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WiMAX Forum™ Response to the Anacom Public Consultation on “Broadband Wireless Access”

The WiMAX Forum™¹ welcomes the opportunity to provide its views and comments concerning the issues for BWA contained in the Anacom public consultation announcement.

The WiMAX Forum is an industry-led, non-profit corporation formed to promote and certify the compatibility and interoperability of broadband wireless products using the IEEE 802.16 and ETSI HiperMAN wireless MAN specifications. The forum's goal is to accelerate the introduction of these devices into the marketplace. WiMAX Forum Certified™ products will be fully interoperable and support Metropolitan Broadband Fixed and Portable Applications. For more information about the WiMAX Forum and its activities, please visit www.WiMAXForum.org. WiMAX Forum™ and WiMAX Forum Certified™ are registered trademarks of the WiMAX Forum™.

The WiMAX Forum responses are embedded in Attachment 1.

Yours Sincerely

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Annex 1

Public consultation on Broadband Wireless Access

1. General Framework

2. Questions

1. BWA Framework

a) Define and describe the technologies covered by BWA, indicating positive aspects and possible fragilities.

WiMAX BWA technology is based on IEEE 802.16-2004, IEEE 802.16e-2005 and ETSI HiperMAN standards. From these standards, the WiMAX Forum has identified specific profiles that support interoperability. The current certification profiles are listed in table 1.

WiMAX technology is IP-based and therefore reflects the growing trend towards all IP-based networks.

The WiMAX Forum notes the historical trend towards convergence of information services. As a consequence the line between fixed and mobile services continues to blur. We believe that Broadband Wireless Access licensing should allow for Fixed, Nomadic, Mobile and Backhaul applications. WiMAX technology is well suited for all of these different market segments. WiMAX products will often fall into more than one of these application categories and thus license constraints on type of application will unnecessarily limit operators' ability to address market demand.

Table 1.

SYSTEM PROFILES	CERTIFICATION PROFILES		
	Spectrum	Duplexing	Channel Width
Fixed WiMAX (IEEE 802.16-2004, OFDM)	3.4 - 3.6 GHz	TDD	3.5 MHz
	3.4 - 3.6 GHz	TDD	7 MHz
	3.4 - 3.6 GHz	FDD	3.5 MHz
	3.4 - 3.6 GHz	FDD	7 MHz
	5.725 - 5.850 GHz	TDD	10 MHz
Evolutionary WiMAX (IEEE 802.16e-2005, OFDM)	4.935 - 4.990 GHz	TDD	5 MHz
Mobile WiMAX (IEEE 802.16e-2005, OFDMA)	2.3 - 2.4 GHz	TDD	5, 10 MHz (dual)
	2.3 - 2.4 GHz	TDD	8.75 MHz
	3.4 - 3.6 GHz	TDD	5 MHz
	3.4 - 3.6 GHz	TDD	7 MHz
	2.496 - 2.690GHz	TDD	5, 10 MHz (dual)
Color Key:		Certified Equipment Available	Eligible Certification Profiles

The above certification profiles reflect the current situation within the WiMAX Forum (November 2006). However, to respond to worldwide market needs, more profiles (TDD and/or FDD) are expected to be released, including profiles in the band 3.6-3.8 GHz. The WiMAX Forum regularly evaluates the requirement for new or revised certification profiles.

b) Define the radio parameters of the technologies mentioned above, including:

i. Power;

The WiMAX Forum profiles currently support power classes dependant upon modulation scheme.

Typical Base Station power levels would be around 36dBm with the possibility to increase up to a maximum level of around 43dBm.

Mobile terminal power levels are expected to be up to around 23dBm although they would be subject to power control.

Fixed / Nomadic terminal devices power levels are expected to be up to around 30dBm

ii. Channels;

WiMAX technology supports channel widths of 3.5MHz, 5MHz, 7MHz and 10MHz although the base standards allow support for channel sizes ranging from 1.25MHz up to 20MHz.

iii. Duplex mode (TDD/FDD);

The WiMAX Forum has identified certification profiles for both Frequency Duplex Division (FDD) and Time Duplex Division (TDD) systems. Therefore it supports paired spectrum for both FDD and TDD operation as recommended by ECC Recommendation (04)05 which provides guidance on frequency assignments for BWA in the 3.5GHz bands. However, if TDD operation is favoured there are clear assignment efficiencies to be gained from single contiguous assignments.

iv. Modulation;

WiMAX is based on OFDM (Orthogonal Frequency Division Multiplex) and OFDMA (Orthogonal Frequency Division Multiple Access) technologies which have inherent advantages in throughput, latency, spectral efficiency, and supports advanced antennae technology. Within the OFDM framework modulation complexities range from QPSK up to 64-QAM.

A comprehensive description of the WiMAX technology can be found at <http://www.wimaxforum.org/technology/documents>

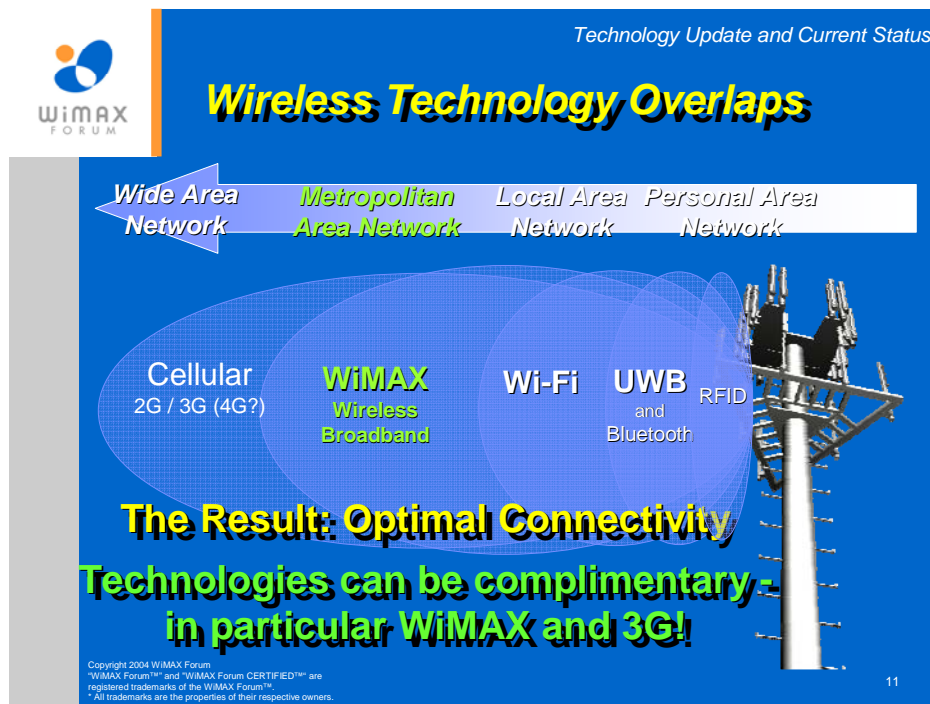
v. *Standard applicable (if existing);*

IEEE 802.16 - 2004 / ETSI HiperMAN
“LAN/MAN Broadband Wireless LANS”

IEEE 802.16 - 2005e / ETSI HiperMAN
“Combined Fixed and Mobile Operation in Licensed Bands”;

vi. *Coexistence of various technologies and variations of the same technology;*

Wi-Fi, WiMAX, 3G technologies are all complementary technologies. Through a combination of technologies it will be possible to provide users with enriched services provided by the most appropriate connection over existing networks according to location and preferred access modes.



c) *What type of use is best suited to BWA technologies: connection to end user, transmission network or both?*

As stated earlier, the WiMAX technology is well suited for the market segments such as Fixed/Nomad/Mobile and even backhaul applications. The regulatory framework should take account of the flexibility offered by today’s advanced technologies such as WiMAX by adopting both TDD/FDD technology neutral as well as service neutral license terms and conditions – aimed at encouraging flexible usage modes across all BWA market segments.

d) What types of service could be offered by each technology? Please explain in concrete terms the amount of spectrum needed to provide these services and the capabilities of the identified technologies.

WiMAX technology is focussed on the delivery of data services and is IP centric. Dynamic scheduling and QoS are features of the standards allowing a broad range of applications to be delivered ranging from real time services such as VoIP or Internet gaming to non-real time file transfers of all types of business or entertainment data.

As a minimum the WiMAX Forum advocates that at least around 2x25MHz is made available per licence. This has been recognized by some administrations around Europe. For example, the German administration reviewed their spectrum award in this band to increase the block size on offer in their recently completed auction procedure.

The WiMAX Forum believes that block allocations for BWA must be of a large enough size to allow operators to succeed in the market, but not so large that they are wasteful of spectrum. We also believe that any guard band requirements are managed by the operators to maximise spectrum efficiency.

e) What is the target market and how big is the market envisaged for the technologies/services offered?

2. Frequency Use

a) What comments do you have on the content of the CEPT/ECC decision and recommendation in Annex?

The WiMAX Forum and some of its members were instrumental in the development of the proposed CEPT/ECC Decision and Recommendation and fully endorse their approval. The WiMAX Forum particularly supports the full usage mode flexibility.

b) Under what conditions do you consider that an operator authorised to operate FWA in the 3.5 GHz and/or 24.5 GHz or 27.5 GHz bands could expand their services, changing their current technology to use BWA technology?

Currently Mobile WiMAX is supported on TDD only and as such if an operator were to upgrade their existing network using the latest mobile WiMAX technology, therefore, provided the licence blocks of spectrum are typically 2x25 MHz, then changing current technology would be feasible.

The WiMAX Forum does not currently support the use of the 24.5 or 27.5 GHz bands and therefore offers no opinion.

c) Which frequency bands do you consider suitable for the provision of BWA, taking into account such factors as international harmonisation, the state

of technological development and the costs involved, the type of authorisation (with waiver or not of radio license), as well as the need for coexistence with other technology systems? Please state reasons.

The WiMAX Forum is currently focused on four frequency ranges for WiMAX Broadband Wireless applications: -

- ***For licensed spectrum applications***

2300 – 2700 MHz, within which the WiMAX Forum is developing certification profiles for Broadband Wireless Access (BWA) equipment in the 2300 – 2400 MHz or 2496 -2690 MHz bands. These support the full range of fixed/nomadic and mobile usage scenarios.

This frequency range offers good propagation characteristics for mobile and nomadic services and the potential for global roaming because spectrum within this range is potentially available in many countries.

3.3-3.8GHz, within which spectrum in the 3.3-3.4GHz, 3.4-3.6GHz or 3.6-3.8GHz bands would also provide excellent opportunities for fixed, nomadic and mobile BWA applications. This spectrum also offers roaming opportunities because of the wide geographical availability of spectrum from within this range. The WiMAX Forum is already certifying fixed/nomadic equipment for the range 3.4 – 3.6GHz.

- ***For unlicensed/lightly licensed applications***

5.725-5.85GHz, which is available for such purposes in many countries of the World.

- ***Sub 1 GHz for rural BWA applications***

Sub 1 GHz, which could possibly be identified inside EU within the digital dividend resulting from the switchover to digital TV

For truly mobile systems, the WiMAX Forum sees the 2.3GHz and 2.5GHz bands being best suited to conventional licensed use so that QoS and other aspects of performance are predictable. This will help to build market acceptance and establish market confidence in BWA for a wide range of applications.

3. BWA implementation in Portugal

a) Do you consider that access to BWA frequencies should be restricted to certain bodies? If so, please indicate which ones, and give reasons who you consider it necessary to put such restrictions in place.

The WiMAX Forum does not have a specific position regarding who should gain access to the BWA frequencies. However, the Forum would be concerned if the licence award process resulted in excessive fragmentation of the spectrum, which can lead to over complex coordination and cooperation requirements.

b) Do you consider that BWA services should be offered nationwide or would it be more suitable to limit them geographically (in which case please give details of the geographic location(s) you consider the service should be limited to)

The WiMAX Forum has no specific preference on the licensing arrangements. However WiMAX is developed on the basis of a global standard. The ability to offer services across Portugal and worldwide enabling roaming capability would be advantageous. Roaming, interconnection, coverage issues will be challenging if licences are offered as regional only. Regional licences can provide opportunities for more focused smaller operators however the viability of business cases needs to be taken into account and market evolution made possible through e.g. secondary trading and/or consolidation.

c) What type of procedures do you consider most suitable for the allocation of rights/selection criteria for BWA systems in the bands mentioned in the Annexes?

The WiMAX Forum has no specific preference on the licensing award procedures.

d) What type of requirements, as regards coverage obligations, quality of service, interoperability or other, do you consider should apply to usage rights?

The WiMAX Forum is keen that licence awards result in timely deployment. This is important to ensure that the opportunities and benefits of BWA based on multi-vendor, interoperable equipment are realized as soon as possible. This timely start will provide the launch pad for future evolution towards the personal broadband vision that can support the objectives of the i2010/eEurope's Action Plan 2005, which identifies broadband access as an important issue.

e) Do you consider that BWA services will complement or coincide with other existing or future technologies (in operation or planned) in the same or other frequency bands?

The WiMAX Forum believes BWA services can be offered using complementary technologies. They would sit alongside other technologies offering similar services with 3G as a typical example. Typically Mobile WiMAX offers higher data rates and advanced applications than 3G services. WiMAX is optimized for IP-Based high-speed wireless broadband whereas 3G is optimized for cellular voice and moderate data-rate applications.

4. Introduction of BWA systems in the market

a) What conditions do you consider important for the successful implementation of BWA technologies?

The main conditions for market success will include:

- License coverage areas compatible with efficient business cases (national / regional) with secondary trading and consolidation as open options
- Sufficient amounts of spectrum made available to each operator (2x25 MHz)
- Flexible usage mode rights allowing for any BWA application to reach the market to consolidate RoI and business models
- Realistic spectrum license durations (15 years average)

For further information on BWA market policy issues, WiMAX Forum would welcome Anacom's participation to our Regulatory Outreach program made available to NRAs from our website (registration: http://www.wimaxforum.org/regulator_membership/)

b) When do you consider that BWA technologies will have the necessary conditions for successful implementation in the Portuguese market?

The WiMAX certification profiles detailed in Table 1 details what profiles are currently supported by certified equipment. Currently only certified product against IEEE 802.16-2004 is available. The Mobile WiMAX certification scheme to IEEE 802.16e-2005 will be available for product interoperability testing by Q2 '07.

c) In what way would you be interested in using and eventually commercialising BWA technologies?

The WiMAX Forum would encourage Anacom to make spectrum available for BWA deployment in a timely manner taking account of our response throughout this document. WiMAX is a technology available today with over 250 operator trials and deployments in over 65 Countries.

*More than 250 Operator Trials and Deployments
in 65+ countries! WiMAX is REAL!*



5. Are there any other points you consider relevant?