

# Airmux-400

## Broadband Wireless Multiplexer



- Carrier-class cost-effective broadband wireless radio system with Layer-2 Ethernet capabilities
- Net throughput of up to 250 Mbps aggregated (symmetric and asymmetric)
- Hybrid E1/T1 and Ethernet services on a single platform
- Multiband operation over 2.3 to 2.5 GHz, 3.5 licensed and 4.8 to 5.9 GHz frequencies
- High reliability and availability based on robust air interface protocol
- Long transmission range of up to 120 km (75 miles)



Airmux-400 is a carrier-class, cost-effective multiple point-to-point broadband wireless transmission device. It combines legacy TDM and Ethernet services for transmission over 2.3 to 2.5 GHz, 3.5 licensed and 4.8 to 5.9 GHz bands, and is suitable for deployment in FCC, IC and ETSI-regulated countries.

Airmux-400 offers high throughput, longer range and robustness at a competitive price for the global markets of cellular backhaul, WiMAX and ISP backhaul, broadband access, large private and government networks.

Airmux-400P is a new product supporting the following additional features:

- 250 Mbps aggregate throughput (Ethernet service only)
- AES 256 (via software license key).

Airmux-400P operates at maximum 40 km range.

In addition to Airmux-400 and Airmux-400P, the Airmux-400L model is available as a cost-effective solution for backhaul and access application with Ethernet and TDM throughput of up to 200 Mbps.

Airmux-400LC is available as a low-cost solution replacing previous Airmux-200 family, while offering Airmux-400 capabilities.

Airmux-400LC supports Ethernet and TDM throughput up to 50 Mbps.

All types of Airmux-400 ODUs can be ordered with optional anti-salt coating for installation in harsh marine environment.

Airmux is a complimentary addition to RAD's Service Assured Access & Service Assured Networking solutions. The portfolio combines extensive support for legacy services with future-proof Ethernet capabilities to address the challenges faced by utilities, transportation networks, carriers, and mobile operators in migrating to next-generation networks and services with flexibility, efficiency and carrier-class reliability.

### MARKET SEGMENTS AND APPLICATIONS

#### Private Networks

Airmux-400 can be used in high-capacity interbranch connectivity applications for university campuses, health care organizations, government institutions, large enterprises and public establishments with high traffic requirements (Figure 1).



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### Service Providers and ISPs

Providing IP backhaul of 4G/broadband services in multiple point-to-point topologies, Airmux-400 offers broadband access for remote, rural and underserved communities:

- nLOS (near line of sight) in urban environment
- Long haul in rural setting ( *Figure 2* ).

Large corporate clients can build their networks to eliminate the recurring fee of incumbent leased line services while maintaining a secured dedicated capacity per site.

### Mobile Carriers

In rural-to-urban cellular backhaul applications, Airmux-400 extends mobile reach to rural locations with carrier-grade, long-haul point-to-point E1/T1 and Ethernet services. It can also be used for backhaul of 3G traffic in urban environment with easy migration path from converged TDM/IP networks to all-IP networks.

### Security and Surveillance

Aggregation and backhaul of traffic from multiple co-located megapixel video cameras, make Airmux-400 suitable for homeland security applications, municipal 'safe city' projects, or border control installations.

### CAPACITY

The following models with different Ethernet or aggregate throughputs exist:

- Airmux-400P: 250 Mbps aggregated throughput (Ethernet only)
- Airmux-400: 200 Mbps aggregated throughput with up to 16 E1/T1 channels. This model operates in the following modes:
  - 100 Mbps full duplex with 40 MHz channel bandwidth
  - 200 Mbps asymmetric with 10, 20 or 40 MHz channel bandwidths and user-selectable uplink/downlink capacity (50-50% up to 92-8%).

- Airmux-400L: Supporting up to 200 Mbps aggregated throughput and up to 8 E1/T1 channels. Airmux-400L connectorized ODU includes a Small Form Factor (SFF) embedded antenna. 50 Mbps throughput can be upgraded to 100 or 200 Mbps with license key (for hardware 9 and above)
- Airmux-400LC: Different models supporting up to 10 Mbps Ethernet + 2 x E1/T1 or up to 50 Mbps Ethernet + 4E1/T1 user traffic.

Airmux-400LC throughput can be upgraded from 10 to 25 or 50 Mbps by license key without HW replacement.

Airmux systems can be deployed to create a single point-to-point link, in a central site co-locating a multiple point-to-point array of links, or as a resilient ring for Ethernet-only services.

Transmission range of up to 120 km (75 miles) is attainable with an external antenna.

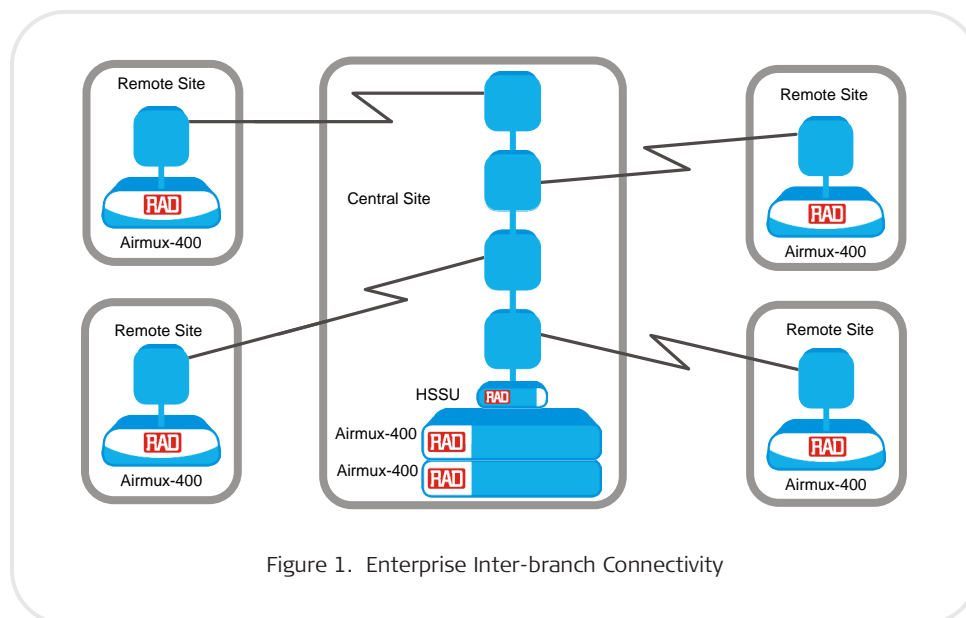


Figure 1. Enterprise Inter-branch Connectivity

## ARCHITECTURE

Airmux multiplexers consist of a mast- or wall-mountable outdoor unit (ODU), an optional external antenna and an indoor unit (IDU) with redundant DC power supplies.

## RADIO

Built on advanced MIMO and OFDM technologies, a pair of Airmux-400 units provides a high-capacity link at channel bandwidth of 10, 20 or 40 MHz (see Table 1 and Table 2). This guarantees a robust air interface able to withstand strong RF interference and harsh ambient conditions.

## Security

Data transmitted over the air interface is encrypted using Advanced Encryption System (AES) with a 128-bit encryption key.

## Air Link Quality of Service

When the link quality is low, Airmux-400 automatically searches for a clear channel within a pre-selected list of frequencies.

## Short Time-to-Service

Because Airmux-400 operates in license-exempt frequencies, it can be deployed in record time, eliminating the costs and delays involved in leasing lines or trenching fiber.

## Site Synchronization

Hub Site Synchronization (HSS) assists in the co-location of multiple radios by reducing the interference that normally occurs when several radios transmit and receive in close proximity to one another. HSS enables a complex radio environment of mixed services (TDM and Ethernet) and channel bandwidth frequencies.

New cable -free HSS allows co-located radios synchronizing without HSS unit and cables.

This feature is supported by Airmux-400 and Airmux-400L with hardware 9 and Airmux-400LC with hardware 4.

**Note:** Like any other RF deployment, wireless operation is highly dependent on factors such as available frequencies and the physical space between radios. HSS does not eliminate the need for careful RF planning to ensure the design will work as planned.

For long distance coverage, the synchronization can be obtained, using a GPS Synchronization Unit (GSU). The GSU reduces the interference between the collocated radios by providing a GPS signal simultaneously to ODUs at all locations.

## RESILIENCY

### 1+1 TDM Link Backup

The Monitored Hot Standby (MHS) 1+1 link redundancy protects the wireless transmission against equipment failure or air interface loss. Link switchover is performed in less than 50 msec.

### Diversity

With dual bipolar antennas, Airmux-400 links can be configured to transmit the same data through both radios. This ensures data transmission integrity under harsh conditions.

### Ethernet Ring Protection

Ethernet rings are used to protect data against link and node failures.

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### ETHERNET

The IDU-E devices include three LAN ports: two Fast Ethernet UTP (RJ-45) ports and one Fast Ethernet SFP slot.

The Gigabit IDU-E device includes two Gigabit Ethernet UTP ports (RJ-45) and one Gigabit Ethernet SFP slot.

The regular IDUs have two 10/100BaseT ports.

With RAD's MiTOP-E3/T3, SFP-based TDM pseudowire gateway, Airmux-400 delivers E3/T3 data streams over its wireless link.

### MANAGEMENT AND SECURITY

A single SNMP-based network management application (Airmux Manager) is used to control multiple Airmux-400 links as a unified network.

Airmux is compatible with SNMP v1 and SNMP v3.

RADview, RAD's SNMP-based management software provides access to the Airmux Manager via its topology map.

The Airmux Manager Spectrum View utility is an RF survey tool enabling the link installation prior to full link service activation. It provides comprehensive and clear spectral measurement information for easier installations.

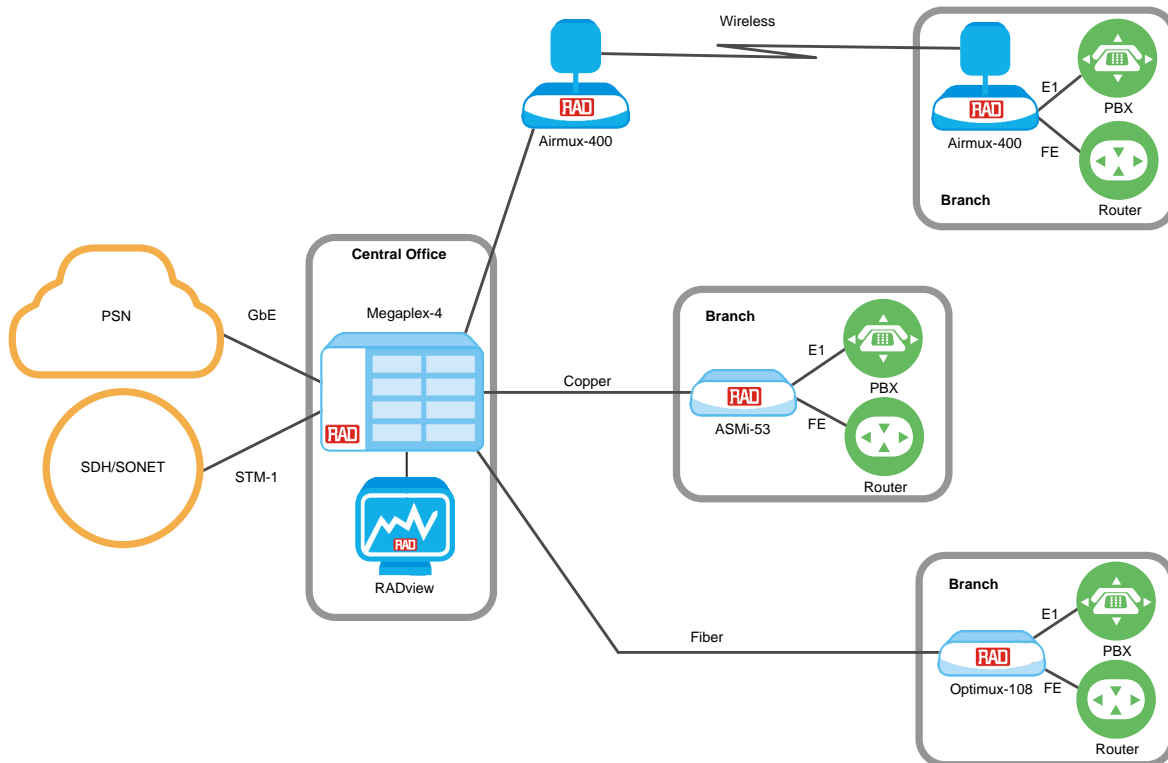


Figure 2. Providing Access for Multisite Connectivity

Table 1. Compliance

Band [GHz]	Regulation	Occupied Frequency Range [GHz]	Supported Channel Bandwidth [MHz]	Compliance
2.3	Universal	2.297-2.482	10, 20	N/A
2.4	FCC/IC	2.402-2.472	10, 20	FCC 47CFR, Part 15, Subpart C and IC RSS-210
2.4	ETSI	2.402-2.482	10, 20	EN 300 328 V1.7.1
2.5	FCC BRS(*)	2.495-2.690	5, 10, 20	FCC 47CFR, Part 27, Subpart M (BRS/EBS)
3.5	ETSI(+)	3.4105-3.7025	5, 10, 20	ETSI EN 302 326-2
	IC	3.475-3.650	5, 10, 20	IC RSS-192
	Universal	3.300-3.800	5, 10, 20	N/A
3.6	FCC/IC	3.650-3.675	5, 10, 20	FCC Part 90, Subpart Z and IC RSS-197 (Restricted)
4.4	Universal	4.400-5.000	5, 10, 20	N/A
4.8	Universal	4.800-4.900	5, 10, 20, 40	N/A
4.9	FCC/IC	4.940-4.990	5, 10, 20	FCC 47CFR, Part 90, Subpart Y and IC RSS-111
	Universal	4.890-5.010	5, 10, 20, 40	N/A
4.9	Japanese Regulations – see Table 2			
5.0				
5.3	ETSI	5.150-5.350	10, 20	ETSI EN 301 893
	FCC/IC	5.260-5.340	5, 10, 20, 40	FCC 47CFR, Part 15, Subpart E and IC RSS-210
	Universal	5.140-5.345	5, 10, 20, 40	N/A
5.4	ETSI	5.475-5.720	10, 20, 40	ETSI EN 301 893
	FCC	5.480-5.590	5, 10, 20, 40	FCC 47CFR, Part 15, Subpart E
		5.660-5.715		
	IC	5.480-5.590	5, 10, 20, 40	IC RSS-210
		5.660-5.715		
	Universal	5.465-5.730	5, 10, 20, 40	N/A
5.6	Japanese Regulations – see Table 2			
5.8	ETSI	5.725-5.875	10, 20	ETSI EN 302 502
	FCC/IC	5.725-5.850	5, 10, 20, 40	FCC 47CFR, Part 15, Subpart C and IC RSS-210
	MII China	5.730-5.845	5, 10, 20, 40	MII China
5.9	Universal	5.730-5.960	5, 10, 20, 40	N/A
6.0	Universal	5.690-6.060	5, 10, 20, 40	N/A
6.4	Universal	5.900-6.400	10, 20	N/A

Specifications

RADIO

Compliance

FCC/IC:

- FCC 47CFR, Part 15, Subpart C,
- FCC 47CFR, Part 15, Subpart E
- FCC 47CFR, Part 90, Subpart Y
- RSS-111
- IC RSS-210

ETSI:

- ETSI EN 302 502
- ETSI EN 301 893

China: MII

Duplex Technique

TDD

Frequencies, Channel Bandwidths and Regulations

See Tables 1 and 2

Modulation

2x2 MIMO-OFDM, see Table 3

Sensitivity

See Table 3 (measured at BER < 10E-11, 20 MHz)

Encryption

AES 128, FIPS-197

Integrated Antenna Characteristics

See Table 4

Embedded antenna (Airmux-400L)

Characteristics

See Table 5

IDU-to-ODU Connection

Outdoor Cat.5e cable, 100m (328 ft) max. length

CAPACITY

Throughput

Airmux-400LC: Up to 50 Mbps aggregated (Ethernet and up to 4 x E1/T1) or 10 Mbps (Ethernet only)

Airmux-400L: Up to 200 Mbps aggregated (Ethernet and up to 8 E1/T1 combined)

Airmux-400: Up to 200 Mbps aggregated (Ethernet and up to 16 E1/T1 combined)

Airmux-400P: Up to 250 Mbps aggregated Ethernet only

TDM INTERFACES

Number of Ports

2, 4, 8 or 16

Type

E1/T1

Framing

Transparent to framing mode

Timing

Plesiochronous (independent Tx and Rx)

Line Code

E1: HDB3

T1: B8ZS, AMI

Latency

8 msec

Line Impedance

E1: 120Ω, balanced

T1: 100Ω, balanced

Jitter and Wander

As per G.823, G.824

Connector

RJ-45

ETHERNET INTERFACES

Number of Ports

3

Type

2 x 10/100BaseT, autonegotiation (802.3u)  
1 x SFP

Framing/Coding

IEEE 802.3u

Bridging

Up to 2048 MAC addresses self-learning

Traffic Handling

MAC layer bridging, self-learning

Latency

3 msec (typical)

Line Impedance

100Ω

VLAN Support

802.1p & Q

Table 2. Japanese Regulations

Band [GHz]	Channel Bandwidth [MHz]	Frequency Allocation [MHz]	Regulation
4.9	10	4915, 4920, 4925, 4935, 4940, 4945	MIC Notification 88 Appendix 47, Article 2, Paragraph 1, Item 19-5, 6, 7, 8, 9, 10, Base station
	20	4920, 4940, 4960, 4980	
	40	4930, 4970	
5.0	10	5040, 5045, 5055	
	20	5040, 5060, 5080	

**SFP Port**

Fast or Gigabit Ethernet, for full details, see the *SFP Transceivers data sheet* at [www.rad.com](http://www.rad.com)

**Note:** It is strongly recommended to order this device with **original RAD SFPs installed**. This ensures a comprehensive functional quality test on the entire assembled unit prior to shipping. RAD cannot guarantee full compliance to product specifications for units using non-RAD SFPs.

For detailed specifications of the SFP transceivers, see the *SFP Transceivers data sheet*.

**MANAGEMENT AND SECURITY****Protocol**

SNMP, Telnet

**Interface**

10/100/1000BaseT

**Note:** 1000BaseT is supported by the IDU-E Gigabit only.

**Connector**

RJ-45

**Upgrade Capabilities**

Local and over-the-air software download

**MONITORING AND DIAGNOSTICS**

Constant traffic monitoring over the radio link

Statistics data collecting

Internal and external loopbacks on both sides of a link

**RESILIENCY****Grounding and Lightning Protection**

Individual grounding for each IDU/ODU

Internal arrestors for lightning protection

Internal ESD protection circuits over power/telecom lines

Optional lightning protection kit

**GENERAL****Power**

DC: -20 to -60 VDC (AC/DC power adapter can be ordered separately)

**Power Consumption**

35W max (ODU with IDU)

**Indicators**

IDU (green/orange/red): IDU status

ODU (green/red): ODU status

AIR I/F (green/orange/red): Air link status

SVC (green/orange/red): TDM service status

HSS (green/orange/red): HSS status

STBY (green/orange/red): MHS status

LINK (yellow): Ethernet link status

ACT (green): Ethernet activity status

**Environment**

Outdoor unit and external antenna:

Enclosure: IP67 all-weather case

Temperature: -35° to 60°C (-31° to 140°F)

Indoor units:

Temperature: 0° to 50°C (32° to 122°F)

Humidity: Up to 90%, non-condensing

**Physical**

ODU with integrated antenna:

Height: 300 mm (11.8 in)

Width: 300 mm (11.8 in)

Depth: 90 mm (3.54 in)

Weight 2.7 kg (5.9 lb)

ODU with embedded antenna:

Height: 270 mm (10.62 in)

Width: 195 mm (7.67 in)

Depth: 90 mm (3.54 in)

Weight 1.8 kg (3.6 lb)

LC ODU with integrated antenna:

Height: 197 mm (7.76 in)

Width: 241 mm (9.49 in)

Depth: 77 mm (3.03 in)

Weight 1.3 kg (2.86 lb)

LC ODU with high gain integrated antenna:

Height: 300 mm (11.8 in)

Width: 300 mm (11.8 in)

Depth: 59 mm (2.3 in)

Weight 1.8 kg (3.97 lb)

LC ODU with external antenna:

Height: 196 mm (7.72 in)

Width: 171 mm (6.73 in)

Depth: 72 mm (2.83 in)

Weight 1.1 kg (2.43 lb)

IDU:

Height: 44 mm (1.7 in)

Width: 237 mm (9.3 in)

Depth: 165 mm (6.5 in)

Weight 0.5 kg (1.1 lb)

IDU-E

Height: 44 mm (1.7 in)

Width: 436 mm (17.2 in)

Depth: 210 mm (8.2 in)

Weight: 1.5 kg (3.3 lb)

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Table 3. Radio Link Characteristics (Channel Bandwidth 40 MHz)

Modulation	Air Rate [Mbps]	Full Duplex Throughput [Mbps]	Tx Power [dBm]	Sensitivity [dBm]	Notes
BPSK 0.5	13	–	25	-88	Installation Mode
QPSK 0.5	27	10	25	-86	Single Mode
QPSK 0.75	40.5	16	25	-83	Single Mode
16 QAM 0.5	54	22	24	-81	Single Mode
16 QAM 0.75	81	32	21	-80	Single Mode
64 QAM 0.66	108	43	19	-72	Single Mode
64 QAM 0.75	121.5	49	18	-70	Single Mode
64 QAM 0.83	135	53	18	-67	Single Mode
2 x BPSK 0.5	27	10	25	-88	Dual Mode
2 x QPSK 0.5	54	21	25	-86	Dual Mode
2 x QPSK 0.75	81	32	25	-83	Dual Mode
2 x 16 QAM 0.5	108	43	24	-81	Dual Mode
2 x 16 QAM 0.75	162	64	21	-80	Dual Mode
2 x 64 QAM 0.66	216	85	19	-72	Dual Mode
2 x 64 QAM 0.75	243	96	18	-70	Dual Mode
2 x 64 QAM 0.83	270	100	18	-67	Dual Mode

Table 4. Integrated Antenna Characteristics

Antenna Type	Frequency [GHz]	Gain [dBi]	Beam [degrees]	Dimensions		Weight	
				[mm]	[inch]	[kg]	[lb]
Flat panel, Dual Polarization	4.9x-5.875	19 (4.9x GHz) 23 (5.x GHz)	9	371×371×40	14.6×14.6×1.5	2.5	5.5
Flat panel, Dual Polarization	2.400	17.5	16	371×371×40	14.6×14.6×1.5	2.5	5.5
Flat panel, Dual Polarization	3.4–3.7	21	12	371×371×11	14.6×14.6×0.4	3.5	7

Table 5. Embedded Antenna Characteristics

Antenna Type	Frequency [GHz]	Gain [dBi]	Polarization	Beam Width		Lightning Protection
				Azimuth 3 dB	Elevation 3 dB	
Flat panel	4.9-5.15	13.0 ±1	Dual Linear	35°	15°	DC Grounded
Flat panel	5.15-5.47	15.0 ±1	Dual Linear	35°	15°	DC Grounded
Flat panel	5.47-5.875	15.5 ±1	Dual Linear	35°	15°	DC Grounded
Flat panel	5.875-6.02	12.5 ±1	Dual Linear	35°	15°	DC Grounded

## Ordering

### Outdoor Units (ODU's)

#### Airmux-400\*

Complete \* from *Table 6* for selected ODU type (P/ODU, ODU or L/ODU), band and rate

#### Airmux-400/ODU-H/+

Complies with HAZLOC standard and certified to operate under hazardous environment in explosive zones

Complete + from *Table 7* for selected band and rate

#### Airmux-400LC/ODU/£

Complete £ from *Table 8* for selected band and rate

**Note:** INT antenna has 15 dBi gain, INT/HG antenna has 23 dBi gain.

### Indoor Units (IDU's)

#### Airmux-400/IDUE/#

Indoor unit with redundant DC power supply

#### Legend

# IDU-E interface:

<b>4TDM</b>	4 TDM ports, 3 Ethernet ports (10/100 Mbps) (2 UTP + 1 SFP)
<b>8TDM</b>	8 TDM ports, 3 Ethernet ports (10/100 Mbps) (2 UTP + 1 SFP)
<b>16TDM</b>	16 TDM ports, 3 Ethernet ports (10/100 Mbps) (2 UTP + 1 SFP)
<b>2GbE</b>	2 Gigabit Ethernet ports (2 GbE copper + 1 SFP)

#### Airmux-IDUH/2ETH

Indoor unit with six PoE ports  
Supports all ODU's except Airmux-400LC

#### Airmux-IDU/%

Indoor unit with single DC power supply

% IDU interface:

<b>2TDM</b>	2 TDM (E1/T1) interfaces, 2 ETH interfaces, alarm port
<b>2ETH</b>	2 ETH interfaces

#### Notes:

- Enhanced Ethernet capabilities (VLANs and QoS) and resilient ring topology supported by both IDU/2TDM and IDU/2ETH models.
- For AC power feeding, order external power adapter (Airmux-PS-E-AC/a). See *Optional Accessories* below.

### Power Adapters

#### Airmux-PS-E-AC/a

Power adapter for IDU and IDU-E,  
90–240 VAC to 48 VDC

#### Airmux-PS-H-AC/a

Power adapter for IDUH,  
90–240 VAC

### Power over Ethernet (POE) Devices

#### Airmux-POE/GBE/a

PoE device with 100BaseT/GBE interface and AC power feeding

#### Legend

a Power cable with matching plug:

<b>ACEU</b>	Europe
<b>ACUS</b>	US
<b>ACUK</b>	UK
<b>ACAU</b>	Australia/China
<b>ACOC</b>	Open-ended connector
<b>ACAR</b>	Argentina
<b>ACSA</b>	South Africa
<b>ACBR</b>	Brazil

#### Airmux-OPOE/GBE/AC

Outdoor GBE AC PoE device for all Airmux radios with AC power feeding

#### Airmux-OPOE/GBE/DC

Outdoor GBE DC PoE device for all Airmux radios with DC power feeding

#### Airmux-POE/GBE/ET/ ACJPN

Extended temperature PoE supporting  
-40° to 70°C (-40° to 158°F)

#### Airmux-POE/GBE/ET/DC

Extended temperature PoE supporting  
-40° to 70°C (-40° to 158°F) and DC range  
-10 to -60 VDC

**Note:** A PoE device eliminates the need for ordering an IDU-E.

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Table 6. Airmux-400\*

Band	P/ODU/ 250 (IP only)	/ODU/			L/ODU/
		200	100	10	50
F24F		F24F/200M/INT	NA	NA	F24F/INT
		F24F/200M/EXT	NA	NA	F24F/EXT
F25F		NA	F25F/100M/INT	NA	F25F/INT
		NA	F25F/100M/EXT	NA	F25F/EXT
F3XF	F3XF/250M/INT	NA	F3XF/100M/INT	F3XF/10M/INT	NA
	F3XF/250M/EXT	NA	F3XF/100M/EXT	F3XF/10M/EXT	NA
F3XE		NA	F3XE/100M/INT	F3XE/10M/INT	NA
		NA	F3XE/100M/EXT	F3XE/10M/EXT	NA
F4XU		NA	F4XU/100M/EXT	NA	NA
F49F	F49F/250M/INT	F49F/200M/INT	NA	NA	F49F/EMB
	F49F/250M/EXT	F49F/200M/EXT	NA	NA	F49F/INT
F49/JPN	F4950J/250M/INT	F49/JPN/INT	NA		F49/JPN/INT
	F4950J/250M/EXT	F49/JPN/EXT	NA		F49/JPN/EXT
F50/JPN		NA	F5X/JPN/INT	NA	F5X/JPN/INT
		NA	F5X/JPN/EXT	NA	F5X/JPN/EXT
F54E	F54E/250M/INT	F54E/200M/INT	NA	NA	F54E/EMB
	F54E/250M/EXT	F54E/200M/EXT	NA	NA	F54E/INT
F54U	F54U/250M/INT	F54U/200M/INT	NA	NA	F54U/EMB
	F54U/250M/EXT	F54U/200M/EXT	NA	NA	F54U/INT
F58F	F58F/250M/INT	F58F/200M/INT	NA	NA	F58F/EMB
	F58F/250M/EXT	F58F/200M/EXT	NA	NA	F58F/INT

Table 7. Airmux-400/ODU-H/+

Band	Rate (Mbps)		
	200	100	10
F58F	F58F/200M/INT	NA	NA
	F58F/200M/EXT	NA	NA

Table 8. Airmux-400LC/ODU/ε

Band	Rate (Mbps)		
	50	25	10 (IP only)
F24F	F24F/50M/INT	F24F/25M/INT	F24F/10M/INT
	F24F/50M/INT/HG	F24F/25M/INT/HG	F24F/10M/INT/HG
	F24F/50M/EXT	F24F/25M/EXT	F24F/10M/EXT
F54E	F54E/50M/INT	F54E/25M/INT	F54E/10M/INT
	F54E/50M/INT/HG	F54E/25M/INT/HG	F54E/10M/INT/HG
	F54E/50M/EXT	F54E/25M/EXT	F54E/10M/EXT
F54U	F54U/50M/INT	F54U/25M/INT	F54U/10M/INT
	F54U/50M/INT/HG	F54U/25M/INT/HG	F54U/10M/INT/HG
	F54U/50M/EXT	F54U/25M/EXT	F54U/10M/EXT
F58F	F58F/50M/INT	F58F/25M/INT	F58F/10M/INT
	F58F/50M/INT/HG	F58F/25M/INT/HG	F58F/10M/INT/HG
	F58F/50M/EXT	F58F/25M/EXT	F58F/10M/EXT

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## OPTIONAL ACCESSORIES

## Airmux-400-ANT/\$

External antenna with 1m (3.3 ft) cable.  
**grid** stands for a grid antenna, **fp** – a flat panel antenna, and **dish** – a dish antenna.

## Legend

\$ External antenna:

17/2327/FP/1ft	17 dBi, 2.30–2.70 GHz bands
19/3340/FP/1ft	19 dBi, 3.30–4.00 GHz bands
22/4451/FP	22 dBi, 4.40–5.10 GHz bands
23/4960/FP/1ft	23 dBi, 4.90–6.00 GHz bands
23/5764/FP/1ft	23dBi, 5.70–6.40 GHz bands
28/4964/FP	28dBi, 4.900–6.425 GHz bands
28/5260/DISH	28dBi, 4.90–6.06 GHz bands
32/4958/DISH	32dBi, 4.90–5.875 GHz bands
25/3338/DISH	25.5dBi, 3.30–3.80 GHz bands

**Note:** For detailed description of external antennas, see Airmux-400 External Antennas data sheet at [www.rad.com](http://www.rad.com).

## CBL-Airmux/@

Assembled cable for connection between IDU and ODU

## Legend

@ Cable length:

5	5 m (16 ft)
25	25m (82 ft)
50	50m (164 ft)
75	75m (246 ft)
100	100m (328 ft)

## Airmux-HSSU

Hub site sync unit to connect 8 collocated outdoor units and 2 additional HSS units

## Airmux-GSU/a

Outdoor GPS-based synchronization kit (GSU, GPS antenna, 1.5m (4.9 ft) RF cable, CBL-Airmux-HSS/5 cable, PoE unit, and mounting kits for GSU and GPS antenna)

## Legend

a Power cable with matching plug:

ACEU	Europe
ACUS	US
ACUK	UK
ACAU	Australia/China
ACOC	Open-ended connector
ACAG	Argentina
ACSA	South Africa

## CBL-Airmux-HSS/@@

Assembled cable for HSS connection

## Legend

@@ Cable length:

5	5m (16.4 ft)
15	15m (49.2 ft)
50	50m (164 ft)
100	100m (328 ft)

## Airmux-MHS-kit

Cable and patch panel assembly (8 × RJ-45 Y-connections) for Monitored Hot Standby configuration

## Airmux-Lightning-Protection

Outdoor lightning protection unit for 10/100/1000BaseT surge protector. Includes 0.5m (1.64 ft) CAT5e cable and wall/poll mounting kit.

## Airmux-Lightning-Protection-Kit

Set of 10 Airmux-Lightning-Protection units

## Airmux-Planner

Radio network planning tool

## Airmux-FE-Repeater

Ethernet repeater to extend the PoE-to-ODU cable beyond the 100m limit (but not more than 200m)

## Airmux-RMK-SPARE

Spare mounting kit for Airmux-400P/400/400L radios

## Airmux-RMK-LC-SPARE

Spare mounting kit for Airmux-400LC radios

## Airmux-RMK-MARINE

Mounting kit for salty environment (excluding Airmux-400LC)

## CBL-Airmux-RF/1.2m

## CBL-Airmux-RF/2m

Coax cable with two N-type connectors (1.2 or 2 m length)

## Capacity/P1025/Airmux-400LC/10M-25M

## Capacity/P1050/Airmux-400LC/10M-50M

## Capacity/P2550/Airmux-400LC/25M-50M

Software license keys for Airmux-400LC capacity upgrade

## Capacity/P5000/Airmux-400L/50M-100M

## Capacity/P0001/Airmux-400L/100M-200M

## Capacity/P5001/Airmux-400L/50M-200M

Software license keys for Airmux-400L capacity upgrade

## ENCRYPTION/Airmux-400P/AES256

Software license key for AES-256 support (for Airmux-400P only)

## Airmux-Maritime-Kit/LFF

Anti-salt coating for Airmux-400P/400/400L

## Airmux-Maritime-Kit/SFF

Anti-salt coating for Airmux-400/LC

## Airmux-Maritime-Kit/GSU

Anti-salt coating for Airmux-GSU

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