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October 15, 2009

Thomas J. Navin
202.719.7487
tnavin@wileyrein.com

VIA ELECTRONIC FILING

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Washington, D.C. 20554

Re: Notice of *Ex Parte* Presentation. In the Matter of A National Broadband Plan for Our Future; GN Docket No. 09-51

Dear Ms. Dortch:

On Tuesday, October 13, 2009, Dr. Timothy Regan, Senior Vice President, and John Igel, Vice President, of Corning, Inc., Ed Naef, Vice President CSMG Adventis, Thomas Cohen, Kelley, Drye, Collier, and Shannon on behalf of the Fiber to the Home Council, and the undersigned had separate meetings with Christi Shewman (Legal Advisor for Commissioner Baker) and Kimberly Harding (legal intern to Commissioner Baker), Carol Simpson (Legal Advisor for Commissioner Clyburn), and Jennifer Schneider (Legal Advisor for Commissioner Copps) to discuss the attached presentations concerning fiber to the home deployment. We also met collectively with the following members of the National Broadband team to discuss the same: Blair Levin, Executive Director, Corlos Kirjner, Senior Advisor, Erik Garr, General Manager, Steve Rosenberg, Infrastructure Manager, Marcus Maher, Assoc. Chief Wireline Competition Bureau, and Andrew Nesi, Office of Strategic Planning and Policy Analysis.

Pursuant to Section 1.1206 of the Commission's rules, an electronic copy of this letter is being filed for inclusion in the above-referenced docket.

Sincerely,

/s/ Thomas J. Navin

Thomas J. Navin

Attachments

cc: Christi Shewman
Carol Simpson
Jennifer Schneider
Blair Levin
Erik Garr

CORNING

Innovations in FTTH reduced cost and improved scalability of deployments

John Igel
Vice President, Technology

Corning Incorporated

Founded:
1851

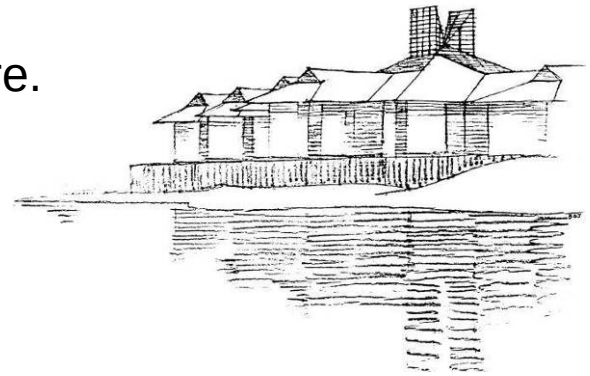
Headquarters:
Corning, New York

Employees:
Approximately 23,000 worldwide

2008 Sales:
$5.9 Billion

Fortune 500 Rank (2009):
414

- Corning is the world leader in specialty glass and ceramics.
- We create and make keystone components that enable high-technology systems for consumer electronics, mobile emissions control, telecommunications and life sciences.
- We succeed through sustained investment in R&D, more than 150 years of materials science and process engineering knowledge, and a distinctive collaborative culture.



Corning Incorporated
A Culture of Innovation at Corning

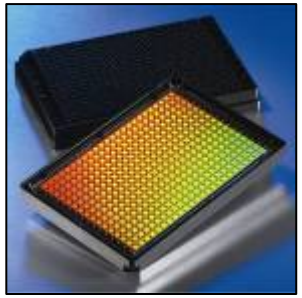
Glass envelope for Thomas Edison's light bulb

Dow Corning silicones

Glass ceramics

Ceramic substrates for automotive catalytic converters

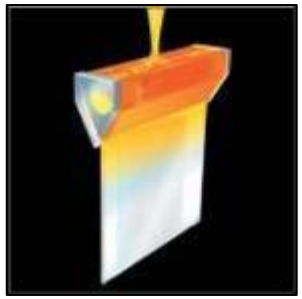
High-throughput label-free screening platform for drug discovery



1879 **1915** **1934** **1947** **1952** **1960** **1970** **1972** **1984** **2006**

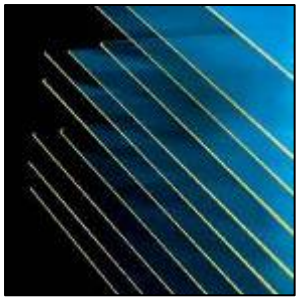
Heat-resistant Pyrex® glass

Processes for mass producing the television bulb



Fusion draw process

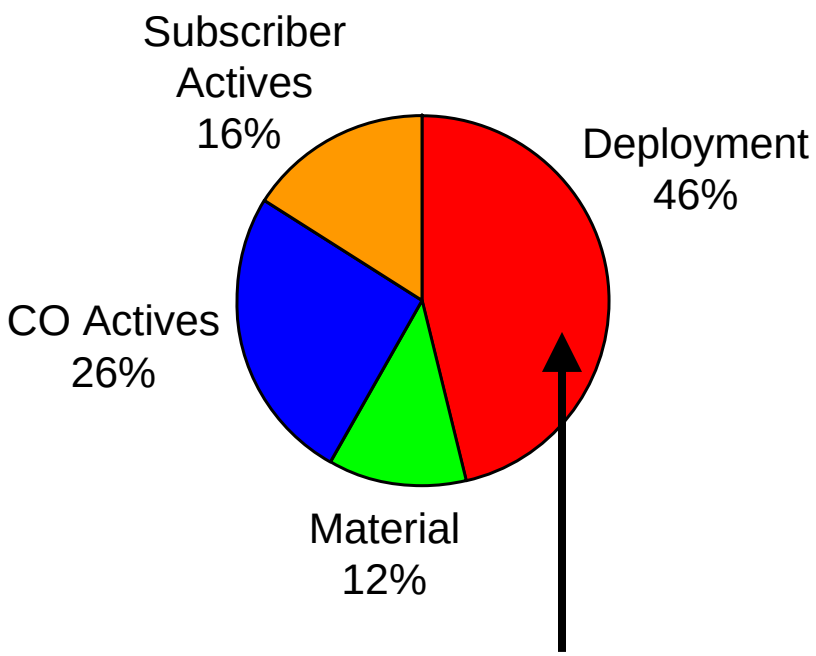
First low-loss optical fiber



AMLCD glass for computers and large screen TVs

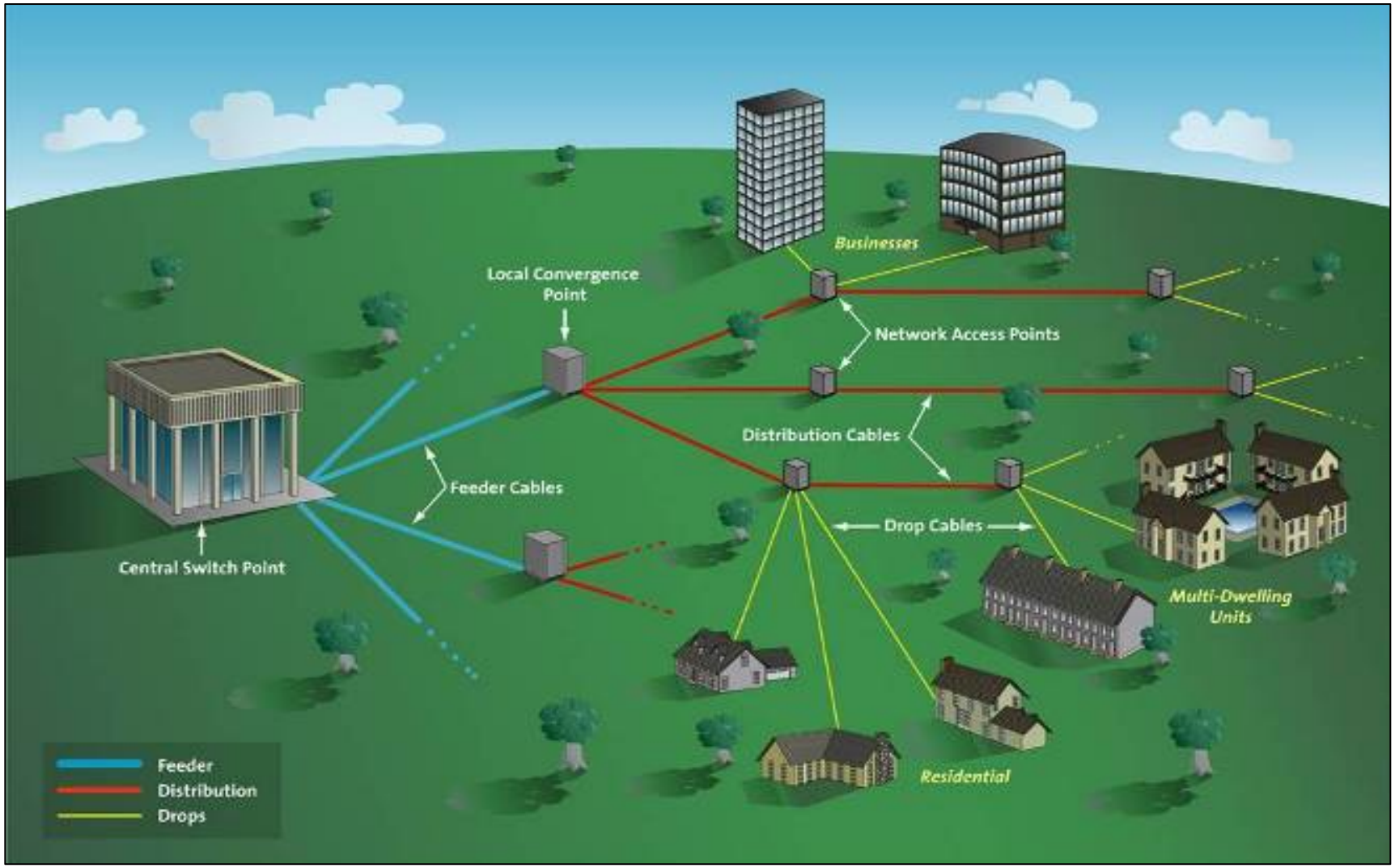
Corning
A Commitment to Innovation

- Corning solves tough problems for our customers
  - Focused innovation efforts on relieving network deployment and operation costs
  - Became the market leader in development of new fiber-to-the-X (FTTX) technologies with (passive) keystone components that enable scalable and cost effective system deployments



Corning is focused on reducing costs and time associated with installation

Fiber-to-the-home (FTTH) Network Segments



Proven Track Record of Innovation in Outside Plant Networks
Keystone components enabled cost reduction and scalability

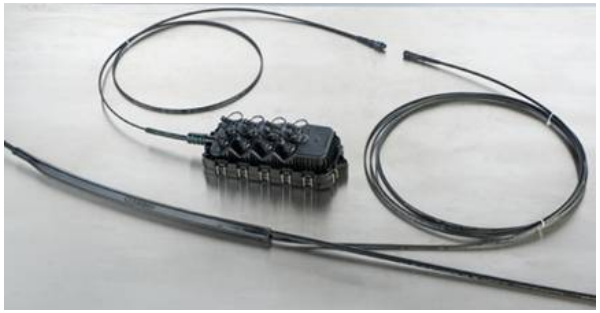
OptiTap® Connector

OptiSheath® MultiPort Terminals

OptiTap® Drop Assemblies

Up to 50% Speed and Cost Reduction in Connecting Homes in FTTH networks

OptiTip™ Connector



FlexNAP™ Terminal Distribution System

Up to 40% Speed and Cost Reduction in Passing Homes in FTTH networks

Proven Track Record of Innovation in Inside Plant Networks
Keystone components enabled cost reduction and scalability

ClearCurve™
Bend-Insensitive Fiber

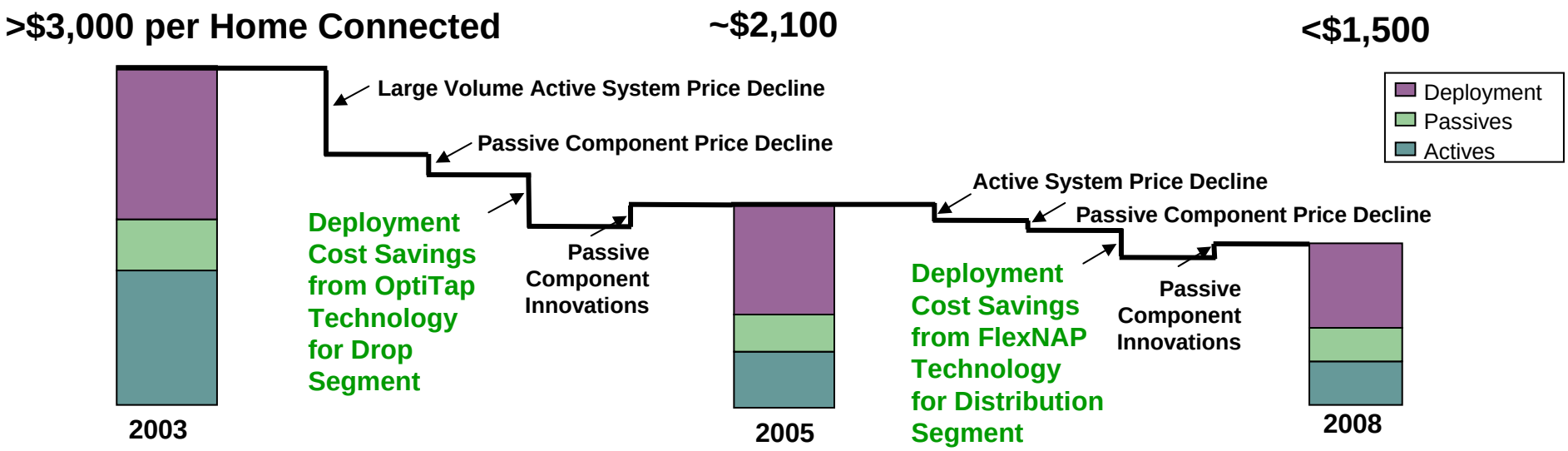
ClearCurve™
Indoor FDT

OptiTect™
Outdoor MDU Terminal

ClearCurve™
MDU Drop Cables and Assemblies

Up to 25% Cost Reduction inside MDU buildings for FTTH networks

Corning's outside plant solutions contributed significantly to FTTH deployment cost reduction for Single Family Units



Field-spliced

Skilled splice technician required to install each fiber drop

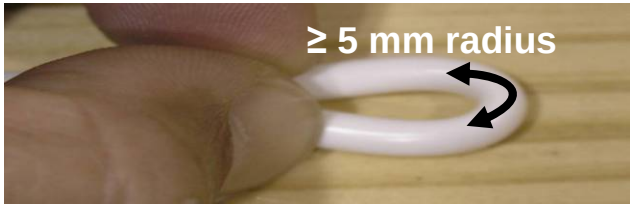
OptiTap

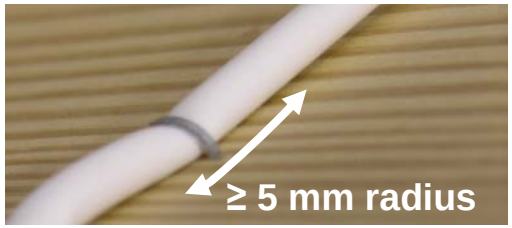
I&R technician can quickly install each fiber drop

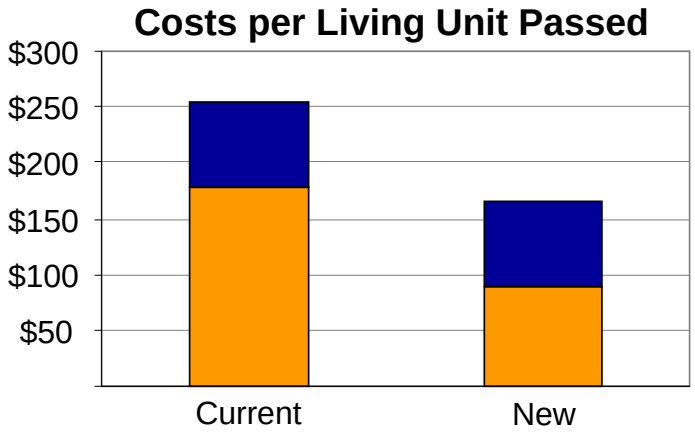
FlexNAP

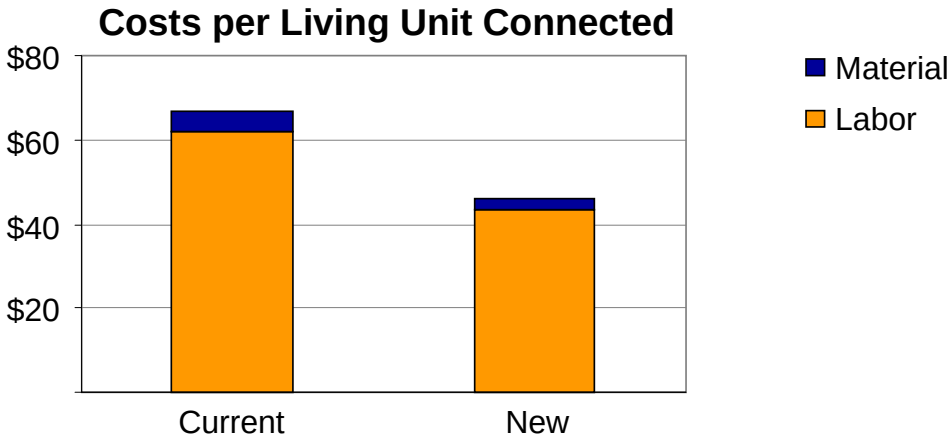
I&R technician can quickly install each fiber drop AND <u>now even the fiber terminal</u>

Corning's ClearCurve solution contributed significantly to MDU deployment cost reduction





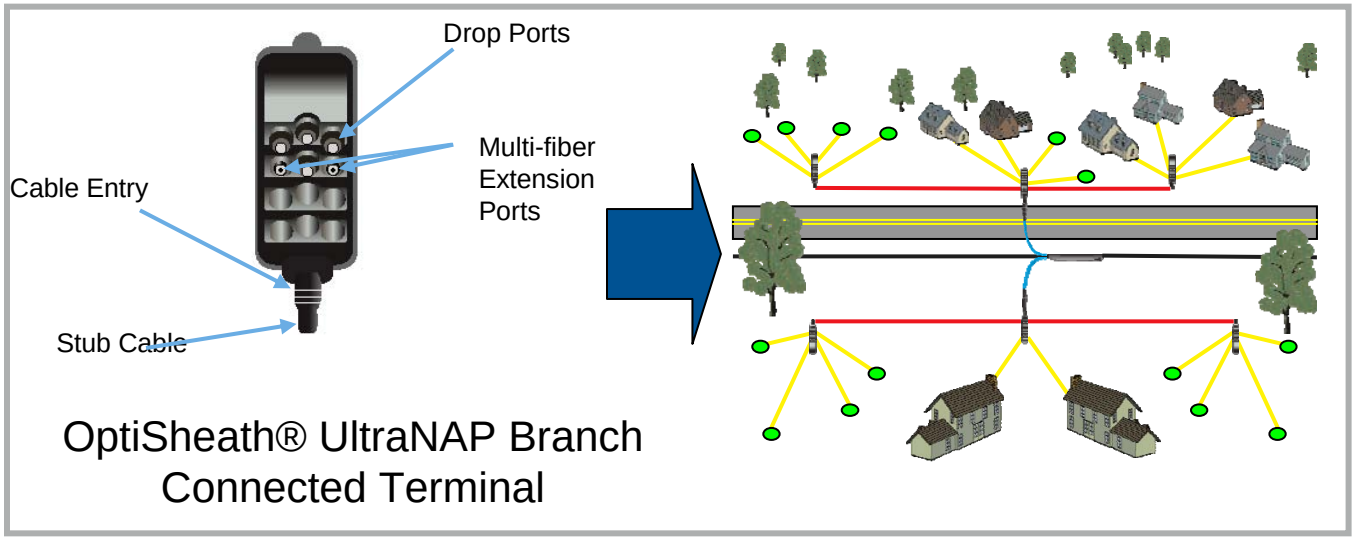




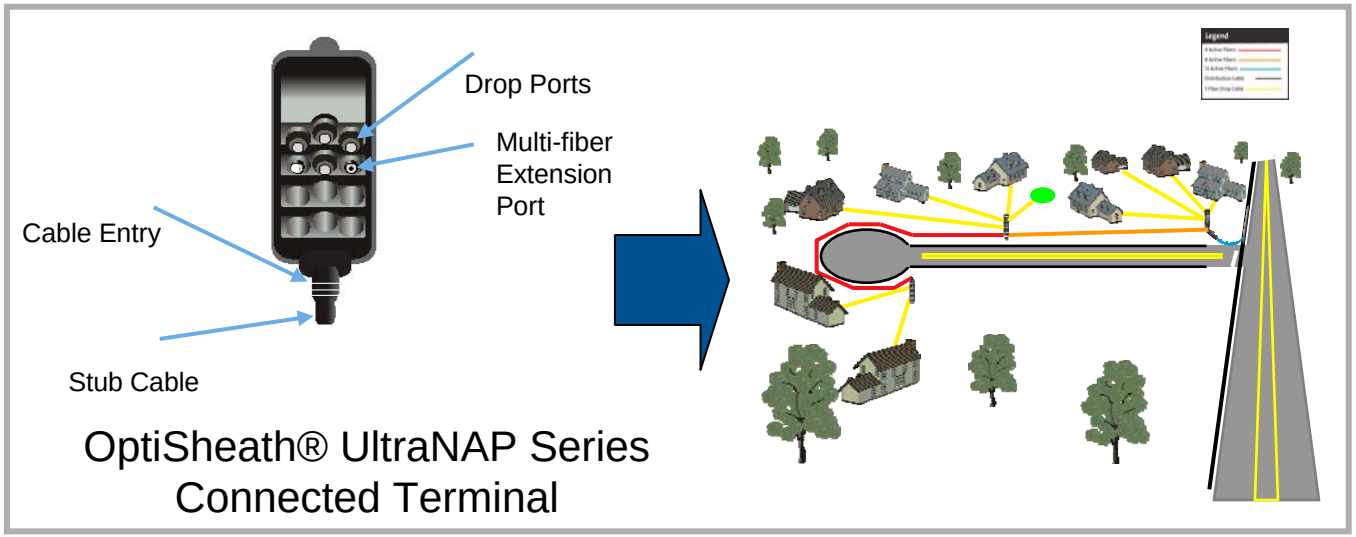
- Reduce/eliminate microducts and raceways (materials & installation)
- Easier installation process (e.g. stapling)
- Reduce time troubleshooting / returns to rework drops

~$110 Net Savings per Living Unit Connected

Corning continues to reduce deployment cost – Enabling new FTTH topologies for less dense areas



OptiSheath® UltraNAP Branch Connected Terminal



OptiSheath® UltraNAP Series Connected Terminal

Up to 40% material cost deferment expected in addition to reduction in actual route miles

CORNING

Boston • London • Kansas City • Shanghai • Washington DC

CSMG
A TMNG Global Company

FTTH Deployment Assessment

Prepared for: CORNING

October 13, 2009

"We Make Strategy Work"

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Corning has engaged CSMG to analyze and provide comment on the investment required to deploy fiber-to-the-home (FTTH) networks in the US

Background and Objectives

- As a strategy consulting firm specialized in telecommunications and technology, CSMG has considerable knowledge and experience working with communication service providers across varied wireline and wireless network technologies and economic models
  - We have specific expertise building and evaluating models for FTTH economics and deployment
- Today we plan to present the results of our assessment of the following topics:
  - FTTH network architecture and drivers for investment required
  - Distribution of US households by density
  - CSMG's investment estimate for deploying FTTH to US households
  - Comparison to the FCC's recent investment estimates for providing universal availability of FTTH
- Please note: CSMG acknowledges the fundamental limitations of our analysis and commentary
  - Full detail on the FCC's methodology for estimating FTTH deployment investment is not available. Our analysis of FCC estimates is therefore limited
  - The investment required to deploy FTTH in the least dense 20% of areas is difficult to estimate due to the lack of existing deployments and published data. We have therefore focused on the remaining 80% of HHs in our analysis and recommendations

Summary Findings

- CSMG suggests the following approach for estimating the investment required for widespread FTTH deployment in the US:
  - Considering households as the basis for connection, rather than housing units (which include secondary homes)
  - Accounting for existing FTTH builds and planned deployments through 2015
  - Assuming reasonable levels of service uptake for FTTH (42% of homes passed) in determining cost to connect to each home
  - Focusing on the 80% most dense US households for planned FTTH deployment
  - Reflecting cost and efficiency improvements achieved by FTTH vendors and service providers over the past 5 years

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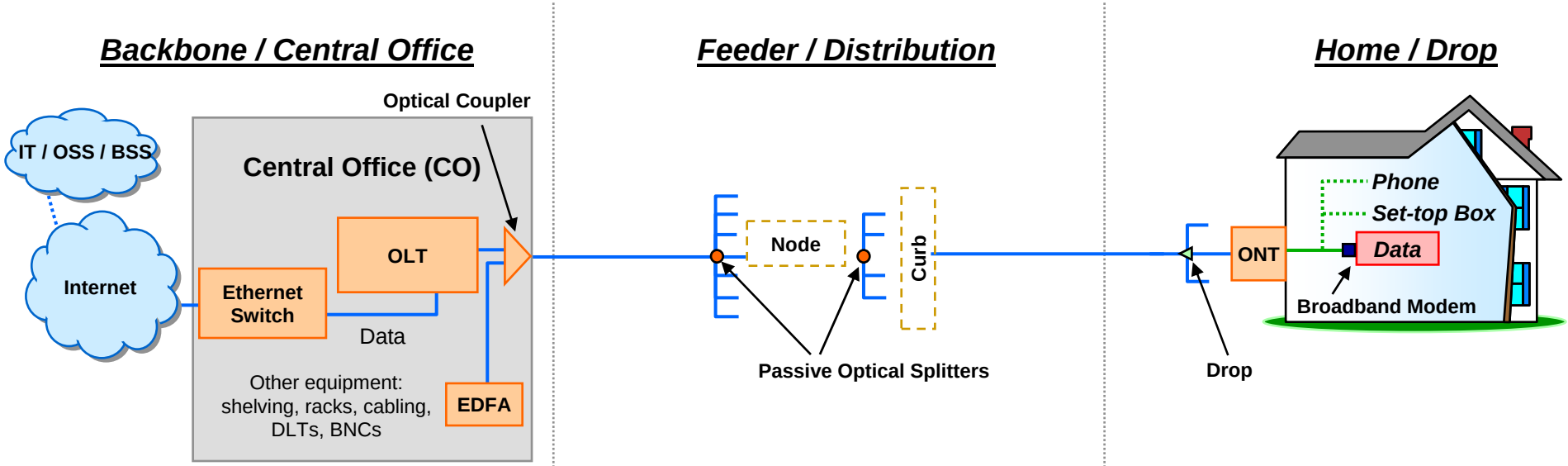
FTTH architectures are based on several components whose investment requirements vary based on the interplay of multiple factors



	Backbone / Central Office	Feeder / Distribution	Home / Drop
COST COMPONENT	• OLT • Backbone (allocation) • CO Labor (installation) • Other CO Equipment (passive and active components)	• Feeder and Distribution Fiber Costs • Feeder and Distribution Fiber Labor Costs • Passive Optical Components	• Drop Fiber Cost • Drop Fiber Installation Cost • ONT • Broadband Modem Cost
COSTS VARY BY	• Homes per CO • Subscribers per CO • Labor and equipment cost/efficiency improvement over time	• Length of feeder and distribution fibers • Extent of buried vs. aerial plant • Labor and equipment cost/efficiency improvement over time	• Length of drop (housing lot size) • Installation efficiencies • Labor and equipment cost reductions

Factors that increase the FTTH investment required include: lower household density, greater linear distance between households, fewer homes per CO, higher service uptake, more buried plant

Source: CSMG analysis

Note: The pictured architecture is not specific to any single vendor, but instead is representative of the topology for a typical FTTH build in the US

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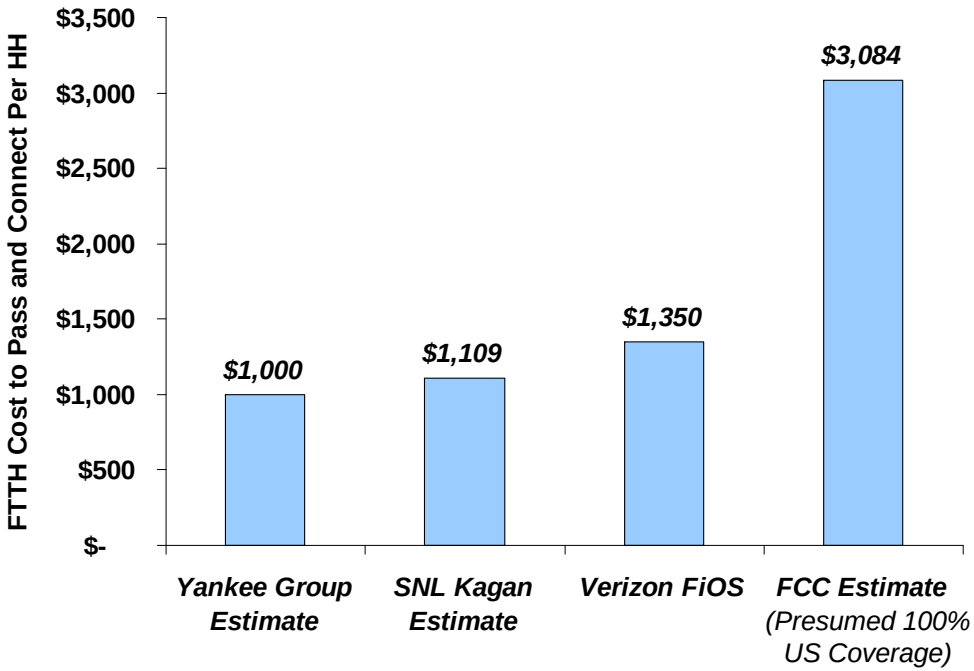
FTTH investment requirement estimates based on large-scale deployments and US averages place the cost to pass at ~$700 per HH and cost to connect at an incremental ~$650 per subscriber HH

2009 Benchmarks - FTTH Cost to Pass or Connect – Urban and Suburban Builds

Carrier / Analyst Estimate	Cost to Pass per HH	Incremental Cost to Connect Per HH
Verizon FiOS	$ 700	$ 650
Jaguar Communications (Minnesota)[1]	$ 474	$ 586
Hiawatha Broadband (Minnesota)[2]	$ 800	$ 750
Analyst Estimate - SNL Kagan	$ 697	$ 412
VARIATION IN COST	**$474 - $800**	**$412 - $750**

1. Jaguar Communications market - Blooming Prairie City MN (their sole urban market)
2. Hiawatha Broadband markets – Winona, Wabasha, St.Charles, Stockton, Lewiston, Rollingstone (all in MN)

2009 Benchmarks - FTTH Cost to Pass and Connect – National Large Scale FTTH Deployments and Estimates



- These figures are representative of realized investment requirements for deployment in relatively dense territories, reflecting the focus of FTTH builds to date in the US
- Verizon's original FiOS deployment was planned for 54% of VZ territory (prior to recent rural line divestitures); Verizon territory pre-divestiture compares roughly to the US as a whole in terms of population densities
- Deployment to more sparsely populated areas will likely surpass these levels of investment, though there are pockets of density and unit deployment costs are often much lower in rural areas
- Note that estimates of the cost to pass AND connect involve assumptions about service uptake rates, which may account for variation in these figures

Source: FCC Filings, SNL Kagan, Yankee Group, CSMG Analysis 1. FCC estimate per HH based on total cost of $350B for universal availability to 113.5M housing units (mean of 111-116M)

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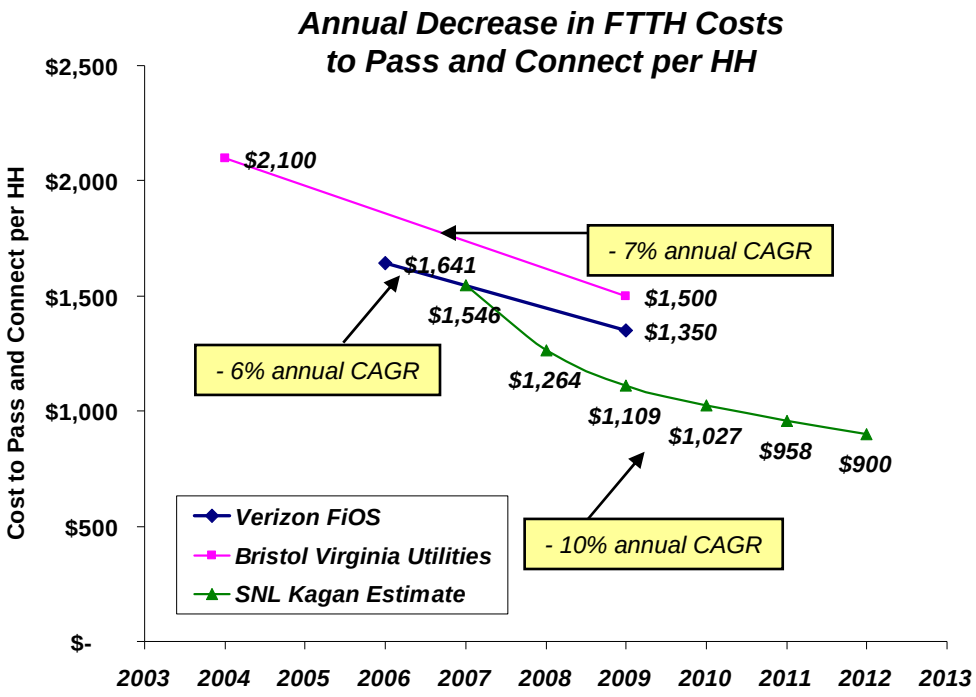
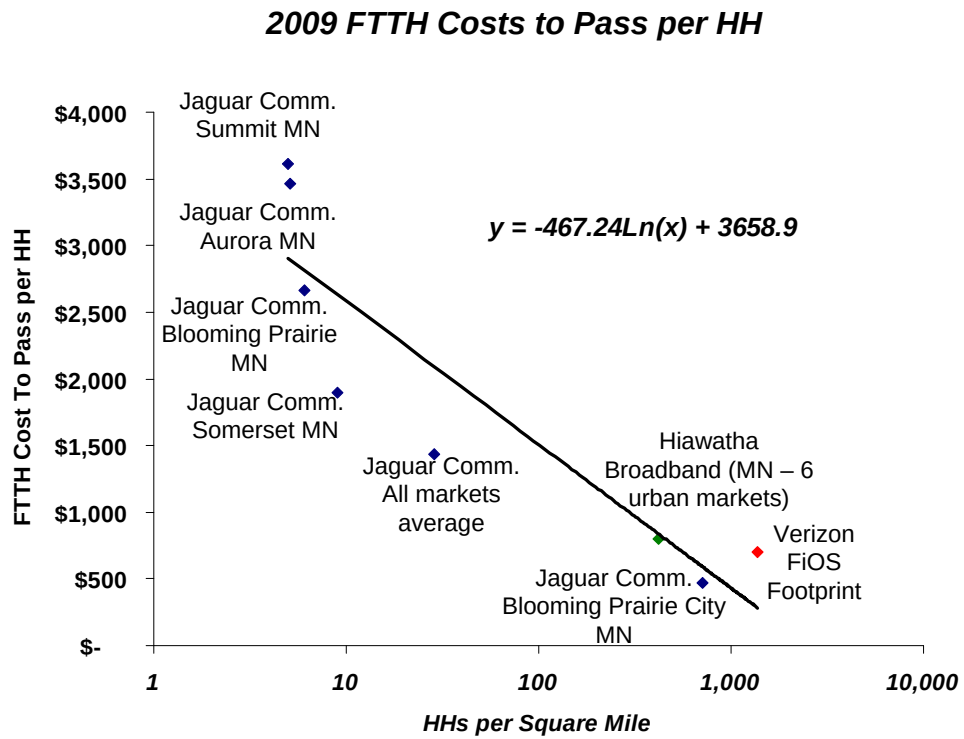
Investment requirements for FTTH have decreased substantially over the past few years and vary considerably depending on the topography being served





- These reductions in investment required over time are driven by three major factors:
  - Field efficiency improvements by service providers through improved procedures, training and use of innovative labor-saving methods
  - Materials cost reductions through increasing purchase volumes and manufacturing efficiency
  - Fixed cost allocation across a larger number of passed households and subscribers
- It is noteworthy that multiple service providers (not just Verizon) have achieved cost declines – we expect future deployments by other service providers to reap many of these benefits

- We observe a 5X difference in FTTH costs per HH passed over the range of HH densities with publicly reported data
- This range of densities represents a wide spectrum of HH densities from rural (5 HHs per sq. mile) to urban (1,375 HHs per sq. mile)

Source: FCC Filings, SNL Kagan, CSMG Analysis

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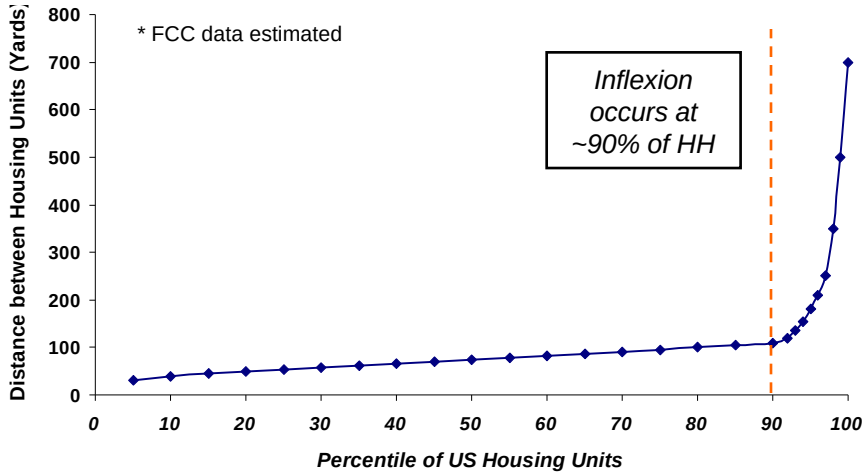
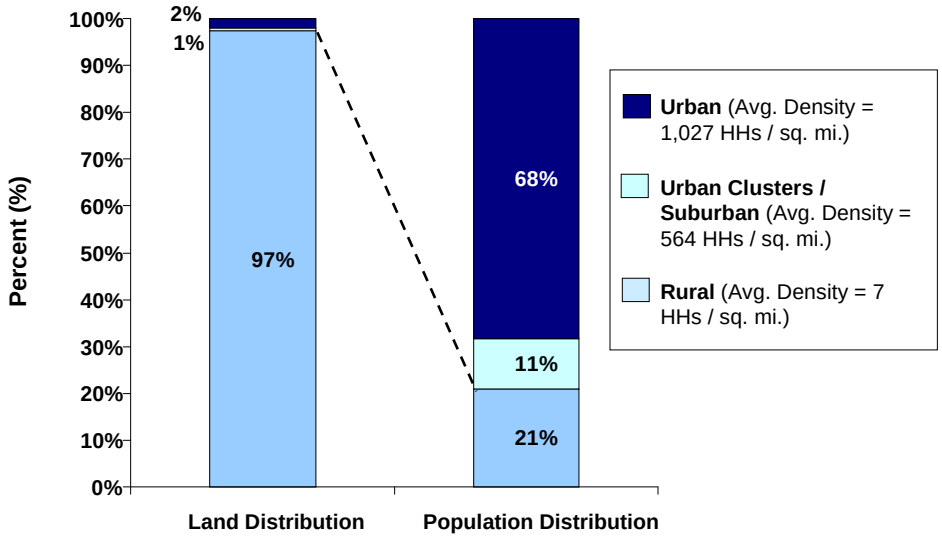
The vast majority of US households exhibit similar density characteristics, with only ~10% likely to drive significantly higher network deployment investments

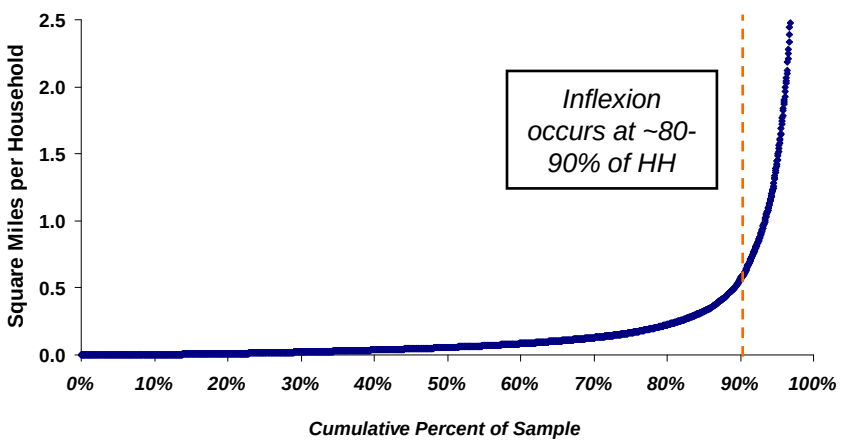
FCC – Distance Between US Housing Units



US Population & Land Distribution, 2000



CSMG – US Wirecenter Coverage Area (Sq. Mi.) per HH



- Rural areas in the US contain 21% of the population, but cover 97% of the land. The urban population (79% of total) inhabits <3% of total land area
- A substantial proportion of FTTH build investment requirements are driven by household density and distance from CO
- CSMG and FCC data shows that US HHs are relatively evenly distributed, with only the most rural ~10% becoming significantly more sparse
  - Suggests the vast majority of HHs can be built out at reasonable cost

Source: US Census Bureau, FCC, CSMG Analysis

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FTTH deployment investment requirements for rural areas are difficult to estimate due to variations in household distributions (clustering) within even the most sparsely populated areas

Example Rural Localities & Household Density

Example Locality	Burwell, NE	Lancaster, NH	Jamestown, TN
County Name	Garfield County, Nebraska	Coos County, New Hampshire	Fentress County, Tennessee
County HH Density	1.4 HHs per sq. mi.	7.8 HHs per sq. mi.	13.4 HHs per sq. mi.

- Broad classifications of locality type (rural vs. urban) and density metrics may be poor indicators of the investment required to deploy FTTH to a community, as population and households can exhibit differing levels of clustering
  - The highest-cost 20% of households to serve will largely but not uniformly be in rural areas

Source: Google Earth, US Census Bureau, CSMG Analysis

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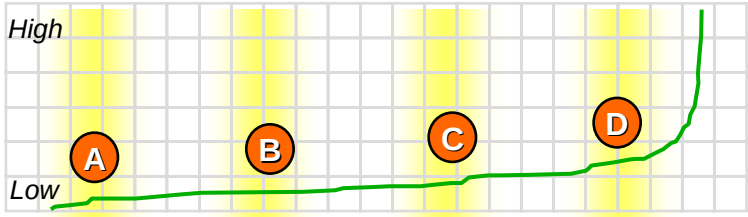
Estimated investment required for widespread FTTH deployment

- The basis for universal broadband service should be US households – not housing units
- There are currently 18 million US households with FTTH availability, plus an additional 16.5 million forecasted by 2015 funded by private capital. All 34.5 million should be considered in estimates for universal availability requirements
- Based on current FTTH build investment requirements (FiOS and rural providers), CSMG estimates that the average cost to pass and connect all but the 20% most expensive remaining non-FTTH households in 2015 is ~ $1,704 per HH
- The incremental cost to connect will only be incurred for a subset of homes passed, reflecting FTTH service uptake levels. FTTH penetration short of 100% is recommended -- CSMG estimates 41.5% based on current benchmarks and forecasts
- The cost to pass and connect the most rural areas could be significantly higher than the cost of FTTH deployment in non-rural areas
- Though future efficiencies in deployment practices and technology are expected to decrease the cost to connect each FTTH HH, these have not been factored into the estimation for investment required

FTTH Network Deployment Costs per HH



	Like FiOS to Date	More Costly	Significantly More Costly	Not Evaluated
# 2015 HHs not already Covered by FTTH (M)	34.3	19.1	14.0	25.4
Average HHs Per Sq. Mile	879.5	174.9	71.9	NA
Percentiles Covered	28-54%	55-69%	70-80%	81-100%
Modeled Cost to Pass per HH	$700[1]	$1,246[2]	$1,661[2]	NA
Incremental Cost to Connect per Sub[3]	$650	$650	$650	NA
Assumed Penetration[4]	41.5%	41.5%	41.5%	NA
Cost to Pass ($B)	$24.0B	$23.7B	$23.2B	NA
Cost to Connect ($B)	$9.3B	$5.1B	$3.8B	NA
Total Investment Requirement ($B)	$33.3B	$28.9B	$27.0B	NA

Total Investment

$89.2B

NOTES:

1. Current 2009 FiOS Cost to pass per HH
2. Current urban and rural FTTH costs to pass per HH benchmarks
3. 2009 urban and rural FTTH provider cost to connect per HH benchmarks
4. Analyst estimate of expected 2015 FTTH uptake rates

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Comparable national programs are largely focused on deploying next generation broadband networks to 75%-90% of HHs

International Broadband Initiatives

Country	Date	Network Type	Speeds	Coverage
Australia	2009-2017	Fiber Backbone and Last Mile	100 Mbps download	90% homes and businesses
France	2009-2012	Fiber Backbone and Last Mile	NA	~33% homes and businesses
Germany	2009-2014	Universal Broadband Coverage	50 Mbps download	75% homes and businesses
Korea	2009-2012	Fiber Last Mile	1 Gbps download	100% homes and businesses
Malaysia	2007-2017	Fiber Backbone and Last Mile	10 Mbps+ download	38% homes and businesses
New Zealand	2009-2019	Fiber Backbone and Last Mile	100 Mbps download	75% homes and businesses
Singapore	2009-2015	Fiber Backbone and Last Mile	1 Gbps download	100% homes and businesses
UK	2009-2017	Next Generation FTTC	24-100 Mbps	75% homes and businesses

Most comparable programs target less than full deployment

Most comparable programs focus on enabling next-generation networks

Sources : SNL Kagan, AFP, NY Times, Australian and New Zealand Gov't websites, BSG, FTTH Council, Metro UK, Telekom Malaysia, Infocomm Development Authority of Singapore, Telecompaper, Screendigest, CSMG Analysis

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