Backhaul for Distributed Architectures in MSOs

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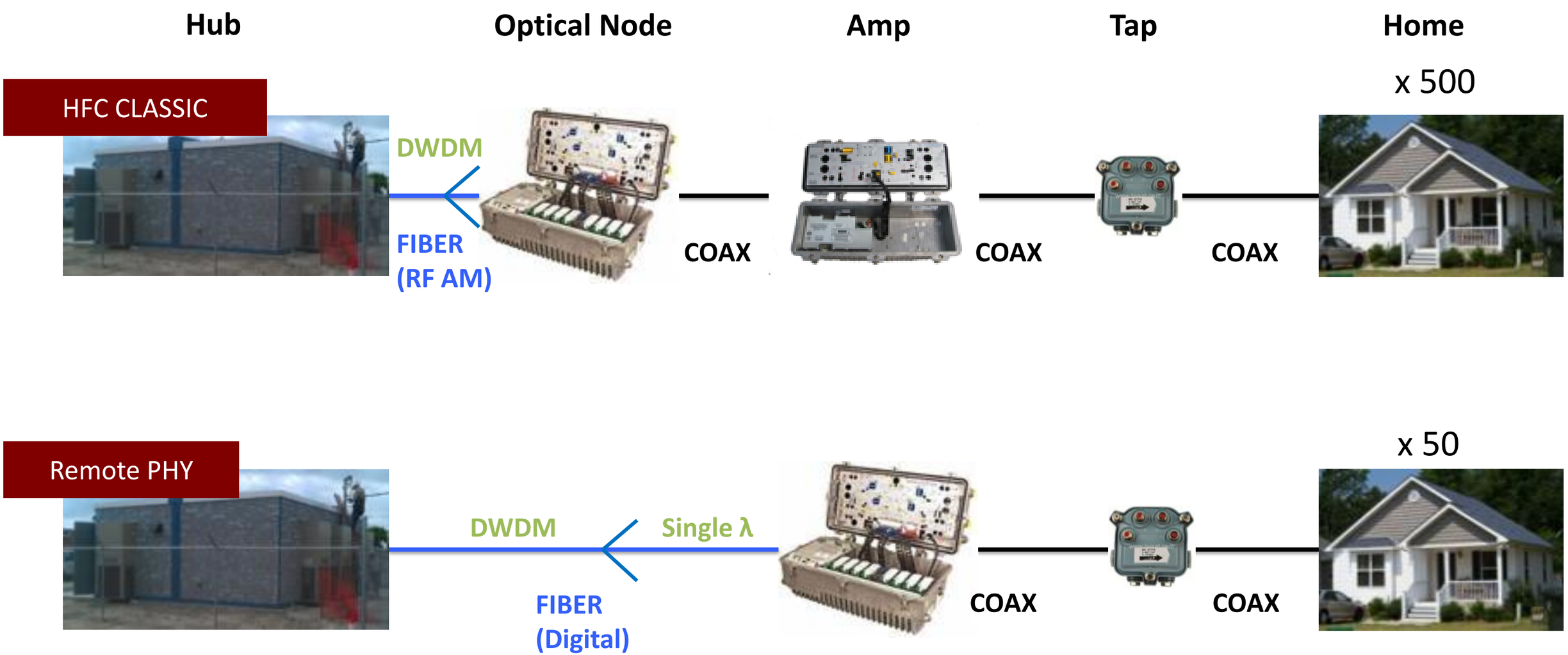
Supporters

- Tom Williams, Acacia
- Eric Maniloff, Ciena
- Marek Hajduczenia, Charter Communications
- Shawn Esser, Finisar
- Curtis Knittle, CableLabs
- Steve Swanson, Corning
- Winston Way, NeoPhotonics
- Yi Wang, Applied Optoelectronics

Agenda

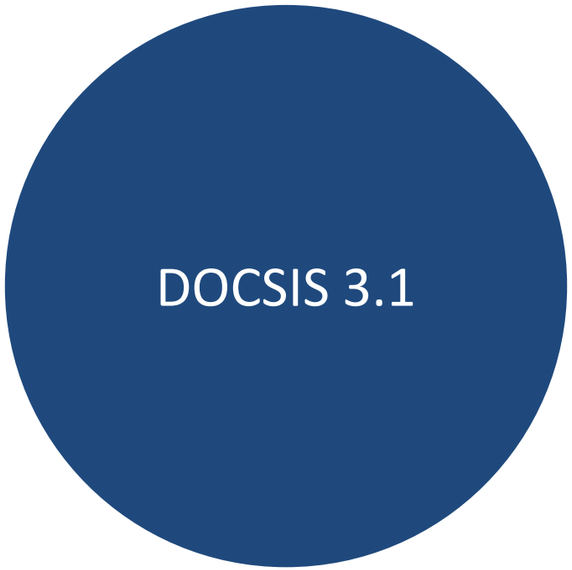
- Architecture Evolution
- DOCSIS EVOLUTION
- Distributed Access Architecture (DAA)
  - Remote PHY (R-PHY)
- MARKET SIZE
- KEY REQUIREMENTS

Migration Strategy

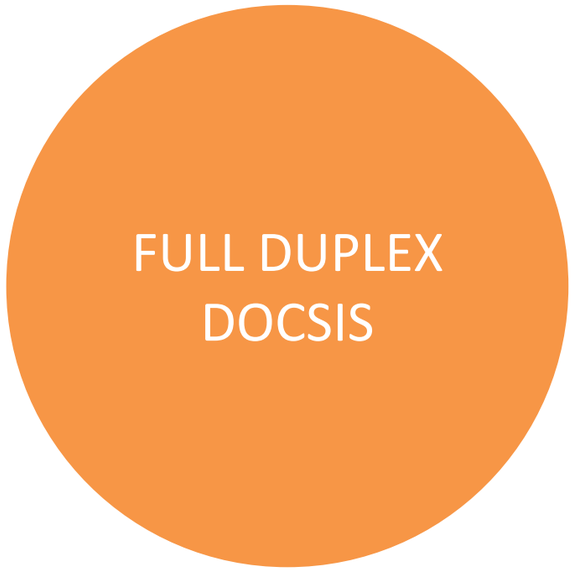


Service Group Bandwidth Evolution

1 Gbps DS
200 MHz US

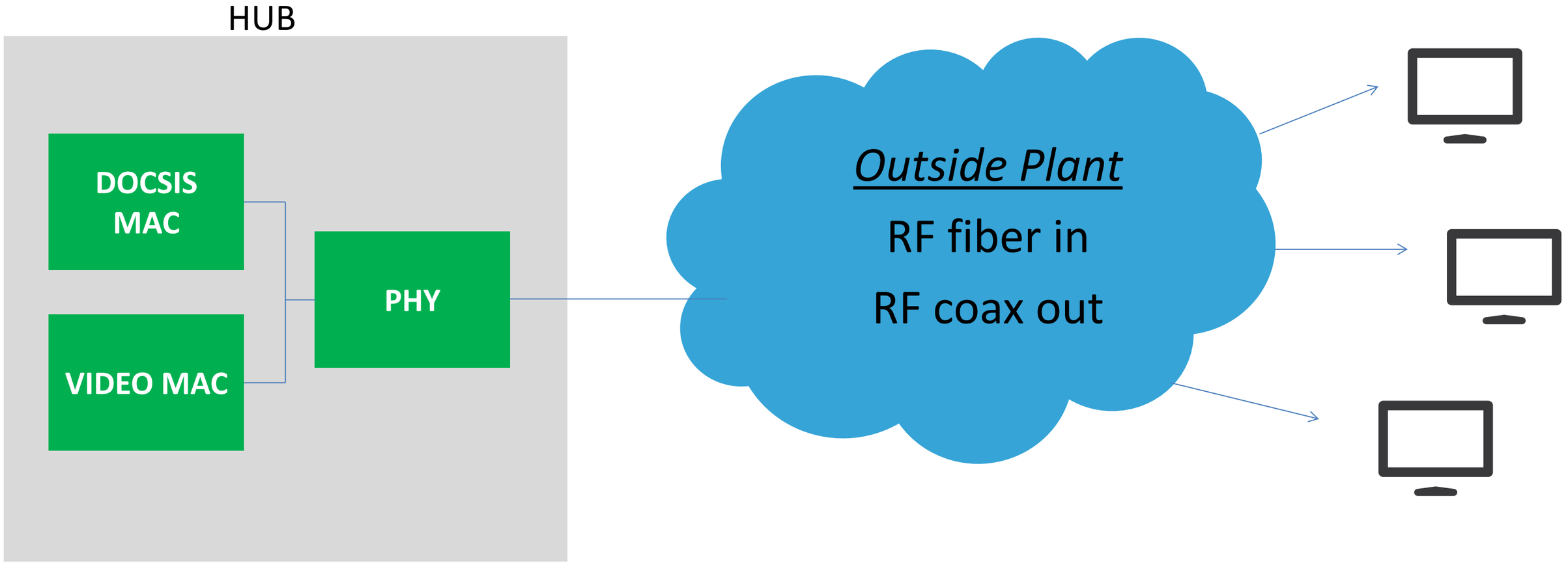


10 Gbps DS
2 Gbps US

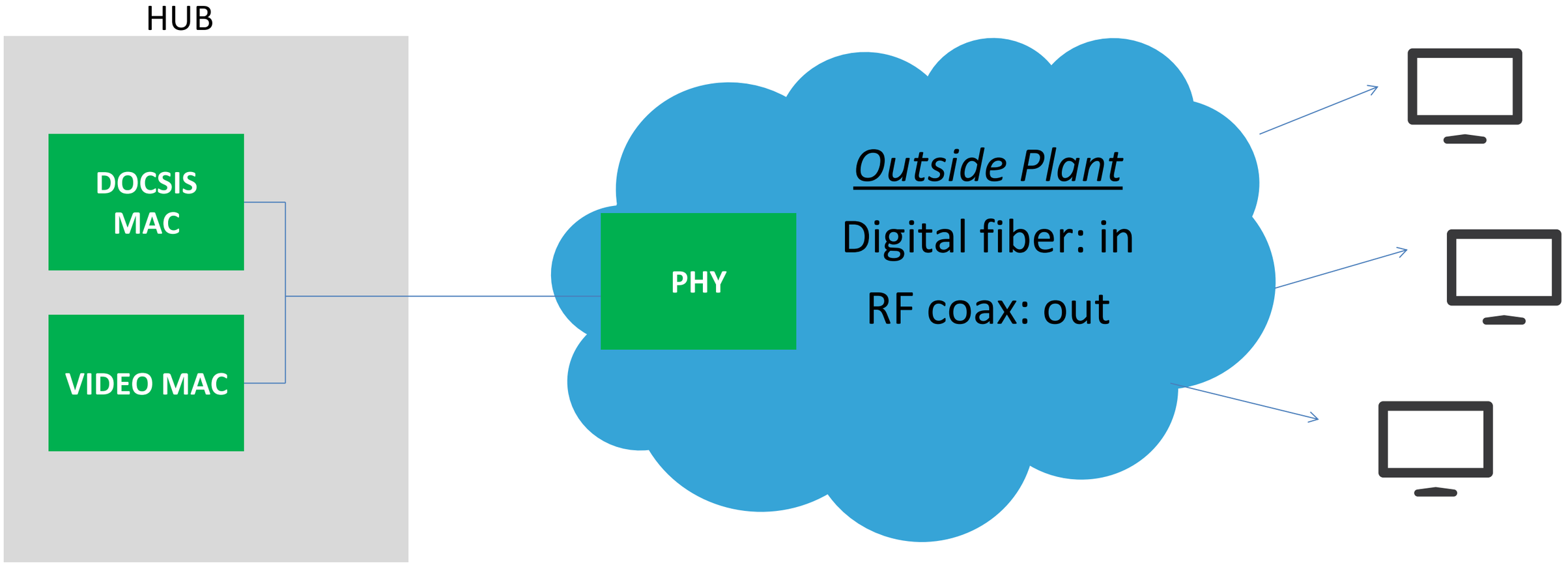


10 Gbps DS
10 Gbps US
Plant must change ***

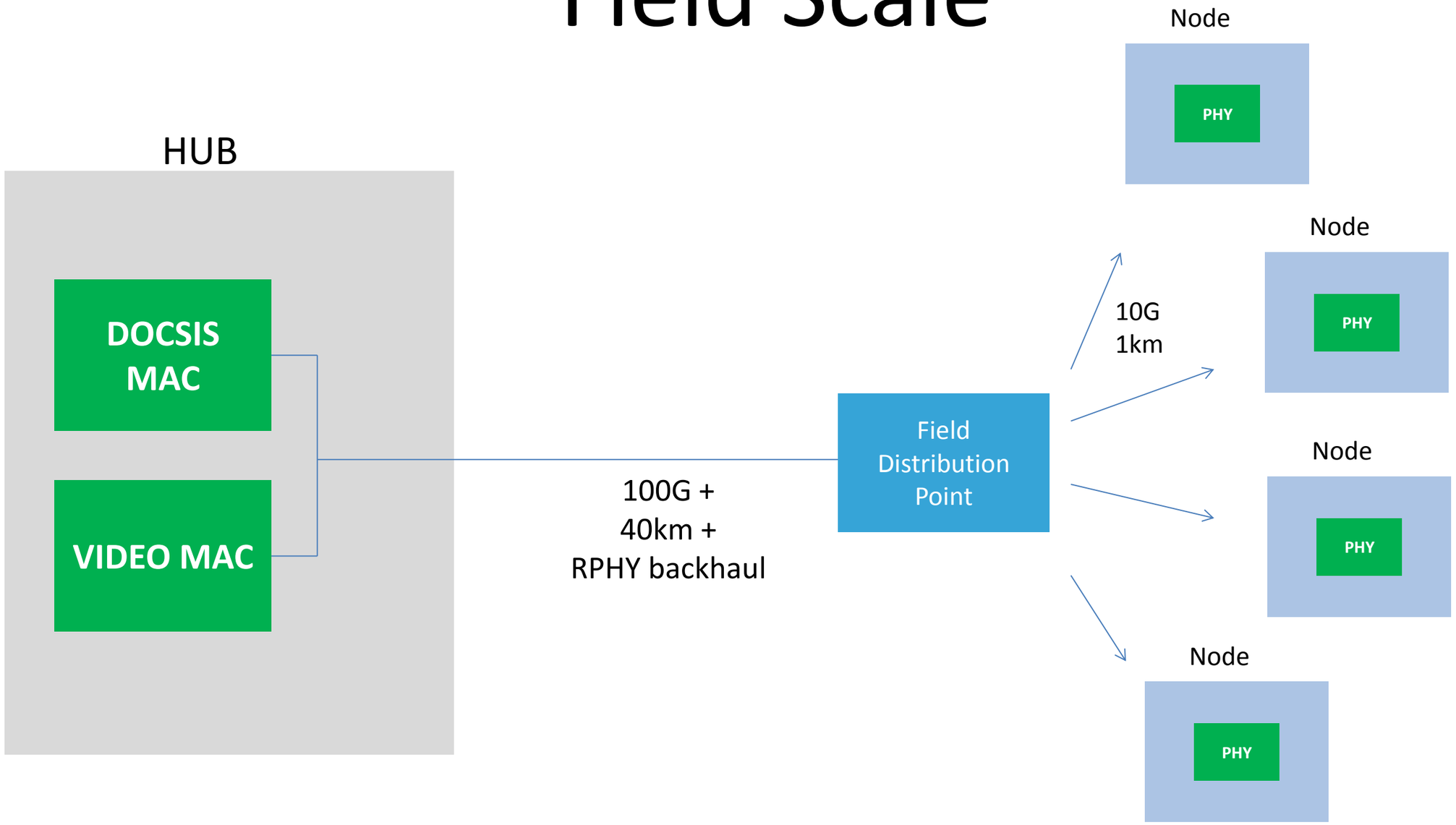
Classic Cable Core



Cable Remote PHY



Field Scale


HUB
DOCSIS MAC
VIDEO MAC
100G +
40km +
RPHY backhaul
Field Distribution Point
10G
1km
Node
PHY
Node
PHY
Node
PHY
Node
PHY

Field Distribution Point

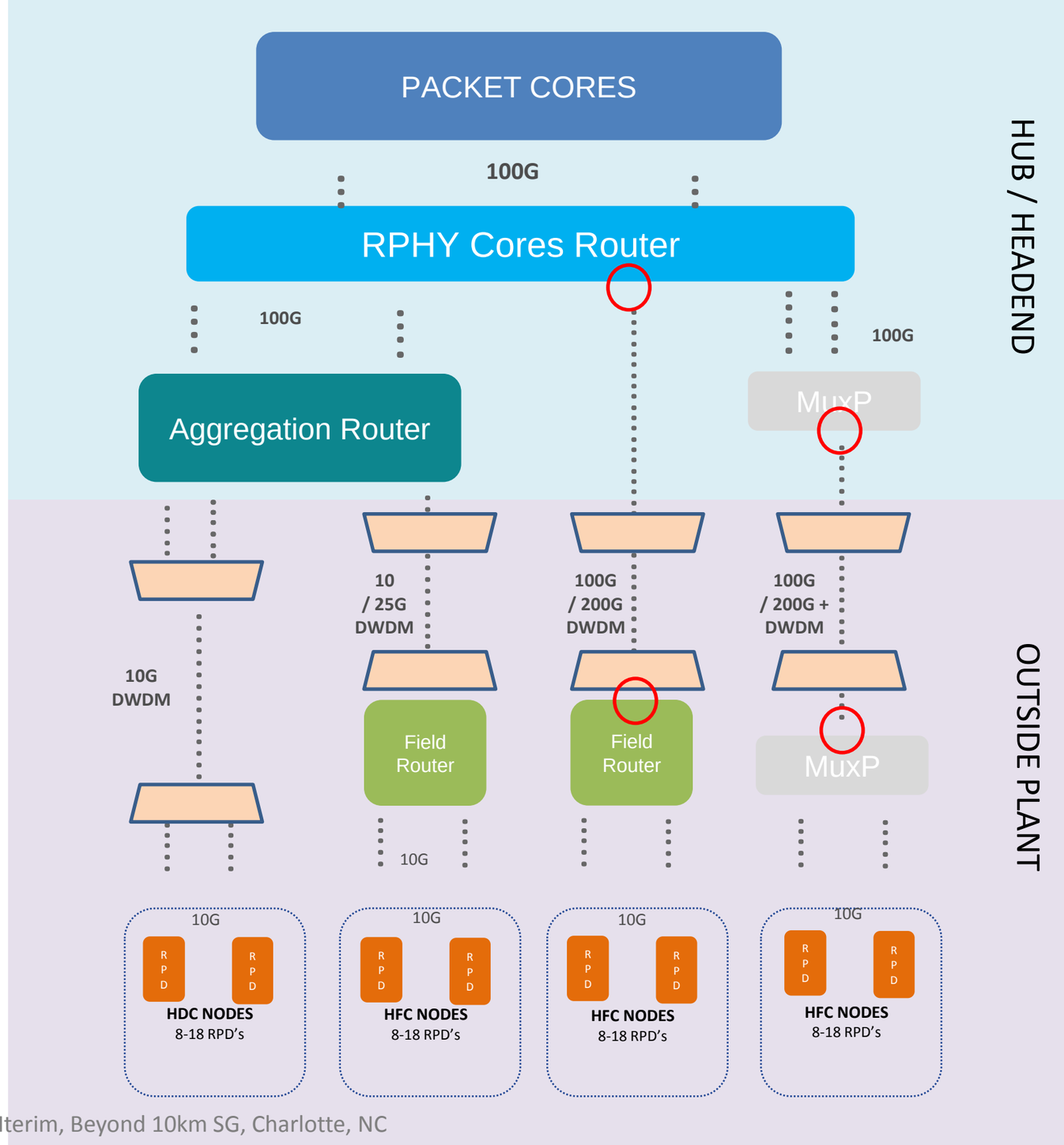
- Generic Cable Node Platforms
- Strand mounted on utility pole
- Typical Size
  - ~ 541 mm Length
  - ~ 295 mm Height
  - ~ 282 mm depth

RPHY Architecture Options

- Option 1: Hub / RPD direct connect
- Option 2: Field router 10 / 25G, pay as you grow
- Option 3: Field Router 100 / 200G, coherent
- Option 4: Muxponder, coherent

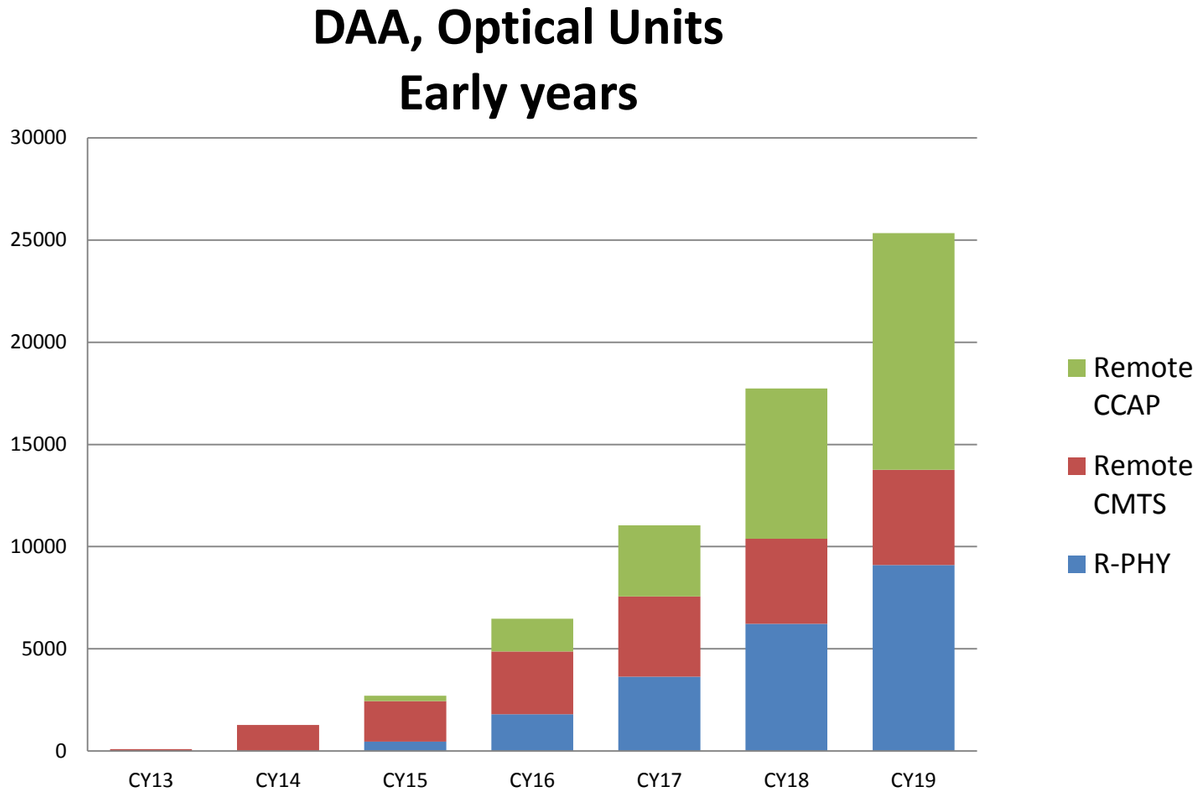
Outside Plant
- 5-40 km typical
- 40-80 km necessary for, redundant paths, hub collapse

DWDM
- Current nodes per fiber 8-16
- Future RPDs per fiber 64 - 288



HFC Market Evolution:
Estimate

- DAA Addressable Nodes: **1.2 M**
  - Not including China / India
  - Avg. homes passed / node: 500
- Current Nodes become aggregation points:
  - → **1.2 M** backhaul lines
  - 100G+ to distribution point
- Evolution timeframe
  - 10 yr +
- Further Growth Potential: Mobile, business services



H.I.S. (Infonetics) Node Market Study 2015
(Nodes transitioned /12) *2
No redundancy

Key Requirements

- Distance 40 – 80 km
- Throughput 100 / 200 + G
- Compatible with DWDM infrastructure

Note: Final solutions will operate in outdoor environment -40C to +85C.

Note, CableLabs, a cable consortium, is creating a specification to implement this solution for the MSO space. A collaborative effort should be possible.

Recommendation

- Consider MSO market requirements when forming Study Group objectives.
- This includes:
  - 200 Gb/s 40-80km interface with appropriate support for DWDM systems
  - 100 Gb/s 40-80km interface with appropriate support for DWDM systems

Abbreviations (Cable market specific)

- DAA – Distributed Access Architectures
- DOCSIS – Data Over Cable Service Interface Specification
- HFC – Hybrid Fiber Coaxial (network)
- MSO – Multiservice Operator (cable service provider)
- RF – Radio Frequency
- R-PHY – Remote PHY

THANK YOU

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