
Ethernet in the First Mile A Carrier Perspective

Charles Cook
cicook@qwest.com



Setting the Stage - Caveats

Applicable to Copper, PON, and P2P

Wish List

- **Presentation of desirable attributes irrespective of perceived technology constraints**

System Approach

- **Touches on requirements beyond current EFM scope**
- **Must know how a carrier may use this technology in order to ensure the MAC and PHY have the necessary hooks and functionality**

Intended to Stimulate Thought

High-level Carrier Objectives

Provide Higher Bandwidth Opportunities

Single Network versus Multiple Overlays

Consistency with Existing Distribution Network

Ubiquitous Deployment

Reduce Capital Expenditures

Low Operations Costs

Requirements

Physical Layer

- **Range (copper):** 12Kft 24gauge, consistent with CSA design rules
- **Range (PON, P2P):** TBD - but >20Km seems reasonable
- **Splitting Ratio:** ≥ 64 , provides deployment flexibility
- **Bridged Taps:** equivalent working length consistent with CSA design rules
- **Bandwidth (copper):**
 - ≥ 21.5 Mbps downstream (3 simultaneous video streams + voice + data)
 - ≥ 3 Mbps upstream, would like enough for an upstream video feed
- **Bandwidth (PON, P2P)**
 - PON > 50 Mbps
 - P2P > 1 Gbps

Requirements - continued

CPE

- **Shrink-wrapped CPE (customer owned ultimately)**
- **Self Install (copper), e.g., plug into a network provisioned RJ-45**
- **Self Install (fiber), future**
- **Diagnostic CPE Self Test - accessible by network and subscriber**
- **Bandwidth Aggregation (copper terminating CPE) - in order to get reach and bandwidth, may consider a 2 pair solution.**
- **Low cost**

Requirements - continued

Services

- **Broadcast Support In Downstream Direction**
 - streaming video distribution
 - streaming audio distribution
- **DBA (Dynamic Bandwidth Allocation)**
 - request high bandwidth bursts when resources are available
- **QoS**
 - real time video
 - real time voice
- **Security, Encryption - sniffing and authentication risks**
- **Bridging Under Control of the Carrier - maintain QoS and billing**
- **Lifeline**

Requirements - continued

Operational

- **Deployment**
 - No truck rolls
 - Auto Provisioning
 - Auto Discovery
 - Self Provisioning
 - Same Protocol Usable in Copper, PON, and Point-to-Point
 - Spectral Compatibility
- **Maintenance**
 - Loopback at CPE
 - Diagnostic CPE Test
 - Dying Gasp / Local power / Battery backup

Summary

High Bandwidth

Long Reach

One Access Network

Operations Simplicity

Evolution Path

Low CapEx and OpEx