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## Frequently Asked Questions

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### **WiMAX Technology**

#### **1. What is WiMAX technology?**

WiMAX™ is based upon the IEEE 802.16 standard enabling the delivery of wireless broadband services anytime, anywhere. WiMAX products can accommodate fixed and mobile usage models. The IEEE 802.16 standard was developed to deliver non-line-of-sight (LoS) connectivity between a subscriber station and base station with typical cell radius of three to ten kilometers. All base stations and subscriber stations claiming to be WiMAX compliant must go through a rigorous WiMAX Forum Certified™ testing process.

#### **2. What is the data transfer speed of WiMAX technology for end users?**

Users can expect to have broadband access speeds ranging from 1-5 Mbps depending on the service provider offering. Plus, there is a range difference because it depends on a number of factors, including which frequency is being used, distance of the user from the base station or node, whether there is line of site or NLoS to the base station, and the number of users on the network.

When the WiMAX Forum refers to 40 Mbps, it is referring to a single channel in wireless frequency (as part of the network) that is likely shared among multiple users. Individual users will have access to that amount of capacity, but the likelihood is they will have the ability to achieve downlink speeds of 1-5 Mbps, which is similar to the cable experience. There is the potential to burst to higher speeds, but that would depend on the operator's plans and business model.

#### **3. What are the key elements of WiMAX technology?**

A key differentiator for WiMAX is the interoperability of WiMAX Forum Certified equipment, resulting in mass volume economy of scale and assurance for service providers that when buying equipment from more than one company, the technologies are interoperable. The WiMAX Forum has assembled an alliance of leaders in the communications and computing industries to drive a common platform for the global deployment of IP-based broadband wireless services. Other key elements include cost, coverage, capacity and standards for all wireless usage models.

- **Standard for all usage models (fixed to mobile):** By leveraging the same technology networks, WiMAX technology will become the most cost-effective solution for carriers to deploy for any usage model including fixed, portable, nomadic and mobile.
- **Wider coverage:** The technology behind WiMAX is optimized to provide excellent non-line-of-sight (NLoS) coverage. NLoS advantages are coverage of wider areas, better predictability of coverage and lower cost as it means fewer base stations and backhaul, simple RF planning, shorter towers and faster CPE install times.
- **Higher capacity:** WiMAX technology utilizes Orthogonal Frequency-Division Multiplexing (OFDM) over EDGE, GPRS, HSPA to deliver higher bandwidth efficiency and therefore higher data throughput, with more than one Mbps downstream and higher data rates. Adaptive modulation also increases link reliability for carrier-class operation and the possibility to keep higher order modulation at wider distance extend full capacity over longer distances.
- **Lower cost:** A standards based platform for WiMAX technology drives down costs delivering volume economics to WiMAX equipment.

#### 4. Where is WiMAX deployed?

As of May 2009, WiMAX Forum has tracking 475 network deployments in 140 countries. Please visit WiMAX Maps at [www.wimaxmaps.org](http://www.wimaxmaps.org). WiMAX Maps is an interactive WiMAX deployment mapping database provided by WiMAX Forum and powered by Informa Telecoms & Media's World Cellular Information Service (WCIS) using the familiar Google Maps API.

#### 5. What will WiMAX services offer to the average consumer?

WiMAX will provide broadband connectivity anywhere, anytime, for any device and on any network. WiMAX will provide high speed internet access where it is currently unavailable, substantially increase data speeds for applications to include online gaming, streaming video, video conferencing, VoIP and location based services and drive wireless Internet equipment and access prices to a competitive price point comparable to cable, DSL, and fiber Internet services. A few regional examples include:

- **United States:** With a robust telecommunications infrastructure already in place, the United States represents a strong market for WiMAX. Mass market Mobile WiMAX services from Clearwire are expected to reach 120 million consumers in 80 markets by the end of 2010. WiMAX is also gaining steam providing rural broadband coverage, with several companies, such as Digital Bridge Communications, launching solutions to bring broadband to those consumers with no access to DSL or other broadband technologies
- **India:** Basic internet services are not available in most homes in India. Currently broadband penetration in India is four million out of the more than one billion consumers, which is one broadband connection per 300 consumers. There are already several operators offering WiMAX services in India today. For instance, Tata Communications plans to bring a mix of fixed and mobile broadband services to homes and small businesses around the country to meet the growing need for such services. Tata's goal is to develop a profitable business model

with single digit ARPU and affordable devices that can be replicated in other developing countries.

- **Taiwan:** Continuing its leadership in the development and deployment of WiMAX operability, Taiwan had six commercial WiMAX licenses awarded in July 2007 for six separate Taiwanese wireless communication providers. In regions like Taiwan, where users are spread out and the wireless traffic is going a long distance, WiMAX technology provides a reliable, inexpensive solution for constant wireless broadband connectivity.
- **South Asia:** South Asia will continue to be home to some of the fastest growing wireless markets in the world. South Asian markets currently show significant consumer and business interest in both fixed and mobile broadband and this region is witnessing some of the world's biggest deployments of WiMAX. According to Juniper Research, South Asia will be the driving force behind the growth of Mobile WiMAX, and the APAC region is expected to account for more than 50% of the total WiMAX deployments by 2013.
- **Africa:** As a continent with many rapidly developing nations that have little to no fixed infrastructure, Africa provides an ideal environment for WiMAX. WiMAX technology provides the opportunity to connect the African people with Internet and VOIP services faster and more affordably than any other option – and governments agree, with almost all African governments awarding spectrum for WiMAX.
- **Latin America:** Latin America has demonstrated a significant growth in telephony. Cellular figures are impressive, with the region coming close to 400 million subscribers and, according to Teleco, many countries reaching 80% penetration or more. But despite strong cellular uptake there is still an enormous gap in broadband access and penetration. The largest markets in the region are only now reaching 20 million broadband connections. However, in order for supply to reach demand, there is a need for a friendly regulatory environment and “fit for purpose” spectrum is a key element in that equation. The WiMAX Forum is working closely with government regulators to allow for the advancement of WiMAX technology.
- **Australia:** Operators such as Unwired Australia have already deployed WiMAX technology to establish affordable and efficient broadband networks. WiMAX technology is perfectly suited for Australia's urban, suburban and rural areas and the purchase and installation process of WiMAX technology is faster, simpler and cheaper than other offered solutions. Additionally, the non-line-of-sight (NLoS) capability means that WiMAX technology can provide coverage despite the challenges of geography and the limited footprint of wireline.

There are well over 434 Million WiMAX POPS as of May 2009. The WiMAX Forum forecasts that the technology will reach more than 800 million WiMAX POPS by 2010.

## 6. What applications will WiMAX technology bring to consumers?

WiMAX technology has already brought broadband access to millions of users at a cost performance ratio that is far better than any other technology. Even more importantly, unlike other voice-centric cellular technologies, WiMAX was designed to deliver broadband wireless access in an open Internet architecture.

There is no single application today that will be the “silver bullet” for making mobile broadband take-off with mainstream consumers; however, there are some inventive applications now under development in WiMAX Forum-sponsored applications labs (Taiwan's Hsinchu Science Park at the M-Taiwan WiMAX Application Lab and The MAXWell Lab applications labs in the United States at

the University of Maryland). These applications labs allow WiMAX Forum member companies and university researchers to test their applications on both of these live WiMAX networks. These new applications provide a glimpse of what is possible today, and signal why WiMAX is at the forefront of enabling the next generation of mobile Internet and communications.

The U.S. applications labs at the University of Maryland are deploying a WiMAX network to cover both the campus and local transportation systems. This application lab will offer students campus-wide mobile broadband access via WiMAX. From finding your car in the parking lot to instantaneous access to campus security, including live video feeds from the spot where an emergency call is made, WiMAX will bring information to your fingertips like never before.

For more information on WiMAX applications for a variety of markets please visit the WiMAX Forum's white paper library at <http://www.wimaxforum.org/resources/documents/marketing/whitepapers>.

#### 7. **What types of upgrades will operators have to do to deploy WiMAX services?**

A single upgrade move to WiMAX technology's all IP architecture is a direct step to 4G. It can provide a less costly long term approach compared to LTE and HSPA+ and also provides a significant Time to Market advantage. LTE is not a simple 3G upgrade as LTE represents a major upgrade from CDMA-Based HSPA (or EV-DO); it is not and never was a "simple" software upgrade.

### **The WiMAX Forum**

#### 8. **What is the purpose of the WiMAX Forum?**

Founded in June 2001, the WiMAX Forum is an industry-led, not-for-profit organization formed to certify and promote WiMAX products based upon the harmonized IEEE 802.16/ETSI HiperMAN standard. Focused on global adoption of WiMAX, the WiMAX Forum was chartered to establish certification processes that achieve interoperability, publish technical specifications based on recognized standards, promote the technology and pursue a favorable regulatory environment.

Additional WiMAX Forum services include:

- **Global Roaming:** Roaming enables customers to automatically access their wireless services when travelling outside the geographical coverage area of their home network. This includes internet, e-mail, voice, video and other services available on the home network. For more information please visit <http://www.wimaxroaming.org/>.
- **WiMAX Forum Certified™ program:** As the exclusive organization dedicated to certifying the interoperability of WiMAX products, the WiMAX Forum will define and conduct conformance and interoperability testing to ensure that different vendor systems work seamlessly with one another. WiMAX Forum Certified products are based upon a single global standard (802.16) enabling complete interoperability worldwide.
  - For more information on the WiMAX Forum Certified program, please see the WiMAX Forum's Certification overview <http://wimaxforum.org/certification/certification-overview>.
  - To read the WiMAX Forum Certification Q&A, please visit the WiMAX Forum Newsroom at <http://www.wimaxforum.org/news/presskit>.

- Review the Certification Program Reference Manual (CPRM) at <http://members.wimaxforum.org/apps/org/workgroup/cwg/download.php/42780/latest>.
- A list of Certification testing laboratories can be found at <http://members.wimaxforum.org/members/certification/designatedlabs>.

#### **9. What companies are involved with the WiMAX Forum?**

The WiMAX Forum membership represents the entire ecosystem of companies necessary for bringing WiMAX Forum Certified products to market, including equipment manufacturers, operators, system integrators, silicon and component makers, test equipment manufacturers, test labs, content and application providers. For a full list of member companies, visit <http://www.wimaxforum.org/about/member-roster>.

### **WiMAX Forum Certification**

#### **10. What is WiMAX Forum Certified?**

Certified products are based upon a single global standard (802.16) enabling complete interoperability worldwide. WiMAX Forum Certified products have been through rigorous certification testing in order to reduce investment uncertainties and guarantee interoperability for all parties in the access network value chain, from technology providers to service providers to end users.

WiMAX has already established itself in the 3.5 GHz band with deployments in every region. WiMAX is being deployed in the 2.5 GHz in countries such as the U.S., Japan, Taiwan, Russia and Mexico, and new 2.5 GHz WiMAX spectrum allocations are expected soon. WiMAX has been deployed in the 2.3 GHz in South Korea, Malaysia and Singapore with future deployments anticipated in Vietnam, Thailand, Indonesia, Australia and Canada. Most recently, India approved auctions for 2.3 and 2.5GHz. In the U.K., WiMAX is deployed in the 3.5 GHz band.

#### **11. What is involved in WiMAX Forum 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. For more information on the certification process, please read the WiMAX Forum's Certification overview <http://wimaxforum.org/certification/certification-overview>.

#### **12. What are the benefits of WiMAX Forum Certified products?**

Designed for carrier-class deployments WiMAX Forum Certified systems deliver high-capacity service throughput (up to 36 Mbps in a 10MHz channel) and provide a range of up to five kilometers in non-line-of-sight conditions. The systems are scalable for up to thousands of users and because they are interoperable, service providers will be able to purchase equipment from more than one vendor, thereby reducing the overall risk and creating a price-competitive marketplace.

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 ensuring consumers interoperability between devices and networks guaranteeing service anytime, anywhere at a lower price point.

**13. What are the benefits of WiMAX Forum Certified products for vendors, operators and subscribers?**

- **Vendors:** Products are interoperable prior to commercialization, reducing vendor costs and effort. Vendors can easily meet operator requirements for interoperability, and address the global market with their product line. Certified equipment leads to integrated, low cost components. Additionally, vendors can focus on specific products rather than end-to-end product lines.
- **Operators:** With WiMAX Forum certified products, operators can more easily support subscriber devices, including out of network roaming devices. Choice among vendors leads to more flexibility when planning infrastructure and selecting subscriber devices and contained equipment costs make WiMAX business case more attractive. For operators, backwards compatibility and new features allow operators to combine continuity of service with advanced performance.
- **Subscribers:** The WiMAX Forum Certified Seal gives consumers the confidence that products will work out of the box. Subscribers can use a variety of devices depending on location and desired application and large vendor selection means more devices at contained costs.

**14. How will WiMAX Forum Certified products benefit enterprises and residential users?**

- **Enterprises:** The ease of deployment for WiMAX Forum Certified systems can benefit enterprises by bringing new competition into the marketplace and lowering prices, as well as reaching out to locations not served by wireline Internet access. This is especially relevant for industries like gas, mining, agriculture, transportation, construction and others that operate in remote locations.
- **Residential users:** For residential customers in suburban and rural areas (where DSL or cable modem service is not available), WiMAX technology can provide the ability to finally have the broadband access they need. This is particularly true in developing countries, where traditional telecom infrastructure is not readily accessible.

**15. When will WiMAX Forum Certified products be commercially available?**

In January 2006, the WiMAX Forum announced the first commercial products to achieve the designation of WiMAX Forum Certified. There are currently more than 100 WiMAX Forum Certified products (802.16e-2005 products and 802.16d products). The WiMAX Forum predicts 1000+ certified products by 2011.

**16. What companies offer products that have received the WiMAX Forum Certified™ designation?**

For more details on WiMAX Forum certified products and companies please visit the WiMAX Forum's product showcase at <http://www.wimaxforum.org/productshowcase>.

### **17. Where are the WiMAX Forum Certification labs located?**

Globally there are six certification labs in operation. They are located in:

- Spain - AT4wireless in Malaga
- Korea - Telecommunications Technology Association
- Taiwan – Bureau Veritas ADT, Taoyuan Branch
- China - China Academy of Telecommunications Research in Beijing
- Taiwan - (Telecom Technology Center / Compliance Certification Services in Taipei
- U.S. - AT4wireless in Virginia, USA

Brazil, and Malaysia labs are being pursued in 2009.

### **WiMAX vs. Alternative Wireless Technologies**

#### **18. How does WiMAX technology compare to Wi-Fi technology?**

WiMAX and Wi-Fi are complementary. It is important to note that since chipsets that use Wi-Fi are similar to WiMAX chipsets, both can be embedded into one chip. This means that devices utilizing Wi-Fi, including cell phones and laptops, will easily be able to incorporate WiMAX technology on the same chipset at minimal additional cost. Intel's first WiMAX notebook-embedded modem is estimated to be half the cost of 3G modems and deliver three times the performance. In the future, any device that could potentially benefit from connectivity can become a WiMAX enabled device. This includes digital cameras, digital music players and even your home security system.

#### **19. How does WiMAX technology compare to LTE technology?**

WiMAX is included in the IMT-2000 family of mobile wireless interface standards and is supported by a broad, open and innovative ecosystem including the member companies in the WiMAX Forum. This open ecosystem brings the flexibility of the computing industry model to the mobile world. This includes an open IPR model led by the Open Patent Alliance. Additionally, WiMAX has already established itself in the 2.3GHz, 2.5GHz, and 3.5GHz bandwidth deployments in every region. WiMAX is here now.

Conversely, LTE currently has zero deployments. LTE networks are a completely new upgrade as they require new infrastructure and new spectrum. LTE networks will also require new client devices and service providers will need to purchase new radio access network (RAN) equipment in addition to upgrading their core networks to handle additional IP-based traffic. LTE will take time to roll out, with deployments forecast to reach limited adoption by 2012. For a LTE and WiMAX Comparison at a Glance, please visit [http://www.wimaxforum.org/sites/wimaxforum.org/files/industry\\_news/2009/wimax\\_and\\_lte\\_oct\\_29\\_08.pdf](http://www.wimaxforum.org/sites/wimaxforum.org/files/industry_news/2009/wimax_and_lte_oct_29_08.pdf).

#### **20. What is the difference between High-Speed Downlink Packet Access (HSDPA) and WiMAX technology?**

WiMAX technology is an all-IP based architecture specifically designed and optimized for data traffic, whereas 3G has a voice-centric architecture that is being used to transport data. This allows much greater scalability for WiMAX, which consistently performs at an average 2.5 times the speed of HSDPA platforms (depending on equipment and operating conditions). HSDPA cannibalizes voice spectrum bandwidth to supply data services, which can affect call quality and availability..

**21. What is a femtocell and will it be a viable model for WiMAX?**

A femtocell is a portable base station about the size of a coffee pot that has a range of a few hundred feet. It is a useful tool for filling holes in current cellular footprints and providing better in-home service much like a Wi-Fi access point. Unlike Wi-Fi, this model would operate on licensed spectrum with the femtocell device leased by the operator.

Femtocells could provide a good answer to supplementing WiMAX coverage in the home or at a place of business. Many cable companies are already exploring the use of these products, since most cable companies do not offer broadband mobility in their current service packages.

**Intellectual Property Rights (IPR)**

**22. What is the WiMAX Forum's position on IPR and WiMAX technology?**

WiMAX Forum member companies have been the first to bring standardized solutions to the marketplace for wireless broadband, making broadband services more cost-effective to deploy on a wide scale. As of September 2006, there were more than 1,500 patents distributed among 330 companies on WiMAX technologies. Of the 23 companies that hold more than 10 patents, 74 percent are WiMAX Forum members. As additional products become WiMAX Forum Certified and additional patent holders join the WiMAX Forum, we believe that we will be able to achieve our goal of interoperability between OEMs and carriers.

The WiMAX Forum has an IPR policy that is published and widely supported by the industry today. It is publicly posted on the WiMAX Forum website at: [http://www.wimaxforum.org/join/Governing\\_Documents/](http://www.wimaxforum.org/join/Governing_Documents/). The IPR approach initiated by the WiMAX Forum provides for a reasonable and non-discriminatory licensing model.

**23. Does the Open Patent Alliance (OPA) complement the WiMAX Forum IPR policy?**

The current Open Patent Alliance (OPA) model supported by WiMAX Forum is open, transparent, predictable and nondiscriminatory with an objective of delivering a fair royalty rate to all. OPA accelerates the ability for vendors to license WiMAX technology by providing a single source for essential patents. This IPR model has been proven with other technologies to be able to deliver competitive, innovative, and low cost IPR solutions. It's also recognized as a model that encourages the development of interoperable, lower cost products and services that take advantage of the high-bandwidth networks that WiMAX technology provides, thus ensuring economies of scale while keeping entry costs low for consumers. For more information on the Open Patent Alliance, please visit <http://www.openpatentalliance.com/>.

**Industry Standards, Spectrum and Regulation**

**24. What is IMT-2000 and define its current relationship with WiMAX technologies?**

In 1999 the International Telecommunications Union – Radio communications (ITU-R) defined a set of standards called IMT-2000, commonly known as 3G technologies. The IMT-2000 provides a framework for worldwide wireless access by linking the diverse systems of terrestrial and satellite based networks.

The IEEE submitted a formal proposal to the ITU-R to make a subset of the 802.16 (WiMAX) standard a member of the IMT-2000 family, as defined by ITU-R recommendations. The WiMAX Forum provided substantial supporting material in order to make WiMAX a member of the IMT-2000 family. The WiMAX Forum was instrumental in the development of the supporting material necessary to include WiMAX in the IMT-2000 family.

**25. What frequencies does WiMAX technology operate on?**

The WiMAX Forum currently supports continued rapid WiMAX user adoption in the 2.3 GHz, 2.5 GHz, and 3.5 GHz frequency bands, with additional spectrum bands to come. The WiMAX Forum is working with operators and equipment manufacturers to expand the frequency allocation to cover all the key spectrum bands that our member companies identify as interesting to potential WiMAX service providers such as 700 MHz. For mobile applications, initial profiles have been developed for 2.3, 2.5, and 3.5 GHz. These are to address the current market demands by operators.

The WiMAX Forum has the ability to respond rapidly to development of additional profiles as additional spectrum is auctioned or markets change.

**26. What is the status of WiMAX spectrum availability?**

The WiMAX Forum continues to see progress in the assignment of spectrum to WiMAX deployments. Underused spectrum is being refarmed by regulatory authorities and new assignments are being issued. For the initial WiMAX Forum Certified™ products the majority of assignments are in the 3.4 – 3.6 GHz spectrum range. We also see market demand for license-exempt spectrum in the 5 GHz region. For mobile applications, we see many regulators making mobile spectrum allocations and assignments available in the 2.3 – 2.4 GHz and 2.5 – 2.6 GHz regions, as well as the 3.4 – 3.6 GHz band. There is now increasing market demand and regulatory activity relating to frequencies around 700/800MHz. The WiMAX Forum continues to track regional and country-specific policies and promote the availability of technology-neutral spectrum.

Members of the WiMAX Forum have access to a database to help identify available spectrum. The WiMAX Forum has formed an agreement with AT4 Wireless to provide the WiMAX Forum Spectrum and Regulatory Database, allowing member companies access to regularly updated data regarding worldwide spectrum licensing and regulatory information. The database focuses on all the key frequency bands for WiMAX Forum Certified equipment™, including 2.3, 2.6, 3.5, 3.7 and 5.8 GHz. Various user services including Reports, Maps, e-mail alerts and a newsletter are available on an opt-in basis.

**27. Where can I find out more about spectrum adoptions worldwide?**

The WiMAX Forum Spectrum and Regulatory Database provide full technical, licensing, and regulatory information by country. Access to the full database is included with Principal membership in the Forum and is available to regular member companies by subscription. In 2008 additional features were added to the WiMAX Forum Spectrum and Regulatory Database to further enhance the tool. The updates provide WiMAX Forum member companies worldwide spectrum licensing

and regulatory requirements as well as some additional new features to be implemented by AT4 wireless. These include the following:

- There is now a personal user profile feature, which allows WiMAX Forum members to subscribe and unsubscribe to services that enable them to receive specific messages and/or newsletters via email.
- Subscribers receive a notification via e-mail stating whenever there has been an update in the country.
- Subscribers receive a monthly newsletter informing about the latest news concerning WiMAX technology in the worldwide market (public consultants, licensing auctions, new regulation, etc).
- Additional information on regional organizations is also included in the database.

A trial version of the WiMAX Forum Spectrum and Regulatory database is available at [www.wimaxforum.org/members/spectrum\\_database](http://www.wimaxforum.org/members/spectrum_database).

#### **28. What is the WiMAX Forum doing to allow for roaming among compatible networks?**

The WiMAX Forum has a Global Roaming Program that allows operators and vendors to easily obtain the information required to establish WiMAX roaming services. The program is live and can be accessed through a link on the WiMAX Forum public web site at [www.wimaxroaming.org](http://www.wimaxroaming.org).

Roaming capabilities are vital for mobility as roaming allows subscribers to access WiMAX and other services while traveling outside their home network geographical coverage area. The WiMAX Forum Global Roaming program includes several documents for WiMAX Forum member companies implementing roaming services, including technical specifications, a test plan, a roaming contract template and a guide to follow when implementing roaming.

#### **29. What are the next steps with IEEE?**

IEEE 802.16m air interface is the next major landmark in the WiMAX standard's evolution beyond IEEE 802.16e-2005. WiMAX Forum will adopt IEEE 802.16m once the standard is completed, which is expected to occur in the first half of 2010. The IEEE 802.16 Working Group has defined its expected parameters for IEEE 802.16m and all products based upon IEEE 802.16e-2005 will be forward compatible to the future 802.16m IEEE standard.

In addition to its work with the IEEE, WiMAX Forum is committed to contributing to the longer-term work of the International Telecommunications Union, both with enhancements to IMT-2000 and IMT-Advanced. As such, we will be submitting IEEE 802.16m in conjunction with the future WiMAX Forum Mobile System Profiles (including both TDD and FDD schemes) for inclusion in IMT-Advanced.

#### **30. What is orthogonal frequency division multiplexing (OFDM)?**

OFDM is a digital encoding and modulation technology. It has been used successfully in wireline access applications, such as Digital Subscriber Line (DSL) modems and cable modems as well as WiFi. Products from WiMAX Forum member companies are using OFDM-based 802.16 systems to overcome the challenges of NLoS propagation. OFDM achieves high data rate and efficiency by using multiple overlapping carrier signals instead of just one. All future technologies for 4G will be based upon OFDM technology.

Orthogonal Frequency Division Multiple Access (OFDMA) is enhanced OFDM and used in Mobile WiMAX technology and the IEEE 802.16e-2005 standard, and it is the foundation for the next-generations of mobile broadband to come. It is a multi-user version of Orthogonal Frequency-Division Multiplexing (OFDM). The difference between the two technologies is that OFDMA assigns subsets of sub-carriers to individual users allowing simultaneous low data rate transmission from several users.

### **WiMAX Forum Resources and Links**

- Latest opinions on WiMAX and 4G technologies, including blogs, discussion forums and news: [www.WiMAXTimes.com](http://www.WiMAXTimes.com) (Coming in July of 2009).
- Comparisons between WiMAX and LTE technologies: <http://www.wimaxforum.org/news/presskit>

Source URL: <http://wimaxforum.org/resources/frequently-asked-questions>