Fiber Access Extension – Reusing In-Building Coaxial Cabling for Multi-Gigabit Performance

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Fibre Access Extension – Reusing The In-Building Coaxial Cabling for Multi-Gigabit Performance

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Chair, MoCA Access Work Group
BBF Board Member

BASe Las Vegas - October 26th 2019
## Challenges in MDU PON Deployments

<table>
<thead>
<tr>
<th>Potential Barrier</th>
<th>Potential Delay</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>New FTTH cabling</td>
<td>Several months to year</td>
<td>Approval from all condo owners</td>
</tr>
<tr>
<td>Cable construction work to apartments</td>
<td>Several months</td>
<td>Condo owner don’t see any benefit of new wiring</td>
</tr>
<tr>
<td>Apartment installation</td>
<td>Several weeks</td>
<td>Key handling and access to apartments</td>
</tr>
<tr>
<td>Reluctant to convert to fibre services</td>
<td>Length of existing subscription contracts</td>
<td>Understand the benefits with fiber based services</td>
</tr>
<tr>
<td>In-building wiring cost (paid by building owner)</td>
<td>Depending of annual condo meeting</td>
<td>Need to be approved by a majority</td>
</tr>
</tbody>
</table>

**Reduce Deployment Barriers**  **Use existing infrastructure**
## Existing MDU Infrastructure – Coax or Copper

<table>
<thead>
<tr>
<th>Cable Attribute</th>
<th>Coax Cable Network</th>
<th>Twisted Pair Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of in-building wires</td>
<td>☻</td>
<td>☹</td>
</tr>
<tr>
<td>Cable availability at entry point</td>
<td>☻</td>
<td>☻</td>
</tr>
<tr>
<td>Cabling reach home location of TV-set</td>
<td>☻</td>
<td>☹</td>
</tr>
<tr>
<td>Low cable attenuation @ high frequency</td>
<td>☻</td>
<td>☹</td>
</tr>
<tr>
<td>Support for multi-gigabit</td>
<td>☻</td>
<td>☹</td>
</tr>
<tr>
<td>10 gigabit Roadmap</td>
<td>☻</td>
<td>☹</td>
</tr>
</tbody>
</table>
## Coax Access Technologies

<table>
<thead>
<tr>
<th>Technology</th>
<th>DL</th>
<th>UL</th>
<th>Topologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>G.fast over coax (106 MHz profile)</td>
<td>900 Mbps</td>
<td>100 Mbps</td>
<td>Supports only point-to-point topologies</td>
</tr>
<tr>
<td>G.fast over coax (212 MHz profile)</td>
<td>1800 Mbps</td>
<td>100 Mbps</td>
<td>Supports only point-to-point topologies</td>
</tr>
<tr>
<td>G.hn (200 MHz profile)</td>
<td>1200 Mbps</td>
<td>200 Mbps</td>
<td>Supports only 15 modems in point-to-multipoint</td>
</tr>
<tr>
<td>MoCA Access 2.5</td>
<td>2500 Mbps</td>
<td>2000 Mbps</td>
<td>Not a baseband technology</td>
</tr>
</tbody>
</table>

**Best technology match to GPON fiber access extension**

MoCA Access 2.5
MoCA Technology Roadmap

Numbers shown indicate actual data rates.

**MoCA 1.0**
- Field Tests
- Demonstrated 100+ Mbps in 97% of all outlets
- 250 homes (U.S.)

**MoCA 1.1**
- Data rate: 175 Mbps

**MoCA 2.0**
- Field Tests
- Demonstrated 400 Mbps in 90% of all outlets
- 212 homes (U.S.)

**MoCA 2.5**
- Data rate: 2.5 Gbps

**MoCA Access 2.5**
- Data rate: 2.5 Gbps

**MoCA 3.0**
- Data rate: 10 Gbps

MoCA 2.0: 800 Mbps in 100% of homes
MoCA 2.0: 900 Mbps in 75% of homes
Orbi: 300 Mbps in 50% of homes
Eero and Plume: less than 200 Mbps
MoCA Overview

- Alliance established in 2004.
- Fastest and most reliable home networking technology standard available.
- Actual data rates (MAC):
  - 1 Gbps (MoCA 2.0)
  - 2.5 Gbps (MoCA 2.5)
  - 10 Gbps (MoCA 3.0)
- Uses existing coaxial cabling. Not dependent on type or age of wiring.
- MoCA in deployment by cable, telco and satellite operators worldwide.
- More than 270 million chipsets in the field.
- 228 certified products.
- MoCA Access 2.5 in trials at operators in Europe and China.
MoCA Access 2.5 Features

- Transparent IEEE802.3 bridge
- MAC speed up to 2.5Gbps (DL:2.5/UL:2.0)
- Configurable DL/UL ratio
- Profiles for 1.0/1.5/2.0 or 2.5Gbps MAC rates
- MAC using time division multiple access (TDMA)
- Supports up to 512 multicast addresses and full VLAN range
- Shaping and QoS up to eight classes
- Average latency < 3ms
- Max MTU size 2k
- Client node with three power states

- Frequency range 400-1675MHz
- Profile C 225MHz/profile D 300,400 or 500MHz bands with channel bonding
- P2PM up 63 modems
- PHY using time division duplexing (TDD) and OFDM modulation
- Up to 1024QAM
- Packet error rates < $10^{-6}$ or $10^{-8}$
- Supports multicast over a coax link
- 5 pre-defined bands for AL-IP or co-exist TV services
- AES cryptographic algorithm with 128-bits key with AATEK refreshment within six hours
- Three power contours with 45dB, 55dB or 65dB link budget
MoCA Access Principals

- QoS: Shaping, Link Booking, Security, VLAN, IGMP, Management
- Ethernet
  - 2 RF-channels, 200MHz
  - 3 RF-channels, 300MHz
  - 4 RF-channels, 400MHz
  - 5 RF-channels, 500MHz, 250 m
- IEEE1905
- MoCA Access MIB’s / TR-181 / YANG
Coax Network Deployment Topologies

- Star, cascade, tap and tap/splitter
- Point-to-point and point-to-multipoint
MDU Fiber Extension Deployment Locations

Fiber To The Extension Point (FTTep)

- **FTTep\textsubscript{02}**: Out-door Street Cabinet
- **FTTep\textsubscript{01}**: Out-door Wall Cabinet
- **FTTep\textsubscript{IB}**: In-door Basement
- **FTTep\textsubscript{IF}**: In-door Floor
- **FTTep\textsubscript{IL}**: In-door Loft
- **B**: Max. distance from out-door cabinet
P2MP FTTep Deployment – Shared Reverse Power Feed (SRPF) 2MP

Out-door cabinet

MoCA Access NC
GPON

DPX
1025-1650MHz

PE

SRPF 25VDC

Video 5-862MHz

Max. 300 feet / RG11

Modem Grouping

STB Modem

25VDC

AP

PI

25VDC

STB Modem

25VDC

STB Modem

25VDC

STB Modem

25VDC

STB Modem

25VDC

FRu 25VDC

SRPF 25VDC

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INCOAX

October 31, 2019

s. 12
P2P FTTep Deployment – with individual RPF
P2MP FTTep Deployment – Power over Coax (PoC)

Out-door cabinet

- CLC2511v2
- PE
  - EPON
  - PoC
  - Video
- 30-63VAC
- 5-1002MHz
- DPX
- 1125-1650MHz

- Splitter
- Modem Grouping
- Modem
- STB
- AP
- Modem

Max. 300 feet / RG11
InCoax Fibre Access Extension Node

Key features:
- Accumulated 10 Gbps over four RF-ports
- Each RF-port delivers 2.5 Gbps
- Delivers IPTV, VoIP and high-speed Internet
- Operational bands between 400-1675 MHz
- Co-exist with terrestrial and cable-TV services
- Uses existing in-building coaxial cables
- Delivers broadband through existing antenna outlet
- Fast and cost-efficient in-building deployment
Questions?
Fiber Access Extension – Reusing In-Building Coaxial Cabling for Multi-Gigabit Performance

Helga Tiainen
Director, Business Development

INCOAX

broadband forum
June 2-4, 2020
Den Haag, The Netherlands

THE DATE HAS BEEN SET!

An event by tech innovators for tech leaders!

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