

WiMAX: Enabling Mobile Broadband

Christoph Legutko
Global Public Policy
Intel Corporation

Legal Disclaimer

- INFORMATION IN THIS DOCUMENT IS PROVIDED IN CONNECTION WITH INTEL® PRODUCTS. EXCEPT AS PROVIDED IN INTEL'S TERMS AND CONDITIONS OF SALE FOR SUCH PRODUCTS, INTEL ASSUMES NO LIABILITY WHATSOEVER, AND INTEL DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY RELATING TO SALE AND/OR USE OF INTEL PRODUCTS, INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT, OR OTHER INTELLECTUAL PROPERTY RIGHT. Intel products are not intended for use in medical, life-saving, life-sustaining, critical control or safety systems, or in nuclear facility applications.
- Intel products may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request.
- Intel may make changes to dates, specifications, product descriptions, and plans referenced in this document at any time, without notice.
- This document may contain information on products in the design phase of development. The information here is subject to change without notice. Do not finalize a design with this information.
- Designers must not rely on the absence or characteristics of any features or instructions marked "reserved" or "undefined." Intel reserves these for future definition and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them.
- Intel Corporation may have patents or pending patent applications, trademarks, copyrights, or other intellectual property rights that relate to the presented subject matter. The furnishing of documents and other materials and information does not provide any license, express or implied, by estoppel or otherwise, to any such patents, trademarks, copyrights, or other intellectual property rights.
- Wireless connectivity and some features may require you to purchase additional software, services or external hardware.
- Intel, the Intel logo are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.
- *Other names and brands may be claimed as the property of others.
- Copyright © 2009 Intel Corporation. All rights reserved.



Agenda

- Background on Intel
- Mobile WiMAX status
- Mobile WiMAX Products
- IMT-Advanced
- Conclusion

Background on Intel

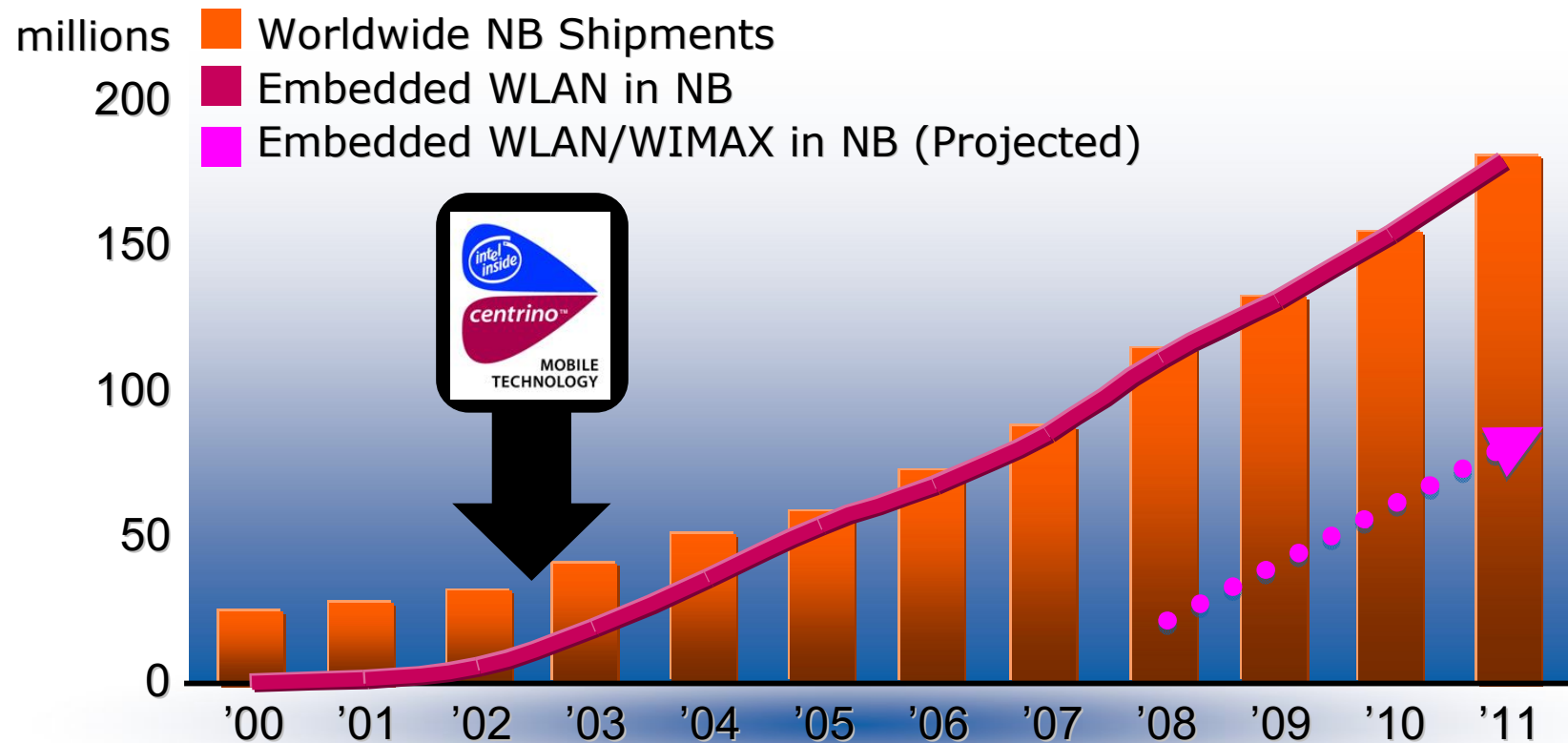
Intel Corporation

- Founded in 1968
- Produced the world's first microprocessor in 1971
- World's largest semiconductor manufacturer
- A leading manufacturer of computer, networking, and communications products
- www.intel.com

Broadband Spectrum Policy

- Intel strongly supports Technology & Service Neutrality:
 - Flexibility to allow licensee to choose any appropriate broadband wireless technology
- Licensing arrangements
 - Allowing market forces to decide ratio of paired/unpaired spectrum
 - Access to sufficient spectrum
 - Support secondary markets (spectrum trading)

PC Ecosystem Changed The World Once... Together, We Can Do It Again



Goal: Everywhere Wi-Fi today, Wi-Fi / WiMAX Tomorrow

*Source: ABI Q1'07, Intel Estimates

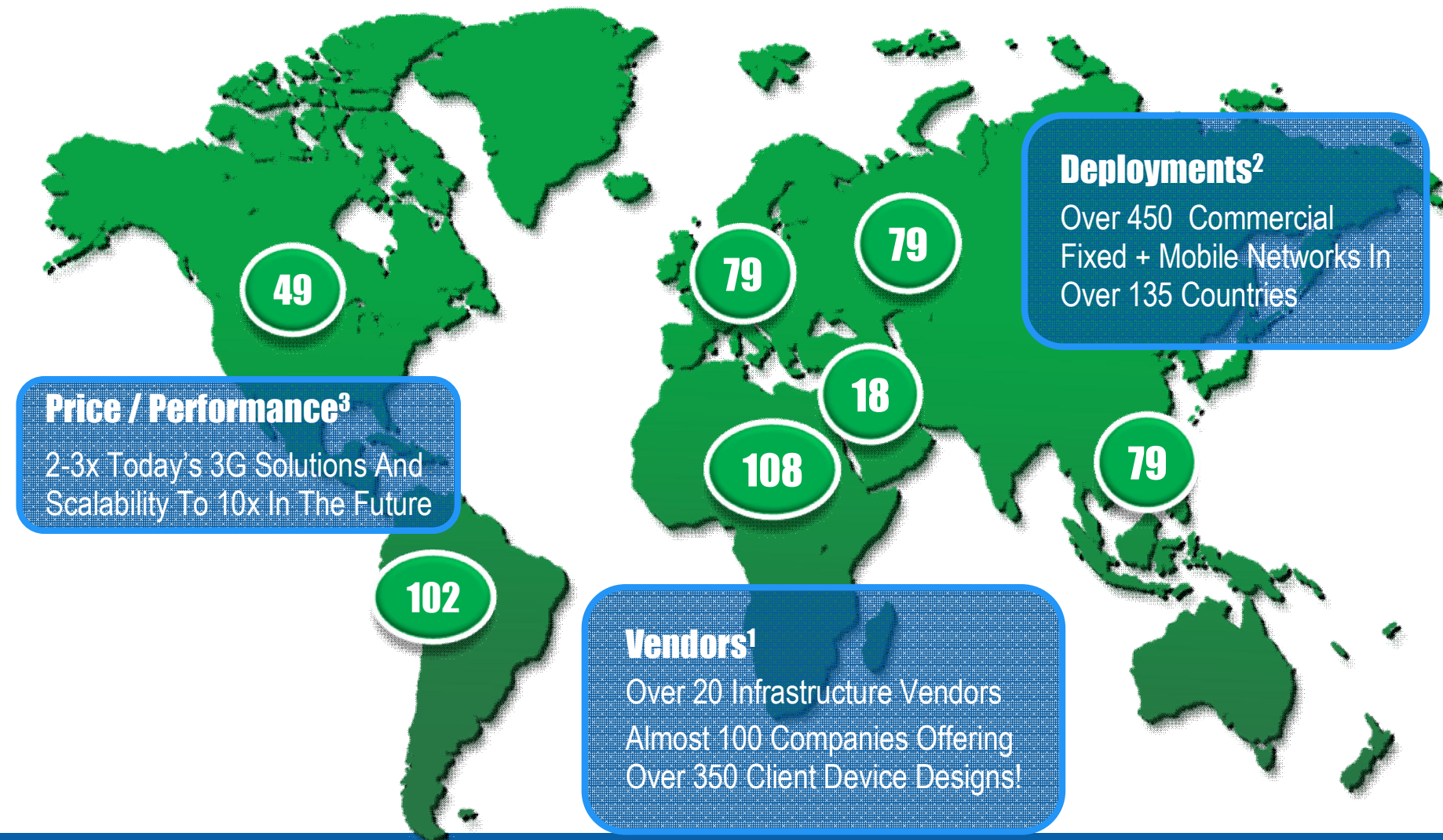


Mobile WiMAX Status

Spectrum Bands

- Mobile WiMAX (IEEE 802.16e) products commercially available today:
 - 2.3-2.4 GHz,
 - 2.5-2.69 GHz,
 - 3.4-3.6 GHz
- Other bands under development including “digital dividend”

WiMAX Global Momentum Continues to Build



1. Infrastructure: ABI Research, 2009; Client devices: Orr Technologies, 2009.

2. Informa Telecoms & Media, 2009

3. 2-3x based upon actual network performance in Korea, US, Russia, Taiwan & Japan; 10x per IEEE 802.16m Systems Requirements Document

USA



"We actually welcome the use of heavy bandwidth data applications that conventional 3G network operators may discourage or simply can't support."

Scott Richardson, Chief Strategy Officer, Clearwire



WiMAX-Ready
LAPTOPS



Clear
MODEM



Clear USB
MODEM



Clear Voice
ADAPTER



Clear Mobile Broadband
ENTERTAINER



Clear
SPOT

- Over 40 notebook models from 6 manufacturers
- Plug in your Clear access device and surf, often in less than 60 seconds
- Targeting coverage in over 80 markets by end of 2010
- Consistent (typical) download speeds of 2-4 Mbps

Other names and brands may be claimed as the property of others



Clear: Actual Mobile user experience in Portland

	CLWR 802.16e	Carrier #1 EVDO - A	Carrier #2 EVDO - A	Carrier #3 HSPA
Peak Rates	19 Mbps	2.4 Mbps	2.5 Mbps	1.9 Mbps
Mean Rate	6.5 Mbps	0.7 Mbps	0.9 Mbps	0.9 Mbps
Mean Latency	83 ms	168 ms	201 ms	354 ms

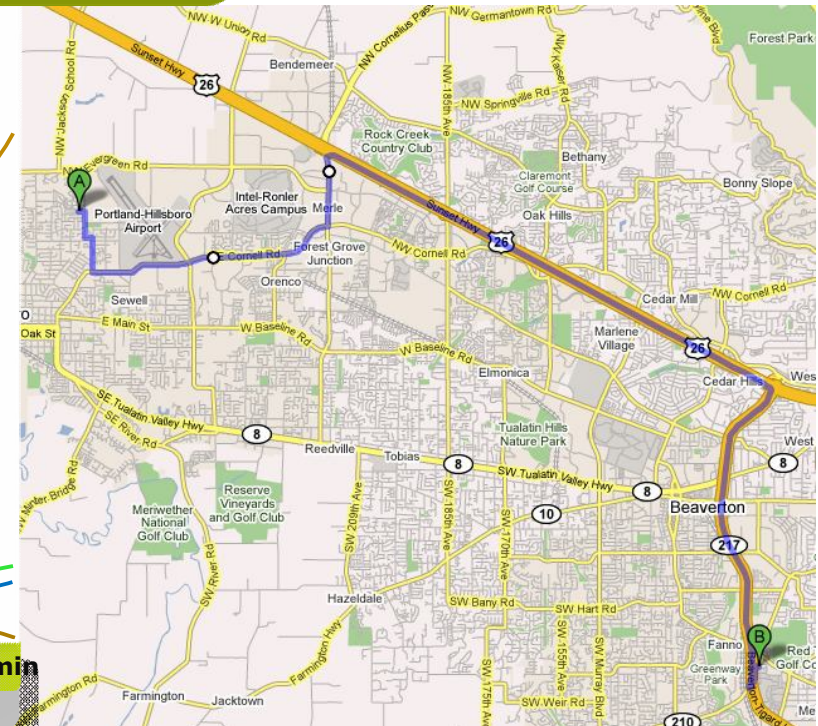
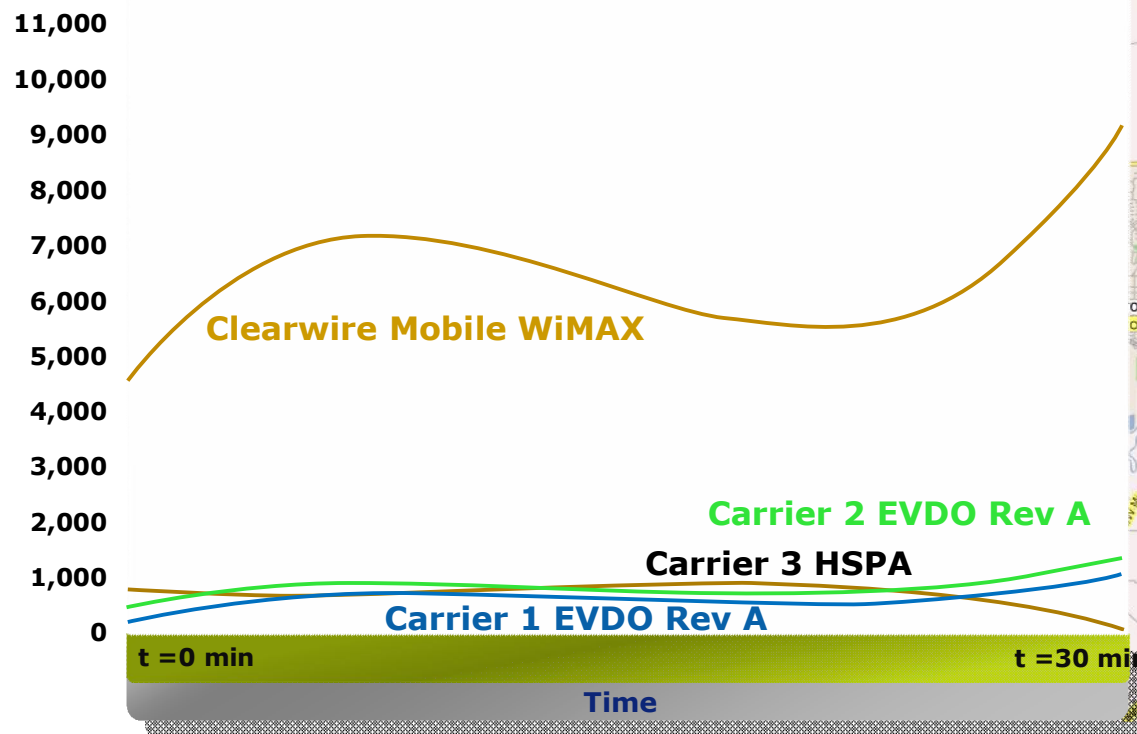
Location: Portland, OR

Drive route: 17 miles

Drive time: 30 min

Average Vehicle Speed: 35 mph

Max Vehicle Speed: 55 mph



Source: Intel – CLWR test.

Note: Drive tests were conducted at off-peak hours to minimize loading effects

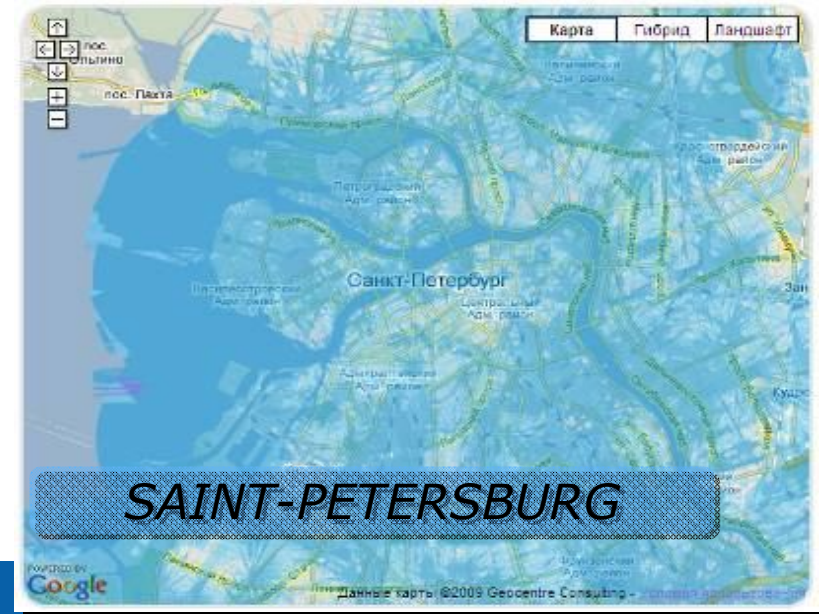
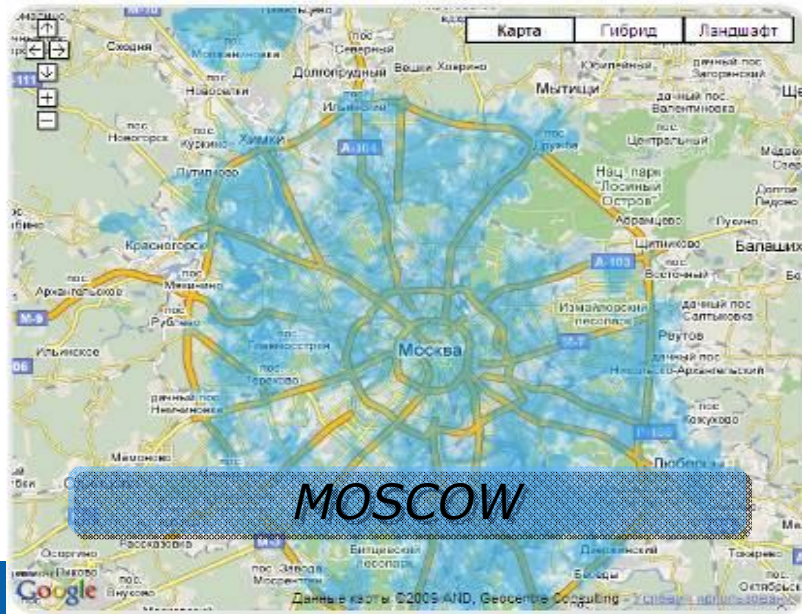
Other names and brands may be claimed as the property of others





Russia

- Targeting over 40 of the largest cities in Russia
- Carrying over 500TB of traffic per month TODAY
- 2,000 new subscribers per day
- Average subscriber is consuming 9.5GB per month!
 - Twice that of DSL/Cable subscribers
 - Twice that of typical monthly data limit set by incumbent operators (5GB)
- HTC GSM / WiMAX dual mode handset



Other names and brands may be claimed as the property of others

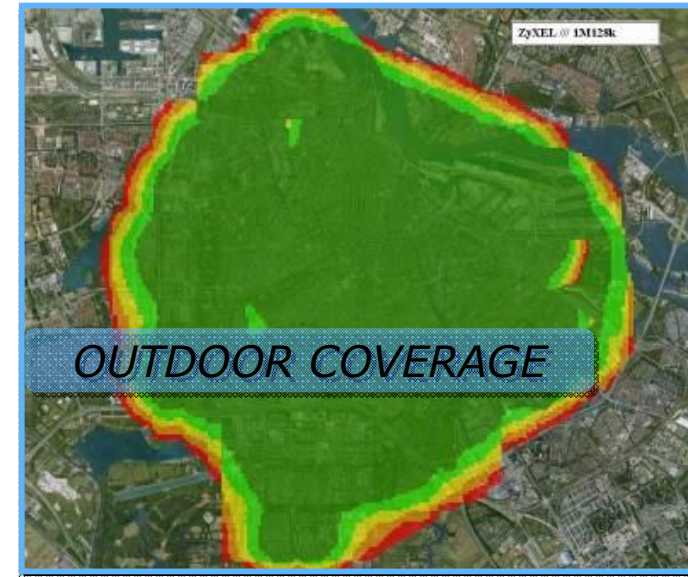




Netherlands



- First Mobile WiMAX network live in Europe
- World's first 3.5GHz carrier
- Installed over 100 base stations in 2 months; over 170 today
- Nationwide coverage expected in 3 years
- 8 Mbps downlink rates





www.p1.com.my
1 300 800 888

Believe it
or not,
WiMAX
is plug
and play.



www.p1.com.my
1 300 800 888

Be the 1st*
in Malaysia
to discover
WiMAX!



*First on the 2.3 GHz WiMAX spectrum.

Other names and brands may be claimed as the property of others

Malaysia

- P1
- World's largest 2.3 GHz deployment outside of So. Korea
- Wireless@KL provides free access to over 70,000 users
- 30% of new broadband subscribers choosing P1





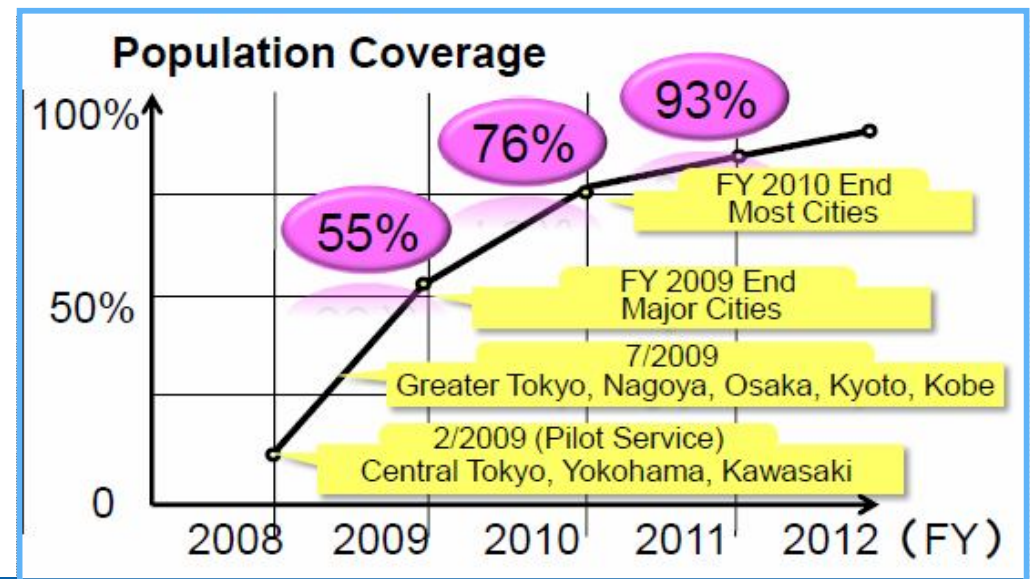
Japan



Faster and Cheaper:

Live speed tests on notebooks have reached about 16 Mbps down and 4 Mbps up, as simple, flat-rate pricing undercuts all current HSPA offers

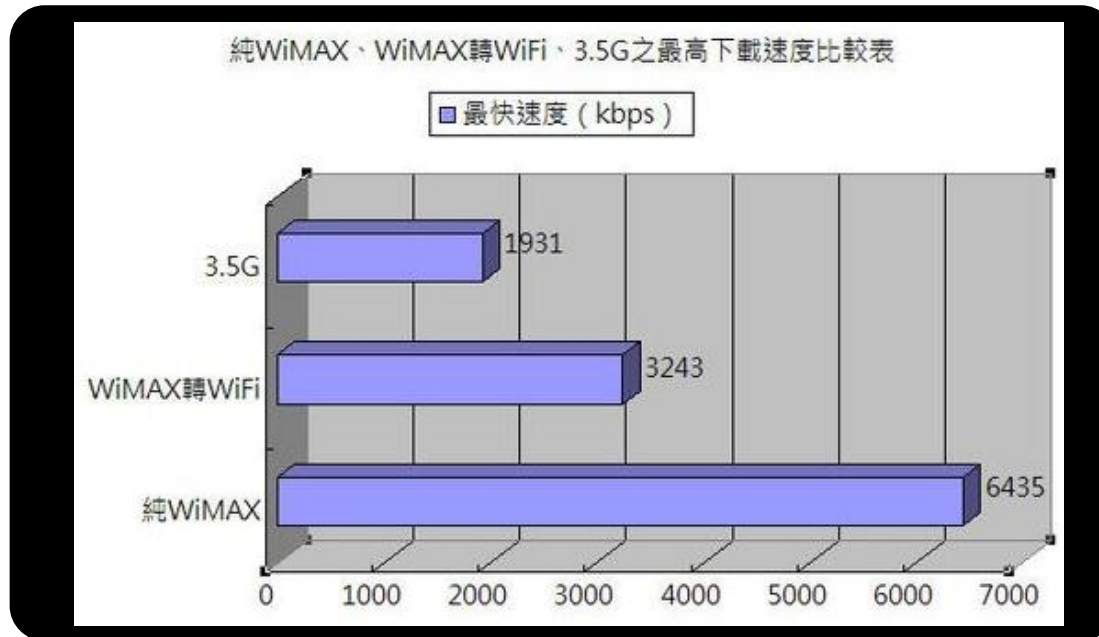
- 13 PC manufacturers announced plans to offer embedded WiMAX notebooks
- Launched with 3 major electronics retailer MVNOs
- Unique railway and mobile application service offerings





Taiwan

- Pre-commercial network shows 3x the performance of HSPA*
- 30 MHz of spectrum in 2.5 GHz
- Start in Taipei and then expand into northern Taiwan



* http://taiwan.cnet.com/crave/0_2000088746_20138755_00.htm

Other names and brands may be claimed as the property of others



India



- Phase 1: Serve over 250,000 subscribers across 80,000 villages
- Phase 2: Serve 675,000 villages and ~ 1.1 million subscribers
- E-governance, telemedicine, distance education, e-travel, e-chaupal, e-legal services, and e-media access
- Plan to cover all urban India – 3 states already launched via franchisees

New Applications Drive Bandwidth Consumption

Average Smartphone user on a 3G Network

=

400MByte/mos

Average iPhone user in NY and San Francisco⁽²⁾

=

800MByte/mos

Watch DVD quality movie on Netflix.com

=

4.7 GigaBytes

Listen 30 minutes a day of Pandora

=

1.2 GigaBytes/mos

Watch 30 minutes daily sitcom using Hulu HD

=

5.8 GigaBytes/mos

Upload 5 minute SD video clip to Facebook 10X

=

1.2 GigaBytes

Sync photos with your Nikon SLR and Flickr

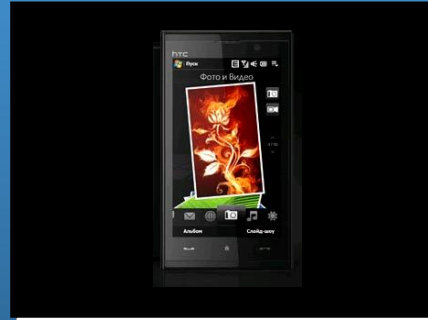
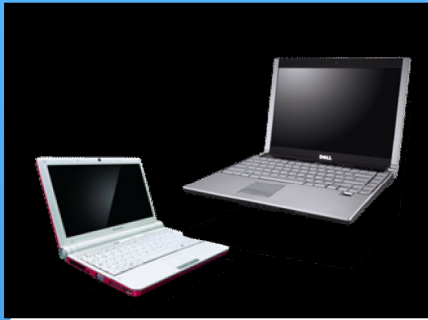
=

5 GigaBytes



Mobile WiMAX Products

A Diverse Offering of WiMAX Devices Available NOW



Intel WiMAX Products & Designs

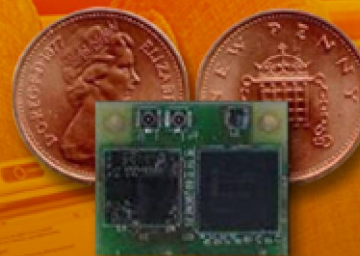
WiMAX/Wi-Fi Combo Modules



Intel® WiMAX/WiFi Link
5050 Series

1st integrated Wi-Fi +
WiMAX module

WiMAX MIDs



Approx indication of size

Intel® WiMAX
Connection 2400

Highly integrated two
chip solution
Small size & low power

WiMAX Embedded Laptops & Netbooks

16 PC OEMs Have Announced Plans to Embed
Intel's WiMAX Modules

U.S.A.

*40 certified models from 6 OEMs
20+ models available in U.S. Channels NOW*

Japan

14 OEMs committed to embed WiMAX

Russia

30+ Models Available from 6 OEMs

Scaling to over 100 models by EOY 2009



IMT-Advanced

- IEEE 802.16e products already delivering Mobile Broadband
- IEEE 802.16m submitted for inclusion in IMT-Advanced
 - Self-evaluation shows meets IMT-Advanced requirements for all 4 test environments
 - Widespread participation in development of standard
 - Demos at ITU Telecom World

Summary

- Intel supports technology and service neutrality
 - Allows market forces to determine which technologies to deploy
- Mobile WiMAX is here today
 - Delivering high speed mobile broadband
 - Momentum continuing to build
- Mobile WiMAX products commercially available today
 - Intel delivering embedded products
 - Over 100 notebook models by end of year
- IEEE 802.16m submitted for inclusion in IMT-Advanced
 - Looking forward to continuing development of IMT-Advanced standards

