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FibeAir® 1500P

High / Ultra High Capacity Wireless Network System

Product Description

Document Version & Date:
3.0
January 2007

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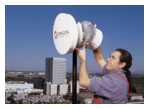
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Introducing FibeAir® 1500P

Continuing with its tradition of innovative high-capacity broadband wireless network solutions, Ceragon Networks® presents FibeAir® 1500P, the latest state-of-the-art FibeAir® family product. FibeAir® 1500P is a response to the ever-growing demands by cellular, fixed, and private network system operators for higher-capacity connectivity, more efficient management of increasingly complex networks, and more cost-effective deployment and maintenance of their networks.

FibeAir® 1500P is upgradeable for capacities of 45 to 622 Mbps, using the same 1U IDU, supporting 1+0, 2+0, 4+0 (with optional XPIC, Cross Polarization Interference Canceller mechanism), 2+0 East-West, 1+1/2+2 HSB, and 1+1 HSB with space or frequency diversity mode. Point-to-point, ring, star, and cascaded chain topologies are supported.

With FibeAir® 1500P operating in co-channel dual polarization (CCDP) mode, using the XPIC (cross polarization interference canceller) algorithm, two STM-1/OC-3 signals can be transmitted over a single 28 MHz channel, using vertical and horizontal polarization. This enables double capacity in the same spectrum bandwidth.

FibeAir® 1500P can integrate seamlessly in any SDH/SONET, IP, and ATM network, and supports a wide variety of interfaces, including *n* x E1/T1, 2 x Fast Ethernet, *n* x STM-1/OC-3, and 3 x DS3.



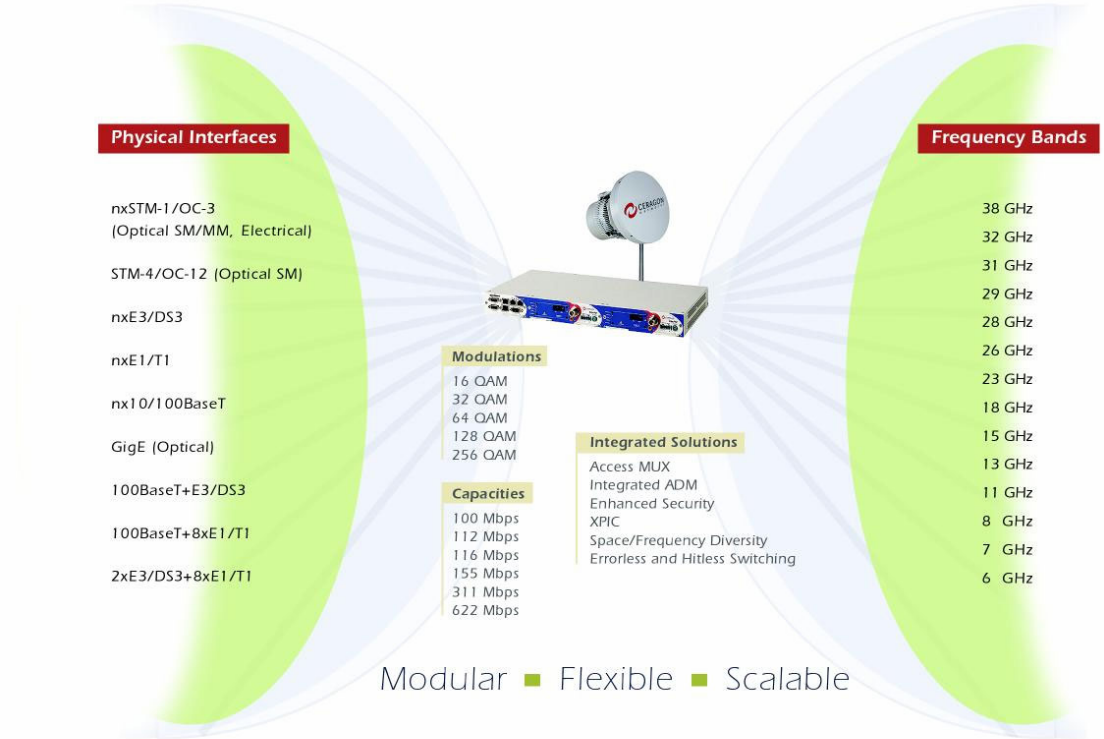
Ceragon's FibeAir® 1500P

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Main Features

FibeAir 1500P offers the following features:

- Operates in the millimetric wave frequencies of 6-38 GHz
- Configurable modulation schemes: 16 QAM, 32 QAM, 128 QAM, 256 QAM
- Configurable capacities (Mbps): 45, 50, 100, 112, 116, 155, 200, 311, 622
- Configurable bandwidths: 28 MHz, 30 MHz, 40 MHz, 50 MHz, 56 MHz
- Built-in XPIC (Cross Polarization Interference Canceller) and ATPC (Automatic Tx Power Control)
- Low frequency installation types: Split mount or All-indoor
- Two receivers and one transmitter in a single transceiver unit, for built-in diversity capability
- Innovative digital multi-mode IF combiner
- Compliant with ETSI, FCC, ITU-T, ITU-R, and IEEE standards and frequency plans, for worldwide operation
- Single modular compact 1U IDU supports 1+0, 2+0, 4+0, 1+1, 2+2, and East-West ring configurations
- Provides SDH, SONET, IP, and ATM interfaces, with two additional 2 Mbps Wayside channels and a built-in Ethernet hub.
- Advanced CeraView® - Java-based SNMP element manager, and PolyView™ - end-to-end open interface network management system.



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Advantages

FibeAir 1500P is an innovative product with many advantages in the broadband wireless market.

With FibeAir 1500P, Ceragon introduces a breakthrough in the point-to-point market with both XPIC and double capacity in a 1U system, enabling a single system to reach 622 Mbps.

The versatility of FibeAir 1500P enables operators to deploy the same system throughout their networks in a variety of different configurations.

The following is a list of some other FibeAir 1500P advantages:

- Up to 2 independent, hot-swappable carriers in one 1U compact upgradeable chassis (100-622 Mbps), supporting space and frequency diversity
- 311 Mbps - single carrier
- Same 1U IDU configurations: 116 Mbps over 28 MHz, 311 Mbps over 56 MHz, 311 Mbps over 28 MHz (dual polarization with XPIC), 622 Mbps over 56 MHz (dual polarization with XPIC)
- Intelligent network element that supports a variety of network types (SDH/SONET, IP, ATM) and multiple network interfaces within the same IDU (nxE1/T1, nxFast Ethernet, nxSTM-1/OC-3)
- Built-in Continuous ATPC (Automatic Tx Power Control) for up to 30 dB, in 1 dB steps
- CCAP - Co-Channel Alternate Polarization, uses dual polarization with XPIC to support 2 carriers 155/311 Mbps over a single 28/56 MHz channel for 311/622 Mbps transmission capacity
- ACCP - Adjacent Channel Co-Polarization, allows operation of two adjacent 28 MHz channels from the same site, and from the same antenna
- Independent hot-swappable control IDM (In-Door Module)
- Flash memory card used to store configuration information for easier software upgrade and maintenance

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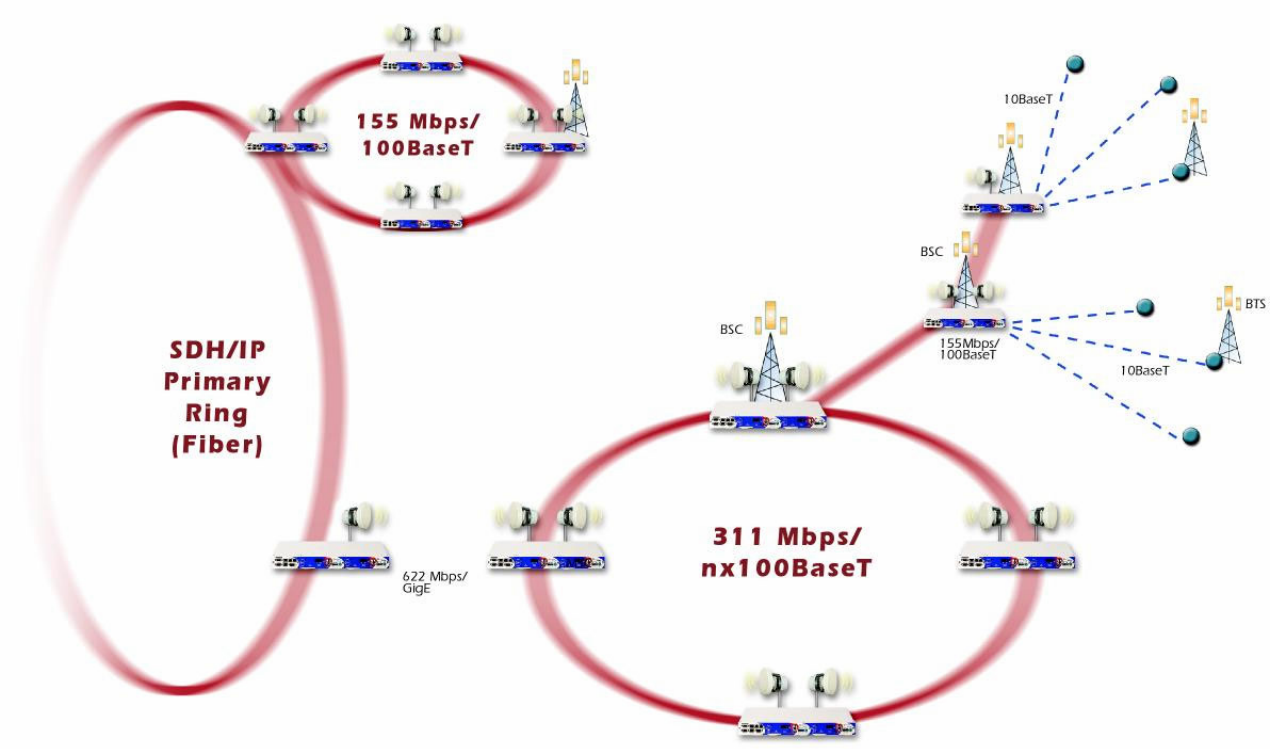
Applications

FibeAir 1500P enables rapid and cost-effective high-capacity connectivity for carriers, both in the cellular and fixed operator markets, for private networks and enterprises.

Mobile Cellular Infrastructure - Ceragon's FibeAir 1500P is an optimal solution for mobile cellular networks, which require higher capacity due to an increase in subscribers, cell sites and data rich applications. As an intelligent network element, FibeAir offers a smooth migration path from existing PDH to SONET/SDH network functionality and to next generation ATM and IP.

Fixed Networks - To bridge the broadband access gap between end-user demands and the core network infrastructure, Ceragon's FibeAir 1500P offers carriers high-capacity wireless metropolitan ring and PTP solutions in the core network. FibeAir 1500P delivers Internet access and integrated high-speed data, video and voice traffic in a cost-effective manner.

Private Networks and Enterprises - The modular FibeAir is ideal for private networks, such as educational and financial institutions, utility companies, and goverment and corporate campuses, providing carrier-class voice ATM, IP private networks, and IP + TDM direct connections.

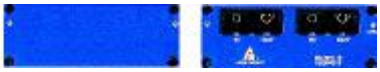
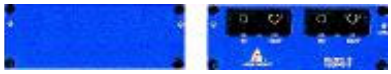


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FibeAir 1500P System Configurations

FibeAir 1500P's flexibility is demonstrated by its diverse range of configurations.

The following table lists the different configuration possibilities.

Configuration / Physical Interface	Modulation	Bandwidth
155 Mbps 1+0 	16 QAM	56 MHz
155 Mbps 1+1 (Diversity) 155 Mbps 2+0 155 Mbps 2+0 East-West 	16 QAM	1/2 x 56 MHz *
155 Mbps 1+0 	128 QAM	28 MHz
155 Mbps 1+1 (Diversity) 155 Mbps 2+0 (XPIC) 155 Mbps 2+0 East-West 	128 QAM	1/2 x 28 MHz *
311 Mbps 1+0 	128 QAM	56 MHz
311 Mbps 1+1 311 Mbps 2+0 (XPIC) 311 Mbps 2+0 East-West 	128 QAM	1/2 x 56 MHz *
311 Mbps 1+0 	256 QAM	50 MHz
311 Mbps 1+1 311 Mbps 2+0 (XPIC) 311 Mbps 2+0 East-West 	256 QAM	1/2 x 50 MHz *
116 Mbps (8xE1/T1 + 100BaseT) 1+0 	32 QAM	28 MHz
116 Mbps 1+1 116 Mbps 2+0 116 Mbps 2+0 East-West 	32 QAM	1/2 x 28 MHz *

* In a single carrier system, only one channel is required. In a system with two carriers, one channel and dual polarization are required if the XPIC mechanism is used, or two channels without the XPIC mechanism.

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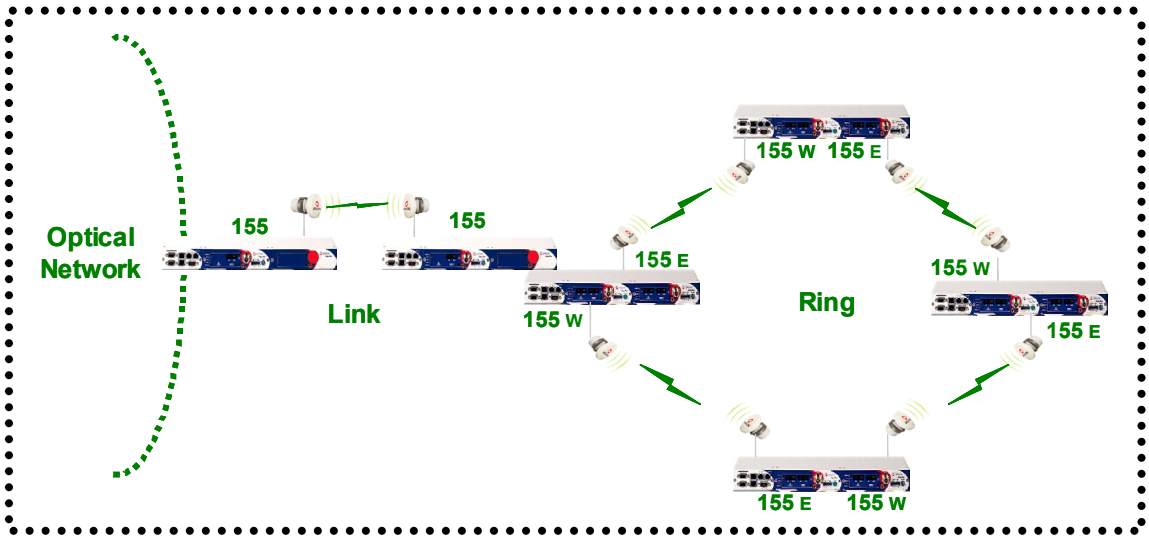
FibeAir 1500P System Expansion

Crucial aspects of any network are its upgradeability and survivability, which means that the network must be able to grow whenever the demand for increased capacity arises, and it must ensure reliable connectivity. FibeAir 1500P was designed with upgradeability and protection in mind. Its multiple schemes of capacity, modulation, and interfaces enable it to provide a complete one-box solution for your network growth and protection requirements, with optimum cost-effectiveness.

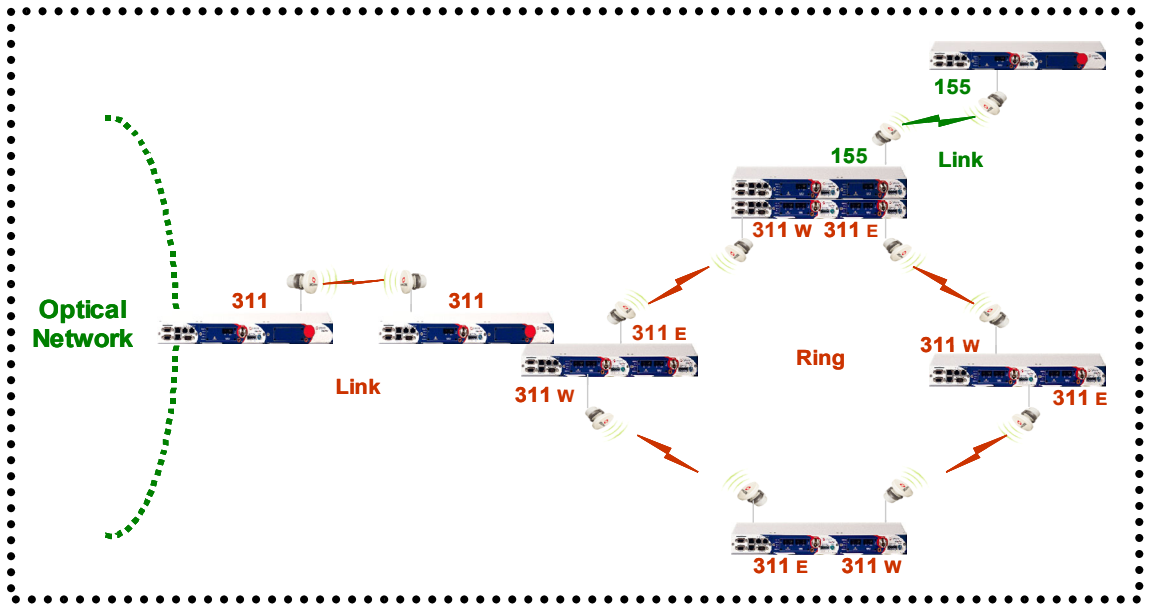
As your network grows, FibeAir 1500P grows with it. When higher capacity is required, FibeAir 1500P is upgraded on-the-fly, by replacing hot swappable modular units in the IDU, without interrupting system operation! And, when protection is required, the same FibeAir 1500P 1U IDU can provide it.

The following illustrations show how FibeAir 1500P is upgraded as the network expands.

Phase 1: FibeAir 1500P, 155 Mbps, in Link and Ring Topologies



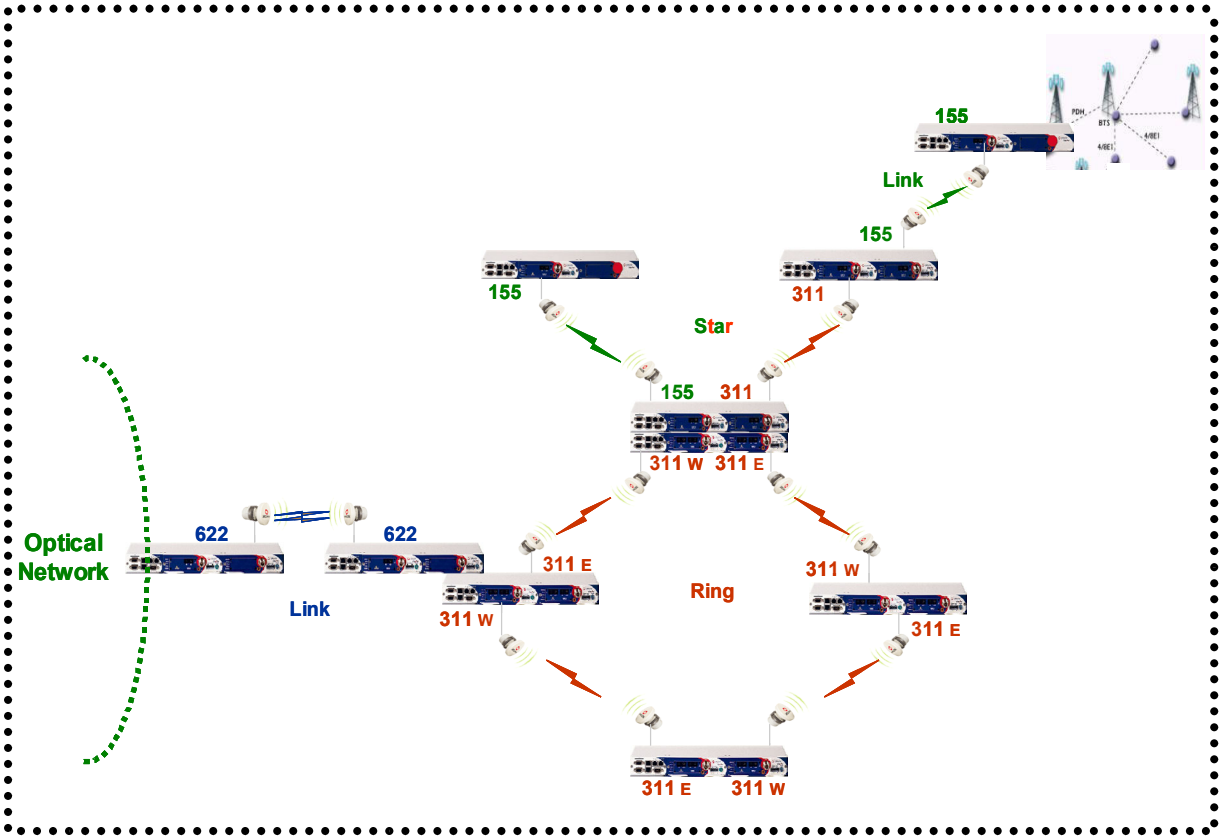
Phase 2: Same FibeAir 1500P Unit, 311/155 Mbps, in Link and Ring Topologies



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Note that for protection in a system with one carrier, only an additional IDM (In-Door Module) is required in the same IDU (In-Door Unit). For protection in a two-carrier system, an additional IDU is required.

Phase 3: Same FibeAir 1500P Unit, 622/311/155 Mbps, in Link, Ring, and Star Topologies



As show in the illustrations, by upgrading the same units with higher capacity modules, FibeAir 1500P provides ongoing support for network growth minus the cost of additional units.

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Management

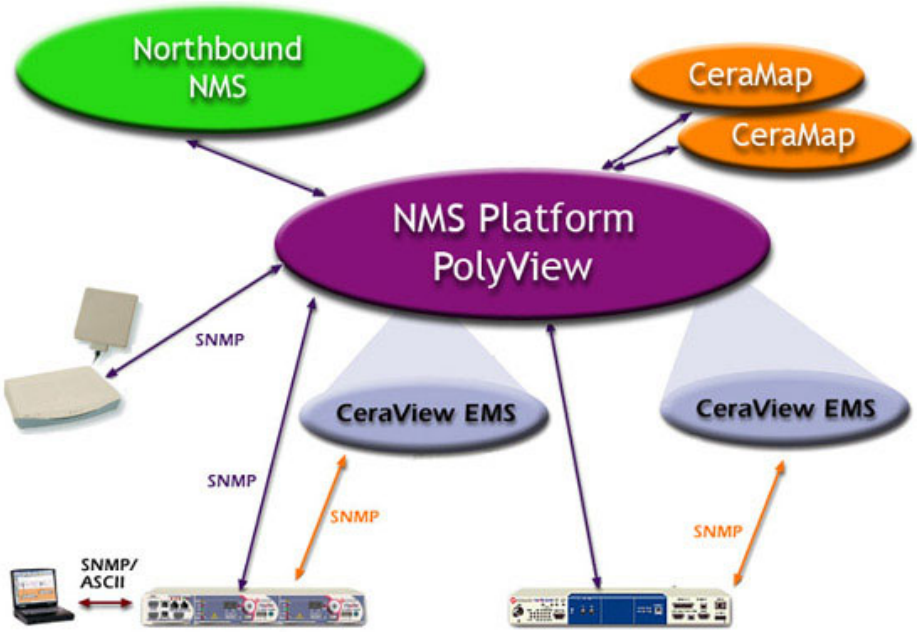
Ceragon provides state-of-the-art management based on SNMP. Our management applications are written in Java code and can control Ceragon units at both the element and network levels. The applications run on Windows 2000/2003/XP, and UNIX Sun Solaris.

CeraView is Ceragon's SNMP-based EMS (Element Management System) that enables the operator to perform element configuration, performance monitoring on RF and SDH levels, remote diagnostics, alarm reports, and more. CeraView integrates with different NMS (Network Management System) platforms, such as HP OpenView and SNMPc, to provide more comprehensive system management.



CeraView Main Window

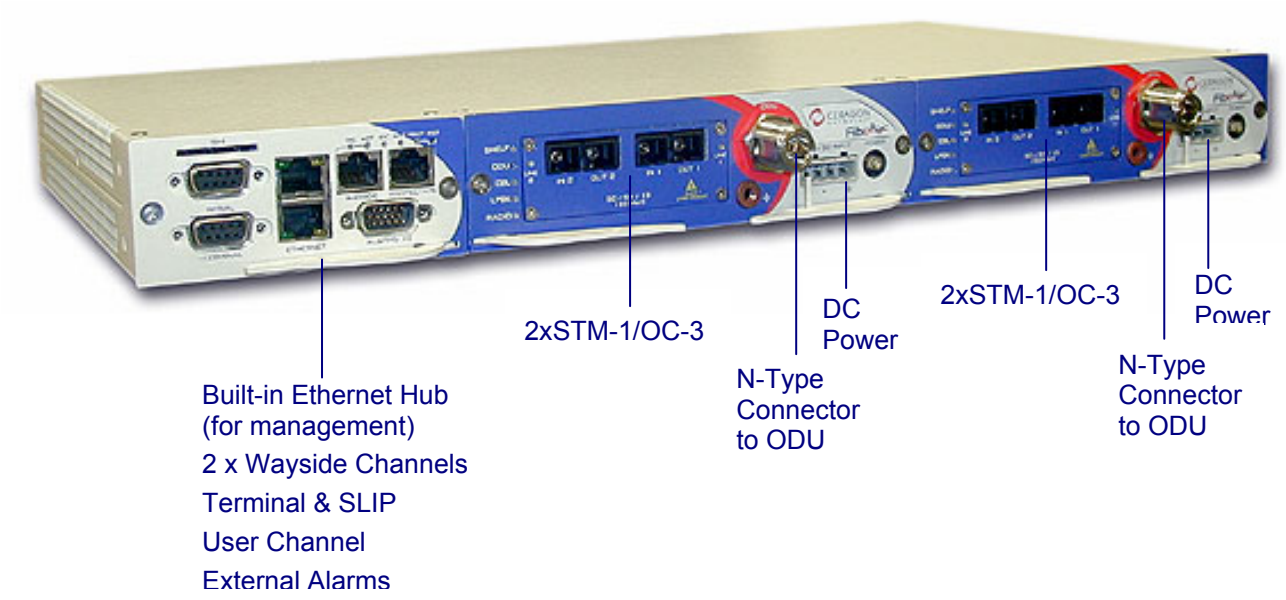
PolyView is Ceragon's network management system that can be used to monitor network element status, provide statistical and inventory reports, download software and configuration to elements in the network, and other network-level operations. Like CeraView, PolyView integrates with other NMS platforms, such as HP OpenView, to provide more comprehensive network management.



PolyView System Overview

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FibeAir 1500P IDU Description



As shown in the photo above, the IDC (Indoor Controller), in the left section of the FibeAir 1500P front panel, includes 2 Ethernet ports for management, Wayside channel connectors, terminal and SLIP connectors, an external alarms port, and a protection cable connector.

In addition, the front panel includes two drawers with internal modems, STM-1/OC-3 connectors, an N-Type IDU-ODU connector, and a DC power input connector.

Each modem drawer includes its own independent power supply unit and can be removed/replaced without causing other radio operation interference.

IDC Auxiliary Channel Options

The Indoor Controller (IDC) provides advanced options, such as the Wayside channel, Engineering Order Wire, external alarm interfaces, external protection interface, auxiliary user channels, and Ethernet management interfaces. The controller is an extractable, hot swappable, and non-traffic-affecting drawer, with four different models to choose from.

All four models include management, external alarms, and protection interfaces. Only the type of auxiliary channel may vary in accordance with the specific system configuration.

IDC models include the following:

- TDM Wayside Channel - Two IDC models with either E1 or T1 wayside channel ports.
- Ethernet Wayside Channel - 2 Mbps Ethernet channels (one per carrier). This IDC includes an Engineering Order Wire interface (G.711 CVSD) for point-to-point voice connectivity.

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- Ethernet Wayside Channel with Auxiliary User Channels - 2 Mbps Ethernet channels (one per carrier). In addition, two software-selectable user channels with the following options: 2 x RS-232 Asynchronous 9.6 Kbps, or 1 x RS-232 Asynchronous and 1 x V.11 Asynchronous (both 9.6 Kbps), or 1 x V.11 Synchronous co/contra-directional (64 Kbps). In asynchronous mode, each user channel can be associated with a different carrier. In synchronous mode, the single user channel can only be associated with the right side IDM carrier. This IDC also includes an Engineering Order Wire interface (G.711 CVSD) for point-to-point or concatenated voice connectivity.

Built-in Ethernet Hub

For applications such as in-band transmission of third party management information, FibeAir 1500P provides a built-in Ethernet hub, as well as an out-of-band connection.

Management information can be transmitted in the DCC overhead bytes, while the transmission can be controlled via Ceragon's CeraView® management software.

Since in-band management enables all management information to be transmitted within the SDH/SONET frame, there is no need to install a separate management network.

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FibeAir 1500P & FibeAir 1500HP/1500SP

FibeAir 1500P can be installed together with FibeAir 1500HP RFUs or FibeAir 1500SP ODUs.

FibeAir 1500HP

FibeAir 1500HP is a high transmit power RFU (Radio Frequency Unit), designed to enable high quality wireless communication, while reducing system cost. It includes an ultra high power transmitter that reaches longer distances and uses smaller antennas. Thus, high quality communication is achieved, with less cost.

With two receivers and one transmitter in a single transceiver unit, FibeAir 1500HP has a built-in Diversity capability, which increases the reliability of the link. In a 1+1 Hot Standby link with Space Diversity, if a hardware failure occurs, the Diversity functionality will not be affected.

FibeAir 1500HP is installed in a split-mount configuration, whereby the RFU is installed near the antenna, with a single cable connecting between the RFU and IDU.

With its high power design, built-in Diversity functionality, and easy installation procedure, FibeAir 1500HP, together with FibeAir 1500P, present a comprehensive, efficient, and budget-saving wireless network building block.

For more information, see the FibeAir 1500HP Product Description.

FibeAir 1500SP

Ceragon's FibeAir 1500SP is an ODU based on the latest FibeAir 1500HP technology.

As part of the FibeAir family, 1500SP supports multiple capacities, frequencies, modulation schemes, and configurations for various network requirements.

FibeAir 1500SP operates in the frequency range of 6-8 GHz, and supports capacities of 40 Mbps to 200 Mbps, for TDM and IP interfaces.

The capacity can easily be doubled using a Cross Polarization Interference Canceller (XPIC) algorithm. For example, using XPIC, two STM-1 signals can be transmitted over a single 28 MHz channel, with both vertical and horizontal polarization. This enables double capacity in the same spectrum bandwidth.

For more information, see the FibeAir 1500SP Product Description.

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FibeAir 1500P System Specifications

General

155 Mbps, 16/128 QAM, Single Carrier

6-18 GHz

Specification	6 GHz	7/8 GHz	11 GHz	13 GHz	15 GHz	18 GHz
Standards	FCC, ETSI	ETSI, Canada	FCC, ETSI	ETSI	ETSI	FCC, ETSI
Operating Fequency Range	5.925-6.425 GHz, 6.425-7.1 GHz	7.1-8.5 GHz	10.7-11.7 GHz	12.75-13.25 GHz	14.5-15.35 GHz	17.7-19.7 GHz
Tx/Rx Spacing	240, 252.04, 260, 266, 340 MHz	119, 154, 161, 168, 182, 196, 245, 311.32 MHz	500, 520, 530,490 MHz	266 MHz	315, 420, 475, 728 MHz	1010, 1560 MHz
RF Channel Spacing 16 QAM / 128 QAM	128 QAM: 28/30/40 MHz	128 QAM: 28/29.65 MHz	128 QAM: 28/30/40 MHz	128 QAM: 28 MHz	128 QAM: 28 MHz	16 QAM: 50/55/80 MHz 128 QAM: 40/27.5 MHz

23-38 GHz

Specification	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz
Standards	FCC, ETSI	ETSI	FCC, ETSI, Canada	ETSI	ETSI/FCC
Operating Fequency Range	21.2-23.6 GHz	24.5-26.5 GHz	LMDS. A1, A2, B, LMCS, ETSI	31.8-33.4 GHz	37-38.4, 38.6-40, 37-39.5 GHz
Tx/Rx Spacing *	1008, 1200, 1232 MHz	1008 MHz	350-500, 1008 MHz	812 MHz	700, 1260 MHz
RF Channel Spacing	16 QAM: 50/56 MHz 128 QAM: 30/28 MHz	16 QAM: 56 MHz 128 QAM: 28 MHz	16 QAM: 50/56 MHz 128 QAM: 28 MHz	128 QAM: 28 MHz	16 QAM: 50/56 MHz 128 QAM: 28 MHz

* *For additional Tx/Rx schemes, please contact your Ceragon representative.*

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All Frequencies

Capacity	155 Mbps
Modulation Type	16 QAM/128 QAM
Frequency Stability	16 QAM: ±0.0005%, 128 QAM: ±0.001%
Frequency Source	Synthesizer
RF Channel Selection	Via NMS
System Configurations	Non-Protected (1+0), Protected (1+1), Space Diversity, Frequency Diversity

311 Mbps, 128 QAM, Single Carrier

18-38 GHz

Specification	18 GHz	23 GHz	26 GHz	28 GHz	38 GHz
Standards	FCC, ETSI	FCC, ETSI	ETSI	FCC, ETSI	ETSI, FCC
Operating Fequency Range	17.7-19.7 GHz	21.2-23.6 GHz	24.5-26.5 GHz	LMDS. A1, A2, B, LMCS, ETSI	37-38.4, 38.6-40/37-39.5 GHz
Tx/Rx Spacing *	1010, 1560 MHz	1008, 1200, 1232 MHz	1008 MHz	350-500, 1008 MHz	700, 1260 MHz
RF Channel Spacing	128 QAM: 55 MHz	128 QAM: 56 MHz	128 QAM: 56 MHz	128 QAM: 56 MHz	128 QAM: 56 MHz

** For additional Tx/Rx schemes, please contact your Ceragon representative.*

All Frequencies

Capacity	311 Mbps
Modulation Type	128 QAM/256 QAM
Frequency Stability	±0.001%
Frequency Source	Synthesizer
RF Channel Selection	Via NMS
System Configurations	Non-Protected (1+0), Protected (1+1)

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116 Mbps, 32 QAM, Single Carrier

6-18 GHz

Specification	6 GHz	7/8 GHz	11 GHz	13 GHz	15 GHz	18 GHz
Standards	FCC, ETSI	ETSI, Canada	FCC, ETSI	ETSI	ETSI, FCC, Canada	FCC, ETSI
Operating Fequency Range	5.925-6.425 GHz, 6.425-7.1 GHz	7.1-8.5 GHz	10.7-11.7 GHz	12.75-13.25 GHz	14.5-15.35 GHz	17.7-19.7 GHz
Tx/Rx Spacing	240, 252.04, 260, 266, 340 MHz	119, 154, 161, 168, 182, 196, 245, 311.32 MHz	500, 520, 530,490 MHz	266 MHz	315, 420, 475, 728 MHz	1010, 1560 MHz
RF Channel Spacing	28 MHz	28 MHz	28, 30, 40 MHz	28 MHz	28 MHz	27.5, 40 MHz

23-38 GHz

Specification	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz
Standards	FCC, ETSI	ETSI	FCC, ETSI, Canada	ETSI	ETSI, FCC
Operating Fequency Range	21.2-23.6 GHz	24.5-26.5 GHz	LMDS. A1, A2, B, LMCS, ETSI	31.8-33.4 GHz	37-38.4, 38.6-40/37-39.5 GHz
Tx/Rx Spacing *	1008, 1200, 1232 MHz	1008 MHz	350-500, 1008 MHz	812 MHz	700, 1260 MHz
RF Channel Spacing	28, 50 MHz	28 MHz	28, 50 MHz	28 MHz	28, 50 MHz

** For additional Tx/Rx schemes, please contact your Ceragon representative.*

All Frequencies

Capacity	116 Mbps (100BaseT+8xE1/T1)
Modulation Type	32 QAM
Frequency Stability	±0.001%
Frequency Source	Synthesizer
RF Channel Selection	Via NMS
System Configs	Non-Protected (1+0), Protected (1+1)

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Supported Standards

Frequency	Standards
Generic essential radio requirements	EN 301 751
6 GHz (lower, upper)	EN 300 234, EN 301 461
7 GHz	EN 300 234, ITU-R 385
8 GHz	EN 300 234, ITU-R 386
10, 11 GHz	EN 300 234, EN 301 461
13 GHz	EN 300 234
15 GHz	EN 300 234
18 GHz	EN 300 430, CEPT T/R12-03, ITU-R F.595-5
23 GHz	EN 300 198, BAPT 211 ZV 02/23, MPT 1409, CEPT T/R13-02, ITU-R REC. F.637-2
26 GHz	EN 300 431, BAPT 211 ZV 11/26, MPT 1420, CEPT T/R13-02, ITU-R REC.748-2
28 GHz	EN 300 431, CEPT T/R13-02, ITU-R REC.748
32 GHz	EN 300 197, ITU-R REC. 746
38 GHz	EN 300 197, BAPT 211 ZV 12/38, MPT 1714, CEPT T/R12-01, ITU-R REC.749

Radio

155 Mbps, 16/128 QAM, Single Carrier

6-18 GHz

Specification	6 GHz	7/8 GHz	11 GHz	13 GHz	15 GHz	18 GHz
Transmit Power * 16 QAM/128 QAM	-/26 dBm	-/24 dBm	-/20 dBm	-/19 dBm	-/20 dBm	20/17 dBm
Tx Attenuation Range 16 QAM/128 QAM	-/30 dB	-/30 dB	-/30 dB	-/29 dB	-/30 dB	30/27 dB
Receiver Sensitivity ($BER=10^{-6}$) 16 QAM/128 QAM	-/-68 dBm	-/-68 dBm	-/-68 dBm	-/-68 dBm	-/-68 dBm	-75/-68 dBm

23-38 GHz

Specification	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz
Transmit Power * 16 QAM/128 QAM	20/17 dBm	20/17 dBm	20/17 dBm	18/15 dBm	18/16 dBm
Tx Attenuation Range 16 QAM/128 QAM	30/27 dB	30/27 dB	30/27 dB	28/25 dB	28/26 dB
Receiver Sensitivity ($BER=10^{-6}$) 16 QAM/128 QAM	-75/-68 dBm	-75/-68 dBm	-74/-67 dBm	-74/-66 dBm	-73/-66 dBm

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All Frequencies

Receiver Overload (BER=10^{-6})	Better than -15 dBm for 16 QAM and -20 dBm for 128 QAM
Unfaded BER	Less than 10^{-13}

** Transmit power must not be set to any value higher than that specified in the tables.*

311 Mbps, 128/256 QAM, Single Carrier

18-38 GHz

Specification	18 GHz	23 GHz	26 GHz	28 GHz	38 GHz
Transmit Power * 128 QAM	17 dBm	17 dBm	17 dBm	17 dBm	16 dBm
Tx Attenuation Range 128 QAM	27 dB	27 dB	27 dB	27 dB	26 dB
Receiver Sensitivity (BER=10^{-6}) 128 QAM	-65 dBm	-65 dBm	-65 dBm	-64 dBm	-63 dBm

All Frequencies

Receiver Overload (BER=10^{-6})	Better than -20 dBm
Unfaded BER	Less than 10^{-13}

** Transmit power must not be set to any value higher than that specified in the tables.*

112/116 Mbps, 32 QAM, Single Carrier

6-18 GHz

Specification	6 GHz	7/8 GHz	11 GHz	13 GHz	15 GHz	18 GHz
Transmit Power * 32 QAM	26 dBm	26 dBm	20 dBm	20 dBm	20 dBm	20 dBm
Tx Attenuation Range 32 QAM	30 dB	30 dB	30 dB	30 dB	30 dB	30 dB
Receiver Sensitivity (BER=10^{-6}) 32 QAM	-74 dBm	-74 dBm	-74 dBm	-74 dBm	-74 dBm	-74 dBm

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23-38 GHz

Specification	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz
Transmit Power * 32 QAM	20 dBm	20 dBm	20 dBm	18 dBm	18 dBm
Tx Attenuation Range 32 QAM	30 dB	30 dB	30 dB	28 dB	28 dB
Receiver Sensitivity (BER=10^{-6}) 32 QAM	-74 dBm	-74 dBm	-73 dBm	-73 dBm	-72 dBm

All Frequencies

Receiver Overload (BER=10^{-6})	Better than -20 dBm
Unfaded BER	Less than 10^{-13}

** All values are typical and are subject to change without prior notification.*

Antenna

6-18 GHz

Specification	6 GHz	7/8 GHz	11 GHz	13 GHz	15 GHz	18 GHz
1 Ft Gain	--	--	--	29.2 dBi	31.9 dBi	33.5 dBi
2 Ft Gain	--	30.1 dBi	--	35.5 dBi	36.6 dBi	38.5 dBi
3 Ft Gain	--	--	--	37.8 dBi	38.9 dBi	42 dBi
4/6 Ft Gain	39.3 dBi	36.4 / 40.2 dBi	40.5/43.6 dBi	41.5/45 dBi	42.6/46 dBi	44.5/48 dBi
8 Ft Gain	41.9 dBi	42.9 dBi	--	--	--	--
10 Ft Gain	43.3 dBi	44.8 dBi	--	--	--	--
12 Ft Gain	45.2 dBi	46.3 dBi	--	--	--	--
15 Ft Gain	46.9 dBi	48.2 dBi	--	--	--	--

23-38 GHz

Specification	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz
1 Ft Gain	35 dBi	36 dBi	36.6 dBi	37 dBi	39 dBi
2 Ft Gain	40 dBi	41 dBi	41.5 dBi	42 dBi	44 dBi
3 Ft Gain	43.5 dBi	44.5 dBi	--	--	--
4/6 Ft Gain	46/49.5 dBi	47/- dBi	--	--	--

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All Frequencies

Polarization	Vertical or Horizontal
Standard Mounting OD Pole	48 mm-114 mm/1.9”-4.5” (subject to vendor and antenna size)
High Performance	ETSI class 2, 3

Mediation Device (Antenna Mount) Losses

Installation Type					Losses (dB)			
Configuration		Mediation Device	Antenna	Path	6-8GHz	11GHz	13-15GHz	18-38GHz
STM1	Direct Mount	Ceragon Interface	SP - Ceragon Interface	-	N/A	0.4	0.8	1
STM1	Remote Mount	SORAM	SP - Standard Interface	-	1	1.4	3.2	4
STM1	Protected - Direct	POSAM	SP - Ceragon Interface	Main-Main	N/A	N/A	4	4.4
				Main-Sec. Sec.-Main	N/A	N/A	8.9	9.3
				Sec.-Sec.	N/A	N/A	13.8	14.2
STM1	Protected - Remote	PORAM	SP - Standard Interface	Main-Main	4.2	4.6	6.4	7.4
				Main-Sec. Sec.-Main	9.6	10	11.3	12.3
				Sec.-Sec.	15	15.8	16.2	17.2
STM2	Direct Mount	1/2 QOSAM	SP - Ceragon Interface	-	N/A	N/A	8.9	8
STM2	Remote Mount	1/2 QORAM	SP - Standard Interface	-	9.6	10	11.3	11
STM4	Remote Mount	QORAM	DP - Standard Interface	-	9.6	10	11.3	11
Dual Pole	Direct Mount	DOSAM	DP - Ceragon Interface	-	N/A	N/A	1.1	1.3
Dual Pole	Remote Mount	DORAM / 2*SORAM	DP - Standard Interface	-	1	1.4	3.2	4
Frequency Diversity		Circulator	SP - Standard Interface	F1-F1	2.1	N/A	N/A	N/A
				F2-F2	2.6	N/A	N/A	N/A

SP = Single Polarization
DP = Dual Polarization
Sec = Secondary

Note: The numbers above are typical losses per link.

Item	Loss (dB)			
	6-8 GHz	11 GHz	13-15 GHz	18-38 GHz
Flex Twist	0.5	0.5	1.2	1.5
Coupler Main	1.6	1.6	1.6	1.7
Coupler Secondary	6.5	6.5	6.5	6.6
Tube	NA	0.2	0.4	0.5
Magic T	NA	NA	NA	3.5
Circulator	0.2	NA	NA	NA

Note: The numbers above are typical losses per component.

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Payload

100-622.02 Mbps Main Channel

Payload Types	TDM: SDH STM-1, SONET OC-3/STS-3, OC-3C/STS-3C ATM: ATM over SONET/SDH IP: Ethernet
Interface Modules	STM-1/OC-3: Electrical - CMI/BNC, Optical - SM/MM Fast Ethernet: 100BaseTx/Fx 2 x Fast Ethernet: 200BaseTx/Fx 3 x DS3 TDM: 8xE1/T1
Compatible Standards	ITU-T G.703, G.707, G.783, G.823, G.957, G.958, ITU-T I.432, ATM Forum, ETSI ETS 300 147, ETS 300 417, ANSI T1.105, ANSI T1.102-1993, Bellcore GR-253-core, TR-NWT-000499

1544/2048 Kbps Wayside Channel (per carrier - up to 2)

Available Interfaces	T1, E1, Ethernet bridge 10BaseT

Note: *All interfaces are available as modular hot insertion interface units.*

Protection

Protection Methods	1+1, HSB, space/frequency diversity, hitless/errorless switching, 2+2 HSB

MTU (Maximum Transmission Unit)

For 1 x FE	1535 bytes
For 2 x FE	1531 bytes

Low Frequency Installation Types

Split-Mount	All FibeAir Systems
All-Indoor	FibeAir 1500P with FibeAir 1500HP

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Network Management, Diagnostics, Status, and Alarms

Type	SNMP, in compliance with RFC 1213, RFC 1595 (SONET MIB)
Local or Remote NMS Station	PolyView, CeraView with advanced GUI for Windows 98/2000/2003/XP/NT or UNIX, integrated with HP OpenView
NMS Interface	Ethernet bridge 10Base-T, RS-232 (PPP, SLIP), built-in Ethernet hub
Local Configuration and Monitoring	Standard ASCII terminal, serial RS-232
In-Band Management	DCCr, DCCm, media-specific, proprietary
TMN	Ceragon NMS functions are in accordance with ITU-T recommendations for TMN
External Alarms	8 Inputs, TTL-level or contact closure to ground, 5 outputs, Form C contacts, software configurable
RSL Indication *	Accurate power reading (dBm) available at IDU, ODU, and NMS
Performance Monitoring	Integral with onboard memory per ITU-T G.828

* *The voltage at the BNC port is not accurate and should be used only as an aid.*

Environment

Operating Temperature (Guaranteed Performance)	ODU/RFU: -35°C to 55°C IDU: -5°C to 45°C
Relative Humidity	ODU/RFU: up to 100% (all weather operation) IDU: up to 95% (non-condensing)
Altitude	Up to 4,500 m (15,000 ft)

Power Input

Standard Input	-48 VDC
DC Input range	-40.5 to -72 VDC (up to -57 VDC for USA market)
Optional Input	110-220 VAC

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Power Consumption

Maximum ODU Power Consumption	For 1+0: 40W For 1+1: 63W
Maximum RFU Power Consumption	For 1+0, 29 dBm: 80W For 1+0, 31 dBm: 100W For 1+1: 30W
Maximum IDU Power Consumption	For 1+0: 25W For 1+1/2+0: 40W

Mechanical

ODU	25 cm diameter x 23 cm depth (10” diameter x 9” depth) Weight: 8 kg
RFU	49 cm height x 14.4 cm width x 28 cm diameter (19” x 6” x 11”) Weight: 17 kg/37 lbs
IDU	4.3 cm height x 43.2 cm width x 24 cm depth (1.7” x 17” x 9.4”) Weight: 3 kg
IDU-ODU Coaxial Cable	RG-223 (100 m/300 ft), Belden 9914/RG-8 (300 m/1000 ft) or equivalent, N-type connectors (male)

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