# New Technology, Markets and Changing Spectrum Requirements

## ITU Workshop on Market Mechanisms

**Geneva, Switzerland, January 22-23 ,2007**

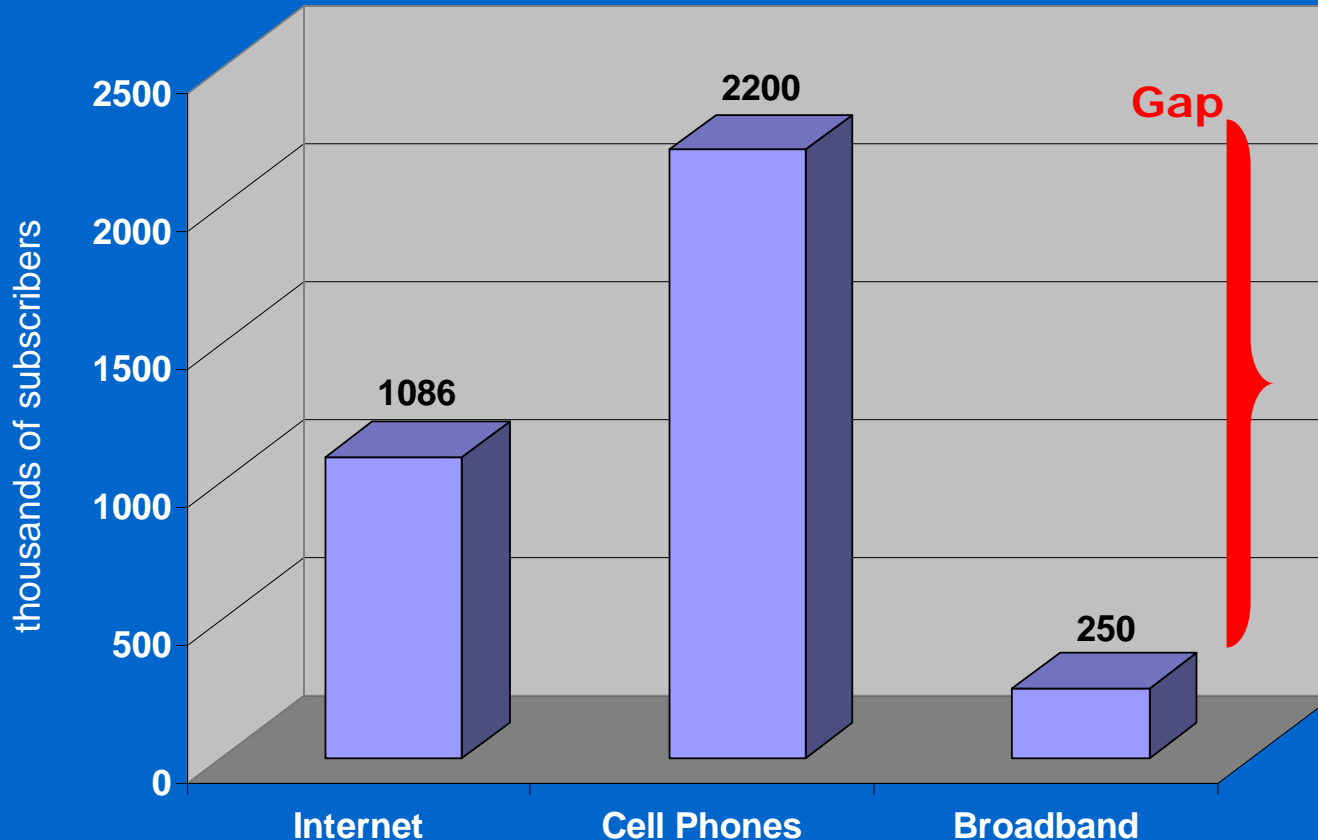Ron Resnick
President, WiMAX Forum

# Agenda

- Market opportunity
- WiMAX technology
- WiMAX Forum background
- WiMAX Forum position on spectrum policy
- "WiMAX in IMT-2000"
- The EC WAPECS Initiative
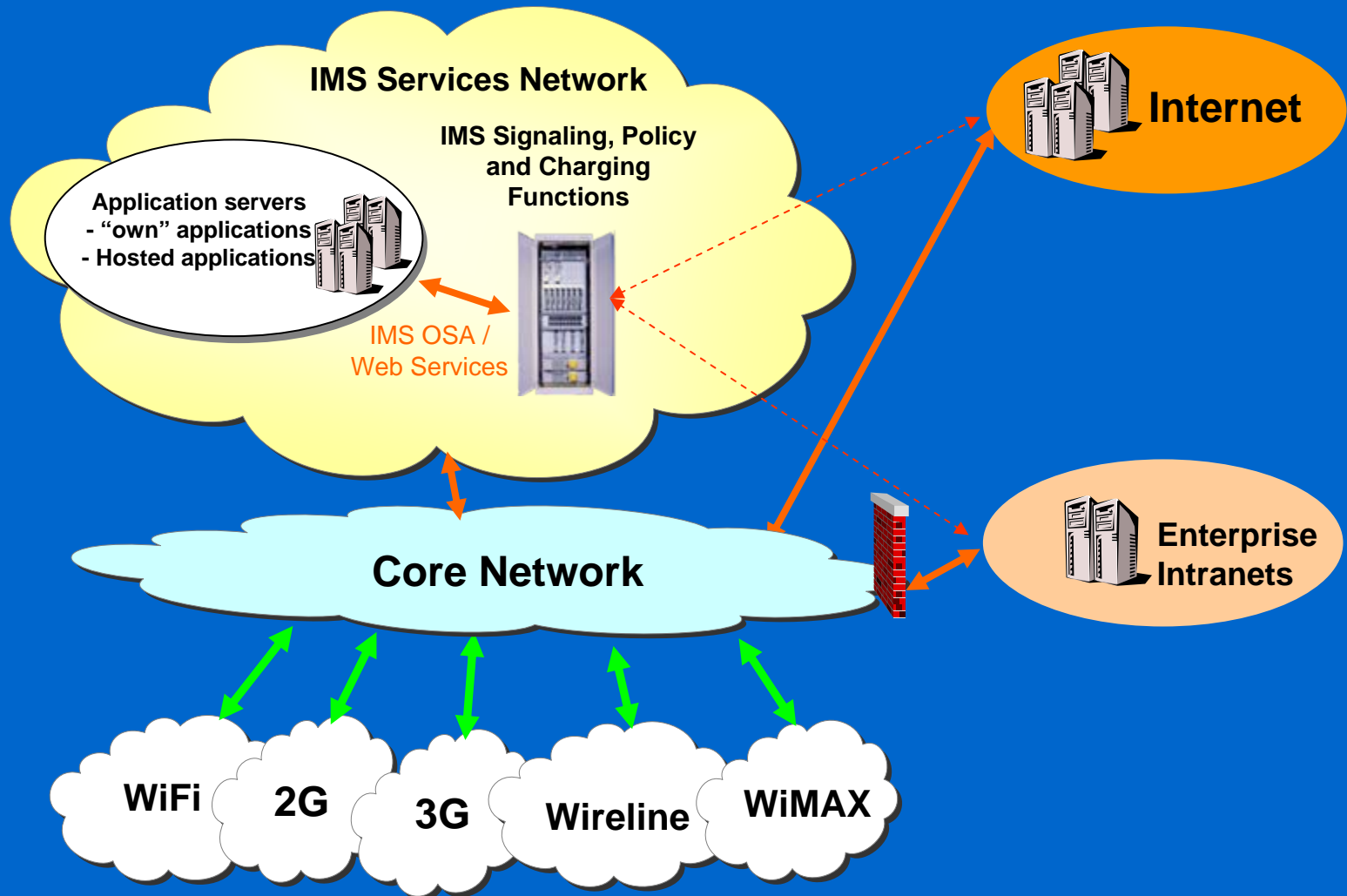- Summary

# Anytime, Anywhere

*The Demand is Real*

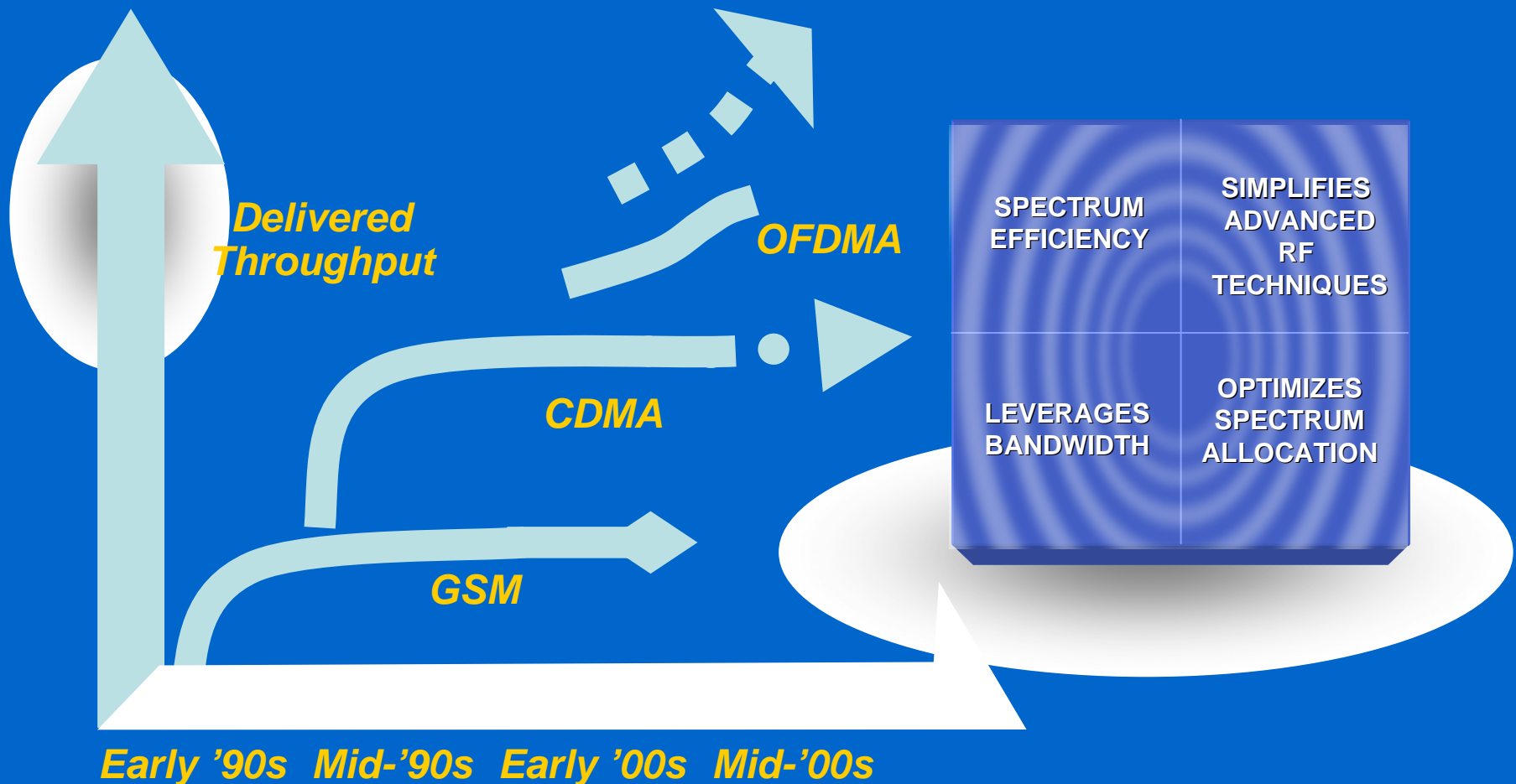# Broadband Market has Significant Upside



Broadband Usage Growing Faster Than We Have Seen in Other Emerging Technologies

Sources: Internet World Stats, Wireless Intelligence, Point Topic

4

# One Platform For All Internet Connectivity

**IMS Services Network**

**IMS Signaling, Policy and Charging Functions**

Application servers
- "own" applications
- Hosted applications

IMS OSA / Web Services

**Internet**

**Enterprise Intranets**

**Core Network**

WiFi  2G  3G  Wireline  WiMAX

# Wireless Technologies are Evolving to OFDMA

**OFDMA offers better spectral efficiency –**

**Directly translates to higher throughput and capacity**

*Delivered Throughput*

*OFDMA*

*CDMA*

*GSM*

| SPECTRUM EFFICIENCY | SIMPLIFIES ADVANCED RF TECHNIQUES |
|---|---|
| LEVERAGES BANDWIDTH | OPTIMIZES SPECTRUM ALLOCATION |

*Early '90s   Mid-'90s   Early '00s   Mid-'00s*

# WiMAX is <u>NOT</u> a Cellular Voice Replacement



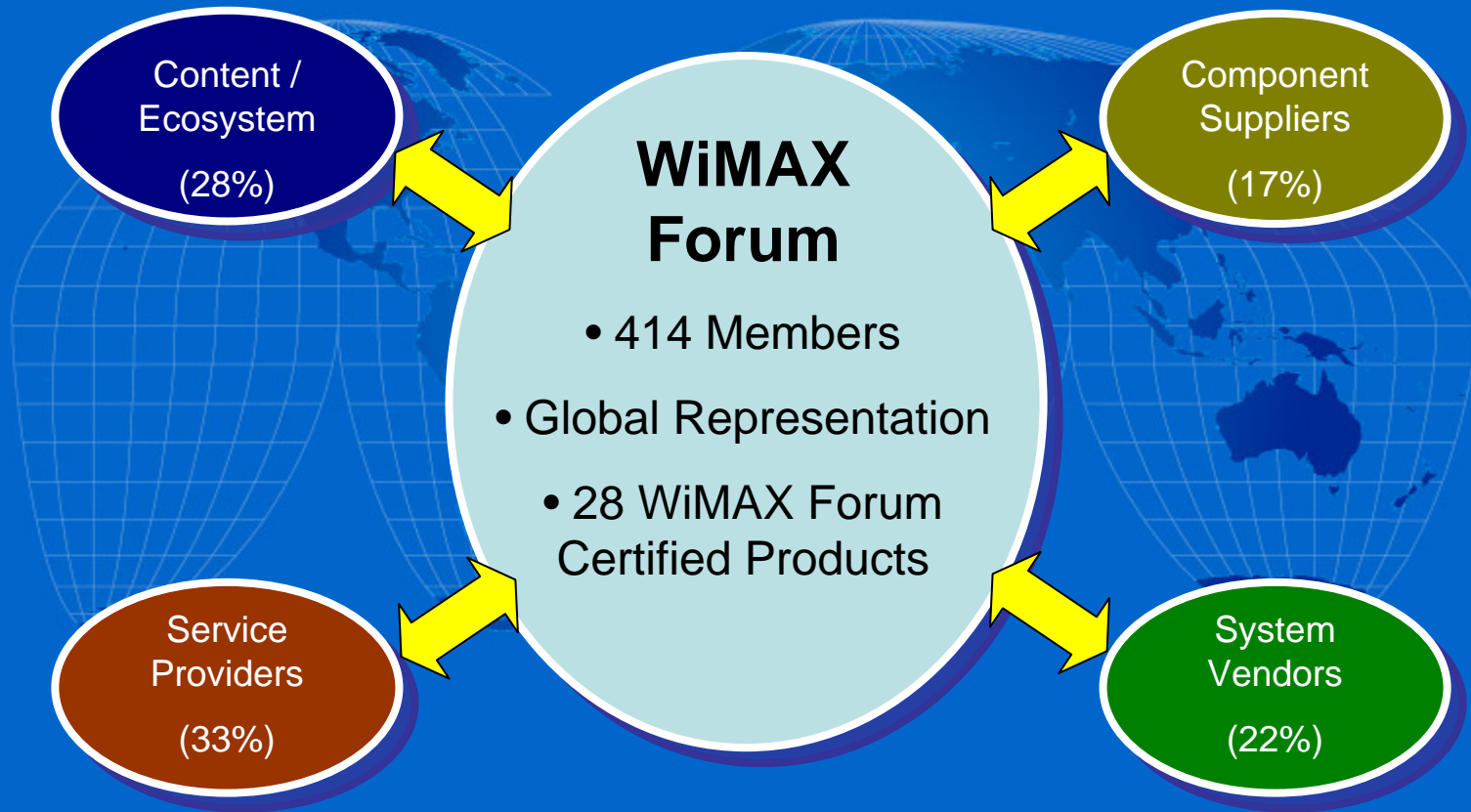- WiMAX was not developed to compete with cellular voice market

## WiMAX <u>WILL</u> Complement 3G Data Services



- WiMAX is a technology choice delivering high-capacity and high-throughput data services
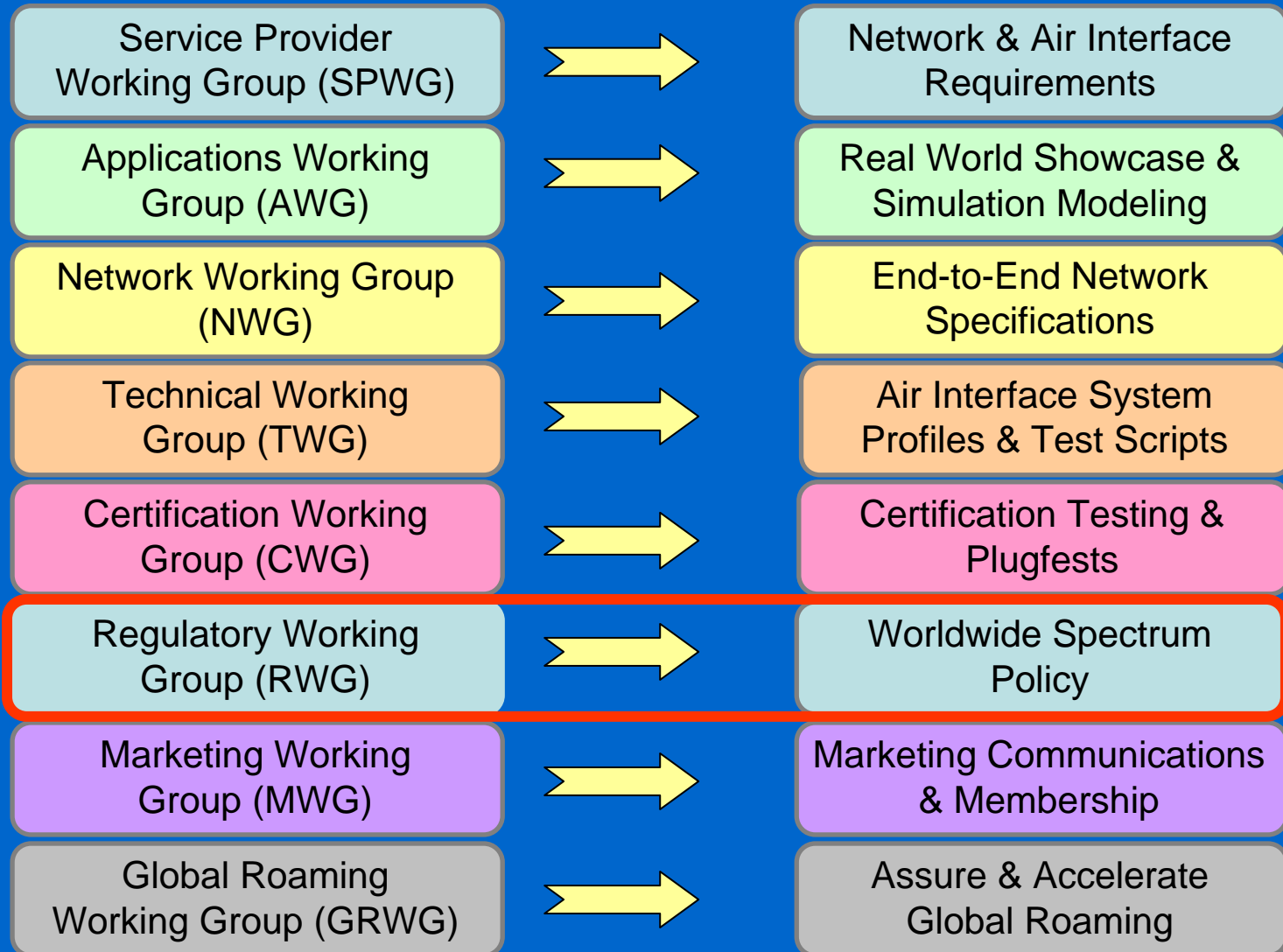
# WiMAX Forum

## WiMAX Forum

- 414 Members
- Global Representation
- 28 WiMAX Forum Certified Products

**Content / Ecosystem (28%)**

**Component Suppliers (17%)**

**Service Providers (33%)**

**System Vendors (22%)**

- Deliver a trusted certification process
- Develop a framework for a high performance end-to-end IP mobile network architecture supporting all usage modes
- Promote WiMAX as the leading business model to deliver global wireless broadband services
- WiMAX Forum contributes to foster a thriving ecosystem

# The WiMAX Forum Working Groups:
# Structured to Accelerate WiMAX Deployments

| | | |
|---|---|---|
| Service Provider Working Group (SPWG) | → | Network & Air Interface Requirements |
| Applications Working Group (AWG) | → | Real World Showcase & Simulation Modeling |
| Network Working Group (NWG) | → | End-to-End Network Specifications |
| Technical Working Group (TWG) | → | Air Interface System Profiles & Test Scripts |
| Certification Working Group (CWG) | → | Certification Testing & Plugfests |
| Regulatory Working Group (RWG) | → | Worldwide Spectrum Policy |
| Marketing Working Group (MWG) | → | Marketing Communications & Membership |
| Global Roaming Working Group (GRWG) | → | Assure & Accelerate Global Roaming |

# More Than 250 Operator Trials and Deployments in 65+ countries!

Source: Intel, the WiMAX Forum

# WiMAX Forum Regulatory Position

- The WiMAX Forum is working with administrations globally to ensure the availability of **flexible spectrum** for truly open markets and the delivery of cost-effective wireless broadband to citizens

- **The availability of similar spectrum worldwide** is crucial to lowering equipment costs for WiMAX Forum Certified$^{TM}$ systems

- The WiMAX Forum advocates that administrations remain **"technology and service flexible"** when assigning spectrum:-

  - Allows license holders to deploy the most appropriate services and technology for their envisaged customer base;

  - Facilitates innovation with a fast-track route to the market;

  - Encourages competition to deliver best value to consumers

Making WiMAX the platform of choice
for broadband wireless access.

NEW! WiMAX Forum China Regional Chapter

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Home > Regulators

# Welcome to the WiMAX Forum Information Portal for Regulators

This Portal has been designed primarily for the use of Regulators and government officials. The aim is to provide a convenient repository of information about WiMAX technology and associated products – a source of trusted information that is typically required by Regulators for making important decisions regarding future licensing of radio spectrum.

The WiMAX Forum is an industry-led, non-profit corporation formed to promote and certify compatibility and interoperability of broadband wireless products. Currently, the WiMAX Forum has over 400 member companies worldwide including leaders in the communications and computing industries. Our member companies support the industry-wide acceptance of the IEEE 802.16™ and ETSI ™ HiperMAN wireless MAN standards. The Forum works to promote global WiMAX deployments and to make WiMAX the platform of choice for broadband wireless.

As markets for Broadband Wireless Access (BWA) mature, the WiMAX Forum welcomes this opportunity to work with Regulators to develop flexible and technology-neutral regulatory frameworks that allow service providers to deploy the most appropriate solutions for their markets. The WiMAX Forum Regulatory Working Group (RWG) has a key role in building and maintaining an open dialogue with Regulators and generally promoting the availability of "WiMAX friendly" spectrum in common bands worldwide.

Before WiMAX Forum Certified systems were available, many solutions were custom-built and non- interoperable. Every piece of WiMAX Forum Certified equipment based on a common profile is interoperable with other WiMAX Forum Certified equipment. WiMAX Forum Certified means a service provider can buy equipment from more than one company and be confident everything works together. WiMAX Forum Certified means a more competitive industry, lower costs, and faster growth for broadband wireless everywhere around the globe. For more information and a directory of WiMAX Forum Certified products, please see our Certified Product Registry.

The WiMAX Forum has initially focused upon four main spectrum bands for certification of interoperability and conformance to the IEEE 802.16 standard:

- ► 2.3-2.4 GHz
- ► 2.496-2.690 GHz
- ► 3.4-3.6 GHz
- ► 5.725-5.850 GHz

Detailed information about the certification profiles and their corresponding frequency bands is available.

**Please note** that the use of this website is subject to the terms of the WiMAX Forum Regulator Membership Agreement. An "at-a-glance" table of Regulator Member benefits and rights is also available.

## What is WiMAX?

WiMAX is a standards-based technology enabling wireless broadband connections in fixed, nomadic and, now, mobile usage modes for wireless broadband connectivity without the need for direct line-of-sight with a radio base station.

As an alternative or complement to wired broadband access such as cable and DSL, WiMAX provides cell radii of up to ten kilometers. In this usage mode WiMAX Forum Certified™ systems can be expected to deliver capacity of up to 40 Mbps per channel for fixed and nomadic access applications. This is enough bandwidth simultaneously to support hundreds of businesses with T-1 speed connectivity and thousands of residences with DSL speed connectivity.

Mobile network deployments are expected to provide approximately 15 Mbps of capacity per sector (with cell radius dependent on the deployment scenario). It is expected that WiMAX technology will be incorporated in notebook computers and PDAs by 2007/2008, allowing urban areas and cities to become "metro zones" for portable outdoor broadband wireless access.
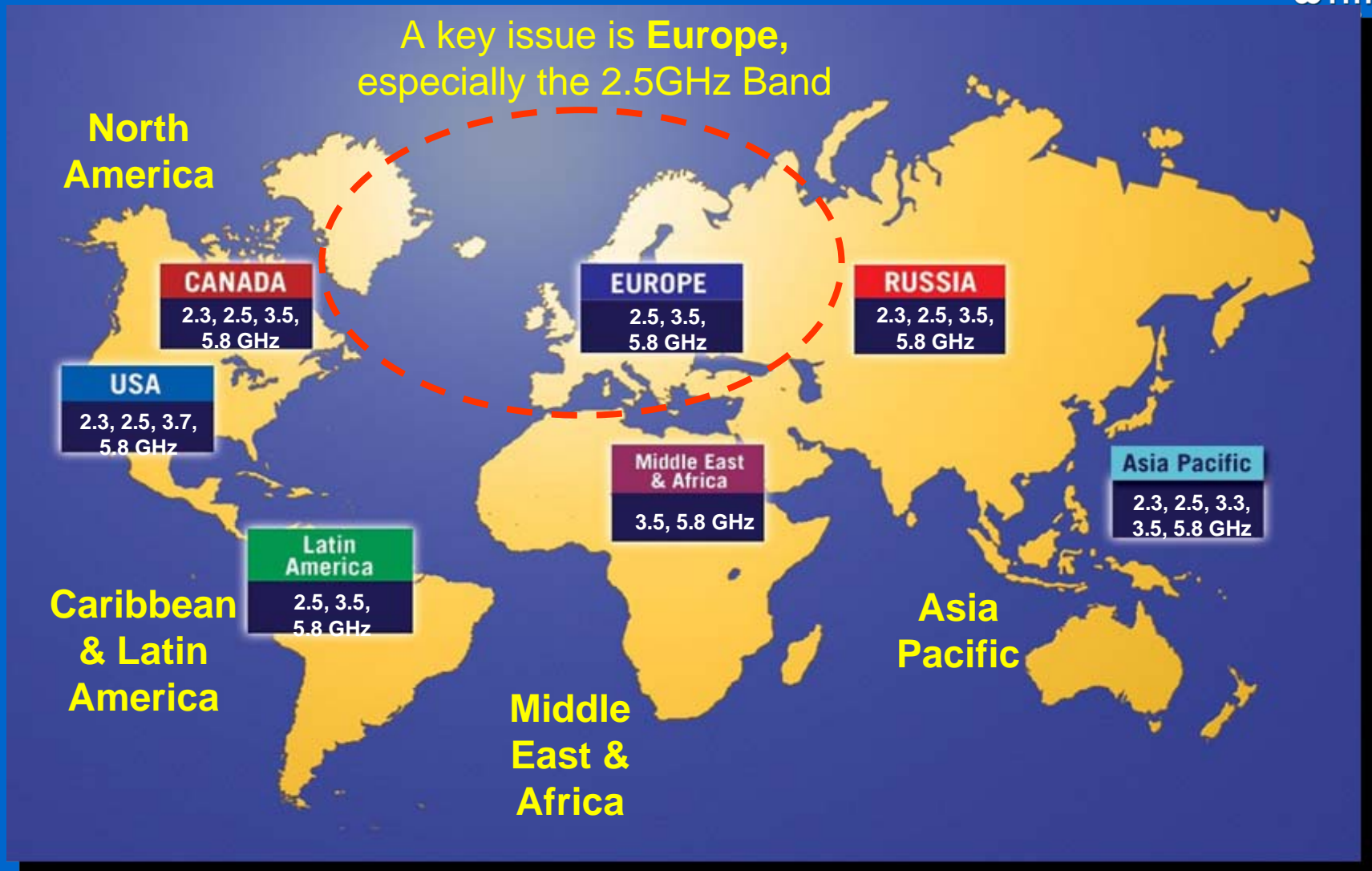
_More info..._

# Spectrum by Region
## 2007 and beyond Spectrum Focus



A key issue is **Europe,** especially the 2.5GHz Band

**North America**

**CANADA**
2.3, 2.5, 3.5, 5.8 GHz

**USA**
2.3, 2.5, 3.7, 5.8 GHz

**EUROPE**
2.5, 3.5, 5.8 GHz

**RUSSIA**
2.3, 2.5, 3.5, 5.8 GHz

**Asia Pacific**
2.3, 2.5, 3.3, 3.5, 5.8 GHz

**Middle East & Africa**
3.5, 5.8 GHz

**Latin America**
2.5, 3.5, 5.8 GHz

**Caribbean & Latin America**
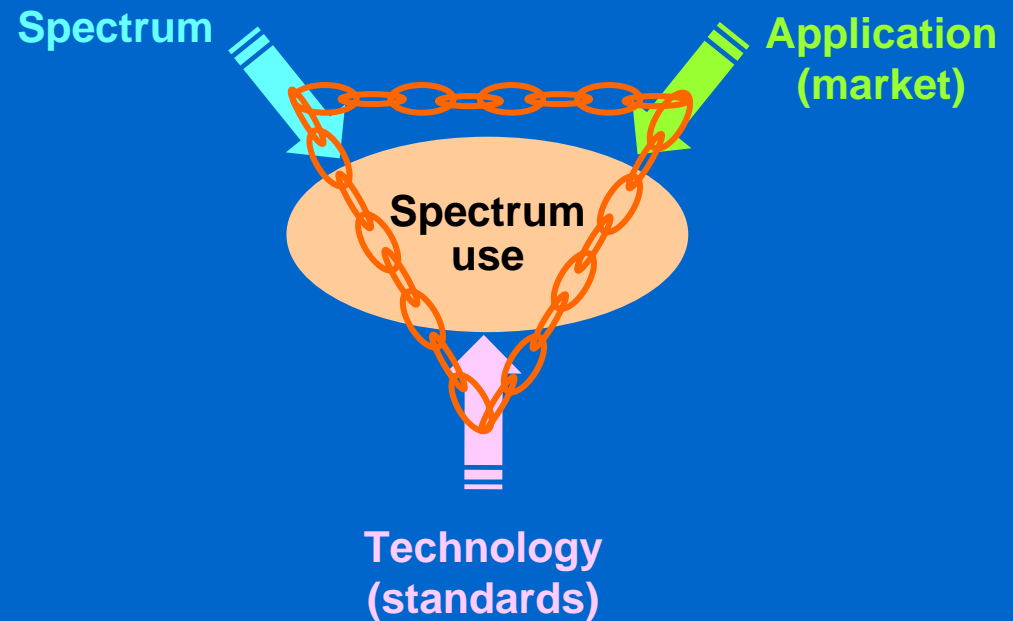
**Asia Pacific**

**Middle East & Africa**

# Spectrum, Applications and Technology

Historically, within Europe at least, the coupling of the 3 key elements of spectrum usage has been inflexible.
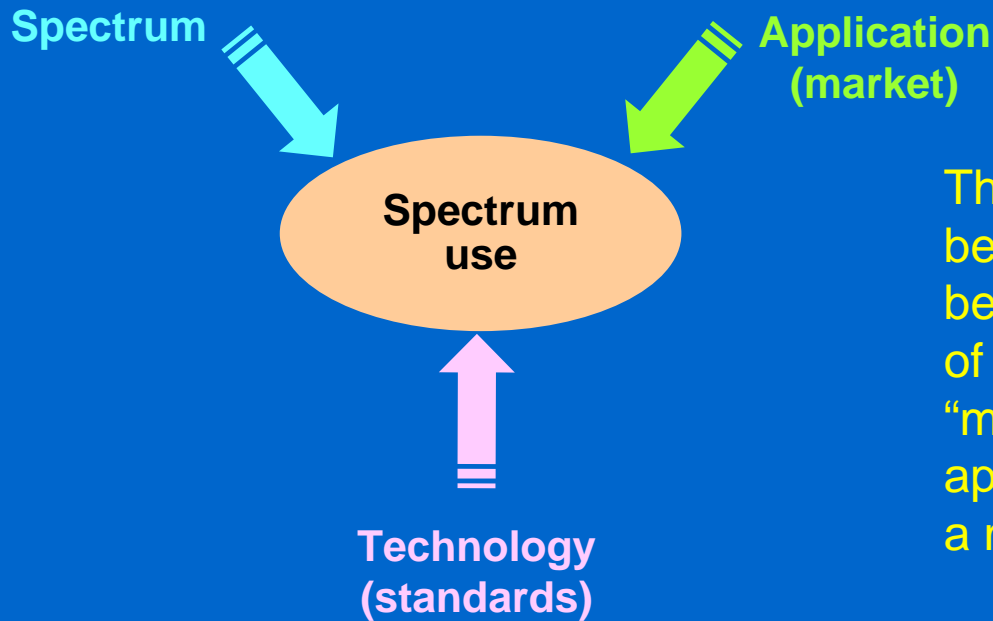
Indeed rigid linkage has been enforced via regulation, harmonisation and inflexible licensing policies

**Spectrum**

**Application (market)**

**Spectrum use**

**Technology (standards)**

"*Economic theory shows that, in general, markets are far more efficient than central regulation at allocating a scarce resource to maximize overall welfare*"
– Analysis Consulting

# The Solution – Break the Chains !

**Spectrum**

**Application (market)**

**Spectrum use**

**Technology (standards)**

The extent to which the potential benefits of wireless broadband can be realised depends on the degrees of freedom available to operators to "mix and match" spectrum, applications and technologies within a more flexible concept of "markets"

"*Without measures to promote trading and liberalisation, innovative activity may move outside Europe where the spectrum needed to gain access to large markets can be obtained more quickly*"
– Analysis Consulting

# Securing Access to Spectrum for WiMAX Forum Certified Systems

The WiMAX Forum RWG is engaged with national and regional regulators to demonstrate the clear benefits of WiMAX and to emphasise the need for appropriate licensing approaches

- Objective: New flexible licensing in "WiMAX" preferred frequency bands

- Action 1: Direct face-to-face engagement with Regulators

- Action 2: Responses to 29 consultations/enquiries from regulatory authorities so far this year

- Action 3: Leveraging the WF's membership of ITU-R, -T and –D, its observer status in CEPT/ECC and CITEL PCC II, and its close links with APT and CRASA

- Action 4: Implementing a new WF "Regulator Outreach" campaign, including regulator member recruitment (from 1st December 2006)

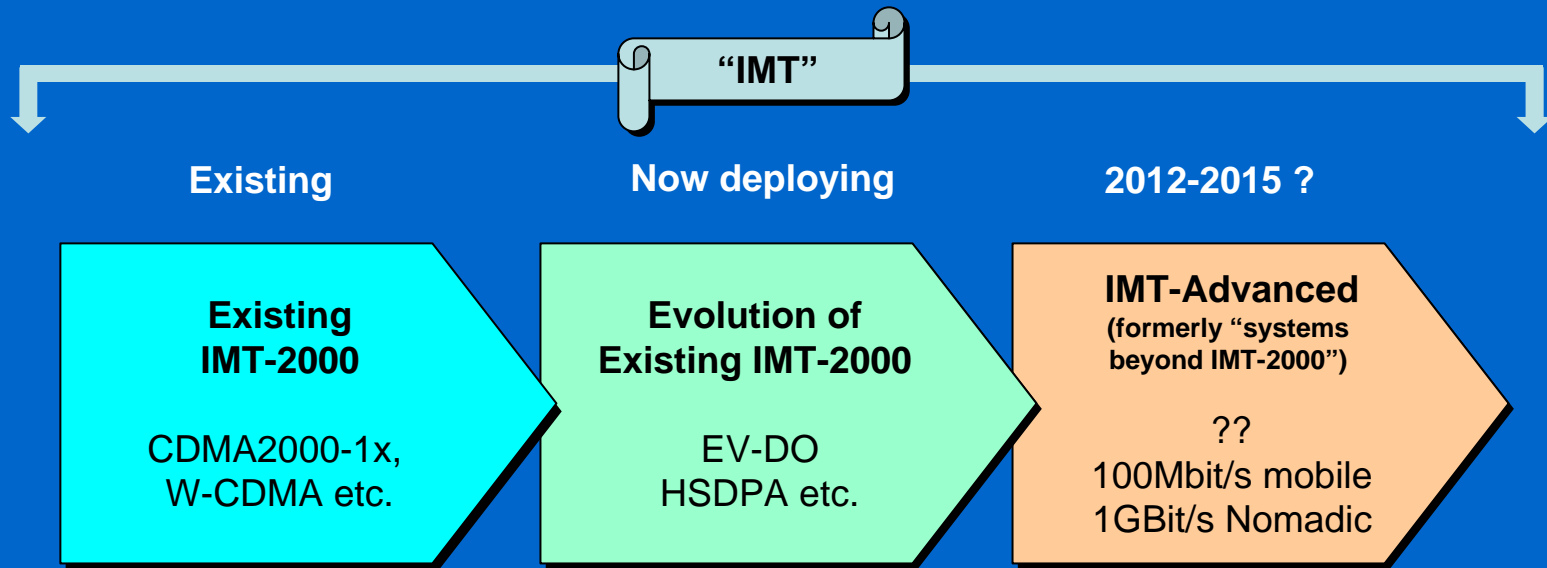The WF is an observer in both CITEL PCC II and CEPT/ECC

# Securing Access to Spectrum for WiMAX Forum Certified Systems

Action to gain access to existing and new spectrum "identified" by ITU-R for IMT-2000 (and IMT?)

- Objective 1: To achieve "non-exclusive" or broad identification of spectrum in the Radio Regulations (immediate focus is on the 2.6GHz band and "new" spectrum that might be identified for "IMT" at WRC-07) and/or
- Objective 2:  To achieve straightforward entry into the "IMT" Family for new technologies

- Action: In-depth engagement by the WF and its Members in ITU-R Working Party 8F
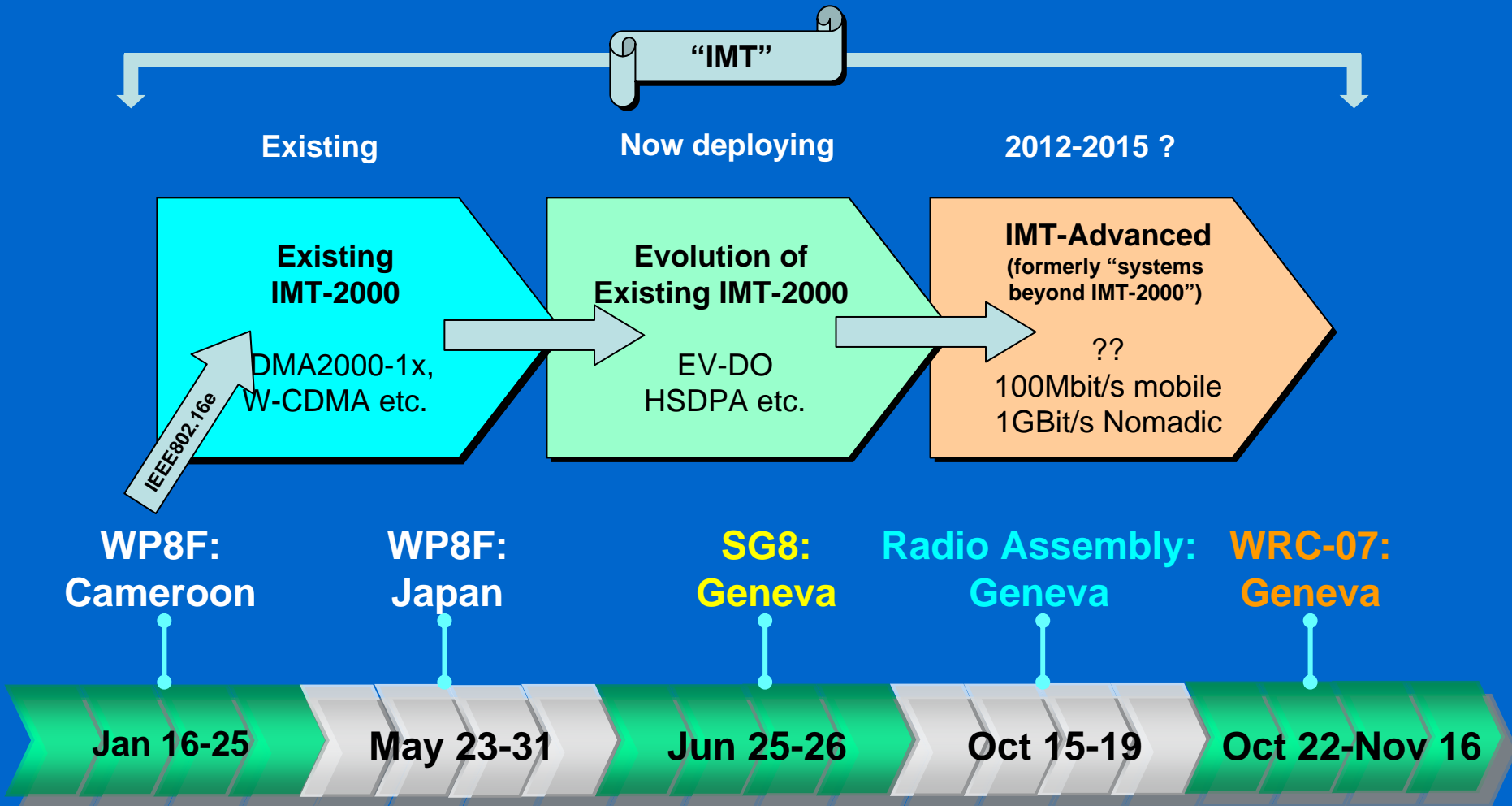
# Entry into the world of "IMT"

**"IMT"**

**Existing**     **Now deploying**     **2012-2015 ?**

**Existing IMT-2000**

CDMA2000-1x, W-CDMA etc.

**Evolution of Existing IMT-2000**

EV-DO HSDPA etc.

**IMT-Advanced**
**(formerly "systems beyond IMT-2000")**

??
100Mbit/s mobile
1GBit/s Nomadic

**An entry process and criteria exist for "new" IMT-2000 air interface technologies (Standards), but as written they are somewhat restrictive** (ITU-R Circular Letters 47 & 95)

**By definition, there are no entry options here for new technologies like WiMAX**

**IMT-Advanced is not yet defined, so there are, as yet, no entry processes or criteria**

# Entry into the world of "IMT"

"IMT"

**Existing**

**Now deploying**

**2012-2015 ?**

IEEE802.16e

**Existing IMT-2000**

DMA2000-1x, W-CDMA etc.

**Evolution of Existing IMT-2000**

EV-DO HSDPA etc.

**IMT-Advanced** (formerly "systems beyond IMT-2000")

??
100Mbit/s mobile
1GBit/s Nomadic

**WP8F: Cameroon**

**WP8F: Japan**

**SG8: Geneva**

**Radio Assembly: Geneva**

**WRC-07: Geneva**

| Jan 16-25 | May 23-31 | Jun 25-26 | Oct 15-19 | Oct 22-Nov 16 |

Supported by the WiMAX Forum, the IEEE will submit a proposal to WP8F in January 2007 for a subset of IEEE802.16e to become a new IMT-2000 TDD family member "IP-OFDMA"

# The EC WAPECS Initiative

| | |
|---|---|
| 470-862MHz | "Digital dividend" |
| 880-915/925-960MHz | GSM 900 Band |
| 1710-1785/1805-1880MHz | GSM 1800 Band |
| 1900-1980MHz/2010-2025MHz/2110-2170MHz | 2GHz "3G" Bands |
| **2500-2690MHz** | "3G Expansion" Band |
| **3400-3800MHz** | Emerging BWA Bands |

- To review existing technical conditions attached to the rights of use of these frequency bands…

- To the extent possible, to identify future common and minimal (i.e. least restrictive) technical conditions across frequency bands listed above…

  – …to be ultimately applicable across the Community…

  – …to justify any deviations from the long term policy goals…

- **The WiMAX Forum fully supports the WAPECS initiative**

# Summary

- WiMAX is making significant headway in establishing a global footprint

- WiMAX Forum spectrum goals are in the best interest to contribute to assure global access to broadband Internet

- The WiMAX Forum and its Regulatory Working Group are dedicated to promote technical flexibility as a spectrum policy

# *Thank You!*



# www.wimaxforum.org