



## Mobile WiMAX™ Certification

June 2008

### Background:

Certification lies at the core of the WiMAX Forum® mission. WiMAX Forum Certified™ equipment gives operators a powerful platform to roll out robust services and applications across a wide range of devices. The availability of WiMAX Forum Certified equipment will accelerate the adoption rate of WiMAX™ technology by promoting the continued introduction into the market of a broad selection of interoperable devices from many vendors at affordable prices.

Since the announcement of the first WiMAX Forum Certified products in January 2006, the certification program has rapidly expanded its scope, addressing new profiles (meaning new spectrum bands) and expanding its global presence. There are now more than 30 certified Fixed WiMAX™ products and eight certified Mobile WiMAX™ products. This is just the beginning. By the end of 2008 more than 100 Mobile WiMAX products are expected to complete the certification process.

The enclosed messages, questions and answers are intended to update the market and WiMAX Forum members with the latest information on mobile WiMAX Certified products.

- **Mobile WiMAX certification remains on track, and continues to meet WiMAX Forum schedules for delivering WiMAX Forum Certified products to the market.**
  - The first round of Mobile WiMAX Certification for the 2.3GHz band (profile MP01) was completed in April 2008.
  - Additional Mobile WiMAX Certified products in other frequency bands are expected later in 2008.
- **WiMAX Forum has the capacity to certify the hundreds of WiMAX products that will enter the global market.**
  - Globally there are 6 certification labs in operation. They are located in: Spain (AT4wireless in Malaga), Taiwan (Advance Data Technology Corporation and TTC/CCS in Taipei), China (China Academy of Telecommunications Research in Beijing), U.S. (AT4wireless in Virginia) and Korea (Telecommunications Technology Association).
  - Two more labs (India and Japan) are already scheduled to be opened in 2008.
- **The pipeline of vendors seeking Mobile WiMAX certification continues to flourish.**
  - Numerous vendors are registered to participate in the next WiMAX Forum Mobile PlugFest in June 2008, further highlighting the rapid expansion and development of the WiMAX ecosystem.

## Frequently Asked Questions and Answers:

### 1. What is the timeline for Mobile WiMAX Forum Certified products?

The first set of Mobile WiMAX products in the 2.3GHz band completed the certification process in April 2008. Eight Mobile WiMAX Certified products gained approval, including four base station modules and four subscriber station modules, representing four different equipment vendors: Posdata, Runcom, Samsung, and Sequans. WiMAX Forum expects the second round of Mobile WiMAX products to become WiMAX Forum Certified in mid-2008.

### 2. What initial mobile features will be certified for interoperability?

Products gain certification by undergoing and passing a set of tests that are designed to demonstrate that the products can meet interoperability requirements and conform to the standard. All products must meet a minimum set of mandatory requirements. Products can also seek certification for advanced features such as MIMO and Beamforming. The WiMAX Forum anticipates that the ability to test additional advanced features will be added as both the technology and market matures.

### 3. I've heard about Wave 1 and Wave 2 Certification, what does that mean?

Waves were initially internal terms used to define product features as the WiMAX Forum began to approach certification testing. To minimize confusion in the marketplace, these terms have been replaced by a new naming convention for certification profiles. Each profile is characterized by the frequency band, channel bandwidth and duplexing scheme. Here are few examples using the new naming convention:

Profile Name	Profile Characteristics (Band, Channel BW, Duplex)
MP01	2.3-2.4GHz, 8.75MHz, TDD
MP05	2.496-2.69GHz, 5+10MHz, TDD
MP09	3.4-3.6GHz, 5MHz, TDD
MP12	3.4-3.6GHz, 10MHz, TDD

### 4. But I've heard there may no longer be a Wave 1 Certification, is that true?

The WiMAX Forum called the initial set of tests for certification with a SISO (Single Input/Single Output) antenna implementation Wave 1. Wave 1 tests ensure that WiMAX products meet a minimum set of mandatory requirements specific to the 2.3 GHz frequency in support of the Korean WiBro service offered by Korea Telecom and supported by several device vendors. Thus, the WiMAX Forum has certified products in Wave 1 only for this profile and no other.

### 5. What about the rest of the products, how will they be certified?

Wave 2 certification is the standard baseline set of requirements that mobile certified products must meet. Such requirements ensure devices will be capable of advanced features such as MIMO (multiple input/multiple output) and Beamforming, as well as modes of operation such as idle and sleep modes. To accelerate certified Mobile WiMAX products into the market, the WiMAX Forum updated its standards to require that all future products meet at least this minimum set of requirements. The first WiMAX Forum Certified products based on Wave 2 requirements are expected to be available later this year.

### 6. How will products be categorized in the WiMAX Forum certification process?

The WiMAX Forum certifies product features for certain frequencies and bandwidths that you may have heard referred to as profiles. Products may seek certification for mandatory or advanced features according to frequency, channel bandwidth and duplexing mode. The WiMAX Forum assesses market conditions and market readiness for new profiles based on global demand and the products that our members are designing and manufacturing for these frequencies.

**7. Why do we need certification profiles and what are they?**

A certification profile is tied to a specific frequency, channel bandwidth and duplexing mode. Frequency band and channel requirements vary by country, and WiMAX technology, like GSM, has the flexibility to operate in multiple frequencies. The specific certification profiles that are supported can vary across different countries and service providers. WiMAX subscriber stations can incorporate multiple radios that operate in multiple frequencies, and allow roaming among different networks.

**8. What mobile frequencies will be addressed by WiMAX Forum certification?**

The first certified mobile products operate at 2.3 GHz and meet the regulatory requirements of the Korean market. This will be followed by products at 2.5 GHz, a frequency band that is widely used in the global market. WiMAX Forum Certified products for Mobile WiMAX started in December 2007. Certification will continue to add additional profiles. As such, with what we are currently seeing in the market, we anticipate that 3.5 GHz will be added as the next frequency that the WiMAX Forum will certify. This is expected to begin in the second half of 2008.

**9. What are the first types of equipment that will be certified for Mobile WiMAX?**

Base Station equipment, Customer Premises Equipment (CPE), and Subscriber Stations, including: notebook computers, PC cards (PCMCIA), PC Express, mini PCI cards, and portable entertainment devices.

**10. What's involved in certification testing?**

To meet the minimum mandatory requirements for WiMAX Forum Certification, products have to pass multiple tests. These tests are defined under the auspices of the WiMAX Forum Certification Working Group (CWG). Vendors submit products for certification to approved WiMAX Forum Designated Certification Laboratories (WFDCL). If all tests are not passed, vendors have the opportunity to make updates to their products and resubmit for final approval. Once a product passes all interoperability and conformance tests it receives WiMAX Forum Certification and can be marketed as such, including the use of the WiMAX Forum Certified™ logo.

**11. Is backward and forward compatibility preserved as WiMAX standards evolve?**

Yes, all products based upon 802.16e-2005 will be backwards and forward compatible, and forward to the future 802.16m IEEE standard. The need to update and extend the certification program has to be carefully balanced with the need to preserve continuity in the marketplace and to ensure that equipment already deployed will interoperate with new equipment. The WiMAX Forum is committed to ensuring backward compatibility for all WiMAX Forum Certified devices. Any new certified product will be backwards compatible with all products certified within the same certification profile.

**12. In which labs will mobile certification take place?**

There are currently six WiMAX Forum Designated Certification Labs (WFDCLs) that are open for certification of Mobile WiMAX equipment. Those Labs are: ADT (Taipei, Taiwan), AT4 wireless (Malaga, Spain), AT4 wireless (Herndon, United States), CATR (Beijing, China), TTA (Seoul, Korea), TTC/CCS (Taipei, Taiwan).

**13. When will the WiMAX Forum begin work certifying FDD Mobile WiMAX products?**

The IEEE 802.16 standard includes both FDD and TDD. Mobile WiMAX TDD is currently included within the IMT-2000 family of standards, and Mobile WiMAX FDD is to be proposed for inclusion later this year as enhancement of the existing air interface.

With an increased interest in the 700 MHz band and more service providers around the world choosing WiMAX as their next generation mobile broadband technology, the WiMAX Forum has added this frequency band to our technology roadmap. Current market demand indicates that the priorities for additional TDD and FDD profiles are 700 MHz and FDD profiles for the US "AWS" band. The WiMAX Forum is currently working on FDD certification profiles for this spectrum. Work on the technical specifications for 700 MHz WiMAX Forum certification is already underway in the association's working groups. The specifications will be published as they are completed and they will support both TDD and FDD certification profiles.

**14. How many vendors are you expecting for Mobile WiMAX Certification?**

Hundreds of products are expected to be submitted for certification testing. The WiMAX Forum anticipates more than 100 products to be certified by the end of 2008, and more than 1,000 by the end of 2011. This does not include the wide range of Consumer Electronics devices and the hundreds of notebook PC's and other products embedded with pre-certified WiMAX modems that will also be available. Nearly one-quarter of the WiMAX Forum membership is represented by systems vendors, and most of them are expected to submit products for certification over the next few quarters.

**15. Who are the vendors making WiMAX Forum test equipment?**

Testing equipment is supplied by world leading vendors including: Agilent, Anite, AT4, Azimuth, Innowireless, Tektronics, Rohde and Schwarz and Sanjole.

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