



# Netronics®

## NetMAX™ 2300/2500/3500

Let the Industry's Most Mature and Future Proof Platform Take You Mobile

Netronics is answering carrier's needs for a complete, end-to-end WiMAX solution for personal broadband services by leveraging its advanced base station, NetMAX, while incorporating IP mobility core components and a wide range of end user devices to create its NetMotion™ solution.

With the most recent version using 802.16e, NetMAX addresses carrier's current challenge in deploying fixed, nomadic, and ultimately portable and mobile services to both residential and business users located in rural, suburban and urban areas.

Operating in 2.3, 2.5 and 3.5 GHz and related licensed frequency bands, NetMAX addresses all the parameters in the operators industry wish list for carrier-grade, cost effective, next generation broadband wireless access (BWA) systems. The TDD-based platform is ideal for operators deploying high-bandwidth IP-based voice, data and multimedia services and who are planning to move to provide personal broadband services in the future.





## NetMAX: Taking WiMAX to the MAX

NetMAX is a future-proof solution that offers operators reliability, flexibility and compelling economics, while migrating their networks to a standard WiMAX 802.16e architecture.

Powered by intel's WiMAX chipst, NetMAX meets the requirements of a myriad of service environments, from sparsely populated rural areas to high-density urban areas with fast access at net data rates of up to 25 Mbps over a 10 MHz channel.

NetMAX delivers broadband access services to a wide range of customers, including residential, multi-tenant, SOHO, SME, and large enterprise customers.

NetMAX represents the sum total of Netronics advanced technology capabilities and large-term field experience.

NetMAX features high power orthogonal frequency division multiple access (OFDM) technology that supports non-line-of-sight (NLOS) operation, adaptive modulation up to QAM 64 and the highest spectral efficiency available. Moreover, it includes advanced self-install capabilities that improve CPE economics thereby enabling operators to overcome typical link budget management challenges and customer premises installation costs and positions it as an ideal mass market solution for nomadic plug and play applications.

## NetMAX System Components

The NetMAX product family includes:

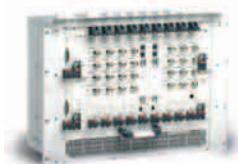
- NetMAX 2300 for the 2.3 GHz band
- NetMAX 2500 for the 2.5 GHz band
- NetMAX 3500 for the 3.5 GHz band

## Base Station Equipment

NetMAX base station equipment is a high density, modular chassis configuration scalable for deployments of various sizes.

### Modular Base Station

The modular base station is a carrier class 8U high cPCI shelf that fits into standard 19" or 22" (ETSI) racks. The chassis contains a network processor unit, multiple access unit modules (up to 6 in a single chassis), power supply and power feeding modules. All the modules are hot swappable, and high availability can be provided through multiple redundancy schemes.



## Network Processing Unit (NPU)

The NPU is the heart of the base station and serves as the central processing unit, managing the base station components and all subscriber units it connects. Its main function include:

- Traffic aggregation of all access units to/from the backbone via 100/1000 BaseT network interface
- Traffic classification and connection establishment initiation
- Services level agreements (SLA) management
- Base station overall management, operation control and alarms management



The NetMAX basestation can host two NPU modules for redundancy support (1+1 redundancy scheme). The GPS unit synchronizes all the base stations that operate in TDD mode.

## Indoor/Outdoor Access Units

The NetMAX access unit is comprised of an indoor unit (IDU) and an outdoor unit (ODU). The access unit IDU module contains the wireless IEEE 802.16e/HiperMAN MAC and modem and is responsible for the wireless network connection establishment and for the bandwidth management.



Each access unit IDU includes four 3.5, 5 or 7 MHz PHY channels for support of RF 2<sup>nd</sup> and 4<sup>th</sup> order diversity combining functionality and radio link redundancy.

The access unit ODU is a high power, multi-carrier radio unit that connects to an external adaptive antenna that enables superior signal penetration through walls and buildings especially designed for NLOS deployments.



The base station operates in full TDD duplex, dramatically increasing system efficiency. It is designed to provide high system gain and interference robustness, utilizing high transmit power and low noise figure.



## Product Highlights & Advantages

**NetMAX, a WiMAX Certified™ and 802.16e-based system, is an optimal solution to build out networks to next generation technology. Few other solutions provide a similar path to mobility.**

- **WiMAX architecture** - based on the WiMAX Forum's standard implementation of the IEEE 802.16e and ETSI HiperMAN industry specifications for wireless access in metropolitan areas networks (MAN)
- **One infrastructure** - delivering fixed and nomadic services today and mobile in the future
- **Multiple frequencies** - NetMAX operates in the 2.3, 2.5 and 3.5 GHz frequency ranges
- **Nomadic 'plug and play solution'** - easy and simple, self-installed CPE's using either a friendly application CD or a smartcard to enable automatic provisioning for the home delivers instant broadband and makes wireless technology a powerful consumer commodity
- **Scalable base station configurations** - a high-density macro base station configuration, ideal for a wide range of deployment scenarios
- **High power multiple diversity radio system** - the base station features high power radios with 2<sup>nd</sup> or 4<sup>th</sup> order diversity that enhance the link budget to allow coverage for self-install CPEs
- **Robust signaling processing for enhancing air link** - uses space time coding (STC) and maximum ratio combining (MRC) to leverage a multiple diversity radio system for maximization of the link budget
- **Addressing multiple markets** - with a wide range of CPEs suitable for managing tiered services for residential, business, MDU/MTU, hotspots, backhauled, and wireless home networking applications
- **Low cost of ownership** - supports simple installation and demand-based, "pay-as-you-grow" build-outs enabling operators to penetrate new market segments rapidly, while minimizing CAPEX
- **Carrier class services** - meets the most demanding requirements of large service providers with high throughput and availability, component redundancy, and a flexible network management system (NMS)
- **High capacity and throughput** - highly efficient and robust 802.16d and 802.16e based air protocol provides high broadband rates per subscriber of more than 10 Mbps net
- **NLOS coverage** - advanced orthogonal frequency division multiplexing (OFDM) enhances performance in non-line-of sight (NLOS) conditions to ensure immunity to interference and multi-path conflicts typical of deployments in densely populated, suburban areas
- **End-to-end Qos** - advanced Qos capabilities in the 802.16e MAC, 802.1pe and DSCP classification and prioritization functions ensure true end-to-end Qos and support high quality data, voice and video services
- **Adaptive modulation technology** - Maximizes the bandwidth throughput of the system over large distances by automatically adjusting modulation to respond to various signal qualities

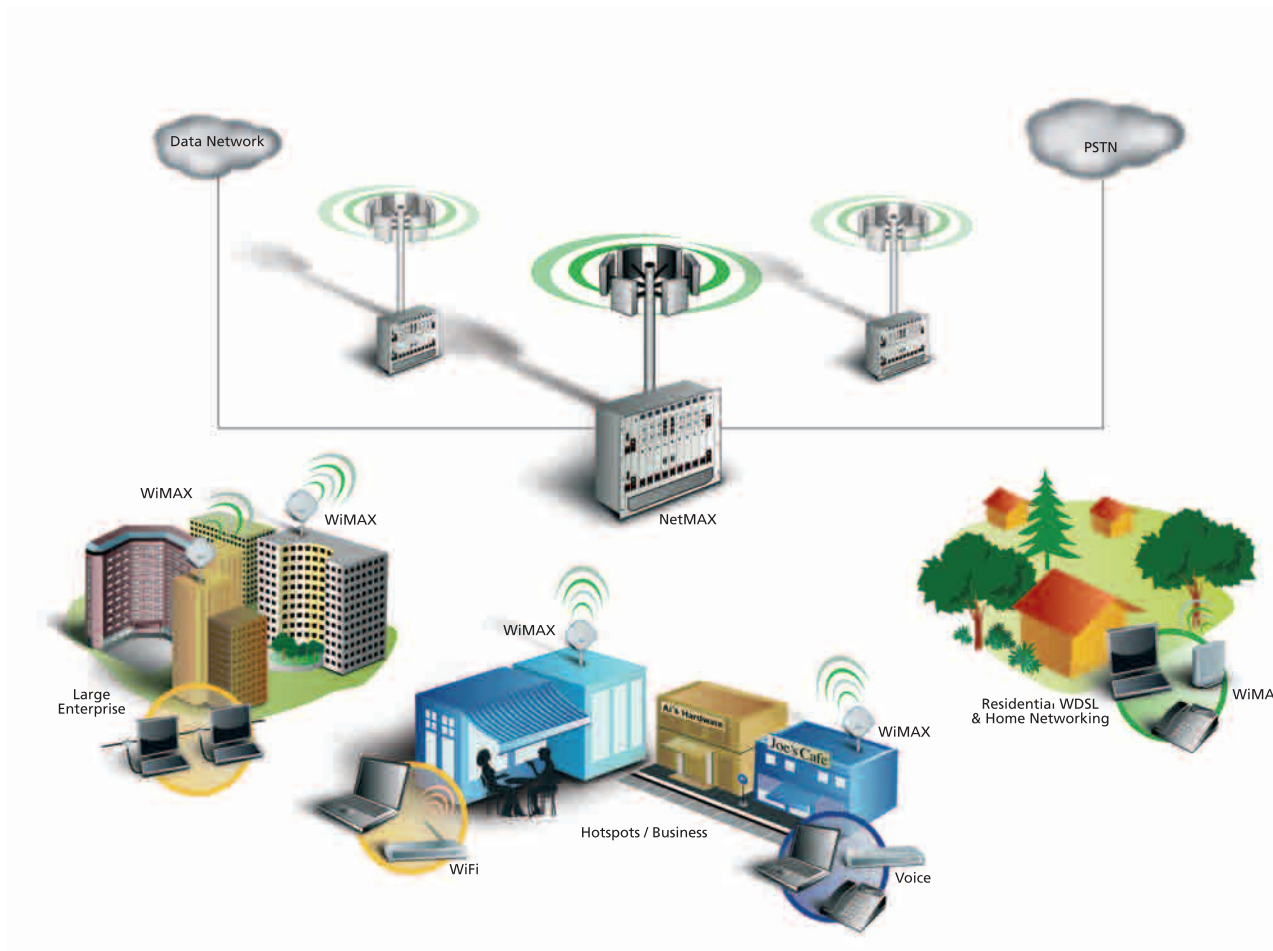


### Base Station Equipment Components

Product Type	Product Name	Product Description
Modular	NMAX-BST-SH	NetMAX
Base Station Equipment	NMAX-BST-NPU	NetMAX base station network processor unit
	NMAX-BST-AU-IDU-4CH	NetMAX base station access unit interface module
	NMAX-BST-PSU	NetMAX base station power supply unit
	NMAX-BST-PIU	NetMAX base station power interface unit
Base Station Radio Equipment	NMAX-BST-AU-ODU	NetMAX base station outdoor radio unit

### NetMAX CPEs - MAXimizing Service to Customers with Compelling Economics

The NetMAX platform provides several CPE types to provide operators the ultimate flexibility to serve a variety of business and residential customers cost effectively with self-install flexibility. NetMAX CPEs are all powered by Intel's WiMAX chip.







### NetMAX PRO-S Customer Premises Equipment (CPE)

The NetMAX PRO-CPE is comprised of an indoor unit (IDU) and an outdoor unit (ODU) that contains the modem, radio, data processing and management components. It also contains an integral high-gain flat antenna with either vertical or horizontal polarization.



An ODU with a connector to an external antenna is also available.

The NetMAX PRO-S CPE IDU is available in multiple network configurations that optimally serve a wide variety of market segments and applications. Each version of the IDU connects directly to the ODU via a category 5 Ethernet cable that carries the data traffic, power and control signals between the IDU and ODU.

## NetMAX Si

### Indoor, Self-Installable CPE

NetMAX Si is Netronics self-installable, nomadic WiMAX subscriber unit, which provides broadband data services in a compact design, ideal for residential and SOHO users. It is a complete indoor solution, without the need for an ODU. Central provisioning is enabled through an AAA radius server ensuring full nomadic support. The NetMAX Si includes an installation software utility and/or a smart card enabling self-installation of the CPE and automatic service operation.



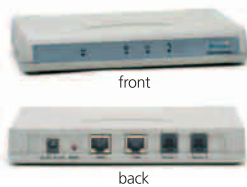
NetMAX Si uses either 10/100 Base port or USB V1.1/2.0 interface. The NetMAX Si integrates multiple antennas with fast switching, best base station selection, high output power to the antenna port and much more.

**Just open the box and plug it in...**

### Voice Services Over WiMAX

The broadband voice gateway CPE provides integrated voice and data services for residential and SOHO and is available with either one or RJ-11 POTS ports.

Featuring advanced voice and data functions such as VLAN tagging, traffic prioritization by IP DiffServ, H.323 and SIP protocols supports, Class voice services (3-Party conference, call waiting, call hold), integrated management and more, the broadband voice gateway CPE presents an ideal single box solution for operators seeking to serve combined broadband voice and data services.



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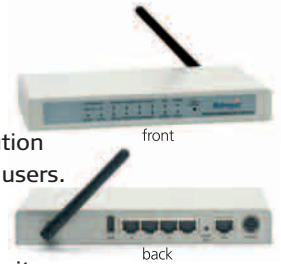
### IDU Broadband Data & Voice-Gateway, Feeding and Backup in One unit

Both the IDU-1D1V and 1D2V are well mounted, compact and easy-to-install indoor units, providing a residential gateway and outdoor unit feeding functionality. Supporting broadband data with 1 or 2 POTS lines, the IDU, is also equipped with battery backup ensuring service continuity. Voice networking is achieved through either SIP or H.323 protocols supporting all CLASS services.



### Networking Gateway CPE

The NetMAX networking gateway CPE is the optimal networking solution for both home and small business users. It features an advanced integrated broadband router with comprehensive IP-sharing and security capabilities.



The networking gateway CPE has four 10/100 Base T ports and an 802.11g wireless access point.

The powerful networking solution not only enables comprehensive high-speed connection sharing for multiple users, but also brings the freedom of high-speed, wireless broadband connectivity to home and SOHO networks with integrated 802.11b/g wireless LAN functionality. With features such as static & dynamic routing, NAT functionality, built-in firewall and an indoor coverage range of 35-100m, the networking gateway presents operators with a compelling, high quality home networking solution.

Product Type	Product Name	Product Description
CPE Indoor Equipment	NMAX-CPE-Si	NetMAX self-install indoor CPE unit with the one 10/100 BaseT or USB 1.1/2.0 data port
	NMAX-CPE-IDU-1D	NetMAX broadband data CPE indoor module with one 10/100 BaseT data port
	NMAX-CPE-IDU-VG-1D1V	NetMAX broadband voice gateway CPE indoor module with one 10/100 BaseT data port + one RJ 11 POTS port
	NMAX-CPE-IDU-VG-1D2V	NetMAX broadband voice gateway CPE indoor module with one 10/100 BaseT data ports + two RJ 11 POTS ports
	NMAX-CPE-IDU-NG-4D1WLAN	NetMAX networking gateway CPE indoor module with four 10/100 BaseT data ports + one 802.11b/g
CPE Outdoor Equipment	NMAX-CPE-ODU-PRO-SA	NetMAX subscriber outdoor radio unit with integrated vertical antenna
	NMAX-CPE-ODU-PRO-SE	NetMAX subscriber outdoor Equipment radio unit with external antenna

## Specifications

Parameter	Value
<b>Frequency</b>	
2.3 GHz band	2,305 - 2,360 MHz
2.5 GHz band	2,495 - 2,690 MHz
3.3 GHz band	3,300 - 3,400 MHz
3.5 GHz band	2,399.5 - 3,500 MHz
3.6 GHz band	2,600 - 3,700 MHz
<b>Radio Access Method</b>	TDD/FDD
<b>Modulation</b>	OFDM/OFDMA 16QAM, 64QAM
<b>Channel bandwidth</b>	3.5 MHz, 5 MHz, 7 MHz, 10 MHz (SW selectable)
<b>Central frequency resolution</b>	125 KHz
<b>Antenna for CPE</b>	Integrated antenna Vertical & Horizontal on the same antenna:
Outdoor CPE	13 dBi at 2.3 Ghz 14 dBi at 2.5 Ghz 17 dBi at 3.5 Ghz
Indoor Si CPE	6 Integrated antennas - 7 dBi each for 2.3/2.5 GHz and 9 dBi for 3.5 GHz
<b>Sensitivity typical values</b>	-80 dBm for highest modulation (QAM 64) @ 5 MHz -98 dBm for highest modulation (BPSK) @ 5 MHz
<b>Diversity Provision</b>	Quarter/Half Sector - 2 /4 Order Diversity

### Data Communications

Data	IEEE 802.3 CSMA/CD
Air Interface	IEEE 802.16e/IEEE 802.16d
VLAN support	IEEE 802.1 Q
Traffic Classification	Layer 2 IEEE 802.1p, IP DiffServ Code Points DSCP

### Networking Gateway CPE

<b>Interfaces</b>	
Ethernet LAN	1-4 10/100 Base-TX RJ45 connectors
USB	Host Port for a USB printer
Ethernet WAN (copper)	10/100 Base-TX RJ45 connector
<b>General Features</b>	
WAN connection Types	Static Ip, Dynamic IP (DHCP), PPPoE and PPTP client
Routing	Static Route, Dynamic Route (RIP 1/2)
Firewall	NAT Firewall With SPI mode
NAT Functionality	NAT, Virtual Server, Special Application DMZ Host
VPN	IPSec, PPTP & LT2P Pass-Through
DHCP	DHCP server for LAN and WLAN clients, DHCP client for WAN
Wireless Features (supported only with wireless networking gateway)	
Standard	IEEE 802.11b / 802.11g
Range Coverage	Indoors - approx. 35-100m (114-328ft)
Security	WEP encryption 64 Bit, 128 Bit

### Voice Gateway CPE

<b>Interfaces</b>	
Ethernet LAN	One 10/100 Base-TX RJ45 port
Telephony	One or two RJ 11 connectors for analog telephones
<b>Security</b>	
PipeLockTM	Button for disconnection of the secure Ethernet LAN port
Paket filter	Separates data, management and telephone traffic
VLAN	802.1 Q+P
Authentication per registration	H225.o.o RAS
<b>Telephony and fax services</b>	
VoIP Protocol	H.323 or SIP
Internal Class 5 services	Call Waiting, 3-part call, call alteration, differentiated ringing tones
External Class 5 services	Activation/deactivation of class 5 services supported by the IP-telephony system
G3 Fax	T.38
Calling number identification	FSK, DTMF
DTMF	IN-band and out-band using H.245 and H.225 bi directional
Speech Codecs	G.711 (Ulaw & Alaw), G.729ab
DiffServ	Level 3 (IP) mechanism for handling Qos

### Electrical

Parameter	Subscriber Unit	Modular Base Station
Power Source	100 240 VAC, 50-60 Hz	-36 to -72 VDC
Power Consumption (max)	Outdoor CPE: 25 W Self Install CPE: 12.5 W	1420 Watt *Fully loaded for 6 sectors support, including ODU's

### Environmental

Parameter	Indoor Unit	Outdoor Unit
Operating Temperature	0oC to 40oC (32 - 104 oF)	-40oC to 55oC (-40 - 131 oF)
Operating Humidity	5%-95% non condensing	5%-95% non condensing, weather protected

### Standard Compliance

<b>Type</b>	Standard
EMC	ETSI EN 301 489-1
Safety	EN 60950 (CE), CB, IEC 60 950 US/C (TUV)
Environmental	ETS 300 019 (part 2-1 T 1.2 & part 2-2 T 2.3 for indoor & outdoor (part 2-3 T 3.2 for indoor (part 2-4 T 4.1E for outdoor
Radio	FCC part 27, ETSI EN 301 021 V1.4.1, ETSI EN 301 753 V1.1.1



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