Economics of Digital Cable between Content and Information Services
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Cable Industry at a Glance
- 95% of 106.5 mill. HH with access possibility
- 72 mill. HH subscribed to cable (analogue & digital)
- 308 national cable provider, Top 5 serve 70% of subscribers

<table>
<thead>
<tr>
<th>Provider</th>
<th>Market share / Cust.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comcast Corp.</td>
<td>36% (21,305,100)</td>
</tr>
<tr>
<td>Time Warner Cable</td>
<td>15% (10,914,000)</td>
</tr>
<tr>
<td>Charter Communications</td>
<td>9% (6,578,800)</td>
</tr>
<tr>
<td>Cox Communications</td>
<td>9% (6,280,800)</td>
</tr>
<tr>
<td>Adelphia Communications</td>
<td>8% (5,321,700)</td>
</tr>
</tbody>
</table>

Digital Cable Technology
- 'Hybrid Fiber / Coax (HFC)' architecture, 75% roll-out (12/01)
  - Reliability of signal (↑)
  - Quality of picture (↑)
  - Feedback channel capability
- Digital set-top-boxes, > 60% roll-out (12/02)
  - Capacity (↑)
  - Compatibility (↓)

Agenda
- Digital Cable Industry at a Glance
- Areas for Investigation and Research Design
  - Competitive Situation for Cable Operators
    - Market for Content Services
    - Market for Information Services
  - Technology Driven Business Model Changes
- Summary and Outlook towards Europe

Areas of Investigation
(1) Competition of broadband infrastructures:
   Profitability potentials for single providers?
   (Cable, satellite, terrestrial broadcasting, telecommunication services / DSL, mobile networks [UMTS - WiFi])
   - Reasons for differences between countries?

(2) Impacts of intelligent end user devices - especially Digital Video Recorders (DVRs)
   - on business models / value propositions?
**Drivers of Infrastructure Competition**

- Market Situation / Industry Structure
  - Status quo - installed platforms
  - Competition strategies / market entries / substitutes

- Technology
  - New services and business models
  - Cost of 'upgrade'

- Regulation
  - Status quo
  - Trend re. facility-based competition

**Value Chain - Video Content Services**

- Content Providers
  - e.g. Hollywood
- Channels
  - Aggregators, Programs
  - e.g. CNN, ESPN, Discovery
- Equipment Providers
  - Set Top Boxes
  - e.g. Motorola, Scientific Atlanta
- Cable Operators
  - e.g. Comcast, Time Warner, Cox
- Multi Service Operators (MSOs)
- Distributors
- Viewers
  - e.g. Comcast, Time Warner, Cox

**Investigation '1': Infrastructure Competition**

- 'Content Services' - Cable operators
- 'Optical Network' - Satellite providers
- 'Internet access' - DSL

**Investigation '2': Innovative End-User Devices**

- Business models? Value added?
- DVR, DVD, VoD, etc.

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**Content Services - Cable versus Satellite**

- Digital
  - 72% Cable
  - 27% Satellite

**Competition for market share and price**

- So far: Competition for market share
- If price competition: advantages for satellite
Information Services - Cable versus DSL -

**Dig. cable**
- > 13.4 mill. subscribers
- 4 big ILECs* > 5 mill. subscribers (76% mark. share)
- Higher concentration
- Access regulations ('Open access rules')
- '1996 Telecommunication Act': Deregulation until 1999
- '2003 Triannual Review': Permission for services bundle
- Cost of 'Last Mile' as doubtful economic calculation

**DSL**
- Investments > US$ 70 bill. 12/02, (US$ 1,000 per cable customer)
- 4 big ILECs* > 5 mill. subscribers (76% mark. share)
- Higher concentration
- Access regulations ('Open access rules')
- '1996 Telecommunication Act': Deregulation until 1999
- '2003 Triannual Review': Permission for services bundle
- Cost of 'Last Mile' as doubtful economic calculation

* Incumbent Local Exchange Carriers

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Information Services - Economic Comparison -

<table>
<thead>
<tr>
<th>Marketing / Acquisition</th>
<th>Line Card</th>
<th>DSLAM*</th>
<th>Cross-Connect &amp; Tests Installation</th>
<th>Customer premise equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>125</td>
<td>211</td>
<td>174</td>
<td>73</td>
<td>162</td>
</tr>
<tr>
<td>-41%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cable versus DSL

Marketing / Acquisition

- 125
- 211
- 174
- 73
- 47
- 162
- 120

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DVR Features and Drivers

- Cross-promotion & lead-ins ? Questionable
- Role of prime time and concept of life shows ? Minimized
- 'Call-in' model ? Not feasible
- Channel surfing ? Reduced
- Exposure to commercials ? Reduced
- Different forms of advertising needed (e.g. promotions within programs)
- Replay figures replacing Nielssen Data
- More accurate information about viewers

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DVR Impacts on Value Chain

- DVRs: Business model - trade off required!
- **Income**
  - Advertising (from channels) ➔ DVRs
  - Subscription (from viewers) ➔ DVRs
  - **Trade-Off**

- On-demand sales ➔ DVRs - not both!
- DVDs (and their exchange platforms) ➔ DVRs

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Necessity for broadband technology w/ feedback channel capability

<table>
<thead>
<tr>
<th></th>
<th>DSL</th>
<th>Dig. Cable</th>
<th>Total Broadband</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>USA</strong></td>
<td>7,575,800</td>
<td>13,367,000</td>
<td>20,942,800</td>
</tr>
<tr>
<td>(36.2% of BB)</td>
<td>(63.8% of BB)</td>
<td>(18% of HH)</td>
<td></td>
</tr>
<tr>
<td><strong>GE</strong></td>
<td>3,864,500</td>
<td>64,600</td>
<td>3,929,100</td>
</tr>
<tr>
<td>(98.4% of BB)</td>
<td>(1.6% of BB)</td>
<td>(7% of HH)</td>
<td></td>
</tr>
</tbody>
</table>

Problem: feedback channel

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Digital subscriber Line Access Multiplexer

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Summary and Outlook (1)

- Video Content Services:
  - US: Large cable incumbents challenged by small, but promising DSBs
- Information Services:
  - US: New entry cable players as serious threat to ILECs

Competitive situation in both markets heavily depending on 'Industry Structure' & 'Regulation'
- To be analyzed country by country

Summary and Outlook (2)

New technologies such as DVRs:
Impact on various business models / economics in related industries
- Too new and too small to offer real world calculations
- Less country-specific than infrastructure - facility battles

Digital Cable Industry
-US and Europe -


<table>
<thead>
<tr>
<th>Country</th>
<th>DSL-Access (% tel. ext.'s)</th>
<th>Cablemodems (% tel. ext.'s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Spain</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Italy</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>France</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>UK</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Austria</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Belgium</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Netherlands</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>USA</td>
<td>14</td>
<td>15</td>
</tr>
</tbody>
</table>

Cable Markets in Selected Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>G</th>
<th>GB</th>
<th>F</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhabitants [Thsd.]</td>
<td>82,143</td>
<td>59,501</td>
<td>60,628</td>
<td>281,000</td>
</tr>
<tr>
<td>HH [Thsd.]</td>
<td>38,123</td>
<td>25,105</td>
<td>24,400</td>
<td>106,500</td>
</tr>
<tr>
<td>TV-HH [% Total-HH]</td>
<td>98.7</td>
<td>97.0</td>
<td>93.6</td>
<td>99.4</td>
</tr>
<tr>
<td># channels received by 70% of inhabitants</td>
<td>38</td>
<td>5</td>
<td>7</td>
<td>n.a.</td>
</tr>
<tr>
<td>HH w/physical cable access</td>
<td>77.5</td>
<td>51.9</td>
<td>36.8</td>
<td>95.0</td>
</tr>
<tr>
<td>[% of TV-HH]</td>
<td>55.3</td>
<td>13.6</td>
<td>13.2</td>
<td>72.0</td>
</tr>
<tr>
<td>HH w/Cable access [% of TV-HH]</td>
<td>5.1</td>
<td>25.8</td>
<td>13.6</td>
<td>26.5</td>
</tr>
</tbody>
</table>

… Questions, Comments, Complaints ?

Thank you very much for your attention!

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