



# Transmission Strategies for High-Speed Access over Ethernet Copper Wiring

# Why higher speeds?

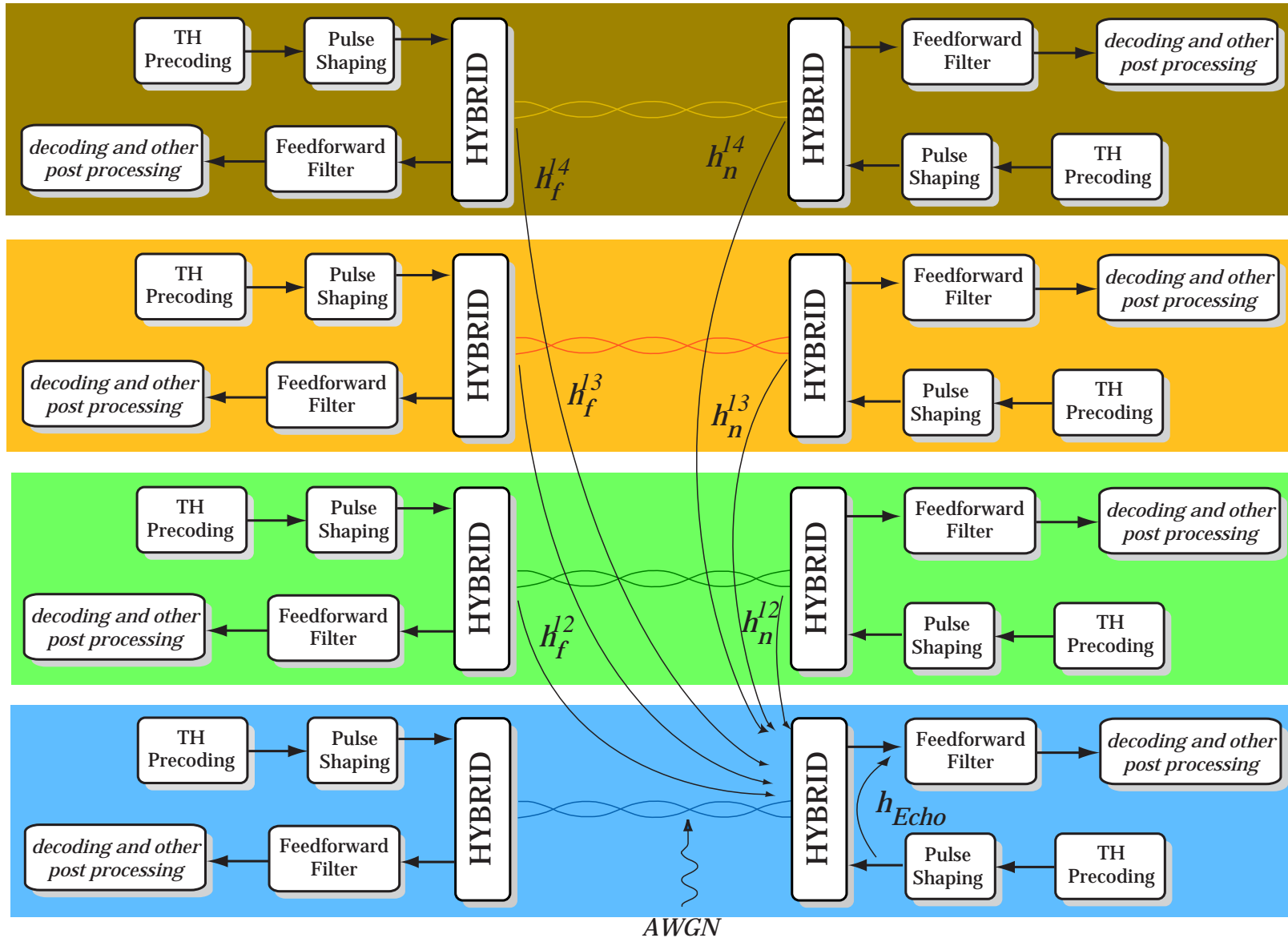


# Applications of 40 Gbps

High-speed, cost-effective data applications

- Workstations supporting:
  - Modeling and simulation
  - Video
  - High resolution image files
- Local and aggregation uplinks
- High-Power-Computing data centers
- Enterprise server farms
- Power over Ethernet

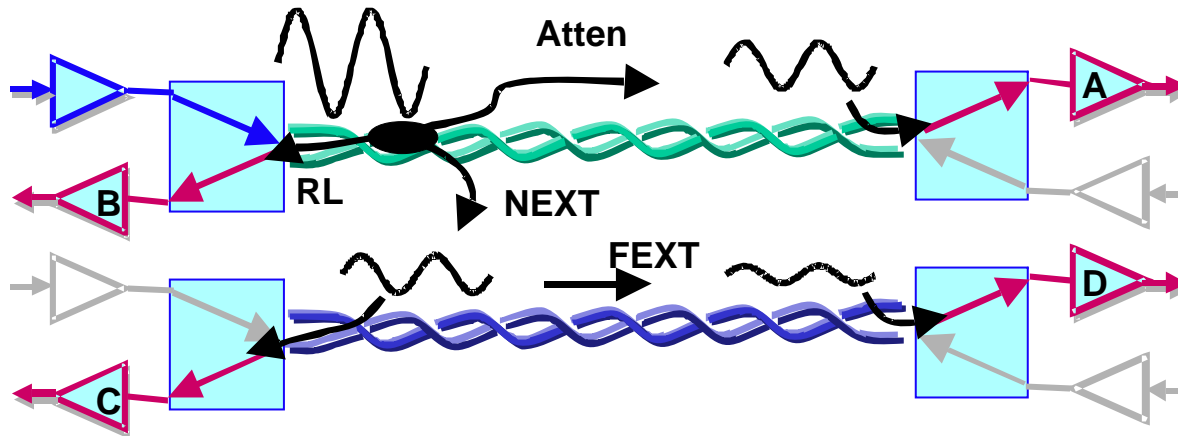
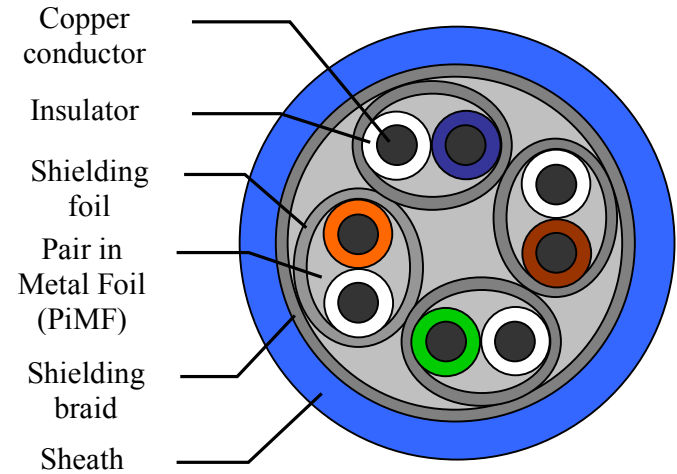
# Ethernet PHY



# Interference

## ■ Interference sources:

- Echo; dominant
- Far-End Crosstalk (FEXT); dominant
- Near-End Crosstalk (NEXT)
- Due to the double shielding, Alien X-talk is negligible for CAT-7A cables.



## Power Utilization

- Increase PHY complexity results in:
  - Increased power consumption (first generation chips consume 10x more power than 1000BASE-T chips)
  - Increased need for cooling

## Latency

- Latency is the time delay needed to recover signal packets:
  - 1000BASE-T PHY has a round-trip latency of up to 880 ns.
  - 10GBASE-T PHY has a round-trip latency of up to 2.56  $\mu$ s.



## Next Generation Initiatives

- Decrease power utilization and latency:
  - These initiatives are being driven by:—Energy Efficient Ethernet (EEE) objectives.
  - U.S. Federal Executive Order 13423.
  - U.S. Green Building Council (USGBC).

