The Place And Progress Of FTTH In North America

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RVA LLC
Market Research & Consulting
RVA FTTH Research Methodology
North America (USA, Canada, Caribbean, Mexico*)

350 Provider Interviews: Reported March 2013
(Supplemented with vendors, experts, etc.)

2,000 Consumer Interviews: Reported June, 2012

*Mexico stats from IDATE
Wireline Value Proposition
“Everything ISN’T going wireless”
Mobile Devices Are Not Generally Preferred At Home

Percent Preferring Devices At Home For Online Tasks

<table>
<thead>
<tr>
<th>Task</th>
<th>Handheld</th>
<th>Tablet</th>
<th>Desk/Lap</th>
<th>Television</th>
</tr>
</thead>
<tbody>
<tr>
<td>All AGES:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watch a movie</td>
<td>1%</td>
<td>1%</td>
<td>7%</td>
<td>92%</td>
</tr>
<tr>
<td>Communicate with a friend via text or email</td>
<td>38%</td>
<td>8%</td>
<td>51%</td>
<td>2%</td>
</tr>
<tr>
<td>Play on online game</td>
<td>7%</td>
<td>16%</td>
<td>66%</td>
<td>11%</td>
</tr>
<tr>
<td>Work on a project for work or school</td>
<td>1%</td>
<td>4%</td>
<td>91%</td>
<td>5%</td>
</tr>
<tr>
<td>AGE UNDER 35:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watch a movie</td>
<td>0%</td>
<td>2%</td>
<td>17%</td>
<td>82%</td>
</tr>
<tr>
<td>Communicate with a friend via text or email</td>
<td>64%</td>
<td>5%</td>
<td>29%</td>
<td>2%</td>
</tr>
<tr>
<td>Play on online game</td>
<td>11%</td>
<td>10%</td>
<td>63%</td>
<td>15%</td>
</tr>
<tr>
<td>Work on a project for work or school</td>
<td>0%</td>
<td>3%</td>
<td>96%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Building Fiber-to-the-Home Communities Together
Many connect mobile devices to WiFi at home ... and most wish to when easier or automatic.
FTTH Value Proposition

For Consumers
Speed Is Just Part Of The Story
Customers Describe Diverse FTTH Advantages

Categorization Of Open End Responses

The real “triple play”:

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast / Speed/ Capacity</td>
<td>56%</td>
</tr>
<tr>
<td>Better Video / TV</td>
<td>48%</td>
</tr>
<tr>
<td>Reliable / Cust Service</td>
<td>25%</td>
</tr>
<tr>
<td>Better Price</td>
<td>6%</td>
</tr>
<tr>
<td>Positive general</td>
<td>3%</td>
</tr>
<tr>
<td>Packaged/ Bundled</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>5%</td>
</tr>
</tbody>
</table>

Building Fiber-to-the-Home Communities Together
Users Much More Satisfied With FTTH Service

Percent “Very Satisfied” With Aspects Of Service

Reliability – service uptime
- FTTH: 65%
- Cable: 44%
- Wireless: 42%
- DSL: 43%

Provider’s customer service
- FTTH: 43%
- Cable: 37%
- Wireless: 33%
- DSL: 27%

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Users Much More Satisfied With FTTH Video

Percent “Very Satisfied” With Aspects Of Video

- **Quality of HD picture**
  - FTTH: 73%
  - Satellite: 62%
  - Cable: 58%

- **Number of HD channels**
  - FTTH: 57%
  - Satellite: 52%
  - Cable: 41%

- **VOD**
  - FTTH: 46%
  - Satellite: 36%
  - Cable: 0%

*Building Fiber-to-the-Home
Communities Together*
Users Much More Satisfied With FTTH Data

Percent “Very Satisfied” With Aspects Of Data

- **Broadband speed (upload)**
  - FTTH: 60%
  - Cable: 37%
  - Wireless: 33%
  - DSL: 29%

- **Broadband speed (download)**
  - FTTH: 61%
  - Cable: 44%
  - Wireless: 32%
  - DSL: 28%

- **Consistency of speed**
  - FTTH: 55%
  - Cable: 31%
  - Wireless: 28%
  - DSL: 28%
“Our competition* doesn’t have a chance. We have more HD, better video, faster speed, local contact, competitive price, and are always up.

...What are they going to do?”

* From a small alternative provider with competition from the largest telephone company in the U.S. and the fourth largest cable TV company.
FTTH Adds Home Value

• Non FTTH users believe a home that doesn’t already have very high speed Internet from a direct fibre optic line and advanced inside wiring would have to be discounted $5,337 on average to be considered.*

• FTTH users believe an average discount of $6,451 would be required.*

* Based on $300,000 Home
FTTH Value Proposition

For Providers
Overall FTTH Take-Rates Hit New Record

North American Take-Rates Reach 42.5%
U.S. FTTH Take-Rates Hit New Record

U.S. Take-Rates Reach 44.8%
FTTH Take-Rates Vary By Provider Type

Take-Rates Vary From 40% To 81%

- Real Estate Dev: 80.7%
- Cable TV/MSO: 66.4%
- ILEC: 63.0%
- ILEC/ Clec Div Ilec: 55.1%
- Electric Co-Op: 53.2%
- Competitive Prov/ CLEC: 48.7%
- Muni Retail: 45.8%
- RBOC Overbuild: 40.1%
- Muni Wholesale: 28.9%
FTTH Results In Higher ARPU

Average Cost Of All Services Reported By Consumers By Broadband Type

FTTH

$142.00

Other Broadband

$104.00
FTTH Reduces Operations Costs

Estimated Opex Savings Among Those With Active FTTH Customers

Average Estimate: 20.4%
FTTH Challenges
Top Current Challenges Of Providers (Plant Managers)

Challenges With Over 2% Mention

- Funding new builds/ Cash flow: 19%
- Regulatory concerns/ USF reforms/ FCC: 18%
- Cost/ Cost for overbuilds: 13%
- Aggressive construction/ Construction issues: 6%
- Competing in the market/ Competition: 4%
- Customer retention or regaining - wireless: 3%
- Powering ONT/ Batteries: 3%
- ROI/ Justification for builds/ Business plan: 2%
- Marketing benefits to the consumer: 2%
- Pole attachments/ Easements: 2%
- Cost for rural deployment: 2%
- Video programming costs: 2%
- Specific technical issues: 2%
North American FTTH Connections

Connections Are Nearing 10 Million

- 2013 Homes Passed: 25.55M
- 2013 Homes Marketed: 22.7M
- 2013 Homes Connected: 9.68M

Homes passed = Homes that could be served / includes builds in progress etc.
Home marketed = Homes actively marketed with FTTH
North American FTTH Connections
Homes Marketed Nears 23 Million

- Stimulus impact, Canada, Mexico
- Economic and Stimulus drag
- Verizon deployment ramps up
- Small Telcos, mid-size Munis

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1. FTTH growth in Canada and Mexico has occurred faster than some are aware of.

2. Verizon reports FTTH Internet connections and FTTH video connections, but not total FTTH connections. (Total Verizon FTTH = FTTH Internet + FTTH TV-only + FTTH Voice-only in new developments.)

3. “Stealth FTTH” providers (large providers who install FTTH in greenfields but do not differentiate FTTH service) usually do not publically report FTTH. As old copper developments fill up and starts increase, greenfield FTTH is increasing.

4. The “other 1000” small providers add up to many more connections than some realize.
U.S. FTTH Penetration Is Not Evenly Distributed

State Households Connected Ranges From .3% to 29.7%

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Other Countries In North America Are Now Expanding

The U.S. Represents 86.5% Of NA Homes Marketed

- U.S. 19.66M
- Canada 1.37M
- Mexico 1.62M
- Caribbean.07M

86.5%

6.0%

7.1%

0.3%
Other Countries In North America Are Now Expanding

The U.S. Represents 92% Of NA Homes Connected

Canada now exceeds one half million connections and currently has the fastest rate of growth in North America
RBOCs Dominate Connections, But Others Add Up

U.S. FTTH Connections By Provider Type

- Tier 1 ILEC: 76.1%
- Tier 2 & 3 ILEC: 12.0%
- Muni/ PUD: 4.4%
- Competitive Prov/ CLEC: 2.7%
- Real Estate Dev: 1.6%
- ILEC with CLEC Div: 1.2%
- Cable TV/ MSO: 1.1%
- Electric Co-Op: 0.3%

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The US Has A Tradition Of Bottom Up Construction

97% Of US FTTH Providers Have Under 10,000 FTTH Connections

Approximately 910 U.S. Providers, (970 North American Providers Total)
Most Current Providers Likely To Continue Building

Percent Saying They Will Continue Building FTTH

- Very or somewhat likely: 53%
- Very or somewhat unlikely*: 26%
- NA: All have FTTH/Will soon: 21%

*Unlikely includes those concerned with USF reform, those with low take-rates, & some of those with most homes already connected.
FTTH Greenfield Is Increasing

In the 1998-2007 housing boom, relatively few lots were fiber fed – so many overestimated the impact of Greenfield FTTH.

In the coming housing increase or boom, more and more lots will be fiber fed. Many underestimate coming Greenfield FTTH based on their experience with the last housing boom.
FTTH Benchmarks
Reported Condition Of Remaining Copper

- Very good: 20%
- Fairly good: 52%
- Fairly poor: 23%
- Very poor: 5%
FTTH Maximum Download Speeds
By Provider Type

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FTTH Max Speeds Are Becoming More Symmetrical

Max Upload Speed As A Percent Of Max Download Speed

- Muni: 93.0%
- CLEC: 88.0%
- ILEC: 83.0%
Percent Of FTTH Deployment Underground

By Provider Type

- Tier 1 or 2 ILEC: 88%
- Cable TV: 82%
- CLEC: 80%
- ILEC + CLEC: 76%
- Elec Co-Op: 46%
- MUNI: 36%

Not weighted by number of customers. Some larger deployments have a lower underground percentage.
Time Spent In The Home Past The ONT Varies Widely
Average Time 2.3 Hours Based On 2012 Technical Benchmark Question

- .5 hours or less: 6.0%
- .6-1 hour: 15.3%
- 1.1-1.5 hour: 10.7%
- 1.6-2 hour: 29.3%
- 2.1-2.5 hour: 7.3%
- 2.6-3 hours: 14.7%
- Over 3 hours: 16.7%

Lowest reported: 15 minutes / Highest reported: 8 hours
FTTH Services Offered
Percent Of Providers Deploying Each Service

- Internet: 98.8%
- Telephone: 92.7%
- TV (RF): 52.0%
- TV (IP): 46.0%
- HD Channels: 35.5%
- VOD: 22.0%
- TV Over Top: 7.0%
- Meter read: 2.3%
GPON Dominates, But Many Architectures Are Popular

FTTH Non Tier 1 Connections By Architecture

- GPON: 53.3%
- P2P: 29.9%
- BPON: 8.9%
- RFOG: 6.4%
- EPON: 1.5%

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