
Runcom's
4G TV-WS
NLOS Solution
FC APPROVED
• ROI < 12 months
• Better NLOS coverage than WiFi and LTE (3.65GHz)
• Big Cells due to TVWS Frequencies
• 470-698 MHz coverage
• Enhanced Capacity using Channel bonding (24Mbps)**
• 40 dBm EIRP**
• 4 sectors in one unit
• Affordable user terminals
• Inherent redundancy using the terminals handoff feature
• Special interference avoidance antenna
Runcom
4G End-to-End Mobile Solutions

4G TV White Space Solution

Immediate entry into the 4G TVWS wireless market

Entry into the 4G TV White Space broadband wireless access (TVWS-BWA) market encounters obstacles in the form of high costs, technical complexities and a shortage of resources. Runcom's 4G Network solution for TV White Space provides seamles and cost-effective entry into the BWA – TVWS market for wireless telecom operators, wireless ISPs and system integrators.

The TVWS 4G broadband access wireless solution includes a highly integrated, fully outdoor Runcom 4G enhanced Base Station with 4 sectors, various types of CPE units, a full network gateway and compact NOC towards the internet.

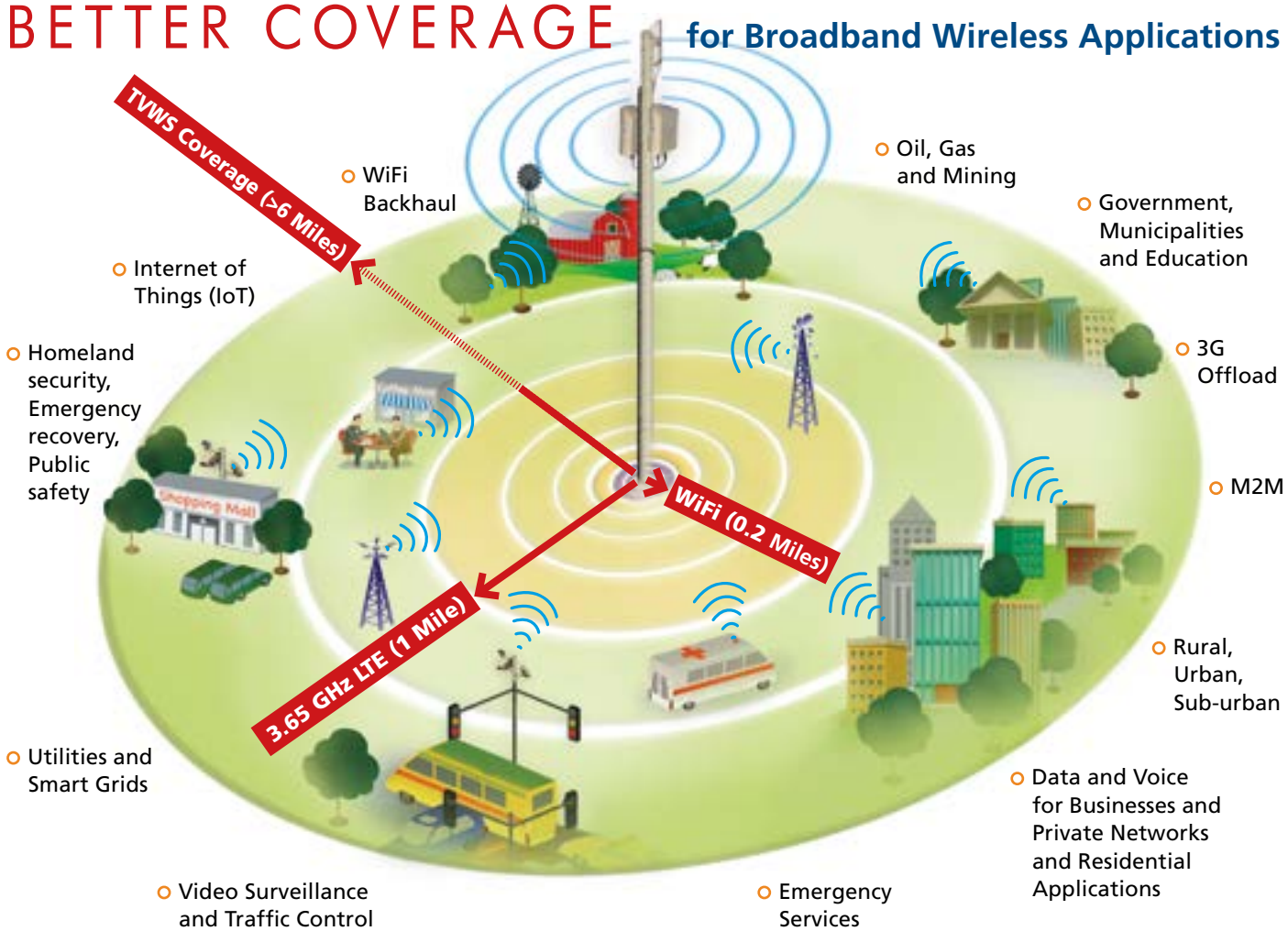
The TVWS solution includes central or distributed service support for daily update of authorized frequencies, and frequency allocation according to the FCC regulations.

All devices are provided with their mechanical installation kit, remote and local configuration capabilities, and user manuals. The TVWS 4G system is delivered as a ready to work plug-and-play system, making it possible for service providers to rollout an initial light weight and low-cost TVWS BWA fixed network in a matter of hours.

Solution content

- Enhanced Base Station with 4 antennas (TX/RX), installation kit and power supply.
- Direct connection to the internet.
- Full site solution with 2,3 or 4 base stations, MicroNOC and frequency automated allocation server (AFAS).
- Automated frequency allocation server for daily update according to FCC regulations.
- Outdoor plug and play CPE with PoE, remote management and users behind CPE control.

BETTER COVERAGE for Broadband Wireless Applications



Key Features

- Core components of the 4G TVWS advanced outdoor solutions:
  - MicroNOC: ASN gateway, Basic AAA, DHCP & DNS
  - 4G OFDMA Base Station with integrated 4 RF transceivers covering all TVWS spectrum (470-698MHz)
  - CPEs with multi user, multi service support
  - AFAS – Automated Frequency Allocation Server
- Complete network interface including AAA, routing, profile policing enforcement, and more
- Remote control and configuration to all network elements
- Daily frequency updates by the AFAS according to FCC requirements
- Supports full white space spectrum at all devices, including channel bonding (12MHz).**
- Supports multiuser behind CPE, application awareness, QoS and more
- Synchronization circuit with GPS (internal or external)
- Designed for light and easy installation in both urban and rural areas
- Plug-and-play – quick and easy-to-install
- Flexible base station installation – on rooftops, street, water tanks, grain elevators, poles or towers
- Seamless migration from single enhanced base station, through multiple base stations at a site to full-scale network with Runcom NOC
- Suitable for multiple applications (full tripleplay – Video, Voice, Data)

Operational Benefits

- Unique, all-in-one solution
- Quick installation
- Low entry cost
- Adaptable to customer needs
- Suitable for fixed and mobile networks

Applications

- Rural and suburban internet services for large area coverage
- Data and voice for businesses, private networks and residential applications
- Government, municipalities and education
- Video surveillance, public safety and traffic control
- Emergency services
- Utility companies, Oil, gas and mining, M2M
- Industrial zone broadband connectivity

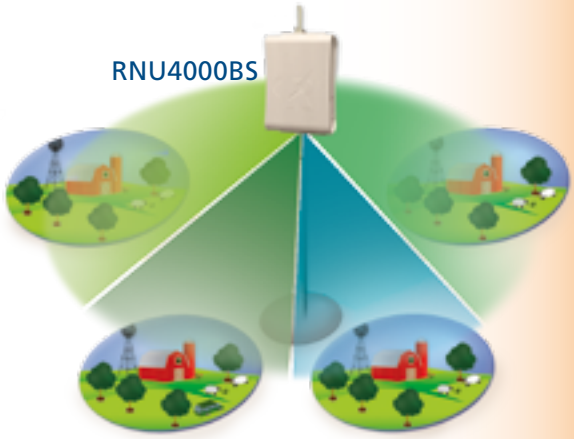
RNU4000BS Scalable Deployment

Coverage based

Capacity based

SISO Quad Sector 1x1 Mode

- Quad sector 1X1
- 24Mbps accumulated capacity in 4 sectors or 0-24MBps/sector



Dual Sector 2X2 Mode

- Dual Sector 2X2
- 48Mbps accumulated capacity in 2 Sectors or 24Mbps/sector **

QUAD Sector 4X4 Mode

- QUAD sector 4X4
- 96Mbps accumulated capacity in 4 sectors**

Basic Solution Specifications

BTS	
Number of sectors (BTS)	4 sectors with 1 antenna each or 1 sector with all antennas on it
Frequency	470-698MHz
FFT	512, 1024MHz**
FEC	Convolution Code, Turbo Code and repetition
Channel bandwidth	6MHz, 12MHz**
Duplex method	TDD
Central frequency Resolution	125 KHz
Rx Sensitivity per channel	-97 dBm @ 6MHz channel and QPSK1/2 modulation -89 dBm @ 6MHz channel and 16QAM 3⁄4 modulation
Noise Figure	<6dB
Antennas (BTS) connector	4 x N-Type 50 Ohm
Modulation and coding rates	DL/UL: QPSK (1/2, 3/4), 16 QAM (1/2, 3/4), 64 QAM (2/3, 3/4)
Multiple antenna techniques	DL: MIMO-A/B (2x2)**, STC, SISO
Synchronization (BTS)	Integrated GPS module with on board synchronization unit
Capacity	12Mbps(6MHz); 24Mbps(12MHz)**

Management	
Network Management	SNMPv2, standard and proprietary MIB
System Configuration	SNMP, FTP, CLI
Software Upgrade	Remote TFTP upgrade of firmware and programming
FCC Data Base Management	Using AFAS Software

Physical Dimension (BTS)	
Dimensions	39cm (L) x 24cm (W) x 12cm (H)
Weight	5 KG
Operating external temperature	-40°C – 65°C industrial -10°C – 55°C commercial

CPE*	
Frequency	470-698 MHz
BW	6MHz, 12MHz
Antennas	2 x external antenna connection
Indicator	Signal strength, Data
Power	24 ± 1.5 dBm

* The CPE is pending FCC approval

Deliverables

Equipment	Network/Antenna interface	Antenna Mode	Antennas gain	TX Power	Power source	Power consumption
BTS / eBTS	2xRJ-45 / N Type	4TX, 4RX	6dBi	4x24dBm	-48VDC	65W
Micro Noc	2xRJ-45	NA	NA	NA	110-230Vac 12VDC	15W
Outdoor CPE*	POE RJ-45 / F Type	2TX, 2RX	2x12dBi or 2x7dBi	2x24dBm	POE 48VDC or 18VDC	5W
AFAS	RJ-45	NA	NA	NA	110-230Vac	NA
BTS Antenna	N Type	Panel Antenna	6dBi	NA		NA
CPE Antenna	F Type	Yagi Antenna	10dBi	NA	NA	NA

** These features are pending FCC approval

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