with up to 81W POE-Out.
Environmental	Operating Temperature: -49° ÷ +131°F (-45° ÷ +55°C); Ingress Protection Rating: IP67.
Dimensions	6.9 x 9 x 2.5 in. / 175 x 230 x 65 mm. (W x H x D), antenna not included.
Weight	4.4 lbs. / 2 Kg, antenna not included.
In the box	Terminal unit, all weather shell, grounding cable, quick start guide.
Accessories	External Antenna, Mounting Kit, Power Supply – not included. Optional accessories, not included: surge protector, SFP/SFP+.

MultiHaul™ TG T280 – Standards Compliance

Environmental

- EN 300 019-1-1 Class 1.2 (storage, weather protected, not temperature-controlled)
- EN 300 019-1-2 Class 2.2 (transportation)
- EN 300 019-1-4 Class 4.1E (operations, non-weather protected locations – extended)
- Ingress Protection Rating: IP67
- NEMA rating: enclosure type 4

Please refer also to the heading by the same name in the Generic System Description.

Acronyms

ACM	Adaptive Modulation and Coding
AES	Advanced Encryption Standard
AN	Network Assigned Name / ID
ATPC	Automatic/Adaptive Transmit Power Control
BU	Base Unit
CLI	Command Line Interface
FD	Full Duplex
FTP	File Transfer Protocol
GbE	Gigabit Ethernet
Gbps	Gigabit per second
IoT	Internet of Things
ISP	Internet Service Provider
MAC	Medium Access Control
Mbps	Megabit per second
MMF	Multi-Mode Fiber
NETCONF	Network Configuration Protocol
NNI	Network Network Interface
PD	Powered Device (over PoE)
PSE	Power Supplying Equipment (over PoE)
PoE	Power over Ethernet
PtMP	Point to Multi Point
PtP	Point to Point
RF	Radio Frequency
SaaS	Software as a Service
SDN	Software Defined Network
SFTP	Secure File Transfer Protocol
SLA	Service Level Agreement
SMF	Single Mode Fiber
SSH	Secure Shell
SSID	Service Set Identifier
SW	Software
TDMA	Time Division Multiple Access
TG	MultiHaul™ Terragraph compliant series
TU	Terminal Unit
VLAN	Virtual Local Area Network (LAN)
YANG	Yet Another Next Generation data modelling language

About Siklu by Ceragon

Siklu by Ceragon delivers Gigabit capacity millimeter wave wireless backhaul solutions operating in the 60, 70 and 80 GHz bands. Ideal for dense, capacity-hungry urban security networks, the ultra-high capacity wireless links can be easily and discreetly installed on the very same street fixtures as the security cameras. The most deployed mmW radios in the world, thousands of units are delivering carrier grade performance in varying weather conditions around the world.