Broadband Cable
& The Evolution of Technology

Panel: Obsolescence of Cable Television Assets: A Comprehensive Approach

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TFI Communications Technology Asset Valuation Conference

January 24-25, 2013

Marriott Courtyard Downtown, Austin, Texas

Time Warner Cable

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IBM Case

Presented at *TFI Communication Technology Asset Valuation Conference* Jan 24-25, 2013

IBM Credit Corporation v. NC Property Tax Commission
NC Court of Appeals

- Appeal of Valuation of leased computers, Durham County, 2001 Tax Year
- IBM I (2007)
  - NC C.App. vacates PTC decision, "on the grounds that the Commission's prior order had failed of properly employ the burden of proof required…"
  - IBM meet "burden of production", PTC did not meet "burden of persuasion"
- IBM II (2010)
  - PTC gather no new evidence.
  - NC C.App. rules that PTC failed to comply with its previous decision (IBM I). Again remanded with specific issues to consider.
- IBM III (2012)
  - PTC claimed insufficient information due to IBM's evidence not "reliable or credible" and suggested hybrid valuation approach.
  - NC.App. rules PTC still did not meet burden of proof AND that hybrid approach does follow acceptable income approach typically applied by NC
  - Remands with order of entry of a decision "… finding the property is valued at the value listed by the taxpayer, IBM…"

IBM Credit Corporation v. NC Property Tax Commission
NC Court of Appeals

Quotable Quotes:

- "Thus, we are here in 2012, in the ridiculous position of considering a third appeal in the same case…where the Tax Commission has twice failed to comply with the Court's mandate.
- "While we could reject this new valuation approach only on the basis that it was not raised at the hearing before the Tax Commission, as it is well-settled that 'law does not permit parties to swap horses between courts to get a better mount'."

Valuation Lessons??

- Do tables adequately encompass obsolescence?
- Can taxing jurisdiction rely on tables to defeat taxpayer opinion of value?

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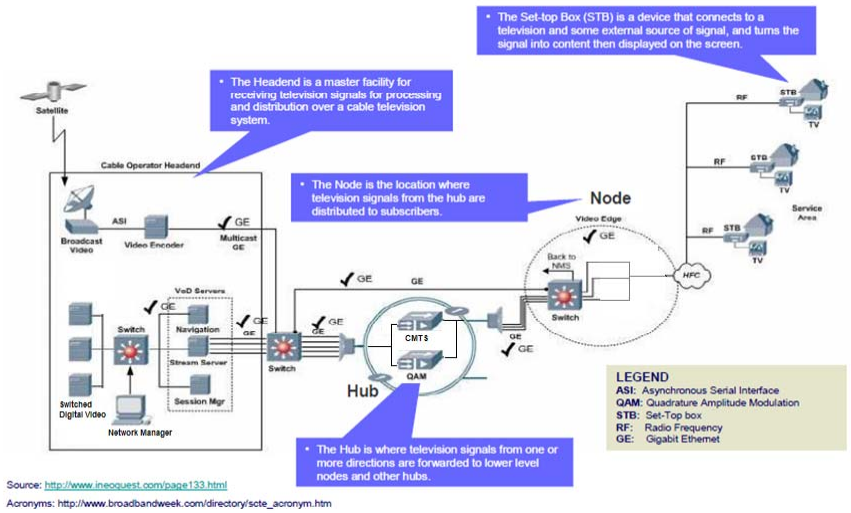
Legacy Headend Model

Typical Hybrid Fiber-Coaxial Network



Source: http://www.ineoquest.com/page133.html

Acronyms: http://www.broadbandweek.com/directory/scte_acronym.htm

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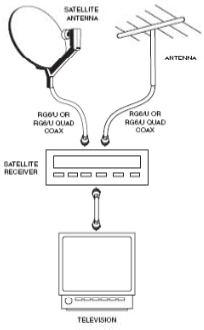
Satellite Receiver

- Receives the signal from dish antenna and passes it on to the TV
- How it works:
  - De-scrambles the encrypted signal received from satellite
  - Converts the signal into an analog format that a standard television can recognize
  - Extracts the individual channels from the larger satellite signal
  - Keeps track of pay-per-view programs and periodically phones a computer at the provider's headquarters to communicate billing information
- Example: Cisco PowerVu D9850



CISCO

Encoder

- At the broadcast center, the high-quality digital stream of video goes through an MPEG encoder, which converts the programming to MPEG-4 video of the correct size and format for the satellite receiver
- Encoding works in conjunction with compression to analyze each video frame and eliminate redundant or irrelevant data.
- After the video is compressed, the provider encrypts it to keep people from accessing it for free.
  - Encryption scrambles the digital data in such a way that it can only be decrypted (converted back into usable data) if the receiver has the correct decryption algorithm and security keys
- Example: Harmonic DiviCom

harmonic

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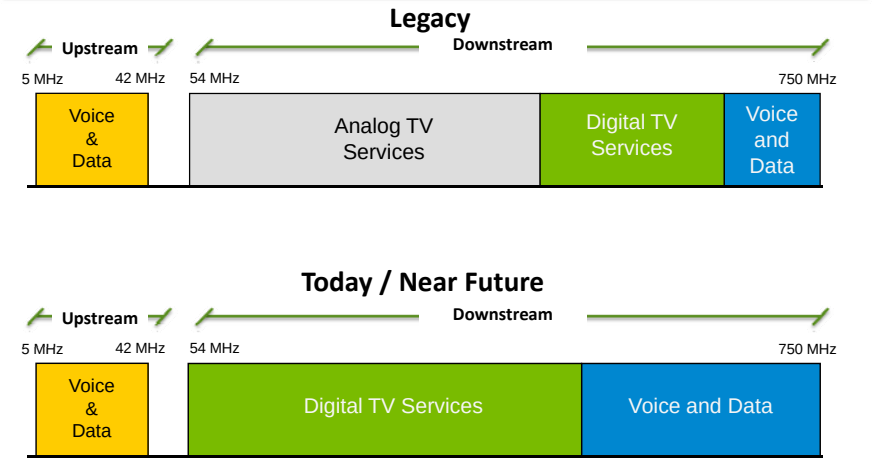
Current Headend Model

CATV Spectrum (Legacy - Today)



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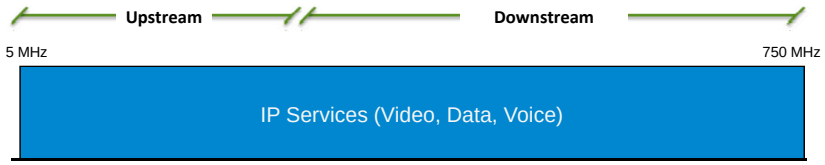
CATV Spectrum – Next Generation

745 MHz = 28.6 Gb/s to 57.3 Gb/s



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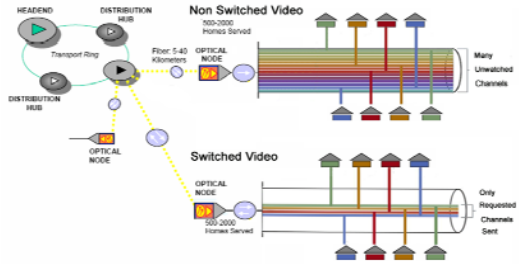
Switched Digital Video (SDV) Equipment

- Traditional broadcast system (non-SDV):
  - Cable service providers send all the video channels to all the TVs connected to it
  - At a given point of time not all TV sets will be playing at the same time
  - Further, not all channels will be playing at the same time
  - Therefore, this system is inefficient
- Switched Digital Video Equipment: The cable service provider uses this equipment to send only the channels customers are actually trying to watch
  - More efficient
  - Saves bandwidth



Digital Content Managers (DCMs)

- Grooms and processes SDV streams
  - Multiplexing – Combining multiple video streams into a single signal over a shared medium
- Supports transcoding – the direct data conversion from one encoding language to another (e.g. MPEG-2 to MPEG-4)
- Allows for digital program insertion (splicing) of regional content or advertisements onto existing video streams

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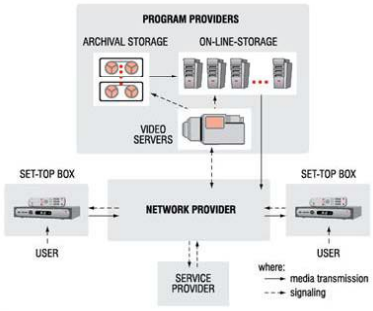
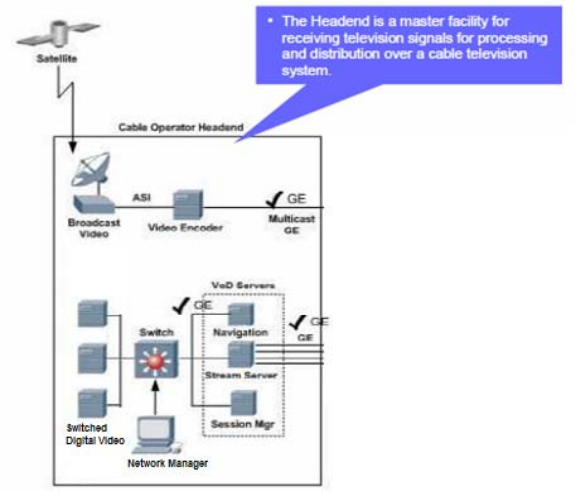
Video on Demand (VOD) Equipment

- Allows users to select and watch/listen to video or audio content on demand
- Stream content through either a set-top box, a computer or other device
- How it works:
  - Set top box sends signal to network provider server for a particular video
  - The network server contacts the content provider video server holding the video library
  - Video server retrieves the video from archives
  - Video streamed back to the set top-box
- Example: Cisco Content Delivery Engine



Headend Network Diagram



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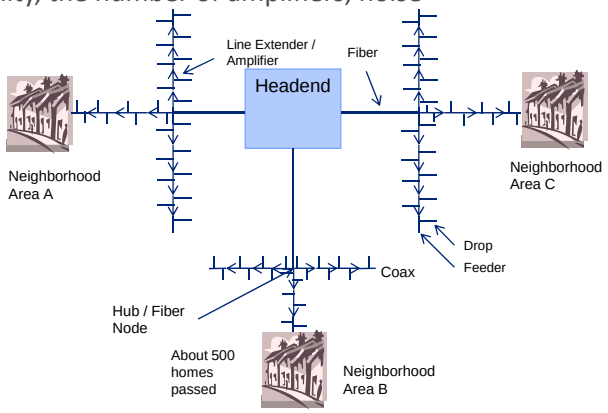
Outside Plant

Hybrid Fiber-Coax Topology

- Node architecture: dividing homes into small neighborhood areas of about 500
- Hybrid fiber-coax ("HFC") network
- Reliability, the number of amplifiers, noise



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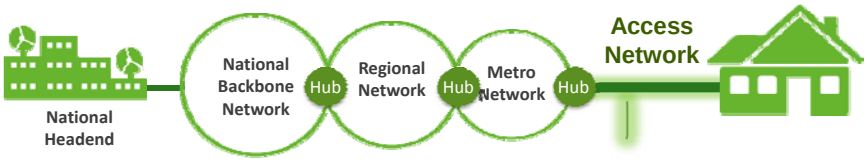
Network Overview



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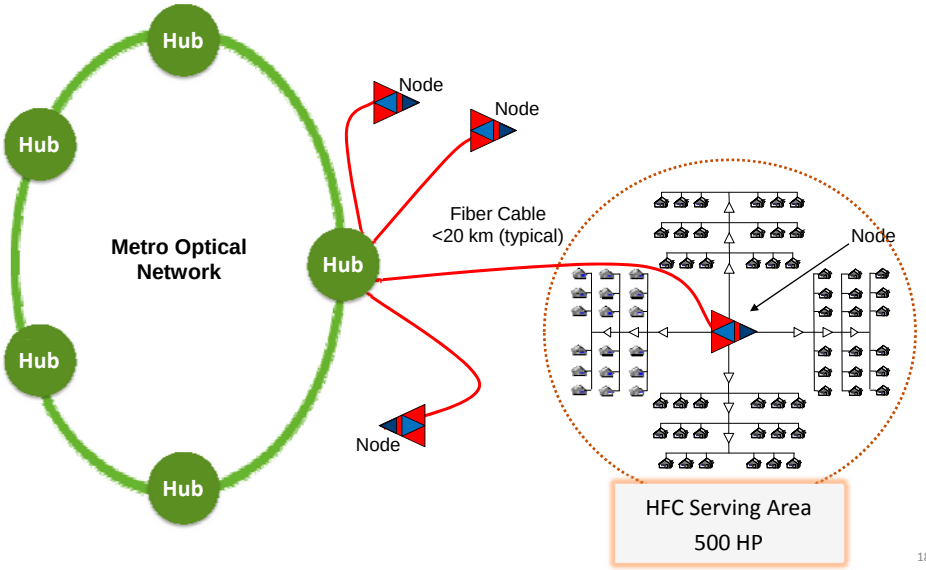
HFC Access &Transport Network



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Depreciation Factors: Coax Cable, Fiber Optic Cable, Electronics

Technological Substitution

- For Coax Cable & Electronics: The technology substitution of Fiber to the Last Amplifier (FTTLA) for HFC
  - Although FTTLA does not necessary replace all existing coaxial cable, it is likely to have significant impact
- For Fiber Optic Cable: The technology substitution of full-spectrum fiber for standard fiber.

Technological Obsolescence

- The declining relative efficiency of existing HFC assets due to the continuing cost of HFC upgrades to maintain current market share in the face of increasing bandwidth demands.

Physical mortality

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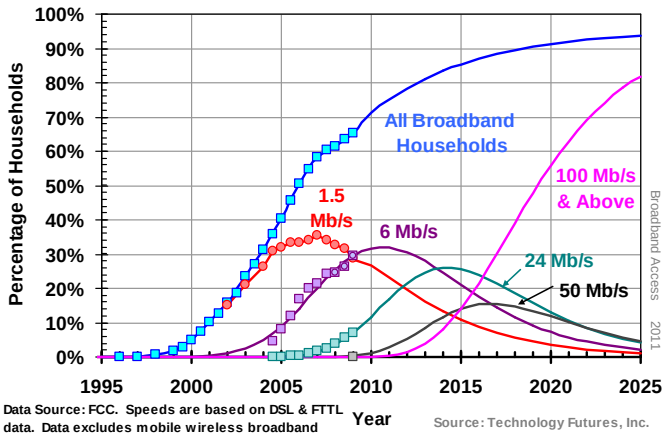
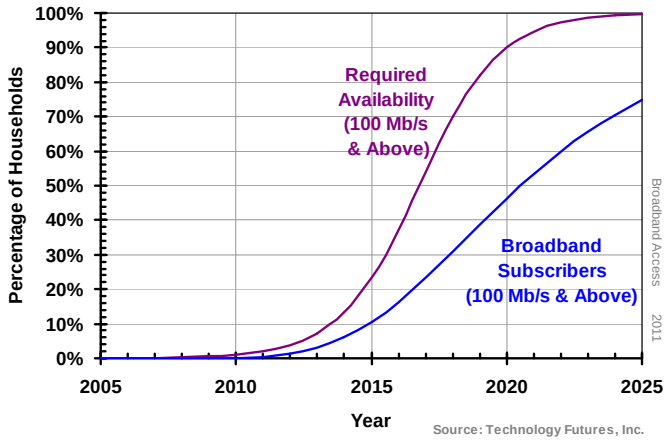
U.S. Broadband Households by Nominal Data Rate



Data Source: FCC. Speeds are based on DSL & FTTL data. Data excludes mobile wireless broadband

Source: Technology Futures, Inc.

Minimum Availability of 100 Mb/s & Above Broadband



Source: Technology Futures, Inc.

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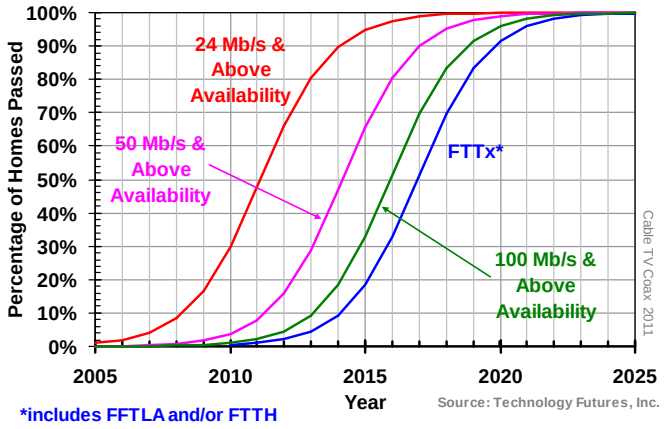
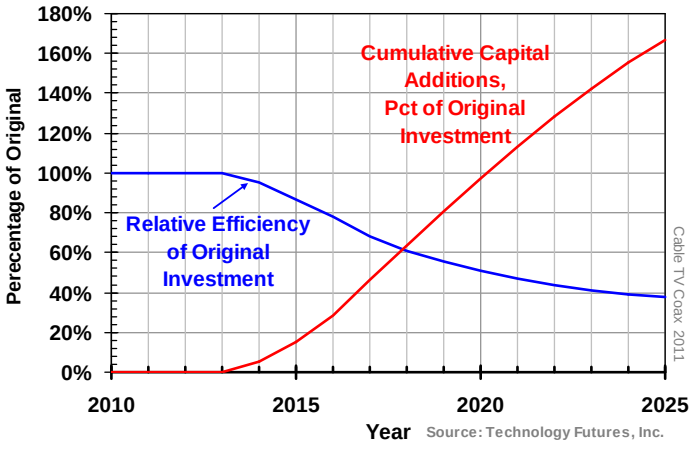
Availability Requirement for Broadband Services and Forecasted FTTLA Adoption



*includes FFTLA and/or FTTH

Forecasted Relative Efficiency of Existing HFC Assets



Relative efficiency = Current Cost / (Current Cost + Upgrade Cost)
= Current Cost / [Current Cost * (1 + Pct Upgrade Cost)]
= 1 / (1 + Pct Upgrade Cost)

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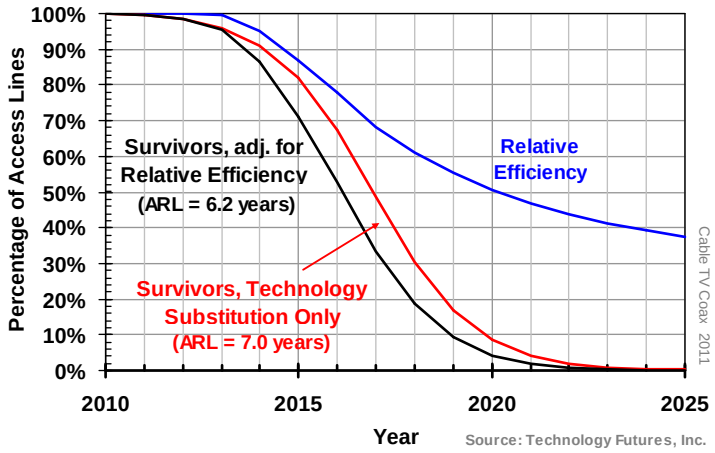
Technology Survivor Curves and Relative Efficiency – NOT Considering Physical Mortality



Applied only to assets subject to replacement: 100% for Electronics, 25% for Coax Cable

Percent Good Factor Calculations for Coaxial Cable assuming FTTLA

Coax Subj. to Replacement: 25% Iowa R3 P-Life: 10

Year End	Survivors HFC	Survivors Coax	Rel Eff.	Adj	Age	Mortality Surivors	Mortality Only RL	Mortality Only SL	Mortality Only Factor	Combined RL	Combined SL	Combined Factor
2010	100%	100%	100%	100%	0.5	99.95%	9.5	10.0	0.9500	7.3	7.8	0.9356
2011	99.5%	99.9%	100%	99.9%	1.5	99.70%	8.5	10.0	0.8504	6.8	8.3	0.8191
2012	98.3%	99.6%	100%	99.6%	2.5	99.08%	7.6	10.1	0.7519	6.3	8.8	0.7154
2013	95.9%	99.0%	99.7%	98.7%	3.5	97.88%	6.7	10.2	0.6557	5.7	9.2	0.6213
2014	91.1%	97.8%	95.0%	92.9%	4.5	95.83%	5.8	10.3	0.5630	5.2	9.7	0.5348
2015	82.1%	95.5%	86.9%	83.0%	5.5	92.68%	5.0	10.5	0.4750	4.6	10.1	0.4545
2016	67.5%	91.9%	78.0%	71.7%	6.5	88.18%	4.2	10.7	0.3928	4.0	10.5	0.3793
2017	48.8%	87.2%	68.3%	59.6%	7.5	81.96%	3.5	11.0	0.3173	3.4	10.9	0.3094
2018	30.4%	82.6%	61.0%	50.4%	8.5	73.31%	2.8	11.3	0.2503	2.8	11.3	0.2462
2019	16.7%	79.2%	55.3%	43.8%	9.5	61.69%	2.3	11.8	0.1935	2.3	11.8	0.1916
2020	8.5%	77.1%	50.7%	39.1%	10.5	47.37%	1.8	12.3	0.1475	1.8	12.3	0.1467
2021	4.1%	76.0%	46.9%	35.7%	11.5	31.96%	1.5	13.0	0.1121	1.4	12.9	0.1118
2022	1.9%	75.5%	43.8%	33.1%	12.5	18.18%	1.2	13.7	0.0858	1.2	13.7	0.0856
2023	0.9%	75.2%	41.2%	31.0%	13.5	8.54%	0.9	14.4	0.0645	0.9	14.4	0.0645
2024	0.4%	75.1%	39.1%	29.4%	14.5	3.16%	0.7	15.2	0.0437	0.7	15.2	0.0437
2025	0.2%	75.0%	37.4%	28.1%	15.5	0.52%	0.5	16.0	0.0313	0.5	16.0	0.0313

Node and cable electronics are similar except 100% of assets are subject to replacement and mortality P-Lives and Iowa curve shapes are different.

QUESTIONS?