

Cable Technology

Overview -

FCC Technology

Transitions Policy

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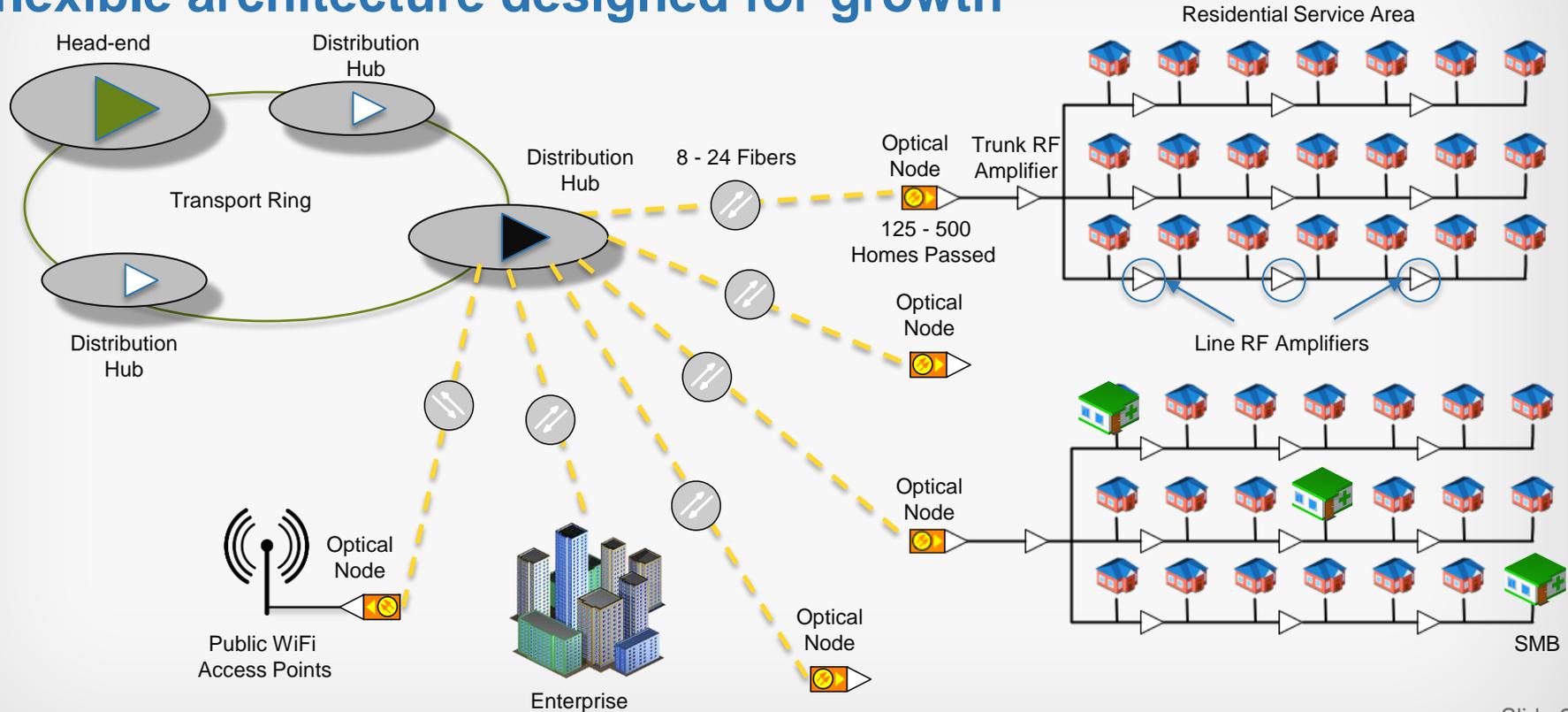
Task Force Workshop

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# Cable Hybrid-Fiber Coax (HFC) Architecture

A flexible architecture designed for growth



# Cable Hybrid-Fiber Coax (HFC) Architecture

## A flexible architecture designed for growth

- HFC enables evolution from analog linear TV services only to:
  - Analog and digital linear TV services (both SD and HD)
  - Switched digital TV services (e.g. VoD and SDV)
  - Broadband Internet access services
  - VoIP telephony services
  - Home security services
  - Managed IP cable services
- Cable operators have also deployed over 120,000 public WiFi access points
- Cable operators also provide services to small, medium and large businesses

# Diversity of Cable Systems

## Not all cable systems are the same

- Key HFC characteristics impacting network capacity that vary:
  - Cable system spectrum typically is 750 or 860 MHz, but may vary from as low as 450 MHz to as much as 1 GHz
  - Typical node segment size is less than 500 HHP, but may be as high as 1,000 HHP
  - Number of amplifiers in cascade from zero to 5 or 6
- Each cable operator must assess how to optimize the deployed HFC network (segment nodes, upgrade network to expand frequency limits, reduce or eliminate analog channels, etc.)

# DOCSIS<sup>®</sup> Technology Evolution

| DOCSIS Version                          | DOCSIS 1.0 | DOCSIS 1.1 | DOCSIS 2.0 | DOCSIS 3.0   | DOCSIS 3.1          |
|---|------------|------------|------------|--------------|---------------------|
| <b>Example Services</b>                 |            |            |            |              |                     |
| Broadband Internet                      | X          | X          | X          | X            | X                   |
| Tiered Services                         |            | X          | X          | X            | X                   |
| VoIP                                    |            | X          | X          | X            | X                   |
| Video Conferencing                      |            |            | X          | X            | X                   |
| SMB Business Services                   |            |            | X          | X            | X                   |
| Entertainment Video                     |            |            |            | X            | X                   |
| Enterprise Business Services            |            |            |            |              | X                   |
| <b>Example Customer Premise Devices</b> |            |            |            |              |                     |
| Cable Modem                             | X          | X          | X          | X            | X                   |
| VoIP Phone (MTA)                        |            | X          | X          | X            | X                   |
| Residential Gateway                     |            | X          | X          | X            | X                   |
| Video Conferencing                      |            |            | X          | X            | X                   |
| Mobile Devices                          |            |            |            | X            | X                   |
| IP Set-top Box                          |            |            |            | X            | X                   |
| Business Services Gateway               |            |            |            |              | X                   |
| <b>Downstream Bandwidth</b>             |            |            |            |              |                     |
| Capacity in bits-per-sec                | 40 Mbps    | 40 Mbps    | 40 Mbps    | 160 Mbps min | Target 1 Gbps min   |
| <b>Upstream Bandwidth</b>               |            |            |            |              |                     |
| Capacity in bits-per-sec                | 10 Mbps    | 10 Mbps    | 30 Mbps    | 120 Mbps min | Target 200 Mbps min |

# DOCSIS 3.1 Technology

## Cable continues to invest

- What's new in DOCSIS 3.1?
  - More efficient modulation and FEC (OFDM, OFDMA, LDPC)
  - Enables new downstream and upstream spectrum allocations
  - Extensive re-use of DOCSIS 3.0 concepts
  - Energy efficient operation through traffic-load based duty cycle
- Backward compatibility with earlier versions
  - DOCSIS 3.1 cable modems can be upgraded before head-end and can coexist with older versions (1.1, 2.0, and 3.0)
- DOCSIS 3.1 specifications to be issued later this year

# Summary

## Evolving Cable Technology

- Cable is investing in delivering the best broadband experience possible
- DOCSIS 3.1 is the latest in the series that has evolved to meet anticipated future demand and facilitate new applications
  - It can cost-effectively scale to multi-gigabit speeds
  - It can work in and further optimize existing HFC plant
  - It defines options for new spectrum usage
  - It uses the latest modulation and FEC technologies