

Airmux-400H

Broadband Wireless Multiplexer with Extended Rate



- Carrier-class cost-effective broadband wireless radio system with Layer-2 Ethernet capabilities
- Net throughput of up to 750 Mbps aggregated (symmetric and asymmetric)
- Multiband operation over 5.1 to 6.0 GHz frequencies
- High reliability and availability based on robust air interface protocol
- Long transmission range of up to 40 km (25 miles)



Airmux-400H is a carrier-class, cost-effective multiple point-to-point broadband wireless transmission device. It operates in 5.1 to 6.0 GHz bands, and complies with FCC, ETSI and MII regulations.

Airmux-400H 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.

All Airmux-400H ODU variants can be ordered with optional anti-salt coating for installation in harsh marine environments.

Airmux is a complimentary addition to RAD's Service Assured Access and 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-400H can be used in high-capacity inter-branch connectivity applications for university campuses, health care organizations, government institutions, large enterprises and public establishments with high traffic requirements (Figure 1).

Service Providers and ISPs

Providing IP backhaul of 4G/broadband services in multiple point-to-point topologies, Airmux-400H 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-400H extends mobile reach to rural locations with carrier-grade, long-haul, and Ethernet services. It can also be used for backhaul of 3G traffic in urban environment.

Security and Surveillance

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



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INTEROPERABILITY

Airmux-400H is interoperable with RAD's Ethernet and TDM devices, to build optimized access PSN networks over the air interface, with optimal performance and high spectral efficiency in dense radio environments and multipath conditions.

RADIO

Built on advanced MIMO and OFDM technologies, a pair of Airmux-400H units provides a high-capacity link at channel bandwidth of 10, 20, 40 or 80 MHz (see Table 1). This guarantees a robust air interface able to withstand strong RF interference and harsh ambient conditions.

The Dynamic Channel Bandwidth Selection (D-CBS) mechanism selects the appropriate MCS and CBW combination that yields the highest throughput at any given time. D-CBS maximizes capacity in unlicensed congested spectrums while assuring link robustness and availability. In addition, D-CBS operates at 20/40/80 MHz channel BW.

ETHERNET

RAD's Power-over-Ethernet devices provide FE and GbE data and power to Airmux-400H outdoor units.

RESILIENCY

Diversity

With dual bipolar antennas, Airmux-400H 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.

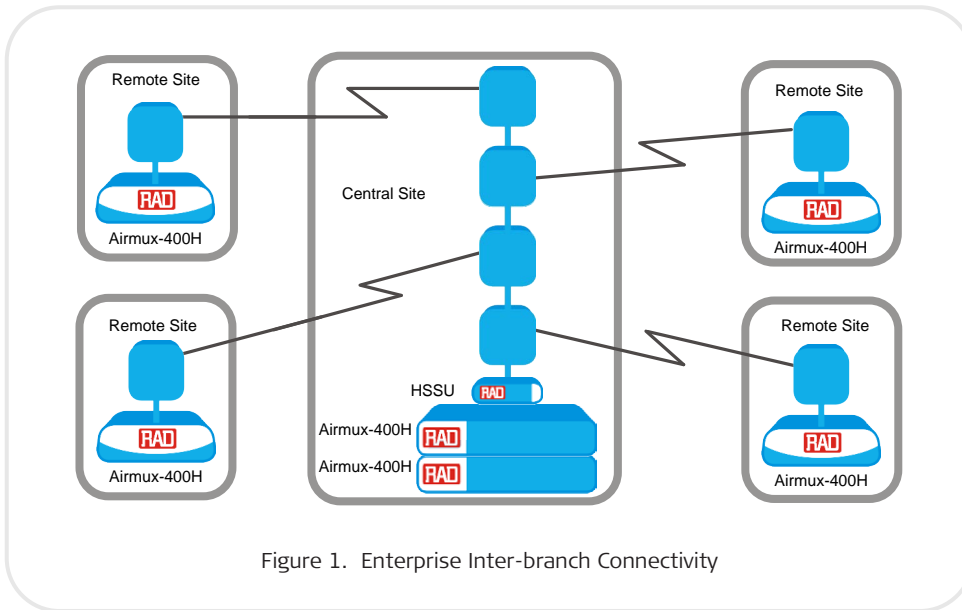


Figure 1. Enterprise Inter-branch Connectivity

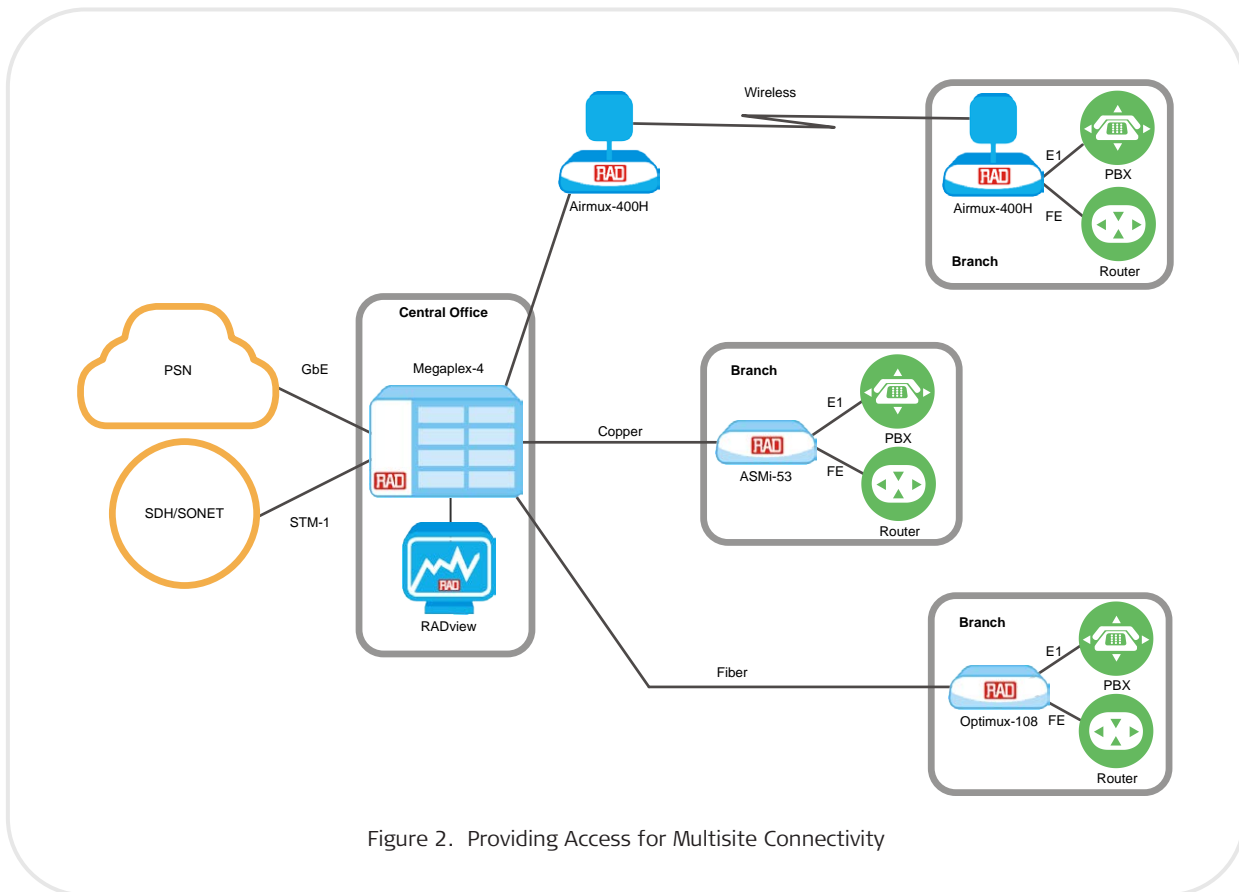


Figure 2. Providing Access for Multisite Connectivity

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TIMING AND SYNCHRONIZATION

The HSS (Hub Sites Synchronization) technology synchronizes the transmission timing of multiple Hub Sites to the same clock source, thus eliminating self interference. It is particularly useful at a multi-link base station employing several ODUs.

The HSS unit provides intra-site synchronization.

The GPS-based synchronization unit (GSU) is designed to handle inter-site interferences under large-scale deployment scenarios.

MANAGEMENT AND SECURITY

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

Airmux Manager is compatible with SNMP v1 and SNMP v3.

Airmux Manager access is protected by the Link Password and the SNMP Community strings.

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

ARCHITECTURE

Airmux multiplexers consist of a mast- or wall-mountable outdoor unit (ODU), an optional external antenna and a Power-over-Ethernet device (PoE) for power and data connection.

OPERATION AND MAINTENANCE

Short Time-to-Service

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

Air Link Quality of Service

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

Security

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

MONITORING AND DIAGNOSTICS

Airmux-400H constantly monitors traffic over the radio link and collects statistics data for the air interface and Ethernet ports. It does so continuously, even when the Airmux Manager is not connected.

The **Get Diagnostics** feature collects link and manager information from selected sites and saves them in a text file. The information in this file can be used for diagnostics.

Table 1. Supported Bands, Frequency Ranges and Regulations

Band	Frequency Range [GHz]				Compliance
	10 MHz Channel BW	20 MHz Channel BW	40 MHz Channel BW	80 MHz Channel BW	
5.1 GHz Universal	5.145-5.340	5.140-5.345	5.130-5.355	5.130-5.375	Universal
5.4 GHz Universal	5.470-5.725	5.465-5.730	5.455-5.740	5.455-5.760	Universal
5.8 GHz FCC/IC (Default)	5.725-5.850	5.725-5.850	5.725-5.850	5.725-5.850	FCC 47CFR Part 15.247; IC RSS-210
5.8 GHz WPC	5.825-5.875	5.825-5.875	5.815-5.885		WPC (India) G.S.R38(E) dated 19 January, 2007 notification
5.9 GHz Universal	5.725-5.955	5.720-5.960	5.710-5.970	5.710-5.990	Universal
6.0 GHz Universal	5.695-5.055	5.690-6.060	5.680-6.070	5.680-6.090	Universal
5.8 GHz MII	5.735-5.840	5.730-5.845	5.720-5.855	5.700-5.875	CMIIT RTA
5.160-5.245 GHz FCC/IC	5.160-5.245	5.160-5.245	5.155-5.250	5.155-5.250	FCC 47CFR Part 15.407;

Specifications

CAPACITY

Up to 750 Mbps network throughput

RADIO

Compliance

FCC/ETSI/MII radio regulations

Duplex Technique

TDD

Frequencies, Channel Bandwidths and Regulations

See *Table 1*

Modulation

2x2 MIMO-OFDM

Encryption

AES 128, FIPS-197

Integrated Antenna Characteristics

Gain 23 dBi

IDU-to-ODU Connection

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

ETHERNET

Number of Ports

1

Type

100BaseT/GBE

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

802.1p & Q

MANAGEMENT

Protocol

SNMP, Telnet

Interface

10/100/1000BaseT

Connector

RJ-45

Upgrade Capabilities

Local and over-the-air software download

RESILIENCY

Individual grounding for each ODU

Internal arrestors for lightning protection

Internal ESD protection circuits over power/telecom lines

Optional lightning protection kit

DIAGNOSTICS

Get Diagnostics feature

Constant traffic monitoring over the radio link

Internal and external loopbacks on both sides of a link

GENERAL

Physical

ODU with integrated antenna:

Height: 300 mm (11.8 in)

Width: 300 mm (11.8 in)

Depth: 100 mm (3.9 in)

Weight 2.9 kg (6.4 lb)

ODU with external antenna:

Height: 280 mm (11.0 in)

Width: 195 mm (7.7 in)

Depth: 80 mm (3.1 in)

Weight 5.29 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 (8.3 in)

Weight: 1.5 kg (3.3 lb)

Power

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

Power Consumption

25W max (ODU with PoE)

Environment

Outdoor unit and external antenna:

Enclosure: IP67 all-weather case

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

Humidity: 100% condensing, IP67 (totally protected against dust and immersion up to 1m)

Indoor units:

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

Humidity: Up to 90%, non-condensing

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Ordering

OUTDOOR UNITS (ODUS)

Airmux-400H/ODU/F58F/INT

Airmux-400H ODU with integrated antenna, 5.x GHz multi-frequency bands. Factory default 5.8 GHz FCC/IC.

Airmux-400H/ODU/F58F/EXT

Airmux-400H ODU connectorized for external antenna (2 x N-type), 5.x GHz multi-frequency bands. Factory default 5.8 GHz FCC/IC.

Airmux-400H/ODU/F54E/INT

Airmux-400H ODU with integrated antenna, 5.x GHz multi-frequency bands. Factory default 5.4 GHz ETSI.

Airmux-400H/ODU/F54E/EXT

Airmux-400H ODU connectorized for external antenna (2 x N-type), 5.x GHz multi-frequency bands. Factory default 5.4 GHz ETSI.

Airmux-400H/ODU/F54U/INT

Airmux-400H ODU with integrated antenna, 5.x GHz multi-frequency bands. Factory default 5.4 GHz Universal.

Airmux-400H/ODU/F54U/EXT

Airmux-400H ODU connectorized for external antenna (2 x N-type), 5.x GHz multi-frequency bands. Factory default 5.4 GHz Universal.

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:

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

OPTIONAL ACCESSORIES

Airmux-400-ANT/\$

External antenna with 1m (3.3 ft) cable.

FP stands for a flat panel antenna, and

DISH for 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

CBL-Airmux/@

Assembled cable for connection between ODU and PoE device.

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 co-located 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

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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 lightening 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-400H radios

Airmux-RMK-MARINE

Mounting kit for salty environment

CBL-Airmux-RF/1.2m**CBL-Airmux-RF/2m**

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

Airmux-Maritime-Kit/LFF

Anti-salt coating for Airmux-400H

Airmux-Maritime-Kit/GSU

Anti-salt coating for Airmux-GSU

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