



Look Closer

You'll find GENBAND in nearly every network

Industry Trends: Circuit to Packet

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Outline

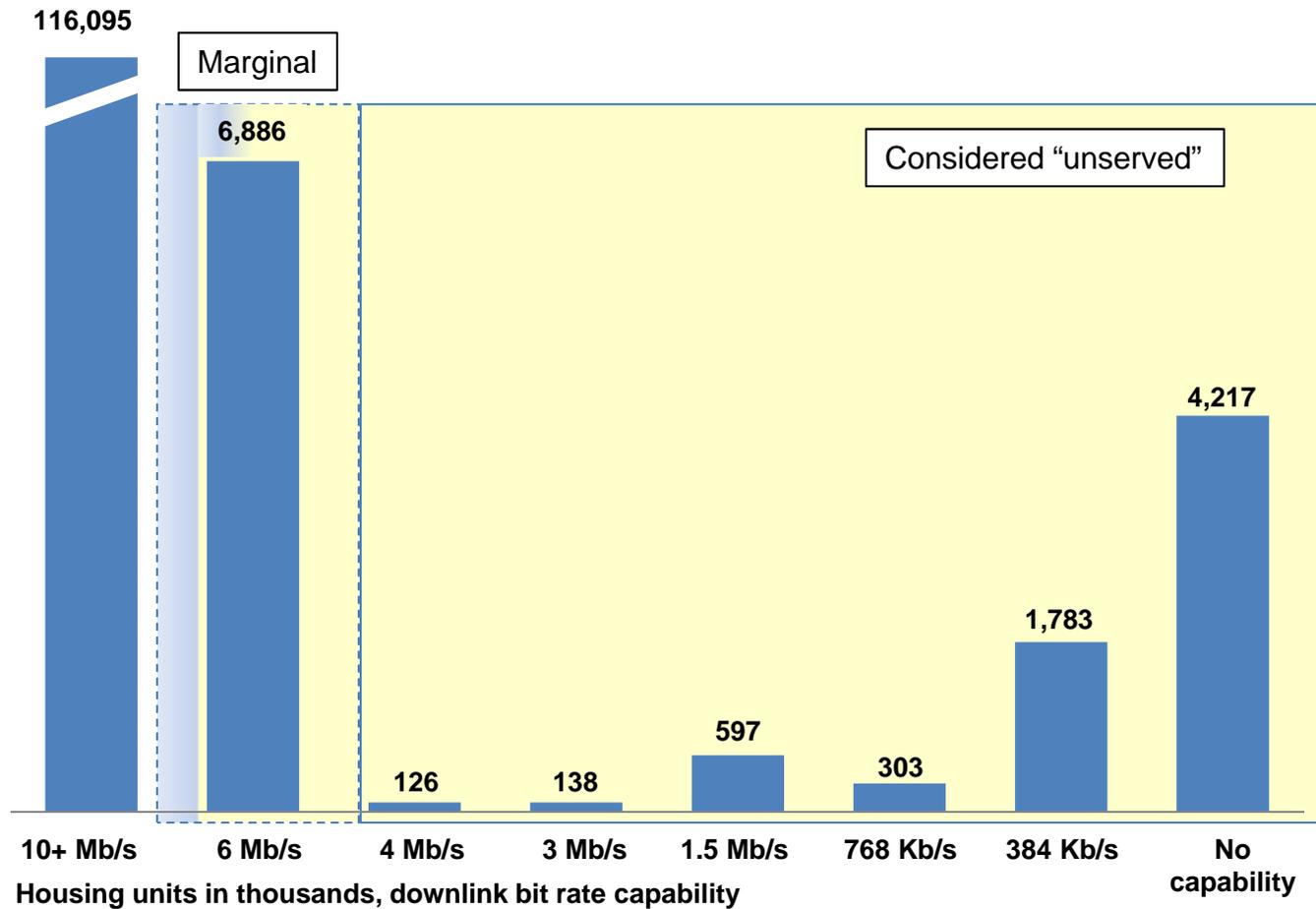
- Broadband Access Trends
- Service Trends
- Enabling Broadband Network Transformation

How Much Bandwidth Do You Need?

Source	Codec	Format	Resolution	Bit Rate
Amazon VoD	VC-1	720p	1280 x 720	2.5 Mb/s
CBS.com		1080p	1920 x 1080	3.5 Mb/s
Hulu	On2 VP6 (Flash)	720p	1280 x 720	2.5 Mb/s
iTunes/Apple TV	H.264	720p	1280 x 720	4 Mb/s
Netflix	VC-1	720p	1280 x 720	3.8 Mb/s
Vudu	H.264	1080p/24	1920 x 1080	4.5 Mb/s
HD Voice	G.722	---	50Hz - 7KHz	64 Kb/s

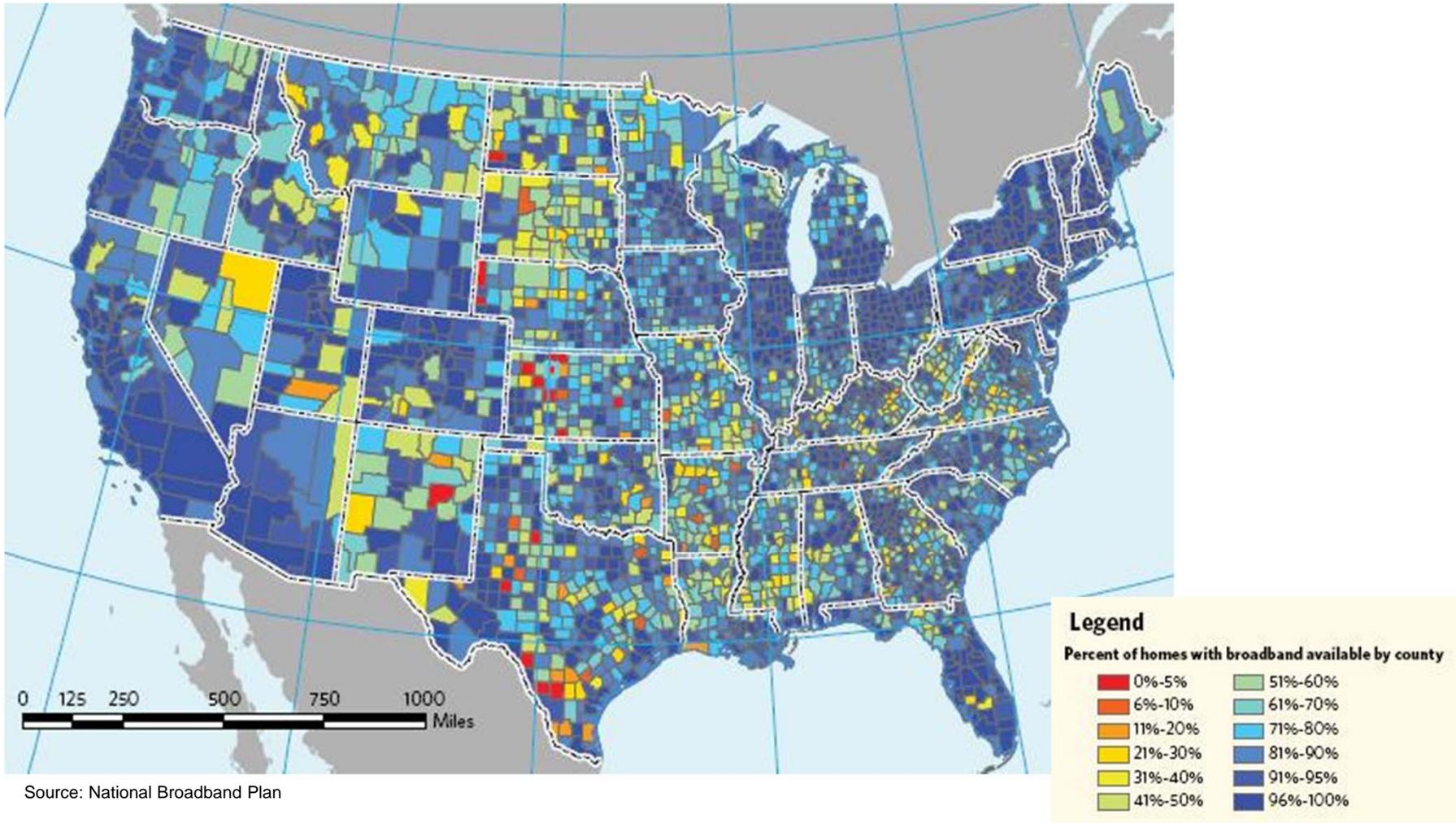
Source: Wikipedia

How Much Bandwidth is Available?



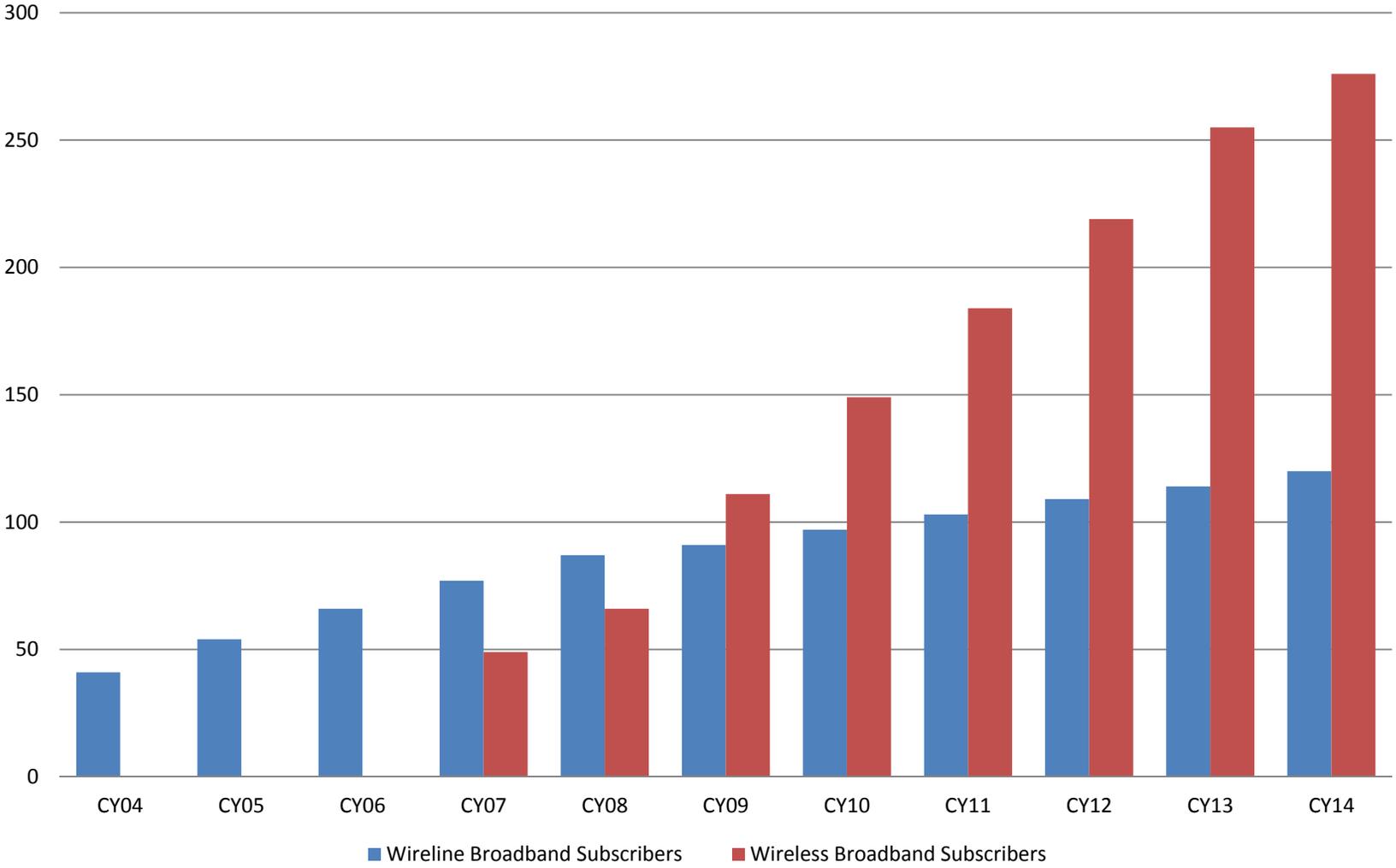
Source: FCC Broadband Availability Gap

Availability of 4 Mb/s Capable Broadband



Source: National Broadband Plan

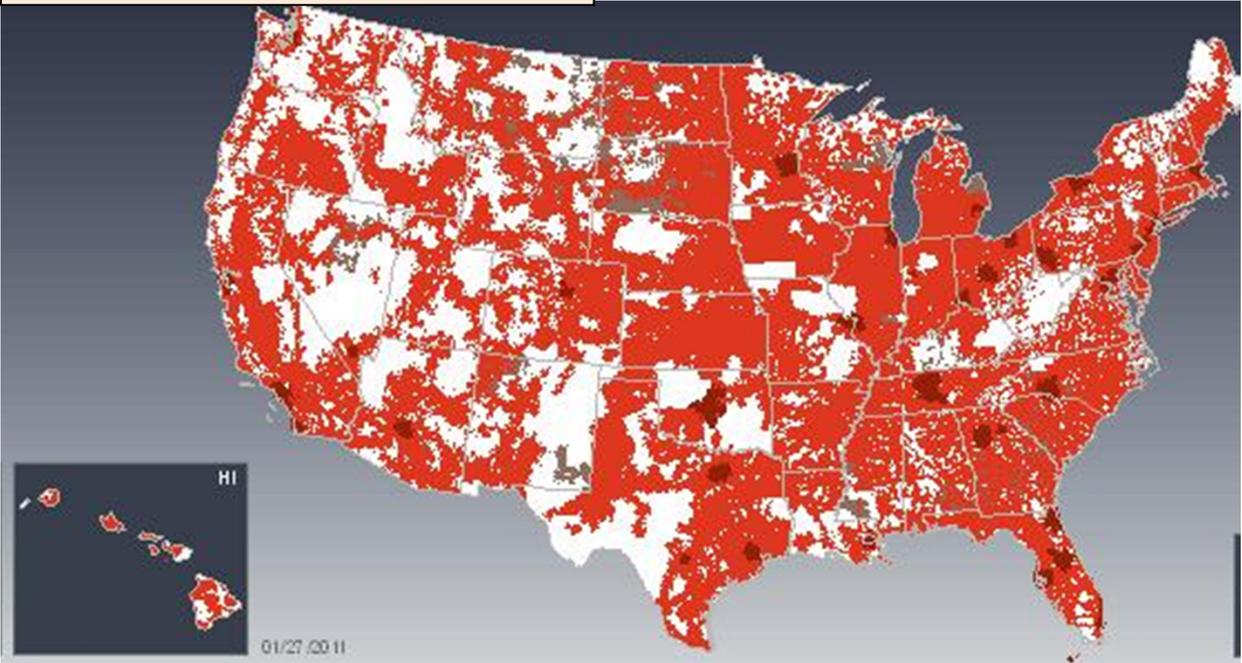
Mobile Broadband is Surpassing Fixed Broadband



Infonetics, Fixed and Mobile Subscribers, Annual Worldwide and Regional Market Size and Forecasts, Apr 20, 2010
 Data for North America

Wireless Broadband Emerging

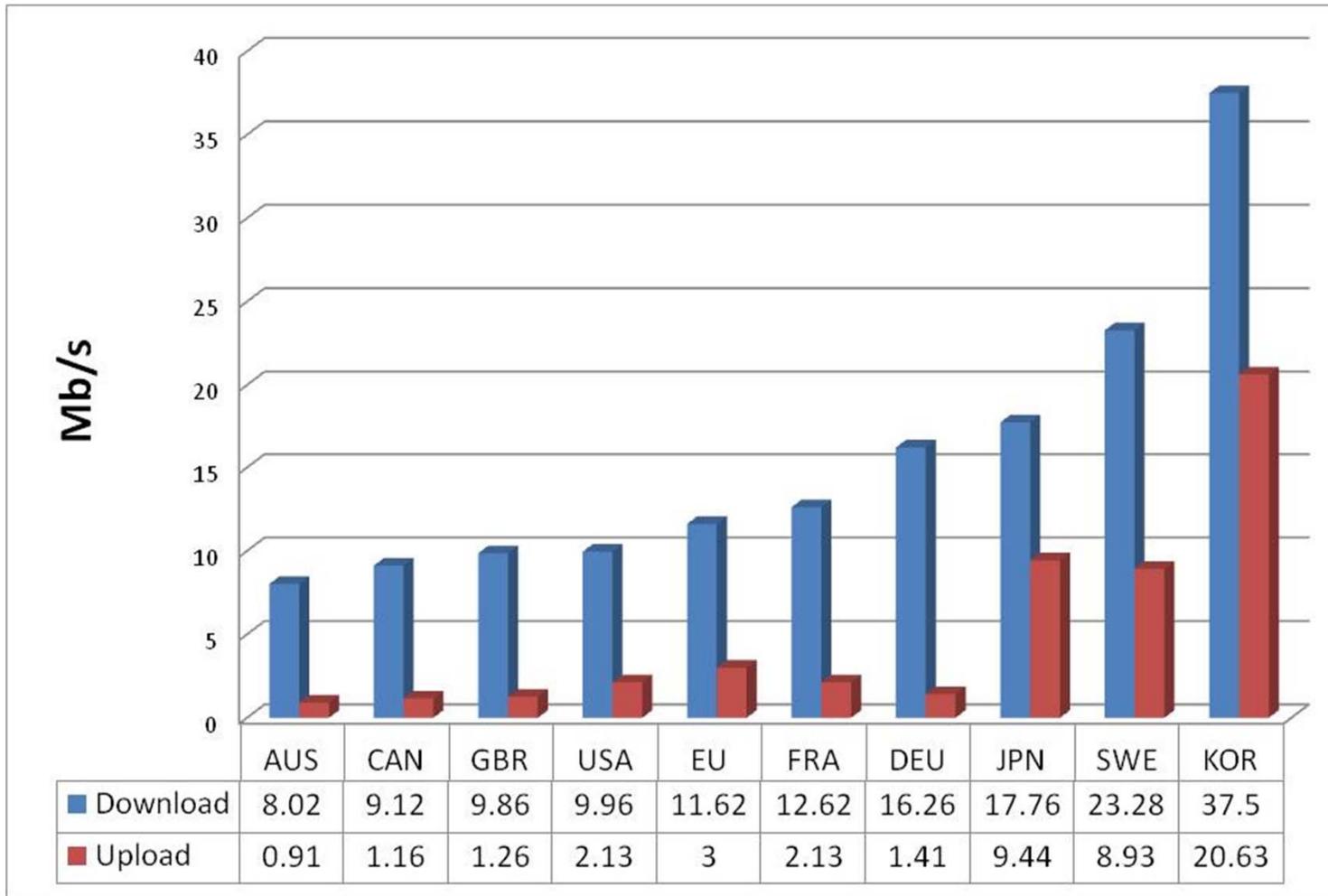
Verizon Broadband Coverage



Source: www.mobile-broadband-reviews.com - available with 4G Mobile Broadband USB Modems

Credible Wireless Broadband Options Available

Broadband Speeds



Source: Ookla Net Index, January 2011 Results are based on user initiated tests by [Ookla](#) and Speedtest.net. The Speed Test is a true measurement of HTTP throughput between the web server and the client.

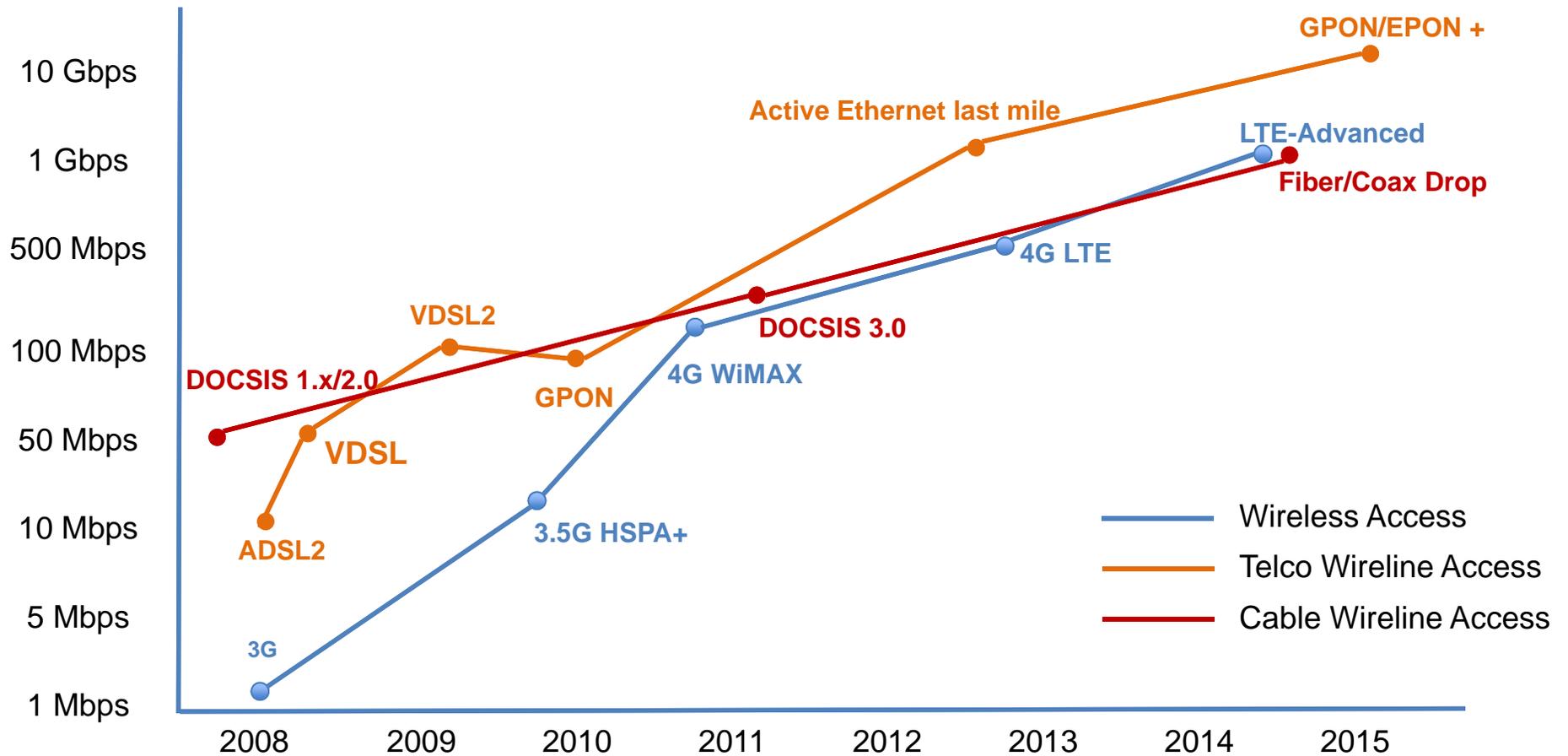


Source: Speedtest.net



Source: itunes.apple.com

Broadband Access Technology Trends



- All access types will converge to Fiber Feeder with a short “Copper” or Wireless Drop
- Multi-point Fiber Architectures and Ethernet underpin future access networks
- Rate of build out determined by regulatory policy and spectrum availability; not technology

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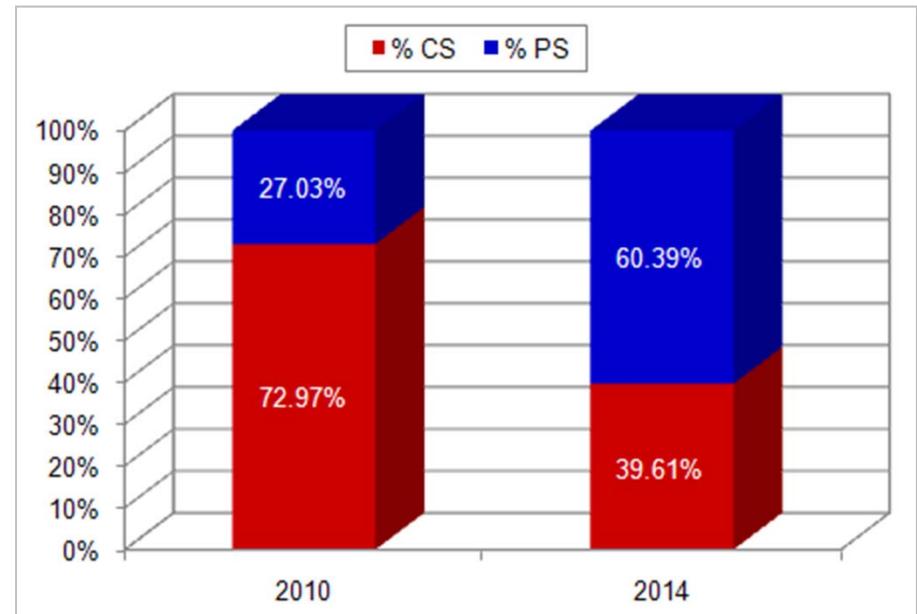
What About Voice?

Broadband networks are already fully capable of supporting voice, including all regulatory requirements:

- Over ¼ of U.S. “PSTN” has already completed the transformation to packet!
- **Inter LATA:** The majority of interoffice traffic is already VoIP
- **Proven technology:** Cable networks have been deploying VoIP for a decade
- **Bandwidth:** requirements for voice are negligible compared to other services
- **Regulatory:** VoIP technology can meet all regulatory requirements
 - E911
 - CALEA
 - Operator Services
 - COLR
 - Reliability



Images: somethingyoushouldread.com, geekalerts.com/retrophone-rotary-dial-phone-app-for-iphone/

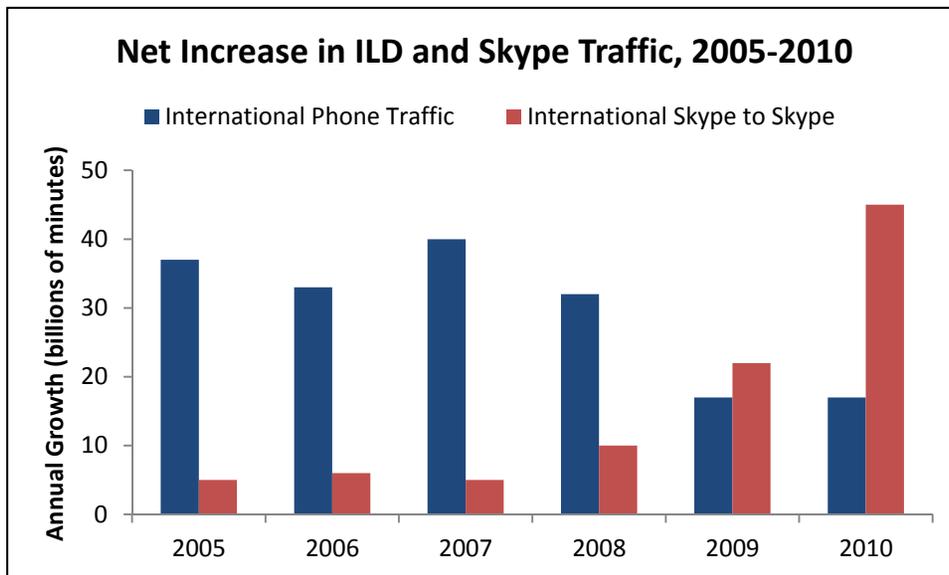
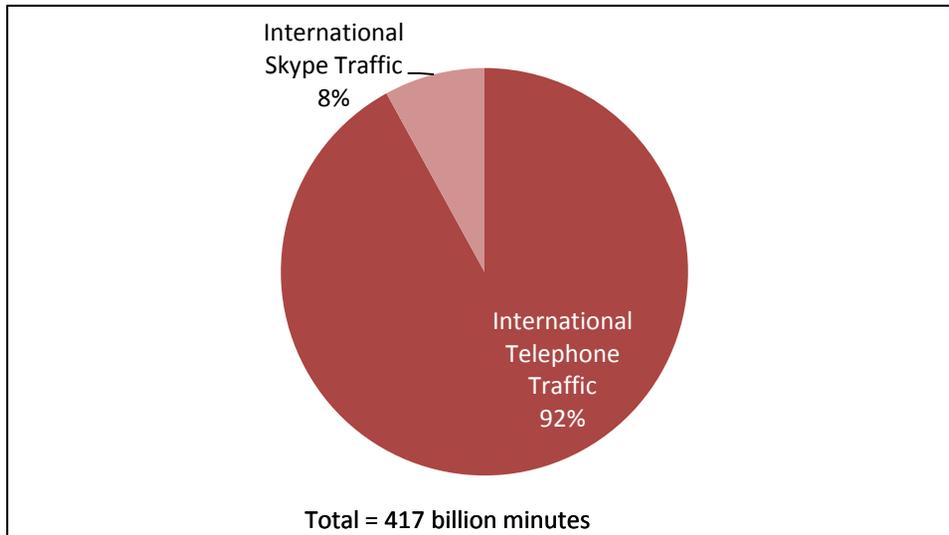


IP Network Transformation

Source: Heavy Reading IP Network Transformation Market Tracker

Technology is not the problem...

International VoIP

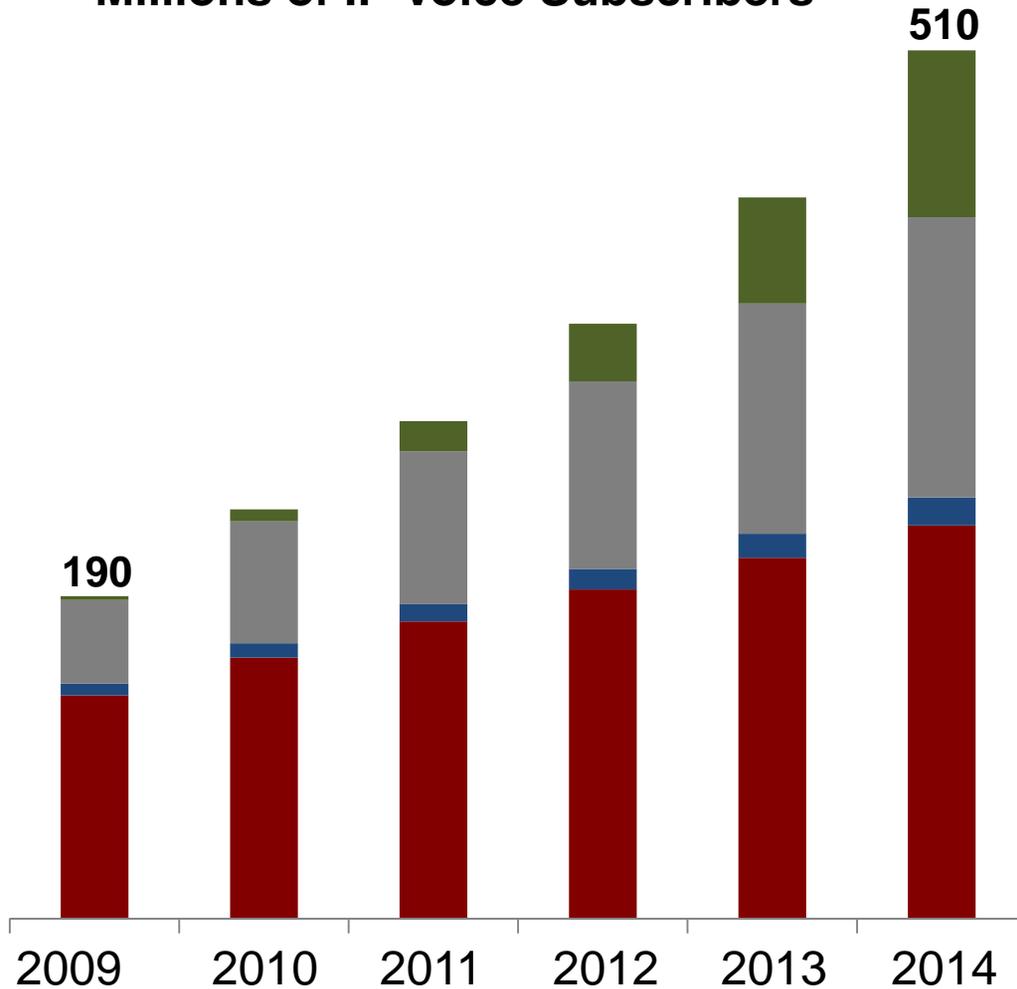


Source: TeleGeography

- Skype accounts for 8% of all international voice traffic in 2008
- Growth of Skype long distance minutes passes growth of international phone traffic
- Verizon allows Skype mobile for international long distance calls

IP Voice Subscriber Growth

Millions of IP Voice Subscribers



	CAGR
Mobile	113%
Over The Top (OTT)	27%
Enterprise Hosted & UC	19%
Residential / SOHO	12%
<hr/>	
TOTAL	22%

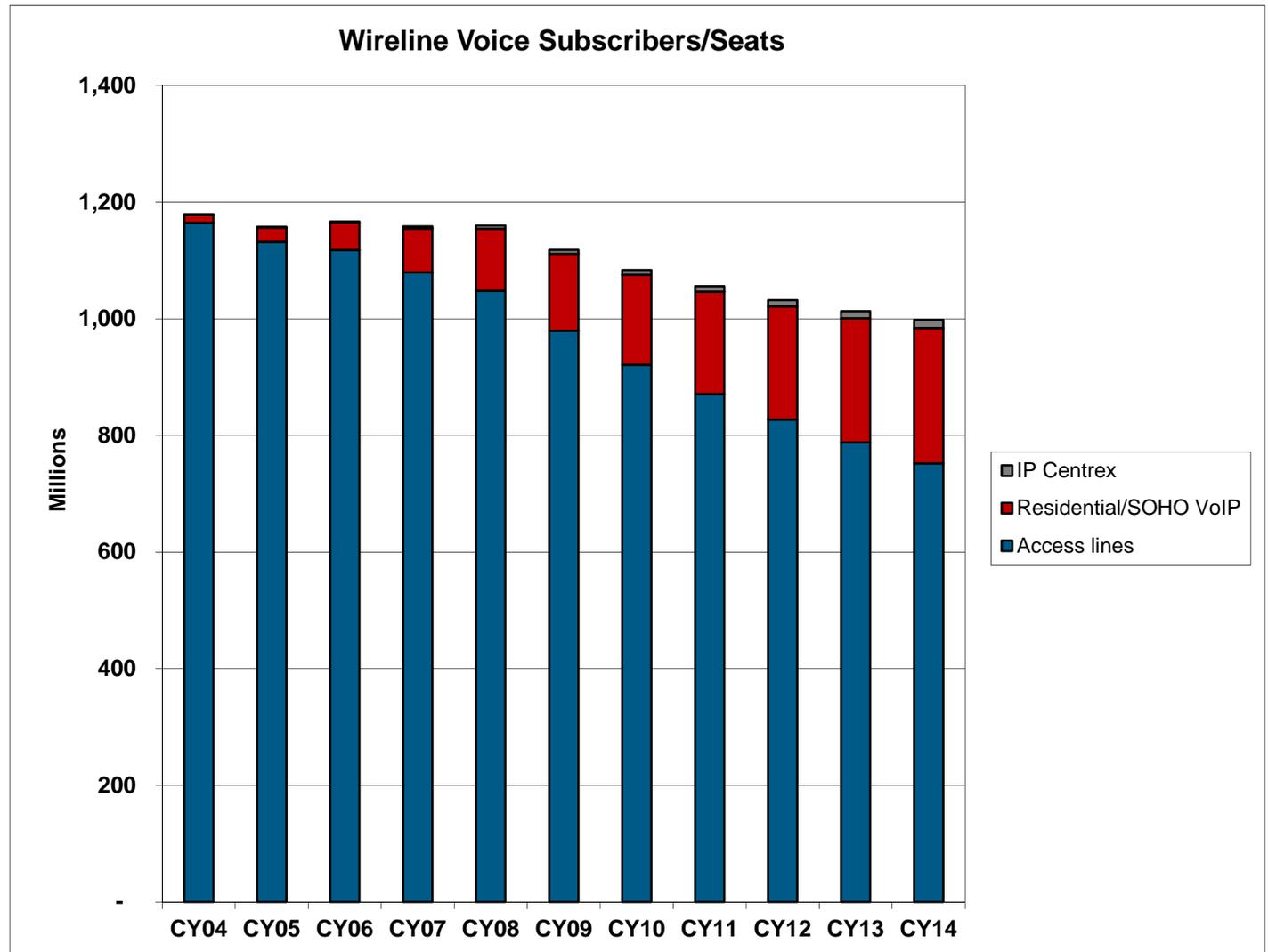
Source: Infonetics Research 2010: IP Voice & UC Subs

The PSTN in Rapid Decline

Incumbent operators are losing millions of PSTN subscribers to competitors

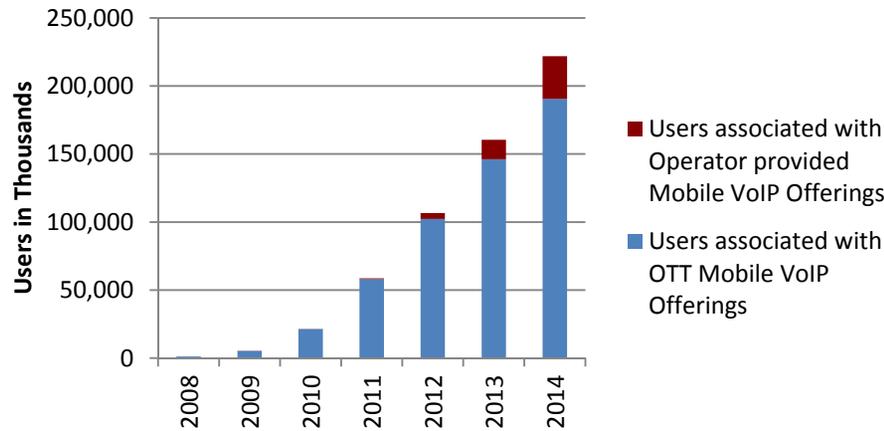
Many households are using mobile plans to replace PSTN service

Most young adults have never been a PSTN subscriber

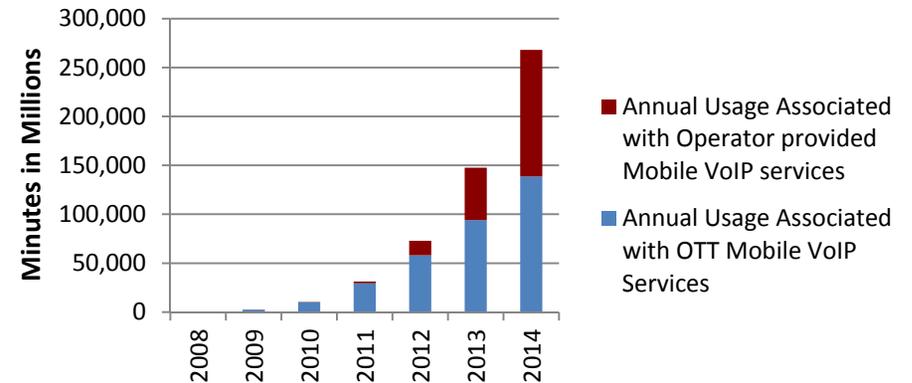


OTT vs. Operator Provided Mobile VoIP

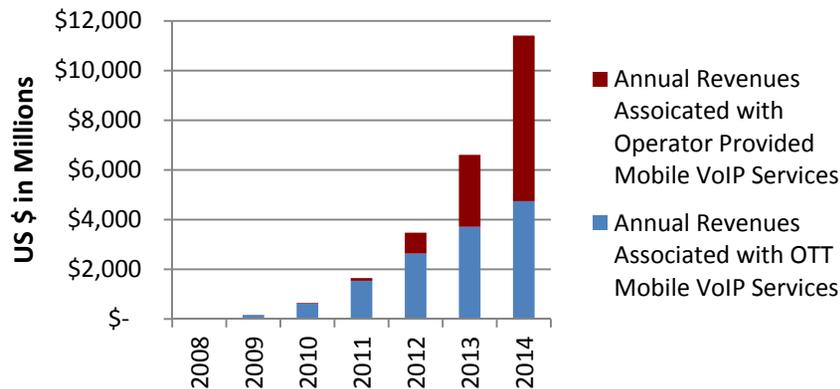
**Projected Growth in Mobile VoIP Users
OTT v. Operator provided**



**Mobile VoIP Minutes
OTT v. Operator provided**



**Mobile VoIP Annual Revenues
OTT v. Operator provided**



- Mobile VoIP users to increase tenfold by 2014
- Mobile operators will embrace VoIP as a primary voice service garnering higher per-user revenues
- Social networking apps integration with Mobile VoIP extends reach of operators

Source: In-Stat, 11/10

Social Networks – A New Communications Medium

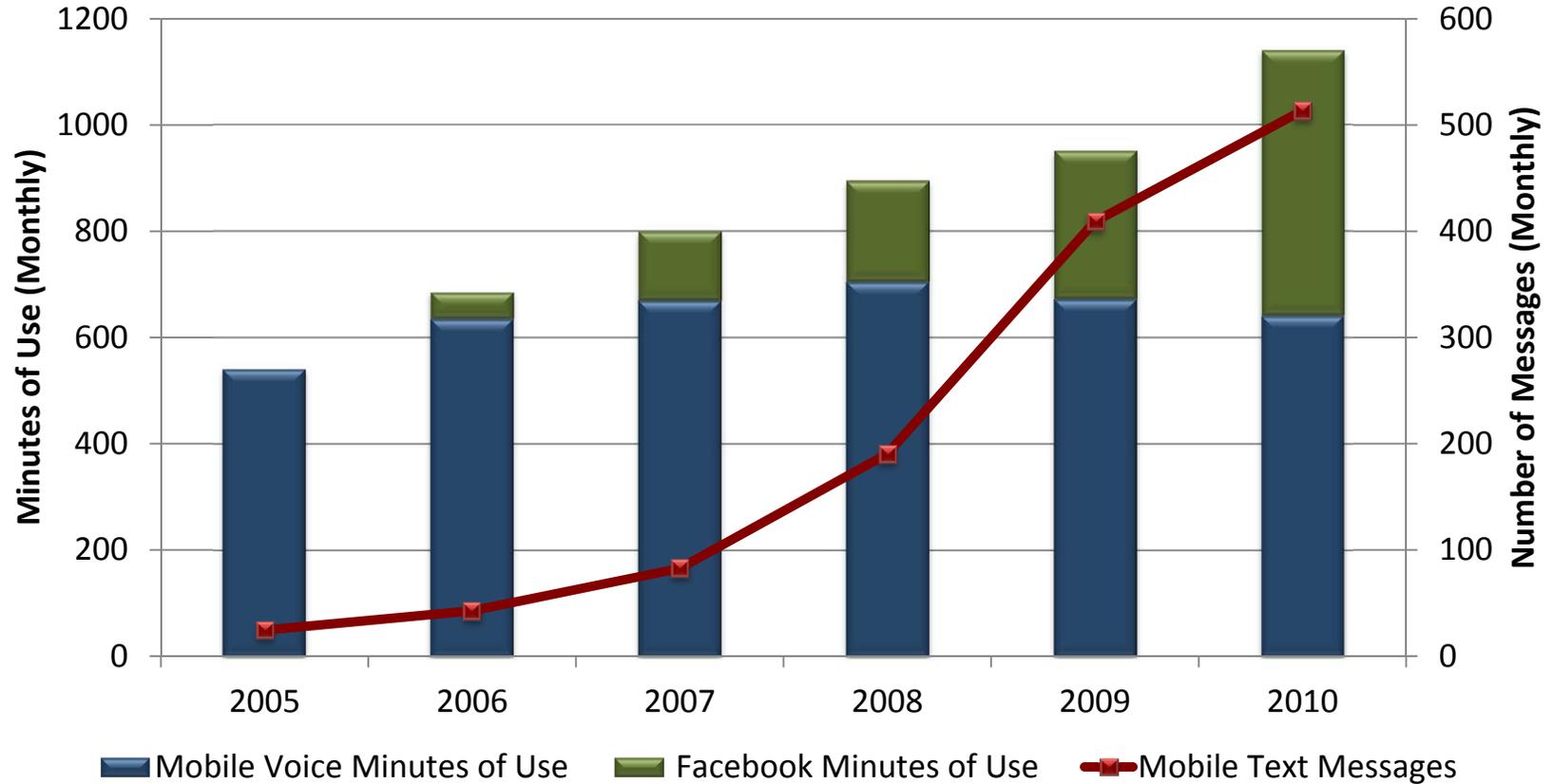


- 900+ million global users
- More users than email (July 2009)
- 550,000+ active Facebook users
- North American users spend 22% of online time using social networks, up from 16% in 2009
- 200 mobile operators in 60 countries deploying Facebook mobile products

Sources: Morgan Stanley Internet Trends (June 2010)
 Morgan Stanley Mobile Internet Report (Dec 2009)
 Facebook Press Room (July 2010)

Mobile User Focus is Shifting

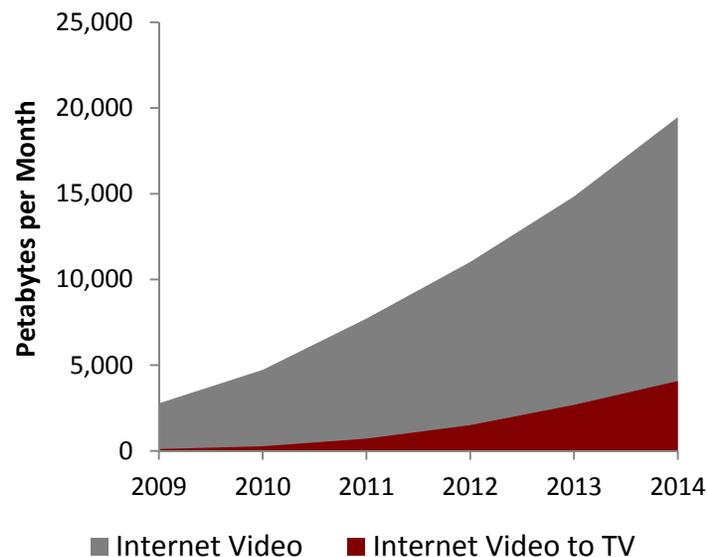
US Average Monthly Time Spent



Sources: CTIA Wireless, 2010
 Nielsen Research, Aug 2010
 comScore, 2010

Entertainment Video Delivery via the Internet

Growth in Internet Video Traffic



Netflix accounts for more than 20% of all downstream Internet traffic during peak times in the U.S.

Source: Cisco Visual Networking Index 2009–2014



- 450M TV Episodes and 100M Movies Sold



- 99-cent Rentals of High-Def TV Shows



- 61% of 15.9M Subs Watching Internet Video



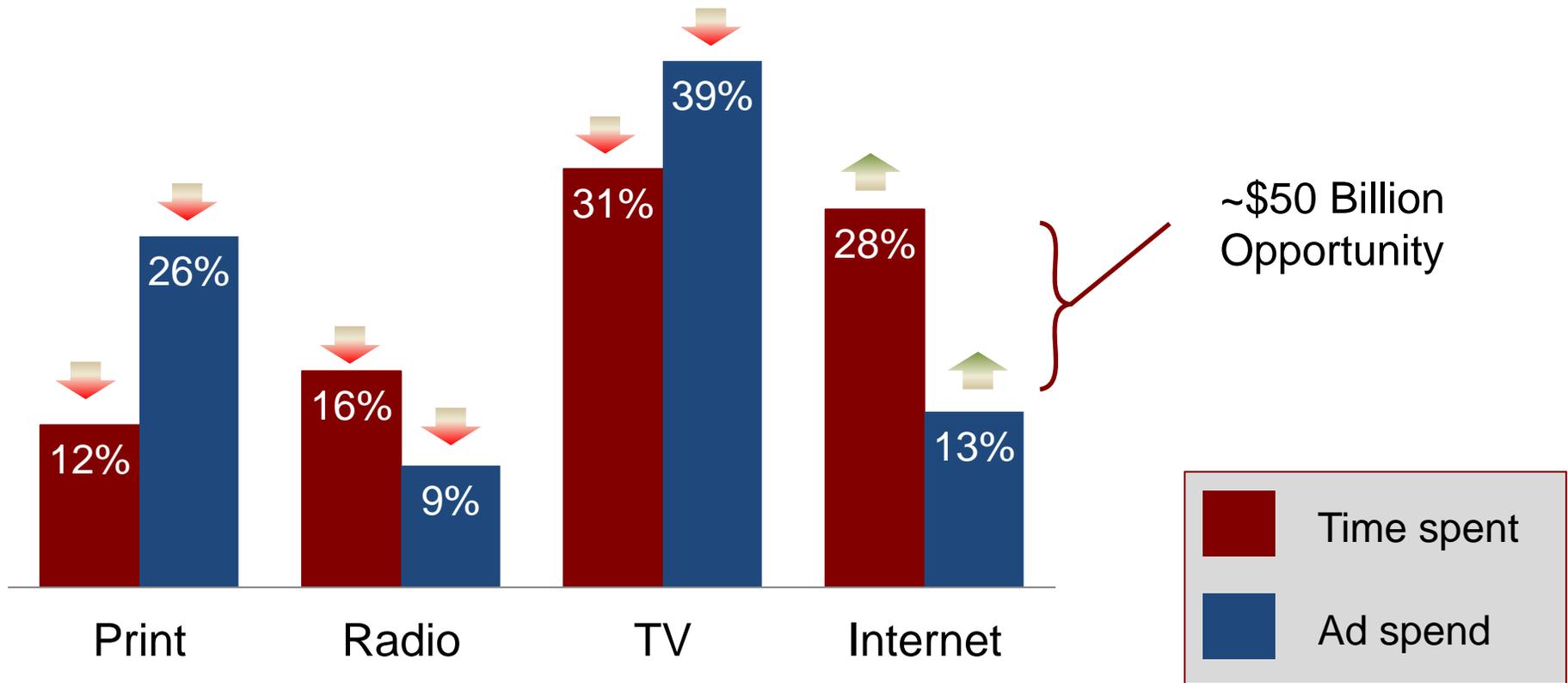
- Fall Launch of Internet TV and Video Search



- Netflix Model for Older, "Catalogue" Content

Advertising-Funded Business Models

% of Time Spent in Media versus % of Advertising Spending, USA 2009



Source: Morgan Stanley's
Mobile Internet Report

As Internet Media Time Increases,
Targeted Ad Penetration Drives Growth

Summary of Trends

- Technology exists to provide high-quality Broadband Access today
 - Fixed is mature but expensive to deploy
 - Cost effective mobile broadband technology is emerging but deployment is spectrum limited
- Voice over broadband is mature and can easily replace the existing PSTN
 - End-users are already “voting with their feet” – mobile, Skype, etc.
- Broadband access delivers a broader range of important information and entertainment services
 - It does so at lower costs
 - End-user choices are enhanced
 - New communications models become available

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US Broadband Goals

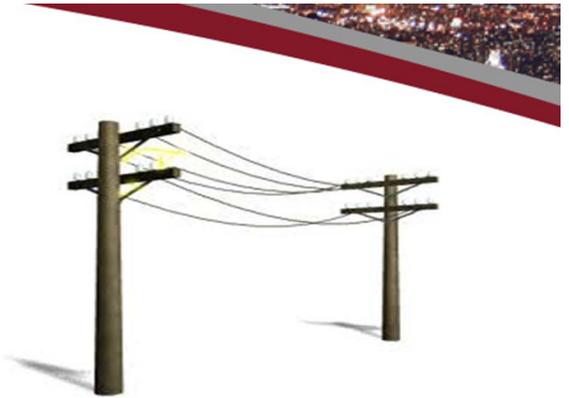
- “Broadband is no longer a luxury. It is a necessity for full participation in our 21st-century economy and society.”
(FCC Chairman Julius Genachowski at the Minority Media and Telecom Council Broadband and Social Justice Summit in Washington, D.C., Jan 20, 2011)
- Broadband can deliver VoIP
... and much more
 - New age communications services, social networking
 - Enhanced competition for information and entertainment services
 - Greater cost efficiency
- Sources of necessary investment
 - Restructured USF
 - Supplemental revenue streams (e.g. Advertising)
 - End-user spend stimulated by broadband availability



Images: monster.com, careercoffeebreak.com, primermagazine.com

How to Get There From Here...

- Bootstrap the transition
 - Restructure distribution end of USF to support Broadband Investment
 - Enable access to alternative revenue streams to supplement USF (ex. Advertising)
 - Initiate predictable PSTN sunset
- Proactively make Wireless Spectrum accessible for use in Rural deployments
 - Encourage use to provide wireless Broadband option for rural areas
- Phase out PSTN model
 - Significant cost savings possible

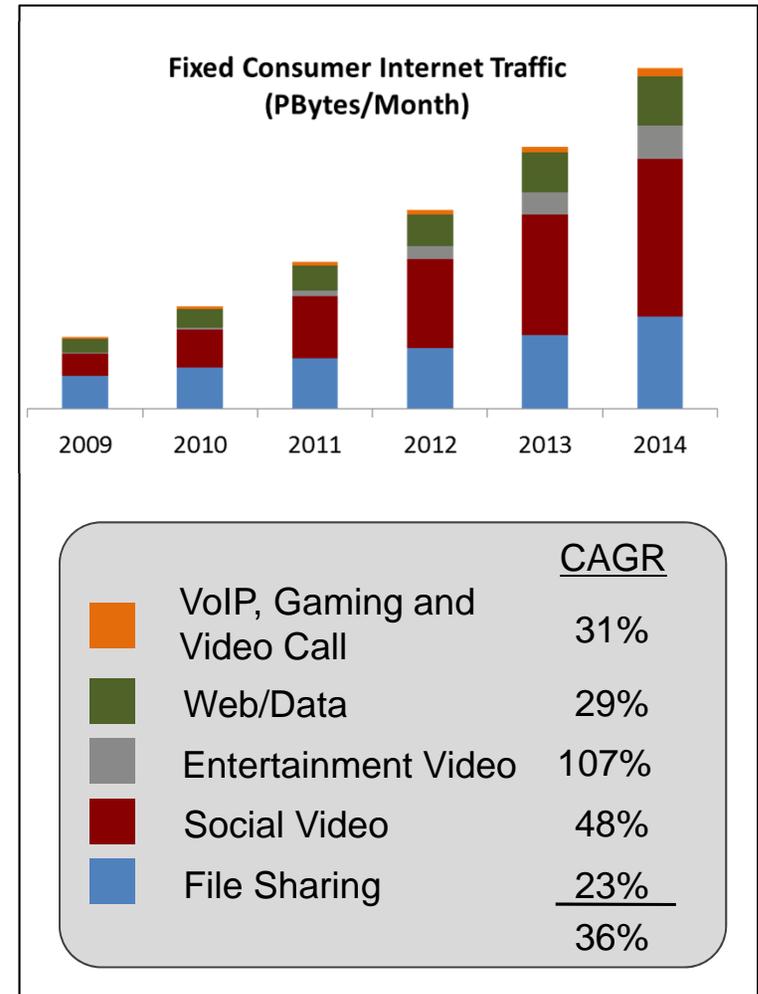


Images: trangobroadband.com, bestswabi.blogspot.com, qwickstep.com



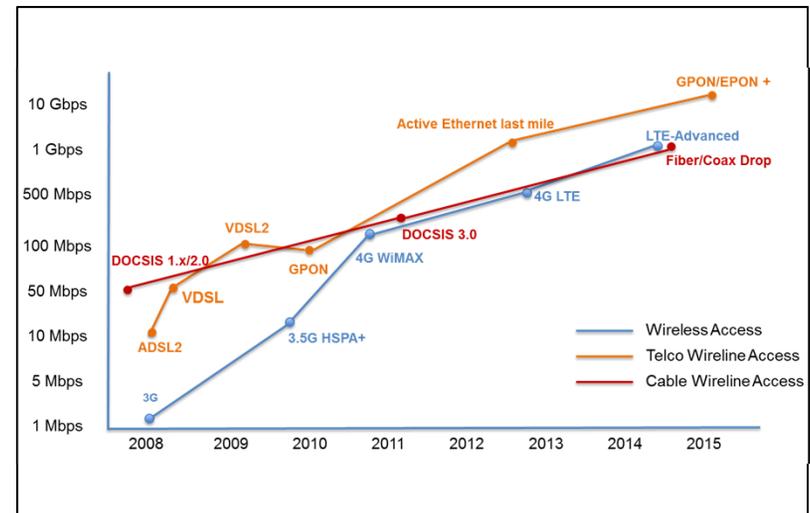
Voice Over Broadband

- Voice is a very small component of broadband traffic
 - Encourage deployment of Voice over BB
 - Requires sufficient BB speed (increasing)
- Voice over BB requires mechanism to ensure it receives required priority
 - Clarify regulation to explicitly allow traffic and policy management with user opt in
- Restructure USF and ICC subsidies to incent deployment of Voice over BB
 - Shift subsidy structure to incent investment in more efficient VoIP-based technologies
 - Restructure subsidies and regulation to favor investment in IP interconnection
 - Encourage modern, flexible IP interconnect technologies like IPX



Technology Neutral Broadband Deployment

- All technologies converge over time to similar speeds.
 - Capacity differences will exist
- Technology neutral metrics
 - Minimum upstream/downstream speeds (recommend 6 Mbps DS, 500Kbps US)
 - Sustainable capacity of approximate 80%
 - Reasonable monthly total DL capacity
 - Encourage option of user controllable prioritization of traffic
- Enable access to and encourage utilization of rural spectrum for 4G service
 - Spectrum can be largest single impediment to deployment of mobile BB





Questions?