

Airmux-5000

High Capacity Point-to-Multipoint Wireless System



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

- Up to 200Mbps aggregate throughput with guaranteed SLA per Subscriber Unit
- Suitable for wide variety of applications such as Fixed, Nomadic and Mobility topologies
- Long range of up to 40 km/25 miles between Base Station and Subscriber Unit
- Multiband operation over 2.5 GHz, 3.3 to 3.8 GHz and 4.8 to 6 GHz frequencies
- Excellent operation in nLOS and NLOS environments
- Robust and reliable in tough conditions and extreme temperatures

Airmux-5000 is a carrier-class, cost-effective point-to-multipoint broadband wireless system.

It includes High Capacity Base Stations (BS) and High Capacity Subscriber Units (SU) for **Fixed** and **Nomadic** applications. In these applications a Subscriber Unit can be set at fixed location or move about between Base stations and get service while in stationary position.

Airmux-5000 portfolio also offers High Capacity Base Stations (BS-MOB) and High Capacity Subscriber Units (SU-MOB) for **Mobility** applications. In this application a Subscriber Unit can be set on moving vehicles and get continuous broadband service while in motion.

Airmux-5000 supports transmission over an extensive range of frequency bands: 2.5, 3.3 to 3.8 GHz and 4.8 to 6 GHz.

AIRMUX
ACCESS+

RAD

data communications

The Access Company

Airmux-5000

High Capacity Point-to-Multipoint Wireless System

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.

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 supports Ethernet over wireless links, to address the challenges faced by utilities, transportation networks, carriers, and mobile operators, in migrating to next-generation networks and services.

MARKET SEGMENTS AND APPLICATIONS

The most common wireless applications are described below.

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 (near line of sight) in urban environment
- Long haul in rural setting.

Corporate Clients

Large corporate clients can build their networks with Airmux-5000 to eliminate the recurring fee of incumbent leased line services, while maintaining a secured dedicated capacity per site.

Mobile Networks

Airmux-5000 can be used in Public and Private Organizations requiring broadband connectivity for vehicles in motion.

The Mobility solution offers powerful, easy to deploy Base Stations that guarantee high capacity connectivity to mobile units mounted on vehicles, trains and vessels.

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.

Figure 1 illustrates a typical wireless access network for ISPs.

Table 1. Airmux Family Comparison Table

Feature	Airmux-400	Airmux-400L	Airmux-400LC/25	Airmux-400LC/10	Airmux-5000
Topology	Point-to-point	Point-to-point	Point-to-point	Point-to-point	Point-to-multipoint, up to 32 remote SUs
Aggregate Bandwidth, Mbps	200	50	25	10	200
Services	16 TDM Ethernet	8 TDM Ethernet	4 TDM Ethernet	Ethernet	Ethernet
Application	Fixed	Fixed	Fixed	Fixed	Fixed Nomadic Mobility

PHYSICAL CONFIGURATIONS

Airmux-5000 multiplexer includes a mast- or wall-mountable High-Capacity Base Station (HBS), operating at multiple frequencies, and PoE devices. Each HBS supports up to 32 remote High-Capacity Subscriber Units (HSUs) with aggregated throughput of 5, 10, 20 or 50 Mbps (depending on SU type).

SUPERIOR SPECTRAL EFFICIENCY

Built on advanced MIMO and OFDM technologies, the Airmux-5000 system provides a high-capacity link at channel bandwidth of 5, 10, 20 or 40 MHz. This guarantees a robust air interface able to withstand strong RF interference and harsh ambient conditions.

MULTIBAND RADIO

All Airmux-5000 radios support multiband operation over various frequencies: same hardware can be used at different bands.

SECURITY

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

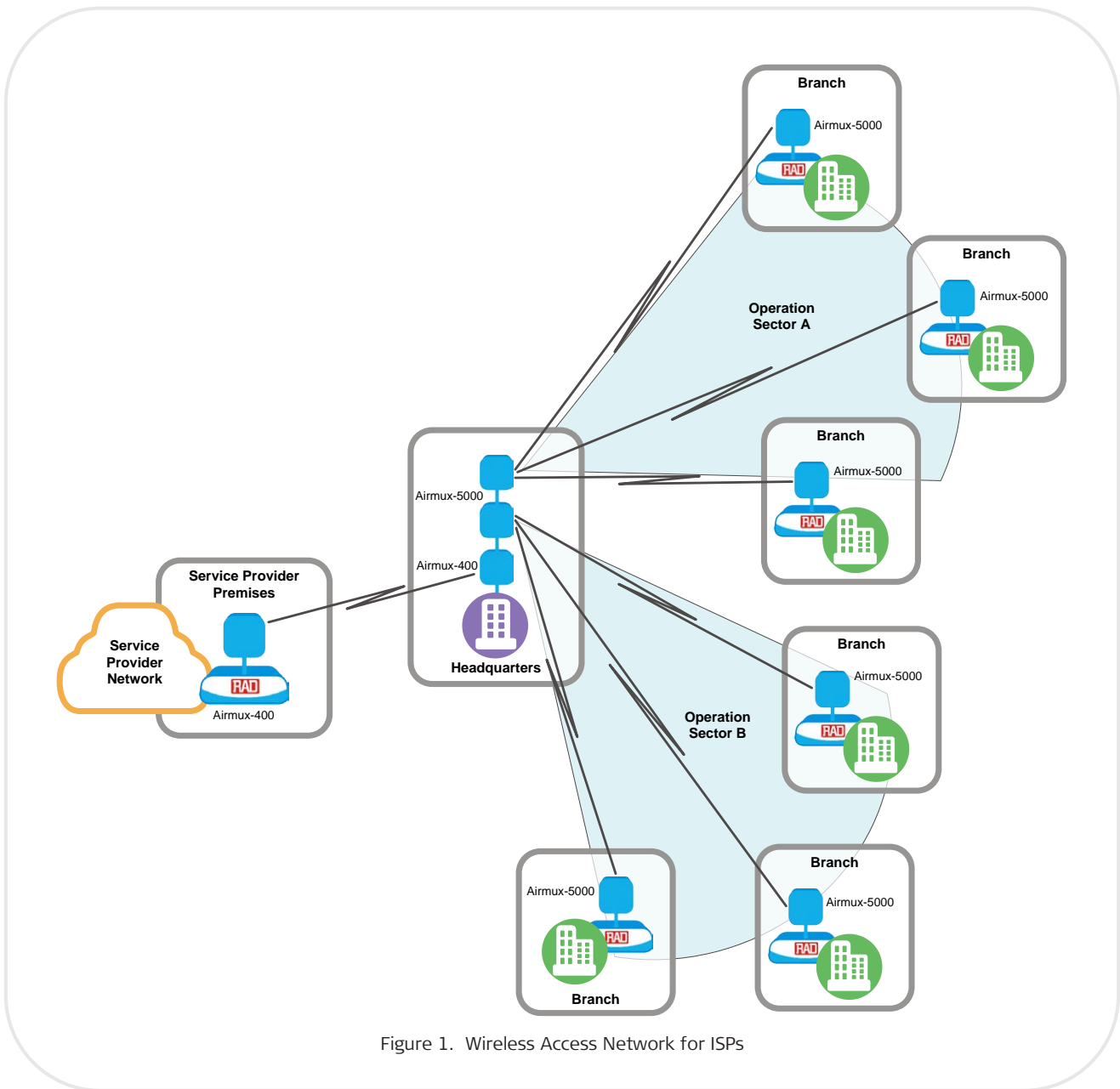


Figure 1. Wireless Access Network for ISPs

Airmux-5000

High Capacity Point-to-Multipoint Wireless System

AIR LINK QUALITY OF SERVICE

When the link quality is low, the Airmux-5000 Base Station automatically searches for a clear channel within a pre-selected list of frequencies.

SHORT TIME-TO-SERVICE

Since 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.

NOMADIC SUPPORT

Airmux-5000 nomadic solution delivers high capacity service to Nomadic users.

Subscriber Units can now move from one Base Station to another and get services once resuming stationary position without any need for device reconfiguration.

Nomadic support allows customers to use existing Airmux-5000 install base for new application such as perimeter security in airports and factories or broadcasting services from remote vehicles.

Both fixed and nomadic users are supported from a common Base Station.

MOBILITY SUPPORT

Airmux-5000 Mobility solution delivers high capacity of up to 100 Mbps at speeds of up to 200 Km/h for video and Internet connectivity.

Train operators can now provide real-time video surveillance and Internet access to passengers on board.

Military organizations can remotely control unmanned patrol vehicles and get high quality video streams from moving vehicles.

Industries can use this technology for remote control of heavy machinery such as cranes in docks, Trucks and drills in mining plants or for communication between ships and oil rigs.

Table 2. Supported Bands, Frequency Ranges and Regulations

Band (GHz)	Regulation	Occupied Frequency Range (GHz)	Supported Channel Bandwidth [MHz]	Compliance
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)
4.9	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
5.0	Universal	4.990-5.160	5, 10, 20, 40	N/A
5.3	ETSI	5.150-5.350	5, 10	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 5.660-5.715	5, 10, 20, 40	IC RSS-210
Universal	5.465-5.730	5, 10, 20, 40	N/A	
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
	WPC India	5.825-5.875	5, 10, 20, 40	GSR-38
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

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, wireless operation is highly dependent on factors such as available frequencies, the physical space between radios, or 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 ODUs 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.

Airmux-5000 Web Interface (WI) enables to carry out the basic sector management functions using a Web browser.

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.

Specifications

RADIO

Net Aggregate Capacity

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

HSU: 5, 10, 20, 50 Mbps

Note: For a full list of supported bands and frequency ranges see Table 2.

Subscriber Units Supported

Up to 32

Range

Up to 40 km (25 miles)

Channel Bandwidth

5, 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 USER 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

IEEE 802.1p & q, QinQ, layer-2 VPN

MANAGEMENT

Protocol

SNMP, Telnet

Interface

10/100/1000BaseT

Connector

RJ-45

Upgrade Capabilities

Local and over-the-air software download

GENERAL

Power

PoE device with AC power feeding:
100-240 VAC

PoE device with DC power feeding: 48 VDC

Power Consumption

HBS: 20W max

HSU: 25W max

PoE Cable

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

Environment

Enclosure: IP67 all-weather case

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

Humidity: 100%, condensing

Physical

HBS/HSU (with external/embedded 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)

Airmux-5000

High Capacity Point-to-Multipoint Wireless System

Ordering

FIXED AND NOMADIC SERIES STANDARD CONFIGURATIONS

Airmux-5000/BS/F58F/200M/EXT
 Airmux-5000/BS/F54E/200M/EXT
 Airmux-5000/BS/F54U/200M/EXT
 Airmux-5000/BS/F3XF/100M/EXT
 Airmux-5000/BS/F25F/100M/EXT
 Airmux-5000/BS/F58F/50M/EXT
 Airmux-5000/BS/F54E/50M/EXT
 Airmux-5000/SU/F58F/50M/EXT
 Airmux-5000/SU/F54E/50M/EXT
 Airmux-5000/SU/F58F/20M/INT
 Airmux-5000/SU/F58F/20M/EMB
 Airmux-5000/SU/F54E/20M/INT
 Airmux-5000/SU/F3XF/20M/INT
 Airmux-5000/SU/F25F/20M/INT

MOBILITY SERIES STANDARD CONFIGURATIONS

Airmux-5000/BS/F58F/MOB/EXT
 Airmux-5000/BS/F54U/MOB/EXT
 Airmux-5000/SU/F58F/MOB/EXT
 Airmux-5000/SU/F54U/MOB/EXT

LEGEND

Frequency Band and Regulation

F58F 5.x GHz, FCC/IC
F54E 5.x GHz, ETSI
F54U 5.x GHz, universal
F3XE 3. x GHz, ETSI
F3XF 3. x GHz, FCC/IC
F25F 2.5 GHz, FCC/IC

Aggregate Throughput

5M 5 Mbps
10M 10 Mbps
20M 20 Mbps
50M 50 Mbps
100M 100 Mbps
200M 200 Mbps

Antenna

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

FIXED AND NOMADIC CONFIGURATIONS

Airmux-5000/BS/*

Airmux-5000/SU/+

Complete * from *Table 3* or + from *Table 4* for selected band and rate.

Table 3. Fixed and Nomadic Base Station Configurations

Band	Rate [Mbps]		
	200	100	50
F58F	F58F/200M/EXT	NA	F58F/50M/EXT
			F58F/50M/INT
F54E	F54E/200M/EXT	NA	F54E/50M/EXT
			F54E/50M/INT
F54U	F54U/200M/EXT	NA	F54U/50M/EXT
			F54U/50M/INT
F3XE	NA	F3XE/100M/EXT	NA
F3XF	NA	F3XF/100M/EXT	NA
F25F	NA	F25F/100M/EXT	NA

Table 4. Fixed and Nomadic Subscriber Unit Configurations

Band	Rate [Mbps]			
	50	20	10	5
F58F	F58F/50M/INT	F58F/20M/EMB	F58F/10M/EMB	F58F/5M/INT
	F58F/50M/EXT	F58F/20M/INT	NA	F58F/5M/EXT
F54E	F54E/50M/INT	F54E/20M/EMB	F54E/10M/EMB	NA
	F54E/50M/EXT	F54E/20M/INT	NA	NA
F54U	F54U/50M/INT	F54U/20M/INT	F54U/10M/EMB	F54U/5M/INT
				F54U/5M/EXT
F3XE	NA	F3XE/20M/INT	F3XE/10M/INT	NA
		F3XE/20M/EXT	F3XE/10M/EXT	
F3XF	NA	F3XF/20M/INT	F3XF/10M/INT	NA
		F3XF/20M/EXT	F3XF/10M/EXT	
F25F	NA	F25F/20M/INT	NA	NA
		F25F/20M/EXT		

OPTIONAL ACCESSORIES

Fixed and Nomadic BS External Antennas

Airmux-5000/BS-ANT/\$

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°

Fixed and Nomadic SU External Antennas

Airmux-400-ANT/\$

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.

Mobility BS External Antennas

Airmux-5000/BS-ANT/15/4959/M/FP

Single polarization, sector antenna, 120 degrees, 15 dBi gain, 4.9-6.1 GHz

Airmux-5000/BS-ANT/12/5358/M/FP

Single polarization, flat panel antenna, 18 degrees, 18 dBi gain, 5.15-5.875 GHz

Mobility SU External Antennas

Airmux-5000/SU-ANT/10/4958/M/FP

Omni-directional antenna, 10 dBi gain, 4.9-5.875 GHz

Airmux-5000/SU-ANT/12/4959/M/FP

Vehicular omni-directional antenna, 12 dBi gain, 4.9-5.9 GHz

Airmux-5000

High Capacity Point-to-Multipoint Wireless System

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-PoE/GbE/a

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

Airmux-PoE/RUG/2060DC

Ruggedized DC-PoE for Airmux-5000 Mobile units with 20 to 60 VDC power feeding.

Airmux-PoE/RUG/1030DC

Ruggedized DC-PoE for Airmux-5000 Mobile units with 10 to 30 VDC power feeding.

Airmux-PS-E-AC/a

AC power adapter 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
ACAG	Argentina
ACSA	South Africa

CBL-Airmux-UTP/@

Assembled cable for connection between IDU and ODU

Legend

@ Cable length:	
25	25m (82 ft)
50	50m (164 ft)
75	75m (246 ft)
100	100m (328 ft)

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-Planner

Radio network planning tool

Airmux-Lightning-Protection

Outdoor lightning protection device to minimize the risk of damage due to lightning strikes

Airmux-Lightning-Protection-Kit

Set of 10 Airmux-Lightning-Protection units

Airmux-FE-Repeater

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

Airmux-HSSU

Hub site synchronization unit to support the collocation of more than two outdoor units at a central site

Airmux-GSU/a

Outdoor GPS-based synchronization kit to handle inter-site interferences under large-scale deployment scenarios

Airmux-IDUH/2ETH

Ethernet traffic aggregation device for up to six HBSSs (or other RAD ODU products)

Airmux-PS-H-AC/a

AC power adapter for Airmux-IDUH/2ETH

Airmux-RMK-LC-SPARE

Spare mounting kit for 5M radios (see *Table 4*, Column 5)

International Headquarters

24 Raoul Wallenberg Street
Tel Aviv 69719, Israel
Tel. 972-3-6458181
Fax 972-3-6498250, 6474436
E-mail market@rad.com

North America Headquarters

900 Corporate Drive
Mahwah, NJ 07430, USA
Tel. 201-5291100
Toll free 1-800-4447234
Fax 201-5295777
E-mail market@radusa.com