symmetry

WiMAX-Ready NLOS/OFDM Broadband Solutions

SR Telecom



s y m m e t r y

Advanced wireless services today and a low-risk migration path to the WiMAX standards of tomorrow.

symmetry™ is the only broadband wireless access (BWA) solution available today that delivers carrier-class TDM voice and broadband data (including VoIP) by combining the most advanced modulation techniques (OFDM) with key features that are optional in the WiMAX standard (including antenna diversity, Space-time Coding, Hybrid ARQ, and Sub-channelling). Our 10 years of experience with this technology has shown us that these features are essential to deploy successful and efficient Non-Line-of-Sight (NLOS) networks.

With over 10-years experience in NLOS networks, SR Telecom has more experience than any other vendor at deploying large, carrier-class OFDM networks. As a result, **symmetry** offers the best range, flexibility and efficiency of any other solution on the market today.

symmetry makes good on the future promises of WiMAX today by providing best-in-class spectral efficiency and the highest NLOS range available, with SME-class service and reliability at price points suitable for residential business cases – ***a first in the industry for NLOS equipment***.

Using **symmetry**, operators benefit from a platform that simultaneously supports today's field-proven sectors and tomorrow's WiMAX sectors without the worry of costly forklift upgrades. Moreover, operators can migrate smoothly to 802.16-2004 or 802.16e sectors depending on their needs. And, **symmetry** 's extensive suite of network management tools facilitates trouble-free deployment and operations, enabling carriers to jump-start the WiMAX revolution.

Business Benefits

symmetry helps operators develop sound and profitable business models by offering an extensive range of services and by minimizing the total cost of carrier-class operations.

symmetry extends operator's service offerings with:

- A wide range of carrier-grade services (including broadband data, VoIP, and circuit-switched voice) for residential and business users.
- Tiered services using different grades of service. By assigning subscribers to virtual channels with different data speeds and over-subscription rates, operators can offer different service level agreements (SLAs) at higher price-points.
- A consistent level of service to subscribers in the same cell. By maintaining 64-QAM to the cell's edge, most users operate at the maximum data throughput, so operators can negotiate more SLAs at higher price-points.

symmetry minimizes operators' total cost of operations by:

- Delivering the industry's best NLOS coverage and capacity, allowing for easy installation in urban, suburban, rural, and self-installed sites.
- Offering scalable, easy-to-use NMS tools that simplify order-taking, flow-through provisioning, work-order management and installation; thereby, reducing the costs associated with maintenance, training, and customer service.

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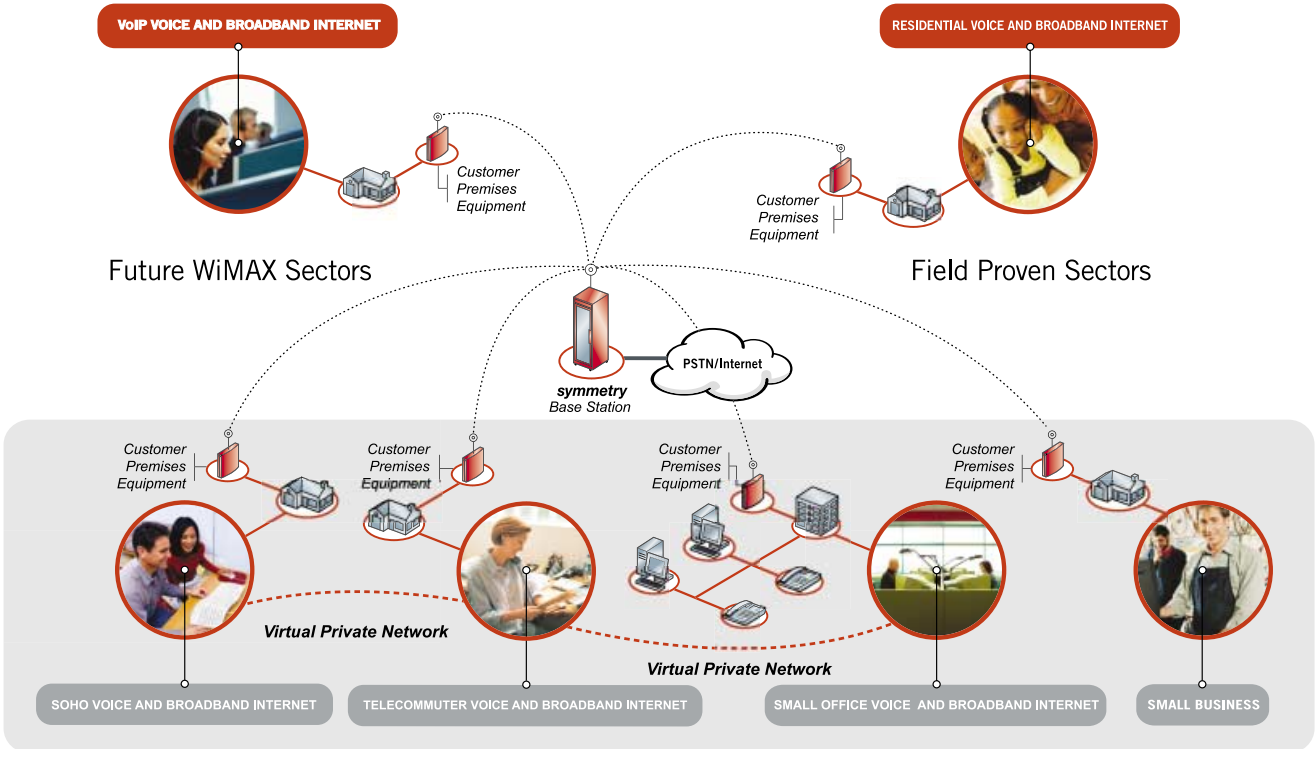
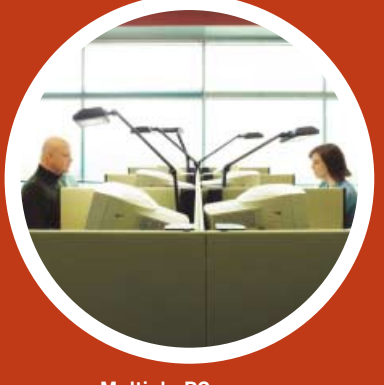
Residential and Business Broadband Data and Voice

Architected from the beginning as a carrier-grade system, the **symmetry** core technologies were selected and integrated based on their superior performance and total cost of operation. Furthermore, integration and testing followed the strictest carrier benchmarks. As a result, **symmetry** is the only BWA solution that has been deployed in a cellular topology, thus removing spectrum limitations inherent in legacy installations, and providing scalability to millions of subscribers.



True Non-Line-of-Sight

Real Toll-Quality Voice



Multiple PC access
without affecting voice service

Highlights

- **Advanced OFDM WiMAX Technology:** By using advanced technologies, such as MIMO, Sub-channelling, Space-time Coding, Uplink/Downlink Power Control, Hybrid ARQ, and Advanced Modulation, **symmetry** networks are high-performance, cost-effective, and optimised for success.
- **True Non-Line-of-Sight**: With over 100,000 lines deployed, operators throughout the world are already benefiting from **symmetry**'s advanced NLOS technology with the industry's best performance and range in NLOS conditions.
- **Bandwidth Efficiency**: Best-in-Class MAC efficiency enables operators to deploy more subscribers per MHz.
- **Broadband Data**: Multiple PCs can access the Internet simultaneously at DSL-like data rates without affecting voice quality or data speeds, and without specific client software. **symmetry** is the first BWA solution providing wireline-equivalent performance and consistency. As a result, subscribers enjoy the full broadband experience of multi-megabit data rates, real-time applications like videoconferencing and gaming, and streaming audio and video.
- **Real Toll-quality Voice**: In addition to VoIP, **symmetry** provides circuit-switched voice, giving operators the choice to deliver real, toll-quality voice solutions for primary-line and pay-phone service.
- **Carrier-class network management system (NMS)**. **symmetry**'s comprehensive suite of NMS tools scales to millions of subscribers, and offers real-time and historical monitoring, broadcast software upgrades to 40,000 CPEs at a time, and server redundancy.

BASE STATION

The **symmetry** platform offers flexibility and performance

- Compact base station that is easily installed in either an ANSI 482.6-mm (19-inch) or ETSI 600-mm (23.6-inch) rack.
- Clock reference options to synchronize the network to an external E1 or T1 clock source over the External Synchronization Interface (ESI), an internal clock source, or a Global Positioning System (GPS).
- Fast Ethernet 100Base-T, n x E1, and n x T1 network interface options to the base station.
- Radio options for outdoor and indoor installations provide flexibility to balance maintenance and tower lease costs with performance.
- Radio capacity supporting up to six, 1-MHz RF channels per base station for an aggregate net throughput of 18 Mbps, in only 6 MHz of spectrum allocation.
- WiMAX-ready backplane allowing operators to mix and match 1-MHz OFDMA channels with 1.75-MHz and 3.5-MHz WiMAX OFDM channels as they become available. A full, six-sector WiMAX configuration provides up to 66 Mbps of net throughput in a 21-MHz frequency allocation.

symmetry is a modular and scalable WiMAX-ready platform that uses a single technology to meet the varied service requirements of residential and business markets everywhere.

Network Interface Characteristics

Network interfaces	Base Connection Interface (BCI): Fast Ethernet 100Base-T interface Generic Network Interface Controller (GNIC): up to 16 E1 or T1 interfaces
Data signalling	Multi-Link Point-to-Point Protocol/Point-to-Point Protocol (MPPP/PPP)
Voice signalling	V5.2 or GR-303

symmetry General Chassis Characteristics

Management interfaces	RS-232 and Ethernet 10Base-T
Dimensions H x W x D	480 mm x 440 mm x 480 mm (19 in. x 17.5 in. x 19 in.)
Rack-mounting options	482.6 mm ANSI rack (19 in.), 600 mm ETSI rack (23.6 in.)
Power supply	-48 Vdc nominal (-40 Vdc to -60 Vdc)
Max. power consumption (fully-redundant)	Six sectors : 1550 W (indoor), 1230 W (outdoor) Three sectors: 970 W (indoor), 810 W (outdoor)

Base Station Specifications

Radio Characteristics

Antenna beamwidth	90°, 360°, other beamwidths upon request
Polarization	± 45° dual-polarized or vertical
Diversity	Two-branch Tx/Rx polarization diversity
Tx RF power (average)	35 dBm indoor XCVR / 29 dBm outdoor xcvr
Receiver sensitivity per tone (includes diversity)	-116 dBm at 16 QAM
Dimensions H x W x D	510 mm x 280 mm x 110 mm (20 in. x 11.2 in. x 4.5 in.)
Power source	-48 Vdc
Radio interface	Baseband link through digital connector interface
Max. power consumption	80 W (outdoor); 75 W (indoor)

General RF Characteristics

Operating frequency	2.3 GHz, 2.4 GHz, 3.5 GHz
Frequency downlink/uplink	2305-2315 MHz / 2350-2360 MHz, 2306-2370 MHz / 2400-2464 MHz, 3388-3600 MHz / 3312-3700 MHz
Channel/TxRx spacing	1 MHz / 45 MHz at 2.3GHz, 1 MHz / 94 MHz at 2.4GHz, 1 or 1.75 MHz / 100 MHz, or 1 MHz / 76 MHz at 3.5GHz
Radio access methods	Orthogonal Frequency Division Multiplexing Access (OFDMA) Frequency Division Duplexing (FDD)
RF modulation	Adaptive Modulation 64 QAM, 16 QAM, 8 QAM, QPSK
Range	Up to 30 km (19 mi.) using 64 QAM
Capacity (six sectors)	Voice / Data partitioning selected through NMS Voice: up to 6,000 lines Data: up to 18 Mbps (net) to support up to 730 subscribers at a typical information rate of 512 Kbps and an overbooking subscription rate of 20

Contact SR Telecom for specific bands and spacing.

Standards Compliance

Radio frequency	EN 301 021
Safety	EN 60950 UL 60950
Environmental Specifications	EMC and regulatory requirements: EN 300 019-2-4 (V2.1.2), EN 301 021 V1.5.1 (2001-10), EN 302 085 V1.1.2 (2001-02) Emissions: EN 55022 Immunity: EN 61000-4-x Environmental conditions for telecommunications equipment: Indoor equipment: ETS 300 019-1-1, Class 3.1E Outdoor equipment: ETS 300 019-1-4, Class 4.1E

SUBSCRIBER EQUIPMENT

Single Subscriber Unit 4000 (SSU4000)
The SSU4000 communicates with the **symmetry** Base Station (ABS4000 and ABS3000) to transmit and receive wireless local loop voice, broadband data, fax, and modem communications via a patented OFDMA interface. The SSU4000 provides up to two voice lines and a 10Base-T broadband data connection for residential or SOHO users. Both voice line and data connectivity can be active concurrently, with standard fax and V.90 modem support on one line.

The SSU4000 comprises an outdoor radio unit, an indoor connection adapter, and an optional indoor universal power supply (UPS).

SSU4000 Integrated Radio Unit and Subscriber Terminal
The SSU4000 contains digital and telephony circuitry, radio frequency (RF) electronics, a DC/DC converter, and antenna assemblies. The unit is designed for outdoor use (exterior wall mounting) and is housed within a weatherproof enclosure, enabling technicians to access the unit's full functionality without having to enter the customer premises.

The unit may be mounted to an external wall of a residence or building. The antenna-mounting bracket allows rotation of the antenna through 180 degrees to maximize signal quality. Line-of-sight to the supporting Base Station is not required.

SSU4000 Universal Power Supply (UPS)
The UPS provides DC power to the SSU equipment and contains a back-up battery for continued operation during power outages (optional). The UPS is designed for indoor use (wall-mounting).

Subscriber Unit Specifications (SSU4000)

General Characteristics (SSU4000)

	2.3 GHz	2.4 GHz Licensed Band	3.5 GHz (other custom designed bands are also available)
Frequency downlink	2305-2315 MHz	2306-2370 MHz	3388-3600 MHz
Frequency uplink	2350-2360 MHz	2400-2464 MHz	3312-3700 MHz
Tx/Rx spacing	45 MHz	94 MHz	76 or 100 MHz
Radio access method	OFDMA / FDD		
RF modulation	QPSK, 8 QAM, 16 QAM, 64 QAM		
Channel spacing	1 MHz	1 MHz	1 or 1.75 MHz

Radio Unit

	2.3 GHz	2.4 GHz	3.5 GHz
Antenna pattern	Vertical		
Horizontal beamwidth	30°	30°	15°
Vertical beamwidth	30°	30°	15°
Antenna gain	21 dBi	21 dBi	20 dBi
Front-to-back ratio	25 dB		
Tx RF power (average)	17 dBm		
Receiver sensitivity (16 QAM)	-118 dBm – ETSI 301 021 V 1.6.1		
Diversity	Space-frequency block coding and dynamic phase adjustment		

Electrical, mechanical, and environmental

Power	25 W peak, 20 W standby
Supply	120 VAC / 240 VAC
Operating temperature	-40 to + 60°C (-40 to +140 °F)
Storage temperature	-40 to + 70°C (-40 to +158 °F)
Operating humidity	5 to 95%
Dimensions W x H x D	3.5 GHz: 333 mm x 333 mm x 130 mm (13 in. x 13 in. x 5 in.) diamond mount 2.4 GHz: 483 mm x 483 mm x 102 mm (19 in. x 19 in. x 4 in.)
Weight	3.5 GHz: 2.5 Kg (5.5 lbs.), 2.4 GHz: 4 Kg (8.5 lbs.)

Subscriber Unit (SSU4000)

Service characteristics

	SSU4000
Voice coding	ITU-T G.729E
Echo cancellation	ITU-T G.168 (in uplink and downlink directions)
Fax	Group 3
Modem	V.90/V.34 available on one POTS line.
Broadband data	Downlink: up to 2.3 Mbps Uplink: up to 470 Kbps

Subscriber interface

	SSU4000
POTS	Loop start (up to 2 lines)
Voice loop length (24 AWG)	POTS: 500 m (1640 ft.), 10Base-T: 100 m (328 ft.)
Electrical	TR-57, ETSI EN 300 132, EN 300 448
Broadband data	Ethernet 10Base-T

Standards compliance

	SSU4000
Radio frequency	EN 301 021
Safety	EN 60950, UL 60950
EMC	EN 301 489 (SSU4000: EN 301 489-1, EN 301 489-4)
Environmental	EN 301 019
General	ETSI EN 302 085, EN 301 390, EN 301 021

Subscriber (radio) unit to customer equipment cabling

	SSU4000
Format	10Base-T, DC, POTS
Maximum cable distance	60 m (197 ft.)
Cable type	Custom

Customer Connections

At SR Telecom, we are driven by our customer's needs. Our number one priority is to build lasting relationships with our customers. We do this by maintaining a global presence and providing expert technical services. From initial contact to delivery and installation, our coordinated approach ensures the smooth deployment of complete solutions that surpass industry standards. With offices located strategically over six continents, we ensure that our customers get the support they need, when they need it. We provide full technical assistance by telephone and web-based solutions tracking — 24 hours a day, 7 days a week. We also offer customized technical training, maintenance and network management. On-time delivery, product reliability, advanced technology, and quality technical support – that's what SR Telecom is all about.

The WiMAX Evolution

The WiMAX Forum, of which SR Telecom is a principal member, is a nonprofit association established in 2001 by equipment and component suppliers. This cooperative industry initiative is working to facilitate the deployment of broadband wireless networks based on the 802.16 standard by helping to ensure the compatibility and interoperability of broadband wireless access equipment.

While the industry waits for the WiMAX standards to be defined and the products to mature, SR Telecom's **symmetry** NLOS/OFDM WiMAX-ready solution offers ILECs and CLECs not only performance and price points demanded for today's broadband fixed wireless access solutions, but also a proven, stable, and mature WiMAX-ready system. **symmetry** offers carriers the flexibility to provision pre-WiMAX services to existing subscribers using a six-sector base station architecture, while ensuring a seamless migration path to the future 802.16-2004 (OFDM) and 802.16e (SOFDMA) WiMAX standards.

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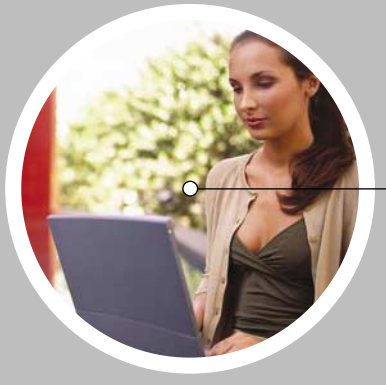

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For the past 25 years, SR Telecom has been refining the wireless experience, adapting to market trends with product lines that address the legacy narrowband requirements of rural deployments, to the broadband access needs emerging today, and to the next-generation mobile networks promised by the WiMAX standards of tomorrow.

By continuously aligning our product portfolio with market trends, SR Telecom has successfully maintained a global leadership position in narrowband solutions that we are now building off of to drive our leadership in the emerging broadband and WiMAX markets.

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