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WiMAX Forum™ Regulatory Working Group

Initial Certification Profiles and the European regulatory framework – September 2004

Introduction

Standardisation work for Fixed Wireless Access (FWA) has matured and stabilised over recent years. Both ETSI and IEEE have published standards in this field and work continues with refinement and enhancement activities in both these areas. Based on these standards it is now possible to consolidate towards a consistent set of technology choices that will bring economies of scale important for the success of FWA.

Involving all elements of the industry including vendors, operators and regulators, the WiMAX Forum has been working to focus the technological options based upon the published standards. The forum has now defined an initial set of baseline “profiles” for FWA systems that will allow large scale commitment from the industry, consistent with driving down the equipment, system and deployment costs demanded by the operators.

This paper looks at those initial profiles, identifies the key characteristics and evaluates them against the existing European regulatory framework in which they would be expected to operate. Any potential areas of conflict are identified so that timely action can be taken to minimize entry barriers for WiMAX Forum Certified™ equipment.

WiMAX Forum Certification Profile Selection Process

The forum technology and certification working groups are finalising the initial certification profile for the first wave of WiMAX Forum Certified™ equipment to get underway at the end of 2004. These are presented below in Table 1.

The process of developing certification profiles is an ongoing procedure within the Forum working groups. Consideration is given to technological developments and to evolving market requirements in order clarify the appropriate choices for further development of the certification test procedures. Therefore the profiles identified in Table 1, being based on IEEE802.16-2004, represent only the first set of choices and further profiles will be defined subsequently that will reflect standards development, new frequency band opportunities or perhaps other market driven requirements like further channel width options.

Freq Band (MHz)	Duplexing	Channelisation (MHz)
3400 - 3600	TDD	3.5
		7.0
	FDD	3.5
		7.0
5725 - 5850	TDD	10

Profiles are for PMP systems only and are for 256 OFDM

Table 1: “First Round” profiles currently identified for the initial certification process

The “First Round” profiles are being considered to establish the first development of the WiMAX certification process heading for completion by the end of 2004. These profiles identify the importance

attached to the 3.5 GHz band and the 5.8 GHz band for the European markets and reflect the opportunities seen in both licensed and licence-exempt¹ frequencies.

As the required WiMAX interoperability test procedures and certification processes for the “first round” systems are anticipated to be ready for testing trials at the end of 2004, the first WiMAX Forum Certified™ products consistent with this baseline will appear on the market around the third quarter of 2005.

Key Profile Characteristics

- All the current profiles under consideration operate using OFDM multiple carrier schemes and a Fast Fourier Transform (FFT) size of 256 points has been selected. OFDM is a robust modulation that facilitates the possibility for non line-of-sight (NLOS) operation also.
- TDMA is currently anticipated as the multiple access mechanism with an option for OFDMA uplink sub-channelisation.
- OFDM can be scaled to operate within a variety of channel widths. Widths of 3.5 MHz, 7 MHz and 10 MHz have initially been selected as these are consistent with allocations and assignments in many regions around the world.
- Both FDD and TDD techniques are included. Both techniques offer specific characteristics that can be advantageous for service providers and are supported in the standards..

Relationship to European Wireless Regulatory Framework

Although many aspects of the initial WiMAX profiles identified in Table 1 already align with the regulatory framework in place within many European countries there are a number of areas where improvements could occur.

Channelisation: The options detailed in CEPT/ERC Recommendation 14-03E already include the possibility for 3.5 MHz or 7 MHz channels consistent with the requirements of the first phase profiles in the 3400 – 3600 MHz band. However, non-harmonised frequency assignments can exist as either 50 MHz or 100 MHz duplex spacing are recommended by CEPT.

Assignment Blocks: The details of assigned blocks in the 3.5GHz band vary from country to country across Europe. A key requirement is that sufficient spectrum as a block is available for viable system planning to provide broadband capacity. There must be capacity for systems to evolve as services are taken up as well as sufficient spectrum for proper deployment planning. In order to fully exploit the full range of spectral efficiencies and high speed delivery, sets of 4 unconstrained channels represent a good compromise between viability and effective assignment.

Duplexing technique: The regulatory ETSI standards remain largely silent and neutral about the duplexing technique, and this is treated in a non-harmonised way by many national regulations. This leads to uncertainties about access to markets and compliance with licence conditions. Both TDD and FDD options are attractive to operators based on their anticipated service requirements and both should be equally possible.

Frequency Bands: The **3.5GHz band** has generally been made available through licensing as it is identified as a “preferred” band for FWA in CEPT/ERC Recommendation 13-04. However national assignments are not harmonised either in terms of the actual frequencies used or the block sizes of the licences. It is recognized though that developments currently underway with a new draft ECC Recommendation (04)05 for the 3400- 3600 MHz and 3600-3800MHz bands address this aspect and this is welcomed as it will encourage greater assignment harmonisation across Europe and increased consistency concerning licensing and technical conditions. For new allocations, the Forum recommends band plans supportive of TDD and/or FDD, and per operator paired blocks of about 20-40MHz or wider could be appropriate for example to accommodate 4 to 6 channels of up to 14MHz wide to enable true broadband services.

¹ In this context, “licence-exempt” refers also to light licensing schemes and implies any process that does not involve regulatory frequency planning or co-ordination between potential or existing operators within the band.



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The **5.8GHz band** however is currently available in only a limited number of European countries. Although studies are underway within CEPT working groups, the outcome remains uncertain and projected timescale suggest that the regulatory decisions may not be complete until the end of 2005. When time is allowed for individual national measures, it can be estimated that band availability on a general basis may not occur until well into 2006. This is clearly inconsistent with both the WiMAX certification process and the ETSI standard process which may result in a stable draft harmonised standard being available around spring 2005.

Power Levels: Being a licensed band there are in theory few constraints on EIRP that will impact deployment possibilities in the **3.5GHz band** and to date the setting of limits has been on a national basis and loosely defined by ETSI equipment standards. However it is noted that the new draft ECC Recommendation (04)05 for the band providing assignment guidance does suggest "guidance limits" for EIRP and these should be looked at carefully from the point of view of future systems. The draft Recommendation is based upon ERC Report 33 dealing with existing FWA systems and may not accurately reflect the characteristics of developing systems. The resulting guidance material should be carefully considered before acceptance.

In the **5.8GHz** licence-exempt band it is clear that EIRP restrictions will impact the ability of systems to provide viable services over large ranges. Typically in the 5.8GHz band, EIRP restrictions currently in force in certain countries would limit ranges to around 5km. Additionally with little margin in the link budgets, they limit the possibilities for NLOS operation.

Harmonization of regulatory procedures across Europe

In order to promote and accelerate the take up of WiMAX products across Europe regulatory barriers to market entry and deployment need to be minimized. In EU countries, market entry for wireless products is tackled by application of the RTTE Directive 1999/5/EC providing the possibility for self declaration of product compliance and recognition across all the member states.

However market access for FWA is hampered by the lack of frequency band harmonisation and non-uniform procedures associated with country-specific notification identified in the Directive. The procedure is open-ended with no obligation for a response. Different countries attach varying degrees of importance to this process and it is difficult to get visibility of the specific national procedures. The possibility for specific national technical restrictions introduces unacceptable uncertainties in the "getting to market" process.

Evolutionary Path and Future Profiles

As services and technologies mature so the expectations for performance and service accessibility will increase. WiMAX profile choices will evolve to address the changing environment, market demands and standards developments. Already consideration is being given to the second phase laid out in Table 2 although some final decisions remain dependant upon regulatory and market developments. Consideration will be given to additional profiles for new frequencies as they become available.

Freq Band (MHz)	Duplexing	Channelisation (MHz)
2500 - 2690	TDD	5.0 / 5.5
	FDD	5.0 / 5.5

Table 2: Tentative profiles under consideration for the next round of the certification process

It is expected that in time the traditional views concerning fixed and mobile systems will start to blur as the market demands more cost effective solutions driving towards “self install” and indoor terminal devices. Terminal devices may change in their nature becoming less of a permanent installation towards something more nomadic in nature.

The WiMAX Forum will also continue to work with world standards and regulatory bodies to advance the allocation of licensed and licence-exempt spectrum in lower frequency bands. Bands in the sub 1 GHz frequency range are of particular interest to the forum and are expected to become available in a number of territories as other services migrate to new technologies or other frequency bands.

Developments in regulatory frameworks will need to recognise and be prepared for this evolution that will be driven by the market.

WiMAX Forum Action Requests

As a result of the considerations in this paper there are a number of key actions the WiMAX forum would like to emphasise. The forum encourages administrations to:

- Take a neutral stance on technological detail in national licensing plans to allow the greatest flexibility for FWA opportunities.
- Increase the degree of assignment harmonisation wherever possible. Consistent minimum frequency block size appropriate for broadband delivery and duplex spacing.
- Consider opening the 5.8GHz band ahead of the completion of the CEPT process and to avoid overly restrictive transmitter e.i.r.p.limits.
- Have in mind the possibility for rapid technological developments when agreeing regulatory measures. Including the possibility for nomadic and indoor “self install” terminals.
- Support greater harmonisation of the RTTE Directive Notification procedure or remove the need completely with greater frequency band harmonisation.

About WiMAX Forum™

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.

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