Columbia Institute
for Tele-Information

Broadband in America

Where It Is and Where It Is Going

(According to Broadband Service Providers)

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Tasks

- Listing of All Publicly Announced Broadband Plans
- Comparison of All Publicly Announced Broadband Plans
- Future Projection

Data Sources

- Primarily used BB service providers' statements and plans, directly or via investment analysts and market researchers
- Consciously did NOT use materials otherwise made available to the FCC
  - If we have similar data, it validates both
  - And different data signals need for deeper analysis

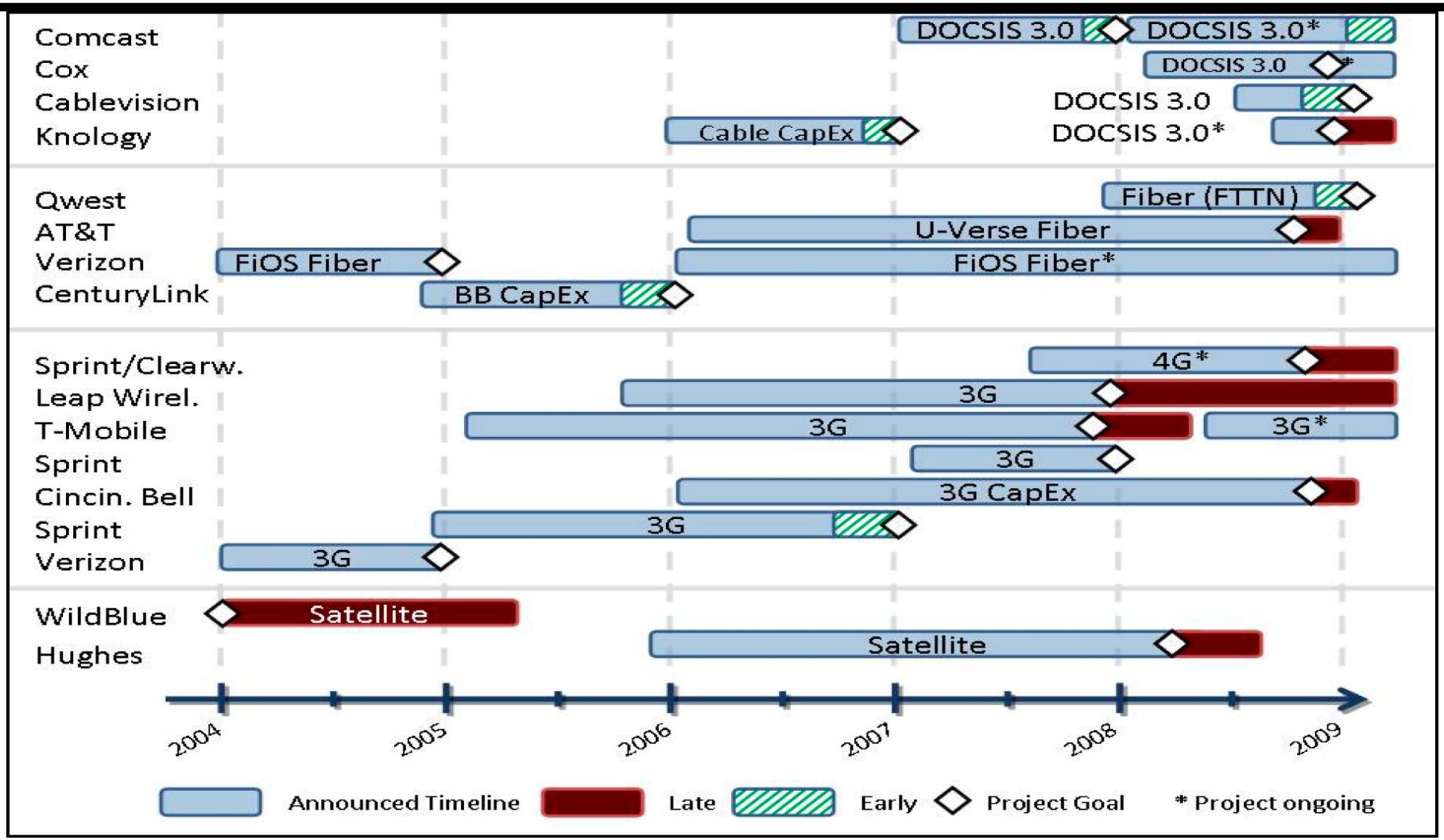
Broadband Plans Reviewed

Company	Page	Company	Page
AT&T	A-2	MediaCom	A-23
CableOne	A-6	MetroPCS	A-24
Cablevision	A-7	OpenRange	A-25
CenturyLink	A-8	Qwest	A-26
Charter	A-9	RCN	A-27
Cincinnati Bell	A-10	Sprint Nextel	A-28
Clearwire	A-11	T-Mobile	A-31
Comcast	A-13	Time Warner Cable	A-32
Cox	A-14	Verizon	A-33
EchoStar Corp	A-15	ViaSat	A-37
Fairpoint	A-16	WildBlue	A-38
Frontier	A-17	Windstream	A-39
Gilat	A-18	WISP Industry	A-40
Hughes	A-19	OPATSCO	A-41
Insight	A-20	American Cable Assoc.	A-42
Knology	A-21	NTCA	A-43
Leap Wireless	A-22		

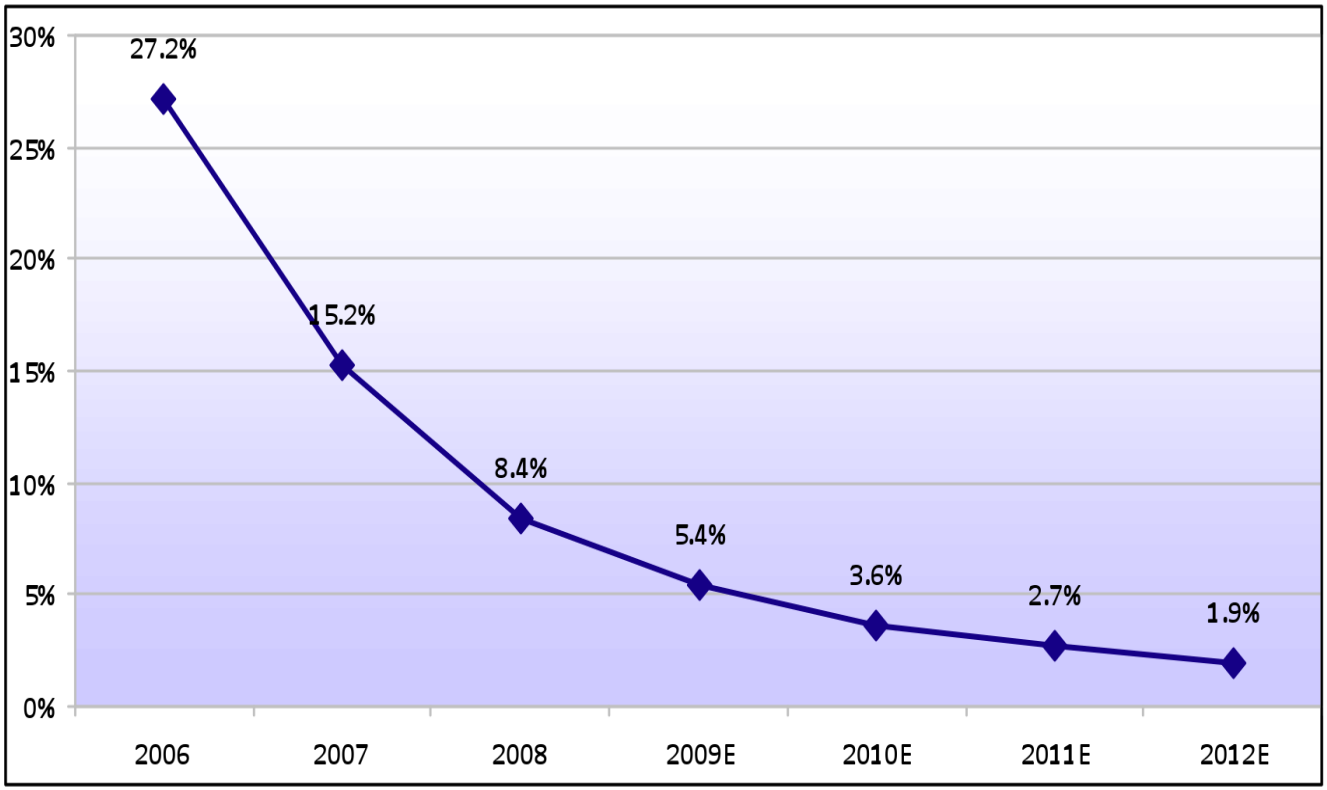
Appendix Example

TIME WARNER CABLE							*) Project not completed
Technology Details	Announced Timeline	Current Deployment / Coverage Footprint	Expected Deployment/ Coverage Footprint	States	Expected Capital Outlays / Operating Expenditures	Expected Broadband Performance / Quality	Expected ARPU
DOCSIS 3.0*	DOCSIS 3.0 is expected to be deployed in the remainder of the NYC service area by Spring 2010.[20]	Manhattan, Staten Island, and Queens, NY.		NY		Residential Wideband Internet: Speeds up to 50 mbps down & 5 mbps up for 99.95. Business Class Wideband Internet: Speeds up to 50 mbps down & 5 mbps up or 20 mbps down & 2 mbps up.	
HSD, DOCSIS 2.0		As of September 30, 2009 TWC had approximately 14.6 million customer relationships.[21] Residential HSD subscribers increased to 8.874 million from 8.757 at the end of the 2Q09. Commercial HSD subscribers increased to 293 thousand from 289 at the end of the 2Q09. An estimated 26.9 million homes passed in 28 states in the 3Q09 for HSD.[22]		AL, AZ, CA, CO, HI, ID, IL, IN, KS, KY, MA, ME, MI, MO, NE, NC, NH, NJ, NM, NY, OH, PA, SC, TX, VA, WA, WI and WV.	Total capital expenditures in the 3Q2009 were 758 million, or 16.9% as a percentage of total revenues. Total year to date 2009 capital expenditures were 2.3 billion. Total 2009 capital expenditures are projected to come in under 3.3 billion dollars.[23]	TWC offers four tiers of its Road Runner high-speed data service in all of its systems: Turbo TM , Standard, Basic and Lite and, in New York City, it also offers Extreme.	Monthly ARPU for HSD services $41.74.

Major Broadband Deployments

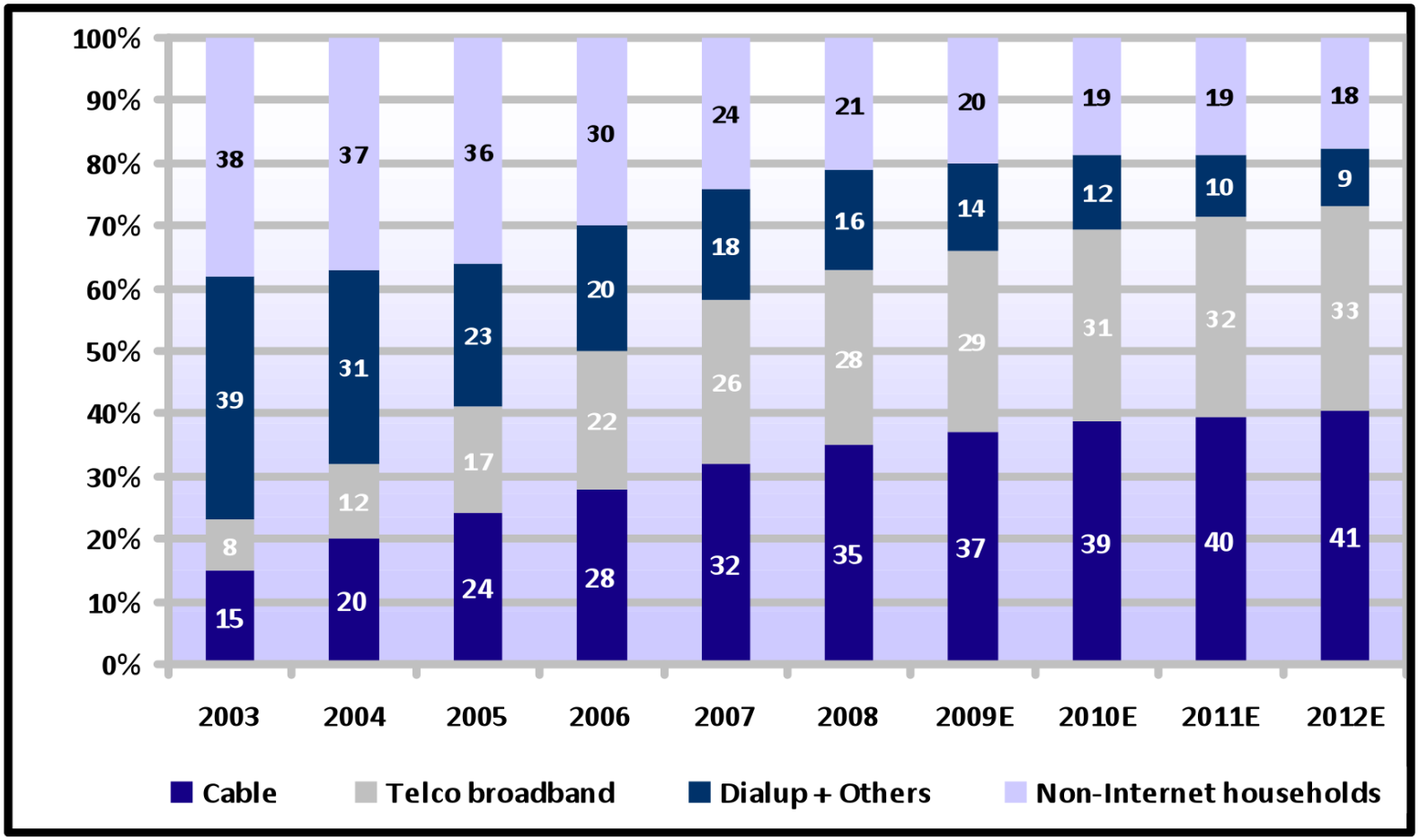


Wired Broadband Subscriber Growth



Adapted from UBS Investment Research, Sorting Through the Digital Transition, Sept. 3, 2009 at 6.

Internet Penetration of U.S. Households



Adapted from: Goldman Sachs Global Investment Research, Americas: Communications, Sept. 8, 2009 at 15.

Coverage Summary

- 95% of U.S. homes will have access to a low speed BB and 90% will have access to advertised speeds of 50 mbps downstream by 2013-14
  - Many homes will have access to higher speeds by 2011-2012: Cable DOCSIS 3.0 expected to cover 92% by 2013; AT&T and Verizon will cover 50 million homes at 10mbps or higher by 2011
- Wireless BB at advertised speeds up to 12 mbps downstream (5 mbps more likely) will be available to about 94% of the population by 2013.
- Upstream speeds for wired and wireless services will generally be significantly lower than downstream.

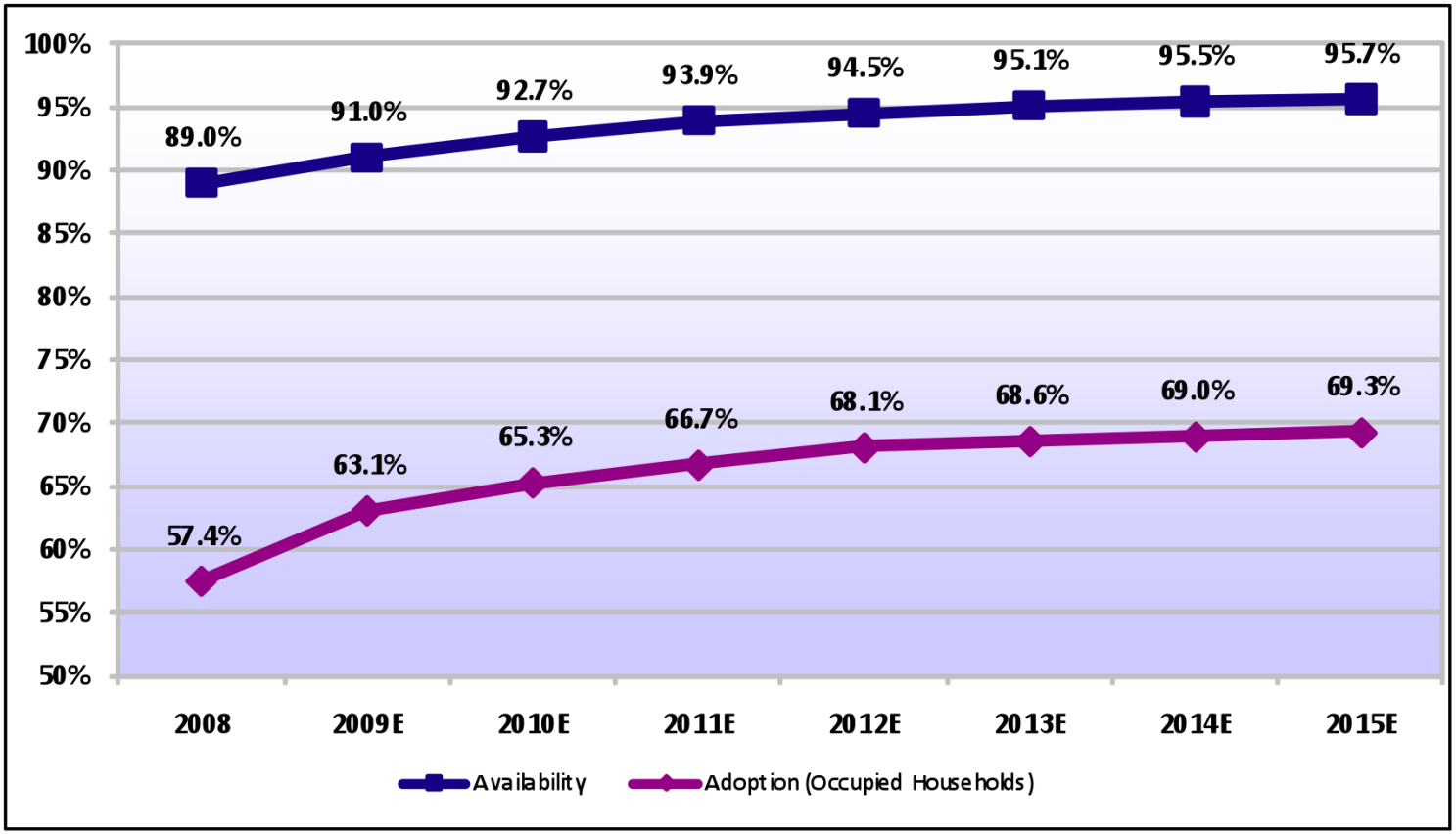
Coverage Summary

- 5-10 million U.S. homes (4.5-9%) will have significantly inferior choices in broadband
  - Substantially lower speeds
  - Fewer choices, maybe only satellite which has higher price and latency issues

Adoption Summary

- Adoption will continue to lag substantially behind the availability of broadband for the foreseeable future.
  - 69% of households will subscribe to wired broadband by 2015
  - 53% of the population will subscribe to wireless broadband services by 2013.

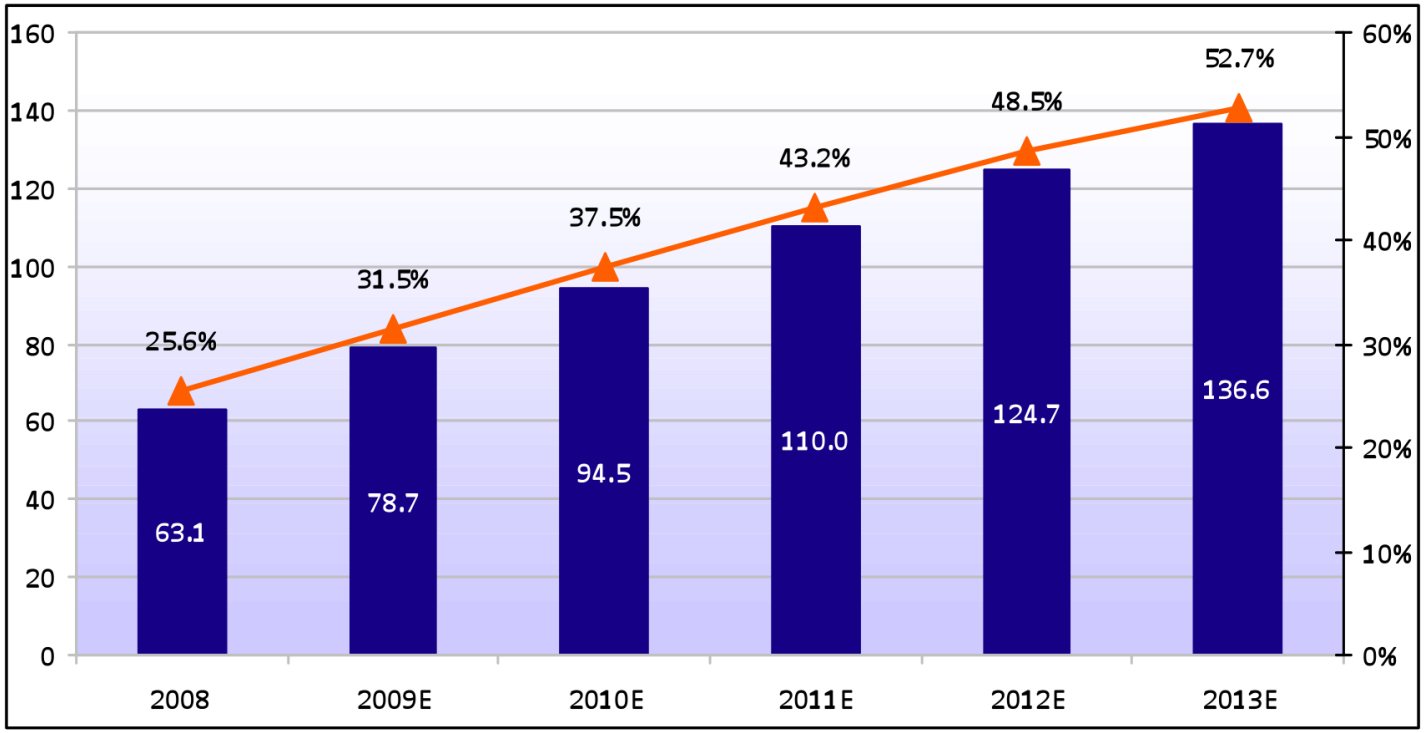
Wireline Broadband Availability And Adoption



Source: Average of analysts' data provided to CITI

Wireless Broadband Penetration

(in millions of users and penetration as percentage of U.S. population aged 14 and older)



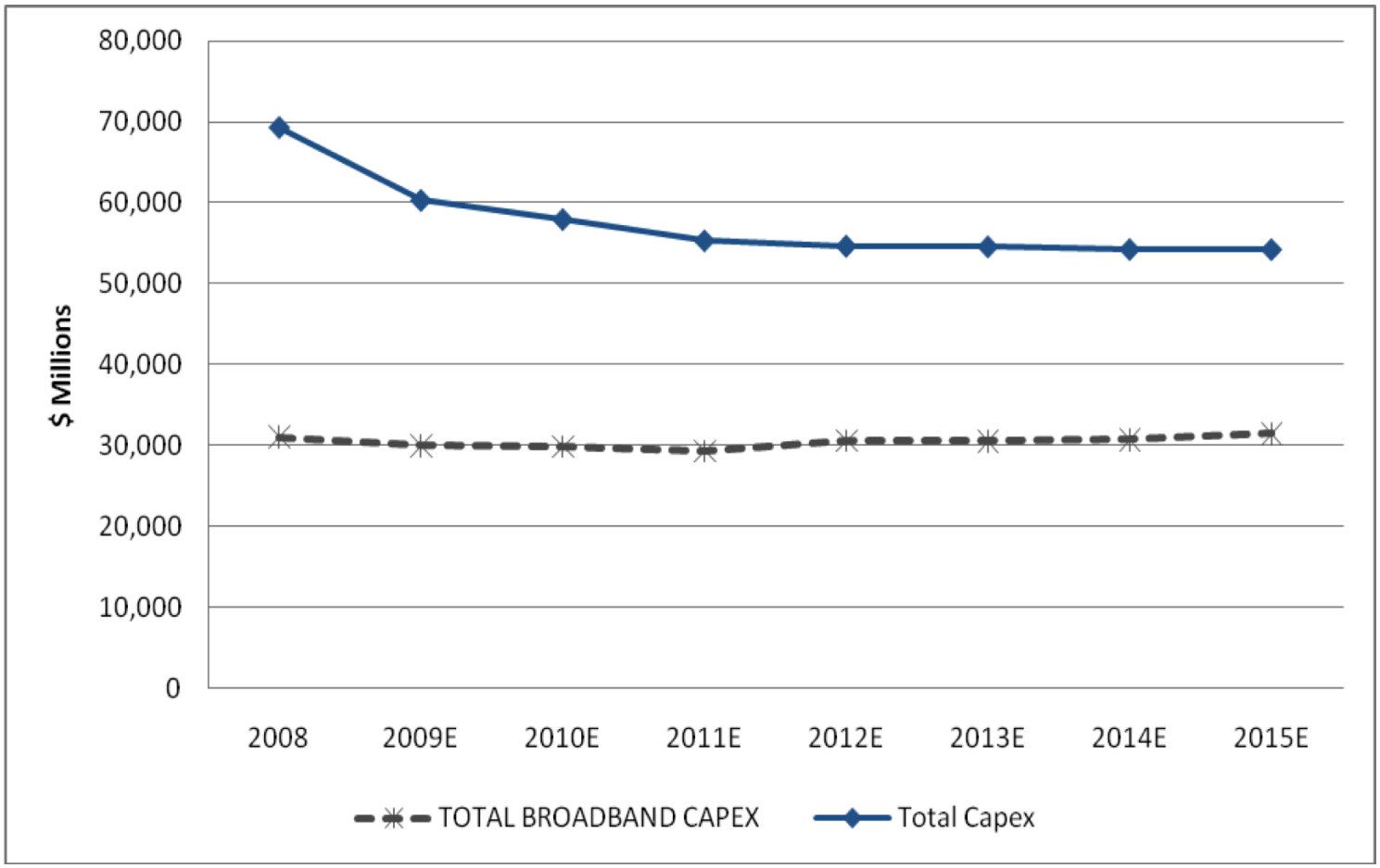
Source: Average of analyst data provided to CITI, Jupiter U.S. Wireless Data Access Forecast 2008-2013, and population from U.S. Census.
Note: Users include cell phones and a small number of laptop wireless cards but excludes SMS.

Total Capex and Broadband Capex by Sector

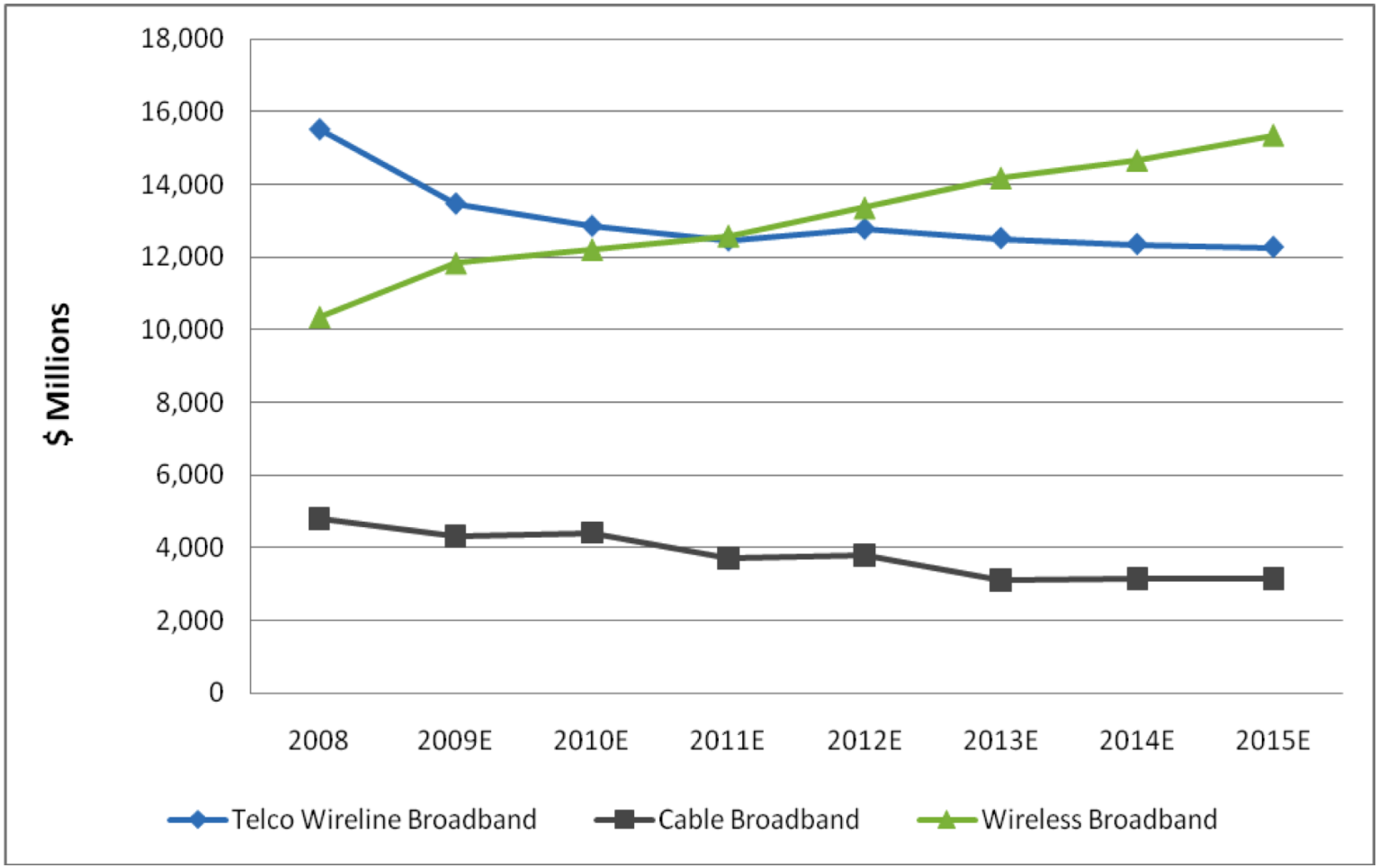
BROADBAND CAPEX (in millions)	2008	2009E	2010E	2011E	2012E	2013E	2014E	2015E
Major Telco Wireline Capex	26,283	21,060	19,353	17,458	16,755	16,420	16,203	16,095
Total Telco Capex	32,289	25,872	23,775	21,447	20,583	20,172	19,905	19,773
% Broadband	*48%*	*52%*	*54%*	*58%*	*62%*	*62%*	*62%*	*62%*
Telco Wireline Broadband	**15,499**	**13,454**	**12,839**	**12,439**	**12,762**	**12,506**	**12,341**	**12,259**
Major Cable Capex	13,148	11,817	12,109	12,237	12,476	12,818	12,969	12,986
Total Cable Capex	15,956	14,342	14,695	14,851	15,140	15,556	15,739	15,760
% Broadband	*30.0%*	*30.0%*	*30.0%*	*25.0%*	*25.0%*	*20.0%*	*20.0%*	*20.0%*
Cable Broadband	**4,787**	**4,302**	**4,408**	**3,713**	**3,785**	**3,111**	**3,148**	**3,152**
Major Wireless Capex	19,520	18,597	17,990	17,449	17,251	17,140	17,070	17,036
Total Wireless Capex	20,700	19,721	19,077	18,504	18,294	18,176	18,102	18,066
%Broadband	*50.0%*	*60.0%*	*64.0%*	*68.0%*	*73.0%*	*78.0%*	*81.0%*	*85.0%*
Wireless Broadband	**10,350**	**11,833**	**12,210**	**12,583**	**13,354**	**14,177**	**14,663**	**15,356**
Satellite Broadband	**200**	**200**	**200**	**300**	**400**	**400**	**200**	**300**
WISP Broadband	**199**	**219**	**241**	**265**	**292**	**321**	**353**	**388**
TOTAL CAPEX	**69,344**	**60,354**	**57,989**	**55,367**	**54,709**	**54,624**	**54,300**	**54,287**
TOTAL BROADBAND CAPEX	**31,035**	**30,008**	**29,898**	**29,300**	**30,593**	**30,516**	**30,705**	**31,455**

Source: Average of analyst data provided to CITI, with adjustments as described in the accompanying text. *Telco*: AT&T (excluding wireless), Verizon (excluding wireless), Qwest; *Cable*: Comcast, Time Warner, Cox, Cablevision, Charter, Mediacom, and Insight; *Wireless*: AT&T, Verizon, Sprint, T-Mobile.

Total Capex and Total Broadband Capex



Industry Sectors' Broadband CapEx



CapEx Observation

- Is 50 mbps a “fork” in the broadband road?
- Flatness of analysts’ capex forecasts may not reflect cyclical nature of network deployment: 2011-2015 may be the low points in the current investment cycle.
- Critical issue for the investment cycle: Is 50 mbps “enough” for most users?
  - If so, less urgency for cable or DSL-telcos to transition to FTTH, so they can make incremental investments to upgrade existing infrastructures rather than a step-function to FTTH
  - If not, capex forecasts may be quite low

CapEx Observation: A Trillion Dollar Decade

- Broadband capex of about $30 billion per year is:
  - about $100 per capita
  - about $300 per household
  - over six years (2010-2015), $182 billion of additional investment.
- We are midway through a decade where network operators and users will collectively spend **over one trillion dollars** on broadband

Observation (Lesson Learned)

- Rural America may not be as “underserved” as expected
- At least 5 million rural customers may be “under the radar”
  - 2 million WISP customers
  - 2.9 million telephone co-op broadband customers (many FTTH)
  - 150,000 municipal FTTH customers
- Broadband mapping program might produce surprising results

Observation (Lesson Learned)

- Broadband infrastructure industry is likely to be concentrated
- Economies of scale will affect broadband industry structure:
  - There are likely to be only a few broadband companies in most markets
  - New entry at the infrastructure level seems unlikely
  - Further concentration is possible.

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Thank You.

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