The New World of Broadband - Implications for Assessment Valuation

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APPRaisal for AD VALOREM TAXATION
of Communications, Energy and Transportation Properties
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Moderator:
Annette Crawford, Comcast

Panel Members:
Christian Altenburger – Comcast
John Reed – Charter
Jim Stegeman – Costquest Associates
Carl Hoemke – Valentiam Group
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2. The New World of Broadband  
3. Compliance Challenges  
4. Determining the Replacement Cost New  
5. Converting Cost to Value  
6. Q&A
Introduction of Panel

1. Annette Crawford - Comcast
2. Christian Altenburger - Comcast
3. John Reed - Charter
4. Jim Stegeman - Costquest
5. Carl Hoemke – Valentiam Group
What is driving Obsolescence?

A. Customer Demand for Broadband speeds:
   • Competitive Wireline Environment
   • Emerging 5G Wireless Deployment

B. Technological Advancements:
   • Computer Hardware
   • Software
   • Methods & Standards (DOCSIS 3.0, 3.1, 4.0)
Bandwidth Demand

- **Moore's law** says that computers double in capabilities every 18 months, which corresponds to about 60% annual growth.
- **Nielsen's law** is similar to the more established Moore's law. Growth rate is 50% per year. This has held true for over 36 years.
Cable Infrastructure

An Evolving Network

- Node Splitting
- DOCSIS 3.0 to DOCSIS 3.1 (10gD/2gU)
- Fiber Deep (NODE +0)
- Fiber to the Home
Cable Infrastructure

Remote PHY

• Maximizes DOCSIS 3.1 Channel capacity
• Higher Efficiency of Digital Optics vs. Analog Optics (wavelengths, reach, cost)
• Consistency with FTTx deployments which will include remote architectures for reach and wavelength management

Courtesy CableLabs®
Compliance Challenges

Excess Cost

Optimization
- Original fiber path is not the optimum path today
- Changes in streets, housing unit density, changes in subscriber demand, etc.

Ghost Assets and Capacity Modifications
- As a result of technology evolutions the fiber network overlaps the coaxial network
- Due to changing demand, fiber network is deployed closer to the customer
- This will continue as the network is constantly upgraded (i.e. DOCSIS 3.1 / Fiber Deep / FTTP)

Truck Rolls / Capitalized Maintenance / Incremental Upgrades
- Repeated customer premise installs result in excess capitalized costs
- Repairs and Maintenance are capitalized -- these capitalized cost do not always add value
- Upgrading the network with repeated node splits is more costly than building the network in its current state today

Electronics (e.g. distribution electronics, set top boxes, and head-end equipment)
- Changing customer demand requires continuous replacement of older technology
- Newer technology costs less per measure of function

Fixed Asset Policies - focus on managing the net book - If fully depreciated, then why go through the effort to remove from the books since it has no impact to Net Book
HFC System: New build

- Hub
- Trunk
- Feeder
- Distribution
- Coax Cable
- Coax Drop
- Fiber Cable
- Amplifier
- Tap
- Fiber Node with power supply
Fiber Deep: HFC N+0: Overlay

- Coax Cable
- Passive multiplexer
- Fiber Cable, may parallel power coax
- Fiber Node, may have power supply

*Early obsolescence:*
All amplifiers
Cable from last tap to new cluster

*Cable cut dead or removed if node has power supply*
Fiber Deep: HFC N+0: New build

- Trunk
- Feeder
- Distribution

Legend:
- Coax Cable
- Passive multiplexer
- Fiber Cable, may parallel power coax
- Fiber Node, may have power supply

No cable placed
FTTH System: Overlay

Early obsolescence:
All amplifiers and power supplies
All coax cable and drops
FTTH System: New Build

- Fiber Cable
- Fiber Drop
- Passive multiplexer
- Fiber NAP

Diagram showing the components of an FTTH system, including Trunk, Feeder, Distribution, and a Passive multiplexer.
HFC versus Fiber Deep: Design Parameters

Target locations passed per Fiber Node:
- HFC: 300-750
- Fiber Deep: 60-80

Max Coax distance:
- HFC: 5,000ft
- Fiber Deep: 1,000ft
HFC: Sample Area Design
Fiber Deep: Sample Area Design
FTTH: Sample Area Design
HFC vs Fiber Deep: Cable Footage Comparisons

HFC
  • Coax: 1,986,803
  • Fiber: 600,359

Fiber Deep
  • Coax: 1,630,277
  • Fiber: 1,272,998
HFC vs Fiber Deep: Equipment Count Comparison

HFC
- Fiber Node Count: 207
- Locations per Node: 515

Fiber Deep
- Fiber Node Count: 1488
- Locations per Node: 70
## HFC vs Fiber Deep: New Build Cost

<table>
<thead>
<tr>
<th>Asset Category</th>
<th>HFC</th>
<th>Fiber Deep</th>
<th>New Build Change</th>
<th>Pct New Build Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drop</td>
<td>3,299,436</td>
<td>3,299,498</td>
<td>62</td>
<td>0.0%</td>
</tr>
<tr>
<td>Total OSP</td>
<td>42,658,694</td>
<td>44,641,976</td>
<td>1,983,282</td>
<td>4.6%</td>
</tr>
<tr>
<td>Distribution Coax</td>
<td>34,564,354</td>
<td>26,048,964</td>
<td>(8,515,390)</td>
<td>-24.6%</td>
</tr>
<tr>
<td>Amps/Splitters/Taps</td>
<td>439,637</td>
<td>132,423</td>
<td>(307,214)</td>
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<tr>
<td>Feeder Fiber</td>
<td>7,271,944</td>
<td>18,077,137</td>
<td>10,805,193</td>
<td>148.6%</td>
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<td>Pole/Make Ready</td>
<td>382,759</td>
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<td>693</td>
<td>0.2%</td>
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<td>COT/FiberNode</td>
<td>2,161,564</td>
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<td>10,001,173</td>
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<td><strong>TOTAL BUILD</strong></td>
<td><strong>48,119,694</strong></td>
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![FTTp vs HFC vs FiberDeep Graph](image-url)
## HFC vs Fiber Deep: Brownfield Cost

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| TOTAL BUILD         | 48,119,694 | 60,104,211 | 50,241,648 |
Why Fiber Deep for the Subject?

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Today’s New Build

If we ask engineers and business managers—“Assuming you were building new, what would you build today, if given the choice?”
The common answer is FTTH

Why FTTH?
In short, it provides the best business case
• It provides the ultimate delivery platform (and is somewhat future proof)
• Is cheaper to operate
• Expands revenue opportunities, improves take, and decreases churn
• And as shown below, is only marginally more expensive than HFC for the initial build

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Valuation: What is the Starting Point

In the cost approach, the appraiser is comparing the Subject Property to its most likely Substitute

  - Replacement Cost New is generally the proper starting point, as compared to Reproduction Cost New
  - The replacement property would be the most economical new property replacing the service provided by the Subject Property
  - The cost approach recognizes that prudent buyers will not pay more for a property than the cost of acquiring a substitute property of equivalent utility, taking into consideration all physical depreciation, as well as any functional and external obsolescence present in the assets in arriving at a reasonable determination of Fair Market Value

In short, what option for a broadband network, that is available in the market, would the prudent buyer consider

... FTTH is the likely choice – The choice of most experts... the choice in the marketplace for new builds... the most economical new property
Considering **Additional Concepts**

**When choosing the replacement plant, we need to:**
- Estimate the initial capex
- Review the differences in ongoing capex between the replacement and the subject
- Review the differences in operational cost between the replacement and the subject
- Review the differences in revenue between the replacement and the subject

... in short, understand the cash flow differentials

**In the case of Cable systems, if we use an FTTH replacement, we now need to look at**
- Coax cost of removal
- Power cost savings
- Operational cost savings
- Lost revenue

... in short, additional forms of obsolescence
Converting Cost to Value

-**Filing**
  - HC: $100.0

-**Trended**
  - HC: $120.0

-**Reproduction**
  - True Reproduction Cost New: $60.0

-**Assessed**
  - Assessor Depreciation: $62.0
  - Subject HFC RCN: $68.0

-**RCN (HFC)**
  - Fiber Deep RCN: $110.0

-**RCN (FD)**
  - Fiber Deep RCN: $110.0

-**RCN (FTTH)**
  - FTTH RCN: $90.0

-**RCN (EU)**
  - Equivalent Utility: $60.0

-**Appraisal**
  - Depreciation: $35.0
  - FMV: $25.0
Example of Excess Capital: Node Splits

<table>
<thead>
<tr>
<th>Nodes</th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>8</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node type</td>
<td>Primary</td>
<td>Child</td>
<td>Child</td>
<td>Child</td>
<td>Child</td>
</tr>
<tr>
<td>Cost per child node</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$50,000</td>
<td>$50,000</td>
</tr>
<tr>
<td>Total Cost</td>
<td>$100,000</td>
<td>$200,000</td>
<td>$400,000</td>
<td>$800,000</td>
<td>$800,000</td>
</tr>
<tr>
<td>HP</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td>Cumulative Cost/HP</td>
<td>$700</td>
<td>$800</td>
<td>$1,000</td>
<td>$1,400</td>
<td>$2,200</td>
</tr>
<tr>
<td>HP/Node</td>
<td>1,000</td>
<td>500</td>
<td>250</td>
<td>125</td>
<td>63</td>
</tr>
<tr>
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<td>$700,000</td>
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<td>$800</td>
</tr>
</tbody>
</table>
# Example of Excess Capital: Node Splits

<table>
<thead>
<tr>
<th>Nodes / HP</th>
<th>HFC -&gt; 4 Splits -&gt; FTTH</th>
<th>HFC -&gt; 1 Split -&gt; N+0 -&gt; FTTH</th>
<th>N+0 -&gt; FTTH</th>
<th>FTTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>$700</td>
<td>$700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>$100</td>
<td>$100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>$200</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>$400</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>62.5</td>
<td>$800</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 (N+0)</td>
<td>NA</td>
<td>$600</td>
<td>$1,100</td>
<td></td>
</tr>
<tr>
<td>0 (FTTH)</td>
<td>$200</td>
<td>$200</td>
<td>$200</td>
<td>$900</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$2,400</strong></td>
<td><strong>$1,600</strong></td>
<td><strong>$1,300</strong></td>
<td><strong>$900</strong></td>
</tr>
<tr>
<td><strong>Excess Cost</strong></td>
<td><strong>62.5%</strong></td>
<td><strong>43.8%</strong></td>
<td><strong>30.8%</strong></td>
<td><strong>0%</strong></td>
</tr>
</tbody>
</table>
Cost Trends

Types Used

Assessor Trends
- One Trend
- Generalized Industrial Trends
- Rarely negative

Proper Trends
- Federal Reserve Board Trend
- Properly Constructed Industry Specific Trends

Purpose

Assessor
- Translate Historical Cost to Today’s Cost

Appraiser
- Assets where RCN is not available
- Aging
- Quantifying Excess Cost
Industry Specific Trends – Including Labor
## Summary: Value Drivers

<table>
<thead>
<tr>
<th>Value Driver</th>
<th>Replacement Plant</th>
<th>Subject Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost Basis</strong></td>
<td>Equivalent Utility RCN of <strong>$60 million</strong> – provides for direct measure of costs.</td>
<td>Historical Cost Tended $120 million – imperfect trended cost, capitalized maintenance, and duplicate costs originating from system upgrades leading to excess cost basis.</td>
</tr>
<tr>
<td><strong>Cable Routes</strong></td>
<td>Modeled with knowledge of current service area demographics and services optimizing routes and costs.</td>
<td>Suboptimal because based on legacy service area demographics and services having been built and modified over time as service area demographics change.</td>
</tr>
<tr>
<td><strong>Excess Maint. Cap Costs</strong></td>
<td>Does not include inappropriate duplicate costs</td>
<td>Capitalized Maintenance and lower scale repairs included in addition to the original cost to construct</td>
</tr>
<tr>
<td><strong>Ghost Assets</strong></td>
<td>Contains only cost to construct functional plant</td>
<td>Contains costs of assets not physically in place or function but still remain on the books</td>
</tr>
<tr>
<td><strong>Head End/CPE</strong></td>
<td>Built with updated technology at today’s prices</td>
<td>Some upgraded equipment, higher legacy costs with lower functioning equipment. Cost to remove and replace previous technology included</td>
</tr>
<tr>
<td><strong>RCN</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Physical Age</strong></td>
<td>Subject plant network assets’ EA is 5.6 years. Service lives averaging around 10 yr. service life indicates a physical percent good of 50% Percent Good.</td>
<td></td>
</tr>
<tr>
<td><strong>Technology Substitution</strong></td>
<td>Contains powered network and amplifiers. Fiber Deep will quickly displace these assets. FTTH will be a requirement in 8 years reducing the service life of the Subject assets to 8 years.</td>
<td></td>
</tr>
<tr>
<td><strong>FMV</strong></td>
<td></td>
<td><strong>RCN Less Depreciation of Network Assets @ 41.7%: $25 Million</strong></td>
</tr>
</tbody>
</table>
## Steps to Value

<table>
<thead>
<tr>
<th>Description</th>
<th>Value (Million)</th>
<th>Percentage Good</th>
</tr>
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<tbody>
<tr>
<td>Network Assets Economic Replacement Cost (FTTH)</td>
<td>$90.0</td>
<td></td>
</tr>
<tr>
<td>Useful Life Adj. (from 15 yr. FTTH to 10 yr. HFC)</td>
<td></td>
<td>75%</td>
</tr>
<tr>
<td>Funct. Obsol. (Lower function and higher costs)</td>
<td></td>
<td>89%</td>
</tr>
<tr>
<td>= Network Asset Econ Repl. (Equivalent Utility)</td>
<td>$60.0</td>
<td></td>
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<tr>
<td>Physical Depreciation (5.6 Effective Age @ 10yr life)</td>
<td></td>
<td>50.0%</td>
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<tr>
<td>Technology Substitution (8 yr. life versus 10 yr. life)</td>
<td></td>
<td>83.6%</td>
</tr>
<tr>
<td>= Combined Age Dependent Depreciation</td>
<td></td>
<td>41.7%</td>
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<tr>
<td>= RCNLD Network Assets</td>
<td>$25.0</td>
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Depreciation Table Floors

Assessor

Limits Percent Good

20% Floor

Issue

• Cable Plant Equipment does not have salvage value remaining at the end of its expected useful life.

• Value of an asset left in place after its expected life is negative as it becomes a liability.
Potential Solution

Trend
Do not trend plant
Use negative trend on equipment

Depreciation
Remove Percent Good Floors

Obsolescence
Apply an obsolescence factor to Cost to account for suboptimal routes, ghost assets, and capitalized maintenance.
Q&A
Annette Crawford
Senior Manager, Property Tax

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- Ms. Crawford is a Senior Manager of Property Tax for Comcast Corporation focusing on property tax audits and compliance. Prior to joining Comcast in December 2014, Annette spent the past 15 years providing property tax management, consulting and valuation services with several firms including Ryan LLC, Thomson Reuters and Deloitte Tax LLC.

- Annette holds a Bachelor of Business Administration in Marketing from the University of Georgia in Athens, Georgia. She is currently a member of the Broadband Tax Institute and Certified Member (CMI) of the Institute for Professionals in Taxation. She is currently serving as a member of the Planning Committee for the Wichita State University Workshop of “Appraisal Communications, Energy and Transportation Properties for Ad Valorem Taxation”.

Christian Altenburger
Senior Manager, Property Tax – Comcast Corporation
BS in Finance – Catholic University of America
MBA in Finance – Temple University Fox School of Business

• 16 years of experience in cable property tax with a focus on valuation, appeals, strategy and policy
John Reed
Senior Director, Property Tax
Charter Communications
BS in Finance – Millikin University

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+1 (618) 304-2153 | Mobile
john.reed@charter.com
www.spectrum.com

• 14 years broadband/cable property tax management experience, 24 years of property tax experience including appeals, audits, budgeting, planning, and tax policy.
Jim Stegeman
President of CostQuest Associates, Inc.

BS in Math and Statistics and an MS in Statistics, both from Miami University of Ohio.

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jstegeman@costquest.com
www.costquest.com

• Mr. Stegeman has been a major force behind the development of the latest generation economic cost models used by cable, telco, tower and wireless companies and state and government agencies in support of broadband deployment analysis (telco, cable, wireless and satellite), valuation, and UNE (Unbundled Network Element) and USF (Universal Service Fund) proceedings.

• He led the design, coding and implementation of the Connect America Cost Model (“CAM”, “CACM”, “A-CAM”) that is being used by the FCC to disburse over $3Billion annually to fund broadband deployment. He led the design, coding and implementation of the GigabitCity model that is currently being used by investment banking entities, cities and carriers to investigate the financials for fiber deployment. He led the design, coding and implementation of the Broadband Analysis Model (“BAM”) that was used by the FCC to develop and support the economic findings in the National Broadband Plan. He also led the design and development of the CostPro model designed to support USF and UNE costing and tax valuation efforts. CostPro has been used by multiple state commissions and tax entities and is in use by multiple carriers with operations in all 50 states. This model incorporates geocoded customer locations, road networks, engineering rules, and unique algorithms to design a truly forward-looking communications network.
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- Mr. Hoemke is an executive with 30 years of experience in valuation, property tax and technology disciplines. Carl is an author and has served as an expert witness in many legal venues. Carl is also an integral part of Valentiam Group’s management team while also serving as the CEO of CrowdReason, a technology services company.

- Previously, Carl served as a National Tax Partner for Ernst & Young and founded both the Property Tax and Tax Technology practices for Duff & Phelps. Carl has practiced valuation for tax and accounting purposes since 1993. In 1999 he became partner at Ernst & Young, where he served as a U.S. National Tax and Valuation partner, focusing on complex industries, such as telecommunications and energy. Carl has also grown and led valuation and tax groups within Standard & Poor’s CVC, Duff & Phelps, and Economics Partners. Carl founded the tax technology firm, CrowdReason, in 2014, and is leading the development and support of the industry’s most advanced property tax management software.