



## MultiHaul™ compact Terminal Unit (cTU)

### Product Description



#### **Introduction**

This Product Description document details the special features of the MultiHaul™ compact Terminal Unit cTU.

Edition: A0, April 2019



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## Document Information

Revision	Date	Author	Revision notes
A0	22 April 2019	SH	Initial Release

## Intended Audience

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

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

Comments and suggestions are welcome to: [info@siklu.com](mailto:info@siklu.com).

## 1. Introduction

This Product Description document details the special features of the MultiHaul™ compact Terminal Unit cTU, in reference to MultiHaul™ family generic characteristics which are reviewed in a companion document, the MultiHaul™ System Description (reference [1]), also available on Siklu's partners' portal. The unique aspects are contained in this document, while the aspects common to the MultiHaul™ product lines are included by reference to the generic MultiHaul™ System Description document. The 2 documents can be reviewed in the order suitable to the reader.

The MultiHaul™ compact Terminal Unit cTU (MH-T201) radio delivers carrier-grade wireless point-to-multipoint Gigabit Ethernet services utilizing the 60 GHz un-licensed V band spectrum. The solution is designed for a range of last hop connectivity, from CCTV and Safe /Smart-City networks to Gigabit-to-the-Home. On one hand, the cTU meets the stringent requirements of service providers while on the other hand allows easy installation by non-Telco professional staff.



Figure 1: MultiHaul™ cTU installed

The cTU is based on Siklu's revolutionary integrated-silicon technology, which results in a highly reliable, zero footprint, and low-cost radio.

The cTU offers Gigabit throughput, enhanced adaptive coding & modulation for maximum spectral efficiency, and services availability. All in a very small and light outdoor package that is optimized for zero footprint installations and designed to overcome pole sway, twist and/or tilt. MultiHaul™ cTU is fast, simple and inexpensive to deploy.

- Point to Multipoint
  - Wide coverage, 1 to many
  - Pencil-thin narrow beams
- All-outdoor zero footprint

- Small and light
- Quick and very easy to install, with ZeroAlign
- Siklu integrated AnyMount bracket allow for installations on poles or flush on walls
- Optimized for variety of deployments, from street level to roof-top
  - Works on poles, buildings facades (walls), traffic lights and more
  - Designed to overcome sway, twist and/or tilt
- Field proven technology
- Reduced TCO and fast ROI
- Smart Radio
  - Adaptive coding and modulation for high availability

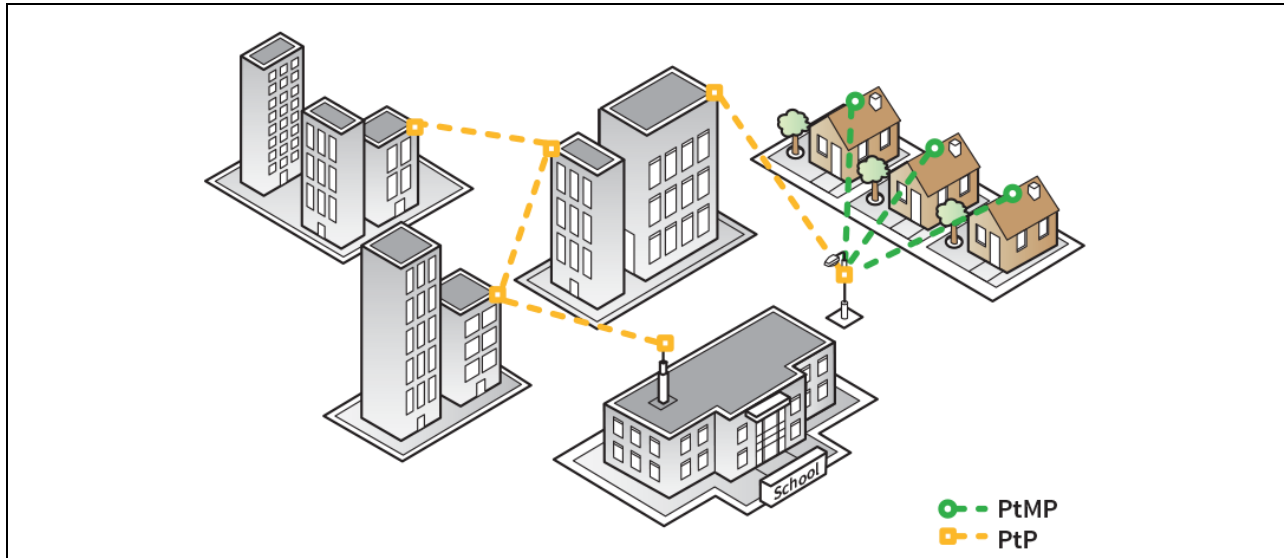


Figure 2: Gigabit Services

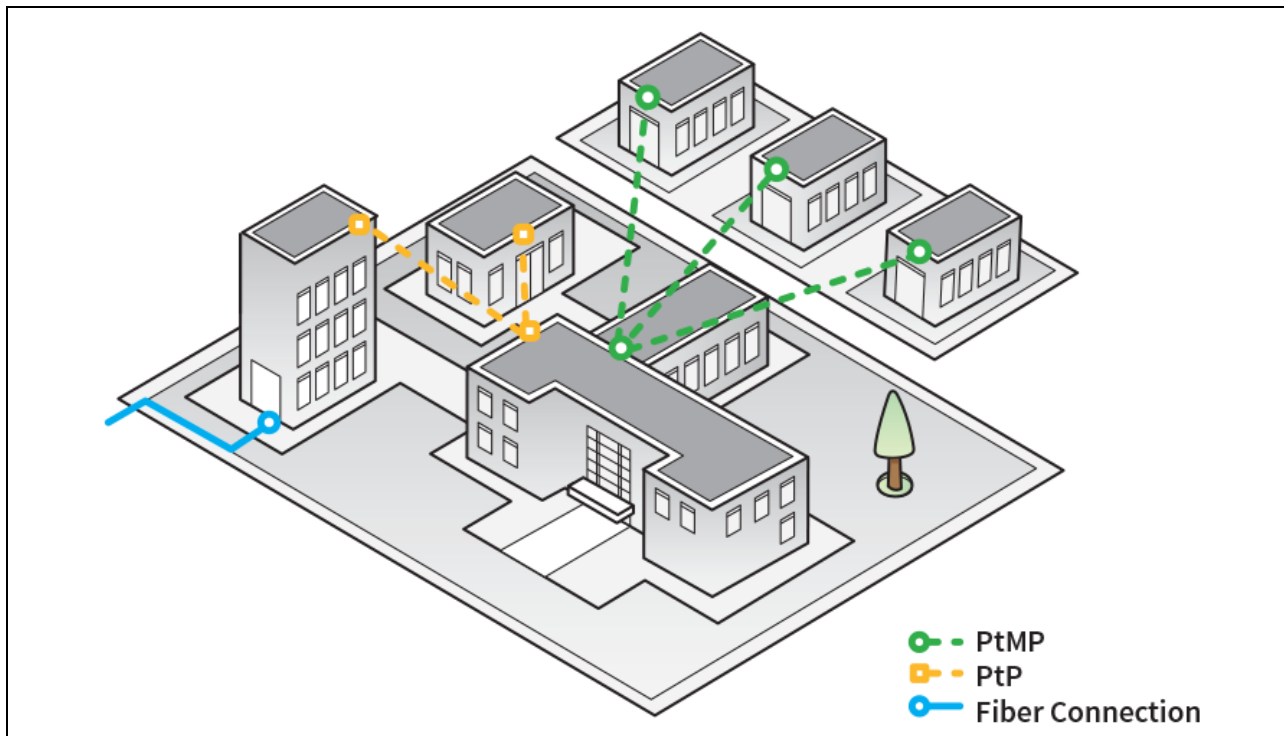


Figure 3: Campus Connectivity

Easily integrated into service-provider networks, out-of-the-box up & running capable, highly-scalable, the MultiHaul™ cTU is software-upgradable to support future capabilities as networks evolve.

The MultiHaul™ cTU features advanced adaptive modulation, bandwidth and coding - allowing operators to maintain connectivity in all weather conditions, while achieving maximum (up to 99.999%) link availability for prioritized services such as voice or control protocols.

Offering easy and low cost all-outdoor installation and a compact form factor, the MultiHaul™ cTU are also environmentally-friendly - boasting a tiny system and antenna footprint with especially low power consumption.

The MultiHaul™ cTU is a high-capacity Gigabit Ethernet radio at the lowest TCO in the industry. MultiHaul™ cTU enables service providers to profitably and reliably provide data intensive services. Provided by Siklu, the pioneer in silicon-based mm-waves backhaul systems, MultiHaul™ cTUs are the perfect choice for future proof investment.

## 2. MultiHaul™ cTU Overview

### 2.1 Functional Blocks

The MultiHaul™ cTU is an all-outdoor unit comprised of the following functional blocks:

- RF section: Siklu's self-designed innovative multi-antenna array, powered by Silicon integrated transceivers and amplifiers, together with the Modem/Baseband ASIC: a modem/baseband ASIC modem, capable of point to multipoint operations and management of the antenna array.
- Baseband section: the general purpose host processor controls the system, and the integrated Ethernet switch.
- Interfaces: a single copper Ethernet port, RJ-45.
- Power: is derived via PoE-In from the Ethernet# port, regulated and delivered to the various blocks of the T201.

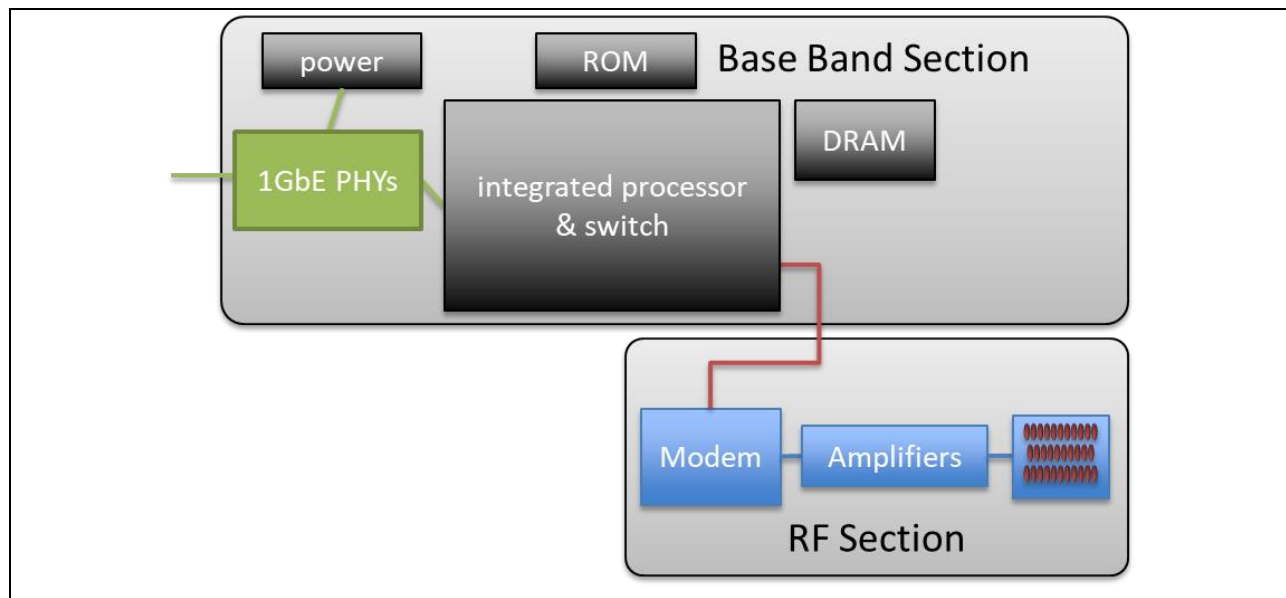


Figure 4: MultiHaul™ cTU T201 Block Diagram

## 2.2 MultiHaul™ cTU T201 Form Factor

The MultiHaul™ cTU T201 features a unique all-integrated form factor, as shown on Figure 5 (front and side views) and Figure 6 (open drawer):

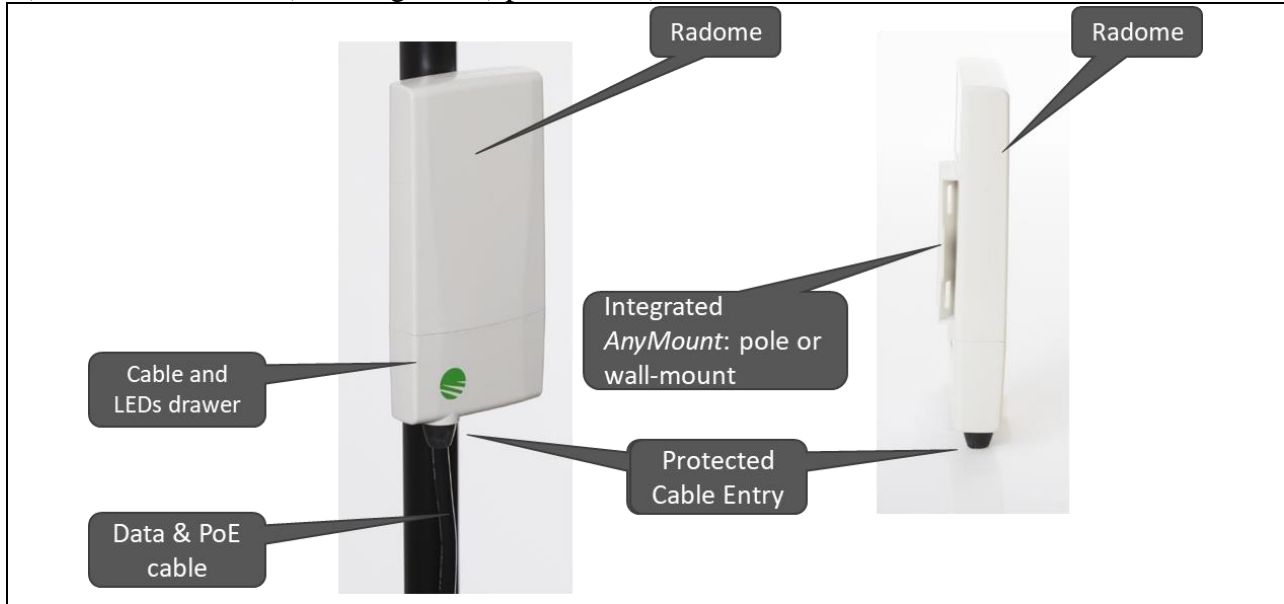


Figure 5: MultiHaul™ cTU T201 - front view and LEDs

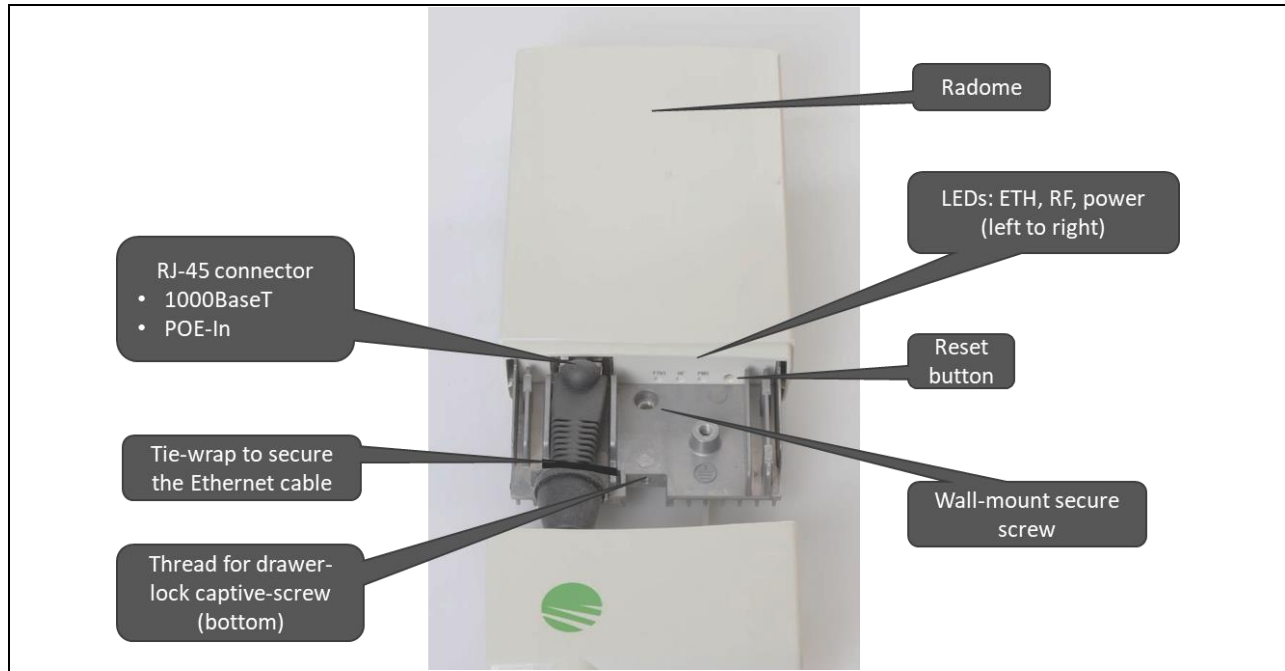


Figure 6: MultiHaul™ cTU T201 - rear view

LED	Color	Status
RF	Green	RF Link UP
ETH	Green	1Gbps
	Orange	10/100Mbps
PWR	Green – Power On	Blinking – boot up
	Orange - reboot	

### 3. MultiHaul™ cTU Specifications

#### 3.1 Point to Multipoint

MultiHaul™ cTU introduces a new level of performance in 60GHz millimeter wave communications, by adding point-to-multipoint topologies in a very compact form factor. SW controlled beam-forming ensures a wide angle coverage and narrow beams for immunity and performance. Additional information is provided in the companion document “MultiHaul™ System Description”.

#### 3.2 Scanning Antenna

MultiHaul™ cTU features a compact integrated horizontal scanning antenna, which auto-aligns the narrow-beam link between BU and cTU. Additional information is provided in the companion document “MultiHaul™ System Description”.

#### 3.3 Continuous Align Antenna

MultiHaul™ cTUs continuously align and re-align links. Additional information is provided in the companion document “MultiHaul™ System Description”.

### **3.4 Adaptive Modulation and Coding**

MultiHaul™ implements adaptive coding and modulation adjustments to optimize the over-the-air transmission and prevent weather-related fading traffic interruptions. Additional information is provided in the companion document “MultiHaul™ System Description”.

### **3.5 Dynamic Capacity Allocation**

MultiHaul™ continuously assigns dynamically the licensed capacity between the Base Unit and the Terminal Units, between the downstream and the upstream directions, for optimal user experience per the changing needs and traffic patterns of the services in actual use. Additional information is provided in the companion document “MultiHaul™ System Description”.

### **3.6 Ethernet Port Configuration**

The MultiHaul™ cTU T201 Ethernet port can be configured to support:

- Auto negotiation enabled/disabled
- Speeds: 10/100/1000 Mbps.
- Full-duplex / half-duplex
- Isolation of payload traffic and management traffic (see networking)

#### **3.6.1 Benefits**

Flexible configuration allows easy integration of the cTU in many networks.

### **3.7 Out-Of-Box OOB Operations**

While MultiHaul™ cTU is a very sophisticated product, it is very simple to deploy and operate. Additional information is provided in the companion document “MultiHaul™ System Description”.

## **4. MultiHaul™ cTU Networking Features**

Full details are provided in the companion document “MultiHaul™ System Description”.

## **5. MultiHaul™ cTU OAM features**

Full details are provided in the companion document “MultiHaul™ System Description”.

## **6. MultiHaul™ cTU Management Concepts**

Full details are provided in the companion document “MultiHaul™ System Description”.

## **7. MultiHaul™ cTU Deployment Topologies**

Full details are provided in the companion document “MultiHaul™ System Description”.



## 8. MultiHaul™ cTU Power

The MultiHaul™ simplifies powering the unit by leveraging the data cable of its Ethernet port for power, with the standard Power Over Ethernet concept, 802.3af, implementation dependent.

Parameter	Values
Voltage input	42 ÷ 57 VDC
Power draw	10W, 802.3af

## 9. Technical Specifications

Parameter	Values																				
Topologies	Point to Multi-Point (PtMP) and Point to Point (PtP)																				
Frequency & Channels	57-64GHz ; 3x 2,160MHz channels (FCC plan)																				
	<table border="1"> <thead> <tr> <th>Channel</th> <th>Band</th> <th>Min</th> <th>Max</th> <th>BW</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>58.32 GHz</td> <td>57.24 GHz</td> <td>59.40 GHz</td> <td>2.16 GHz</td> </tr> <tr> <td>2</td> <td>60.48 GHz</td> <td>59.4 GHz</td> <td>61.56 GHz</td> <td>2.16 GHz</td> </tr> <tr> <td>3</td> <td>62.64 GHz</td> <td>61.56 GHz</td> <td>63.72 GHz</td> <td>2.16 GHz</td> </tr> </tbody> </table>	Channel	Band	Min	Max	BW	1	58.32 GHz	57.24 GHz	59.40 GHz	2.16 GHz	2	60.48 GHz	59.4 GHz	61.56 GHz	2.16 GHz	3	62.64 GHz	61.56 GHz	63.72 GHz	2.16 GHz
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Channel Access	Channel Sense Multiple Access (CSMA/CA)																				
Modulation	BPSK/QPSK																				
Maximum output power (EIRP)	40 dBm																				
Air Interface PHY rate	Up to 2,300Mbps at highest modulation																				
Over-the-air L2 throughput	Up to 1,000Mbps aggregated, dynamically allocated between up- and downstream																				
Interfaces	1x 10/100/1000 Base-T																				
Antenna	Integrated MIMO antenna array, 90° wide horizontal scanning coverage Vertical beam width: 20° RX gain: 20 dBi (TX gain included in output power above)																				
Power options	PoE-In on Ethernet port: 10W, 802.3af																				
Management	<ul style="list-style-type: none"> <li>Out-of-band local management and over-the-air remote management,</li> <li>Web GUI (one click management of local &amp; remote units), embedded CLI, SNMPv2/3,</li> <li>Zero-touch turn-up, TACACS+, RADIUS</li> </ul>																				
Environmental	<ul style="list-style-type: none"> <li>Operating temperature: -27°F ÷ 131°F (-33°C ÷ 55°C)</li> <li>Ingress protection rating: IP65</li> <li>NEMA rating: enclosure type 3</li> </ul>																				
Regulatory	<ul style="list-style-type: none"> <li>Radio: US FCC 47 CFR Part 15 subpart C &amp; EN 302 567-2 V1.2.1:2012</li> <li>EMC: FCC 47 CFR Part 15 subpart B &amp; EN 301 489</li> <li>Safety: UL 60950</li> </ul>																				
Dimensions	H x W x D: 6.5 x 3.1 x 1 in. / 165 x 80 x 25 mm.																				
Weight	0.5 lbs. (250 gm), including AnyMount bracket																				

## 10. MultiHaul™ cTU Standards Compliance

The list of standards and recommendations supported generically by MultiHaul™ software and hardware is:

### Management

- IEEE 802.1AB - Link Layer Discovery Protocol (LLDP)
- RFC 3410/3416 - SNMPv2/3
- RFC 2131 - Dynamic Host Configuration Protocol
- RFC2819 - RMON Remote Network MONitoring

### Security

- IETF TACACS+
- RADIUS
- RFC 2246 - Transport Layer Security (TLS) protocol
- RFC 7230 - HTTPS, HTTP over TLS
- RFC 4251 - the IETF extension of the Secure Shell protocol (SSH) version 2.0
- RFC 959/1350 - FTP, SFTP, TFTP
- U.S. FIPS PUB 197 (FIPS 197), AES with 128 bits
- RFC2616 - Hypertext Transfer Protocol (HTTP)
- IEEE 802.1x

### Networking

- IEEE 802.1ad - Provider Bridge, QinQ VLAN/VLAN stacking
- IEEE 802.1d - Transparent Bridge
- IEEE 802.3ab - Ethernet 1000BASE-T
- IEEE 802.1p - Traffic management (L2)
- IEEE 802.1ab - Link Layer Discovery Protocol (LLDP)
- MSA SFP INF-8074 Small Form Factor Pluggable

### Environmental, Power

- CE: CE Marked (pending)
- EMC: FCC 47 CFR Part 15 subpart B & EN 301 489
- IEEE 802.3af PoE PD powered device
- Ingress Protection Rating: IP65
- NEMA rating: enclosure type 3
- Operation: EN 300 019-1-4 Class 4.1E
- Safety: UL 60950
- Storage: EN 300 019-1-1 Class 1.2
- Transportation: EN 300 019-1-2 Class 2.2

### Radio

- US: US FCC 47 CFR Part 15 subpart C
- EC: EN 302 567-2 V1.2.1:2012

## 11. References

[1] Siklu' MultiHaul™ System Description, Release D0, April 2019



## About Siklu

Siklu 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.

