UNLEASH THE POWER OF LIMITLESS CONNECTIVITY
Wireline Access Network

The Road to 10G – Migrating Today’s HFC network to meet Tomorrow's Demand

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Cox Communications
Outline

RF Implications of 1.8 GHz

Downstream Bandwidth Squeeze during Migration

DOCSIS 4.0 FDD Migration Path Options
Amplifiers Constraints Drop-In Architecture

**Line Extenders**

- Required Gain: 48-49 dB

**Multiport System Amps**

- Required Gain: 59-60 dB
- Booster ~25% of SA or ~8% of spans
- 10-12 dB Needed
Downstream Extended Spectrum Levels/Tilt

Cox Legacy Level/Tilt Extended
- 46/32 dBmV QAM @ 999/54 MHz
- If Extended to 1.8 GHz
  - 74.8 dBmV TCP @ Node Output
  - Tilt of 25.1 dB

Proposed Step Down and Reduced Tilt
- Hold 46 dBmV QAM @ 999 MHz
- Extended to 1.8 GHz
  - 6 dB Step Down at 1 GHz
  - Reduced Virtual Tilt to 21 dB
  - TCP of 68.6 dBmV @ Node Output
Downstream Tilt – 2 Step

First Gen RPD Nodes
- Targeted 1.2 GHz SHO (N+0) requirements
- Large Step Downs not supported by some vendors and degraded performance for others
- 3 dB Step Down Yields Acceptable Performance

Migration to D4.0 while leveraging 1.2 GHz First Gen Nodes
- Utilize a 2-Step Down Approach
  - 3 dB Step Down at 1 GHz
  - Additional 3 dB (6 dB Total) Step Down at 1.2 GHz
- Enables Interim Migration Step with Current Products
- Slight Increase in TCP by 0.3 dBmV
Moving The Diplexer Split

DS Bandwidth Squeeze

- Industry experience raising the DS upper edge
- Moving diplexer is relatively new activity
  - MS minor Impacts
  - HS and UHS Split have significant impacts due to lost downstream spectrum

Mitigation Options:
1. Early deployments of D4.0 CPE with expanded DS and Switchable Diplexer
   - HS requires a POE device and replacement of other in-home devices
2. Execute DS relief prior to squeeze (MPEG4, SDV retirement, Full IPTV, etc)
Migration Path Options

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Path

1. UHS
2. UHS
3. UHS
4. Probably not Competitive
5. UHS
6. UHS
7. UHS
8. Probably not Competitive

Sub Split

1 GHz Amps 1 GHz Taps

Mid Split

1.2 GHz Amps 1 GHz Taps

High Split

1.2 GHz Amps 1.2 GHz Taps

High Split

1.2 GHz Amps 1.8 GHz Taps

Ultra High Split

1.8 GHz Amps 1.8 GHz Taps
Migration Path Cost Model

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Summary

Guidance on Cox’s planned D4.0 Deployments

- Amplifier Gains
- Low gain booster amps for ~8% of cases
- Maintaining legacy RF level at 1 GHz
- 2-step down RF output profile
- Reduced Tilt
- Bandwidth squeeze and possible mitigation options
- 8 Migration path options
  - Cost implications
  - Likely Cox strategy
Thank You!

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