WiMAX Standards and Regulations

ITU Regional Development Forum
CIS, CEE and Baltic Countries

"Bridging the ICT Standardization Gap in developing countries"
10-11 June 2008, Tashkent (Uzbekistan)

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EMEA Communication Team

1

Agenda

- **Broadband Situation in Region**

- **Standards and Roadmap**

- **Intel Products and Roadmap**

- **WiMAX Forum Update**

- **WiMAX Spectrum and Regulations**

- **Conclusion**

Broadband Situation in Region

- Broadband Penetration: <1% (in 12 Countries)

- Internet Penetration: <5 % (in 12 Countries)

- Mobile Signal Coverage: More than 80 % of population covered (voice, narrow band)

How can we increase broadband and internet penetration ?

(Intel)

IMT-2000 Standards (3G)

IMT-OFDMA TDD WMAN
- also known as **WiMAX**

IMT-DS Direct-Sequence
- also known as **W-CDMA** or **UTRA-FDD**, used in **UMTS**

IMT-MC Multi-Carrier
- also known as **CDMA2000**, the successor to 2G CDMA (IS-95)

IMT-TC Time-Code
- This comprises: UTRA TDD, TDD-SCDMA
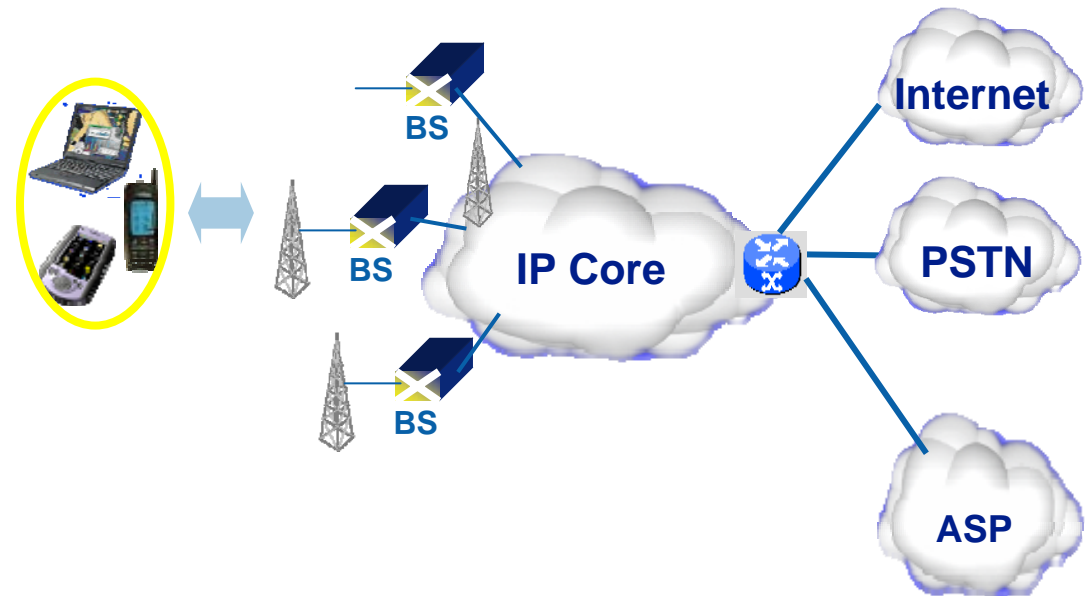
IMT-SC Single Carrier
- also known as UWC, the best known implementation is **EDGE**

IMT-FT Frequency Time
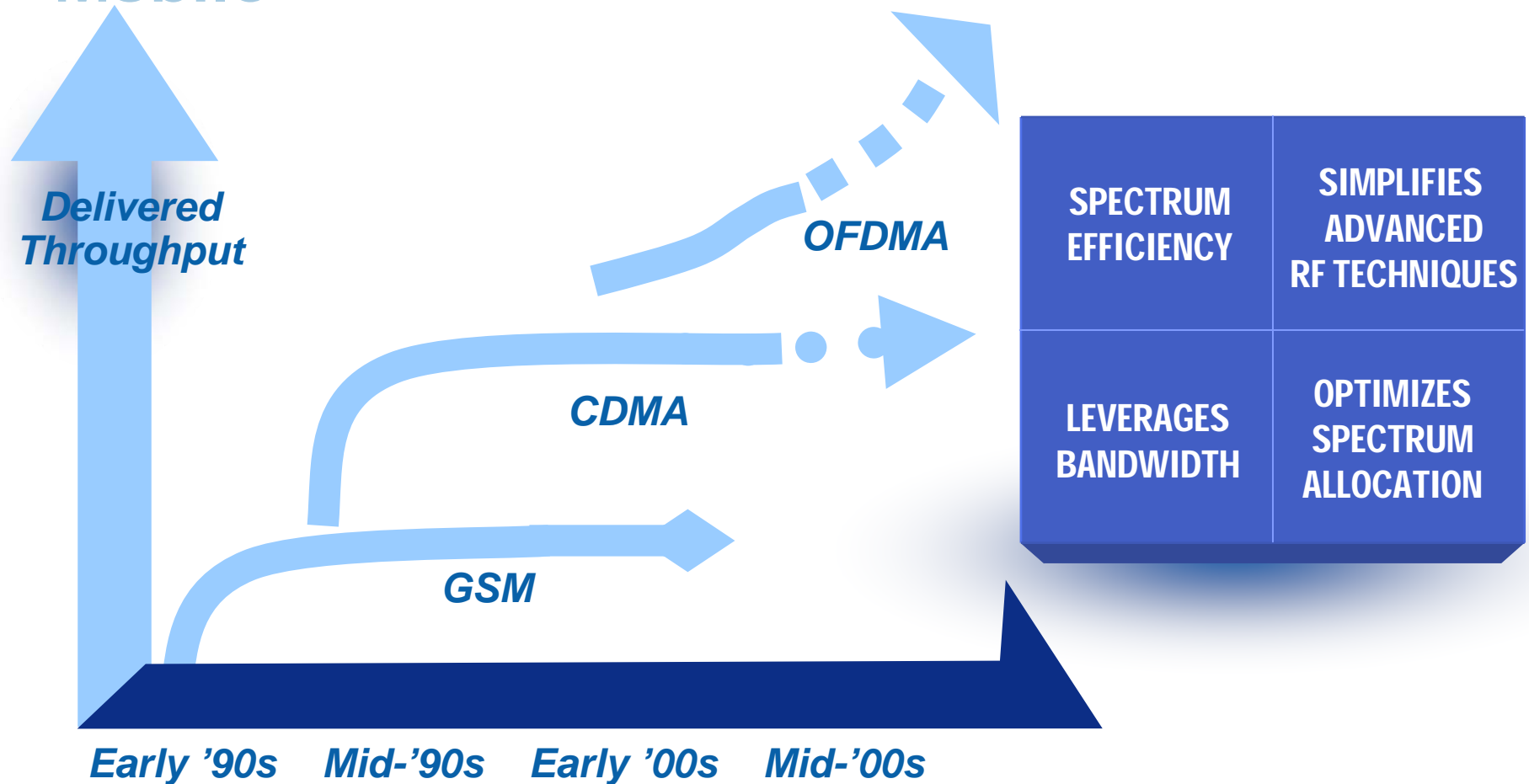- also known as **DECT**

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WiMAX: All-IP 3G Wireless Network for Broadband Delivery

- Increased Revenue: rapid roll-out of advanced services

- Lower CAPEX and OPEX

- Higher Compatibility, Lower Complexity

- Simplified internetworking with other IP technologies

- WiMAX fits easily into wired and wireless ecosystem

Why WiMAX is such a Big Deal?
It Represents a Shift to OFDM for Fixed and Mobile

Delivered Throughput

OFDMA

CDMA

GSM

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

SPECTRUM EFFICIENCY	SIMPLIFIES ADVANCED RF TECHNIQUES
LEVERAGES BANDWIDTH	OPTIMIZES SPECTRUM ALLOCATION

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Why WiMAX?

WiMAX Will Meet Emerging Customer Needs

Established Customer Demand
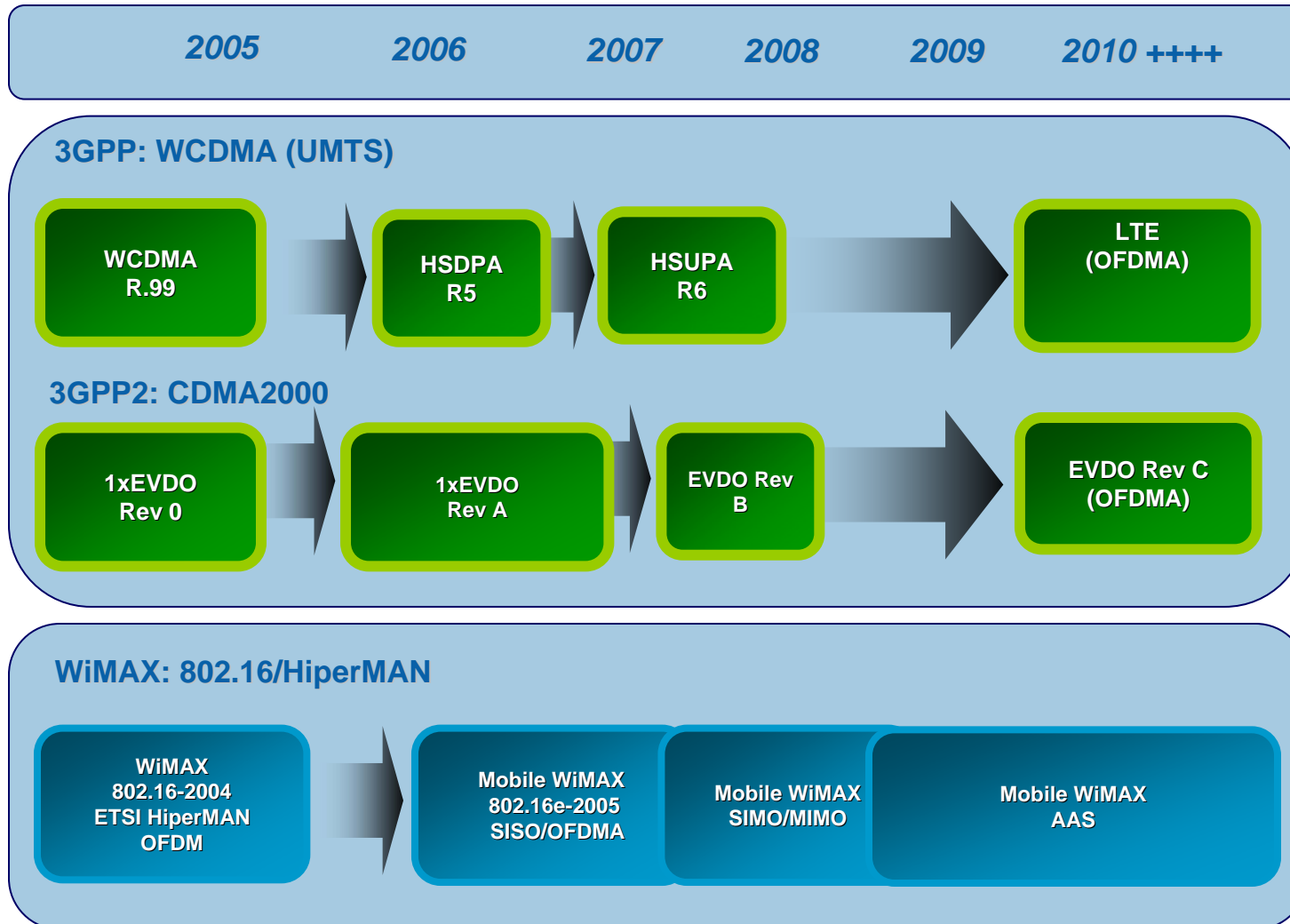
Broadband, *but* Fixed

Mobile, *but* Narrowband

Offering varying levels of Broadband Data, Voice, & Video for Multiple Devices and Usage Models

WiMAX offers a combination of both broadband and mobility
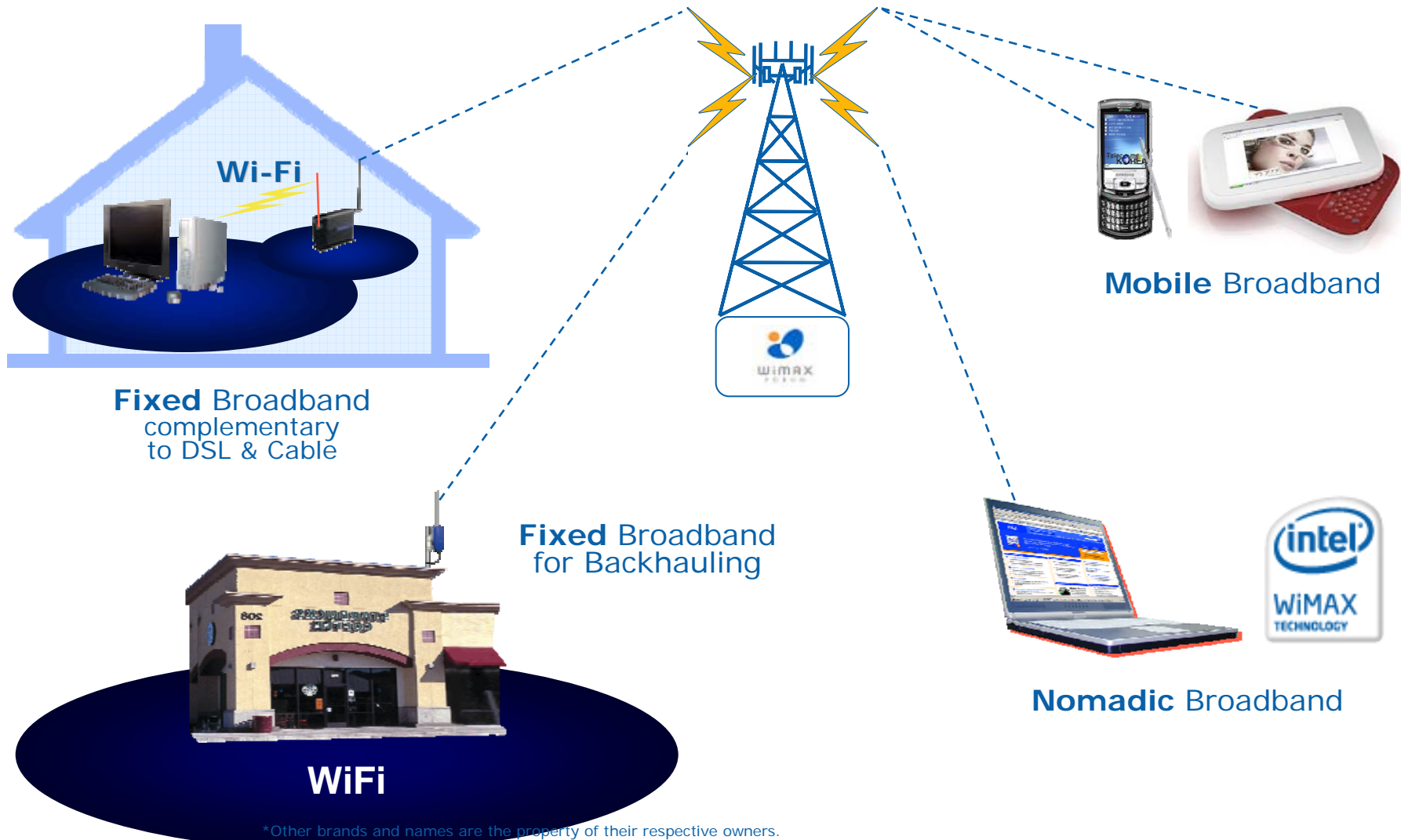
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Wireless Broadband Roadmap

2005	2006	2007	2008	2009	2010 ++++

3GPP: WCDMA (UMTS)

WCDMA R.99 → HSDPA R5 → HSUPA R6 → LTE (OFDMA)

3GPP2: CDMA2000

1xEVDO Rev 0 → 1xEVDO Rev A → EVDO Rev B → EVDO Rev C (OFDMA)

WiMAX: 802.16/HiperMAN

WiMAX 802.16-2004 ETSI HiperMAN OFDM → Mobile WiMAX 802.16e-2005 SISO/OFDMA | Mobile WiMAX SIMO/MIMO | Mobile WiMAX AAS

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Mobile WiMAX Roadmap

In excess of 1000 mbps* at Nomadic (IMT-Advanced Capability)

Mobile WiMAX Rel 1.0 (802.16e)

Mobile WiMAX Rel 1.5 (802.16e)

Mobile WiMAX Rel 2.0 (802.16m)

33 M bps Vehicular

100 M bps Vehicular

100 M bps High-speed Vehicular

2007   2008   2009   2010

* Peak theoretical achievable data rate

WiMAX FORUM®

intel

WiMAX Applications

Wi-Fi

Fixed Broadband
complementary
to DSL & Cable

Fixed Broadband
for Backhauling

Mobile Broadband

Nomadic Broadband

intel WiMAX TECHNOLOGY

WiFi

*Other brands and names are the property of their respective owners.

Anytime, Anywhere — Always Broadband

10

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Intel Developing WiMAX Chips

Ofer-R: World's First Single Chip
Wi-Fi / WiMAX Radio for Mobile Devices

Intel's smallest processor built for low power Mobile Internet Devices and low cost PC's
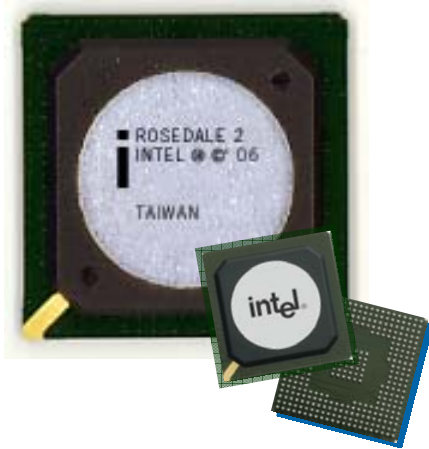
Rosedale-2: Optimized for cost-effective WiMAX modems
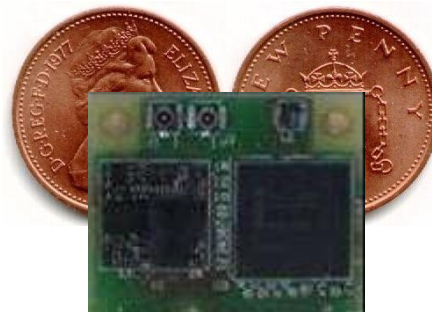
Approx indication of size

Baxter Peak: For Mobile Internet Devices (UMPC)

Baxter Peak
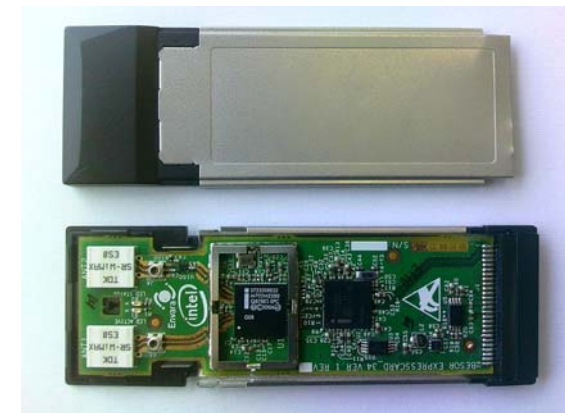
Dana Point
WiMAX Add-in Card Design

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Intel silicon driving new devices

Fixed Modems Mobile Notebooks & handhelds

2006-2007 2008 2009+

Intel® WiMAX Connection 2250 **Intel® Wi-Fi/WiMAX Module** **Integrated Wi-Fi/WiMAX Multi-mode Chipsets**

Ultra-Mobile PC + WiMAX = Mobile Internet

- Web surfing, e-mail
- MMS - Multimedia Messaging Service - high quality image
- Instant Messaging
- Push-type Service
    - Mail, image, ad & coupon
- VoIP, video-conference
- Gaming – low latency
- Music on demand, VOD
- Location Based Service (GPS)
- On-line shopping
- IP TV (DVB-H)
- Safety alarm
- Emergency service

WiMAX Forum Members
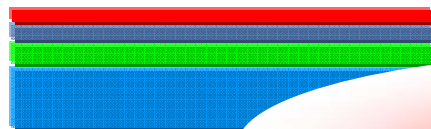

Plus others not specifically listed here

The WiMAX Forum Membership Growing!

Ecosystem/Applications/Content

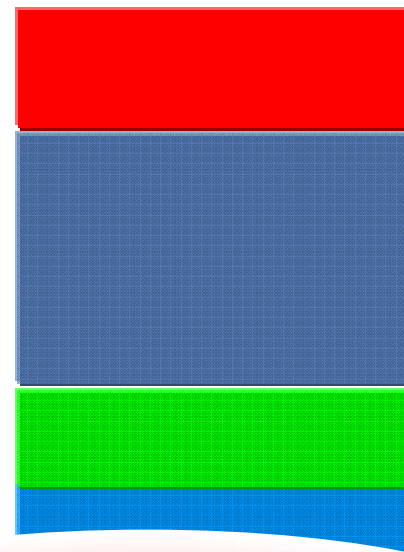Service Providers

System Vendors

Silicon/Component Suppliers
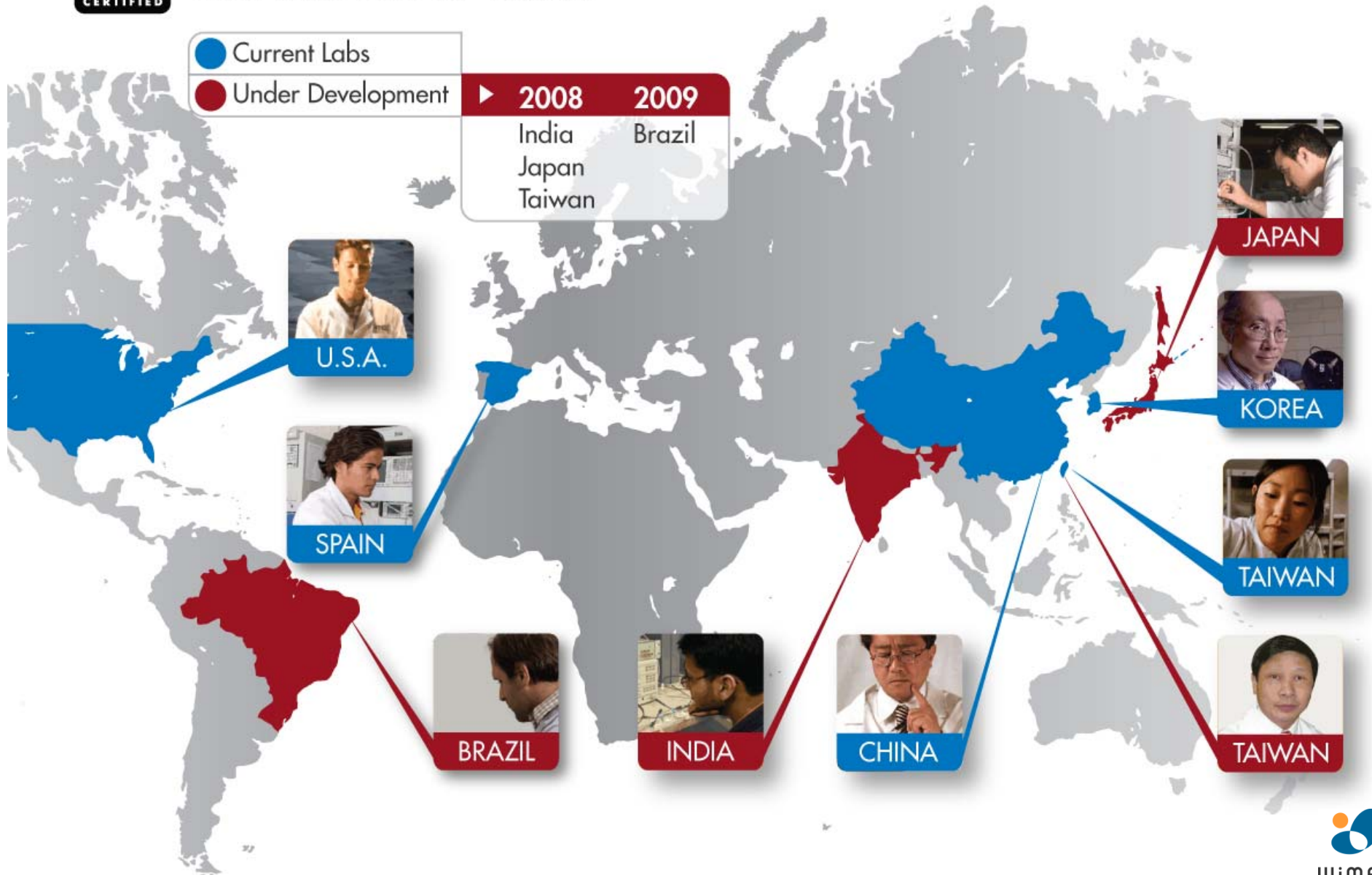
522

46

Spring 2006

Today

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WiMAX Certification

- Certification program started mid-2005.

- Certified products comply with the standards and they interoperate with certified products from other vendors.

- More than 40 Certified products available (for mobile, nomadic and fixed applications).

- WiMAX Forum forecasts that more than 1000 products will undergo Mobile WiMAX certification testing by 2011 and more than 100 certified products will be available by the end of 2008.

- More than 62 companies developing silicon and end user devices, as well as 37 companies developing products for infrastructure.

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Mobile WiMAX Certification Labs

● Current Labs
● Under Development

▶ **2008** **2009**
India Brazil
Japan
Taiwan

U.S.A.
SPAIN
BRAZIL
INDIA
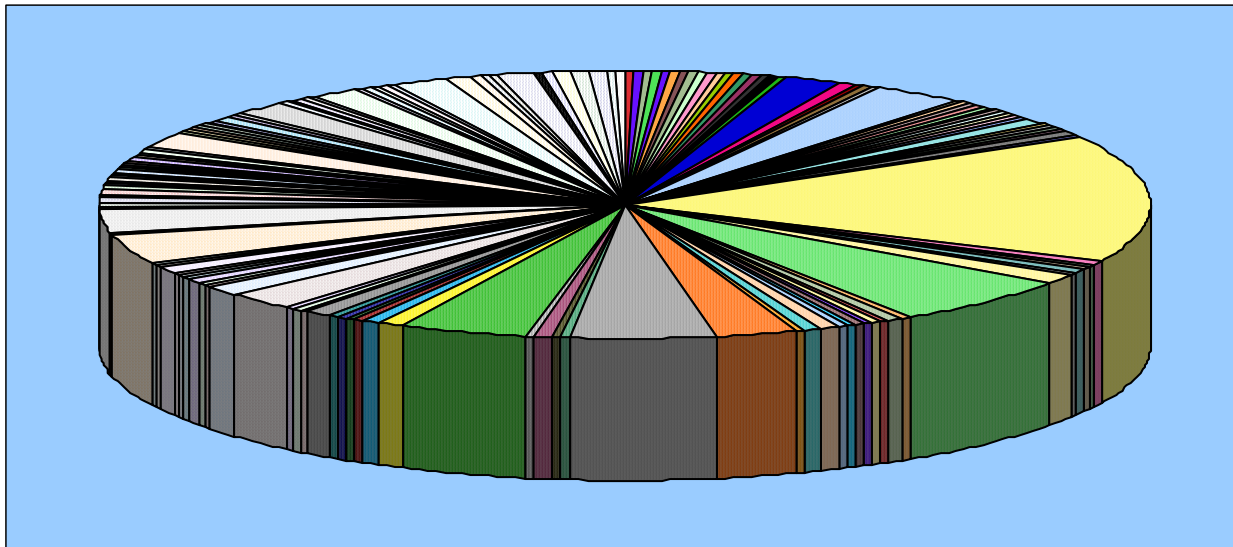CHINA
JAPAN
KOREA
TAIWAN
TAIWAN

Mobile WiMAX Devices

WiMAX Intellectual Property Rights

Dispersed distribution of ownership of patents.

No single company has a dominant IPR position.

1550 patents are distributed among 330 companies

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260 +Commercial Deployments (in more than 110 Countries)

WiMAX™ Networks Worldwide 2008

Source: Informa Telecoms & Media (January 2008)

Mobile WiMAX Regulation Status (2.5/2.3 GHz band)

-South Korea

-USA

-Japan

-Norway

-Sweden

-South Africa

-Saudi Arabia

-Germany Public Consultancy

-Summa Telecom, Russia

-UK Public Consultancy

-Austria Public Consultancy

 and others...

Mobile WiMAX is real $billions invested….at 2.5 GHz band

2 US carriers commit to WiMAX.

intel   SAMSUNG   MOTOROLA

clearw're
wireless broadband

Sprint
Together with NEXTEL

ZTE中兴

NOKIA
CONNECTING PEOPLE

Sprint Nextel Corp. (NYSE: S) today [8th Aug '06] announced its plans to develop and deploy the first fourth generation (4G) nationwide broadband mobile network. The 4G wireless broadband network will use the mobile WiMAX (Worldwide Interoperability for Microwave Access) IEEE 802.16e-2005 technology standard.

"Mobile WiMAX…delivers four times the throughput of other wireless technologies at up to one-tenth the cost."
Sprint

- Sprint PR details
  - Sprint to deploy mobile WiMAX in '07, launch services in '08
  - 100M+ POPs covered by the end of '08
  - Intel to supply technology for laptops and other computing devices

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WiMAX Spectrum Profiles

WiMAX (2.3/2.5 GHz, 3.5/3.7 GHz, 5.8 GHz)

Licensed

2.3/2.5 GHz

Mobile

Licensed

3.5 GHz

Fixed / Nomadic
(mobile)

License
Exempt

5.8 GHz

Fixed / Nomadic

**Current WiMAX
Forum Profiles**

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ITU WRC2007 Agenda Item 1.4 : Results

Existing global identifications for IMT-2000 changed to "IMT"

- 802/862 –915 MHz;

- 1 710 –2025,

- 2 110 -2 200 MHz;

- 2 500 –2 690 MHz (WiMAX certification band)

- 2 300 –2 400 MHz (WiMAX certification band)

- 3 400 –3 600 MHz (WiMAX certification band)
(no global allocation, but accepted by many countries)

- 450 – 470 MHz was newly identified globally for IMT.

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How can we increase broadband penetration?

- We need to transform mobile networks to all IP based broadband mobile networks.

- We need to transform mobile users to broadband mobile users.

- We need to transform mobile handsets to broadband mobile internet devices.

Solution: Mobile WiMAX at 2.5 GHz and 2.3 GHz bands.

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How can we increase broadband penetration?

- **WiMAX is IMT-2000 Standard (3G) approved by ITU**

- **2.5 GHz and 2.3 GHz are for global Mobile WiMAX deployment**

- **2.5 GHz and 2.3 GHz bands recognized by ITU for IMT**

- **Technology neutrality for Mobile WiMAX**

- **Operators should be able to choose any 3G standard**

2.5 GHz   **2.69GHz**

WiMAX needs spectrum

2.3 GHz   **2.4 GHz**

WiMAX needs spectrum

Minimum 30 MHz band (TDD) for each operator

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Conclusion

• Economical, easy, faster high performance mobile broadband solution (IPR Advantage).

• A clear roadmap exists for WiMAX and ready for application.

• Approved by ITU as IMT-2000 standard (3G), equality with other IMT-2000 technologies established.

• Mobile WiMAX can be applied simultaneously, both in developing and developed countries.

• You have the chance to transform narrowband mobile subscribers to broadband mobile subscribers and bridge the broadband gap.

•Need for all IP and OFDMA based broadband mobile technology.

To benefit, 2.5 GHz (or 2.3 GHz) spectrum should be allocated.

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