Broadband Solutions for Chinese Taipei CATV Operator

Purpose: Information
Submitted by: Chinese Taipei
Broadband Solutions for Chinese Taipei
CATV Operator

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CTO, kbro Co. Ltd.
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Agenda

1. Chinese Taipei CATV Market Overview
2. kbro’s Broadband Solutions
3. Alternative Broadband Solution for CATV Network
4. Solutions to Increase HFC Bandwidth
5. CATV Network Move towards Digital Convergence
6. Conclusion
1. Chinese Taipei CATV Market Overview
Chinese Taipei CATV Market Overview

- Population: 23 Millions (7.8M Households)
- CATV subscriber: 4.98M Households (63.8% penetration)
- Franchise areas: 51 areas
- Number of CATV operators: 63 operators
- 5 MSOs control over 75% of the CATV market
- Major Competitor: CHT MoD (0.7M Households)

<table>
<thead>
<tr>
<th>Operator</th>
<th>CATV Subs</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>kbro</td>
<td>1,113,452</td>
<td>22%</td>
</tr>
<tr>
<td>CNS</td>
<td>1,045,143</td>
<td>21%</td>
</tr>
<tr>
<td>TBC</td>
<td>724,628</td>
<td>15%</td>
</tr>
<tr>
<td>TFM</td>
<td>541,176</td>
<td>11%</td>
</tr>
<tr>
<td>TOP</td>
<td>324,668</td>
<td>7%</td>
</tr>
<tr>
<td>Independent</td>
<td>1,231,184</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,980,251</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: NCC, 2010
Chinese Taipei Cable Broadband Market Status

- Chinese Taipei broadband subscribers have reached 5 Million in 2010.
  - xDSL: 2.53M (51%)
  - FTTx: 1.58 M (31%)
  - Cable Modem: 0.83M (17%)
  - Others (LL/WLAN): 0.07M (1%)

- Cable Modem subscriber market share increased 8% within 2 years (9% in 2007 and 17% in 2009).

Broadband Subscribers among CATV Operators:

<table>
<thead>
<tr>
<th>Operator</th>
<th>CATV Subs</th>
<th>Broadband Subs</th>
<th>Penetration Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>kbro</td>
<td>1,113,452</td>
<td>217,805</td>
<td>20%</td>
</tr>
<tr>
<td>CNS</td>
<td>1,045,143</td>
<td>179,100</td>
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<tr>
<td>TBC</td>
<td>724,628</td>
<td>142,540</td>
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<tr>
<td>TFM</td>
<td>541,176</td>
<td>118,843</td>
<td>22%</td>
</tr>
<tr>
<td>TOP</td>
<td>324,668</td>
<td>79,004</td>
<td>24%</td>
</tr>
<tr>
<td>Independent</td>
<td>1,231,184</td>
<td>94,159</td>
<td>8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,980,251</strong></td>
<td><strong>831,451</strong></td>
<td><strong>17%</strong></td>
</tr>
</tbody>
</table>

Source: NCC, Feb. 2010
kbro at a Glance

Currently provides Basic Cable TV, Broadband Internet, and Digital Premium Services:
- Basic Cable TV Subscriber: 1.1 Million
- Cable Modem Subscriber: 0.22 Million
- STB deployed: 0.1 Million Subscribers

The first CATV operator in Chinese Taipei launched HD channels, PPV channels, PVR service, and 30Mbps cable broadband services.

A leading channel distributor in Chinese Taipei with 18 channels under agency.

Coverage Areas:
- Northern: Taipei / Taoyuan / Hsinchu
- Central: Taichung / Changhua
- Southern: Tainan / Pingtung
2. kbro’s Broadband Solutions
kbro’s Broadband Solutions

DOCSIS 3.0

- kbro has implemented DOCSIS 3.0 CMTS since 2008, and begun to provide 20Mbps service in 2009 and 30Mbps service in 2010.

- Currently supports 4 RFs channel bonding and provides down stream speed up to 160Mbps.
Due to coaxial cable has reached most household coverage, “Ethernet Over Coaxial” access technology is a valuable cable broadband alternative solution.

**Customized EoC:**
integrating ONU and EoC Master in single housing.

EOC solution has been adopted by kbro in 2009.
Utilize HFC network fiber resources to construct FTTB / FTTC network for both internet access and leased line services.

kbro has adopted GEPON technology as a broadband service platform and integrated with Ethernet, VDSL as last mile solution.
3. Alternative Broadband Solution for CATV Operator
Alternative Broadband Solution for CATV Network

**FTTH**

- **HFC toward FTTH:**
  - Single Fiber node will cover less and less subscribers.
  - Fiber will move toward customer premise sites.
- Coaxial cable might only play a role as in-house wiring in the future.

**Trunk** → **Feeder** → **Drop**

- **All Coaxial**: Up to 20,000 home passed
- **Fiber replace Backbone**: 500 ~ 1,000 home per FN
- **FTTC**: Up to 100 homes per FN
- **FTTH**: Fiber to home

<table>
<thead>
<tr>
<th>All Coaxial</th>
<th>Fiber replace Backbone</th>
<th>FTTC</th>
<th>FTTH</th>
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<tbody>
<tr>
<td>Fiber</td>
<td>Amp.</td>
<td>Amp.</td>
<td>Amp.</td>
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<tr>
<td>Down</td>
<td>FN</td>
<td>FN</td>
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<tr>
<td>Coaxial</td>
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<td>Fiber</td>
<td>Fiber</td>
</tr>
<tr>
<td>Fiber</td>
<td>Backbone</td>
<td>Backbone</td>
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</tr>
<tr>
<td>Fiber</td>
<td>FTTC</td>
<td>FTTC</td>
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- **Fiber**
- **Coaxial**
RF over Fiber or Glass (RFOG / DOCSIS PON / Cable PON)

- Single fiber supports both forward and return path.
- A solution for cable operators to achieve FTTH by utilizing existing CMTS and HFC infrastructure.
- The specification is still under developing by SCTE (Society of Cable Telecommunications Engineers), also named as Advanced Fiber Access
How Cable Operators benefit from RFoG

- RFoG enables upstream modulation from 16QAM to 64QAM for bandwidth increasing.

- “Burst Mode” could effectively isolate DOCSIS upstream noise interferences generated from customer premises.

- RFoG could be an alternative solution for cable operators to provide both video and data services via different wavelengths.

- RFoG may be a cost effective way to deploy FTTH for cable operator.

- kbro will conduct RFoG field trial in 2nd half of 2010.
4. Solutions to Increase HFC Bandwidth
Alternative Solutions to Increase HFC Bandwidth

Bandwidth is the key factor for cable operator to digital convergence.

HFC bandwidth could be expanded by following methods:
- Fiber Node segmentation **
- Implement 256QAM to obtain more bandwidth **
- Video compression by H.264 **
- Utilize VBR mechanism **
- Advanced HFC broadband technology **
- Switched Digital Video (SDV)
- Reclaim some analog channels **
- Upgrade HFC to 860Mhz or 1Ghz *
- Digitize all analog channels

Note: *
: Solution field trial or on-going actions taken by kbro
**: Solution adopted by kbro already
5. CATV Network Move towards Digital Convergence
CATV Network Move towards Digital Convergence

- Digitize existing HFC network.
- Increase per subscriber bandwidth.
- Provide interactive digital CATV services.
- Trend of IP over Coaxial – DVBC/IPTV dual mode STB or pure IPTV STB
- Face the challenges of internet video service: defend or join?
- Utilize “Cloud Computing” technology to provide converged services.
5. Conclusion
Service demand from customer drives the digital convergence.

Video service increase customer bandwidth demand.

Teleco and CATV MSO will be the major service provider for “Home Networking” service.

IP will be the standard protocol over different network in the future.

Video service will be the main battle field of digital convergence.

Fiber to the home will be the trend both for telecommunication and CATV network.
Thank You

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