



## The Ultimate Mobile WiMAX Base Station

### Main Features

- HiperMAX supports:
  - Option of split indoor / outdoor or all outdoor elements
  - Fully redundant architecture
  - Up to 6 channels per ATCA shelf with full redundancy or Up to 12 channels without redundancy
  - Optical, zero-loss connectivity between indoor and outdoor units
- Up to 40dBm transmit power
- Supports FDD and TDD profiles
- Advanced antenna options, including diversity, MIMO and SAS
- Up to 5bps/Hz per radio (2x2 MIMO)
- HiperMAX uses PicoChip® based Software Defined Radio (SDR) array, rated at 4x600 billion instructions/s
- Hybrid beamforming and MIMO enhancements allows multiple simultaneous transmissions to End User Devices
  - Interference avoidance through null forming
  - Key to spectral efficiency enhancements
  - Multiple antenna beams are synthesised at baseband
- Supports Fractional Frequency Reuse utilising PUSC modes in OFDMA

## HiperMAX Base Station

HiperMAX is the ultimate Mobile WiMAX base station designed for high-density deployment situations. HiperMAX has been architected to provide a highly scalable, fully redundant base station product that will continue to deliver the optimum performance for years to come.

HiperMAX is fully compatible with the Mobile WiMAX Network Reference Model (NRM) as part of the Access Service Network (ASN). HiperMAX supports the reference point (R6) between the base station and the ASN Gateway as well as the reference point (R8) between base stations. HiperMAX interworks with Airspan's ASN Gateway called ControlMAX and with other third party ASN gateways.

HiperMAX represents the state of the art, next generation base station design and includes:

- Fully upgradeable, software defined, PHY and MAC layers enabling simultaneous support for both Mobile WiMAX (SOFDMA) and Fixed WiMAX (OFDM)
- Fully digital, OBSAI based, fibre optic interfaces between indoor and outdoor equipment, which can operate at up to 3km

- Multi-channel transmit and receive diversity
- 2x2 and 4x2 MIMO configurations
- 4 or 8 channel Smart Antenna Systems (SAS)
- Support for FDD and TDD profiles

HiperMAX is designed to deliver the best link budget with the highest capacity and net throughput; all essential qualities for macro-cell deployments used in typical wireless roll out.

HiperMAX implements an all-outdoor radio with up to eight-element antenna array system.

All HiperMAX base stations support SAS and multi-channel Transmit and Receive diversity and are platform ready for SDMA, which uses the antenna array to enhance capacity and improve frequency re-use.

HiperMAX base stations cooperate with the IMS which is part of the Connectivity Service network (CSN) to deliver voice and other multimedia services and can also be configured to support VoIP applications, using a standard media gateway to the PSTN.



HiperMAX mast head units deployed in Vodafone Malta

# HiperMAX Operation

The flexibility of the HiperMAX architecture allows many deployment configurations including those suited to both macro and micro cellular installations. It supports all outdoor as well as split indoor / outdoor configurations allowing the operator to select the deployment model best suited to operational expense considerations and site access constraints.

A HiperMAX Base station configured for traditional multi-sector macro-cell deployments consists of a baseband section, suitable for location within a protected environment, and an outdoor RF section. The indoor boards, referred to as blades within the ATCA standard, are housed in a 5 or 14 slot NEBS compliant ATCA chassis. The outdoor enclosure contains the RF subsystem components, which enables smart antenna functionality running on a Software Defined Radio (SDR). The connection between the baseband and RF sections is made through a fibre optic cable. HiperMAX supports different antenna options including:

- Tx and Rx Diversity
- 2x2 MIMO Matrix A & B
- 4x2 MIMO Matrix A & B
- 4 or 8 element SAS

The antenna system of choice is connected to the outdoor RF unit and in turn to each baseband blade. HiperMAX can support up to 12 baseband blades per 14-slot shelf, with a single fibre optic cable to each RF unit. Baseband blades can be configured to support 6 active channels with full redundancy or 12 active channels without redundancy.

The ATCA shelf also houses the shelf controller and power supplies. In addition to the ATCA shelf, the HiperMAX rack houses the Ethernet switch and the GPS synchronisation unit. The Ethernet switch aggregates the individual traffic streams onto a Gigabit Ethernet stream for backhaul purposes. For TDD and smart antenna operation the multiple sectors are locked to a GPS timing source. The ATCA shelf manager provides a platform management layer that holds an inventory of field replaceable units in the system and monitors their status.

Fibre optic modules operating at speeds of up to 3.1Gbit/s and are connected to fibre optic cables capable of carrying up to 10Gb/s for future expansion, if required.

The all outdoor version of HiperMAX is known as HiperMAX-micro. This consists of split baseband and RF sections connected via a fibre interface, but with all power supply and GPS synchronisation functionality housed within a single SDR-micro enclosure. This form factor is particularly well suited to low density micro-cell sites where access to a temperature controlled room is not possible or preferred. eg. a building rooftop.

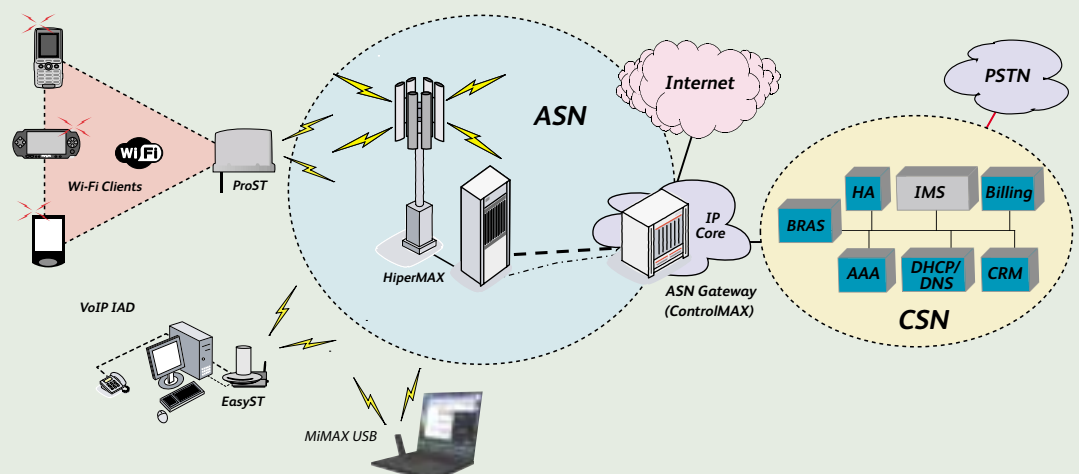


**HiperMAX-micro**

HiperMAX fully supports the extensive QoS characteristics of the IEEE 802.16e-2005 radio interface. In addition, it incorporates specific additional radio resource management features that allow applications such as VoIP to be robustly delivered by implementing Admission Control on a per call basis.

HiperMAX is managed by Netspan, the SNMP based central management platform.

## Network Architecture



# HiperMAX Base Station Technical Summary

	HiperMAX
Mobile WiMAX	Yes
Fixed WiMAX	Yes
Standards Compliance	IEEE802.16e-2005 IEEE802.16-2004
Form Factor	Split Indoor / Outdoor and all Outdoor
Frequency Bands	2.3GHz, 2.5GHz, 3.3GHz, 3.5GHz, 3.7GHz, 4.9GHz (700MHz - Future)
Channel Size	20MHz, 2x10MHz, 10MHz, 7MHz, 5MHz, 3.5MHz, 1.75MHz
FFT	2048, 1024, 512, 256
Duplex Method	TDD, FDD, H-FDD
Tx Power (Frequency band dependant)	Up to 4x +40dBm
Maximum EIRP per sector	+63dBm
GPS Synchronisation	24hr holdover, Distributed
STC	Yes
MRC	Yes
MIMO	4x2, 2x2
MIMO Matrix Type	Matrix A, Matrix B
CSM	Yes
Beamforming	Yes
Uplink Sub-Channelization	Yes
PUSC	Yes
Fractional Frequency Reuse	Yes
Dynamic Frequency Selection (DFS)	No
Ethernet CS	Yes
IP CS	Yes
IP version support	IPv6, IPv4
Network Interface	1000bT Ethernet / R6
End to End VLAN (802.1Q)	Yes
Network VLAN Traffic Segregation	Yes
ASN Profile	Profile C
Supported Usage Scenarios	Mobile, Portable, Nomadic, Fixed
Handover Supported	Yes
Encryption	DES, AES
Authentication	PKM, PKMv2, EAP-TLS, EAP-AKA, EAP-SIM
Environmental (outdoor elements)	ETS 300 019-1-4 Class 4.1E
Environmental (indoor elements)	ETS 300 019-1-3 Class 3.2

Note: Specifications are subject to change without notice and are for information purposes only.



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