Passive Coax Media

PHY-layer Tradeoffs vs. Active HFC Media

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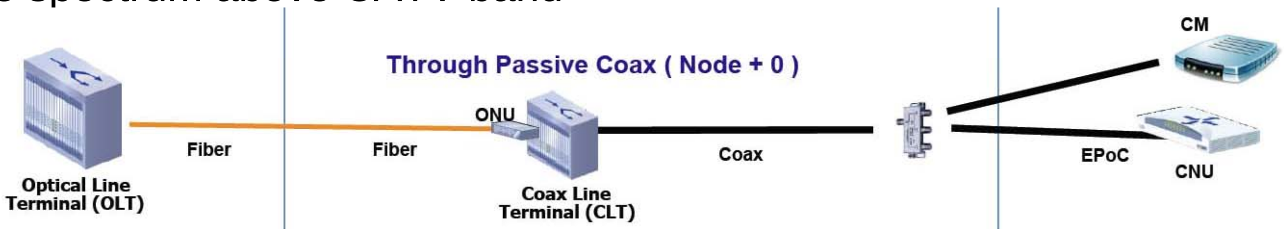
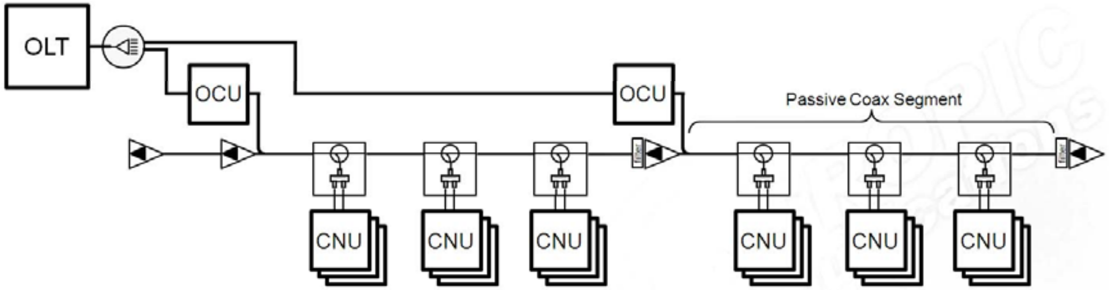
Passive Coax Media vs. Active

- Passive Coax has different channel models than Active HFC's FDD bands
    - passive coax plants (e.g., Node+0 or MDUs)
        - can use spectrum above CATV band



    - passive coax segments between amplifiers on active HFC networks
        - can use and ***reuse*** spectrum above FDD allocations



    - channel models for passive coax are symmetric
        - whereas upstream & downstream models are different within HFC's FDD bands
    - High-RF upstream channel is very different from that of FDD's Low-RF
        - opposite ends of the spectrum (e.g., >750MHz vs. <54MHz)
        - significantly affects optimal PHY-layer design…

PHY for Passive Coax vs. Active

- Both passive coax media can use high-RF spectrum
  - i.e., relatively wider, contiguous, unused spectral allocations
    - occupation of spectrum outside FDD bands (e.g., near tap rolloff)
    - less need for scatter/gather type channelization in freq. domain
    - reduced adjacency to legacy → less need for scatter/gather type modulation
    - well-suited for OFDM efficiencies
      - highly scaleable to wide channels: computational complexity scales ~$N \times \log_2 N$
      - frequency-domain equalization, bitloading, interference mitigation, OFDMA,…
  - High-RF has little/no burst impulse noise (unlike FDD's upstream band)
    - reduced/no need for interleaving; helps enable shorter symbols
  - High-RF has higher attenuation per unit length
    - → higher pathloss to/from CNUs: argues for OFDMA for greater reach/SNR
    - → greater disparity among pathlosses to/from CNUs
      - argues for CNU-specific bitloading
    - → reduced micro-reflection multipath
      - argues for shorter symbol duration
        - » better payload packing efficiency; finer scheduling granularity
        - » fewer simultaneous OFDMA transmitters
        - » shorter allocation cycles; lower latency

Summary: PHY for Passive Coax

- A TDD mode for EPoC can operate on Passive Coax media
  - e.g., use of spectrum outside FDD bands

- Passive Coax has different channel models than Active HFC's FDD bands
  - e.g., broader allocations outside FDD bands (High-RF)
  - significantly affects optimal PHY-layer design

- Objectives need to keep open the possibilities
  - a TDD Mode on Passive Coax
  - PHY optimizations for different media: Passive Coax and Active HFC