Gigabit Broadband Competition in the U.S.

ITU SG9 Workshop on TV and Content Delivery on Integrated Broadband Cable Networks
Hangzhou, China
26 May 2017

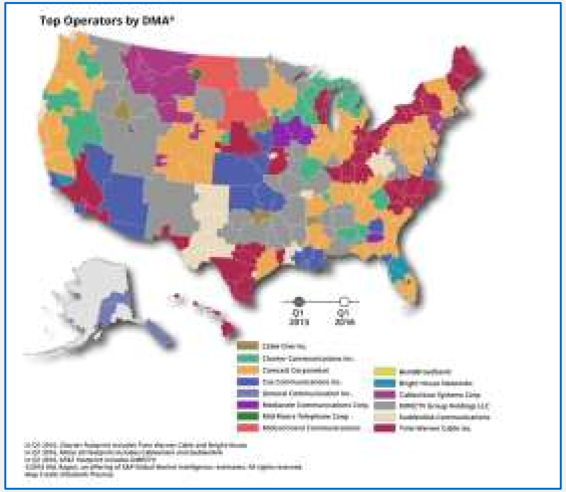
Topics

- Industry Consolidation
- Broadband Profile in the U.S.
- Broadband Competition
- Cable's Competitive Positioning

Industry Consolidation

Industry Consolidation

CableLabs



Charter

TIME WARNER CABLE
THE POWER OF YOU

bright house NETWORKS

DIRECTV SATELLITE TELEVISION

at&t

altice

suddenlink

CABLEVISION

S&P Global – 2016

Pay TV Market Share – 2016

CableLabs

Pay-TV Providers	Subscribers at End of 4Q 2016	Net Adds in 2016
Cable Companies		
Comcast	22,508,000	161,000
Charter	17,236,000	(187,000)
Altice	3,469,000	(111,000)
Mediacom	828,000	(27,000)
Cable ONE	320,246	(43,904)
Other major private company**	4,290,000	(70,000)
Total Top Cable	**48,651,246**	**(277,904)**
Satellite Services (DBS)		
DIRECTV	21,012,000	1,228,000
DISH-DBS^	12,491,000	(1,037,000)
Total DBS	**33,503,000**	**191,000**
Phone Companies		
Verizon FiOS	4,694,000	59,000
AT&T U-verse	4,281,000	(1,359,000)
Frontier^^	1,125,000	(255,000)
Total Top Phone	**10,100,000**	**(1,555,000)**
Internet-Delivered		
Sling TV^	1,180,000	645,000
DIRECTV NOW^^	200,000	200,000
Total Internet-Delivered	**1,380,000**	**845,000**
Total Top Providers	**93,634,246**	**(796,904)**

Leichtman Research Group, March 2017

https://medium.com/digital-vault/nearly-800-000-cut-the-cable-and-satellite-tv-cord-in-2016-772a12969170

- **83% of US video subscribers are now served by four pay TV providers**
  - **AT&T/DirecTV**
  - **Comcast**
  - **Charter**
  - **DISH**
- **96% served by seven pay TV providers**
  - **AT&T/DirecTV**
  - **Comcast**
  - **Charter**
  - **Dish**
  - **Verizon FiOS**
  - **Cox**
  - **Altice**

Broadband Profile in the U.S.

+3.3M Broadband Subscribers – 2016

CableLabs

Broadband Providers	Subscribers at End of 4Q 2016	Net Adds in 2016
Cable Companies		
Comcast	24,701,000	1,372,000
Charter	22,593,000	1,604,000
Altice*	3,907,000	122,000
Mediacom	1,156,000	71,000
WOW (WideOpenWest)**	718,900	20,600
Cable ONE	513,908	12,667
Other Major Private Company^	4,790,000	90,000
Total Top Cable	**58,379,808**	**3,292,267**
Phone Companies		
AT&T	15,605,000	(173,000)
Verizon	7,038,000	(47,000)
CenturyLink	5,945,000	(103,000)
Frontier^^	4,271,000	(243,000)
Windstream	1,051,100	(44,000)
FairPoint	306,624	(4,506)
Cincinnati Bell	303,200	15,800
Total Top Telco	**35,519,924**	**(598,706)**
Total Top Broadband	**92,899,732**	**2,693,561**

Sources: The Companies and Leichtman Research Group, Inc.

Cable now has ~63% of the nearly 92.9 million U.S. broadband customers.

SNL Kagan, April 2017

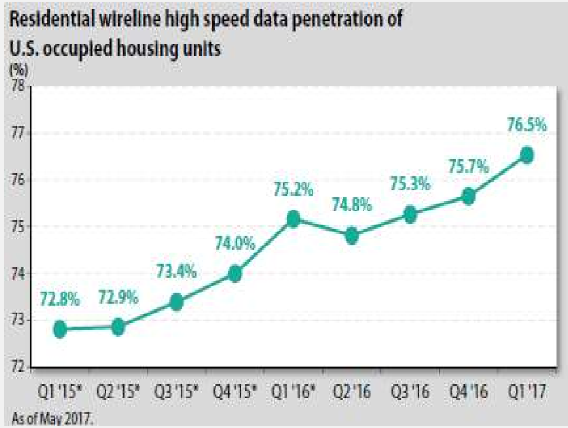
+1M Broadband Subscribers – Q1 2017

CableLabs

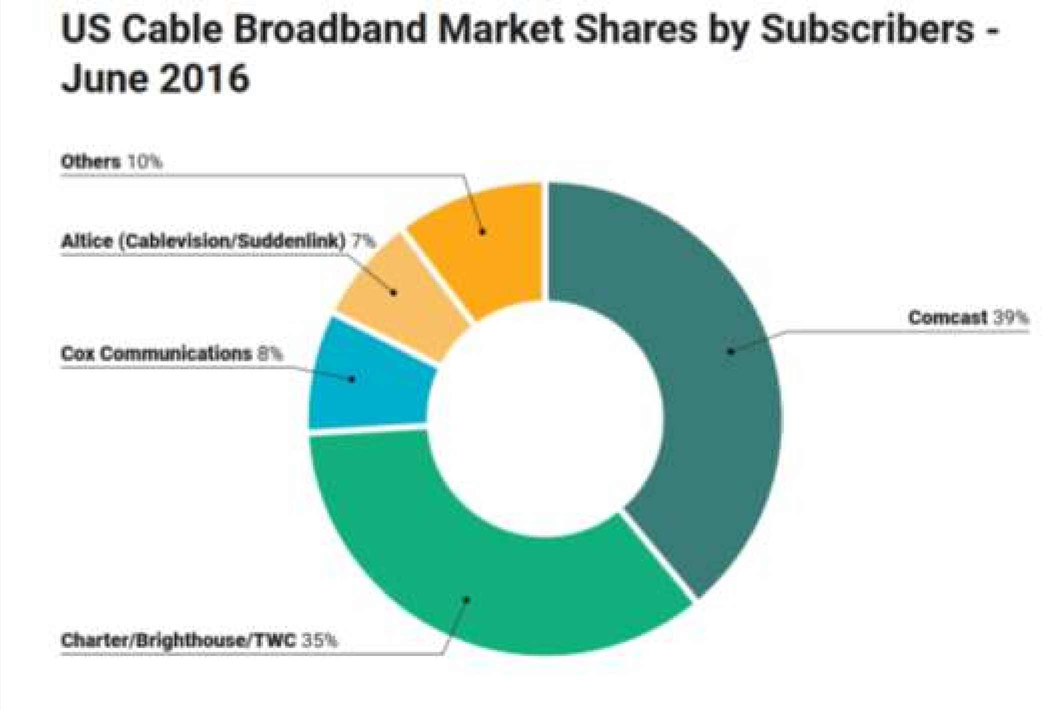
U.S. cable and telco HSD market share trends

		Q1 '15	Q2 '15	Q3 '15	Q4 '15	Q1 '16	Q2 '16	Q3 '16	Q4 '16	Q1 '17
Cable HSD subs*~	(000)	57,034	57,529	58,428	59,647	60,927	61,542	62,477	63,394	64,496
Net adds	(000)	1,186	495	899	1,219	1,280	615	935	917	1,102
% of combined HSD subs	(%)	60.3	60.6	61.1	61.6	62.0	62.5	63.0	63.4	63.9
% of combined net adds	(%)	78.2	140.4	116.6	102.9	95.3	245.0	128.2	119.6	104.8
Residential cable HSD subs~	(000)	53,720	54,121	54,931	56,059	57,248	57,783	58,607	59,426	60,454
Net adds	(000)	1,049	401	810	1,128	1,189	535	823	819	1,028
Telco HSD subs*^~	(000)	37,513	37,371	37,243	37,208	37,272	36,908	36,703	36,553	36,502
Net adds	(000)	331	(142)	(128)	(35)	64	(364)	(205)	(150)	(51)
% of combined HSD subs	(%)	39.7	39.4	38.9	38.4	38.0	37.5	37.0	36.6	36.1
% of combined net adds	(%)	21.8	(40.4)	(16.6)	(2.9)	1.2	(145.0)	(28.2)	(19.6)	(4.8)
Residential telco HSD subs	(000)	33,878	33,781	33,691	33,690	33,629	33,326	33,187	33,085	33,143
Net adds	(000)	493	(96)	(91)	(1)	(60)	(303)	(140)	(102)	58
Combined HSD subs*^	(000)	94,547	94,900	95,670	96,855	98,199	98,450	99,180	99,947	100,998
Combined net adds	(000)	1,517	353	771	1,185	1,344	251	730	767	1,051
Combined residential HSD subs	(000)	87,598	87,902	88,622	89,749	91,133	91,110	91,793	92,511	93,597
Net adds	(000)	1,542	305	719	1,127	1,129	(23)	684	718	1,086

As of May 2017.
*Figures include residential and commercial customers.
~Historical subscribers revised.
^Telco HSD totals include subscribers served by DSL and fiber-to-the-home connections.
Kagan, a media research group within the TMT offering of S&P Global Market Intelligence



US Cable Broadband Share



http://blog.telegeography.com/us-cable-and-broadband-sector-consolidation-news

Telco Broadband – A Tale of Two Networks

CableLabs

Top U.S. telco HSD subscriber mix

	Q1 '16	Q4 '16	Q1 '17	Seqt'l net adds	Seqt'l growth	YoY growth
	(000)				(%)	
AT&T U-verse	13,470	13,865	14,110	245	1.8	4.8
AT&T traditional DSL	2,294	1,740	1,585	(155)	(8.9)	(30.9)
Total	**15,764**	**15,605**	**15,695**	**90**	**0.6**	**(0.4)**
Verizon FiOS	5,508	5,653	5,688	35	0.6	3.3
Verizon DSL	1,589	1,385	1,323	(62)	(4.5)	(16.7)
Total	**7,097**	**7,038**	**7,011**	**(27)**	**(0.4)**	**(1.2)**

As of May 2017.
Includes residential and commercial subs.
Kagan, a media research group within the TMT offering of S&P Global Market Intelligence

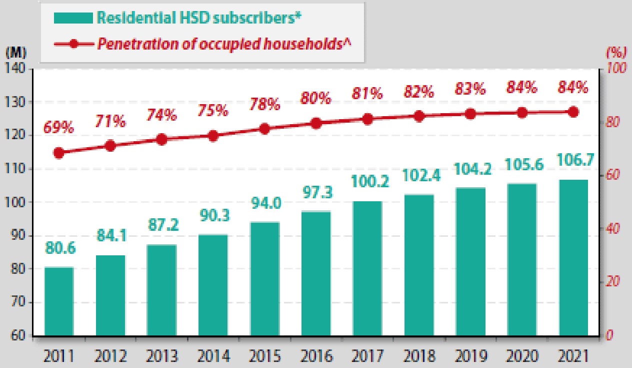
- ***Continued steep DLS decline*** – for fourth straight quarter. Telco HSD dipped to 36.5 million residential and commercial subscribers after losing 51,000 subscribers in Q1
- ***AT&T*** – U-verse gained 245,000 HSD subs, up 21% from net adds one year ago, reaching 14.1 million. After DSL losses, AT&T grew by just 90,000 subs
- ***Verizon*** – FiOS HSD customers grew 35,000 in Q1, down 61% from net adds one year ago—to ~5.7 million. After DSL losses, Verizon lost 27,000 subscribers in Q1

https://www.snl.com/web/client?auth=inherit#news/article?id=40704267&KeyProductLinkType=0

Broadband Trajectory Will Flatten

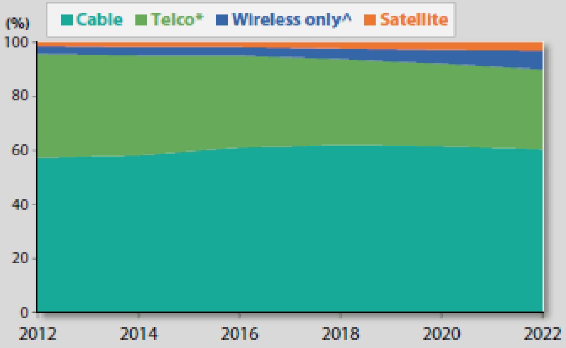
CableLabs

Estimated and projected U.S. residential HSD subscribers, 2011-2021



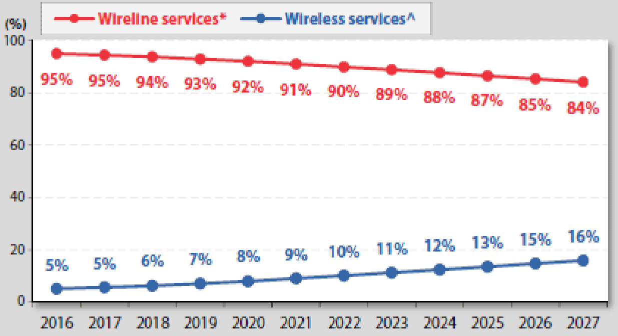
As of May 2017.
*Includes residential subscribers for cable, telco DSL and FTTH, wireless only and satellite service.
^Occupied housing units derived from U.S. Census reports including occupied, temporarily occupied and occasional use housing units.
Kagan, a media research group within the TMT offering of S&P Global Market Intelligence

Projected U.S. residential HSD market share, 2012-2022



As of May 2017.
*Includes DSL and fiber-to-the-home high-speed data access.
^Includes fixed and mobile wireless HSD connections used for primary Internet access.
Kagan, a media research group within the TMT offering of S&P Global Market Intelligence

Projected U.S. residential wireline, wireless broadband market share, 2016-2027



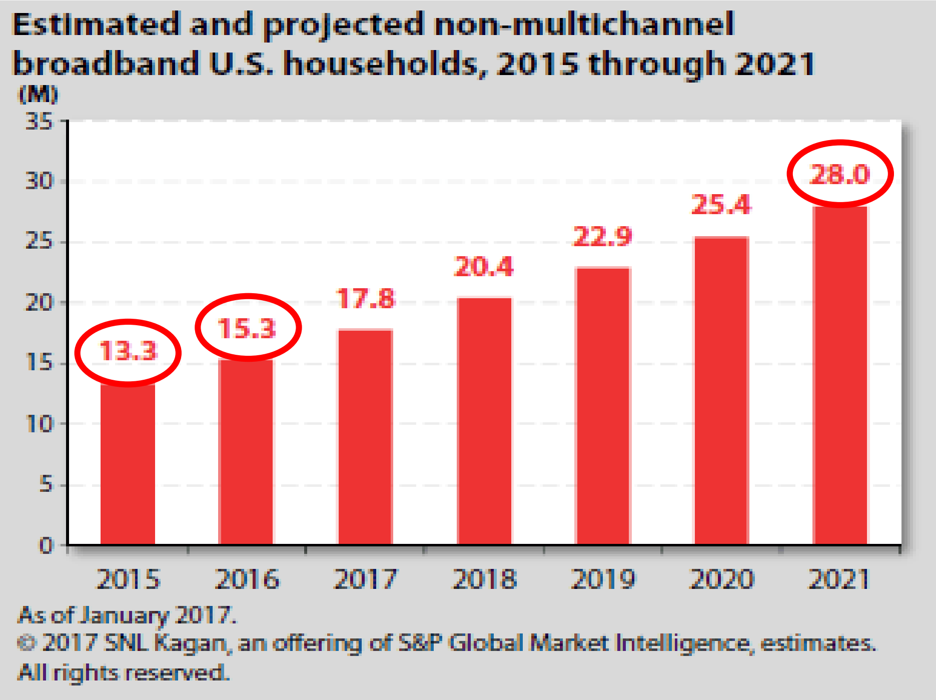
As of May 2017.
*Includes residential subscribers for cable, telco DSL and FTTH connections as a percentage of residential broadband subscribers.
^Includes residential subscribers for wireless only and satellite services as a percentage of residential broadband subscribers.
Kagan, a media research group within the TMT offering of S&P Global Market Intelligence

- Residential HSD subscriptions will surpass 80% of US households and hit 100 million by the end of 2017
- Growth will flatten as some consumers migrate to wireless-only services
- By 2027, wireline providers' market share drops from 95+% to 84%

SNL Kagan, May 2017

Broadband Only Homes >15M in 2016

CableLabs

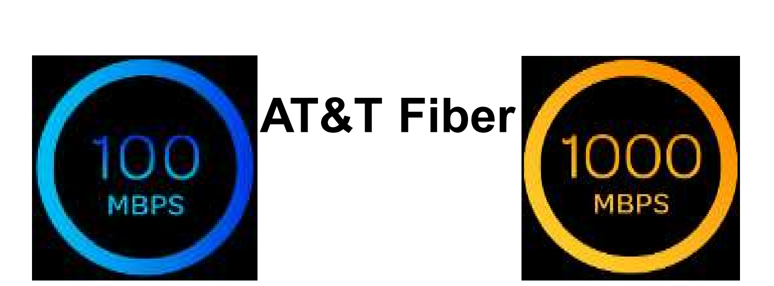


http://www.homemediamagazine.com/research/kagan-broadband-only-homes-represent-13-us-households-39816

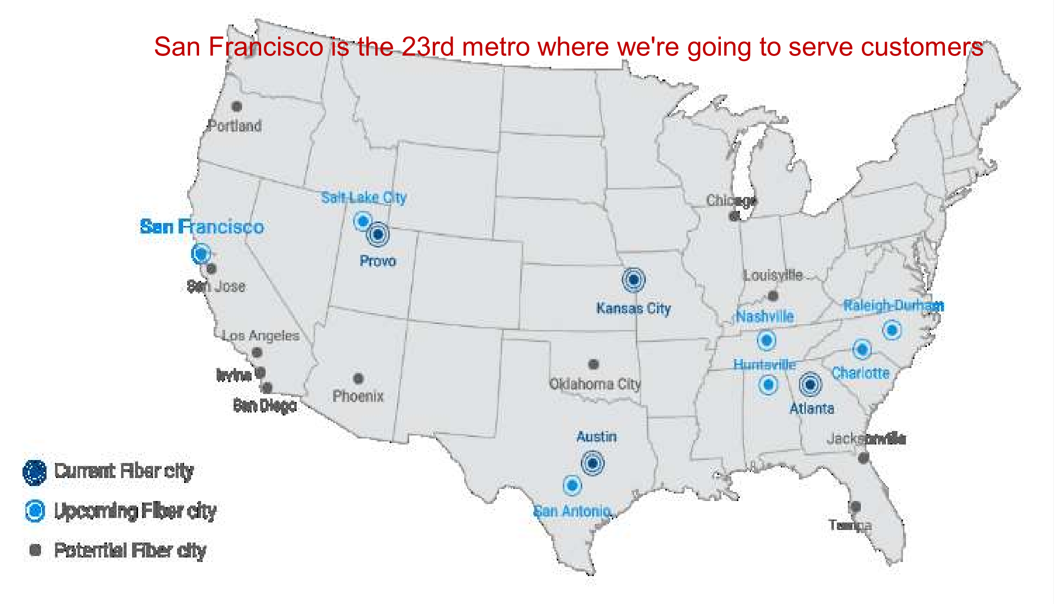
Broadband Competition

Broadband Competition in the US

Google



Google Fiber – Gigabit Deployments



Google Fiber had ~84,000 video subscribers at end of 2016

- That's a fraction of 1% of the U.S. pay TV market after five years
- While broadband subscribers are larger – estimated at ~500K as of June 2016, that's also a fraction of 1% of US broadband subscribers (MoffettNathanson)

Google Fiber – Offers

CableLabs

Gigabit + TV
The full Fiber experience

- Up to 1,000 Mbps upload and download speed.
- 150+ channels. Record up to 8 shows at once.
- 1TB of cloud storage across Google Drive, Gmail, and Google+ Photos.

$130/mo

~~$300~~ waived construction fee with 1 year commitment.
Plus taxes and fees.

Gigabit Internet
100 times faster Internet

- Up to 1,000 Mbps upload and download speeds.
- 1TB of cloud storage across Google Drive, Gmail, and Google+ Photos.

$70/mo

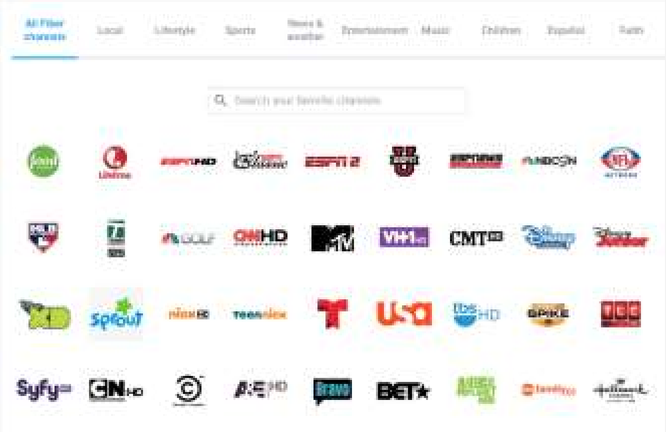
~~$300~~ waived construction fee with 1 year commitment.
Plus taxes and fees.

Basic Internet
Internet at today's basic speeds

- Up to 5 Mbps download and 1 Mbps upload speed.

$0/mo

$300 construction fee. One time payment or $25/mo for 12 months.
Plus taxes and fees.



Oct 2016

Google Fiber – Offer Changes

CableLabs

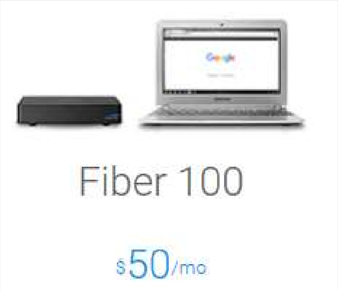
THEN

1Gb - $70/mo.

$300 waived construction fee with 1 year commitment

Google Nexus provided

NOW



100Mb - $50/mo.

1Gb - $70/mo.

$100 waived construction fee with 1 year commitment

Download the Google Fiber TV app on your Android or iOS devices

Add Fiber Phone to your plan for $10/mo.

Google Fiber – Recent Developments

CableLabs

Google's High-Speed Web Plans Hit Snags

After initial rollouts prove costly, Google Fiber rethinks how to deliver connections in metro areas

Google Fiber is ending a free-Internet offer in its first city

Google Fiber buys Webpass to boost its high-speed internet business

Verizon Communications : Eyes `Wireless Fiber` 5G Broadband Launch in 2017

Google Fiber Plans Pivot From Cables To Wireless For Super Fast, Cheap Internet

Google Fiber Signed Up Shockingly Few Video Customers This Year

Google Fiber Told to Lay Off Half of Its Staff (Report)

What is driving these strategic changes?

AT&T Fiber Deployments

CableLabs

- AT&T currently delivers 1 Gbps service to “parts of” 52 metro areas, 4.6 million locations
- AT&T plans to add 1 Gbps service to 2 million locations by the end of 2017
- Plans to reach 75 metro areas in total with 1 Gbps service
- Committed to reach an additional 12.5M customer locations in mid-2019

http://about.att.com/mediakit/gigapower - April 2017

AT&T – Offers

CableLabs

- AT&T Internet 1000 is offered at $70/month when customers purchase another AT&T qualifying service.
- $80/month for Internet-only with a 12 month agreement.
- For internet-only customers, their price will rise to $90 at the end of the promotional period.

AT&T – Offer Changes with DirecTV

CableLabs

1 Gig Internet

Package pricing includes:

- Internet speeds up to 1Gbps (That's 1,000Mbps!)
- $29 a month ongoing discount for Internet
- Waived installation ($99 value) and equipment fee ($7/mo. value)

$70/mo. for 12 months

With 12-mo. agmt. Internet incl 1TB data/mo. $10 chrg for each add'l 50GB (up to $100/mo.)† Ltd. availability/areas. Speeds vary. Not guaranteed.

1 Gig Internet + DIRECTV SELECT™

Package pricing includes:

- Internet speeds up to 1Gbps (That's 1,000Mbps!)
- $29 a month ongoing discount for Internet
- 145+ channels, HD DVR monthly service, and TV equipment fees for up to 2 rooms
- Waived installation ($118.95 value) and equipment fee ($7/mo. value)

2-year price guarantee!

$120/mo. for 24 months

With 24-mo. TV and 12-mo. Internet agmts. Unlimited data allowance ($30 value) at no add'l charge.† Ltd. availability/areas. Speeds vary. Not guaranteed.

1 Gig Internet + DIRECTV + Voice

Package pricing includes:

- Internet speeds up to 1Gbps (That's 1,000Mbps!)
- $29 a month ongoing discount for Internet
- 145+ channels, HD DVR monthly service, and TV equipment fees for up to 2 rooms
- Waived installation ($118.95 value) and equipment fee ($7/mo. value)
- Digital Voice with anywhere access

2-year price guarantee!

$129.99/mo. for 24 months

With 24-mo. TV and 12-mo. Internet agmts. Unlimited data allowance ($30 value) at no add'l charge.† Ltd. availability/areas. Speeds vary. Not guaranteed.

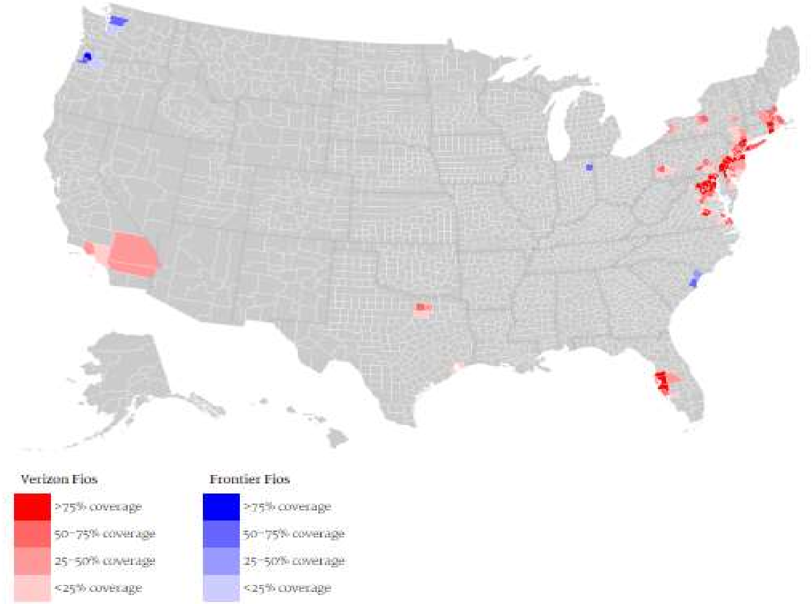
AT&T Seeks to Shake Up Pay TV

Oct. 19. 2016

DirecTV Now service will stream dozens of live channels without a satellite dish, cable box or annual contract http://www.wsj.com/articles/at-t-seeks-to-shake-up-pay-tv-1476882003

Verizon FiOS – FTTH Deployments

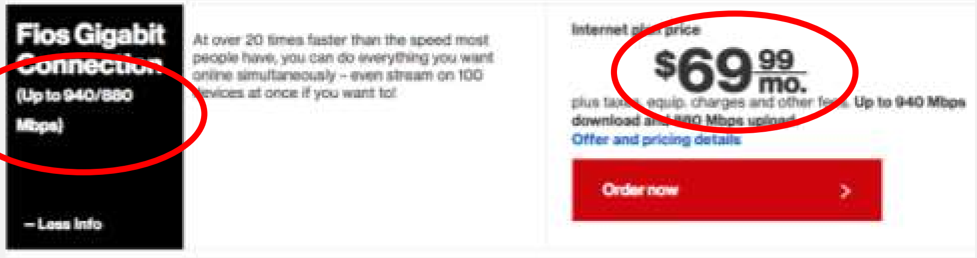
CableLabs



As you can see on the map, we also included the areas that have access to Fios from Frontier Communications. When Verizon sold a large portion of its wireline networks to Frontier in 2009, a few of those areas included Fios installations. Primarily those areas are in Portland, Oregon, Fort Wayne, Indiana and suburbs of Seattle, Washington. Frontier kept the name Fios for it's fiber-to-the-home service under a license agreement with Verizon.

- FiOS is currently available to over 8 million homes
- 5.7 million FiOS internet connections as of Q1

Verizon FiOS – Offers



- Applies to new customers only
- Eligible customers can purchase FiOs Gigabit Connection as a standalone service for $69.99 a month or $79.99 as part of a triple play bundle when ordered online
- For a two-year contract, $79.99 in year one and $84.99 in year two.

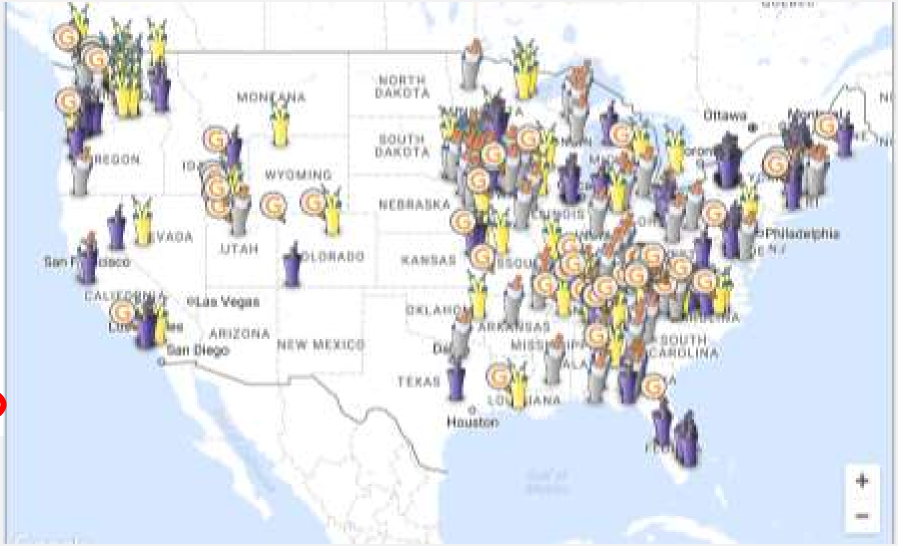
What it was (is?) . . .

http://www.verizon.com/home/FiOS-fastest-internet/

Gigabit Competition – Municipalities

CableLabs

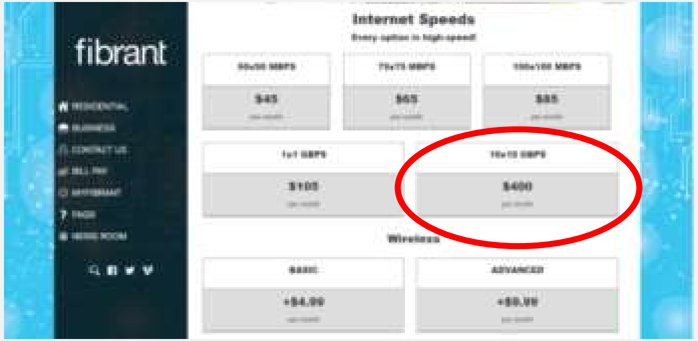
- 95 communities with a publicly owned FTTH network reaching most or all of the community.
- 77 communities with a publicly owned cable network reaching most or all of the community.
- More than 200 communities with some publicly owned fiber service available to parts of the community.
- More than 130 communities with publicly owned dark fiber available.
- More than 110 communities in 24 states with a publicly owned network offering at least 1 Gigabit services.



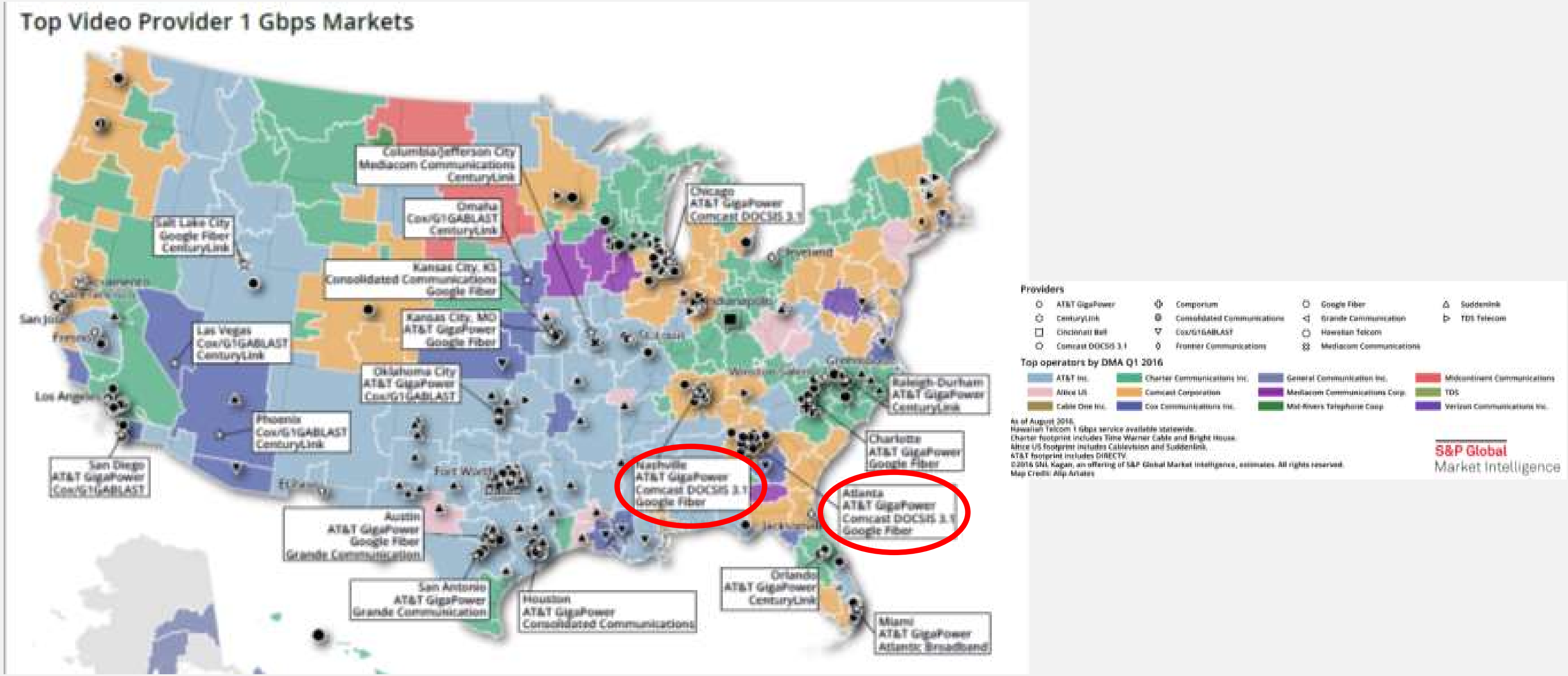
http://muninetworks.org/communitymap

Gigabit Competition – 10 Gbps Services

CableLabs



Gigabit Networks – Rapidly Expanding



https://ofchq.snl.com/Cache/A022FE096036068927.PDF?Y=&CachePath=%5c%5cdmzdoc1%5cwebcache%24%5c&O=PDF&D=&IOP=1&T=&KIDT=23

Cable’s Competitive Positioning

Tools in the Toolkit for Cable Operators . . .

- DOCSIS 3.0
- DOCSIS 3.1
- Full Duplex DOCSIS
- FTTx
- Coherent optics
- Wireless (including 5G)

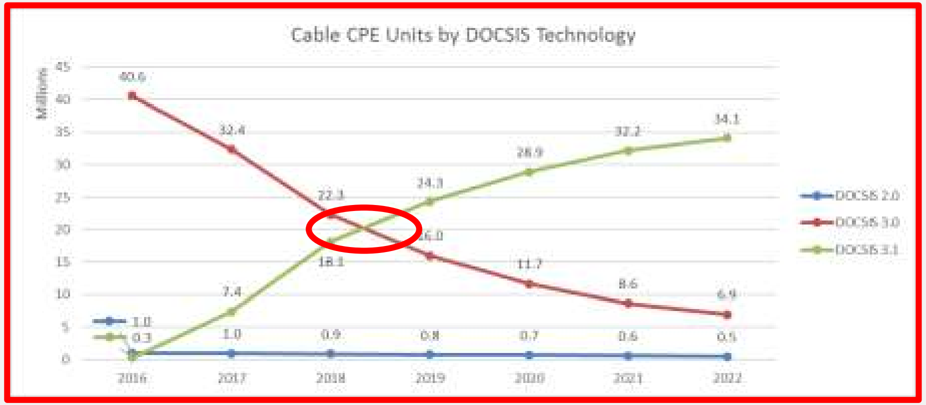
. . . with more to come

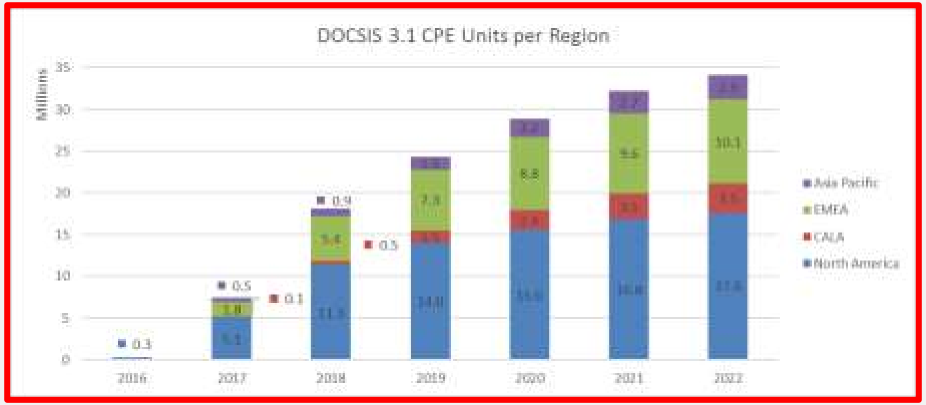
MSOs Offering 1 Gbps Broadband Service

CableLabs

DOCSIS 3.0, DOCSIS 3.1 and/or FTTH

DOCSIS 3.1 Shipments

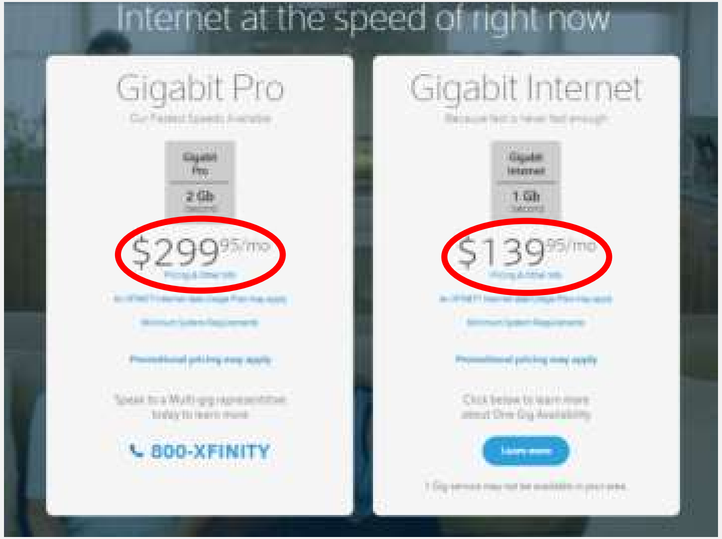


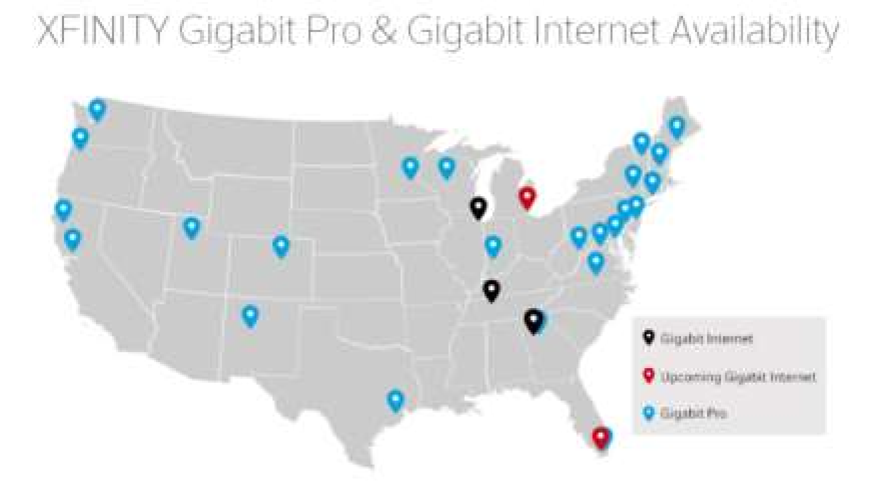


SNL Kagan (April 2017)

Comcast – Gigabit Services

CableLabs





- In 2015, Comcast launched its residential, fiber-based, multi-Gigabit service – Gigabit Pro – with symmetrical 2 Gbps speeds. Gigabit Pro is now available to 18 million homes across the country.
- Comcast offers Gigabit Internet service using DOCSIS 3.1 technology in Atlanta, Nashville, Chattanooga, Chicago, Huntsville, Detroit, and Miami, Denver, San Francisco, and Kansas City to follow.
- Initial customers will have the choice of a promotional contract price of $70 per month for 36 months, or an every day price with no contract at $139.95.

