

Airmux-5000

High Capacity Point-to-Multipoint Wireless System



Carrier-class broadband
point-to-multipoint
radio solution for
Ethernet traffic

- Carrier-class cost-effective broadband wireless radio system with Layer-2 Ethernet capabilities
- Up to 200 Mbps point-to-multipoint solution for enterprise, residential, private and video surveillance networks, that demand assured performance with guaranteed bandwidth for Ethernet services
- Multiband operation over 3.3 to 3.8 GHz and 4.8 to 6 GHz frequencies
- Guaranteed SLA and capacity per Subscriber Unit
- High reliability and availability based on robust air interface protocol

AIRMUX
ACCESS+

Airmux-5000 is a carrier-class, cost-effective point-to-multipoint broadband wireless system. It includes Base Stations (BS) and Subscriber Units (SU) for transmitting over an extensive range of frequency bands: 3.3 to 3.8 GHz and 4.8 to 6 GHz bands.

The system is suitable for deployment in FCC, IC and ETSI-regulated countries.

Ensuring the highest spectrum efficiency available in the market, Airmux-5000 delivers greater throughput over smaller channel bandwidth.



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High spectrum efficiency results in additional network revenue, reduced spectrum license fees and increased flexibility in frequency planning.

Airmux-5000 is the ideal wireless system for business access users demanding high-capacity throughput and Ethernet SLA assurance.

The Airmux product line is part of RAD's Access+ portfolio for Multiservice Access Platform and First Mile 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 TYPICAL APPLICATIONS

The most common wireless applications are described below:

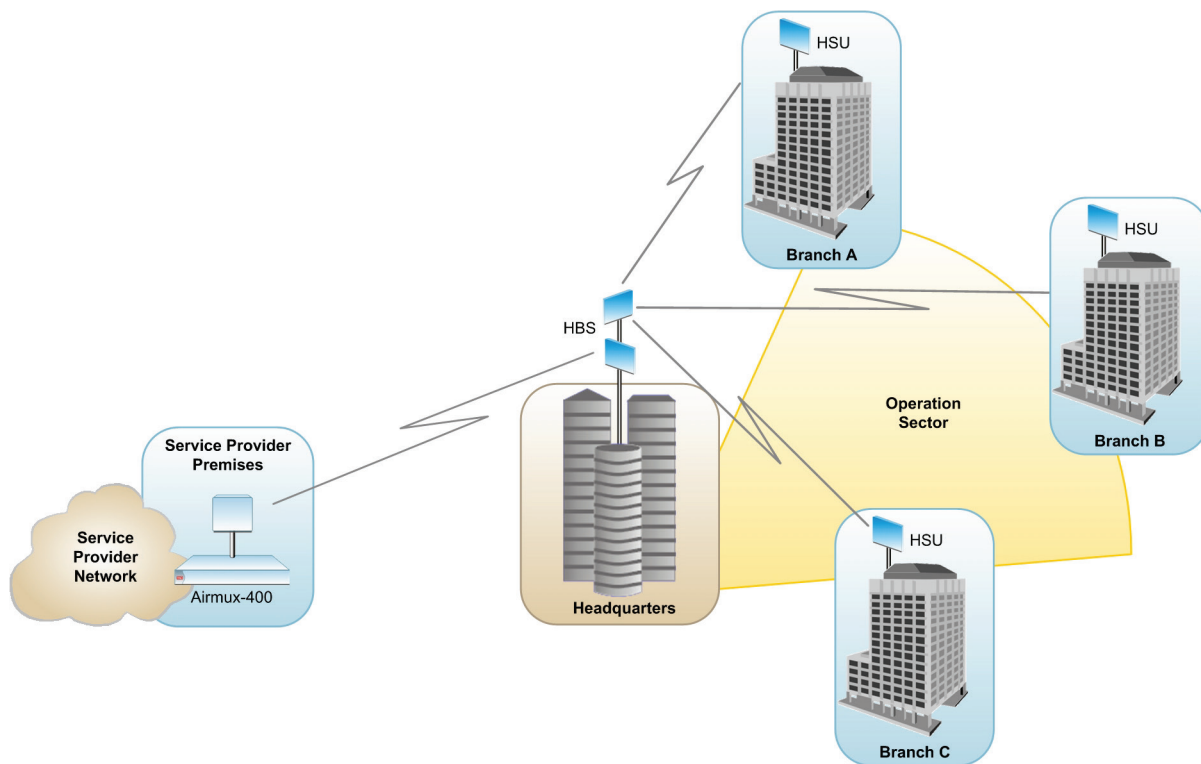


Figure 1. High Capacity Corporate Access

Service Providers and ISPs

Providing IP backhaul of 4G/broadband services in point-to-multipoint topologies, Airmux-5000 offers broadband access for remote, rural and underserved communities:

- nLOS (no line of sight) in urban environment
- Long haul in rural setting.

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.

Private Networks

Airmux-5000 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.

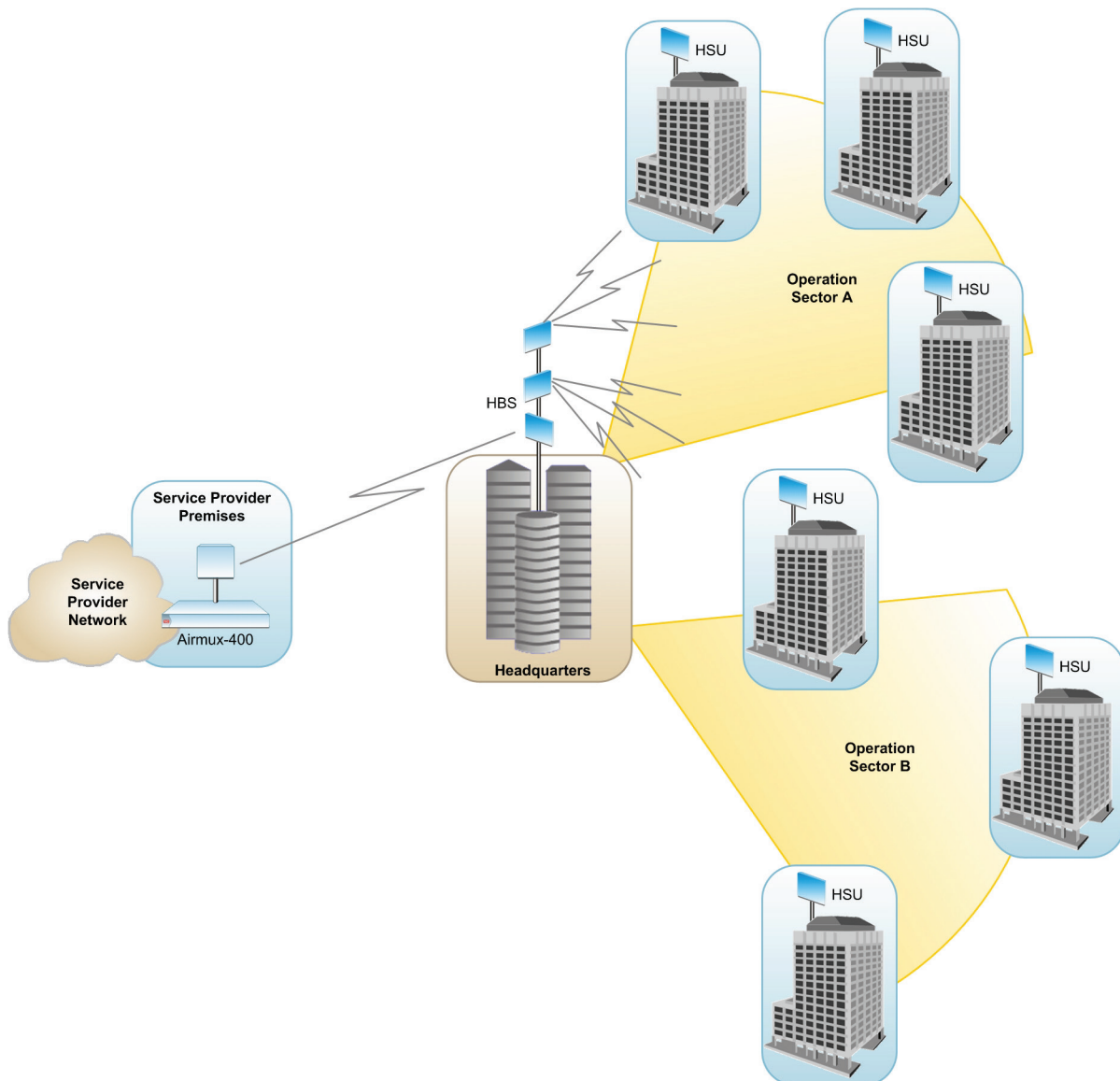


Figure 2. Medium Capacity Corporate Access

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Security and Surveillance

Aggregation and backhaul of traffic from multiple collocated megapixel video cameras, make Airmux-5000 suitable for homeland security applications, municipal 'safe city' projects, and border control installations.

PHYSICAL CONFIGURATIONS

Airmux multiplexers consist of a mast- or wall-mountable High-Capacity Base Station (HBS), operating at multiple frequencies of 5.x GHz, and PoE devices. Each HBS supports up to 16 remote High-Capacity Subscriber Units (HSUs) with aggregated throughputs of 10, 20 and 50 Mbps.

SUPERIOR SPECTRAL EFFICIENCY

Built on advanced MIMO and OFDM technologies, the Airmux-5000 system provides a high-capacity link at channel bandwidth of 10, 20, or 40 MHz. 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-5000 automatically searches for a clear channel within a pre-selected list of frequencies.

SHORT TIME-TO-SERVICE

Because Airmux-5000 operates at license-exempt frequencies, it can be deployed in record time, eliminating the costs and delays involved in leasing lines or trenching fiber.

Table 1. Supported Bands and Frequency Ranges

	Band	Frequency Range [GHz]	Regulation
FCC, MII	5.8 GHz FCC/IC	5.725–5.850	FCC 47CFR, Part 15, Subpart C and IC RSS-210
	5.8 GHz MII	5.730–5.845	II for 5.8 GHz
	5.4 GHz FCC	5.480–5.715	FCC 47CFR, Part 15, Subpart E
	5.4 GHz IC	5.480–5.715	IC RSS-210
	5.3 GHz FCC/IC	5.260–5.340	FCC 47CFR, Part 15, Subpart E and IC RSS-210
	4.9 GHz FCC/IC	4.940–4.990	FCC 47CFR, Part 90, Subpart Y and IC RSS-111
	3.65 GHz FCC	3.650–3.675	FCC 47CFR, Part 90- Restricted mode
	3.5 GHz IC	3.450–3.650	ICC RSS 192, issue-3
ETSI	5.8 GHz ETSI	5.735–5.865	ETSI EN 302 502
	5.4 GHz ETSI	5.480–5.715	ETSI EN 301 893
	5.3 GHz ETSI	5.160–5.340	ETSI EN 301 893
	3.4-3.7 GHz ETSI	3.403–3.710	EN 302 326-2 v1.2.2
WPC	5.8 GHz WPC India	5.825–5.875	WPC GSR-38
Universal	4.8-6.0 GHz	4.800–6.060	Universal
	3.3-3.8 GHz	3.300–3.800	Universal

SITE SYNCHRONIZATION

Hub Site Synchronization (HSS) enables collocating multiple radios by reducing the interference that normally occurs when several radios transmit and receive in close proximity to one another. HSS provides a complex radio environment of mixed services and channel bandwidth frequencies. The collocation feature requires ordering the HSS unit, as well as its synchronization cables.

Note: Like any other RF deployment, the wireless operation is highly dependent on factors such as available frequencies, the physical space between radios, other interfering radios.

HSS does not eliminate the need for careful RF planning to ensure the design will work as required.

For long distance coverage, 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 ODU's at all locations.

DIVERSITY

Airmux-5000 uses dual bipolar antennas to transmit the same data through both radio links. This ensures data transmission integrity under harsh conditions.




MANAGEMENT

A single SNMP-based network management application (Airmux Manager) is used to control the Airmux-5000 system.

RADview-EMS, 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 link installation prior to full link service activation. It provides comprehensive and clear spectral measurement information for easier installations.

Table 2. Airmux Family Comparison Table

		 Airmux-200 (Ver. 1.9.5)	 Airmux-400 (Ver. 2.6)	 Airmux-5000 (Ver. 3.2)
Topology	Point-to-point + multiple point-to-point	Airmux-200 Airmux-200L/LC Airmux-200E	Airmux-400L Airmux-400	-
	Point-to-multipoint	-	-	✓
Bandwidth [Mbps]		Airmux-200: 18 Airmux-200L/LC: 2 Airmux-200E: 6 (can be upgraded to 18/22Mbps by using a license key)	Airmux-400L/50 (Ethernet + TDM) Airmux-400/200 (Ethernet + TDM)	200
Services		Airmux-200: 2 Ethernet + 1, 2, 4 E1/T1 Airmux-200L/LC: 1 Ethernet	Airmux-400: Up to 3 Ethernet + up to 16 E1/T1 Airmux-400L: Up to 3 Ethernet + up to 8 E1/T1	1 Ethernet port via PoE
HSS		✓	✓	✓

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Specifications

RADIO

Net Aggregate Capacity

HBS: 100 Mbps (20 MHz),
200 Mbps (40 MHz)

HSU: 10, 20, 50 Mbps

Note: For a full list of supported bands and frequency ranges see Table 1.

Subscriber Units Supported

Up to 16

Range

Up to 40 km (25 miles)

Channel Bandwidth

10, 20, 40 MHz

Duplex Technique

TDD

Modulation

2x2 MIMO-OFDM

Error Correction

FEC, k = 1/2, 2/3, 3/4, 5/6

Encryption

AES 128

Max Tx Power

25 dBm

ETHERNET INTERFACE

Type

HBS: 10/100/1000BaseT (via indoor PoE device)

HSU: 10/100BaseT

Framing/Coding

IEEE 802.3u

Bridging

Up to 4000 MAC addresses self-learning

Latency

4 to 10 msec (typical under full sector load)

Line Impedance

100Ω

QoS

4-queue traffic prioritization

VLAN Support

802.1p & Q, QinQ, layer-2 VPN

MANAGEMENT

Protocol

SNMP, Telnet

Interface

10/100BaseT

Connector

RJ-45

Upgrade Capabilities

Local and over-the-air software download

GENERAL

PoE Cable Connection

Outdoor Cat.5e cable

Max. length: 100m (328 ft) for 100BaseT
75m (246 ft) for 1000BaseT

Grounding and Lightning Protection

Individual grounding for each HBS and HSU

Power

PoE via external device: 100-240 VAC

Power Consumption

HBS: 20W max

HSU: 25W max.

Indicators

IDU (green/orange/red): IDU status

ODU (green/red): ODU status

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

HSS (green/orange/red): HSS status

STBY (green/orange/red): MHS status

LINK (yellow): Ethernet link status

ACT (green): Ethernet activity status

Environment

Enclosure: IP67 all-weather case

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

Humidity: 100%, condensing

Physical

HBS/HSU (with external/small form-factor antenna):

Height: 270 mm (10.6 in)

Width: 195 mm (7.6 in)

Depth: 80 mm (3.1 in)

Weight 1.8 kg (3.6 lb)

HSU (with integrated antenna):

Height: 371 mm (14.6 in)

Width: 371 mm (14.6 in)

Depth: 110 mm (4.3 in)

Weight 3.5 kg (7 lb)

Ordering

STANDARD CONFIGURATIONS

Airmux-5000/BS/F58F/200M/EXT

Airmux-5000 Base Station Radio
Connectorized for external antenna (2x N-type), supporting multi frequency bands at 5.x GHz, factory default 5.8 GHz FCC/IC

Airmux-5000/BS/F54E/200M/EXT

Airmux-5000 Base Station Radio
Connectorized for external antenna (2x N-type), supporting multi frequency bands at 5.x GHz, factory default 5.4 GHz ETSI

Airmux-5000/SU/F58F/50M/EXT

Airmux-5000 Subscriber Unit Radio
Connectorized for external antenna (2x N-type), supporting multi frequency bands at 5.x GHz, factory default 5.8 GHz FCC/IC

Airmux-5000/SU/F58F/50M/INT

Airmux-5000 Subscriber Unit Radio with integrated antenna, supporting multi frequency bands at 5.x GHz, factory default 5.8 GHz FCC/IC

Airmux-5000/SU/F58F/20M/EMB

Airmux- Subscriber Unit Radio with embedded integrated antenna and Connectorized for external antenna (2x N-type), supporting multi frequency bands at 5.x GHz, factory default 5.8 GHz FCC/IC

Airmux-5000/SU/F58F/20M/INT

Airmux-5000 Subscriber Unit Radio with integrated antenna, supporting multi frequency bands at 5.x GHz, factory default 5.8 GHz FCC/IC

Airmux-5000/SU/F58F/10M/EMB

Airmux-5000 Subscriber Unit Radio with embedded integrated antenna and Connectorized for external antenna (2x N-type), supporting multi frequency bands at 5.x GHz, factory default 5.8 GHz FCC/IC

Airmux-5000/SU/F54E/10M/EMB

Airmux-5000 Subscriber Unit Radio with embedded antenna and Connectorized for external antenna (2x N-type), supporting multi frequency bands at 5.x GHz, factory default 5.4 GHz ETSI

SPECIAL CONFIGURATIONS

Airmux-5000/BS/#/200M/EXT

Base station (BS), connectorized for external antenna

Legend

#	Frequency band and regulation:
F58F	5.x GHz, FCC/IC
F54E	5.x GHz, ETSI
F54U	5.x GHz, universal
F3X/100M	3.x GHz, ETSI, FCC/IC (with 100M only)

Airmux-5000/SU/#/%/&

Subscriber unit (SU)

Legend

#	Frequency band and regulation:
F58F	5.x GHz, FCC/IC
F54E	5.x GHz, ETSI
F54U	5.x GHz, universal
F3X	3. x GHz, ETSI, FCC/IC (only with 20 Mbps)

% Aggregate throughput:

10M	10 Mbps
20M	20 Mbps
50M	50 Mbps

& Antenna:

EMB	Embedded integrated antenna, connectorized for external antenna
INT	Integrated antenna
EXT	Connectorized for external antenna

Note: F3X is provided with an internal or external antenna only.

The following restrictions apply when ordering SUs:

- Connectorized SUs without integrated antenna (**EXT** option) have 50-Mbps throughput only.
- SUs with 10-Mbps throughput can be ordered with embedded antenna only (**EMB** option).
- F54U SUs with 20- and 50-Mbps throughputs can be ordered with integrated antenna only (**INT** option).

OPTIONAL ACCESSORIES

External Antennas

BS and SU devices are available with external antennas for increased range and throughput

Airmux-5000/BS-ANT/\$

External antennas for BS

Legend

\$ External antenna:

14/4959/FP	14 dBi, 4.90–5.950 GHz bands, 90°
15/4959/FP	15 dBi, 4.90–5.950 GHz bands, 60°
12/5358/FP	12dBi, 5.150-5.875 GHz bands, 120°
14/3338/FP	14dBi, 3.3-3.8 GHz bands, 90°
14/2327/FP	14dBi, 2.3-2.7 GHz bands, 60°

Airmux-400-ANT/\$

External antennas for SU

Legend

\$ External antenna:

23/4958/FP	23 dBi, 4.90–5.80 GHz, 4.9, 5.3, 5.4 GHz bands
32/4958/DISH	23 dBi, 4.90–5.80 GHz, 4.9, 5.3, 5.4 GHz bands
28/5260/Dish	28 dBi, 4.90–6.06 GHz, 5.3, 5.4, 5.8, 5.9, 6.0 GHz bands
21/3338/FP	21dBi, 3.30-3.80 GHz bands
19/2327/FP	19dBi, 2.30-2.70 GHz bands

Note: *Fp* stands for a flat panel antenna, and *Dish* for a dish antenna.

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Power-over-Ethernet (PoE) Devices

BS and SU devices receive power and Ethernet traffic via PoE units

Airmux-PoE/GbE/DC

DC-PoE device with 100BaseT/GbE interface for BS with 48 VDC power feeding

Airmux-PS-E-AC/b

AC power adaptor for 90-240 VAC to 48 VDC

Legend

a Power cable with matching plug:

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

Airmux-POE/a

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

Legend

a Power cable with matching plug:

ACEU	Europe
ACUS	US
ACUK	UK
ACIDA	India
ACAU	Australia/China
ACOC	Open-ended connector
ACAR	Argentina
ACSA	South Africa
DC	-20 to -60 VDC

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