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# UNLEASHTHE POWER OF IMITLESS CONNECTIVITY





**Wireline Access Network** 

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

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## **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**







## **Multiport System Amps**





1750

#### **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:

- 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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## 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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