Advanced Broadband Studies

A look at business case modeling and feasibility for FTTH broadband connectivity in selected Kansas Communities
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Introduction

- **CostQuest Associates**
  - Known for Economic/Network Models for Telecommunications
  - FCC – National Broadband Plan, Connect America Fund
  - States – Alabama, California, Idaho, Kansas, West Virginia, Wisconsin, Wyoming
  - Providers – AT&T, Verizon, Comcast, Frontier, T-Mobile and many others
  - Foreign Governments – Australia, Hong Kong, New Zealand
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What were we tasked with?

Feasibility – A BUSINESS CASE for full fiber deployment in selected communities

Selected Pilot Communities:
- Fort Scott
- Dodge City
- Topeka

And, Top Broadband Markets:
- Wichita
- Lawrence
- Manhattan
- Overland Park
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What are we modeling? What Kansas City has.

- Fiber-to-the-premises (homes and businesses) across entire city
- 1Gbit/s Internet Service, TV and other services
- Model looks at neighborhoods (for larger cities)
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What’s in the model?

- **Feasibility/Profitability:** The Advanced Broadband Study estimates the costs and potential profitability and ultimately the viability of the network.

- **10-Year Business Case:** The Study looks at deployment costs and the costs to maintain the network over 10 years.

- **Designed Network:** The underlying geospatial/mapping model determines an efficient routing and architecture of the network.

- **Tested Demand Assumptions:** The underlying cost model’s use of an extensive demand and demographic database provides the ability to understand potential take rates, costs and the revenue flows related to the network plan to understand the economics of each area.
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What are the assumptions for this business model?
Too many to list, but...think Google Fiber

The Rate Plans:
Residential
1Gbit/s Internet Service - $70/mo
1Gbit/s Internet Service + TV - $120/mo
Low Speed Internet (5/1 Mbit/s) – FREE

Business
1Gbit/s Internet Service - $100/mo
1Gbit/s Internet Service + TV - $150/mo
Low Speed Internet (5/1 Mbit/s) – FREE
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What are the key drivers of a successful business case?

Take Rate
What predicts a high take rate? Income, educational attainment are key.

Costs
What drives costs? Density and distance are key.
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*Other parameters – the list goes on (can all be changed)*

<table>
<thead>
<tr>
<th>Input Used</th>
<th>Length of Study</th>
<th>Average Useful Life of Assets</th>
<th>Assumed Provider Size</th>
<th>Revenue Residential Rate Plans</th>
<th>Business Rate Plans</th>
<th>Take Rates Residential Rate Plans</th>
<th>Business Rate Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10 years</td>
<td>20.5 years</td>
<td>Large</td>
<td>120/70/8.99</td>
<td>150/100/8.99</td>
<td>40/45/15</td>
<td>10/80/10</td>
</tr>
<tr>
<td>Comments</td>
<td></td>
<td></td>
<td></td>
<td>Video Bundled/High Speed/Low Speed - The take rates vary by neighborhood and are defined by business and residential businesses and Other Key Inputs/Parameters</td>
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<td>Depreciation, cost of money and income taxes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Can adjust the period</td>
<td>Standard for typical deployment</td>
<td>Large carrier with good buying power and brand awareness</td>
<td></td>
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</tr>
</tbody>
</table>

**Other Key Inputs/Parameters**

- Poles – Pole Placement Hours for owned poles
- Conduct – CAPEX if conduit is rented
- Conduct – UG Material prices for conduit, duct/inside, manholes if conduit is owned
- Poles – CAPEX for attaching cable to non-owned pole
- Poles – Pole/Anchor/Other Material Prices if owned poles
- Conduct – Dust Rent Rates
- Poles/Conduit – Mix of Free vs Non-Free
- Poles – Attachment Rates
- % Customers Choosing each offering: LowData, HighData, Video&HighData
- CircuitPowerFactor
- SwitchPowerFactor
- UplinkCostAdjustment
- FieldToBookOpenFactor
- AssumedAreaDens
- AssumedCompanySize
- Poles
- Conduct
- CarrierType
- Company
- Length of Study
- DiscountFactor
- Installation Brackets – Video / High Speed Data
- Conduit – Underground conduit/duct/inside placement hours for owned conduit systems
- Excavation costs – Buried Excavation Hours
- Excavation costs – Underground Excavation Hours
- Other Key Inputs/Parameters

**Revenue**

- Customer Prem equipment – (Modem, Set top, remote, etc)
- Structure Sharing – Sharing of feeder and distribution cable on same structure
- Fiber – Drop Material Price/ft
- Fiber – Fiber Cable Material Price/ft
- Fiber – Material Costs for Termination of Fiber on Panel in Node Location
- EPL Material Prices and Capacities – UNT
- EPL Material Prices and Capacities – Fiber Splice
- EPL Material Prices, labor and Capacities – Fiber Drop Terminal
- Equipment Material Prices and Capacities – CLT
- Labor Rates
- Miscellaneous Line Items
- Buildings – Free Building Space
- Buildings – Lead and Building CAPEX
- Fiber – Cable placement and splicing hours
- CAPEX Factors – Operating Expense factors
- Plant Mix – Mix of Aerial, Buried and Underground plant
- Structure – structure (incl) Burial Sharing with other Parties
- Installation Expenses – Data Only
- Installation Expenses – Video / High Speed Data
- Conduit – Underground conduit/duct/inside placement hours for owned conduit systems
- Excavation costs – Buried Excavation Hours
- Excavation costs – Underground Excavation Hours

**Take Rates**

- Video Bundled/High Speed/Low Speed – The take rates vary by neighborhood and are defined by business and residential businesses and Other Key Inputs/Parameters
# Advanced Broadband Studies - Results

## Topline Results – Initial Deployment Costs

<table>
<thead>
<tr>
<th>City</th>
<th>Initial Investment (CapEx)</th>
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<tr>
<td><strong>Pilot Cities</strong></td>
<td></td>
</tr>
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<td>$4,744,590</td>
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<td><strong>Top Business Case Cities</strong></td>
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<tr>
<td>Manhattan</td>
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<tr>
<td>Overland Park</td>
<td>$100,835,018</td>
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<tr>
<td>Wichita</td>
<td>$168,229,409</td>
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Advanced Broadband Studies - Results

Topline Results - Demand (Customers)

Subscribers - Levelized Demand

- Wichita: 14,549 (Business), 51,153 (Residential)
- Overland Park: 8,706 (Business), 27,281 (Residential)
- Manhattan: 1,748 (Business), 5,910 (Residential)
- Lawrence: 3,170 (Business), 11,771 (Residential)
- Topeka: 5,030 (Business), 18,710 (Residential)
- Dodge City: 1,017 (Business), 3,490 (Residential)
- Fort Scott: 448 (Business), 948 (Residential)
# Advanced Broadband Studies - Results

## Topline Results – Initial Investment

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### Capital Per Line

- Wichita: $3,098
- Overland Park: $3,362
- Manhattan: $3,304
- Lawrence: $3,535
- Topeka: $3,169
- Dodge City: $3,132
- Fort Scott: $4,153
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Topline Results – Annual Earnings

10-Year Earnings (Pre-Tax Contribution Margin)

- Wichita: $6,208,411
- Overland Park: $3,425,323
- Manhattan: $230,227
- Lawrence: $444,809
- Topeka: $2,003,950
- Dodge City: $524,288
- Fort Scott: ($121,959)

($1,000,000) $0 $1,000,000 $2,000,000 $3,000,000 $4,000,000 $5,000,000 $6,000,000 $7,000,000
Advanced Broadband Studies - Results

Topline Results - Earnings

Net Earnings - NPV per Customer Per Month

<table>
<thead>
<tr>
<th></th>
<th>Fort Scott</th>
<th>Pilot Cities</th>
<th>Top Business Case Cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPV per Customer Per Month</td>
<td>(6.16)</td>
<td>7.65</td>
<td>5.52</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1.93</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.93</td>
</tr>
<tr>
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<td></td>
<td>6.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.23</td>
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</table>

Net Present Value - What one can expect to earn (cash flow), pre-tax, for each customer monthly for the 10-year business case.
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Topline Results – Business Case Summary

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<th>Top Business Case Cities</th>
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<tbody>
<tr>
<td></td>
<td>Fort Scott</td>
<td>Dodge City</td>
</tr>
<tr>
<td>Residential Subscribers</td>
<td>948</td>
<td>3,490</td>
</tr>
<tr>
<td>Business Subscribers</td>
<td>446</td>
<td>1,017</td>
</tr>
<tr>
<td>Total Annual Revenue</td>
<td>$1,140,544</td>
<td>$4,018,467</td>
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<tr>
<td>Total Annual Opex</td>
<td>$716,903</td>
<td>$2,121,755</td>
</tr>
<tr>
<td>Total Annual CapCost</td>
<td>$545,600</td>
<td>$1,372,425</td>
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<tr>
<td>Annual Contribution Margin (Pre-Tax Contribution Margin)</td>
<td>($121,959)</td>
<td>$524,288</td>
</tr>
</tbody>
</table>
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Pilot Cities – Key Drivers
Density and Distance

![Line Footage per Subscriber](Image)

- Topeka: 123
- Dodge City: 123
- Fort Scott: 208

[Map of Topoka, KS]
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Pilot Cities – Key Drivers
Take Rate

<table>
<thead>
<tr>
<th>Fort Scott</th>
<th>NPV per Customer Per Month</th>
<th>Baseline</th>
<th>Take Rate for Res Income for 20-40k up by 5%</th>
<th>Take Rate for Res Income 20-40k up by 10%</th>
<th>Increase BUS Take by 10%</th>
<th>Increase in Take Rate of 10% across board</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(6.16)</td>
<td>(5.02)</td>
<td>(3.99)</td>
<td>(4.04)</td>
<td>(1.29)</td>
<td></td>
</tr>
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Rural Communities Alternatives

- Fixed Wireless may be HALF as much in initial investment

- Mixed-mode of technologies
  - Build fiber to dense areas, community anchor institutions and to business parks
  - Other last mile solutions to remaining locations until economics work out
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Why do some communities have fiber and other do not?

- Core density is a factor
- Some cities have large anchor tenants
- Legacy regulation is a factor
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Why do some communities have fiber and other do not?

• Legacy regulation is a factor
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Why do some communities have fiber and others do not?
- Legacy regulation is the biggest factor

<table>
<thead>
<tr>
<th></th>
<th>Population</th>
<th>Sq Mi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fort Scott, Kansas</td>
<td>8,000</td>
<td>5.59</td>
</tr>
<tr>
<td>Worland, Wyoming</td>
<td>5,500</td>
<td>4.64</td>
</tr>
</tbody>
</table>
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Why do some communities have fiber and other do not?
- Legacy regulation is the biggest factor

Universal Service Funds spent on FTTH by TCT West
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What can be done with the data?

- To develop an understanding of the economic feasibility of a gigabit speed network – City-wide or otherwise.
- To support advocacy to policy makers and stakeholders on the value of such a network.
- To manage procurement of a private partner to deploy or manage the network and business.
- Manage leverage that the city might have – Right-of-way, city assets/equipment, permitting, franchising
- To manage architecture issues and other matters that may serve to expedite build-out.
- Neighborhood demographics, demand and economic data will help to effectively manage deployment and adoption.
- Can be used to advise applications for FCC’s Experiments and other programs