WiMAX:

Changing the Game

25/06/2009, Moscow

Dmitry Laryushin
Technical Policy Director
Intel Russia/CIS

Our Vision:

1 Billion "Connected Mobile Clients" in 5 Years

Core Business

Strategic Growth Areas

Client PCs

Windows, Mac OS

CE (Internet)

Mobile Internet Devices

Low-Cost PCs

Embedded

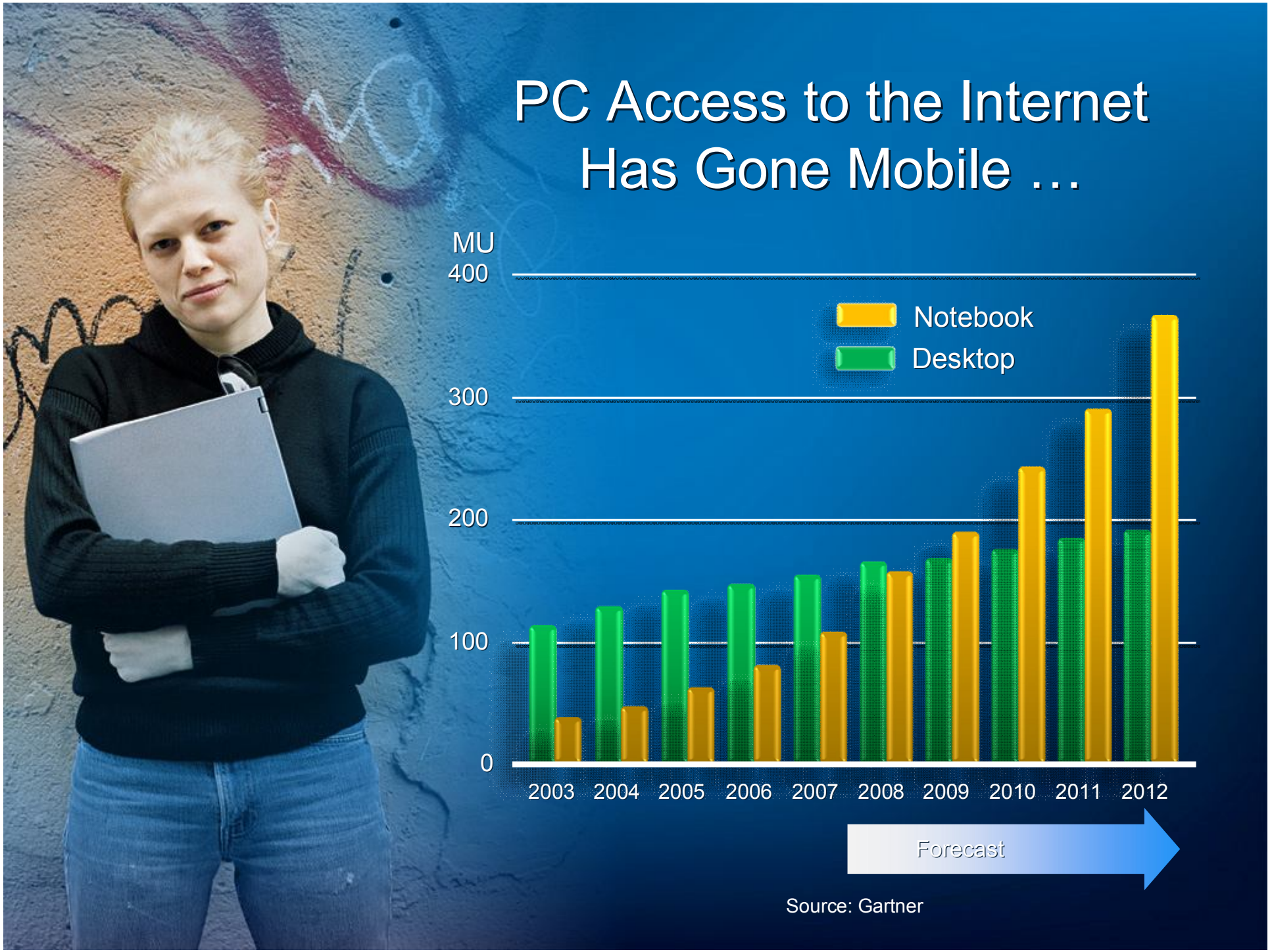
Microsoft Windows / Moblin Linux-based OS / Services Port of Choice

Centrino 2 inside

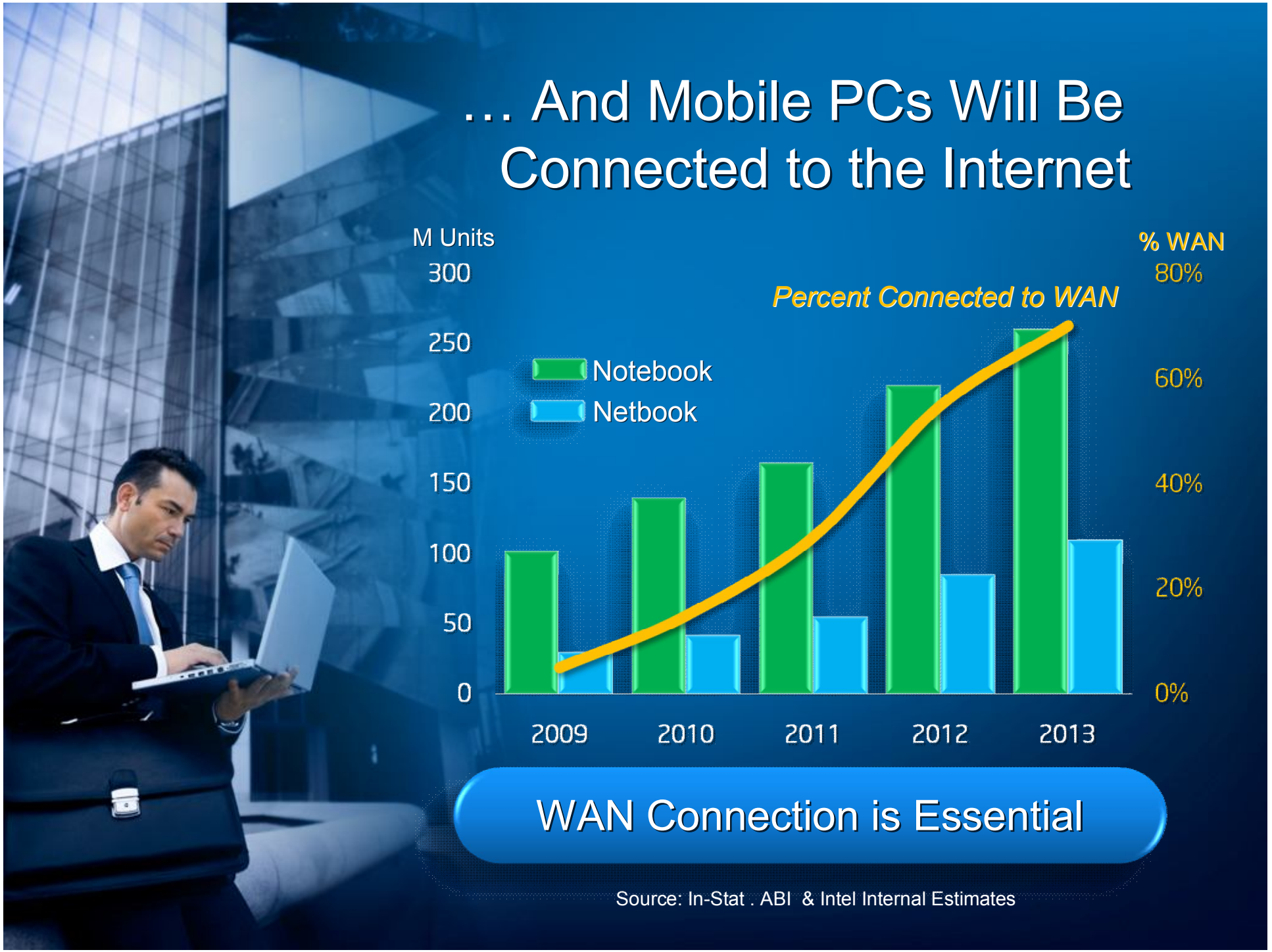
intel Atom inside

One Architecture Across Multiple Mobile Client Platforms

Source: Intel


PC Access to the Internet Has Gone Mobile …
MU
400
300
200
100
0
Notebook
Desktop
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Forecast
Source: Gartner

… And Mobile PCs Will Be Connected to the Internet



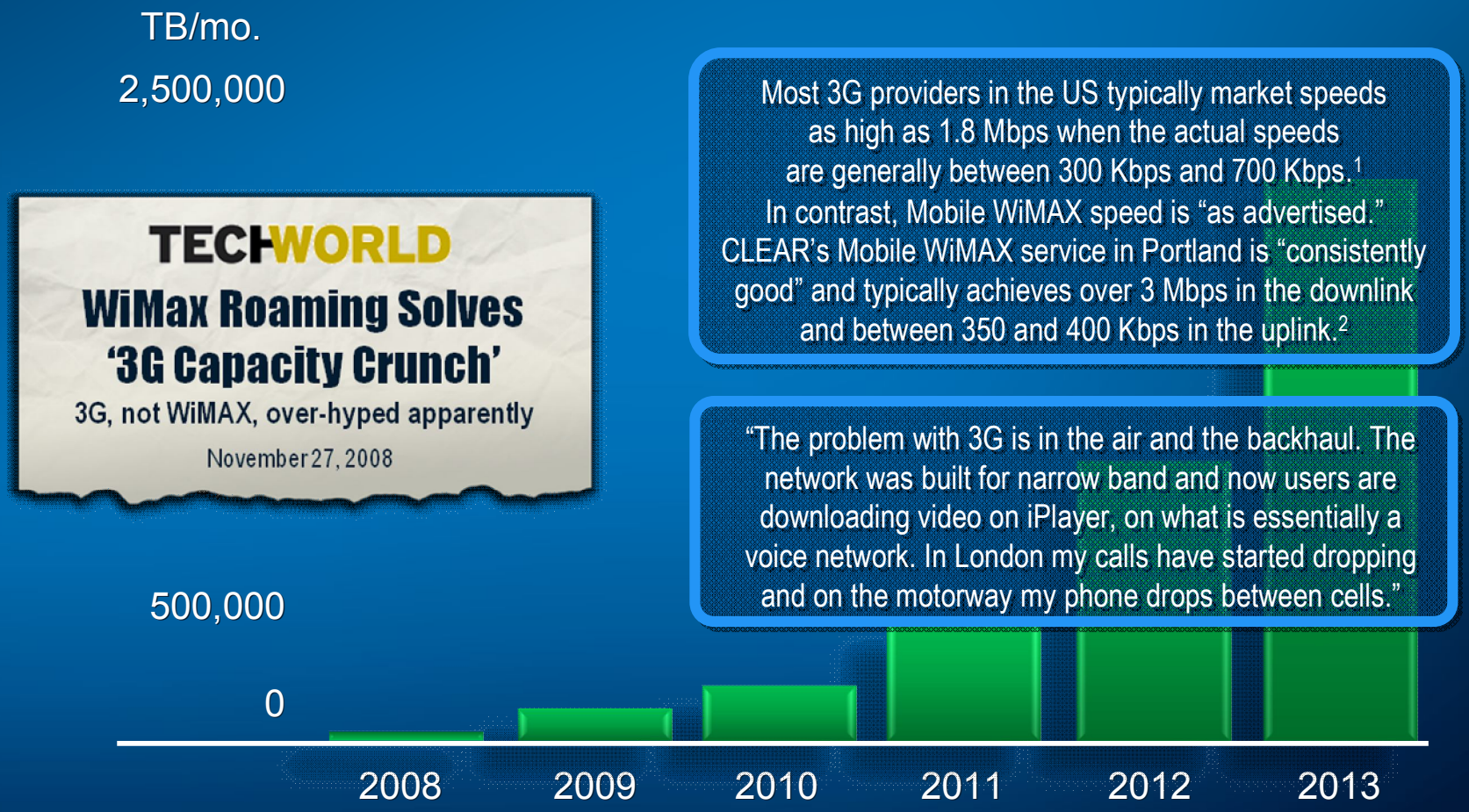
WAN Connection is Essential

Source: In-Stat . ABI & Intel Internal Estimates

… And These New Devices and Applications Are Rapidly Overloading Existing Networks

How Will Operators Meet Demand?

Global Mobile Data Traffic Growth



TECHWORLD

WiMax Roaming Solves '3G Capacity Crunch'

3G, not WiMAX, over-hyped apparently

November 27, 2008

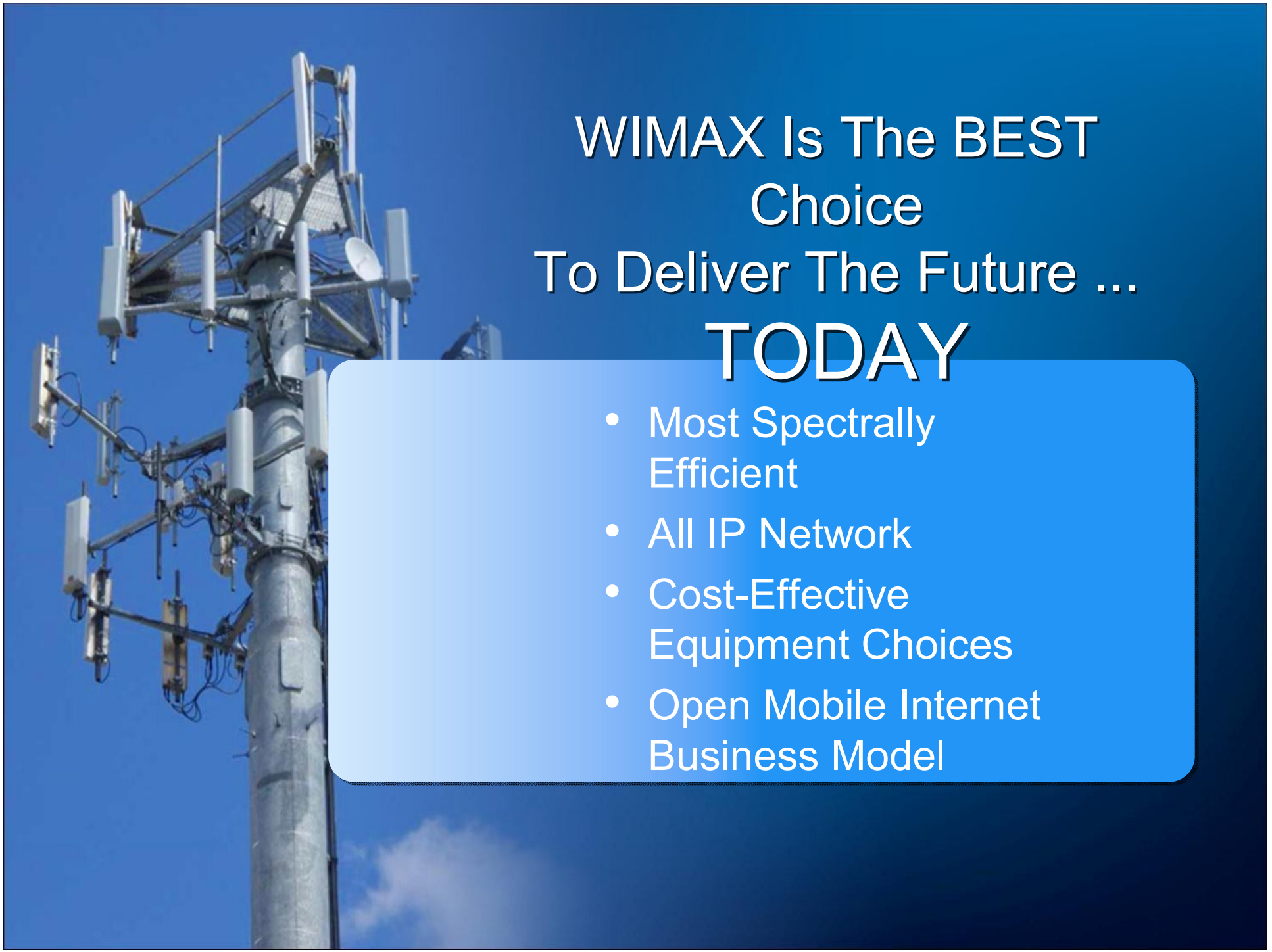
Most 3G providers in the US typically market speeds as high as 1.8 Mbps when the actual speeds are generally between 300 Kbps and 700 Kbps.[1] In contrast, Mobile WiMAX speed is "as advertised." CLEAR's Mobile WiMAX service in Portland is "consistently good" and typically achieves over 3 Mbps in the downlink and between 350 and 400 Kbps in the uplink.[2]

"The problem with 3G is in the air and the backhaul. The network was built for narrow band and now users are downloading video on iPlayer, on what is essentially a voice network. In London my calls have started dropping and on the motorway my phone drops between cells."

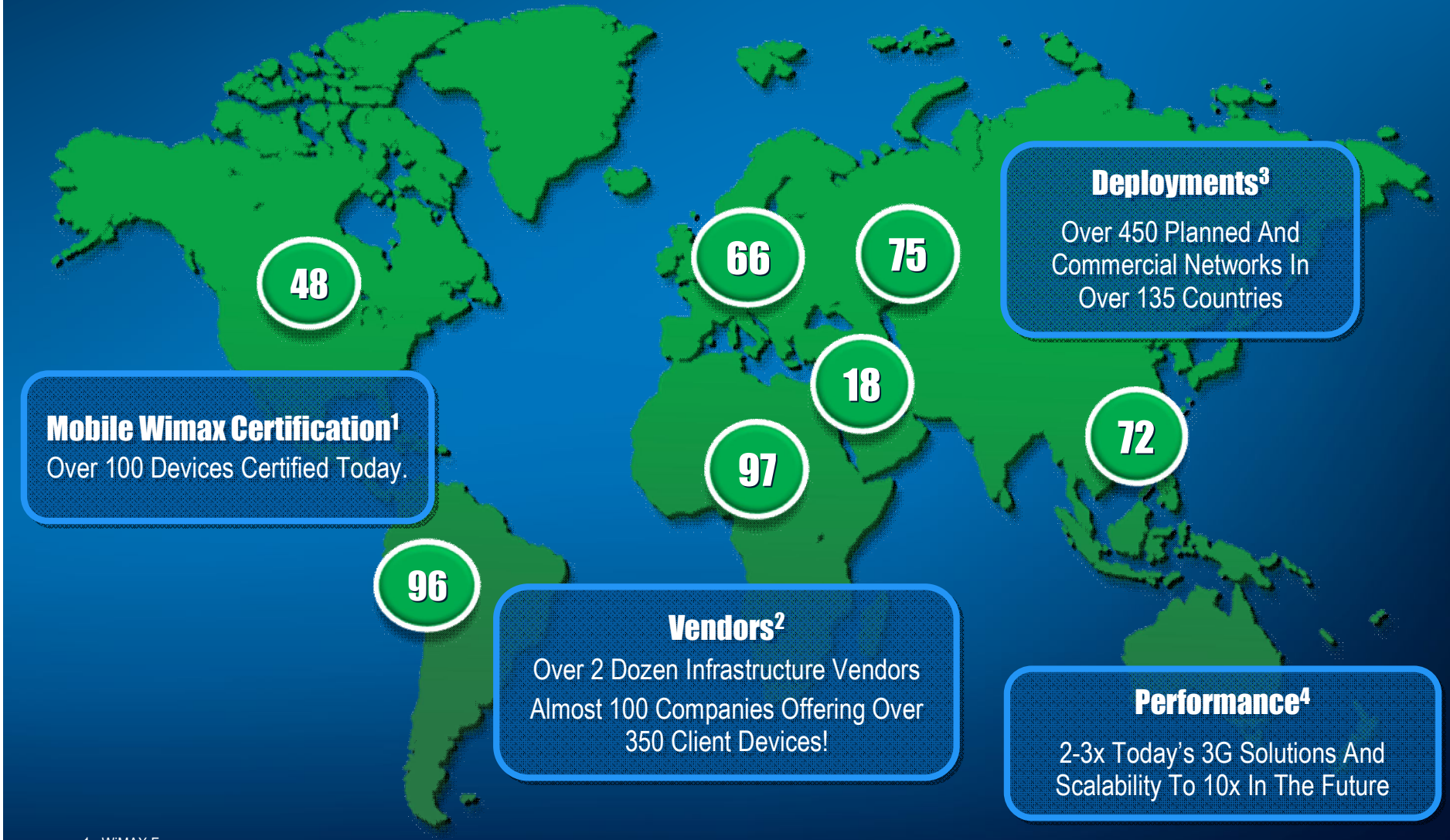
Source: Cisco Visual Networking Index − Forecast, 2008 -2013

[1] "U.S. 3G Networks Deliver Less Than Expected," Phillip Redman, Gartner Research, 22 January 2009.
[2] "Testing WiMAX performance in the CLEAR network in Portland," Senza Fili Consulting, January


Mobile Voice
vs.
Mobile Internet
Traffic Equivalents*
1 Smartphone = 30 Handsets
1 Laptop = 450 Handsets
A Network Optimized For Mobile Voice Cannot Handle High Numbers Of Mobile Internet Users
< 10 Kbs Constant Rate
1-5 Mbps Burst Traffic
More Spectrum Needed
More Backhaul And Different Network Architecture Required
Mobile Internet Requires a Technology Revolution
* Source: Cisco, 2009


WIMAX Is The BEST
Choice
To Deliver The Future ...
TODAY
• Most Spectrally Efficient
• All IP Network
• Cost-Effective Equipment Choices
• Open Mobile Internet Business Model

WiMAX Global Momentum Continues to Build



Deployments[3]

Over 450 Planned And Commercial Networks In Over 135 Countries

Mobile Wimax Certification[1]

Over 100 Devices Certified Today.

Vendors[2]

Over 2 Dozen Infrastructure Vendors

Almost 100 Companies Offering Over 350 Client Devices!

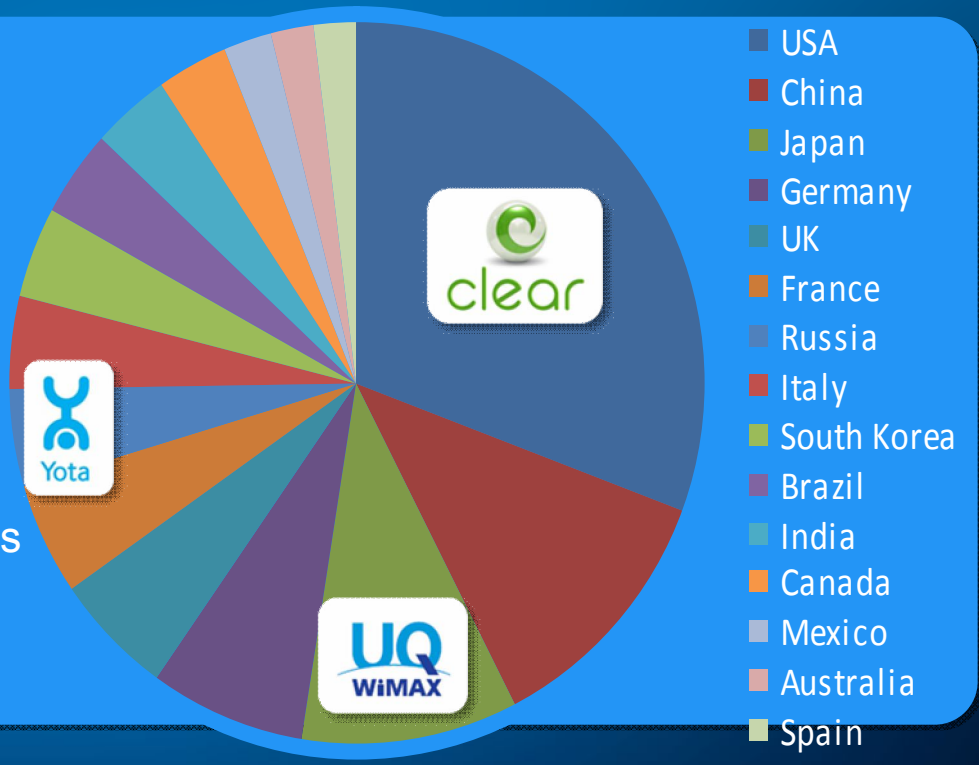
Performance[4]

2-3x Today's 3G Solutions And Scalability To 10x In The Future

1. WiMAX Forum
2. Infrastructure: ABI Research, 2009; Client devices: Orr Technologies, 2009.
3. Informa Telecoms & Media, 2009
4. 2-3x based upon actual network performance in Korea, US, Russia & Japan; 10x per IEEE 802.16m Systems Requirements Document

Mobile WiMAX Being Deployed in 14 of Top 15 PC Markets

- 1.2 billion PCs deployed worldwide
- Top 15 represent 71% of total
- All countries have 2.3/2.5 or 3.5GHz
- 16 IA OEMS supporting WiMAX today
- Clear / US: 35+ models from 6 OEMs
  - 20+ available now
- UQ / Japan: 14 OEMs commit to embed
- Russia: 30 models available from 6 OEMs
- 100 notebook + netbook models by end of year



ASUS EPSON EXCEED YOUR VISION FUJITSU lenovo NEC Panasonic SONY
acer clarion DELL hp msi ONKYO IMAGINATIVE SIGHT & SOUND SAMSUNG SHARP TOSHIBA

Source: Computer Industry Almanac, Jan '09

CLEAR WiMAX Launched in U.S.

CLEAR™

"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

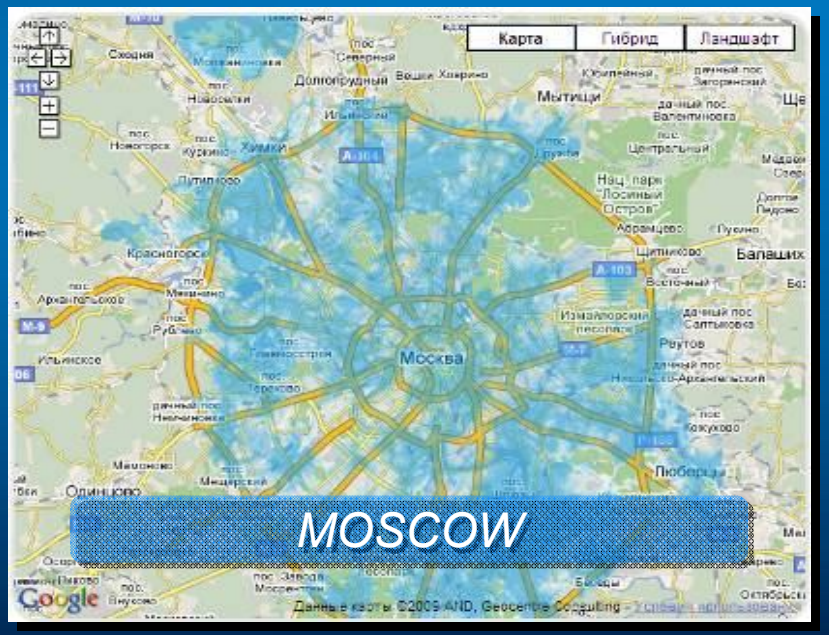
Clear Mobile Broadband ENTERTAINER

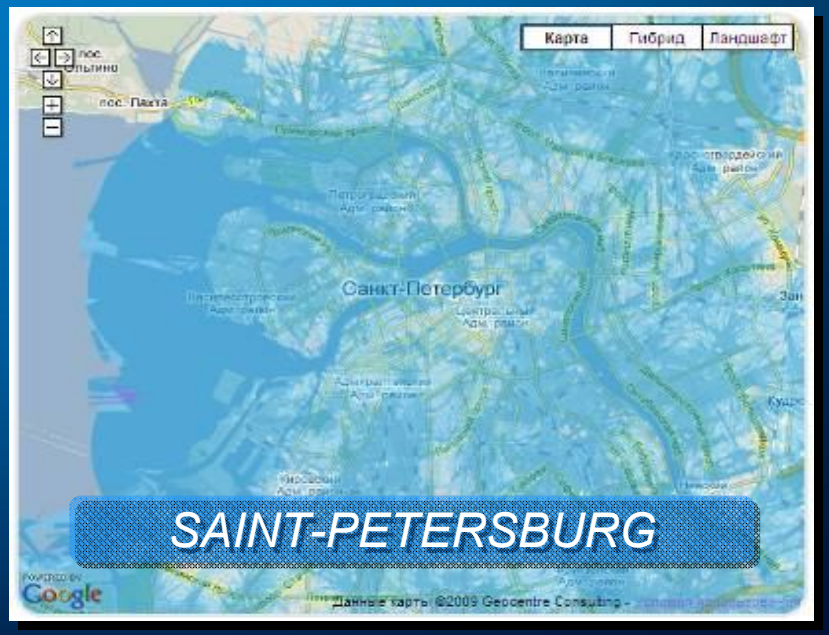
Clear SPOT

- Over 35 notebook models from 6 manufacturers with over 20 in retail today
- Plug in your Clear access device and surf, often in less than 60 seconds
- Targeting coverage in over 80 markets by end of 2010
- Actual (typical) download speeds of 2-4 Mbps

Scartel's Yota Service

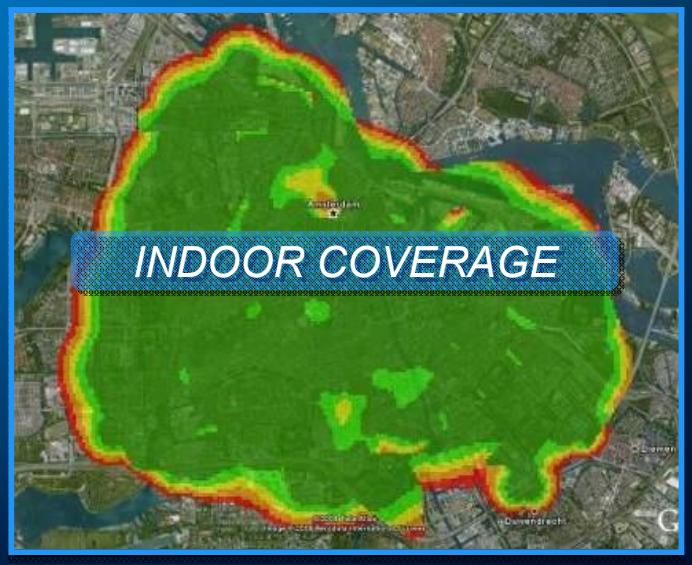
- Targeting over 40 of the largest cities in Russia
- Carrying over 500TB of traffic per month TODAY
- Average subscriber is consuming 9.5GB per month!
  - Twice that of DSL/Cable subscribers
  - Twice that of typical monthly data limit set by operators (5GB)
- HTC GSM / WiMAX dual mode handset





worldmax

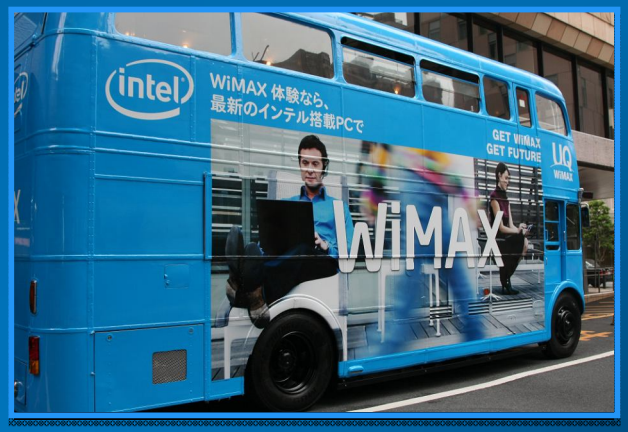
- First Mobile WiMAX network live in Europe
- World's first 3.5GHz carrier
- Installed over 100 base stations in 2 months; over 170 today
- Nationwide coverage expected in 3 years
- 8 Mbps downlink rates



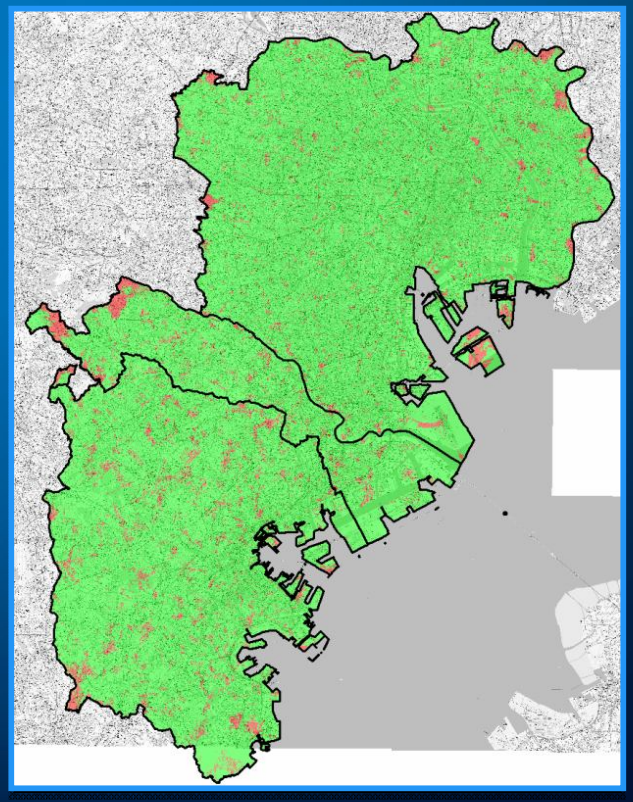
Packet One, Malaysia

- Over 500 new subscribers / day
- World's largest 2.3 GHz deployment outside of So. Korea
- Wireless@KL provides free access to over 70,000 users

Initial Launch Markets:
Tokyo, Yokohama
and Kawasaki



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

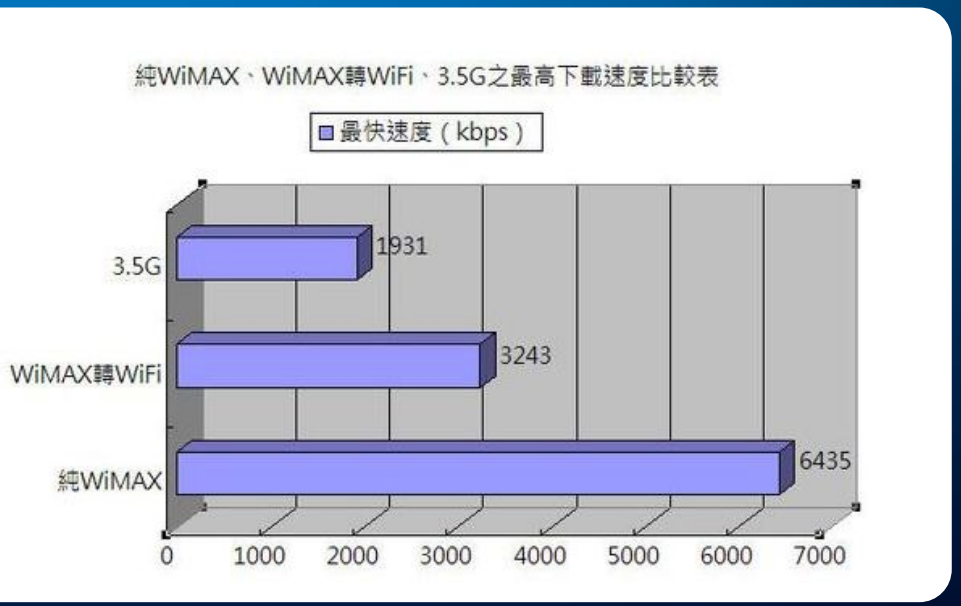


- Targeting over 40 million POPs by end of 2009; 90% POPs by 2013
- 14 PC manufacturers already commited to embedded WiMAX notebooks
- Unique railway and mobile application service offerings
- Simple, flat rate “all you can eat’ service for one affordable price

Owner: SMiller

VMAX TELECOM

- 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

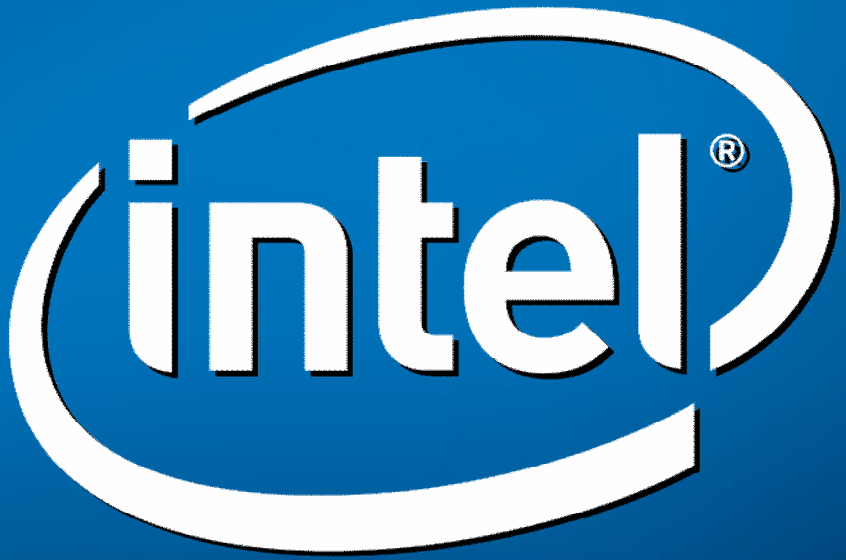


BSNL
Connecting India

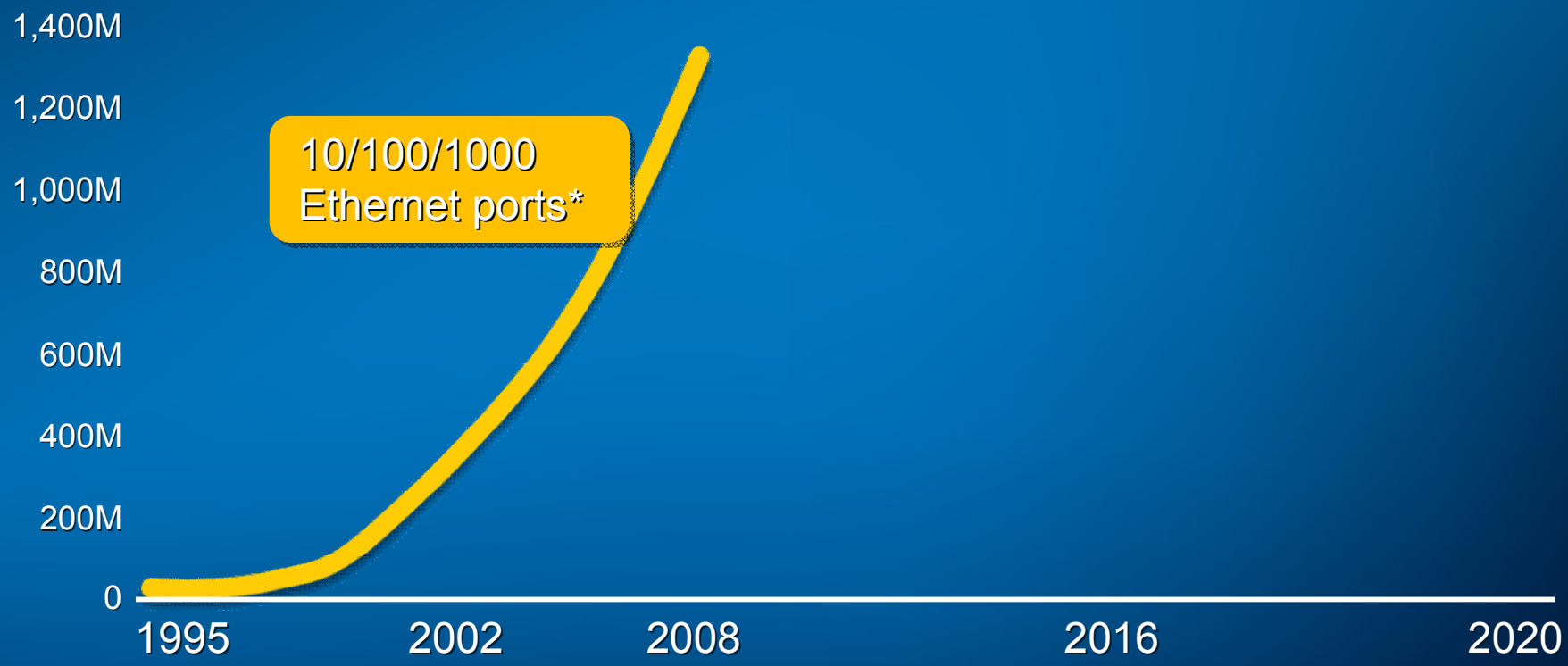
- Phase 1: Serve over 250,000 subscribers across 80,000 villages
- Phase 2: Serve 675,000 villages and ~ 1.1 million subscribers
- E-governance, telemedicine, distance education, e-travel, e-chaupal, e-legal services, and e-media access
- Plan to cover all urban India – 3 states already launched via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

A Diverse Offering of WiMAX Devices Available NOW

What Is Intel Doing



Intel's Vision:
Three Waves of Internet Access

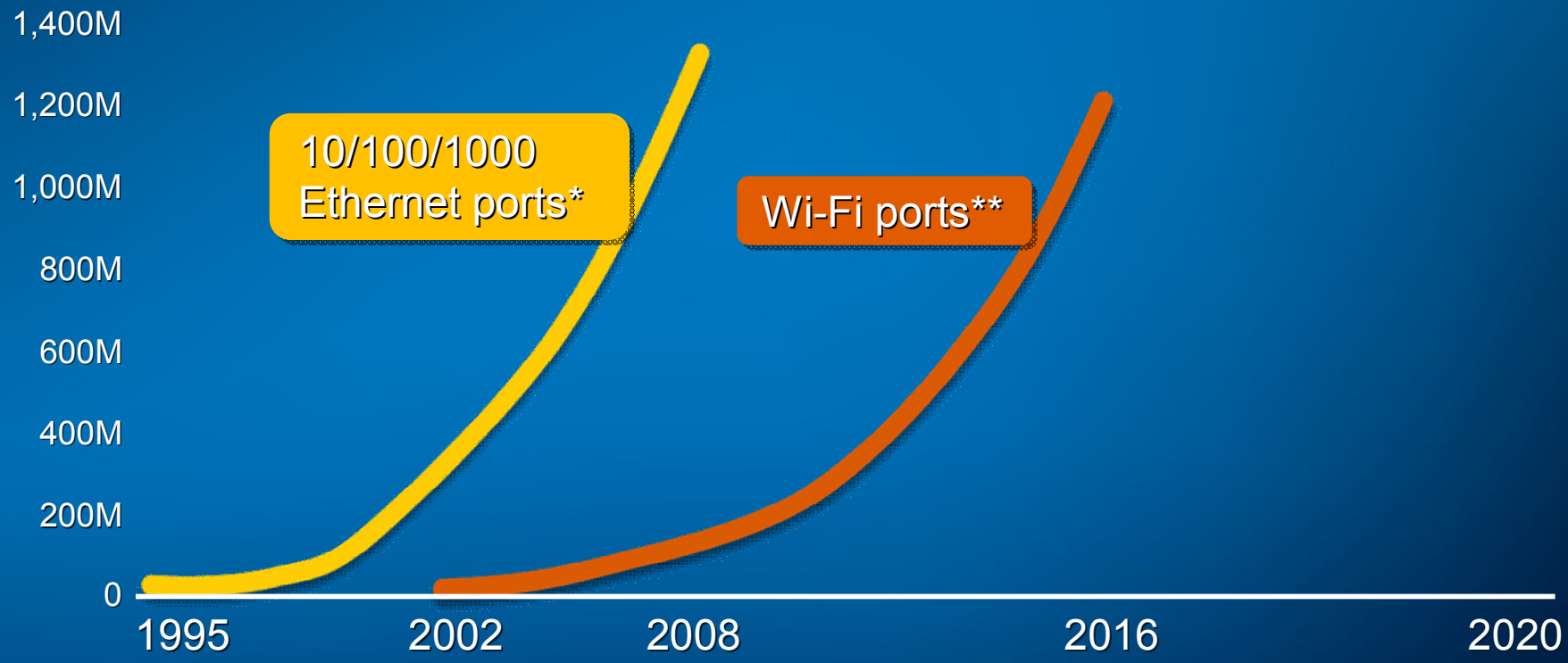


- Helped define the standard
- Drove Integration
- Championed Manageability

- Manufacturing in scale
- #1 MSS for Ethernet LAN-on-Motherboard*
- #1 MSS Network Interface Cards*

*Source: Dell'Oro Group, Q1'08; **Source: IDC, Q1'08; Intel estimates; ***Source: Intel Estimates

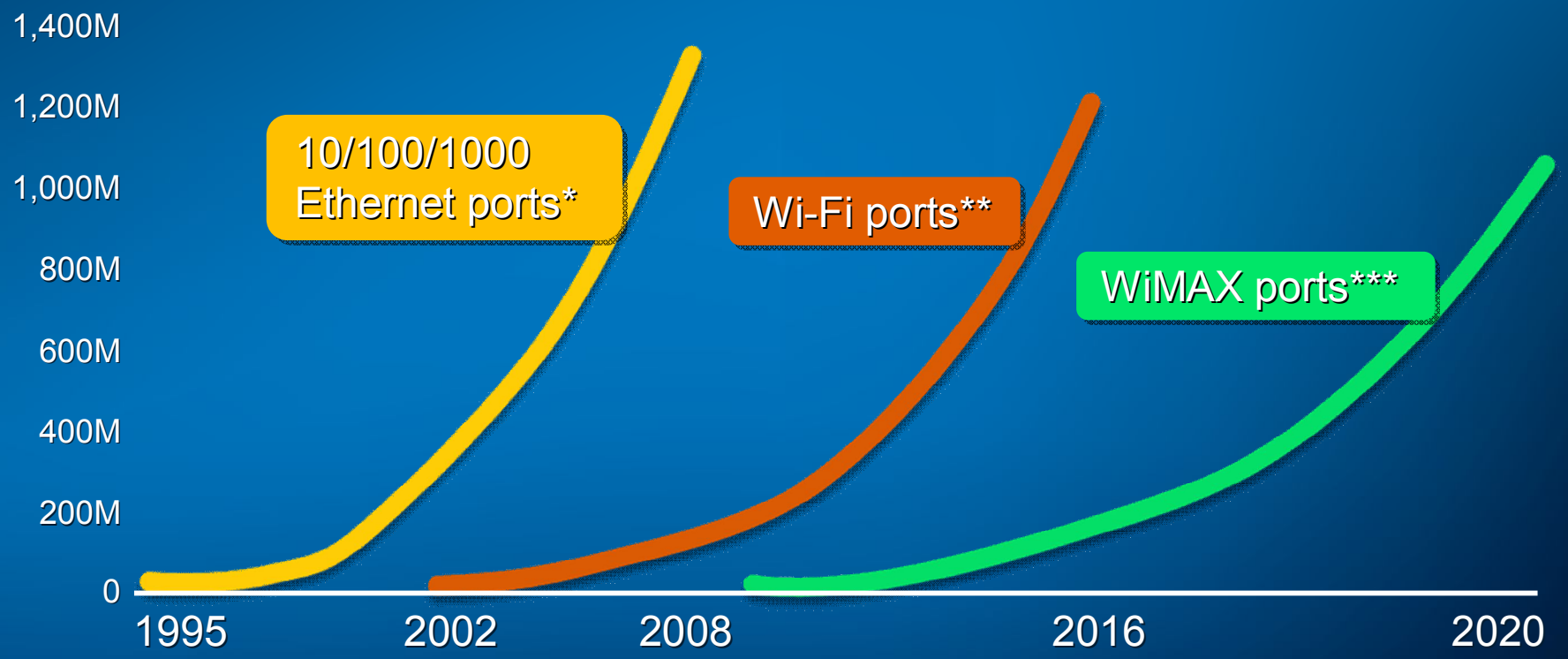
Intel's Vision: Three Waves of Internet Access



- Intel ® Centrino® technology means wireless
- Drove hot spot footprint
- Championed Security
- Standardization across ecosystems
- Embedded wireless form factors
- Significant Intel Capital investment

*Source: Dell'Oro Group, Q1'08; **Source: IDC, Q1'08; Intel estimates; ***Source: Intel Estimates

Intel's Vision: Three Waves of Internet Access



- Defining ITU 4G Standards
- WiMAX into notebooks
- Securing Spectrum

- Driving the Roadmap, Silicon
- WiMAX Open Patent Alliance coordination
- Significant Intel Capital investment

*Source: Dell'Oro Group, Q1'08; **Source: IDC, Q1'08; Intel estimates; ***Source: Intel Estimates

Owner:
Tom

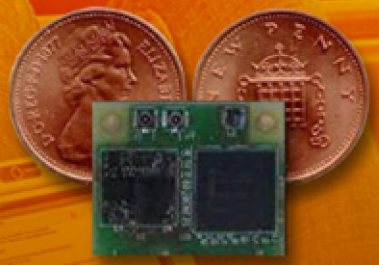
Intel WiMAX Products & Designs

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

* Internal code names for projects in development. Product names and plans are preliminary and subject to change.

WiMAX Embedded Laptops & Netbooks

Scaling to over 100 Models by EOY 2009

16 OEMs Have Announced WiMAX Support

U.S.A.

35+ certified models from 6 OEM's

20+ Models available in U.S. Channels NOW

Japan

14 OEMs committed to embed WiMAX

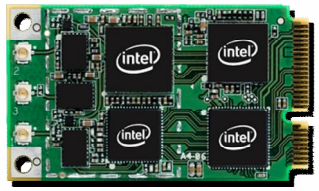
Russia

30+ Mobile PC's – 6 OEM's

ASUS EPSON EXCEED YOUR VISION FUJITSU lenovo NEC Panasonic SONY
acer clarion DELL hp msi ONKYO IMAGINATIVE SIGHT & SOUND SAMSUNG SHARP TOSHIBA

*Source: WiMAX Forum estimates. Does not include consumer electronics or pre-certified devices

What is Intel Doing to Enable WiMAX?



Wimax Silicon

Ecosystem Development

Interoperability Testing

Intel Is Investing In …

Silicon Companies

BECEEM COMMUNICATIONS

GCT

Equipment and Infrastructure Companies

Navini NETWORKS

BridgeWave COMMUNICATIONS

CETERUS NETWORKS

Service Providers

clearwire wireless broadband

UQ Communications

Spectrum Auctions


Thank You

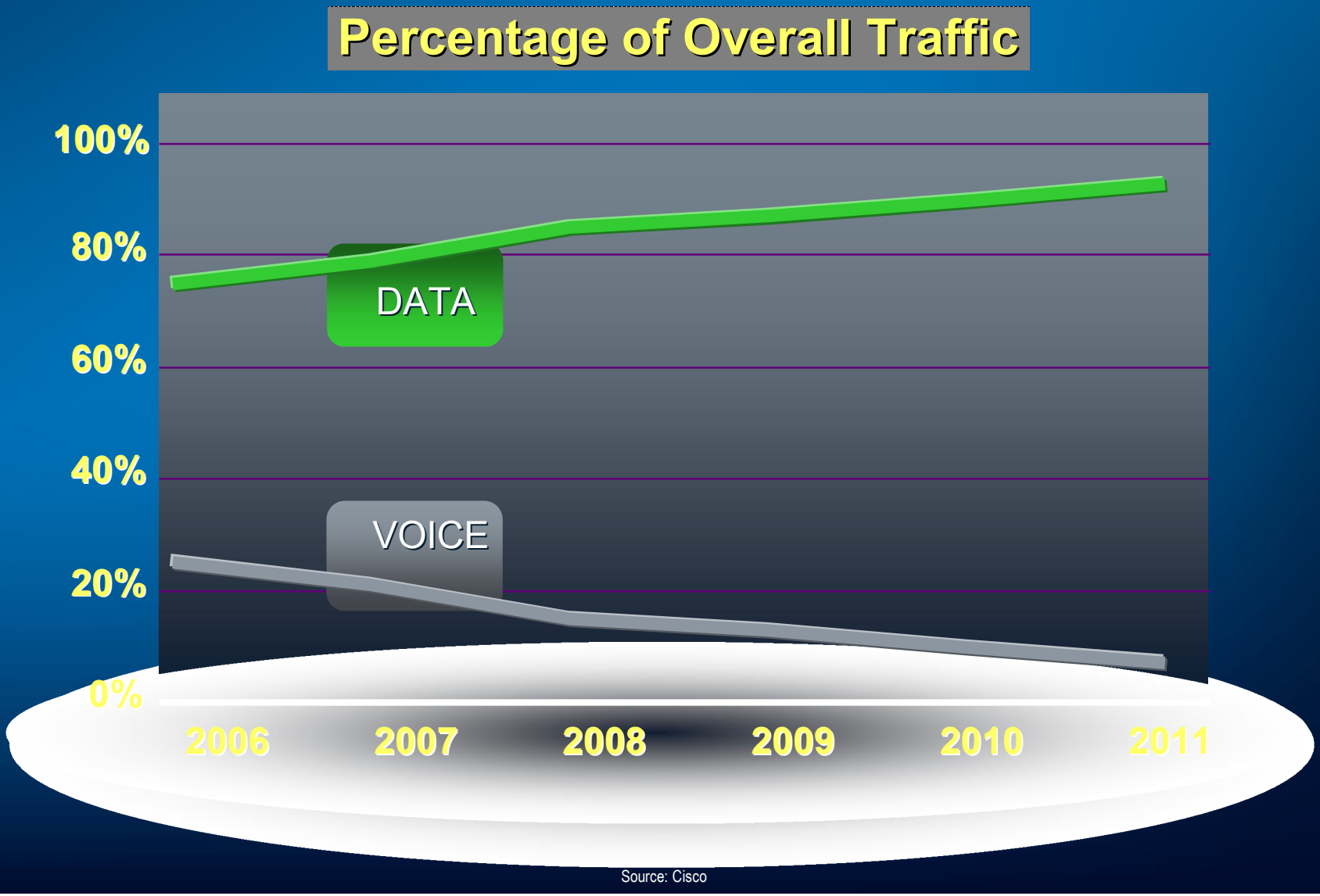
Backup

Owner: ML

WIMAX in Top PC Markets

U.S.	Clearwire, DigitalBridge, Towerstream, Xanadaoo & dozens of others
Japan	UQ soft launch Feb – fastest global network with up to 40Mbps downlink
Germany	DBD in market today with fixed/city wide hotspot; Half dozen others in service or planned
UK	Freedom 4, UK Broadband, Irish Broadband & almost dozen others in market today; 2.5GHz auction this year
France	Bollore deploying fixed and city wide hotspots; 5 others operators across France
Russia	13 carriers include Scartel & Comstar deploying Fixed/Mobile networks
Italy	10 carriers including AriaDSL launching fixed/city wide hotspots
South Korea	KT & SKT in market today with mobile
Brazil	Embartel, Telefonica, Brasil Telecom, TVA & others in market today with fixed, growing city wide hotspots to mobile
India	BSNL deploying today in 25,000 villages; auction in H1'09 for 2.3/5GHz
Mexico	7 carriers including MVS deploying today fixed/city wide hotspot
Australia	6 carriers today including Unwired expanding coverage
Spain	Iberbanda & NeoSky deploying fixed, city wide hotspot and mobile

Data Traffic is Taking Over Voice Networks



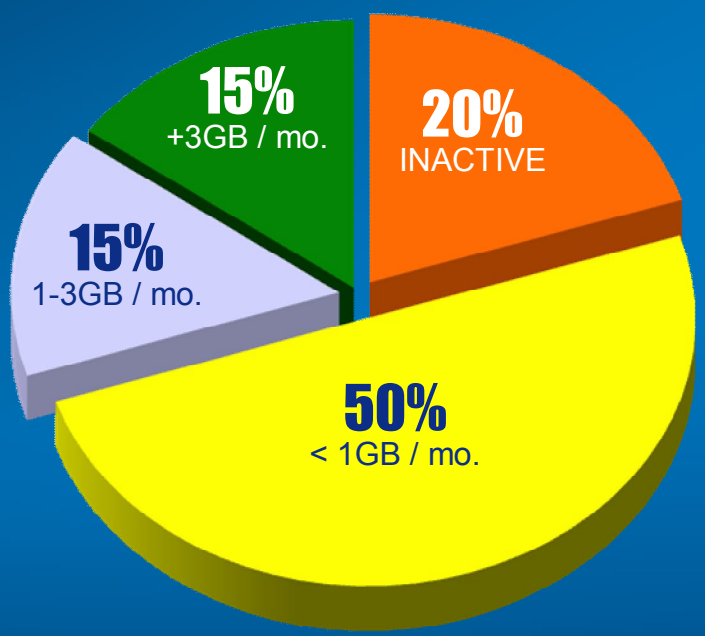
Source: Cisco

Mobile WiMAX: the Best of Available Options

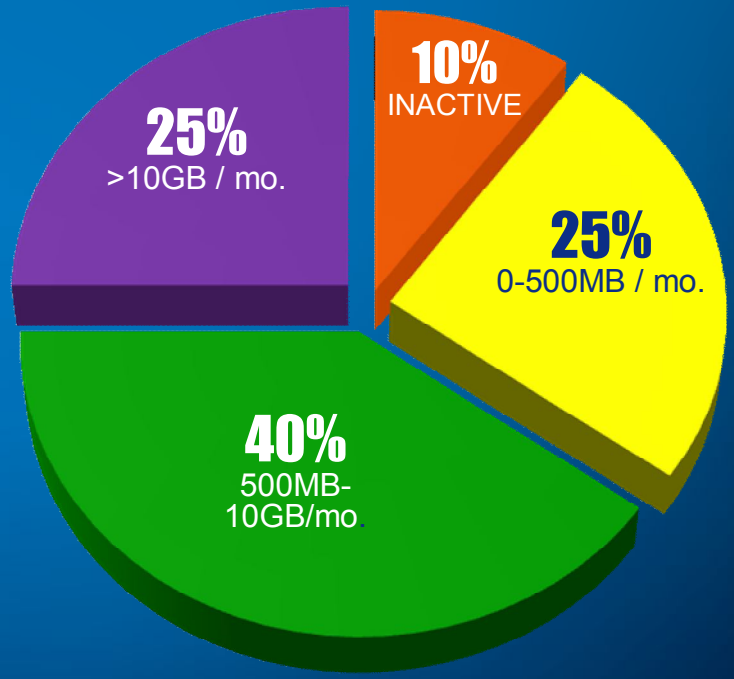
	Technology	Peak Data Rate		RAN Access Latency
		Downlink	Uplink	
Today	WiMAX Release 1.0 TDD (2:1 Ratio) 10 MHz	40 Mbps	10 Mbps*	40 ms
	HSPA (today)	14 Mbps	2 Mbps	50-250 ms
	HSUPA	14 Mbps	5.8 Mbps	50-250 ms
Future	HSPA Evolved (Rel 7) MIMO 2x2	28 Mbps	11.6 Mbps	50-250 ms
	HSPA Evolved MIMO+64QAM downlink	42 Mbps	11.6 Mbps	50-250 ms
	LTE (Rel 8) 2x5MHz	43.2 Mbps	21.6 Mbps	30 ms
	Mobile WiMAX™ 2.0 (802.16m)	300+Mbps, 20MHz expected ’10/’11		

WiMAX Enables New Mobile Broadband Experience

3G PC Data Usage



WiMAX Data Usage



- Data usage expands when **true broadband** becomes available
- WiMAX capable of providing primary broadband, not just mobile
- 3G cost/bit and performance unable to meet BB experience expectations

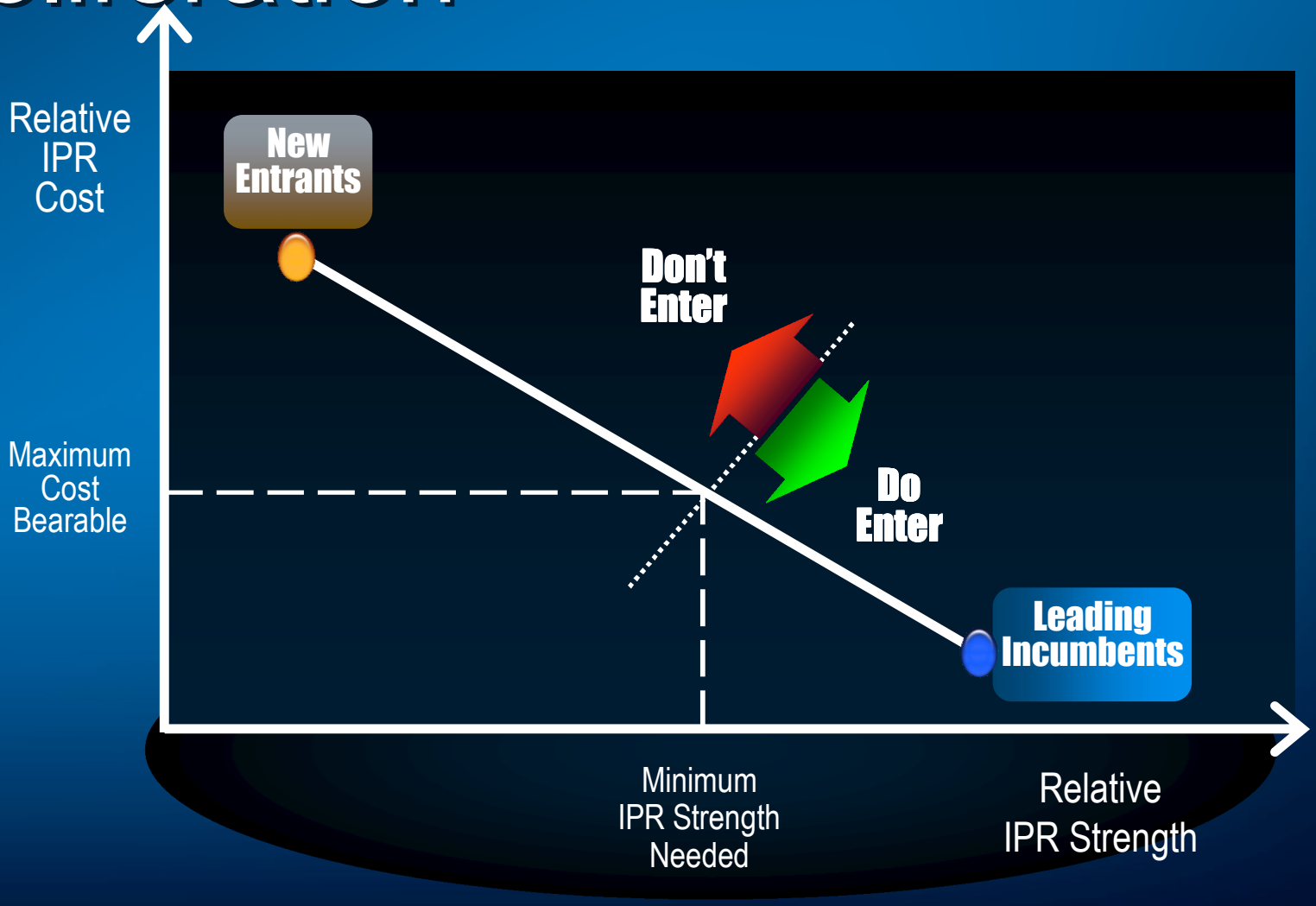
3G Source: Major 3G service provider
WiMAX Source: Major WiMAX service provider

Need to update – remove Nortel? Add other PC OEMs

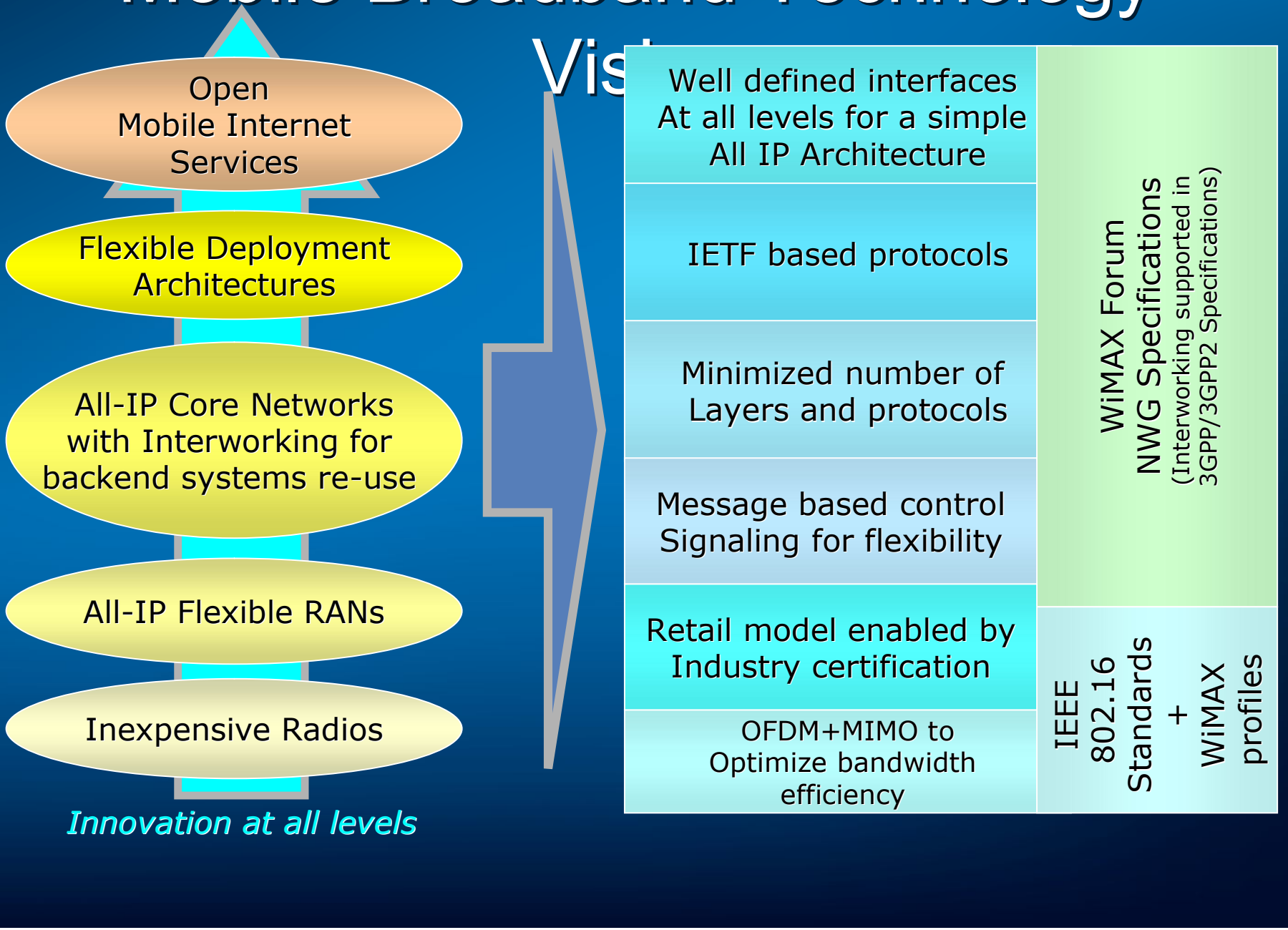
WiMAX Today. A Vibrant Ecosystem

WiMAX and the Open Patent Alliance

Lower IPR is Key to Device Proliferation



Mobile Broadband Technology Vis



LTE Claims & Reality

UPGRADE

LTE is a simple upgrade to 3G

FALSE Complete forklift upgrade from RAN to Core

SPECTRUM

LTE has plenty of spectrum

FALSE LTE needs wide FDD channels, or must re-farm existing spectrum w/o compromising current services

DEVICE COST

Plethora of devices will be there

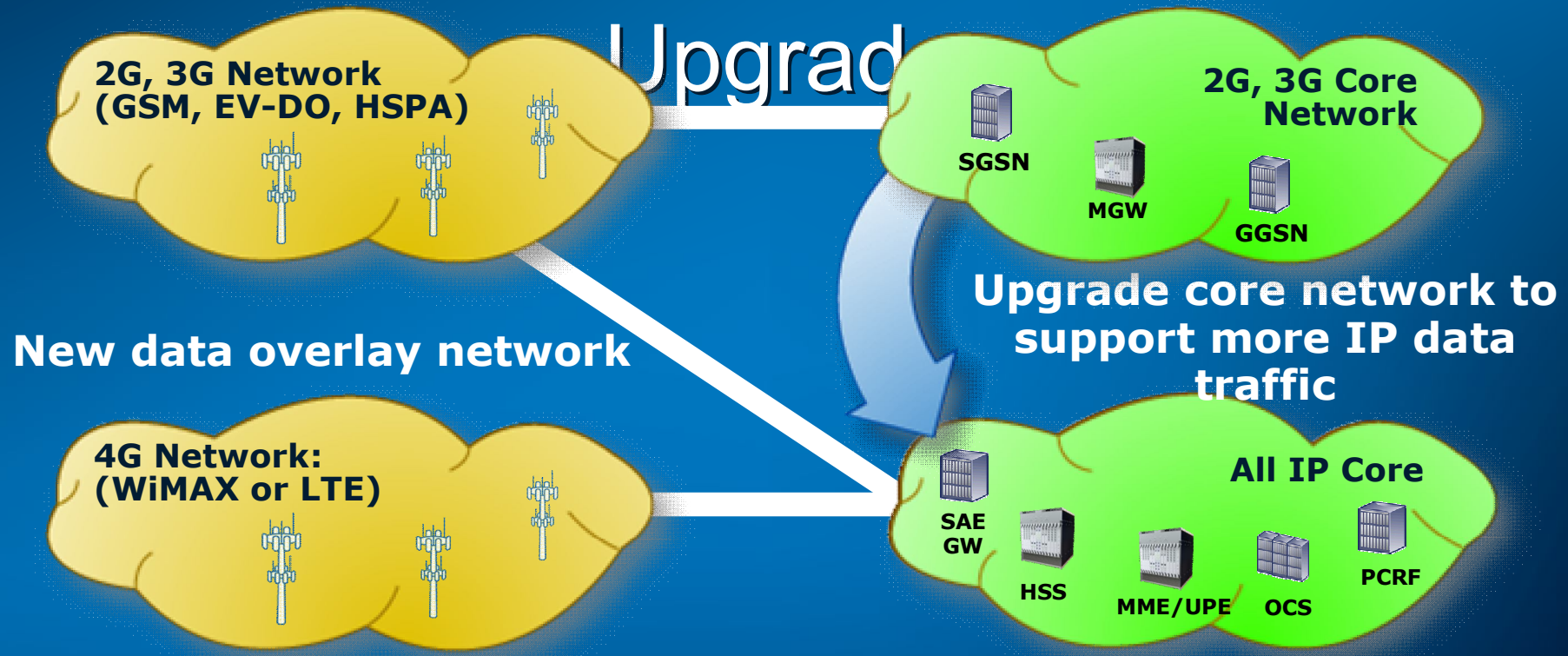
TBD Until IPR is resolved, depth and breadth of devices suppliers limited. Chipsets burdened with legacy multimode.

TIMING

LTE will be ready when the market is ready

FALSE Standard not complete. Multi-year WiMAX Time-to-Market advantage and roadmap to .16m will provide a sustained lead over alternatives.

WiMAX or LTE = Same Level of Upgrad



Both WiMAX & LTE require new RAN equipment & devices.
Neither is “backward compatible” to 3G.
Both can interwork well with existing 2G, 3G networks.

* Intel estimates. Percentage varies based upon the operator’s existing network.