



# WiMAX Interoperability in an Open Ecosystem

## The Importance of WiMAX Certification



# Leading the Way to WiMAX Interoperability

## The Importance of Certification in an Open WiMAX Ecosystem

Deploying a new technology like WiMAX wireless broadband requires striking a balance between bold investment and prudent planning. The more open, flexible and interoperable options a solution provides, the easier it is to find the balance point, aligning innovative new capabilities with practical and strategic business objectives.

To ensure that you have reliable, high quality options for your WiMAX deployment, Motorola is leading the industry toward an open ecosystem of solutions across infrastructure, devices, chipsets and application vendors. By encouraging certification through an active and growing WiMAX Forum<sup>®</sup>, as well as through our own extensive parallel testing and validation initiatives, Motorola is helping to ensure that 802.16e WiMAX is an open, global, interoperable technology that you can embrace with confidence, and deploy with success.

### Introduction

The IEEE 802.16e standard for WiMAX technology was created to enable a spectrally efficient, high performing solution for fixed, nomadic and mobile WiMAX. An open, global standard, IEEE 802.16e provides a platform for solutions across chipset, devices, infrastructure, core, services, and application vendors.

Defining the standard, of course, is simply the first step in delivering a WiMAX solution. The next is ensuring that each element can perform within its defined parameters. Within the WiMAX ecosystem, certification of standards compliance is the role of the WiMAX Forum, a global organization representing the full scope of WiMAX solution providers, from chipset manufacturers to applications developers, infrastructure vendors to device makers. The growing, 500+ member WiMAX Forum is enabling and testing interoperability in controlled environments, helping to create a critical mass of next generation wireless broadband solutions. Motorola is a leading WiMAX Forum member, with representation in every key working group.

While WiMAX Forum enables interoperability testing in the laboratory, Motorola is also proving interoperability in network environments, working together with multiple vendors and operators to deploy real-world solutions in 802.16e WiMAX engagements, trials, contracts, and deployments across the globe. With this two-pronged approach to interoperability — encouraging certification in controlled environments and demonstrating it in functioning networks — Motorola is leading the way to open, flexible WiMAX solutions that can be deployed with confidence.

## Motorola — Leading the Way to an Open WiMAX Ecosystem

### Across Portfolio

Base Stations  
ASN Gateway  
Core Network  
Device  
Chipset  
Applications

### WiMAX Forum

#### Multi-Vendor Approval

- 500+ Members
- Defined Working Groups

#### 100s of Tests

- RF Level
- System Level
- Interoperability

#### Pre Certification

- Plug-fest

#### Certification

### Parallel Interoperability Initiatives

Chipset Vendors including:

- Beceem
- GCT
- Intel
- Sequans
- Runcom

Device Vendors including:

- Zyxel
- ZTE
- Samsung
- Nokia
- OQO



### WiMAX Standards Certification

Nearly every purchaser of technology understands the importance of standards. Innovation in technology can take a virtually infinite number of paths. Some will be widely adopted and lead to future success. Others will dead-end. No one wants to find themselves on the wrong road.

Standards bodies collaborate to define a path that solution providers, and ultimately their customers, can follow with confidence. Once standards are defined, however, an arena is needed for intra-vendor cooperation, interoperability testing and compliance demonstration. For the IEEE 802.16e WiMAX standard, this arena is provided by the WiMAX Forum®.

Motorola is a principal and leading member of the growing, 500+ member WiMAX Forum, a global organization representing the entire WiMAX ecosystem, including chipset manufacturers, applications developers, infrastructure vendors and device makers. Members come together to jointly define and conduct hundreds of controlled interoperability and performance tests for their respective WiMAX solution elements. The WiMAX Forum then awards certification to solutions that successfully pass the tests required for their category.

The WiMAX Forum is committed to thoroughly testing the implementation of IEEE 802.16e WiMAX standards in finished devices as well as base stations. The Forum encourages the participation of a broad range of vendors in order to:

- Enable an open, competitive WiMAX ecosystem
- Provide multiple solution options for operators
- Promote the economies of scale inherent in a global market
- Ensure interoperability of solutions

WiMAX certification is a four-step process:

#### Step 1 - Equipment Submission

- Select Profile\*
- Self test
- Participate in Plug-Fests

#### Step 2 - Conformance Test

(between devices and base stations)

- Certification laboratory tests the equipment's protocol and radio compliance

#### Step 3 - Interoperability Test

(between devices and base stations)

- Interoperability of various features with other vendors

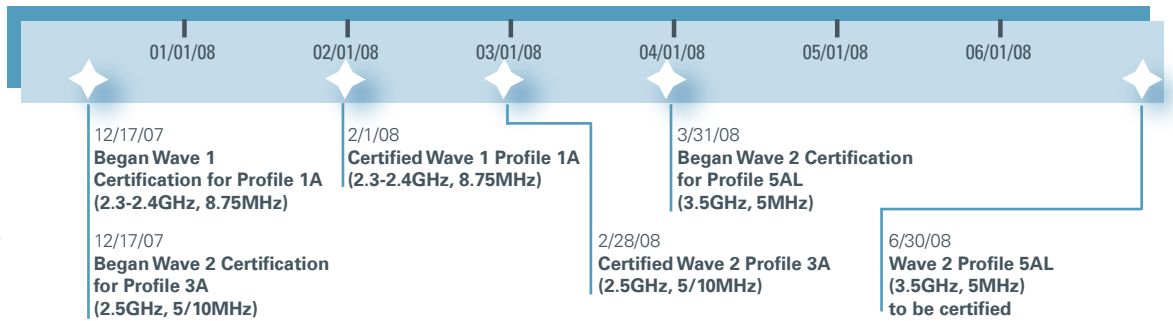
#### Step 4 - Certification Issue

- Announce and issue Certificate with test report

\* Profile refers to specific technology features associated with a particular WiMAX frequency and channel bandwidth pair. For example, the band class 3A profile is for 2.5GHz frequency with 5 and 10MHz bandwidth.

Motorola has already committed to the first three 802.16e based WiMAX profiles, representing 3.5, 2.5 and 2.3GHz frequency, and will consider other profiles as the Forum accepts them. The WiMAX Forum official test labs have begun accepting requests for Wave 2, band class 3A (2.5GHz 5/10MHz) certification and Motorola will be among the first to receive this certification. Motorola has been a leading participant at each of the mobile plug-fests conducted to date. In fact, we are one of the only participants that made actual products available (infrastructure, devices, chipsets) dating from the very first mobile plug-fest in 2006.

## Mobile Certification Plan Timeline through June 30, 2008



### WiMAX Certification Timeline

The WiMAX Forum initially planned two waves of certification for each profile; Wave 1 would test basic feature interoperability and Wave 2 would test advanced features. To simplify the process, most profiles will be tested directly as part of Wave 2 certification.

(Source: WiMAX Forum®, January 2008)

### Beyond WiMAX Certification

The WiMAX Forum tests hundreds of protocols, radio systems and feature sets in carefully designed and controlled multi-vendor environments. This rigorous testing makes WiMAX Forum certification an important step to ensure operators have access to a broad spectrum of compatible devices supplied by multiple vendors. However, certification alone cannot guarantee interoperability.

WiMAX Forum testing is necessarily performed in a laboratory environment. While the Forum carefully manages the logistics of testing a wide base of suppliers over a full range of profiles, its laboratories cannot duplicate every situation that might be found in a live, operating network.

To be successful in its respective market, each WiMAX network deployment will require customized features that go beyond the scope of certification. Each requires additional testing and verification in controlled environments, as well as further proving in a First Office Application (FOA) where devices, base stations and other elements unique to the particular network are methodically integrated and verified.

WiMAX Forum certification is an important first requirement for interoperability. However, as with all wireless technologies that have come before, additional due diligence will be required to ensure interoperability across any system. Operators will benefit from working with vendors who can demonstrate progress in interoperability testing and validation.

In particular, it is important that WiMAX vendors are well connected to other suppliers, especially those who supply chipsets, the engine of any equipment. Today, most of the protocol and radio level IEEE 802.16e specification features are implemented on very small chips. Working directly with chipset vendors allows the additional due diligence of testing at the product development level, rather than simply testing with a finalized product.

### Motorola is Demonstrating WiMAX Interoperability

Motorola has representation and leadership in all the WiMAX Forum working groups, and is leading the charge for interoperability testing and certification. Meanwhile, we are simultaneously working with WiMAX operators and vendors around the world to deliver real-world interoperable 802.16e WiMAX solutions. Motorola parallel initiatives include:

- Serving as a lead supplier for WiMAX contracts around the globe that are successfully demonstrating interoperability across devices, infrastructure, core, accounting, billing, VoIP and other applications
- Working actively with vendors including Samsung, Nokia, ZTE, Zyxel, and OQO to ensure seamless inter-operation at service launch
- Engaging with leading manufacturers to ensure that devices made with their chipsets adhere to the WiMAX specifications and work well with Motorola solutions
- Making Motorola's own development labs available to chipset manufacturers for testing and refinement of their solutions, including Intel, Beceem, GCT, Sequans and Runcom
- Conducting numerous interoperability demonstrations of equipment and devices across a number of other vendor's solutions
- Proving reliability with SEI level 5 testing and a proven M-Gate process that continues to test and refine Motorola products beyond certification

In addition, Motorola's ASN Gateway is functionally aligned to the Profile C specification represented by the WiMAX Forum. The Profile C aligned solution offers a means for cross-vendor interoperability across WiMAX base stations and ASN Gateways where vendors' solutions have demonstrated necessary capabilities.

## ***Motorola's commitment to certification and early interoperability initiatives are playing a significant role in advancing the overall WiMAX industry toward a true, open ecosystem***

### **Conclusion**

The primary advantage of an open WiMAX standard is to ensure that operators have a wide variety of flexible, multi-vendor options when planning and deploying their own WiMAX networks. Only by accessing a rich field of application, device and infrastructure options can each operator customize a solution that can meet their own strategic performance goals ... and in turn, support success in their competitive arena.

WiMAX Forum® certification is an important way for vendors to build confidence in their solution's interoperability and conformance to key performance specifications. Certification offers operators a greater level of assurance that their investments can deliver reliable and flexible solutions. But certification, as important as it is, cannot be considered the final step in interoperable WiMAX solutions. To design and deploy a successful WiMAX network, each operator must choose vendor partners who are prepared to continue testing, proving and integrating certified equipment in real-world, multi-vendor environments.

Motorola is committed to providing our customers with access to a true open ecosystem of WiMAX solutions across infrastructure, devices, chipsets and applications. We have demonstrated that commitment with early and continued leadership in the WiMAX Forum. Our solutions are WiMAX Forum certified. We have also gone beyond certification, with a host of parallel interoperability and validation initiatives that are playing a significant role in advancing the WiMAX industry as a whole.

If a WiMAX device works with Motorola WiMAX infrastructure, the path is paved for it to work with all certified WiMAX infrastructure vendors. By choosing Motorola as its WiMAX vendor, a network operator's path is paved toward smoother, faster, WiMAX network deployment and operation.



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