



Video and Broadband Forecasts
in the Gigabit Era

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January 21-22, 2016
Marriott Courtyard Downtown
Austin, Texas

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The background of this section features a large, stylized graphic of a bridge with blue and red arches, set against a white background.

Industry Broadband Forecasts

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Broadband Generations, Data Rate Categories*

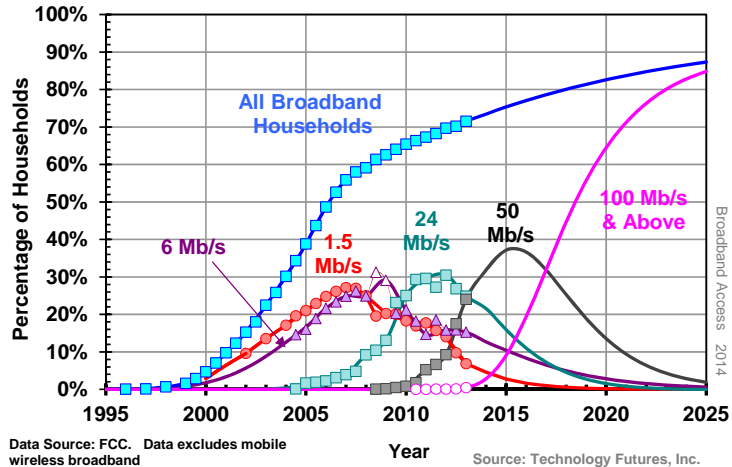
Nominal	Range	
1.5 Mb/s	Less than 3 Mb/s	
6 Mb/s	At least 3 Mb/s and less than 10 Mb/s	
24 Mb/s	At least 10 Mb/s and less than 25 Mb/s	} VHS Broadband
50 Mb/s	At least 25 Mb/s and less than 100 Mb/s	
100 Mb/s	At least 100 Mb/s and less than 300 Mb/s	
300 Mb/s	At least 300 Mb/s (Includes 1 Gb/s)	

*These are based on downstream, but upstream is becoming important also.

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Broadband Households by Nominal Data Rate



Data Source: FCC. Data excludes mobile wireless broadband

Source: Technology Futures, Inc.

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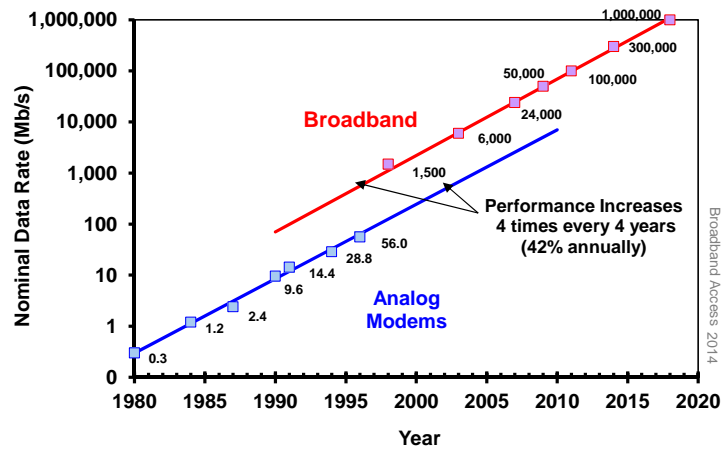
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Adding Another Generation

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Trend in Residential Access Data Rates



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Constant Percentage Rate of Advance

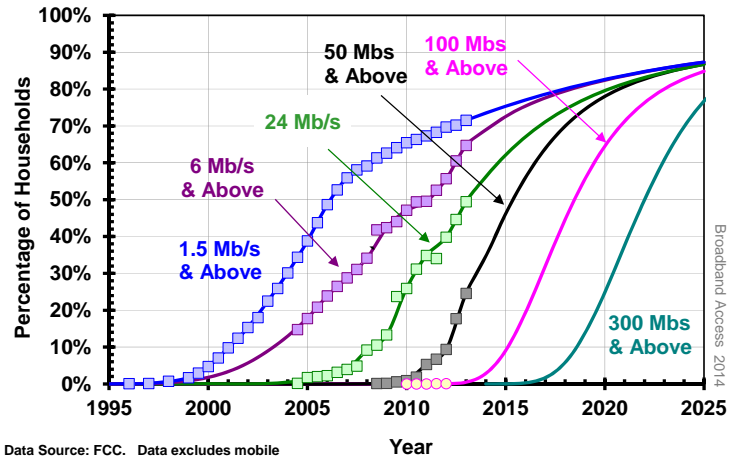
- Most new technologies progress this way
- Rates will continue if:
 - The improvement is technically possible
 - Basic approach remains the same
 - Demand, utility, need continue

From TFI's Technology Forecasting Seminar

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Broadband Households by Nominal Data Rate (Jan 2015 View)



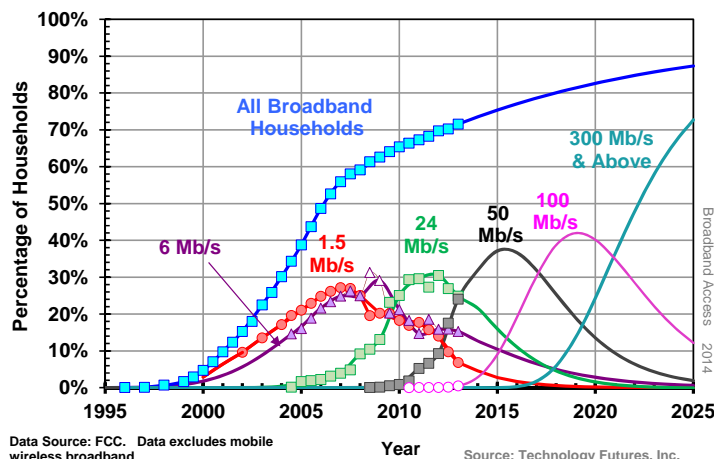
Data Source: FCC. Data excludes mobile wireless broadband

Source: Technology Futures, Inc.

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U.S. Broadband Lifecycles (Jan 2015 View)



Data Source: FCC. Data excludes mobile wireless broadband

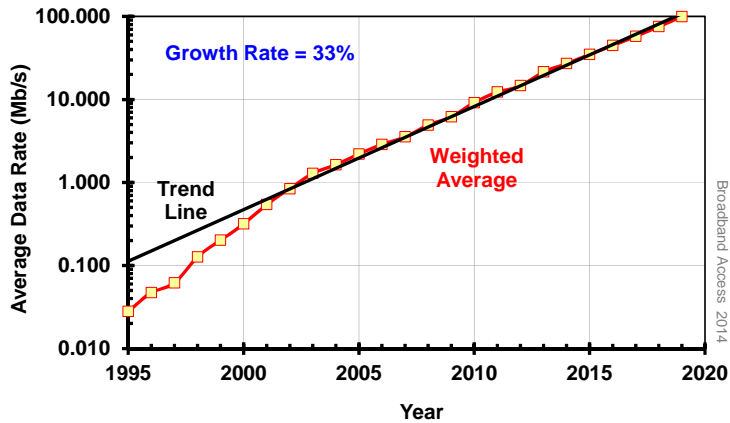
Source: Technology Futures, Inc.

Lifecycle (t) =
Substitution (t) – Next Substitution (t)

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Resulting Average Data Rate (Jan 2015 View)



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Jan 2015 Caveat:

Caveat: The generations reflect historic trends in nominal bandwidth demand. Market forces may accelerate these without a corresponding acceleration in actual bandwidth requirements.

Example: 300 Mb/s & Above may include a lot of “pre-mature” Gigabit!

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Gigabit Internet access grows out of its niche

Google proved gigabit Internet feasible at a price that appealed to consumers and small businesses. Now, with a critical mass of customers and ISPs, the gigabit Internet community seeks the killer app.



By [Steven Max Patterson](#) | [Follow](#)
CIO | Jul 23, 2015 12:10 PM PT

...According to Michael Render, principal analyst at market researcher [RVA LLC](#), 83 Internet access [providers](#) have joined Google to offer gigabit Internet access service (all priced in the \$50-\$150 per month range).

Render's data shows that new subscribers are signing up at an annualized growth rate of 480 percent each year. Between the third quarter of 2014 and the second quarter of 2015 gigabit, subscribers grew from 40,000-174,000.



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July 14, 2015



BY: [RYAN KELLY](#)
Integrated Communications Manager

untangled

@Time Warner Cable*

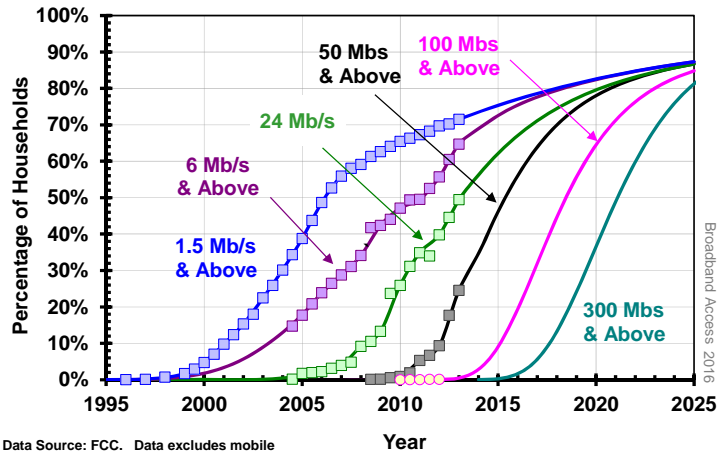
...All told, our enhanced service experience will impact 12 TWC service areas by this fall: New York City, Los Angeles, Austin, Dallas, San Antonio, Kansas City, Hawaii, Charlotte, Raleigh, Wilmington, Greensboro, and San Diego. The last three service areas begin TWC Maxx upgrades this year and should be completed in early 2016.

By year's end, approximately 45 percent of Time Warner Cable Internet customers nationwide will have access to TWC Maxx Internet speeds, up to 300 Mbps, and nearly 50 percent of all TV subscribers will have access to all-digital video.



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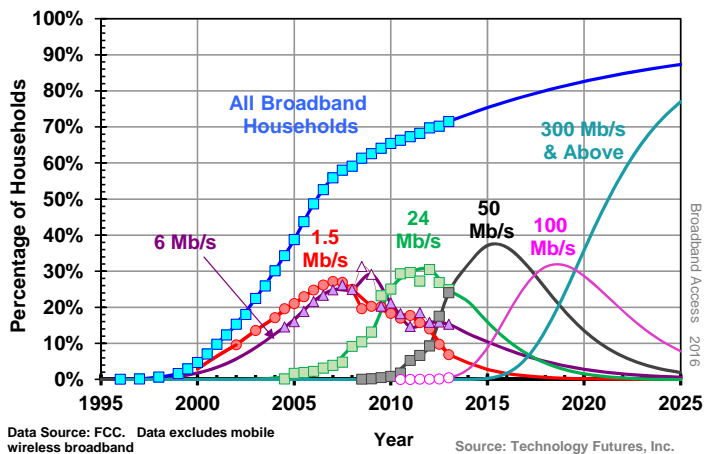
Broadband Households by Nominal Data Rate (Jan 2016 View)



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U.S. Broadband Lifecycles (Jan 2016 View)

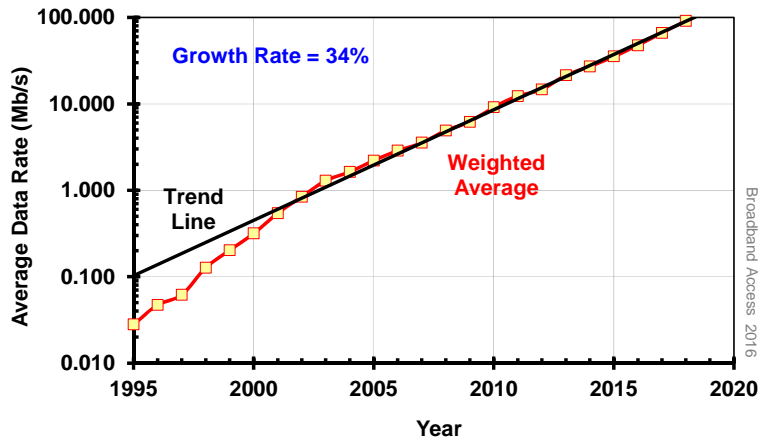


Lifecycle (t) =
Substitution (t) – Next Substitution (t)

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Resulting Average Data Rate (Jan 2016 View)



Source: Technology Futures, Inc.

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AT&T bringing gigabit fiber to LA and dozens of other metro areas

AT&T gigabit fiber on track for 14 million homes and small businesses.

by Jon Brodtkin - Dec 7, 2015 3:50pm CST

AT&T today launched its gigabit fiber Internet service in parts of Los Angeles and West Palm Beach and announced another 36 metro areas that will get the service at later dates. AT&T's "GigaPower" service is available in 20 metro areas as of now... It launched first in Austin, Texas, in 2013.

...AT&T agreed to deploy fiber to at least 12.5 million customer locations within four years in exchange for government approval to buy DirecTV. ...AT&T will end up building to more than 14 million homes and small businesses.

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NETWORKWORLD

How Comcast will roll out gigabit-speed broadband in 2016

With a successful test of a DOCSIS 3.1 modem, Comcast is set to embark on its new plan to offer gigabit-speed internet service.



By Colin Neagle | Network World | Dec 22, 2015 7:54 AM PT

Comcast has made a breakthrough that could enable it to offer gigabit-speed broadband to its existing network without going through the exhaustive, and expensive, process of building out a new fiber network. Through this process, Comcast said it will offer a new gigabit-speed service by the end of 2016.

The DOCSIS standard increases the amount of data that can be transferred over existing cable TV systems, with version 3.1 capable of boosting speed to 10 Gigabit-per-second (Gbps) downstream and 1 Gbps upstream.



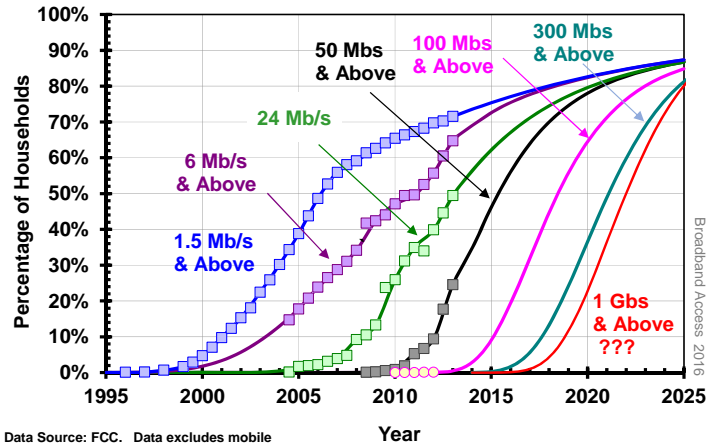
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The Gigabit substitution curve may very closely follow the 300 Mb/s curve



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Broadband Households by Nominal Data Rate (Jan 2016 View ???)



Data Source: FCC. Data excludes mobile wireless broadband

Source: Technology Futures, Inc.

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Comparative Broadband Statistics as a Political Weapon *excerpted from:*

Broadband Access in America: Status, Forecasts, and Politics

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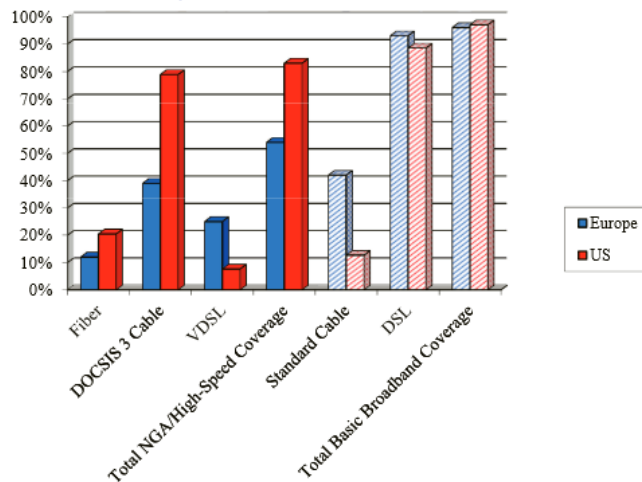
Key Players

- The Service Providers (Cable TV and Telcos)
- The Application Providers (Google, Netflix, Facebook, etc.)
- The Federal Communications Commission (FCC)
- Consumers

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Highspeed and Standard Coverage by Technology - 2012

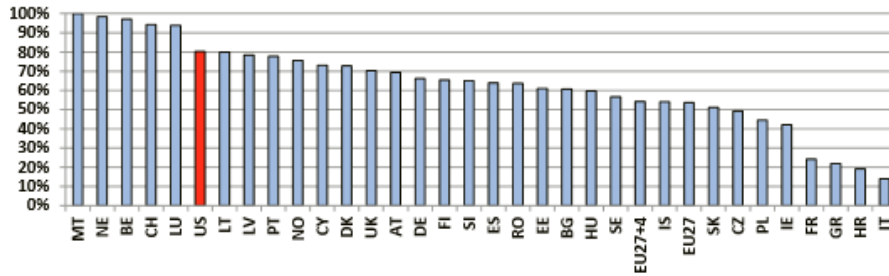


Source: FCC, Fourth International Broadband Data Report (2015), <https://www.fcc.gov/document/fourth-international-broadband-data-report-2015>

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Total Highspeed Broadband Coverage by Country, Dec 2012



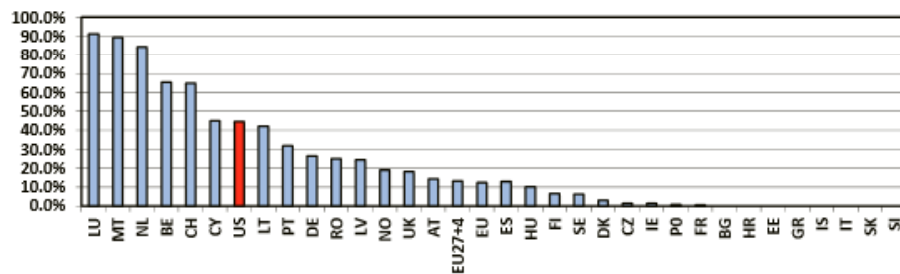
Source: FCC, Fourth International Broadband Data Report (2015), <https://www.fcc.gov/document/fourth-international-broadband-data-report-2015>

“Highspeed” = 25 Mb/s (U.S.)
= 30 Mb/s (Europe)

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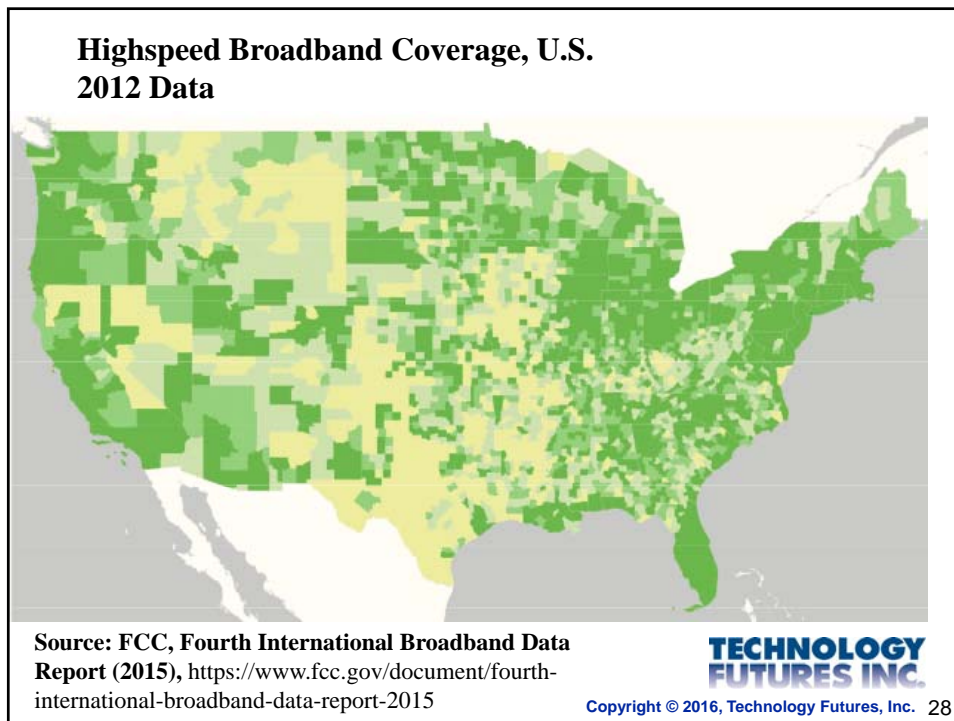
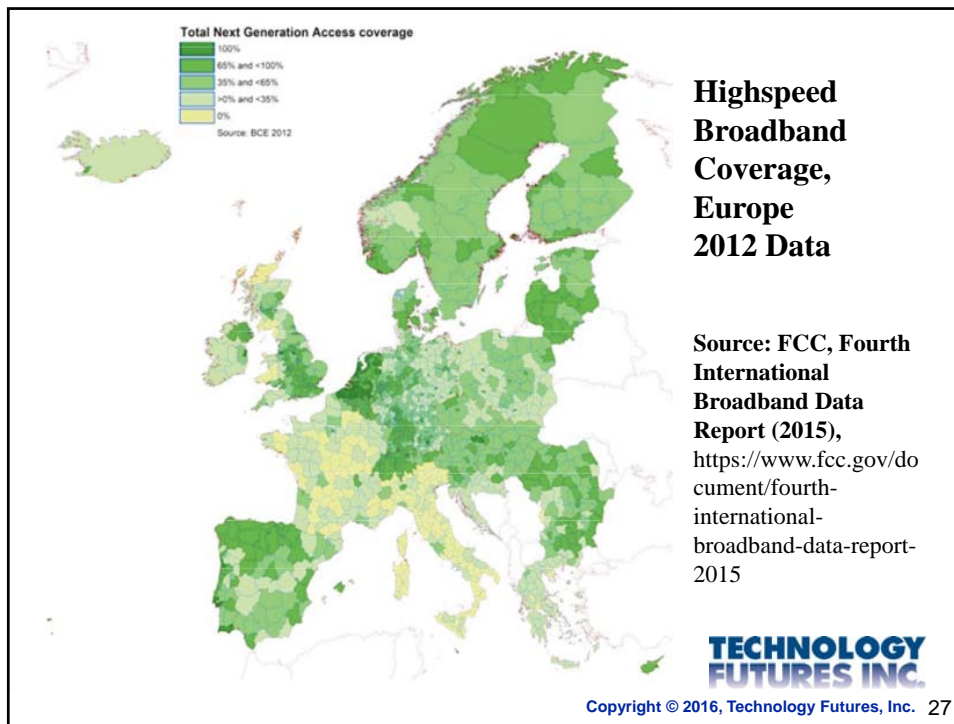
Rural Highspeed Broadband Coverage by Country, Dec 2012



Source: FCC, Fourth International Broadband Data Report (2015), <https://www.fcc.gov/document/fourth-international-broadband-data-report-2015>

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2012 Data			2013 Data		
Country	Average Download Speed (Mbps)	Rank	Country	Average Download Speed (Mbps)	Rank
Lithuania	35.42	1	Luxembourg	42.97	1
Korea	33.63	2	Singapore	42.52	2
Hong Kong	29.73	3	Lithuania	41.72	3
Singapore	29.51	4	Sweden	39.85	4
Luxembourg	27.59	5	Korea	39.28	5
Sweden	27.58	6	Japan	37.42	6
Netherlands	27.31	7	Netherlands	37.02	7
Bulgaria	25.64	8	Switzerland	36.01	8
Japan	24.27	9	Hong Kong	35.85	9
Iceland	23.86	10	Iceland	33.97	10
Portugal	22.42	11	Finland	30.56	11
Switzerland	21.79	12	Denmark	30.45	12
Denmark	20.54	13	Bulgaria	27.78	13
Belgium	19.4	14	Belgium	26.04	14
Norway	18.84	15	Portugal	25.86	15
Czech Republic	18.82	16	Norway	24.08	16
Finland	18.38	17	France	23.66	17
Slovakia	17.87	18	Estonia	23.40	18
Estonia	17.59	19	UK	23.29	19
Germany	17.5	20	Czech Republic	23.18	20
Hungary	17.41	21	Slovakia	23.05	21
United Kingdom	16.87	22	Hungary	22.32	22
France	15.71	23	Austria	22.19	23
Austria	15.22	24	Germany	21.73	24
United States	14.5	25	Ireland	19.28	25
Canada	13.88	26	United States	18.67	26

Average
(Weighted)
Actual
Download
Speeds,
Based on
Ookla data.

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Connection Speeds by Country, Akami, 4Q13

Country/Region	Q4 '13 Avg. Mbps	QoQ Change	YoY Change
— Global	3.8	5.5%	27%
1 South Korea	21.9	-1.1%	57%
2 Japan	12.8	-4.4%	14%
3 Netherlands	12.4	-0.7%	38%
4 Hong Kong	12.2	-2.6%	22%
5 Switzerland	12.0	3.8%	27%
6 Czech Republic	11.4	0.7%	30%
7 Sweden	10.5	13%	30%
8 Latvia	10.4	-6.7%	11%
9 Ireland	10.4	8.4%	59%
10 United States	10.0	2.0%	25%

Figure 20: Average Connection Speed by Country/Region

Country/Region	Q4 '13 Peak Mbps	QoQ Change	YoY Change
— Global	23.2	30%	38%
1 Hong Kong	68.0	3.9%	16%
2 South Korea	64.4	1.3%	31%
3 Singapore	59.1	18%	56%
4 Israel	54.6	14%	68%
5 Japan	53.7	3.4%	22%
6 Taiwan	50.9	19%	74%
7 Romania	50.6	11%	15%
8 Latvia	48.8	13%	22%
9 Switzerland	44.2	15%	23%
10 United States	43.7	18%	32%

Figure 21: Average Peak Connection Speed by Country/Region

Akamai's State of the Internet: Q4 2013 Report

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Connection Speeds by Country, Akami, 4Q14

	Country/Region	Q4 '14 Avg. Mbps	QoQ Change	YoY Change		Country/Region	Q4 '14 Peak Mbps	QoQ Change	YoY Change
–	Global	4.5	0.7%	20%	–	Global	26.9	8.4%	16%
1	South Korea	22.2	-12%	1.6%	1	Hong Kong	87.7	3.7%	29%
2	Hong Kong	16.8	3.4%	37%	2	Singapore	84.0	1.2%	42%
3	Japan	15.2	1.0%	16%	3	South Korea	75.4	1.6%	17%
4	Sweden	14.6	3.5%	34%	4	Japan	69.0	6.0%	30%
5	Switzerland	14.5	0%	21%	5	Romania	67.0	14%	32%
6	Netherlands	14.2	1.7%	15%	6	Taiwan	64.2	17%	25%
7	Latvia	13.0	-2.6%	25%	7	Uruguay	63.3	8.1%	73%
8	Ireland	12.7	-8.9%	24%	8	Qatar	62.8	50%	72%
9	Czech Republic	12.3	0.1%	8.4%	9	Israel	60.5	-2.1%	11%
10	Finland	12.1	2.8%	33%	10	Latvia	60.2	3.7%	23%

Global Rank	Country/Region	Q4 '14 Avg. Mbps	QoQ Change	YoY Change	Global Rank	Country/Region	Q4 '14 Peak Mbps	QoQ Change	YoY Change
16	United States	11.1	-3.7%	15%	7	Uruguay	63.3	8.1%	73%
20	Canada	10.7	3.9%	19%	22	United States	49.4	1.2%	16%
50	Uruguay	5.9	7.9%	87%	27	Canada	46.3	6.0%	14%

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Akamai's State of the Internet: Q4 2014 Report

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Are these comparisons meaningful?

- Most countries “ahead” of U.S. are not comparable. Most are small, dense, and/or wealthy. Others have unique characteristics.
- Not clear that the differences imply significant competitive advantage

Similar comparisons by city, by price, etc. are also questionable

Yet loud rhetoric and major U.S. policy decisions are revolving around them

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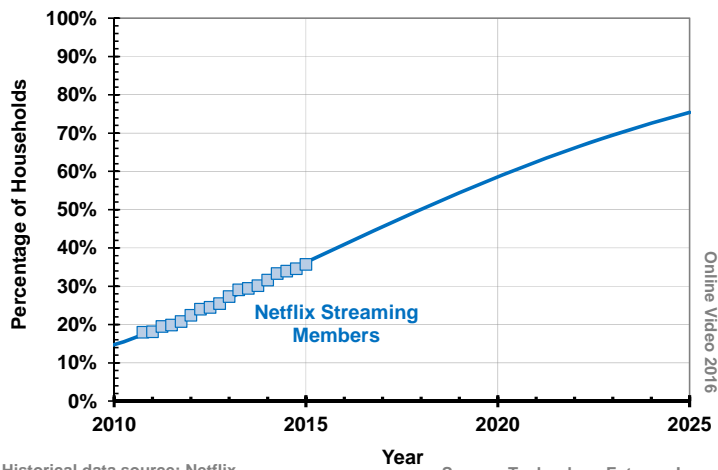
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Online Video Forecasts

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Netflix Streaming Members, Domestic



Historical data source: Netflix

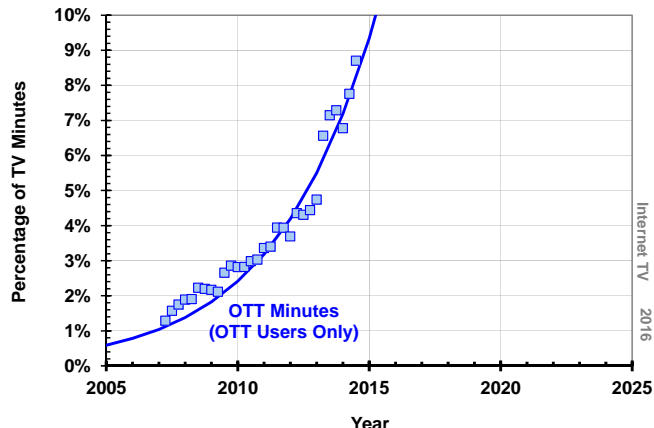
Source: Technology Futures, Inc.

Online Video 2016

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Online Video Minutes, Percent of Total TV Viewing (Scale to 10%)



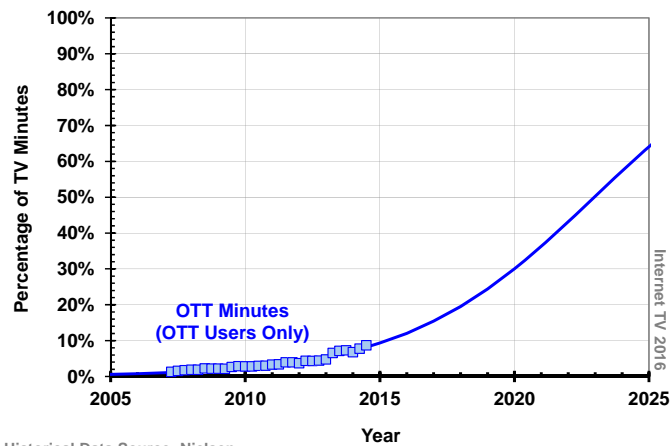
Historical Data Source: Nielsen

Source: Technology Futures, Inc.

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Online Video Minutes, Percent of Total TV Viewing (Full Scale)



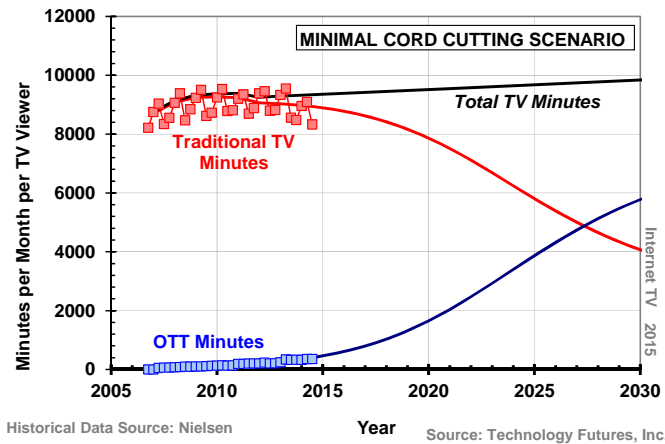
Historical Data Source: Nielsen

Source: Technology Futures, Inc.

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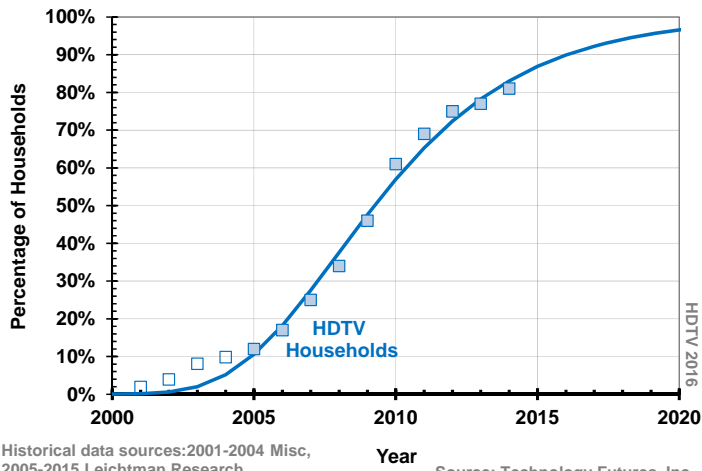
Online Video Minutes vs Traditional Total TV Minutes



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HDTV Households



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The exploding 4K market: Nearly 50% of U.S homes to have UHD TVs by 2020 according to new study

Stephan Jukic – March 06, 2015



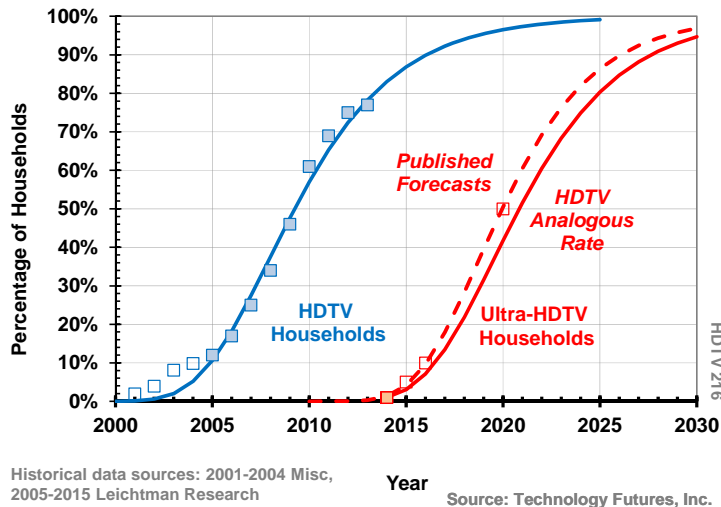
In 2014, only 1% of all U.S homes had a 4K TV, so far in 2015, that percentage is seeing very fast growth and other studies have predicted a fivefold increase in 4K television sales for the current year end, from just under 1 million units sold to about 5 or 6 million by the end of 2015.

The Strategy Analytics study furthermore predicts a 10% market penetration by 2016. While all of these figures are quite impressive, they're still some distance from the 50% penetration predicted for 2020.

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Ultra-HD Households (aka 4K)



UHD TV Data Source (Red Squares): Strategy Analytics

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Netflix SD Stream = ~ 2 Mb/s

Netflix HD Stream = ~ 4 Mb/s

Netflix 4K Stream = ~ 18 Mb/s

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