Rosenberger

Network Optimization Equipments

Rosenberger HQ, Bavaria, Germany

Introduction

Rosenberger Hochfrequenztechnik GmbH&Co. was founded in Germany in 1958 and ranks among the leading manufacturers of high-speed interconnect solutions worldwide. With its long tradition of excellence and innovation, Rosenberger has excelled and earned an outstanding reputation all over the world.

Rosenberger operates on an international scale, having manufacturing plants and sales offices throughout Europe, Asia and North & South America providing products and solutions for the Telecommunication, Automotive Electronics, Information Technology, Test & Measurement, Aviation, Medical and Industrial sectors.

As an important member of the Rosenberger Group, Rosenberger Technologies maintains a far-reaching network of R&D, Production, Sales and Services which extends to North America, Australia, Asia, Middle East and African regions. Presently, Rosenberger Technologies

A: Beijing,China
B: Kunshan,Jiangsu,China
C: Pudong,Shanghai,China
D: Qingpu,Shanghai,China
E: Dongguan,Guandong,China
F: Manesar,India
G: Goa,India
H: Pune, India
I: New Jersey,USA
J: Northmead,Australia

maintains 9 modern manufacturing and R&D bases in Beijing, Kunshan, Shanghai and Dongguan in China, Manesar, Goa and Pune in India, Sydney in Australia as well as New Jersey in the USA.

Rosenberger Technologies is an ISO 9001 quality system, ISO 14001 environmental system certified company. Equipped with advanced machinery, electronic plating, assembly and testing centers and operated by a large group of more than 400 R&D engineers, developing first-class production assembly lines and exercising stringent product and quality control.

Rosenberger's reliability and competitiveness are the cornerstones of this sustainable growth, which has resulted in long-term partnerships with most of the leading companies in their respective industries. And whether it's now or in the future, Rosenberger Technologies will continue to provide excellent product solutions and services for its customers around the world.

Rosenberger Mission

- Customer always comes first
- Drive innovation together with and for our customers
- Maintain a secure, humane and happy environment for our employees
- Develop our employees by investing in their education
- Take social responsibility
- Protect our environment with ecologically friendly products, production and processes

Core Value

- Value Innovation
- Customer Focus
- Sustainable Growth
- Social Responsibility

Rosenberger

Products & Services

Telecommunication	Antenna Active System Passive Components S-Link Feeder System Site Solution Accessories RF Coaxial Products FTTx-ODN Technologies Fiber-To-The-Antenna (FTTA) FO Connectivity & Cables
Enterprise	iIMS Smart System Data Center Solutions Enterprise Network Solutions Micro Datacenter
Automotive Electronics	Data Connector Cable Assembly High-Voltage Connector Magnetic Connector
Test & Measurement	Calibration Kits Test Cables Adaptors Precision Connectors PCB Connectors PIM Testing CoMeT - Coupling Measuring Tube
Medical & Industries	Magnetic Products Non Magnetic Products Hybrid Products High Speed Connectivity Optic Module Smart Home Power Products Machine to Machine - M2M

CONTENT

ROSENBERGER WIRELESS SOLUTION

OUTLINE

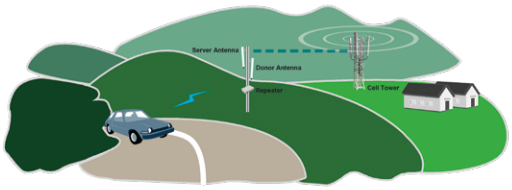
Rosenberger's Off-air repeaters are designed to support multi-mode, multi-operator applications for use in blind spot coverage, quick deployment requirements, and areas without backhaul facilities for base station.

Based on software defined radio (SDR) technology, Rosenberger's Off-air repeaters covers the global cellular frequency band (from 698MHz to 2690MHz), and supports wide range output powers (from 13dBm to 43dBm) with total network monitoring (NMS) capabilities.

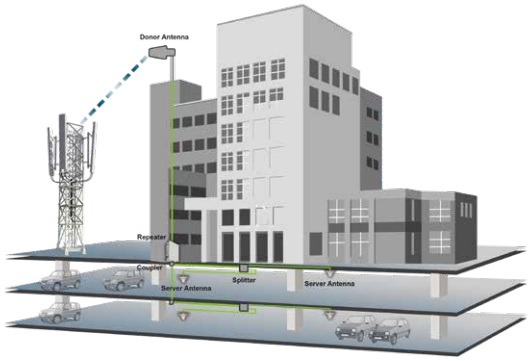
Off-air Repeater Series

Quick deployment solution for blind spot coverage

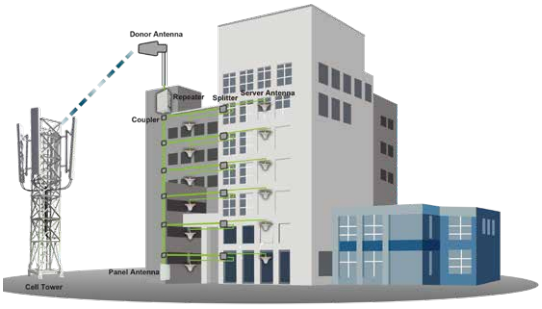
PICO SERIES



MEDIUM POWER SERIES ,
HIGH POWER SERIES



MEDIUM POWER SERIES ,
HIGH POWER SERIES



MEDIUM POWER SERIES ,
HIGH POWER SERIES

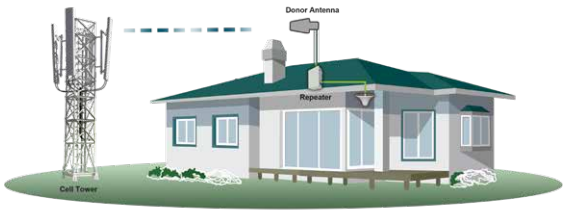
PICO Series

Product Overview

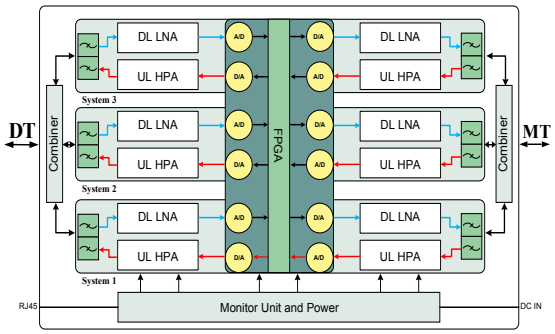
Main Features

- Typical 85dB gain with integrated design offering exceptional coverage
- Typical 60dB out band rejection to prevent unwanted interference from outdoor or from other operators
- Variable sub-bands to support multi-operator applications with variable instantaneous bandwidth to support evolving network requirements
- ICS function adapts to the time-varying isolation environment and provides optimized signal coverage at all times

Application Scenario



Block Diagram



Electrical Specifications

	Uplink	Downlink
Frequency (MHz)	703-748	758-803
	880-915	925-960
	1710-1785	1805-1880
	1920-1980	2110-2170
	2500-2570	2620-2690
	698-716	728-746
	777-787	746-756
	814-849	859-894
	1710-1755	2110-2155
	1850-1915	1930-1995
	2305-2315	2350-2360
RF Output Power (dBm)	13/15/20/23	13/15/20/23
Typical System Gain (dB)	85	85
VSWR	≤2.0	≤2.0
Typical Noise Figure (dB)	≤8	≤8
Attenuator Range(dB)	≥30	≥30

Mechanical Specifications

Power Supply	DC with external adaptor
Ports	SMA/N-F
Operating Temperature	-25 ºC to +55 ºC
Ingress Protection	IP50/IP65

Software Specifications

Local Control	Ethernet port Via LAN / USB
Remote Control	Wireless Modem

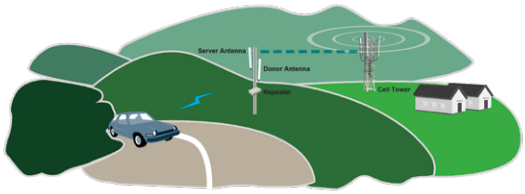
Medium Power Series

Product Overview

Main Features

- Typical 85dB gain with integrated design offering exceptional coverage
- Typical 60dB out band rejection to prevent unwanted interference from outdoor or from other operators
- Variable sub-bands to support multi-operator applications with variable instantaneous bandwidth to support evolving network requirements

Application Scenario



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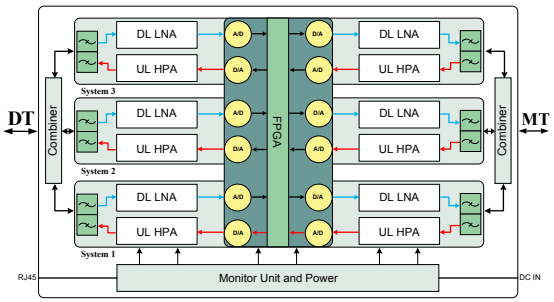


Electrical Specifications

	Uplink	Downlink
Frequency (MHz)	703-748	758-803
	880-915	925-960
	1710-1785	1805-1880
	1920-1980	2110-2170
	2500-2570	2620-2690
	698-716	728-746
	777-787	746-756
	814-849	859-894
	1710-1755	2110-2155
	1850-1915	1930-1995
	2305-2315	2350-2360
RF Output Power (dBm)	20/23	27/30/33
Typical System Gain (dB)	85	85
VSWR	≤1.5	≤2
Typical Noise Figure (dB)	≤6	≤8
Attenuator Range(dB)	≥30	≥30

Mechanical Specifications

Power Supply	DC with external adaptor
Ports	N-F
Operating Temperature	-25 ºC to +55 ºC
Ingress Protection	IP50/IP65

Software Specifications

Local Control	Ethernet port Via LAN
Remote Control	Wireless Modem

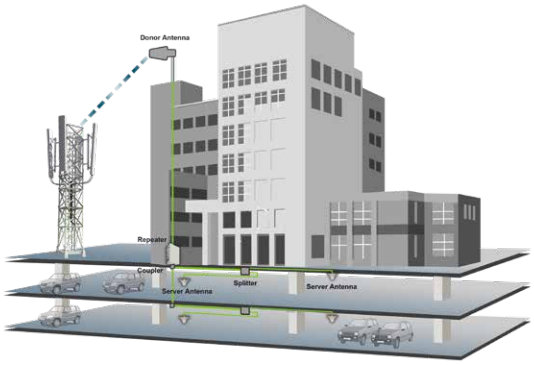
High Power Series

Product Overview

Main Features

- Typical 90dB gain with integrated design offering exceptional coverage
- Typical 60dB out band rejection to prevent unwanted interference from outdoor or from other operators
- Variable sub-bands to support multi-operator applications with variable instantaneous bandwidth to support evolving network requirements
- ICS function adapts to the time-varying isolation environment and provides optimized signal coverage at all times

Application Scenario



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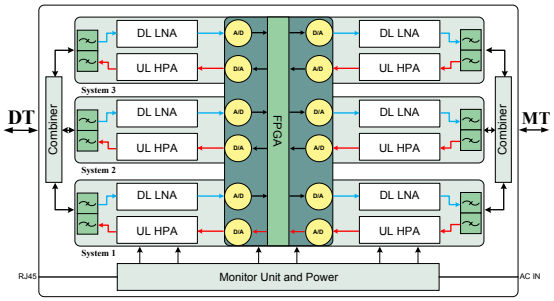


Electrical Specifications

	Uplink	Downlink
Frequency (MHz)	703-748	758-803
	880-915	925-960
	1710-1785	1805-1880
	1920-1980	2110-2170
	2500-2570	2620-2690
	698-716	728-746
	777-787	746-756
	814-849	859-894
	1710-1755	2110-2155
	1850-1915	1930-1995
	2305-2315	2350-2360
RF Output Power (dBm)	23	40/43
Typical System Gain (dB)	90	90
VSWR	≤1.5	≤1.5
Typical Noise Figure (dB)	≤6	≤6
Attenuator Range(dB)	≥30	≥30

Mechanical Specifications

Power Supply	AC
Ports	N-F
Operating Temperature	-25 ℃ to +55 ℃
Ingress Protection	IP65

Software Specifications

Local Control	Ethernet port Via LAN
Remote Control	Wireless Modem

FIBER DAS SOLUTION

OUTLINE

With the burgeoning demand for ubiquitous wireless coverage, in-building solutions are, and will continue be, an essential infrastructure of the radio network. Rosenberger's Fiber DAS platform is a versatile, modular, and multi-technology platform designed to offer flexible and reliable wireless coverage and capacity for indoor and outdoor applications.

Fiber DAS solutions cater to multi-band, multi-operator applications, extending coverage, adding capacity, supporting sectorization reconfigurations, minimizing space requirements, and significantly reducing cost.

Fiber DAS solutions support 2G, 3G, 4G-LTE (SISO and MIMO) and beyond, in all common frequency bands for the global wireless community.

Fiber DAS solutions support both high (40W) and low power (0.25W) remote units over the same fiber system, up to quad-band configurations. incluing main components:

- Smart POI (SPOI)
- High Power Series (FOR)
- Low Power Series (RADIANT)
- Traditional Fiber Optical Repeater

Active All-In-One in Building DAS Solution

Superior user experience
Flexible network combinations (SISO/MIMO) to ensure uniform, high quality service.

Multiple-band and wideband
Maximum of penta-band in one unit to support the needs of most operators, with support for cascade expansions.

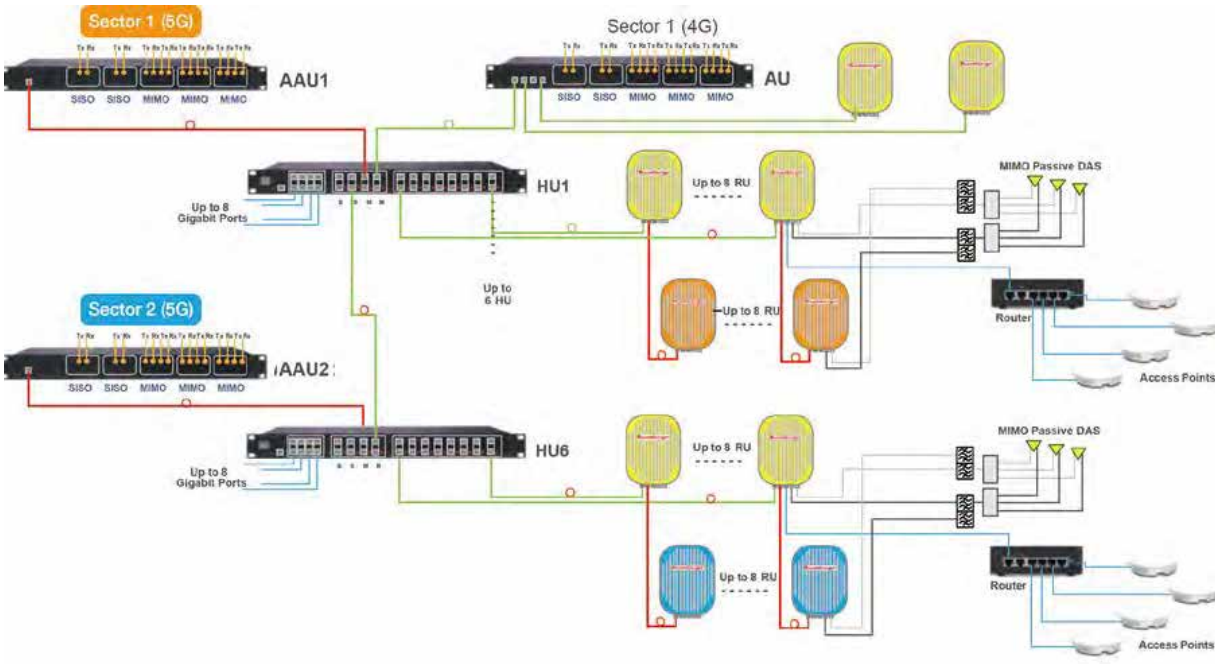
WIFI option
It also supports Ethernet backbone for WIFI off-loading and internet surfing.

Future-ready
Designed to support LTE-Advanced and IOT features, and even 5G via new expansion units.

Rosenberger NMS system
A one-stop, intelligent management, configuration and monitoring by Rosenberger NMS.

Simple and economical
Deployed via standard Ethernet or optic cabling, achieving rapid deployment, savings in time and installation costs.

Tetra option
Specifically designed for use by government agencies and emergency services (police force, fire department, ambulance, etc.) for public safety networks, train radios for rail transport staff, transport services and the military via Tetra expansion unit.



RAAION (Rosenberger Active All-In-One Network) delivers consistent, superior LTE performance in enterprise and public venues at a remarkably lower cost of deploy- ment than traditional passive DAS solution. RAAION works through standard Eth- ernet or optic cabling, where the unique system integrates advanced RF, multi- plexing, and optical technologies, to deliver an unparalleled quality-of-experience and cost-efficient multi-service, multi-operator access. The RAAION Small Cell DAS is versatile, easy to deploy, and ready to support tomorrow's wireless ser- vices and applications.

Product Overview

System consists of Access Unit (AU), Hub Unit (HU), and Radio Unit (RU)

- Up to 384 RUs can be supported

HU supports additional sectors from Auxiliary Access Unit (AAU)

Interconnection between AU, HU, RU and AAU via CPRI digital interface.

Optical interface supports up to 10Gbps, with maximum RF bandwidth of 410 MHz and remaining bandwidth of 977MHz for GbE.

Supports flexible dynamic capacity routing between 2 or 3 sectors

Main Features

Access Unit (AU)

- Supports up to 5 Bands, SISO or MIMO
- Flexible connection via separate RF input ports
- Auto-calibration allows elimination of fiber insertion loss
- Remote control and monitor via SIM, LAN or NB-IOT network
- 19” 1U form factor
- Accommodates up to 5 operators per band

Hub Unit (HU)

- Two master ports to connect to AU or AAU
- Up to 6 HUs can be connected to slave port via daisy chain
- Simple connection via Ethernet or optic cabling to HU
- Supports up to 8 RUs in star
- 1GBps LAN port
- 19” 1U form factor

Radio Unit (RU)

- Supports up to penta-band, with expansion to 8 bands by daisy chain connection
- Two LAN ports for HUB (connects to Router) and Remote Control
- 27/37/40/43dBm optional RF output power

Band and RF Specifications

Frequency Band		700	850	900	1800	2100	2300	2600
Downlink(TX)	Frequency(MHz)	758 - 803	869 - 885	935 - 960	1805 - 1880	2110 - 2170	2300 - 2400	2620 - 2690
	Bandwidth(MHz)	45	16	25	75	60	100	70
Uplink(Rx)	Frequency(MHz)	703 - 758	824 - 840	890 - 915	1710 - 1785	1920 - 1980	2300 - 2400	2500 - 2570
	Bandwidth(MHz)	45	16	25	75	60	100	70

For 2500 services and UHF,For 2500 services and UHF, operator can select band using management software. UHF requires Add-On Remote.

RF Parameters

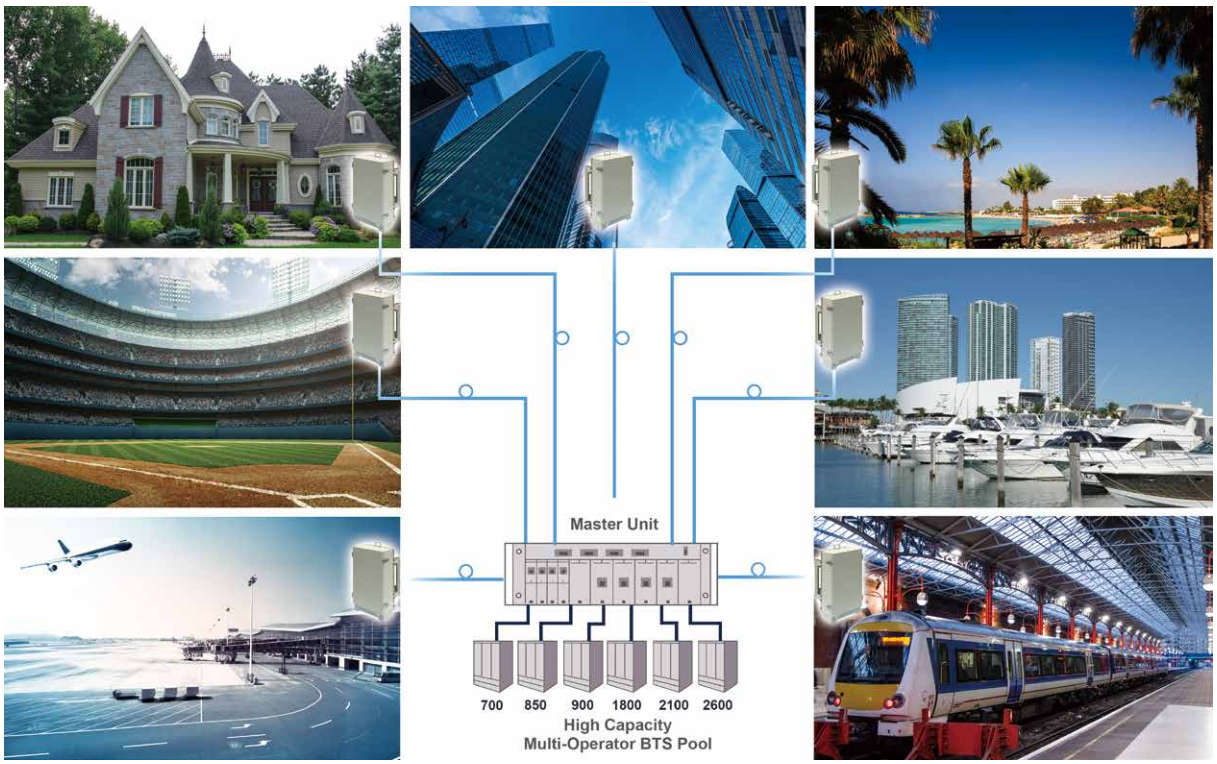
Supported services	700	850	900	1800	2100	2300	2600
Input Power	10 ~ 10 dBm						
Output Power	27/37/40/43 dBm optional						
System Gain	Pout_27dBm:40dB / Pout_37/40dBm:50dB / Pout_43dBm:55dB						
System Noise Figure	For the remote unit TX: 30 dB/step 1dB						
Spurious Emissions	<7dB(1AU+1HU+1RU)						
Gain Control Range	Meet 3GPP TS 25.106 V12.1.0, 3GPP TS 36.106 V12.1.0						

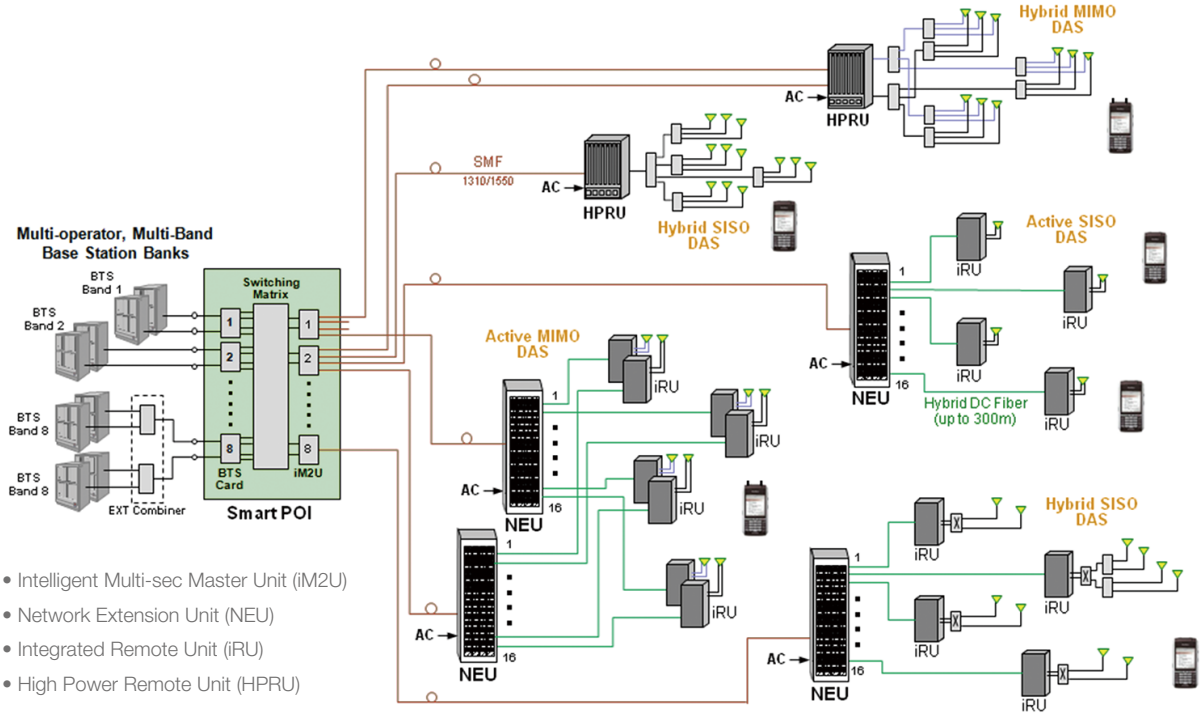
NOTES: System delay excludes fiber optic delay. Additional gain control available at head end including uplink gain control.

Mechanical	Specification		
Mounting Type	Wall or Rack Mounting (fits Standard 19” rack)		
Connectors	N-Female, Serial interface: Ethernet		
Dimensions	AU: 483×255×44 (mm)	HU: 483×255×44 (mm)	RU: 440×310×170(mm)
Weight	AU: 2.6Kg	HU: 2.6Kg	RU: 15Kg
Environmental	Specification		
Ingress Protection	IP65 for RU, IP40 for AU & HU		
Operating Environment	Temp: -13 to 121 °F(-25 to 55 °C) for RU, 14 to 104 °F(-10 to 40 °C) for AU & HU, Humidity: 5% to 90% Non-condensing		
Optical	Specification		
Optic	LC/APC		
Laser Diode	1310 nm		
Photo Diode	1270 nm (BIDI) 1310 nm		
Optic Loss	Max 9dBo each port		

Fiber DAS Solutions

With the explosive growth in the use of smart phone devices for both voice and high-speed data access, with 80% of the latter service being in indoor environments, it has become mandatory to ensure adequate wireless mobile coverage in the majority of buildings. The ability to provide indoor coverage from outdoor macro base stations has been increasing challenging with modern building structures designed to meet environmental legislation requirements, coupled with inadequate capacity from these outdoor macro sites





- Intelligent Multi-sec Master Unit (iM2U)
- Network Extension Unit (NEU)
- Integrated Remote Unit (iRU)
- High Power Remote Unit (HPRU)

Smart Point of Interface (SPOI)

Product Overview

Main Features

- As the interface between BTS and IBS system, Smart POI combines different BTS RF signals together and converts them to optical for transmission
- Provides individual gain control and sector configuration
- Standard module for plug & play
- Up to 8 BTS cards to support up to 16 different sectors
- Up to 32 fiber ports connect to various high and/or low power remote units
- Intelligent capacity configuration and relocation
- Provides total NMS solution

Electrical Specifications

	Uplink	Downlink
Frequency (MHz)	703-748	758-803
	880-915	925-960
	1710-1785	1805-1880
	1920-1980	2110-2170
	2500-2570	2620-2690
	698-716	728-746
	777-787	746-756
	814-849	859-894
	1710-1755	2110-2155
	1850-1915	1930-1995
	2305-2315	2350-2360
Intermodulation (dBm)	NA	-110
VSWR	≤1.5	≤1.5
Insertion Loss (dB)	-50	-50
Attenuator Range (dB)	≥20	≥20

Mechanical Specifications

Power Supply	AC/DC
Ports	4.3-10/DIN/N-F
Operating Temperature	0 ºC to +40 ºC
Ingress Protection	IP40

Software Specifications

Local Control	Ethernet port Via LAN
Remote Control	Ethernet port Via LAN
	Wireless Modem

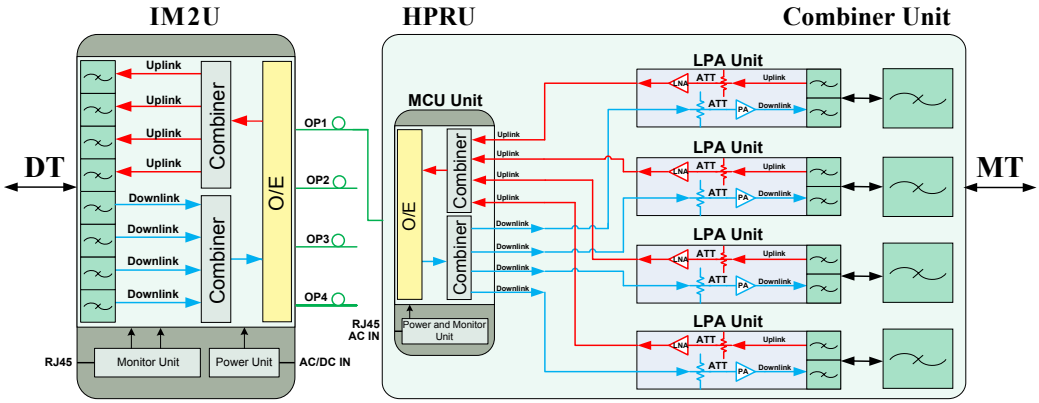
High Power Series (FOR)

Product Overview

Main Features

- Ideal for a wide variety of indoor and outdoor applications to provide coverage enhancement for multi-band and multi-operator environments
- Provides up to 46dBm RF power per band at the output port
- A compact modular platform that supports combination from 1 to 4 frequency bands, plus 2 additional bands for MIMO, or up to 2 bands with redundant LPAs
- Supports 2G, 3G, and 4G applications
- Standard module for plug & play
- Can be locally and remotely monitored and controlled via its integrated software, with remote control software of OMT and NMS available as per customer's requirements

System Schematic Diagram



Electrical Specifications

	Uplink	Downlink
Frequency (MHz)	703-748	758-803
	880-915	925-960
	1710-1785	1805-1880
	1920-1980	2110-2170
	2500-2570	2620-2690
	698-716	728-746
	777-787	746-756
	814-849	859-894
	1710-1755	2110-2155
	1850-1915	1930-1995
	2305-2315	2350-2360
RF Output Power (dBm)	-10dBm	43/46dBm
Typical System Gain (dB)	43	43
VSWR	≤1.5	≤1.5
Typical Noise Figure (dB)	≤5	---
Attenuator Range(dB)	≥30	≥30

Mechanical Specifications

Power Supply	AC/DC
Ports	4.3-10/DIN/N-F
Operating Temperature	IM2U:0 ℃ to +40 ℃
	HPRU:-25 ℃ to +55 ℃
Ingress Protection	iM2U: IP40
	HPRU: IP65

Software Specifications

Local Control	Ethernet port Via LAN
Remote Control	Ethernet port Via LAN
	Wireless Modem

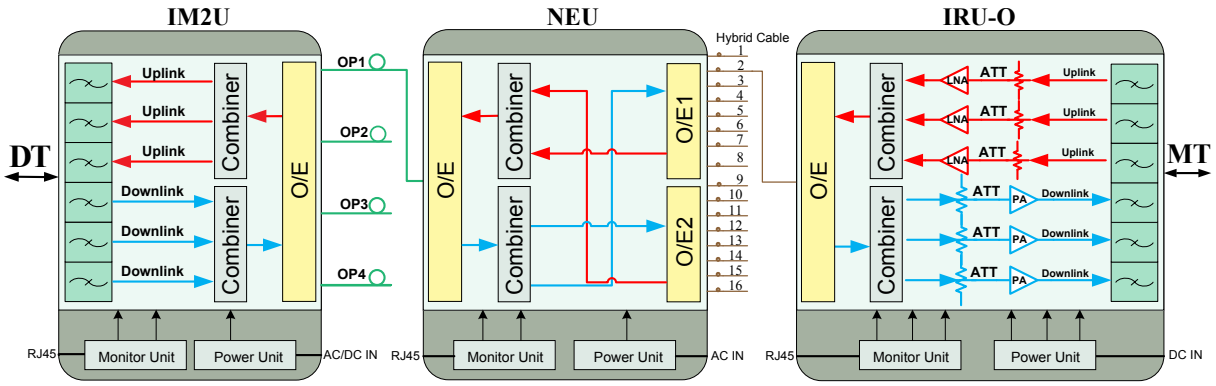
Low Power Series (Radiant)

Product Overview

Main Features

- RADIANT (Rosenberger Active DAS with Integrated Antenna) is a family of Fiber-Optic based DAS repeater products supporting multiple frequency bands and technologies
- Integration of the antenna with the remote unit to provide higher RF performance as compared to traditional DAS solutions
- The three main components are: Intelligent Multi-sector Master Unit (iM2U), Network Extension Unit (NEU), and Integrated Remote Unit-optical (IRU-O)
- Compact and lightweight design for remote Unit (IRU-O)
- Standard 19 inch design for Network Extension Unit (NEU)
- Max quad-band supported
- Max 256 remote units supported
- SISO/MIMO Optional
- iRU-O power provided by hybrid cable from NEU
- Provides total NMS solution

System Schematic Diagram



Accessories

Omni Antenna

Panel Antenna

Hybrid Cable

Electrical Specifications

	Uplink	Downlink
Frequency (MHz)	703-748	758-803
	880-915	925-960
	1710-1785	1805-1880
	1920-1980	2110-2170
	2500-2570	2620-2690
	698-716	728-746
	777-787	746-756
	814-849	859-894
	1710-1755	2110-2155
	1850-1915	1930-1995
	2305-2315	2350-2360
RF Output Power (dBm)	-10dBm	23dBm
Typical System Gain (dB)	25	25
VSWR	≤1.5	≤1.5
Typical Noise Figure (dB)	≤6	---
Attenuator Range (dB)	≥20	≥20

Mechanical Specifications

Power Supply	AC/DC
Ports	4.3-10/DIN/N-F
Operating Temperature	IM2U:0 ºC to +40 ºC
	NEU:0 ºC to +40 ºC /-25 ºC to 55 ºC optional
	IRU-O:-25 ºC to +55 ºC
Ingress Protection	IP50

Software Specifications

Local Control	Ethernet port Via LAN
Remote Control	Ethernet port Via LAN
	Wireless Modem

Hybrid Cable Specifications

Optical Specifications	
Fiber Cable	9/125um optical fiber according to ITU-T G.657A
Cable Attenuation	≤ 0.4dB/km @ 1310nm
	≤ 0.3dB/km @ 1550nm
DC Cable	Copper Cores 2x16AWG
Copper Cores 2x16AWG	13.7Ω/km (max.)
Rating	80°C, 300V
Hybrid Cable Outer sheath diameter	Φ11.0±0.6mm

Panel Antenna Specifications

Sub-Bands	698-960MHz	1710-2690MHz
Polarization	±45°	±45°
Gain	6.5 ± 1 dBi	7.5 ± 1 dBi
Horizontal 3dB Beamwidth	90 ± 10°	75 ± 10°
Front-to-Back Ratio	10 dB	15 dB
Vertical 3dB Beamwidth	65°	60°
Electrical Downtilt	0°	0°
VSWR	≤ 2.0 : 1	≤ 2.0 : 1
3rd Order PIM	-140 dBc @ 2x33 dBm	
Impedance	50 Ω	
Power Handling	50 W	

Omni Antenna Specifications

Sub-Bands	698-960MHz	1710-2690MHz
Polarization	VV	VV
Gain	3-5 dBi	3-5 dBi
Horizontal 3dB Beamwidth	360°	360°
Vertical 3dB Beamwidth	80°	80°
Electrical Downtilt	0°	0°
VSWR	≤ 2.0 : 1	≤ 2.0 : 1
3rd Order PIM	-140 dBc @ 2x33 dBm	
Impedance	50 Ω	
Power Handling	50 W	

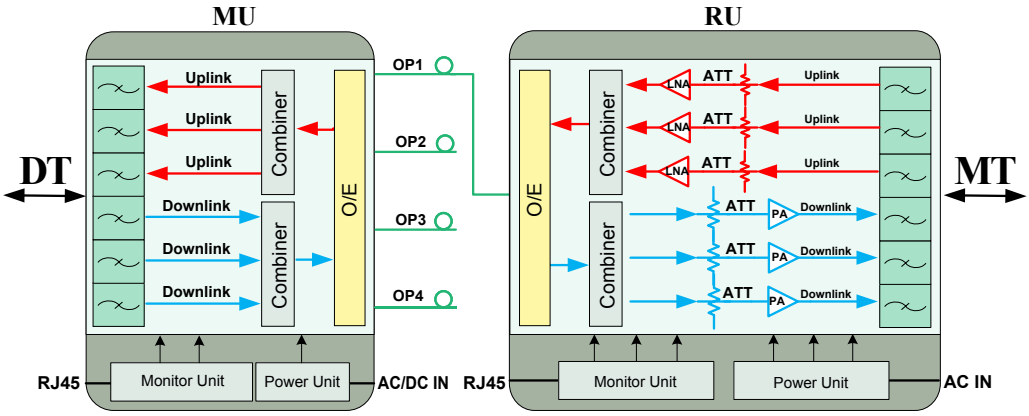
Traditional Fiber Optical Repeater

Product Overview

Main Features

- Large-scale area coverage
- High performance and reliability
- Wideband Performance
- Industry leading noise figure
- 0.3dB/km optical transmission loss allow 20km distance connection between MU and RU.
- Supports 2G,3G,4G applications
- Supports up to 4 remotes from a single MU
- Provides total NMS solution

System Schematic Diagram



Electrical Specifications

	Uplink	Downlink
Frequency (MHz)	703-748	758-803
	880-915	925-960
	1710-1785	1805-1880
	1920-1980	2110-2170
	2500-2570	2620-2690
	698-716	728-746
	777-787	746-756
	814-849	859-894
	1710-1755	2110-2155
	1850-1915	1930-1995
	2305-2315	2350-2360
RF Output Power (dBm)	-10dBm	40/43dBm
Typical System Gain (dB)	40	40
VSWR	≤1.5	≤1.5
Typical Noise Figure (dB)	≤5	---
Attenuator Range(dB)	≥30	≥30

Mechanical Specifications

Power Supply	AC/DC
Ports	4.3-10/DIN/N-F
Operating Temperature	MU:0 ºC to +40 ºC
	RU:-25 ºC to +55 ºC
Ingress Protection	MU:IP40
	RU:IP65

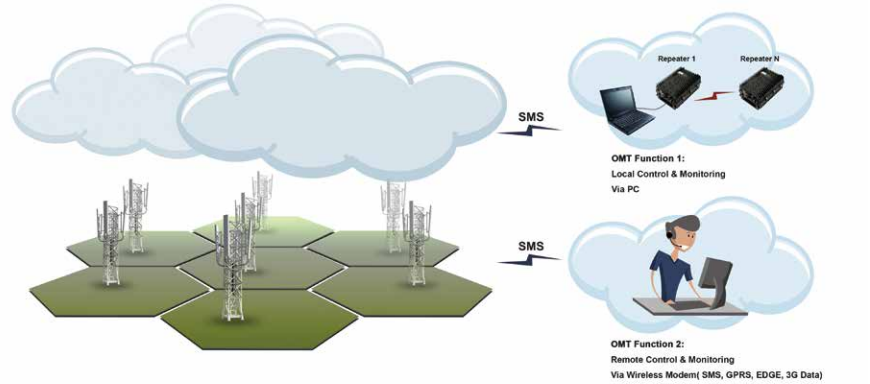
Software Specifications

Local Control	Ethernet port Via LAN
Remote Control	Ethernet port Via LAN
	Wireless Modem

OMT&NMS

Operation and Maintenance Terminal (OMT)

Communication



Main Features

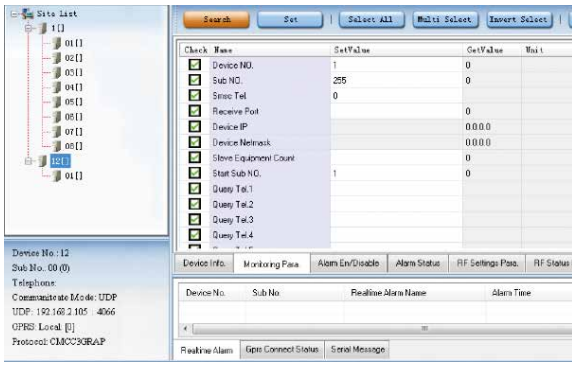
- OMT for Local and remote monitoring
- Free and simply installation
- Able to control and monitor different types of repeaters (2G/ 3G/ LTE, etc.)
- Automatic alarm reporting
- Local and remote upgrade firmware of repeater through UDP mode
- Support UDP, SMS and GPRS data communication with repeater

Description

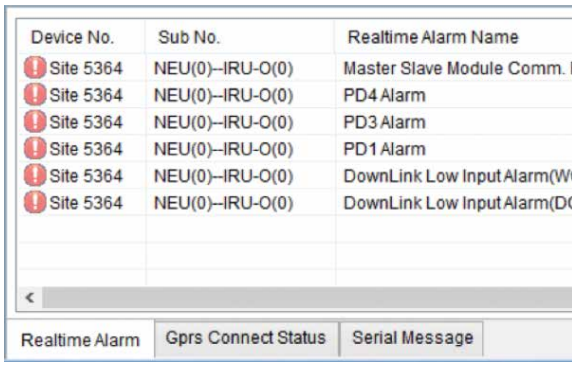
OMT is a completely local and remote monitoring and control tools with repeaters by maintainer

- Support connecting to all types of repeater with LAN or SMS or GPRS modem base on UDP/TCP and SMS
- Monitoring alarms and controlling parameters of repeaters are all available with this software.

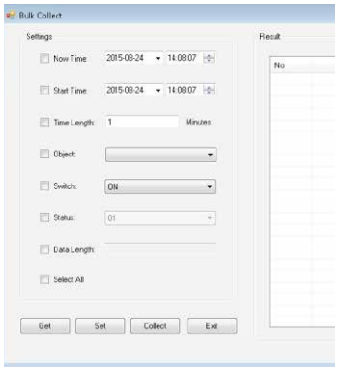
Interface



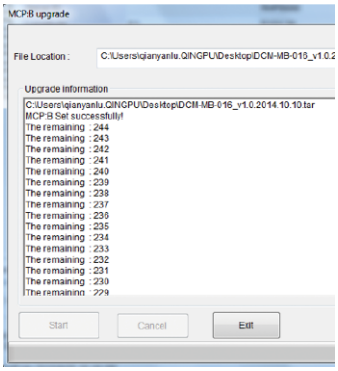
Control Parameter



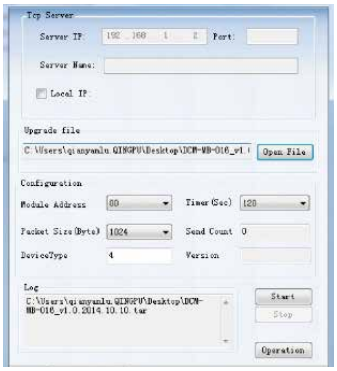
Alarm Monitor



Performance Getting



Remote Upgrade Module



Remote Upgrade Firmware

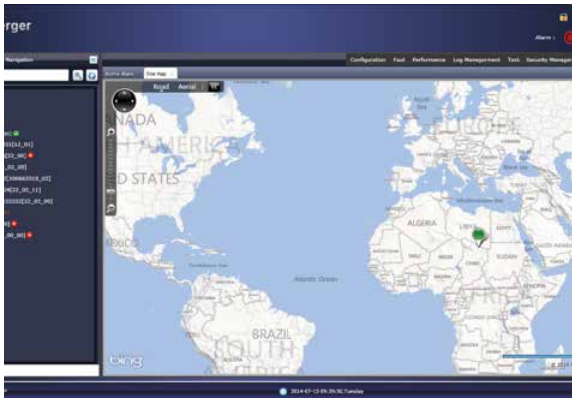
Operation and Maintenance Center (OMC/NMS)

Main Features

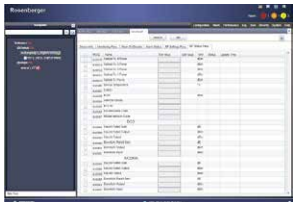
- OMC for remote integrate and real-time monitoring, and can be acted as NMS
- Control and monitor all types of repeaters (2G/3G/LTE, etc.)
- Support SMS, UDP/TCP/IP, SNMP data communication by SMS Gateway, GPRS model and LAN
- Both web interface and client GUI

Interface

Login

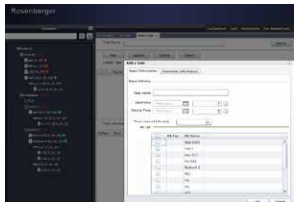


Topology View

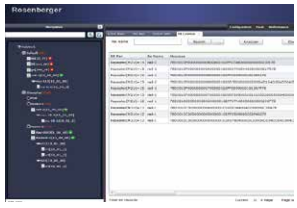


Configuration

Alarm



Polling Setting



Logging Audit

Description

OMC is a completely, high capability and security remote monitor and operation system. And obey on TMN standard of ITU, can be integrated with upper level NMS system by north interface, friendly operation experience existed in two operation interface, low cost solution to monitor large numbers of repeaters (not limited in theory) with expansibility in system.

Available Version and Features

OMC Basic Version (Trial)

- Installation free
- To monitor <100 pcs repeaters
- Provide basic function of TMN and complete solution for integrate monitor equipment, including configuration, alarm monitor, topology view, security management and etc.

OMC Enhance Version

- All functions of basic version included
- Support batch configuration for multi-equipments, such as polling and setting
- Restore & backup in system level
- Enhance of performance analysis and shown for equipment
- More completely security solution for authorization of user
- More reports to analyze network

OMC Professional Version

- More complete reports to analyze network
- Batch upgrade equipment by remote
- Support integration with upper level NMS for getting monitor data of equipment
- More management functions for network, such as investment, nodeB, vendor etc.
- More complete performance analysis of equipment.

Rosenberger SERVICE

Rosenberger offers professional services that improve network design, reliability, scalability and efficiency.

Our service core competences include:

- Network optimization
- Technical consultation
- Customized product design
- Installation & commissioning
- Onsite training & supervision
- System troubleshooting
- After-sales services

In addition, we also offer professional training, technical support and workshops for distributors and agents. We are committed to offering exceptional services for our customers.

Rosenberger is much more than just a supplier – Rosenberger is a valued development partner and we will strive to meet new challenges in order to scale to new heights.

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