

EtherHaul™ 8010FX

Product Description



Introduction

This Product Description document details the special features of the EH-8010FX, in reference to EtherHaul™ 8000 series generic characteristics which are reviewed in a companion document, the “EtherHaul™ 8000 Series System Description” (reference [1]), also available on Siklu’s partners’ portal. The 2 documents can be reviewed in the order suitable to the reader.

Edition: B1, March 2019

Table of Content

1. Introduction.....	4
1.1 Applications.....	4
1.2 Main features.....	5
2. EtherHaul™-8010FX System Overview	5
2.1 Functional Blocks.....	5
2.2 EH-8010FX General Specifications	7
3. EtherHaul™-8010FX Radio Specifications	8
3.1 Full-duplex.....	8
3.2 Frequency bands.....	8
3.3 Channel sizes.....	8
3.4 Adaptive Modulation.....	9
3.5 Channel capacity, transmit power, modulation and receiver sensitivity	9
3.6 Transmit power adjustment	10
3.7 Dual-step Transmit Power Control (DTPC).....	11
3.8 Antenna.....	11
3.9 Alignment	11
3.10 Radio standards compliance	11
3.11 AES Encryption.....	12
4. External interfaces.....	12
4.1 Ports and layout	12
4.2 Standard compliance.....	13
4.3 System capacity	14
4.4 Ingress protection	14
5. Networking features.....	15
5.1 Latency	15
5.2 Class of Service (CoS).....	15
5.3 Quality of Service (QoS)	15
5.4 Strict Priority (SP)	15
6. Management concepts.....	16
6.1 Management connectivity.....	16
7. Security.....	17
8. Logging and auditing features	17
9. Diagnostic tools.....	17
10. Power.....	17
10.1 Input Power.....	17
11. EtherHaul™ 8010FX Deployment Topologies.....	18
12. List of supported standards.....	19
13. References	19
14. Acronyms and Abbreviations.....	20

Document Information

Revision	Date	Author	Revision notes
B1	31 March 2019	SH	Updated release, aligned with System SW R10.2.
A0	25 June 2018	SH	Initial Release, aligned with System SW R10.0.

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.

1. Introduction

This Product Description document details the special features of the EH-8010FX, in reference to EtherHaul™ 8000 series generic characteristics which are reviewed in a companion document, the “EtherHaul™ 8000 Series System Description” (reference [1]), also available on Siklu’s partners’ portal. Radio performance, Port layout, Mechanical and Power information, are listed in this document, while the generic characteristics of the family are explained in the companion document (example: Management concepts). The 2 documents can be reviewed in the order suitable to the reader.



Figure 1: EH-8010FX installed

1.1 Applications

The EtherHaul™-8010FX (EH-8010FX) point-to-point radio delivers up to 10 Gigabit Ethernet carrier-grade capacity utilizing the 70/80 GHz lightly-licensed E-Band spectrum, to provide QoS-aware transport and connectivity between aggregation sites, up to demanding services to multi-use MDU and businesses, in point-to-point or ring topologies. Offering easy and low cost all-outdoor installation and a small form factor, the EtherHaul™ 8010FX are also environmentally-friendly - boasting a small system and antenna footprint with especially low power consumption.

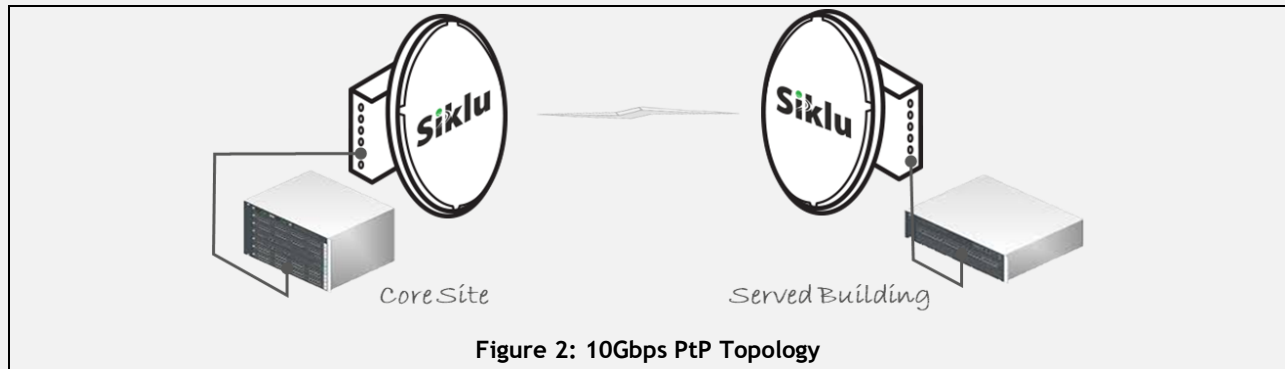


Figure 2: 10Gbps PtP Topology

It combines enhanced adaptive bandwidth, coding & modulation for maximum services availability together with choice of media and advanced OAM&PM tools to ease on the deployment and operations. It supports PtP, rings and drop-and-insert topologies, optimized for high-availability connectivity. All in a very small and light outdoor package that is designed for zero footprint installations.

1.2 Main features

The EH-8010FX is based on Siklu's revolutionary integrated-silicon technology, which results in a highly reliable, zero footprint, and low-cost radio. The EH-8010FX is fast, simple and inexpensive to deploy. The EH-8010FX on one-hand meets the stringent requirements of service providers while on the other hand allows easy installation by non-Telco professional staff.

EH-8010FX includes the following features:

- Field proven technology
- Reduced TCO and fast ROI
- All-outdoor zero footprint
- Small and light
- Quick and easy to install
- Optimized for variety of deployments, from street level to roof-top
- Works on poles, buildings facades (walls), traffic lights and more
- Spectral efficient
- Range of frequencies
- Choice of channel bandwidths
- FDD modulation with very small delay and jitter
- QOS-aware
- Adaptive coding and modulation for high availability
- Encryption

Highly scalable, the EtherHaul™ 8010FX are software-upgradable to support future capabilities as networks evolve.

2. EtherHaul™-8010FX System Overview

2.1 Functional Blocks

The EtherHaul™-8010FX is an all-outdoor unit comprised of the following functional blocks, as shown in Figure 3:

- a. Antenna port and antenna.
- b. RF Diplexer.
- c. RFIC: a pair of Siklu's integrated Silicon Germanium (SiGe) transceiver operating at 71-76 GHz and 81-86 GHz.
- d. Modem/Baseband ASIC: the modem/baseband ASIC includes the modem and the FEC engines.
- e. 10Gbps Ethernet wire-speed capable switch.
- f. Encryption (optional, model dependent)
- g. External interfaces: a 10GbE combo, consisting of an SFP+ cage and an RJ-45 compliant with IEEE 802.3ab (1GbE), 802.3bz (2.5 & 5GbE) and 802.3an (10GbE), and 1 integrated 100/1000 Ethernet port for management or traffic (and POE-PD).
- h. Host processor: the general-purpose host processor manages the whole system.
- i. Power block: the DC/DC power block decides on the power source to the ODU, POE or 48VDC, and regulates and distributes the low DC voltages required in the different functional blocks of the ODU.

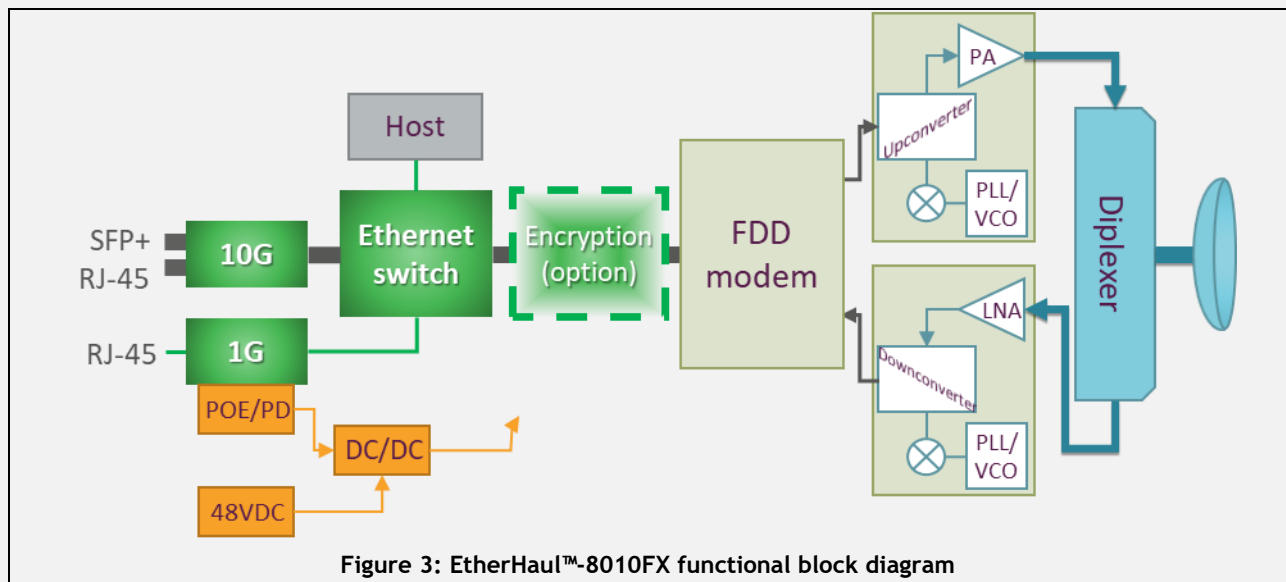


Figure 3: EtherHaul™-8010FX functional block diagram

2.2 EH-8010FX General Specifications

Frequency and Duplexing	<ul style="list-style-type: none"> - 71-76GHz, 81-86 GHz - Frequency Division Duplexing
Modulation	BPSK/QPSK/QAM16/QAM32/QAM64/QAM128
Adaptive modulation	Hitless adaptive bandwidth, coding and modulation, boosting system gain by 29dB
Over-the-air throughput	Up to 10,000Mbps full duplex
Encryption	AES128
Interfaces	<ul style="list-style-type: none"> - 10GbE combo for main traffic, consisting of 1x SFP+ 10GbE and an RJ-45 with 1/2.5/5/10 GbE auto-negotiation; - 1GbE RJ-45 port for traffic or out-of-band management
Antenna options (size / gain)	<ul style="list-style-type: none"> - 0.5ft - 38dBi (not FCC) - 1ft - 48dBi - 2ft - 50dBi
Power options	<ul style="list-style-type: none"> - Direct input 36÷57VDC (flexible polarity) - PoE-In (803.at+) - 50W
Topologies	<ul style="list-style-type: none"> - Point-to-point, daisy-chain, or ring
Management	<ul style="list-style-type: none"> - Out-of-band local management and over-the-air remote management, - Web GUI (one click management of local & remote units), embedded CLI, SNMPv2/3, - Zero-touch turn-up, TACACS+, RADIUS - IPv4 - IPv6
Environmental	<ul style="list-style-type: none"> - Operating temperature: -45° ÷ +50°C - Ingress protection rating: IP67
Regulatory	<ul style="list-style-type: none"> - ETSI EN 302 217-2-2, USA FCC 47 CFR Part 101 :2009, UK IR 2078 & IR 2000, CE marked, EMC, safety UL60950
Dimensions	<ul style="list-style-type: none"> - ODU + 0.5ft antenna: 9.2x 8.1x 5.6in. (23.3x 20.6x 14.1cm) - ODU + 1ft antenna (Dia. x Depth): 12.6x 4.3" (32x 13cm) - ODU + 2ft antenna (Dia. x Depth): 25.6x 15.35" (65x 37cm)
Weight	<ul style="list-style-type: none"> - ODU + 0.5ft antenna: 9.2lbs. (4.1kg) - ODU + 1ft. antenna: 9.9lbs. (4.4kg) - ODU + 2ft. antenna: 24.3lbs (10.9kg)

Table 1 : Features list

3. EtherHaul™-8010FX Radio Specifications

3.1 Full-duplex

The EtherHaul™-8010FX operates in Frequency Division Duplexing (FDD) mode, allowing symmetric traffic mode, up to full 10Gbps capacity in both directions. The actual capacity of the radio link depends on the licensed capacity of the radio, and the radio configuration as detailed in section 3.5.

3.1.1 Benefits

- FDD allows the lowest link latencies.
- Frequency division multiplexing simplifies network design and traffic engineering.

3.2 Frequency bands

The EtherHaul™-8010FX operates in the 71-76 GHz & 81-86GHz E-band frequency spectrum, all configurable in the field.

3.3 Channel sizes

The EtherHaul™-8010FX support channel sizes of 250, 500, 1,250 and 2,000 MHz, configurable in the field.

It is recommended to choose a channel size that will meet the capacity targets of the link.

The following tables detail the commonly available channel plans for the different channel sizes:

Table 2: EH-8010FX frequency plan for channel size 2,000 MHz			
Low (MHz)	High (MHz)	Low (MHz)	High (MHz)
72,125	82,125	74,625	84,625

Table 3: EH-8010FX frequency plan for channel size 1,250 MHz			
Low (MHz)	High (MHz)	Low (MHz)	High (MHz)
71,750 ^{WW, UK}	81,750 ^{WW, UK}	74,250 ^{WW}	84,250 ^{WW}
73,000 ^{WW}	83,000 ^{WW}	75,250 ^{ES, UK}	85,250 ^{ES, UK}
74,000 ^{UK}	84,000 ^{UK}		

Notes:

WW: worldwide channels

ES: Spain channels

UK: UK channels

Table 4: EH-8010FX frequency plan for channel size 500 MHz			
Low (MHz)	High (MHz)	Low (MHz)	High (MHz)
71,875	81,875	73,875	83,875
72,375	82,375	74,375	84,375
72,875	82,875	74,875	84,875

Table 4: EH-8010FX frequency plan for channel size 500 MHz

Low (MHz)	High (MHz)	Low (MHz)	High (MHz)
73,375	83,375	75,375	85,375

Table 5: EH-8010FX frequency plan for channel size 250 MHz

Low (MHz)	High (MHz)	Low (MHz)	High (MHz)	Low (MHz)	High (MHz)
72,000	82,000	73,500	83,500	75,000	85,000
72,250	82,250	73,750	83,750	75,250	85,250
72,500	82,500	74,000	84,000	75,500	85,500
72,750	82,750	74,250	84,250	75,750	85,750
73,000	83,000	74,500	84,500	-	-
73,250	83,250	74,750	84,750	-	-

3.3.1 Benefits

- Channel sizes can be adjusted to deliver the required number of channels according to the network density
- Channel sizes can be matched to the target capacity

3.4 Adaptive Modulation

EtherHaul™-8010FX implements adaptive modulation as discussed in the companion document “Siklu’ EtherHaul™ 8000 Series System Description, version B1, March 2019”.

Note: this feature is supported on hardware revision B1 and later.

3.5 Channel capacity, transmit power, modulation and receiver sensitivity

The EH-8010FX offers a choice of channel capacity and related bandwidth as listed in the tables below:

Channel (MHz)	Modulation	Occupied BW (MHz)	Pout (dBm)	Receiver Threshold (dBm @ BER=10 ⁻⁶)	Radio L1 Capacity ¹ full duplex (Mbps)
2000	QAM128	1758	14	-50	10000
	QAM64	1758	14	-53	8100
	QAM32	1758	15	-56	6800
	QAM16	1758	16	-59	5400
	8PSK	1758	17	-62	4000
	QPSK	1758	18	-66	2700
	QPSK	879	18	-69	1300
	QPSK	439	18	-72	680
BPSK	439	18	-75	330	

¹ L2 capacity is higher than radio L1 capacity, as the radio link does not pass some of the Ethernet overheads

Table 6: EH-8010FX radio parameters for channel bandwidth = 2,000MHz

Channel (MHz)	Modulation	Occupied BW (MHz)	Pout (dBm)	Receiver Threshold (dBm @ BER=10 ⁻⁶)	Radio L1 Capacity full duplex (Mbps)
1,250	QAM32	1250	16	-55.5	5000
	QAM16	1250	16	-58.5	3900
	QPSK	1250	18	-64	2100
	QPSK	625	18	-67	1000
	QPSK	312.5	18	-70	530
	BPSK	312.5	18	-75	210

Table 7: EH-8010FX radio parameters for channel bandwidth = 1,250MHz

Channel (MHz)	Modulation	Occupied BW (MHz)	Pout (dBm)	Receiver Threshold (dBm @ BER=10 ⁻⁶)	Radio L1 Capacity full duplex (Mbps)
500	QAM32	500	16.5	-58.5	2000
	QAM16	500	16.5	-62.5	1500
	QPSK	500	18.5	-68	800
	BPSK	250	18.5	-74	200
	BPSK	125	18.5	-79	80

Table 8: EH-8010FX radio parameters for channel bandwidth = 500MHz

Channel (MHz)	Modulation	Occupied BW (MHz)	Pout (dBm)	Receiver Threshold (dBm @ BER=10 ⁻⁶)	Radio L1 Capacity full duplex (Mbps)
250	QAM32	250	16.5	-61.5	1000
	QAM16	250	16.5	-65.5	750
	QPSK	250	18.5	-71	400
	BPSK	125	18.5	-77	100
	BPSK	62.5	18.5	-82	40

Table 9: EH-8010FX radio parameters for channel bandwidth = 250MHz

3.5.1 Benefits

- Spectral efficient modulations like QAM16 to QAM128 to achieve high capacity
- Robust connectivity using strong error correction codes and increased sensitivity on the other hand.

3.6 Transmit power adjustment

When commissioning a link the maximum RSSI should not exceed -26 dBm. If the maximum RSSI is exceeded, the transmit power needs to be adjusted down until reaching the maximum allowed RSSI. The nominal transmit power of the EtherHaul™ 8010FX may be adjusted in a range between +14 dBm to -7 dBm.

Refer also to 3.7 Dual-step Transmit Power Control (DTPC).

3.6.1 Benefits

The transmit power and other RF parameters are configured in the field, resulting in:

- simple radio planning.
- low inventory quantity of a single radio type.
- fast activation of the radio links.

3.7 Dual-step Transmit Power Control (DTPC)

The Dual-step Transmit Power Control feature of the EtherHaul™-8010FX are discussed in the companion document “Siklu’ EtherHaul™ 8000 Series System Description, version B1, March 2019”.

3.8 Antenna

The EtherHaul™-8010FX is equipped with a Siklu Universal Antenna Port (UAP), which allows mounting a variety of Siklu provided antennas, from a compact 0.5ft with 38dBi gain (ETSI only, not approved by FCC) to 1ft or 2ft with 43 dBi or 50 dBi gain respectively. The antennas are directional antennas, designed for street level or rooftop installation scenarios, and optimized to cope with poles sway and vibration.

Type	0.5ft	1ft	2ft
Gain (typical)	38 dBi	43 dBi	50 dBi
3 dB Beam width	2°	0.9°	0.5°
Radiation Pattern Envelope	ETSI: EN 302 217-4-2 V1.5.1 Class 2 FCC: N/A (not permitted)	ETSI: EN 302 217-4-2 V1.5.1 Class 2 (Class 3 option) FCC: 47CFR101	ETSI: EN 302 217-4-2 V1.5.1 Class 3 FCC: 47CFR101

Table 10: antenna specifications

3.8.1 Benefits

- The 0.5ft antenna results a zero foot print outdoor solution, durable wind load, and easy installation and alignment
- Direct-Mount capability and installation kits extend links physical durability for enhanced performance at tough weather conditions.

3.9 Alignment

The alignment process of the EtherHaul™-8010FX is discussed in the companion document “Siklu’ EtherHaul™ 8000 Series System Description, version B1, March 2019”.

3.10 Radio standards compliance

The EH-8010FX complies with both ETSI spectrum channel arrangement and FCC requirements:

- ETSI EN 302 217-2-2
- USA FCC Part 101:2009

3.10.1 Benefits

The high-performance design of the radio and modem makes possible to use spectral efficient modulations like QAM64 and QAM128 to achieve high capacity on the one hand, and to provide a robust connection using strong error correction codes and increased sensitivity, on the other hand.

Most of the RF parameters are configured in the field using the management software resulting in a minimum service interruption and does not require any manual calibration. This enables:

- easy and flexible radio planning.
- low inventory quantity of a single radio type across a wide range of applications.
- fast activation of the radio links.

3.11 AES Encryption

The EH-8010FX supports wire-speed encryption of the traffic over the radio link, using the industry standard Advanced Encryption Standard (AES), according to IEEE 802.1AE standard, with a key length of 128 bits. The technological support for AES within the EH-8010FX uses a MACsec platform between the 2 sides of the radio link, which imposes a 24 bytes overhead to each Ethernet frame.

3.11.1 Standards

- IEEE 802.1AE

3.11.2 Benefits

Encryption adds an additional layer of privacy and security to the most demanding customers, in addition to the inherent security of mmW links.

The choice of a standard encryption solution ensures a robust implementation, based on years of research and development in this domain.

4. External interfaces

4.1 Ports and layout

The EH-8010FX includes the ETH2 10GbE combo, consisting of an SFP+ cage and an RJ-45 compliant with IEEE 802.3ab/bz/an. ETH1 is an additional 10/100/1000 base-T RJ-45 Ethernet port, for auxiliary traffic or out-of-band management.

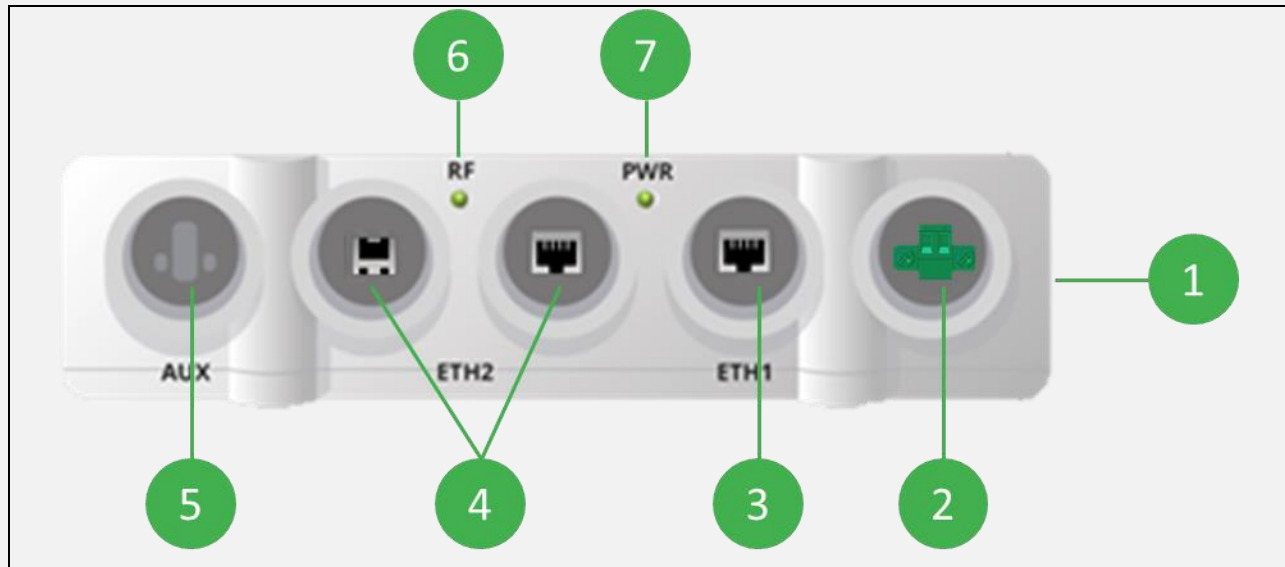


Figure 4: EtherHaul™-8010FX interfaces

- (1) Ground
- (2) 2 prongs secured screw-down DC power connector
- (3) ETH1, RJ-45, 1GbE Ethernet and POE-PD
- (4) ETH2 combo, RJ-45 1/2.5/5/10GbE Ethernet (right) and SFP+ 10GbE (left)
- (5) Auxiliary port, DC-probes for RSSI reading, USB (currently not active)
- (6) RF LED
- (7) PWR LED

4.2 Standard compliance

	ETH1 1GbE	ETH2 10GbE	
Connector	RJ-45	SFP+ cage	RJ-45
Standard	100 Base-T/1000 Base-TX (Auto-sensing or fixed)	MSA SFP+	10G Base-T IEEE 802.3ab/bz/an
Max Segment Length	100m with Cat5e cable	300m with MMF (SFP+ device dependent) 10Km with SMF (SFP+ device dependent)	10GbE: 100m with Cat6a cable 5GbE: 100m with Cat6 cable 2.5GbE: 100m with Cat5e cable

Table 11: EtherHaul™ 8010FX data interfaces

4.2.1 Benefits

- SFP+ sockets are ideal to match the optical interface to the distance required at a hub or chain site. It enables connecting to switches or routers, located close or far, with standard interfaces and protocols.
- Choice of 10GbE on fiber or copper allows deployment on available cables, no rewiring necessary
- An EtherHaul™ product uses standard 10GbE (SFP+ cage) or GE/10GE (RJ-45) connectors and does not require any proprietary cables.

4.3 System capacity

The EH-8010FX products features up to 10 Gbps, full-duplex capacity, as detailed in 3.5 Channel capacity, transmit power, modulation and receiver sensitivity.

4.3.1 Benefits

High capacity allows operators to:

- Deliver multiple services, all with max capacity at same location.
- Provide wireless closure to ring topologies.
- Implement a backup network connectivity for important end-users or critical sites.

4.4 Ingress protection

The EtherHaul™ 8010FX use standard DC, RJ-45 connectors or SFP+ cage and does not require any proprietary sealing solution. Ingress protection is assured by mean of the All Weather Shell illustrated in Figure 5:

- Connector outlet (1)
- Rubber gasket (2)
- Cable inlet (3) with cable securing holder, designed for standard tie-wrap strips.

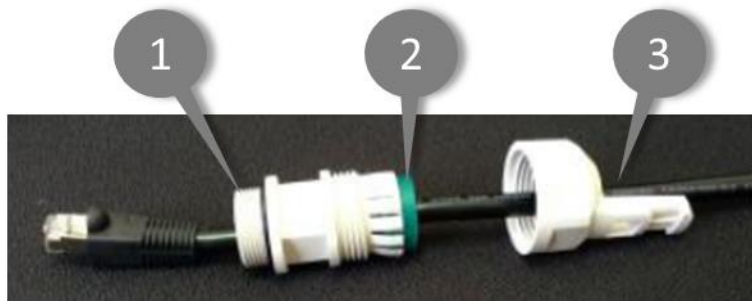


Figure 5: EtherHaul™ connector weather shell assembly

5. Networking features

5.1 Latency

The EH-8010FX achieves minimal delay, typically 8 μ sec (max 12 μ sec).

5.2 Class of Service (CoS)

EtherHaul™-8010FX supports traffic classification as discussed in the companion document “Siklu’ EtherHaul™ 8000 Series System Description, version B1, March 2019”.

Note: this feature is supported on hardware revision B1 and later.

5.3 Quality of Service (QoS)

EtherHaul™-8010FX supports Quality of Service as discussed in the companion document “Siklu’ EtherHaul™ 8000 Series System Description, version B1, March 2019”.

Note: this feature is supported on hardware revision B1 and later.

5.4 Strict Priority (SP)

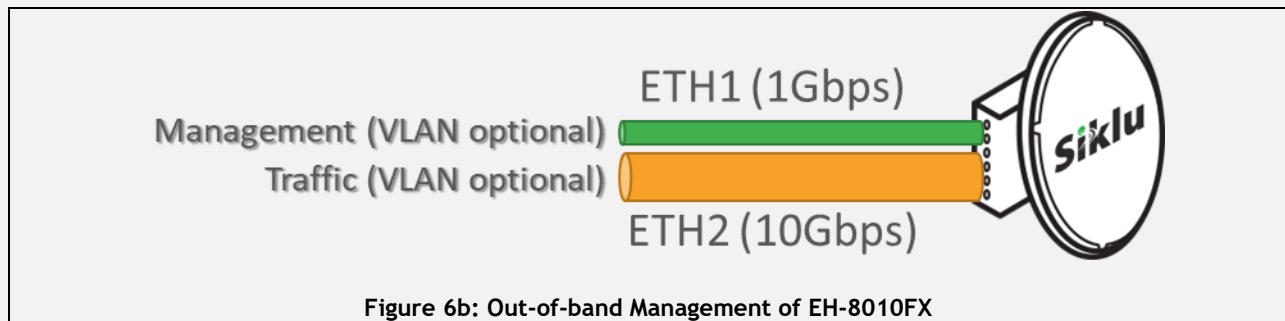
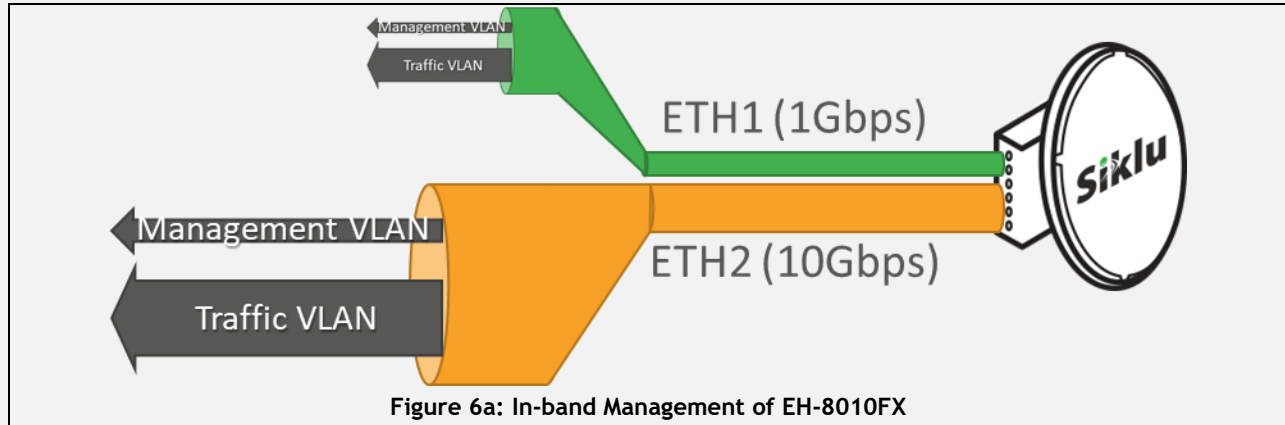
EtherHaul™-8010FX supports Strict Priority as discussed in the companion document “Siklu’ EtherHaul™ 8000 Series System Description, version B1, March 2019”.

Note: this feature is supported on hardware revision B1 and later.

6. Management concepts

6.1 Management connectivity

The EH-8010FX can be managed in-band or out-of-band, as shown in Figure 6 a & b.



In-band management can be performed via ETH2 (the main traffic port with 10Gbps capacity) or ETH1 (the auxiliary port with 1Gbps capacity). In both cases, the management traffic should be isolated from the other traffic by mean of a VLAN. If Out-of-band management is preferred, ETH2 will carry the main traffic and ETH1 will handle the management traffic, with or without a VLAN.

Management connection to a local ODU allows management of the ODU on the other side of the link from the ODU above. Standard remote management function are available; for example, the Web GUI dual pane will allow management of the local and the remote ODU on the same screen.

The other management aspects of EH-8010FX will follow the same generic concepts for management of the ODU as discussed in “”: Web GUI, CLI, SNMP, FTP, and User Access & Rights Management sections.

7. Security

The security aspects are reviewed in the companion document “Siklu’ EtherHaul™ 8000 Series System Description, version B1, March 2019”: physical security, management security and secure interfaces to 3rd party managers.

8. Logging and auditing features

The logging and auditing capabilities of the EtherHaul™-8010FX are discussed in the companion document “Siklu’ EtherHaul™ 8000 Series System Description, version B1, March 2019”.

9. Diagnostic tools

The diagnostic tools of the EtherHaul™-8010FX are reviewed in the companion document “Siklu’ EtherHaul™ 8000 Series System Description, version B1, March 2019”.

10. Power

10.1 Input Power

The EH-8010FX has the following power input:

- Direct 48V DC nominal (42÷57VDC)
- PoE++ (IEEE 802.3at+) over port ETH1
- power draw of 50W in both cases

Hot standby powering of the ODU is possible when power is applied simultaneously to the direct DC and to the PoE++ inputs.

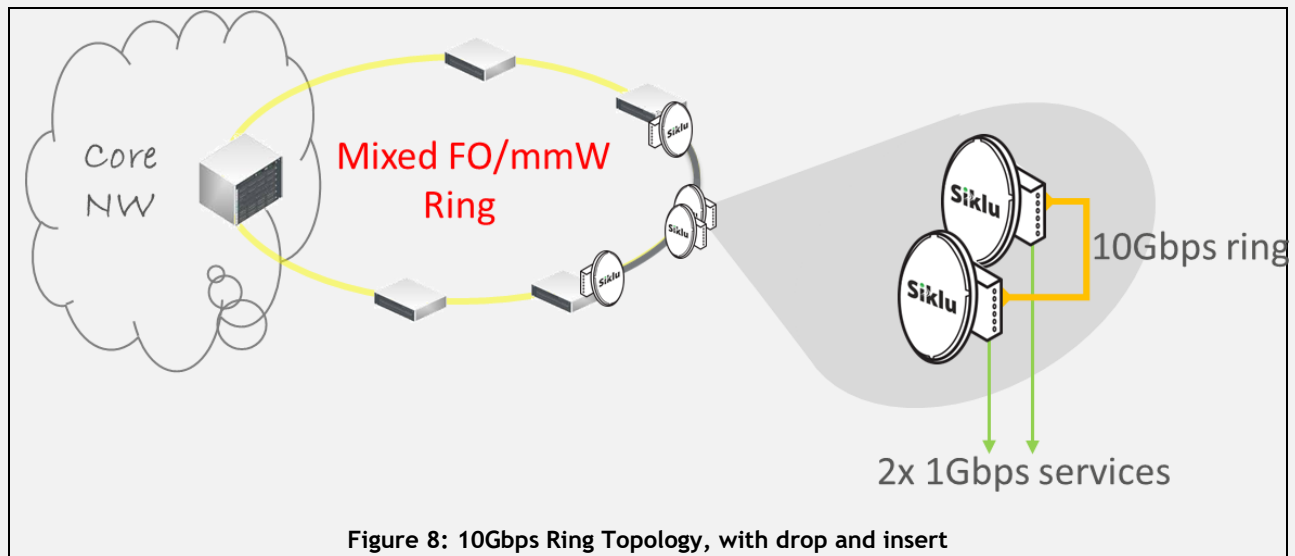
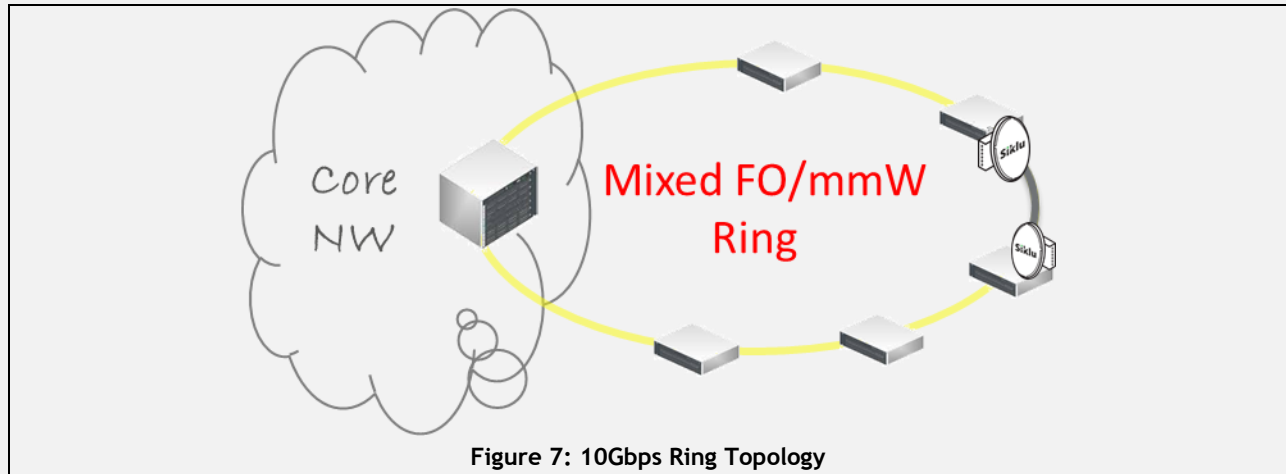
10.1.1 Benefits

Thanks to the efficient system design and high integration, the EH-8010FX:

- Reduces the power consumption and accordingly the associated energy costs.
- Simplifies the installation scenario with PoE input power.
- Backup power option, to increase the reliability of the link.

11. EtherHaul™ 8010FX Deployment Topologies

While the basic topology of the EH-8010FX is point-to-point connectivity between two sites (ref' Figure 2), it can be mixed with fiber segments, Ethernet switches, or routers to deliver advanced topologies such as rings as shown in Figure 7, with optional drop and inserts as shown in Figure 8.



12. List of supported standards

The list of standards and recommendations supported by EtherHaul™ 8010FX:

- Antennas: ETSI EN 302 217-4 Class2 or Class3
- Frequency Regulations:
 - ETSI EN 302 217-2-2
 - USA FCC 47 CFR part 101:2009

Management (reference also to Security)

- 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 2818 - HTTPS, HTTP over TLS
- RFC 4251 - the IETF extension of the Secure Shell protocol (SSH) version 2.0
- RFC 959/1350 - FTP, SFTP, TFTP
- RFC2616 - Hypertext Transfer Protocol (HTTP)
- IEEE 802.1AE - AES

Networking

- IEEE 802.3ab / Ethernet 1000BASE-T
- IEEE 802.3bz / Ethernet 2.5GBASE-T and 5GBASE-T
- IEEE 802.3an / Ethernet 10000Base-T

Environmental, Power

- CE: CE Marked
- EMC: EN 301 489-4 ;FCC 47 CFR part 15
- Ingress Protection Rating: IP67
- MSA SFP INF-8074 Small Form Factor Pluggable
- 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

13. References

- [1] Siklu' EtherHaul™ 8000 Series System Description, version B1, March 2019

14. Acronyms and Abbreviations

AES	Advanced Encryption Standard
CE	Communauté Européenne (European Community)
CLI	Command Line Interface
EMC	Electro Magnetic Interference
ERP	Ethernet Ring Protection
FDD	Frequency Division Duplexing (see also TDD)
FO	Fiber Optic
GUI	Graphical User Interface
Iperf	IP Performance (test tool)
LAN	Local Area Network
LLDP	Link Layer Discovery Protocol
mmW	millimeter wave
MSA	Multi-source Agreement
MMF	Multi Mode Fiber
mmW	millimeter Waves
OOB	Out of the Box
P2P	Point to Point (also PtP)
P2MP	Point to Multipoint
RPL	Ring Protection Link
SFP	Small Form-factor Pluggable
SMF	Single Mode Fiber
SSH	Secure SHell
SyncE	Synchronous Ethernet
TDD	Time Domain Duplexing (see also FDD)
WAN	Wide Area Network



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.

