Cable Enterprise Study Session
OBJECTIVES

This presentation will provide you with information on:

• The cable industry and our part in it
• Improvements we have underway
• Crossroads we face
• The path forward
PART 1

Cable Industry Evolution
PART 1 - CABLE INDUSTRY EVOLUTION

A Brief History of Cable: Creating and Cutting the Cord (Video)

Source: WSJ on Youtube
Evolution of Cable in the U.S.

1970s–2010
CATV to Cable
More channels and packages
= more customers and higher costs

Early 2000s
Cable internet and video/voice/data packages

2014 onwards
Internet video

2018
Cable adopts smaller (aka skinny) channel packages and includes internet video

2019 and on
5G, internet of things, fiber based Gigabyte/second internet speeds, IP Video becomes standard
How the Cable Industry Serves Customers, Earns & Invests Money

Cable Industry’s Traditional Revenue Sources

- Subscriptions: Residential Internet, Video, and Telephony
- Business Services
- Advertising avails on cable channels
- Leased Access Channel(s)
- Equipment Rentals
- Paid Service Calls

Cable Industry’s Expenses

- Plant build and maintenance
- Consumer Premise Equipment (CPE)
- License Fees to Programmers
- Head end equipment and licenses
- Marketing and associated activities (measurement, research, sponsorships)
- Salaries, General & Administrative (SG&A)
- Franchise and Government Fees
Suzy is gaming online against three of her friends. The high-quality graphics and sound of the online video game are using a lot of bandwidth.

Mom is trying to stream a movie. Because Suzy is already using a lot of bandwidth, the movie keeps buffering.

Jimmy is on the computer surfing the web for a research paper and web sites are slow to load as a result of Suzy and Mom using bandwidth.

Joey is in his room snapping and uploading selfies to his social media accounts. Uploads are taking longer than normal.

Dad is using the tablet to find ideas for dinner and it is taking forever. Looks like dinner will be late tonight. Time to update the internet speed.
Overall Internet TV Subscription Penetration (2013–2018)
Among U.S. Broadband Households Surveyed

Source: Parks Associates
PART 1 · CABLE INDUSTRY EVOLUTION

Among All U.S. Broadband Households

% Subscribing to Pay-TV Services

Q1/2015  Q3/2016  Q1/2017  Q3/2017

70%  72%  74%  76%

Source: Parks Associates
PART 1 - CABLE INDUSTRY EVOLUTION

Pay-TV Shares Over Time

- **1995**
  - Cable TV: 93%
  - Satellite TV: 3%
  - TV from Phone Companies: 4%
- **2006**
  - Cable TV: 69%
  - Satellite TV: 30%
- **2017**
  - Cable TV: 54%
  - Satellite TV: 34%
  - Other: 11%

Source: NCTA ANALYSIS OF SNL KAGAN DATA
PART 1 • CABLE INDUSTRY EVOLUTION

More TV Choices Than Ever Before

Until the mid-90s, the only choice for TV was cable or broadcast

Current Household Video Subscriptions (Q4 2017)

- Streaming: 55%
- Cable: 42%
- Satellite: 26%
- Telecom: 9%
PART 1 • CABLE INDUSTRY EVOLUTION

Cable’s Customer Base

- **66.4 M** Cable Internet
- **51.9 M** Television
- **31.4 M** Phone

How We Stack Up

- **53%** • **44%**
  - National
  - San Bruno Cable
  - Broadband

- **41%** • **38%**
  - National
  - San Bruno Cable
  - Cable TV

- **25%** • **6%**
  - National
  - San Bruno Cable
  - Phone
OVER A DECADE OF STREAMING TV INNOVATION

MORE DEVICES, SERVICES, AND APPS ENTER THE TV MARKETPLACE EVERY YEAR. CONSUMERS AND TECHNOLOGY ARE TOGETHER DRIVING THE ENTERTAINMENT EXPERIENCE.
PART 1 - CABLE INDUSTRY EVOLUTION

TV is becoming All Apps

Strong video marketplace
Always connected home
TV is truly everywhere
Merging media devices
Pay TV apps on all devices
TV is getting smarter

Anytime, Anywhere
PART 1 · CABLE INDUSTRY EVOLUTION

The Legacy Industry is Struggling (Video)

Source: CNBC & Youtube
This section provided you information on:

- The Cable TV industry in the U.S.
- How the internet is changing TV entertainment choices
- The crossroads faced by media companies

In the next section, we will tell you about San Bruno Cable, the improvements we have underway and our own crossroads.
PART 2

San Bruno Cable’s Situation
PART 2 · SAN BRUNO CABLE’S SITUATION

American Cable Association Member Story: San Bruno Cable (Video)

Source: ACA on Youtube
# San Bruno’s Cable Infrastructure

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>COST</th>
<th>YEAR</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>270 Mhz System and 46.7 miles of cable</td>
<td>$565,000</td>
<td>1971</td>
<td>12 channel system launched</td>
</tr>
<tr>
<td>Additional 13 miles of cable</td>
<td>$86,000</td>
<td>1975</td>
<td>Expanded to 24 channels, with Set Top Boxes</td>
</tr>
<tr>
<td>450 Mhz System Upgrade</td>
<td>$2,200,000</td>
<td>1985</td>
<td>60 channels fully addressable</td>
</tr>
<tr>
<td>750 Mhz System Upgrade</td>
<td>$7,100,000</td>
<td>1999</td>
<td>117 channels; high speed data</td>
</tr>
<tr>
<td>ISP business launch</td>
<td>$300,000</td>
<td>2002</td>
<td>Launch of broadband internet</td>
</tr>
<tr>
<td>Cable VOD launch</td>
<td>$425,000</td>
<td>2004</td>
<td>Enhanced system functionality</td>
</tr>
<tr>
<td>Router Upgrade; 10k CMTS</td>
<td>$1,700,000</td>
<td>2007</td>
<td>Internet and phone capacity increase</td>
</tr>
<tr>
<td>System upgraded to 100% digital</td>
<td>$230,000</td>
<td>2008</td>
<td>Increased channel capacity</td>
</tr>
<tr>
<td>Upgrade to Arris E6000</td>
<td>$450,000</td>
<td>2012</td>
<td>Enabled enhanced monetization of capacity</td>
</tr>
<tr>
<td>Router Upgrade with 10 Gigahertz Cards</td>
<td>$894,800</td>
<td>2014</td>
<td>Increased internet capacity</td>
</tr>
<tr>
<td>Upgraded VOD Storage</td>
<td>$200,000</td>
<td>2015</td>
<td>Greater Cable VOD capacity</td>
</tr>
<tr>
<td>CAP 1000 Equipment Upgrade</td>
<td>$115,000</td>
<td>2017</td>
<td>Increase HD channel capacity</td>
</tr>
<tr>
<td>MDU Fiber Projects (Shelter Creek, Peninsula Place &amp; Crystal Springs)</td>
<td>$2,200,000</td>
<td>2016-18</td>
<td>Fiber into select MDUs</td>
</tr>
<tr>
<td>Router Upgrade Project</td>
<td>$1,600,000</td>
<td>2018</td>
<td>Increased internet capacity</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$18,065,000</td>
<td>47 Years</td>
<td></td>
</tr>
</tbody>
</table>
PART 2 · SAN BRUNO CABLE’S SITUATION

San Bruno Cable: CATV to Cable

THEN

Headend

Tree and Branch

Amplifier

Coax Trunk Cable

Coax Feeder Cable

Tap

Drop Cable

NOW

Master Headend/Data Center

Hub

Node

Node

Node

50–500 Homes

Amplifier

Tap

Coax Feeder

Regionall HUB

Home Architecture

Ring–Star–Bus
PART 2 · SAN BRUNO CABLE’S SITUATION

System Data

CATV System “Community Antenna TV” → Cable TV System

San Bruno Cable (SBC)

Fiber Coax Based

Serving San Bruno

Miles of Cable

Owns & Operates

750 Mhz

46%

85

Channel 1
PART 2 · SAN BRUNO CABLE’S SITUATION

Performance

<table>
<thead>
<tr>
<th>Year</th>
<th>National</th>
<th>San Bruno Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>55%</td>
<td>44%</td>
</tr>
<tr>
<td></td>
<td>39%</td>
<td>35%</td>
</tr>
<tr>
<td>2018</td>
<td>41%</td>
<td>38%</td>
</tr>
<tr>
<td></td>
<td>53%</td>
<td>44%</td>
</tr>
</tbody>
</table>

Cable TV Penetration

Broadband Penetration
PART 2 - SAN BRUNO CABLE’S SITUATION

Performance (Continued)

- **Infrastructure Spend**
  - **National**
    - $275B
    - 20 years
  - **San Bruno Cable**
    - $16.5M
    - 47 years

- **Revenue**
  - **National**
    - $1.8T
    - 20 years
  - **San Bruno Cable**
    - $139M
    - 15 years

- **Revenue per $1 Spend**
  - **National**
    - $6.55
  - **San Bruno Cable**
    - $7.69
PART 2 · SAN BRUNO CABLE’S SITUATION

Performance (Continued)

San Bruno Coverage
100% homes passed

Age of Head End
20 years

Age of Hybrid Fiber Coaxial Cable Plant
20 years

Cable Operating System
DOCSIS 3.0 (v3.1 in market)

Internet Service Provider (ISP) Business Launched
2002

Video Channels Offered:
396 (105 HD); 4,000 hours Cable VOD

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Broadband Speeds

<table>
<thead>
<tr>
<th>INTERNET SPEED</th>
<th>SERVICE AREA</th>
<th>COMPETITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>5–100 Mbps</td>
<td>100% of homes passed</td>
<td>Yes</td>
</tr>
<tr>
<td>Up to 300 Mbps</td>
<td>100% of homes passed after router upgrade (early Dec 2018)</td>
<td>Select Areas</td>
</tr>
<tr>
<td>Up to 1 Gbps</td>
<td>17% of homes passed</td>
<td>Select Areas</td>
</tr>
</tbody>
</table>
### Current Financial Situation & Goals

**SBC Per Subscriber / Revenue & Expense**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Revenue Per User (ARPU)</td>
<td>$109.54 per month</td>
</tr>
<tr>
<td>Average Expense Per Subscriber</td>
<td>$113.75 per month</td>
</tr>
<tr>
<td>Net Margin</td>
<td>-3.7% ($4.21)</td>
</tr>
</tbody>
</table>

**SBC’s Business Goals**

<table>
<thead>
<tr>
<th>FY 2018-19 Revenue</th>
<th>ARPU Goal</th>
<th>FY 2018-19 Expenses</th>
<th>Net Margin Goal</th>
<th>Cable Fund</th>
<th>Subscriber Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10.926m</td>
<td>$95</td>
<td>$11.056m</td>
<td>+10%</td>
<td>-$14.1m</td>
<td>9,600 (+3k increase)</td>
</tr>
</tbody>
</table>
PART 2 · SAN BRUNO CABLE’S SITUATION

San Bruno Cable Service Calls – 2016 to 2018

- 2016
- 2017
- 2018
PART 2 - SAN BRUNO CABLE’S SITUATION

San Bruno Cable’s Downstream Usage

Gigabytes

### Number of Subscribers

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>SUBSCRIBERS</th>
<th>GROWTH/DECLINE SINCE JULY 2010 (DIGITAL TV UPGRADE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadband + Cable TV</td>
<td>4,858</td>
<td>-8%</td>
</tr>
<tr>
<td>Broadband Only</td>
<td>1,813</td>
<td>46%</td>
</tr>
<tr>
<td>TV Only</td>
<td>909</td>
<td>-212%</td>
</tr>
<tr>
<td>Telephony</td>
<td>870</td>
<td>-7.3%</td>
</tr>
</tbody>
</table>
What San Bruno Cable is Doing Right Now

NEW MARKET LEADING PACKAGES
Internet plus local TV.

NEW LOOK & FEEL
Updated TV Guide coming soon to HD set top boxes.

NEW LANGUAGES AVAILABLE IN BASIC
New Chinese, Filipino and Korean channels now included in Basic Programming. Spanish channels already available.

LOW COST PHONE
Coming soon.

PERFORMANCE IMPROVEMENTS
Increased internet capacity, speeds and reliability.

NEW MARKETING
Modest early effort in Hispanic marketing has led to some subscriber growth. More campaigns to follow.

NEW COST CONTROLS
New service deals with vendors to enable cost savings and new low prices for customers.

CHANNEL 1
Upgrades under review.
PART 2 · SAN BRUNO CABLE’S SITUATION

Updated Guide  (Video)

Current Guide
Preliminary Packages

Proposed New Residential and Business Packages

- Internet plus local TV packages for homes
- Internet plus business phone packages for businesses
- Pricing TBD

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>AVAILABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Gigabit per second Internet and Local Broadcast Channels</td>
<td>System service areas currently installed with fiber</td>
</tr>
<tr>
<td>Up to 300 Megabits per second Internet and Local Broadcast Channels</td>
<td>System service areas with hybrid fiber coax</td>
</tr>
</tbody>
</table>
New Packages & Pricing: Business

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>AVAILABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Gigabit per second Upstream/1 Gigabit per second Downstream internet with two dedicated phone lines</td>
<td>System service areas currently installed with fiber</td>
</tr>
<tr>
<td>300 Megabits per second Upstream/300 Megabits per second Downstream internet with two dedicated phone lines</td>
<td>System service areas currently installed with fiber</td>
</tr>
<tr>
<td>75 Megabits per second Upstream/10 Megabits per second Downstream internet with two dedicated phone lines</td>
<td>System service areas with hybrid fiber coax</td>
</tr>
<tr>
<td>50 Megabits per second Upstream/10 Megabits per second Downstream internet with two dedicated phone lines</td>
<td>System service areas with hybrid fiber coax</td>
</tr>
</tbody>
</table>
PART 2 · SAN BRUNO CABLE’S SITUATION

San Bruno Cable’s Crossroads

Enterprise has provided competitive service to San Bruno for 47 years

Internet usage on San Bruno Cable is exploding—1 Gig to 11 Gig growth from 2011-18. System needs to provide exponentially better internet connectivity to cater to its customers

Limited investment in installing fiber in select apartment complexes, with good results

System needs to offer higher internet speeds, better data caps and better TV/video package options to serve customers

Crossroads
Proceed with a comprehensive fiber upgrade to compete effectively?
PART 2

SUMMARY

This section provided you information on:

• San Bruno Cable’s evolution
• Current subscriber and technical situation
• What the Enterprise is doing right now to better serve customers and control costs
• Where the enterprise stands at this point

In the next section, we will tell you about the enterprise’s path forward.
PART 3

The Path Forward
What is Fiber to the Home (FTTH)?

It is a relatively new technology to transmit digital data over fiber lines which extend all the way into the home.

FTTH is remarkable because of...

- **Long life:** 30–50 years at least
- **No electricity in the fiber lines**
- **No radiation hazard**
- **Very scalable internet speeds**
PART 3 - THE PATH FORWARD

FTTX Fiber Architecture
**Fiber Optic vs. Cable Internet**

### What’s the difference?

**Fiber**
- Data sent via small, flexible strands of glass that transmit light
- Faster over greater distances

**Cable Internet**
- Uses cable TV infrastructure to transmit data
- Connection shared with neighbors

### Faster and more reliable
- Delivered on a dedicated line and more consistent in speed even during peak usage times.
- It is also less likely to go down during a power outage.
- No electricity involved = reduced fire risk
- Installed to your home and harder to hack.
- Can withstand more temperature fluctuations and be submerged in water.
**PART 3 · THE PATH FORWARD**

**Fiber Will Be Better Than 5G for In-Home Internet**

<table>
<thead>
<tr>
<th></th>
<th>SBC Fiber</th>
<th>5G</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance</strong></td>
<td>1GB Down/Up Standard</td>
<td>300 Mbps Standard (1GB possible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Source: Verizon 5G release)</td>
</tr>
<tr>
<td><strong>Performance During San Bruno Peak Data Usage (9-10 PM)</strong></td>
<td>No variance</td>
<td>Varies per traffic at tower</td>
</tr>
<tr>
<td><strong>Cell Towers</strong></td>
<td>None</td>
<td>Up to 240 per square mile (60 per carrier)</td>
</tr>
<tr>
<td><strong>Electromagnetic Radiation</strong></td>
<td>None</td>
<td>Thermal and Non-thermal</td>
</tr>
<tr>
<td><strong>In home Wi-Fi</strong></td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td><strong>Restrictions on Reception</strong></td>
<td>None</td>
<td>Rain fade, line of sight restriction and signal blockage by foliage</td>
</tr>
<tr>
<td><strong>Uptime (Reliability)</strong></td>
<td>99.99%</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Customer Service</strong></td>
<td>Local &amp; hands on</td>
<td>Remote</td>
</tr>
</tbody>
</table>
Consumers

More apps = more internet bandwidth & speeds

More bandwidth & faster speeds = fiber

Connected appliances

Internet video
PART 3 · THE PATH FORWARD

Fiber Buildout Rationale
Fiber Buildout Rationale (Continued)

Fiber...

Implements property values by 3%
Builds GDP by 1%
Improves rental values by 8%
State of American Fiber & Broadband Networks – 2018

- 55 publicly owned FTTH citywide network
- 76 publicly owned cable networks
- 197 communities publicly owned fiber service available to business districts
- 120 communities with publicly owned dark fiber
- 130 communities in 27 states with 1 gigabit publicly owned networks
- 268 communities served by utility companies
PART 3 · THE PATH FORWARD

Case Study: Beverly Hills (Video)
PART 3 · THE PATH FORWARD

San Bruno Cable’s Performance in Fibered MDUs

17% of San Bruno homes have San Bruno Cable’s fiber

All fibered homes are in MDUs

Cost of fiber install: $2,200,000

Subscribers generate $2,013,000 in annual subscription revenue with $420,000 (26%) in post fiber revenue growth

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>UNITS</th>
<th>SUBSCRIBERS (% PENETRATION)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peninsula Place</td>
<td>860</td>
<td>488 (57%)</td>
</tr>
<tr>
<td>Crystal Springs</td>
<td>437</td>
<td>367 (84%)</td>
</tr>
<tr>
<td>Shelter Creek</td>
<td>1,296</td>
<td>911 (70%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,593 (17%)</strong></td>
<td><strong>1,766 (68%)</strong></td>
</tr>
</tbody>
</table>
PART 3 · THE PATH FORWARD

Proposed Fiber Project Costs

- **Network & Fiber Construction**: $8,640,751
- **Fixed Equipment**: $1,819,591
- **Working Capital**: $10,460,342
- **Contingency (15%)**: $1,569,051

Total: $12,029,393
Fiber Aspirations: Beverly Hills & San Bruno

<table>
<thead>
<tr>
<th>BEVERLY HILLS</th>
<th>SAN BRUNO</th>
</tr>
</thead>
<tbody>
<tr>
<td>16,000 homes</td>
<td>15,660 homes</td>
</tr>
<tr>
<td>100 miles of fiber</td>
<td>85 miles of fiber</td>
</tr>
<tr>
<td>$31M</td>
<td>$12 M</td>
</tr>
<tr>
<td>5 years to complete</td>
<td>2 years to complete</td>
</tr>
</tbody>
</table>
PART 3 · THE PATH FORWARD

Internet Traffic Growth driven by Video

Netflix alone constitutes 15% of the World’s Internet Traffic
(Source: Mashable)

An explosion of online video could triple bandwidth consumption again in the five 5 years.
PART 3 · THE PATH FORWARD

Benefits of Fiber

- Future proofed
- 1GB and higher internet speeds
- Enterprise will be internet focused—for data, video and phone services
- With TV Guide’s new look and feel, users will have easy navigation
- Apps and IPTV to follow—Bring Your Own Device the goal
- TV channels per San Bruno customer preferences
PART 3 · THE PATH FORWARD

Cable TV Trends

Traditional TV

- High, rising costs
- Too Many Channels
- Clunky cable boxes
- Outdated practices
- Inflexibility

Broadcast Retransmission Fee – Projected Revenue Growth

<table>
<thead>
<tr>
<th>Year</th>
<th>Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>0.20</td>
</tr>
<tr>
<td>2008</td>
<td>0.50</td>
</tr>
<tr>
<td>2010</td>
<td>1.20</td>
</tr>
<tr>
<td>2012</td>
<td>2.40</td>
</tr>
<tr>
<td>2014</td>
<td>4.90</td>
</tr>
<tr>
<td>2016</td>
<td>7.70</td>
</tr>
</tbody>
</table>
As retransmission fees rose over the last decade, network primetime audiences fell by more than half.
PART 3 · THE PATH FORWARD

Cost Comparison: AT&T & San Bruno Cable

Today, a San Bruno subscriber would pay these regular rates without a contract:

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>AT&amp;T NO CONTRACT</th>
<th>AT&amp;T INTERNET + DIRECTV (OUT OF CONTRACT)</th>
<th>SAN BRUNO CABLE CURRENT (NO CONTRACT)</th>
<th>SAN BRUNO CABLE NEW (NO CONTRACT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet Speed</td>
<td>Up to 100 Mbps (18-50 Mbps is typical)</td>
<td>Up to 100 Mbps (18-50 Mbps is typical)</td>
<td>0-300 Mbps (30-75 Mbps is typical)</td>
<td>1 Gig Fiber</td>
</tr>
<tr>
<td>Internet + Limited TV Package</td>
<td>$118 per mo.</td>
<td>$118/mo.</td>
<td>$65.77/mo.</td>
<td>TBD</td>
</tr>
<tr>
<td>One time Fees</td>
<td>$134</td>
<td>$134</td>
<td>$100</td>
<td>$100</td>
</tr>
<tr>
<td>Additional Monthly Surcharges</td>
<td>Broadcast Fee (typically $8/mo.)</td>
<td>Broadcast Fee (typically $8/mo.)</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Month 1 Service Total</td>
<td>$252</td>
<td>$252</td>
<td>$165.77</td>
<td>TBD</td>
</tr>
<tr>
<td>Year 1 Service Total</td>
<td>$1,646</td>
<td>$1,646</td>
<td>$889.24</td>
<td>TBD</td>
</tr>
</tbody>
</table>
This section provided you information on:

- Fiber to the home technology and its benefits
- Proposed project costs
- San Bruno Cable’s path forward
Feedback requested from City Council to:

• Develop a business plan for San Bruno Municipal Cable’s fiber upgrade
• Research and develop financial options to fund the upgrade
Comments & Questions