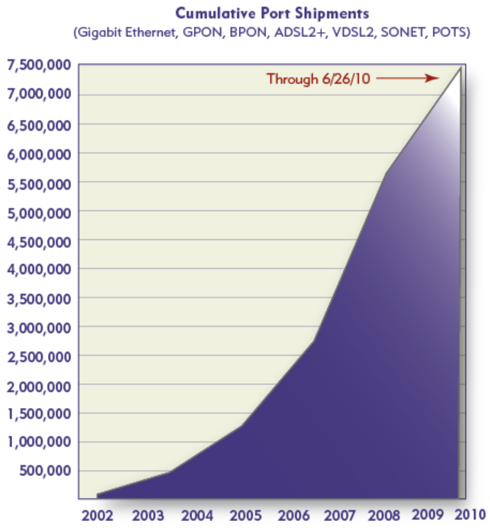
Why Are You Not Getting Fiber?

Calix Background

Focus on *ACCESS INNOVATION*

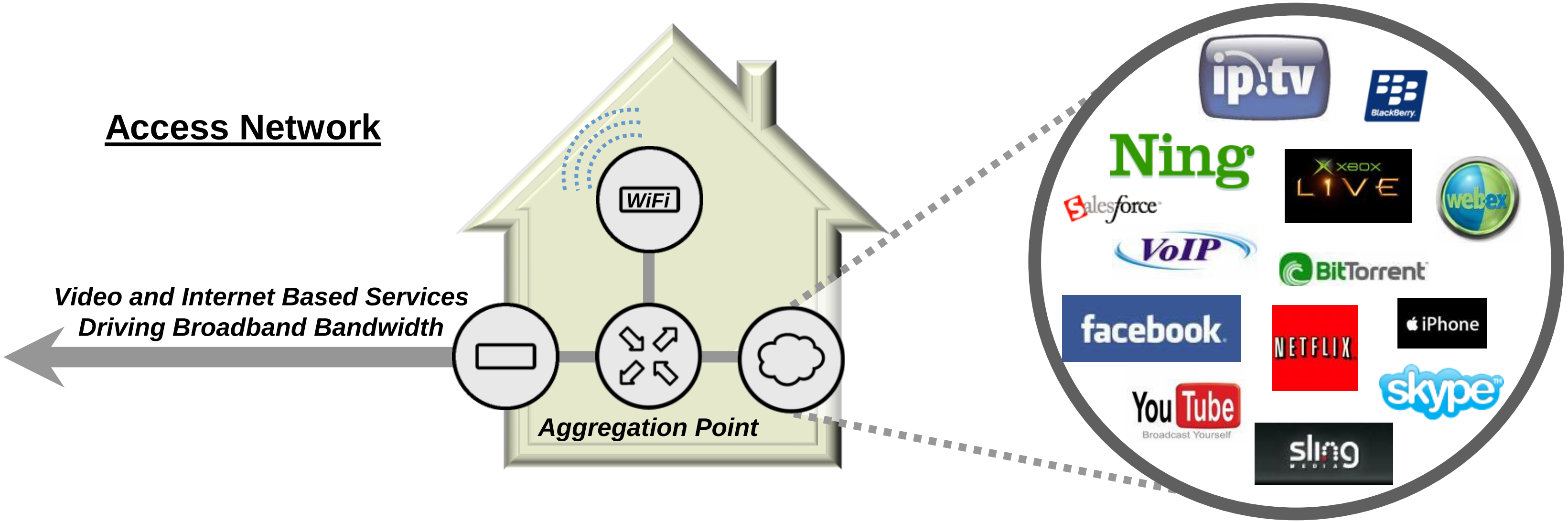
- Headquarters in Petaluma, CA
  - *Development facilities in Minneapolis and Boston*
  - *Traded on the NYSE (CALX)*
  - *Investing **$45 million annually** in R&D*
  - *FTTH and DSL product portfolio*
- **500+** North American customers
  - *Customers: ILECs, CLECs, IOCs, MUNIs, MSOs, PTTs*
  - *North American focus: U.S., Canada & Caribbean*
  - *Both **GPON and Symmetrical GE** FTTH*
  - *Focus on rural and smaller size communities*
  - *Over **40%** of US rural IOCs deploy Calix*
- ***Muni*** deployments accelerating
  - *Muni deployments in **18 cities in 12 states***
  - ***5 new projects** so far in 2010*



The Bandwidth Challenge

Proliferation of consumer devices, HDTV and internet based services will continue to drive consumer bandwidth demand

- Home networks operating at less than100 Mbps today will migrate to Gigabit Ethernet (GE)
- Average access bandwidths will grow to 100 Mbps and beyond
- The National Broadband Plan goal: 100 million homes with 100 Mbps
  - *100 million homes is 76% of all US housing units*

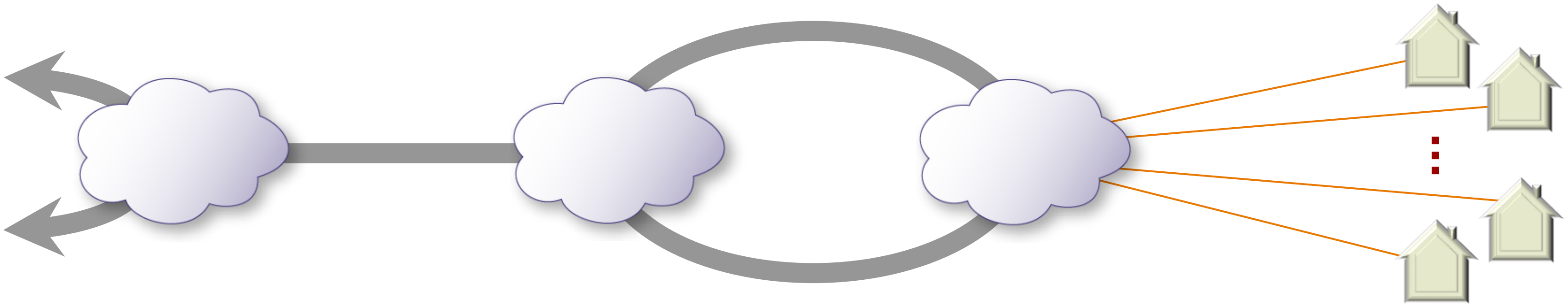


Fiber Offers The Best Solution

Fiber is the only solution deployable today that will meet consumer demand ten years from now

- Fiber is the only technology capable of supporting100 Mbps to GE bandwidths, free of distance limitations
- Fiber can support asymmetrical needs of today with increasing symmetrical needs of the future
- Fiber standards-both PON and Active Ethernet-address the needs of consumer demand today and in the future

<u>Access Network</u>

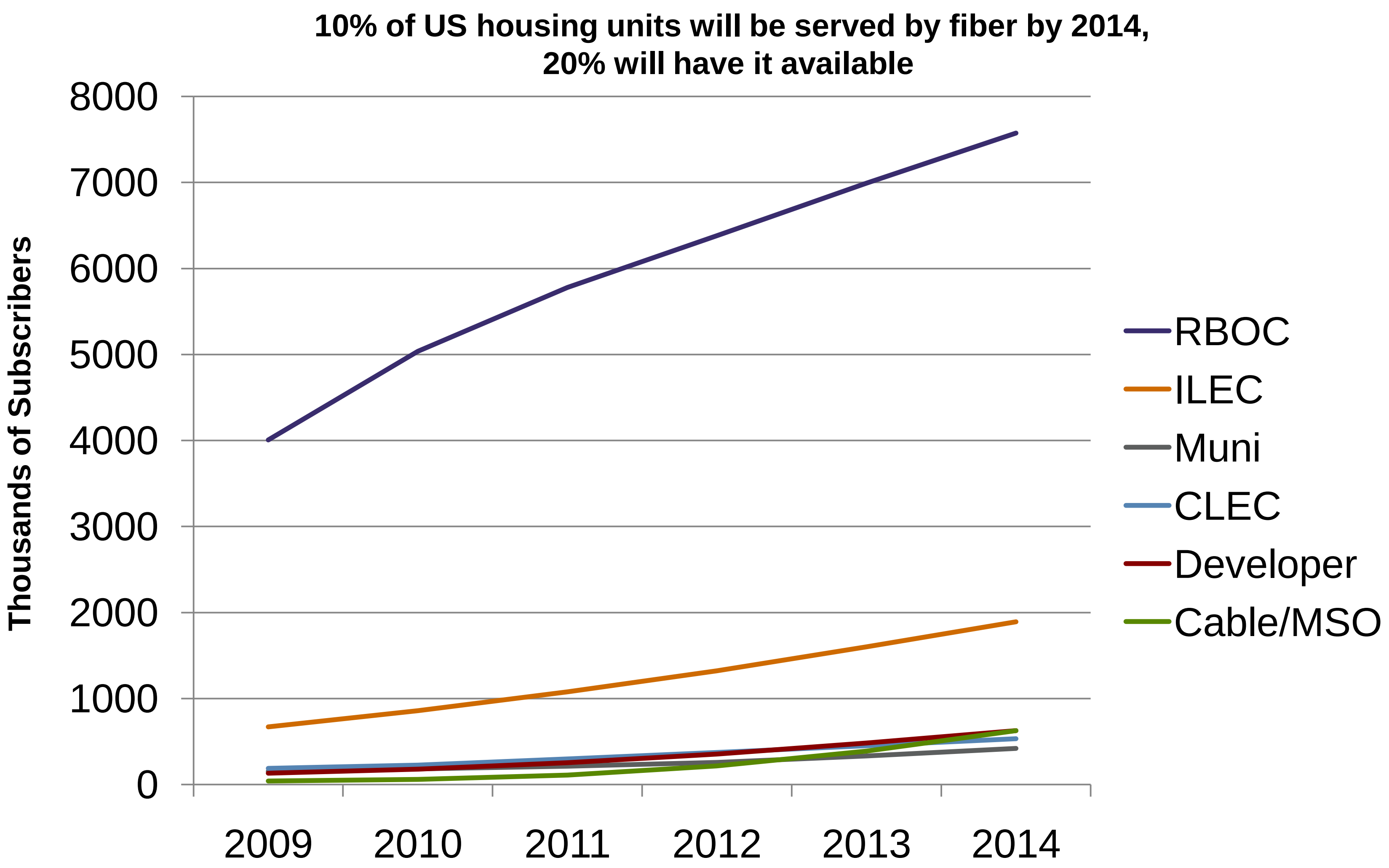


U.S. FTTH Subscribers

	Number of Entities	Number of Connections 9/2010
RBOC (Verizon)	3	5036K
ILECs	475	859K
CLEC	??	225K
Municipality	88	182K
Developer	??	179K
MSO/Cable Operator	<30	60K

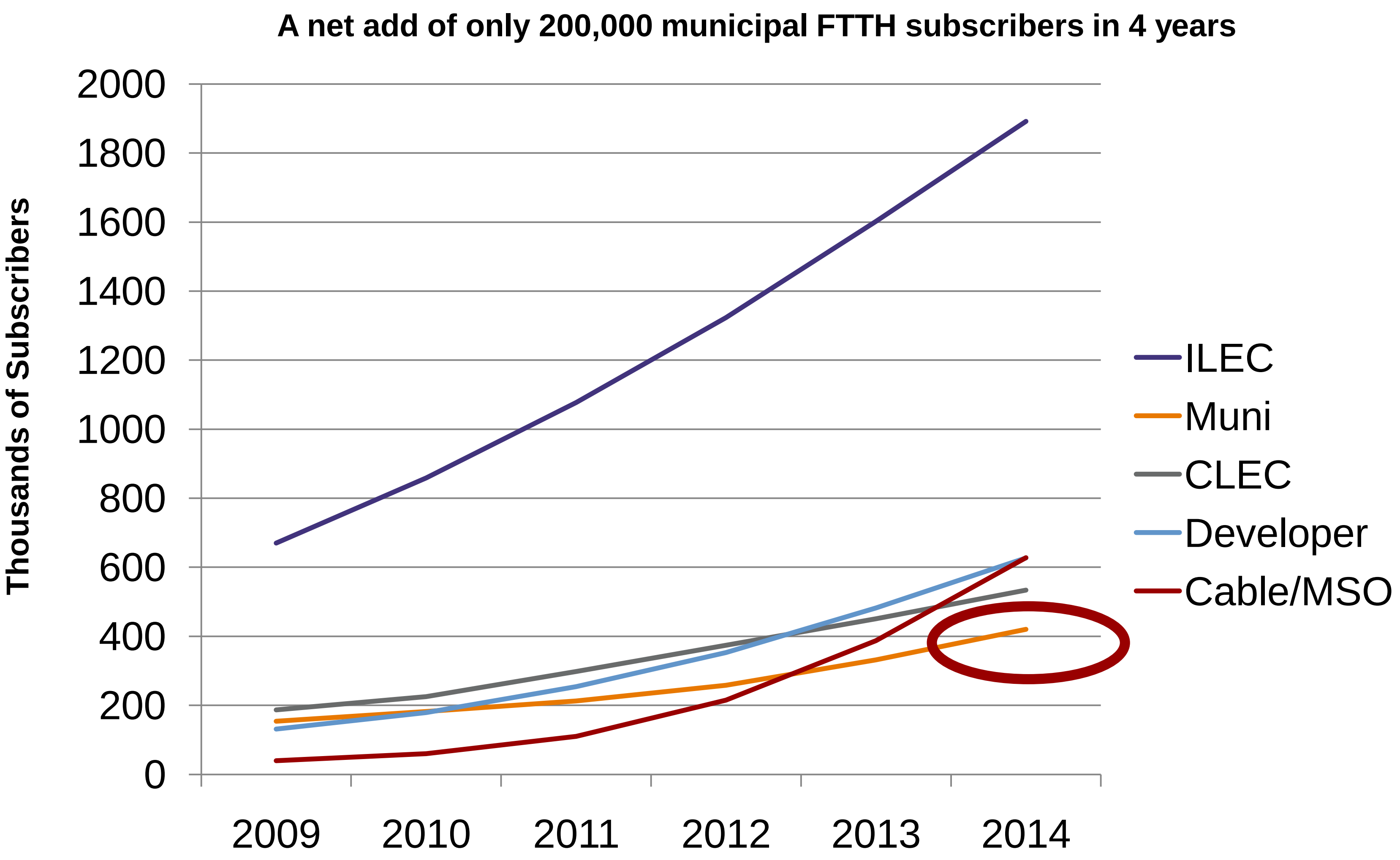
Source: RVA 2010 Forecast

U.S. FTTH Cumulative Forecast



Source: RVA 2010 Forecast

Non-RBOC U.S. FTTH Cumulative Forecast



Source: RVA 2010 Forecast

Municipal FTTH Market Status

Out of 34,000 municipalities in the U.S

- 88 cities offer communications services over FTTH
- Over 350 offer some form of telecom service
- 2,000 own their electric utility
  - *Municipal electrics account for most of the FTTH Muni projects*
  - *Municipal utilities serve 9 million housing units in states that do not prohibit or discourage Muni's from offering broadband services*

Why has the market been slow to develop?

- State restrictions, legal and political opposition
- Many cities have waited-hoping incumbents will build out
- Difficulty making the business case
- Lack of operational expertise; knowledge base

States with Muni Restrictions

Percent of residents served by publicly owned power

Very restrictive

Nebraska	98%
Washington*	**50%**
Utah*	**20%**
Texas	16%
S. Carolina	13%
Missouri	13%
Arkansas	11%
Pennsylvania	1%

Some restrictions

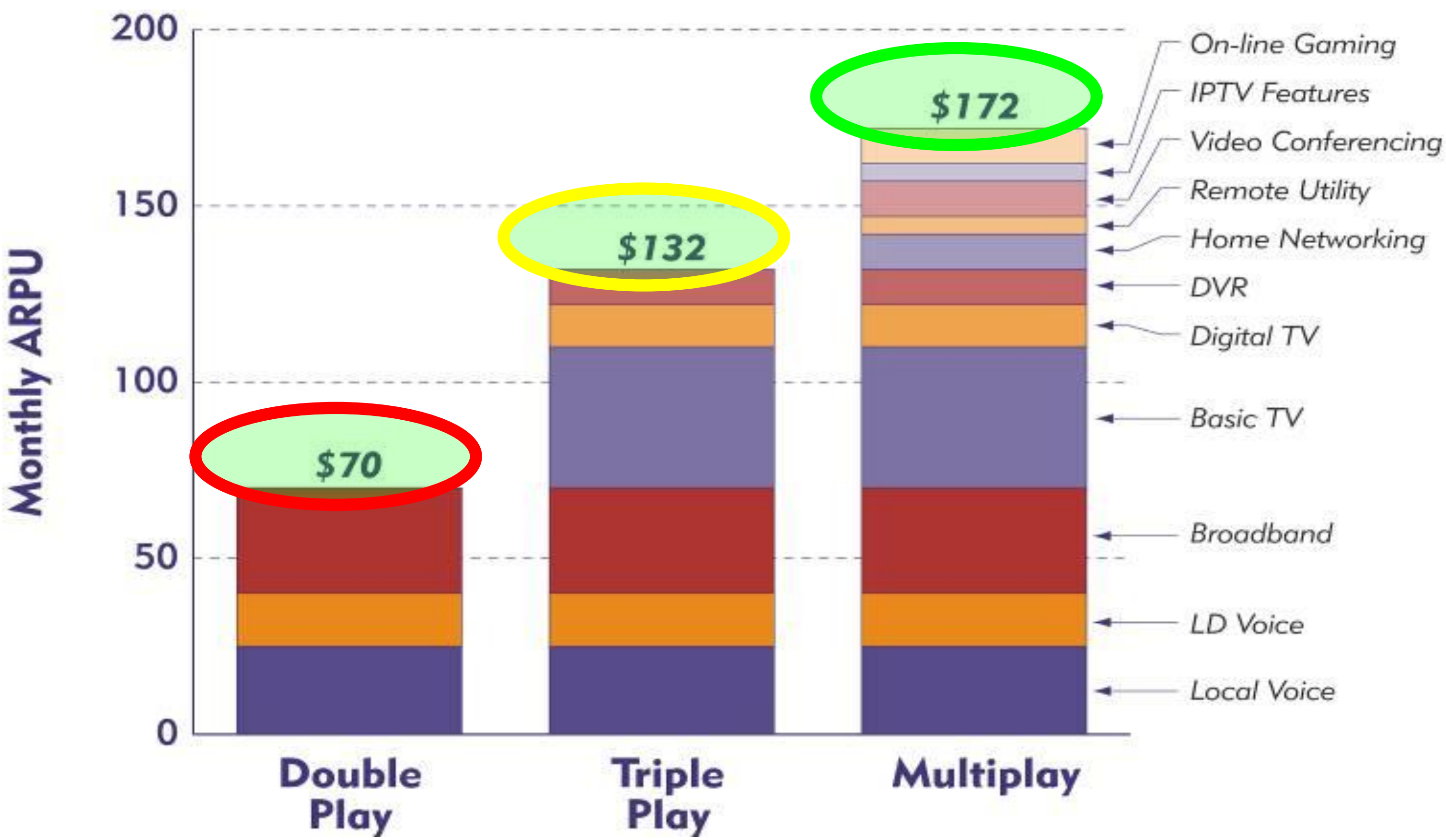
Tennessee*	**69%**
Minnesota*	**14%**
Florida	13%
Wisconsin*	**9%**
Virginia	5%
Nevada	2%

***States in bold have multiple FTTH muni deployments**

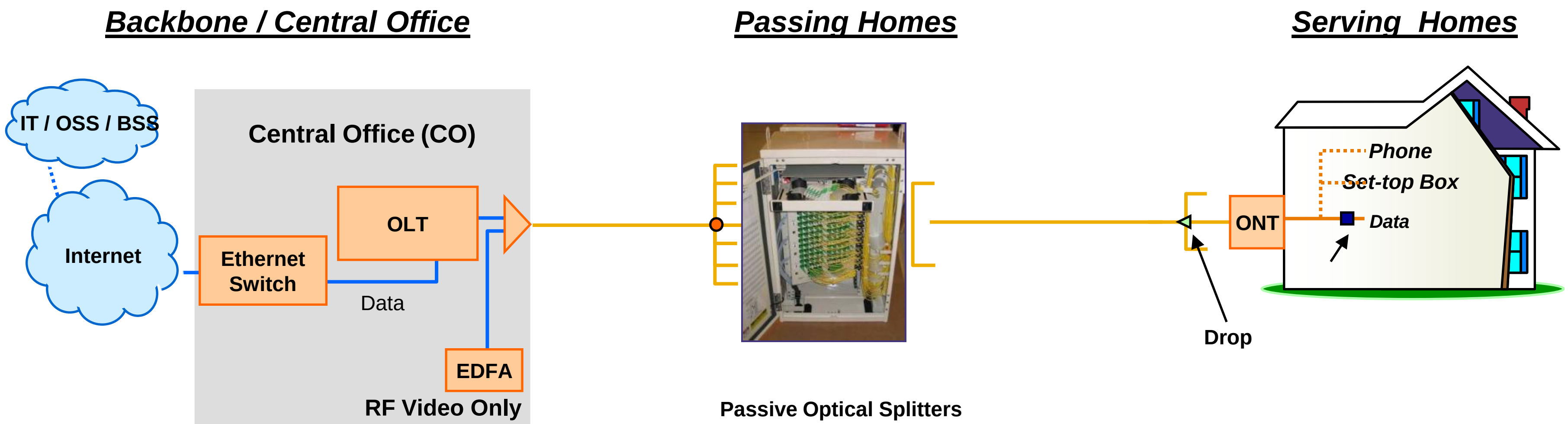
14 states have placed some form of restrictions on municipalities offering communication services; in some states this has brought deployments to a halt, in other states it has merely presented obstacles

Incremental Revenue Potential

Incumbents may have difficulty justifying FTTH based on incremental revenue



FTTH Costs: Passing & Serving Homes



Service Provider	Cost to Pass Per HU	Incremental Cost per HU	HU Density
Verizon	$700	$650	>100's /sq. mile
Jaguar (Rural Minnesota)	$1438	$693	28.53 /sq. mile
Finley Engineering Case Studies (w/Hiawatha BB)	$1871	$750	14.33 /route mile

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

Sources: CSMG, Hiawatha Broadband, Jaguar, Finley Engineering

Verizon's Cost Per Home Served

Actual cost per home served at a 30% take rate for 1000 homes is $2,983
Verizon's average revenue per year/per FiOS sub is over $1500 per year

	30% Take Rate	50% Take Rate	100% Take Rate
Cost per Home Passed	$700	$700	$700
Incremental Cost per Home Served	$650	$650	$650
Actual Cost per Home Served	$2983	$2050	$1350

Rural FTTH Cost Per Home Passed

Costs based on average of nine FTTH projects in the midwest. Verizon's costs per home are less, but take rates are less. Higher costs in rural areas are partly offset by rural operators' higher penetration rates

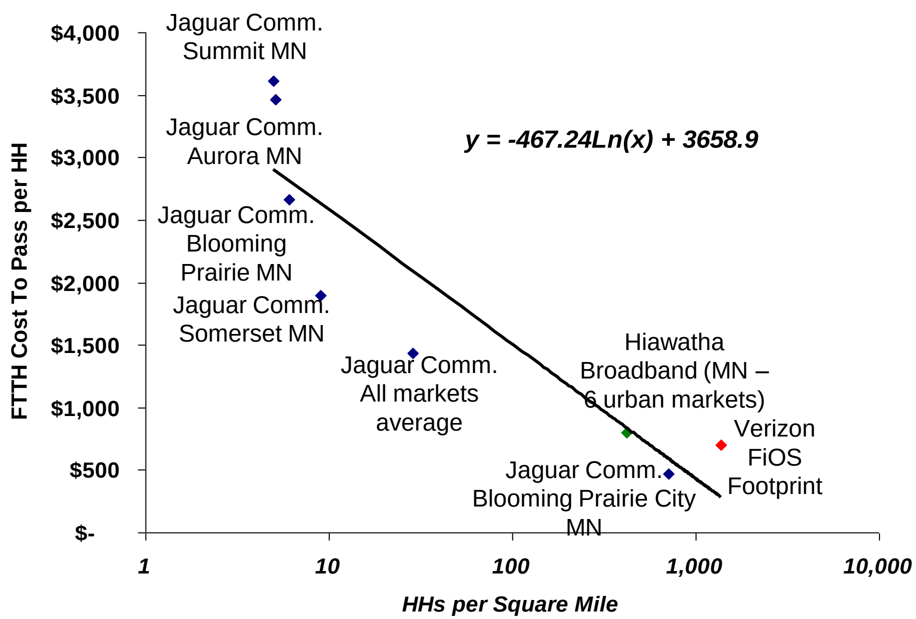
	30% Take Rate	50% Take Rate	100% Take Rate
Cost per Home Passed	$1655	$1655	$1655
Incremental Cost per Home Served	$722	$722	$722
Actual Cost per Home Served	$6238	$4032	$2377

Cost to Deploy Fiber

Within rural towns Hiawatha Broadband and Jaguar achieve costs close to those of Verizon because densities in towns are equivalent to Verizon's

By serving towns and the surrounding rural areas, Hiawatha and Jaguar are able to make their business case work

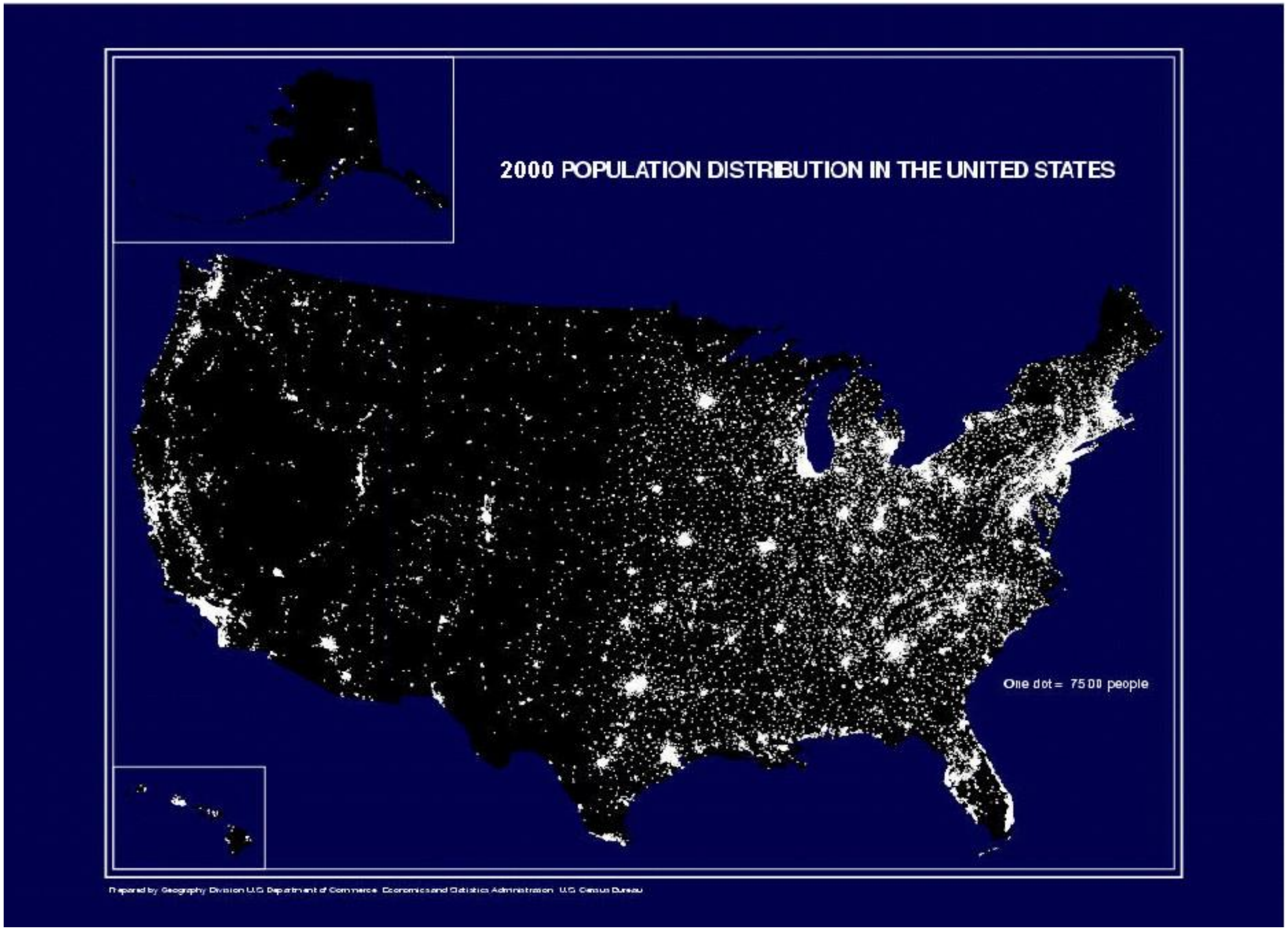
2009 FTTH Costs to Pass per HH



- 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

U.S. Population is Clustered



Source: US Census Bureau

Housing is Concentrated

Example Rural Localities & Household Density

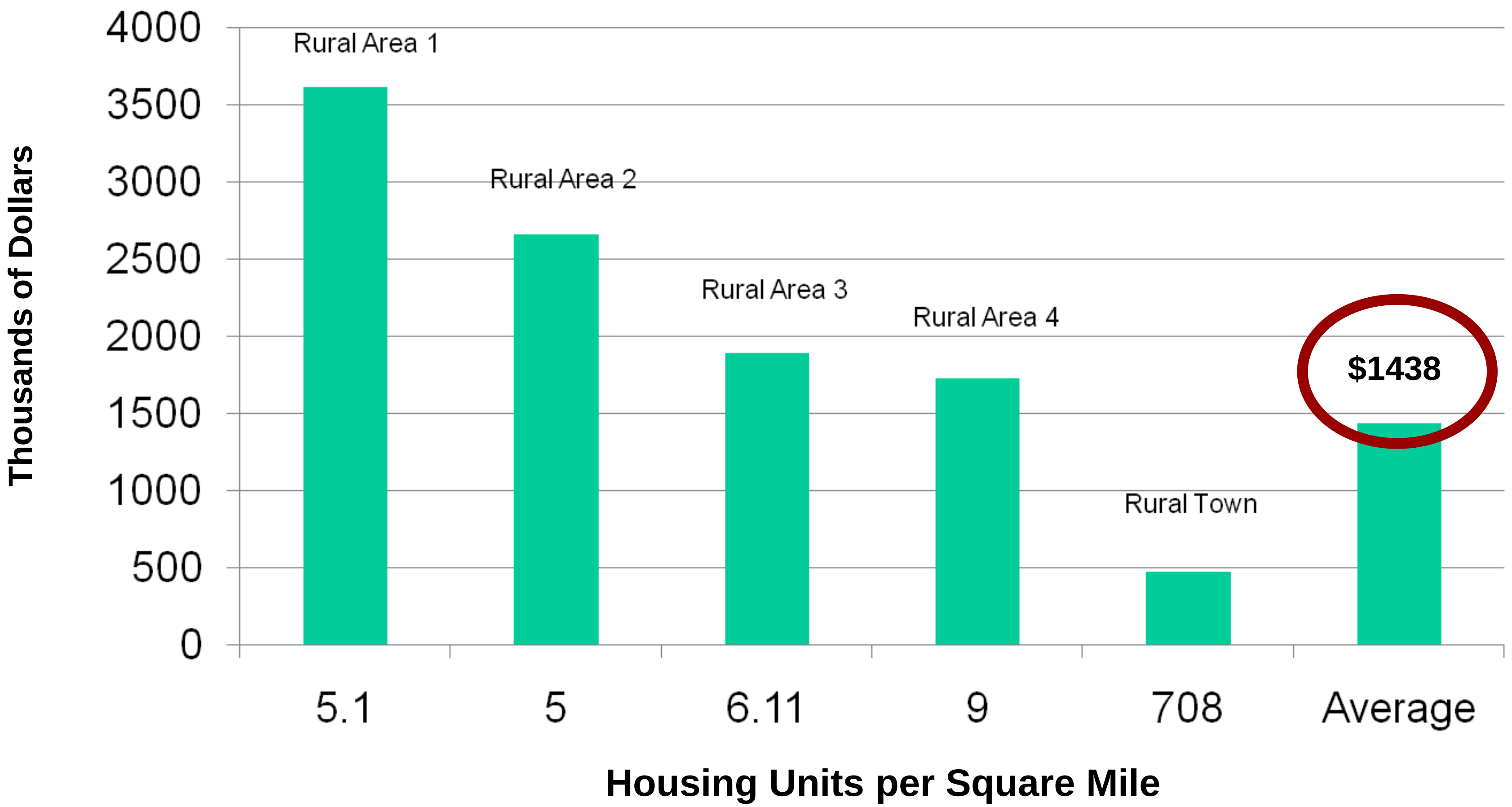
Example Locality	Burwell, NE	Lancaster, NH	Jamestown, TN
			
County Name	Garfield County, Nebraska	Coos County, New Hampshire	Fentress County, Tennessee
County HH Density	1.4 HHs per sq. mi.	7.8 HHs per sq. mi.	13.4 HHs per sq. mi.

- 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

Source: Google Earth, US Census Bureau, CSMG Analysis

Jaguar Cost Per Home Passed

Over half of the housing units are located in town, lowering the average cost to service the area by over $664 per home (28 HU per sq. mile=$2102)



Calix Municipal Fiber Projects

City/Town	Year Awarded	Comments
Kutztown, PA	2002	One of the first in the United States, now upgrading to GPON; Pennsylvania then passed prohibition law
Reedsburg, WI	2003	Highly successful triple play operator
Windom, MN	2004	Just won Round 1 stimulus for expansion to surrounding communities
Crosslake, MN	2005	
Burlington, VT	2006	Recent financial problems at city, despite generally successful deployment
Brookings, SD	2006	Municipal owned telephone company
Powell, WY	2007	Public-private partnership; city recently purchased
Spencer, IA	2007	Started as Muni owned cable operator
Lenox, IA	2008	Started as Muni owned cable operator
LaGrange, GA	2008	Business services only
Bristol, VA	2008	Just won Round 2 stimulus for expansion
Barnesville, MN	2008	Business services only

Calix Municipal Fiber Projects

City Name	Year Awarded	Comments
Monticello, MN	2009	Deployed after bitter legal battle
Barbourville, KY	2010	Started as Muni owned cable operator
Russelville, KY	2010	
Highland, IL	2010	
Harlan, IA	2010	Started as Muni owned cable operator
Concord, MA	2010	Smart Grid only deployment to start

Lessons Learned from FTTH

Don't do it alone
- Partner with a nearby operator
- Hire people that have been there and done it before

Multiple service bundles are key
- FTTH costs require per sub revenues over $120 per month
- Focus on penetration rate

Secrets to success
- Community involvement
- Promoting localness
- Serving businesses and community anchor institutions
- Huge emphasis on marketing
- Superior customer service

Your Role As The Change Agent

Focus on economic growth

- Fiber is a development tool
- Fiber towns grow faster

Find a community leader

- One strong public official at the core of every fiber build
- Your job: Inform the champion

Can you pass the fiber test?

- What is fiber?
- Benefit to the economy
- Regulatory barriers?
- Understand the opposition
- Organize community support


Calix
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C7
REVOLUTIONARY
E7
E5 400
E5 100
CMS
UNIFIED ACCESS
An All-Video World
EXA
POWERED

Thank You