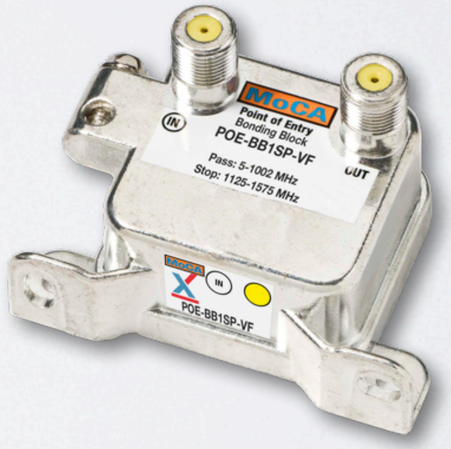
Amphenol

Broadband Solutions

MoCA Overview



MoCA® Overview
Learning Objectives

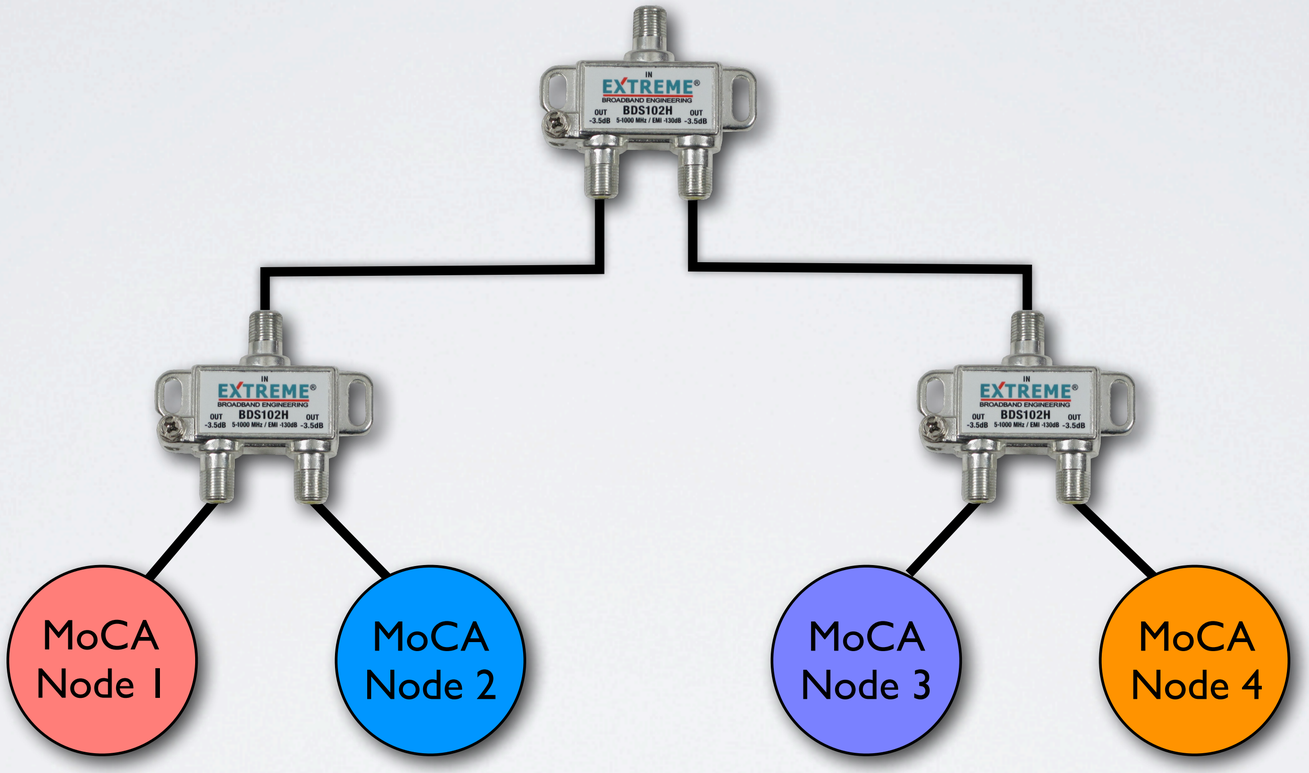
- What is MoCA
- How MoCA Works
- MoCA and Passive Devices
- MoCA Loss Budget

What Can MoCA® Do?

MoCA can network a home by carrying large amounts of information and data through existing coaxial wiring

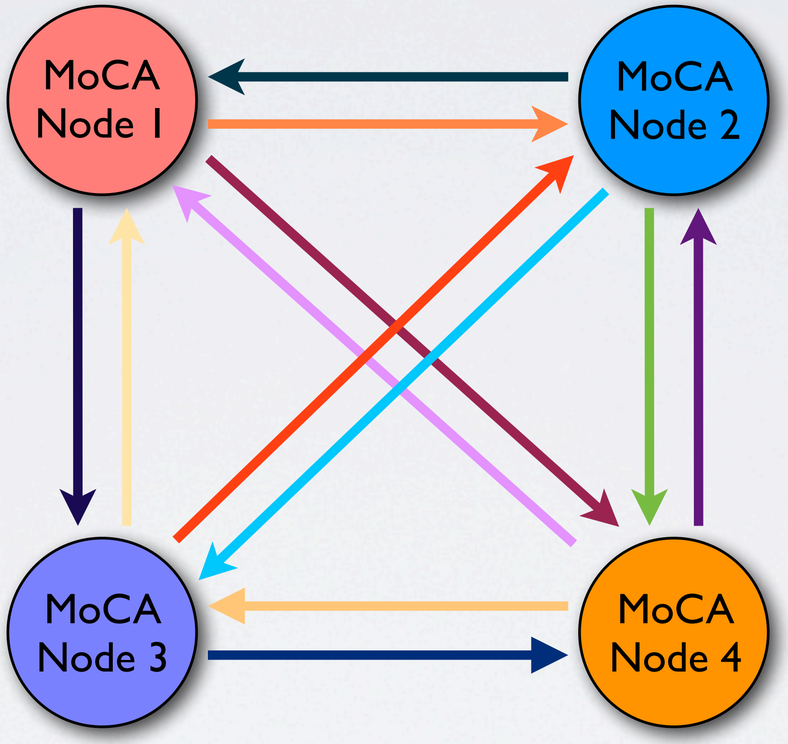
- 135Mbps (MoCA 1.0)
- 175Mbps (MoCA 1.1)
- 400 - 800 Mbps (MoCA 2.0)
- Multiple Streams of HD content
- Data Services

MoCA® Physical Topology



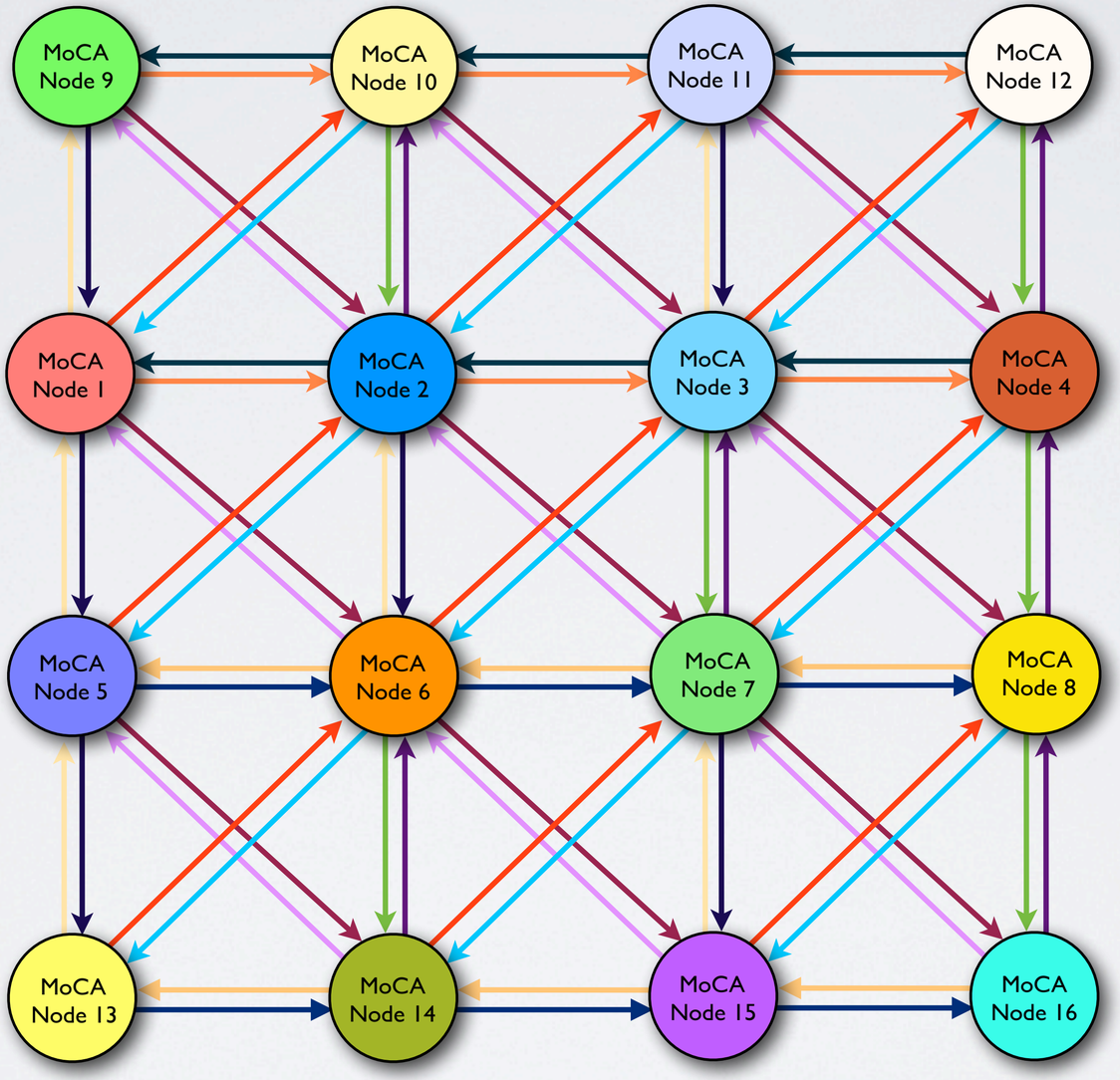
Amphenol
Broadband Solutions

MoCA® Logical Topology



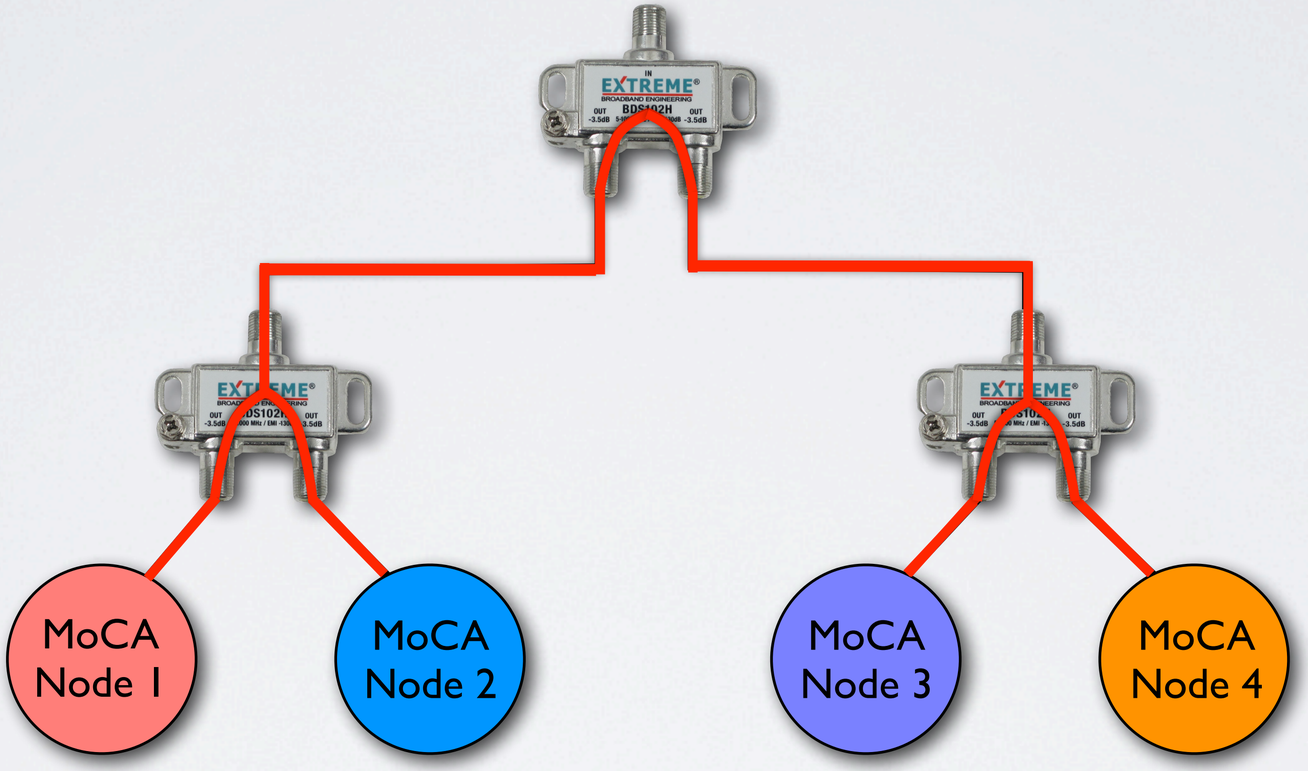
MoCA® Logical Topology

MoCA 1.1 & 2.0 supports up to 16 nodes



Amphenol Broadband Solutions

MoCA® Physical Topology

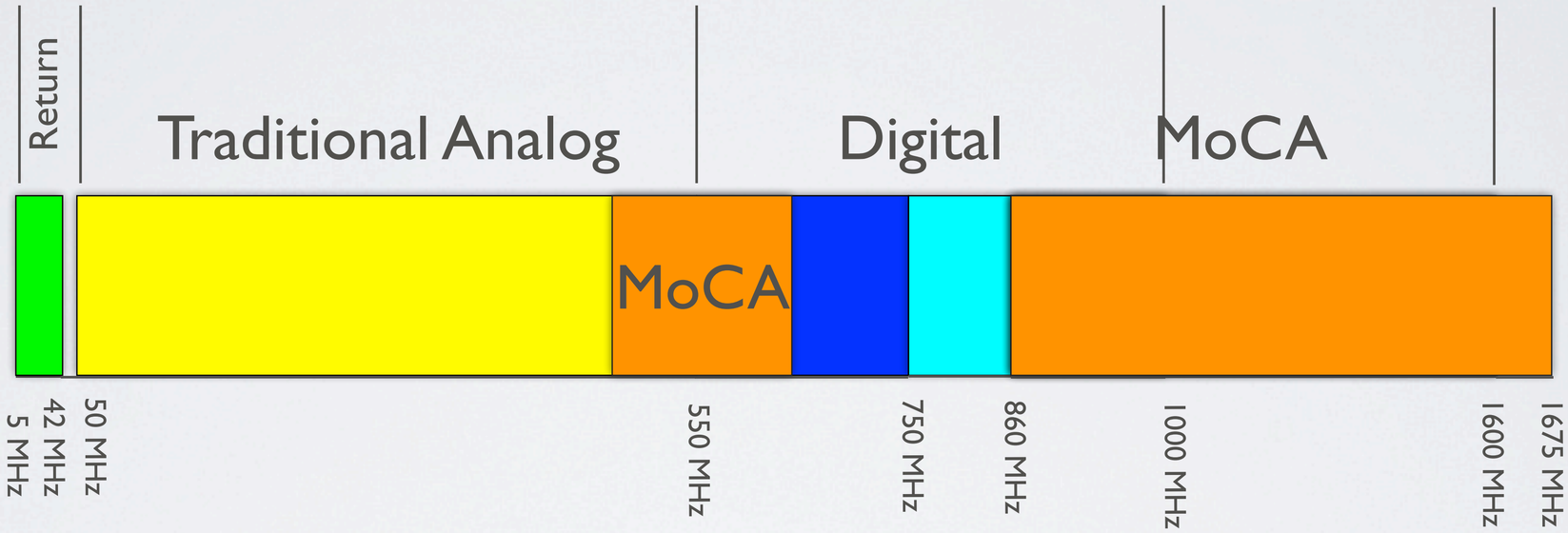


How Does MoCA® Work?

By utilizing the higher frequencies, typically 1125MHz to 1675MHz for CATV applications, MoCA enabled devices can communicate by transmitting and receiving unique data through coaxial cable.

These frequencies pass through the existing passive devices and coax cabling in the home

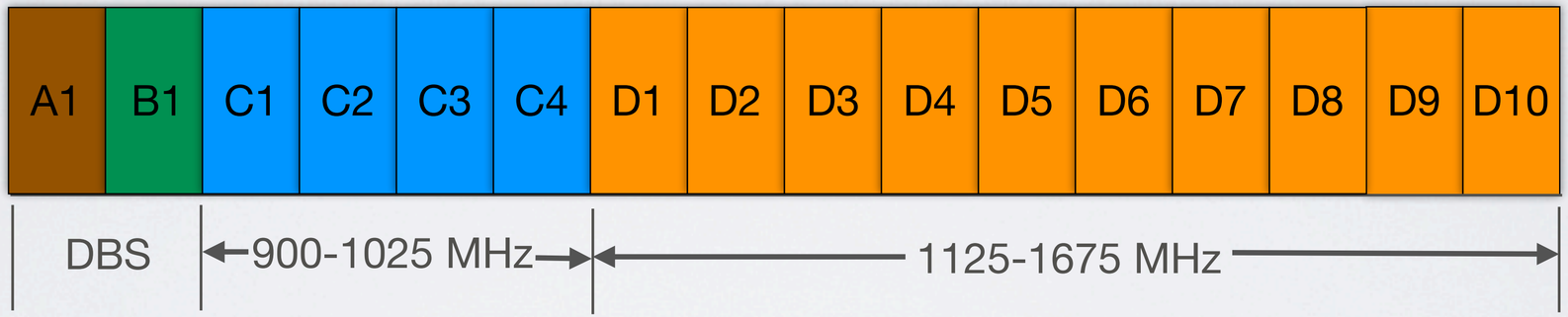
MoCA® Spectrum



Amphenol
Broadband Solutions

MoCA® Spectrum

MoCA Uses 50 MHz Wide Channels



Channels C1 - C4 used for Phone MoCA Services

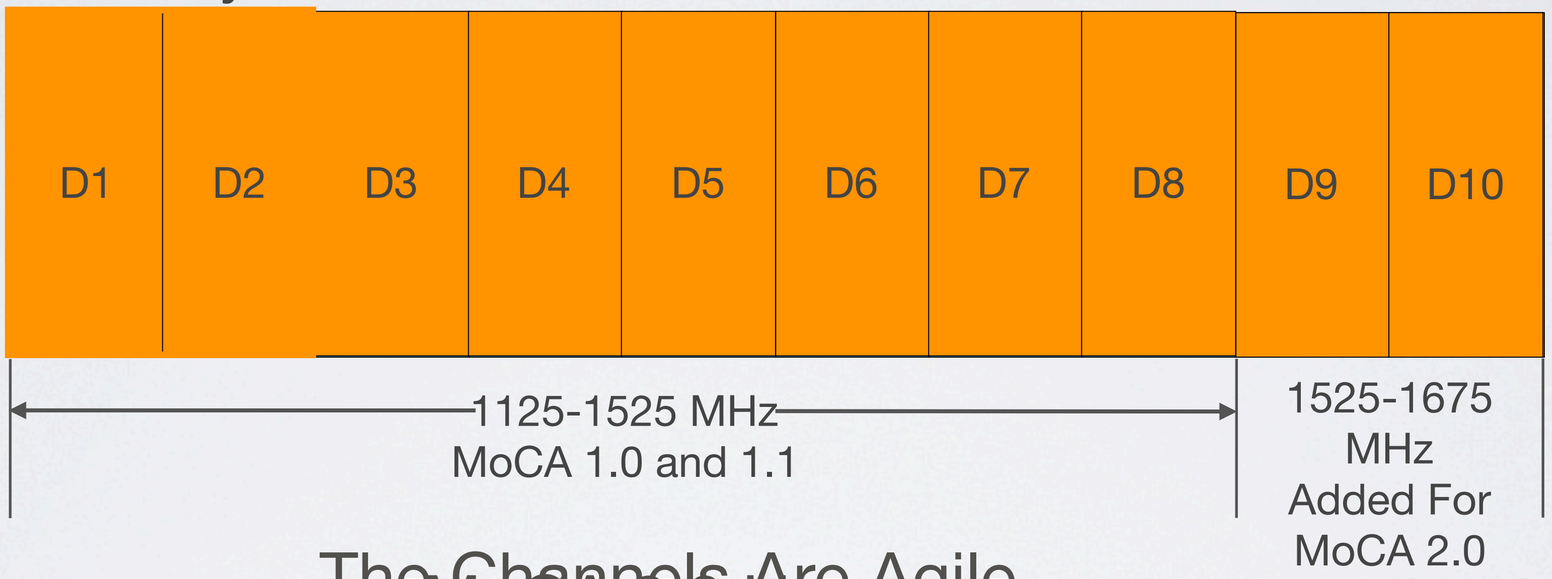
4 Channel Bands

Channels D1 - D10 used for CATV and Consumer Electronic Retail MoCA Services

Amphenol Broadband Solutions

MoCA® Channels

Only One Channel Used Per MoCA Network

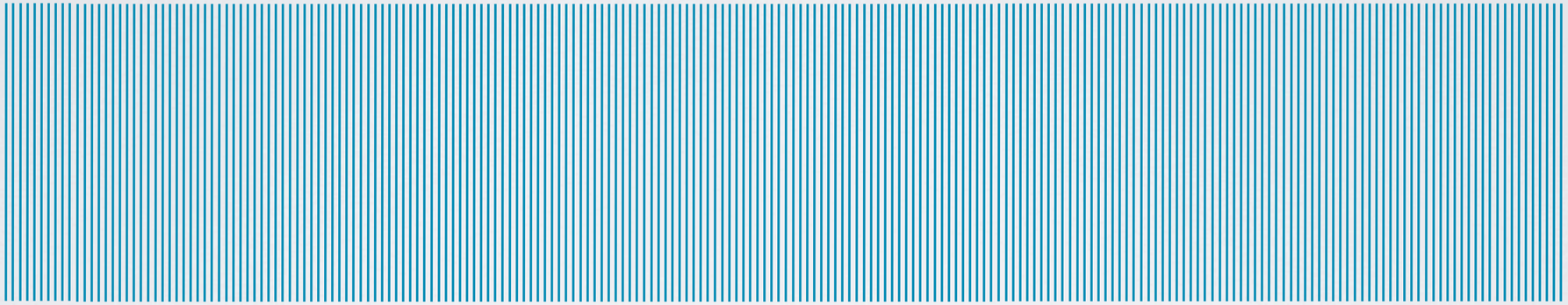


MoCA 2.0 Uses Bonded Channels

The Channels Are Agile And Can Change Depending On The Channel Condition

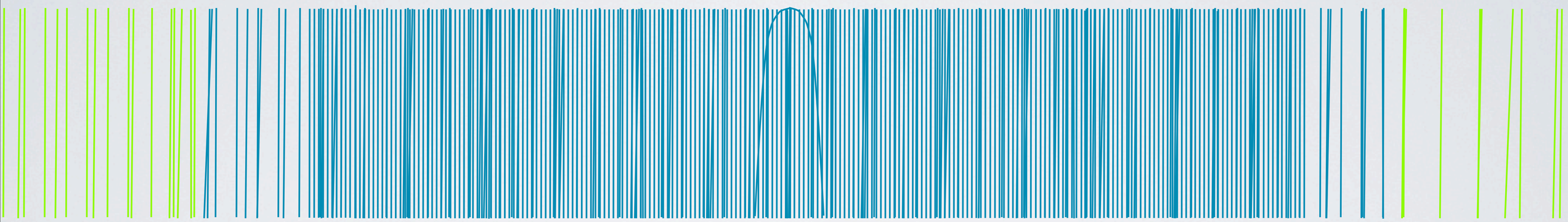
Amphenol Broadband Solutions

MoCA® Sub-Carriers



- Orthogonal Frequency Division Multiplexing (OFDM)
- 224 subcarriers within each channel
- Uses Adaptive Constellation Multi-Tone (ACMT)
- The modulation technique changes based on the physical characteristics of the signal path

Optimized Modulation



Optimized Modulation

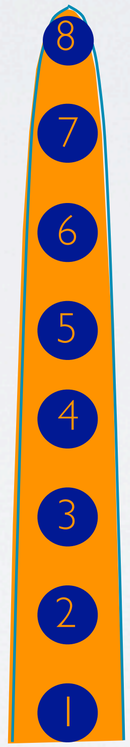
256 QAM - 8 bits/symbol

64 QAM - 6 bits/symbol

16 QAM - 4 bits/symbol

QPSK - 2 bits/symbol

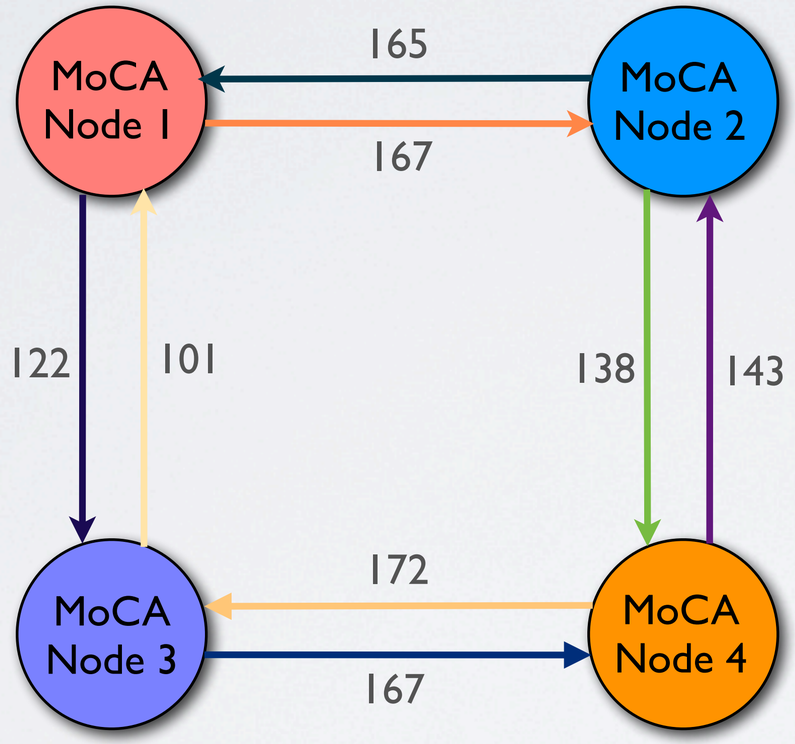
BPSK - 1 bit/symbol



Each subcarrier communicates using the best modulation possible from BPSK up to 256-QAM

Probing

MoCA® Data Rates Can Vary Between MoCA® Devices



The data rates between MoCA nodes will vary depending on the physical characteristics of the path between the transmit and receive nodes

Network Controller (NC)

- NC is automatically selected
  - Normally first node on
  - Preferred NC can be selected by higher layer applications (MoCA v1.1)
  - Backup NC is assigned to ensure rapid handoff in the event of device failure
- Admits new nodes to the network
  - Beacon transmissions are used by New Nodes to detect presence of a network
  - New nodes listen for beacons - If a new node “hears” a beacon, it tries to join the network
  - If a new node doesn’t hear any beacons, it will send beacons and listen for Admission_Request messages from other nodes
- Act as a “traffic cop”, enforcing the time-slotted media access control (MAC) protocol which divides the channel’s available bandwidth into individual data streams between locations

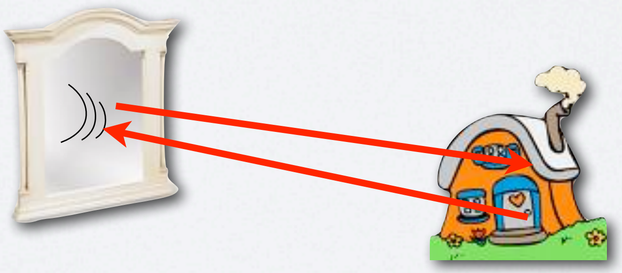
MoCA® Filters

MoCA Signal Blocked & Reflected

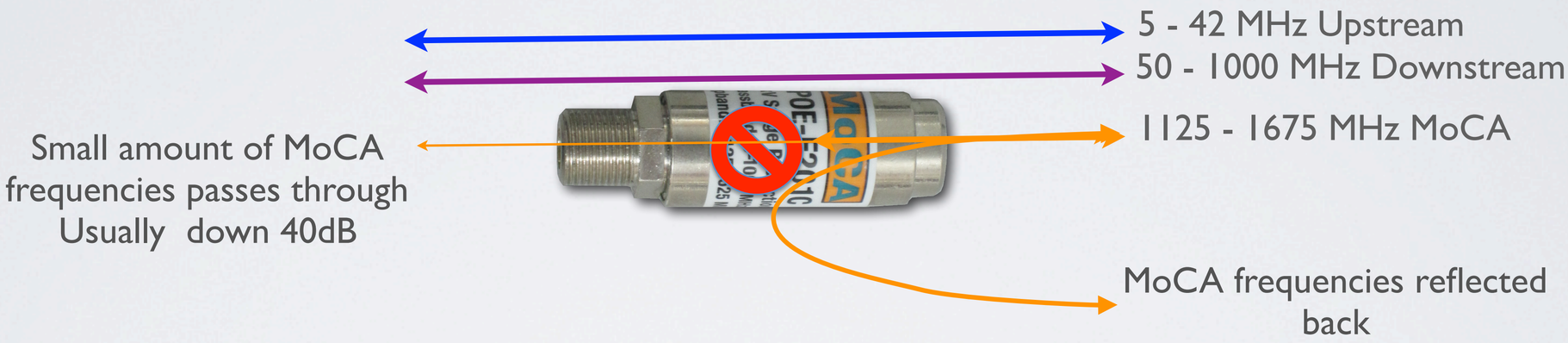
Amphenol Broadband Solutions

What Is A MoCA® Filter?

- The use of Point Of Entry (POE) filters closes the MoCA network and keeps the higher frequencies in the home
- Filters are normally used at the demarcation point or first MoCA Splitter in the network
- What if the customer removes the filter?
- The MoCA filter is like a mirror and is specifically designed to reflect the MoCA signals back into the home with minimal loss



How A MoCA® Filter Works



The MoCA Filter has very low return loss

About 1dB

Amphenol Broadband Solutions

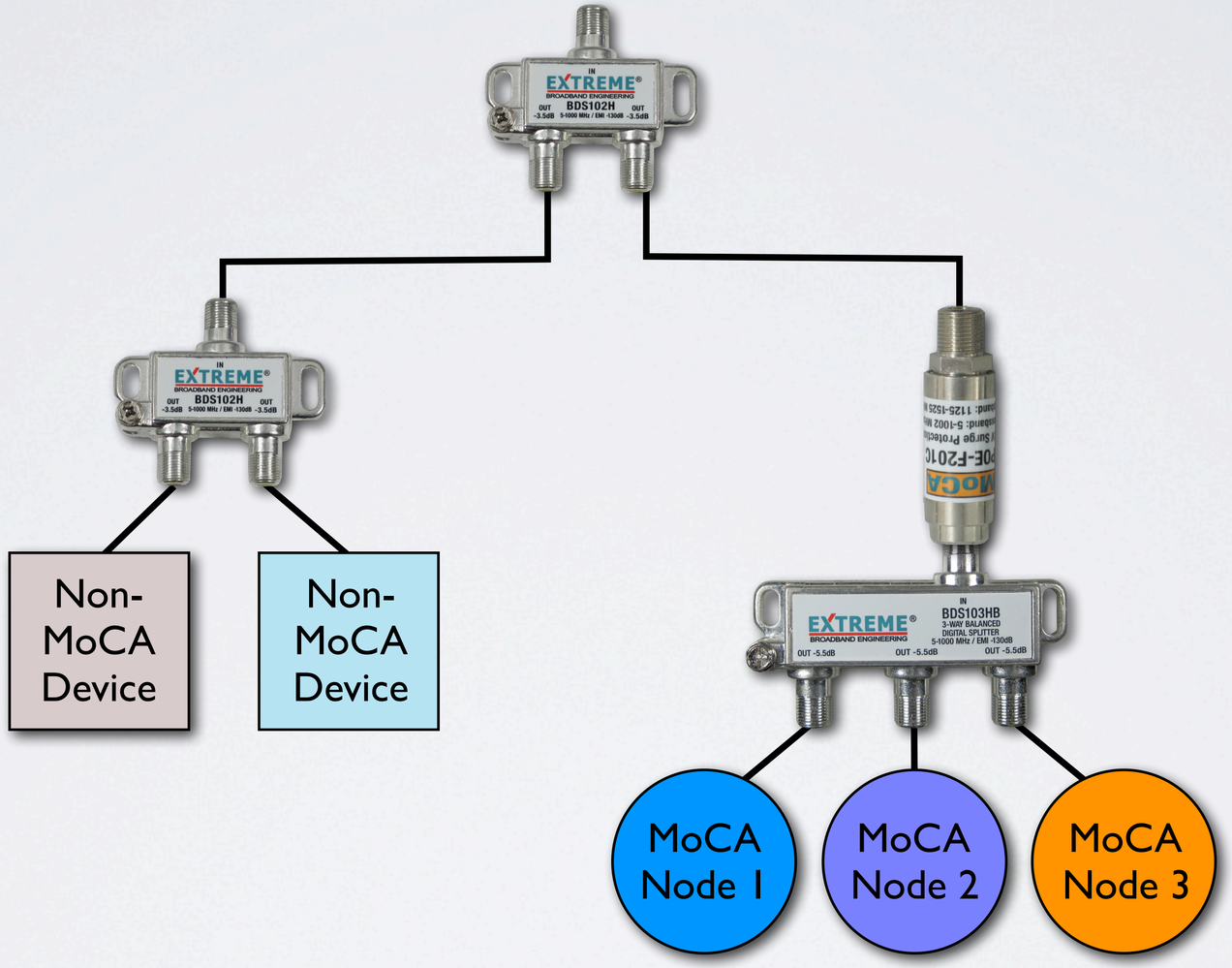
Other MoCA® POE Filter Uses

Blocks Interference From Non-MoCA Devices From Entering The MoCA Network

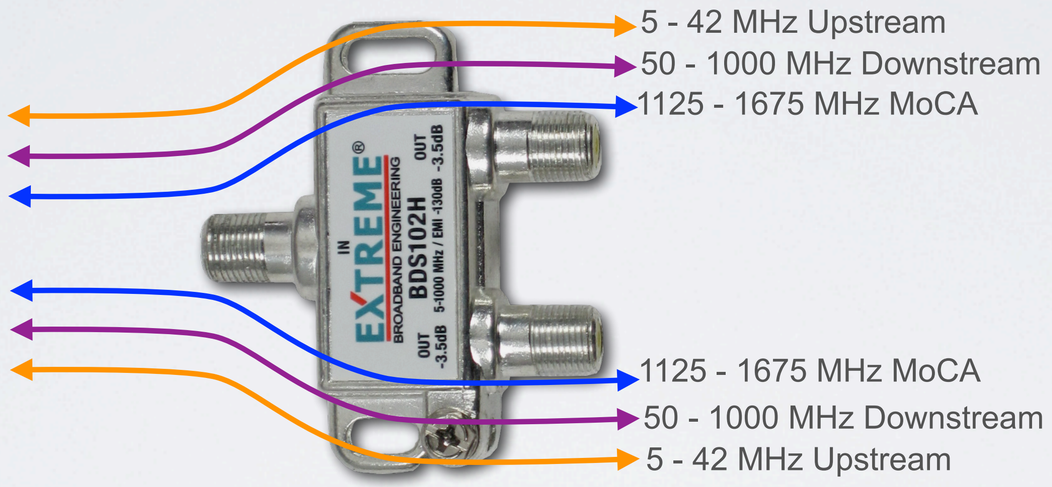
Blocks High Level MoCA Signals From Interfering With Non-MoCA Services

Amphenol Broadband Solutions

Isolating The MoCA® Network



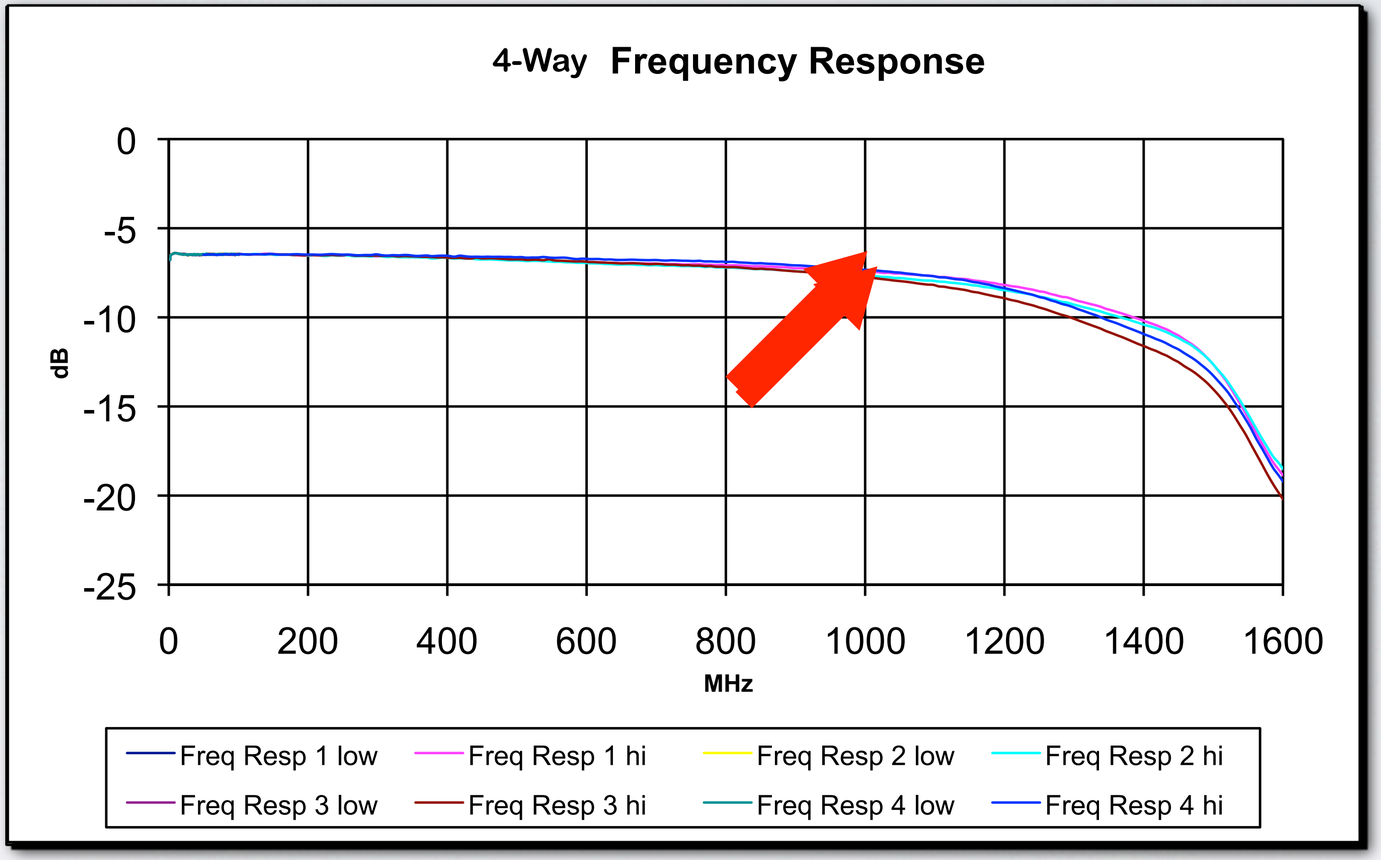
MoCA® Existing Splitter Compatible Insertion Loss



Existing splitters must be able to pass the MoCA frequencies of 1125 MHz - 1675 MHz with minimal insertion loss

Insertion Loss at MoCA frequencies may be 1-4dB or higher per 2 way splitter

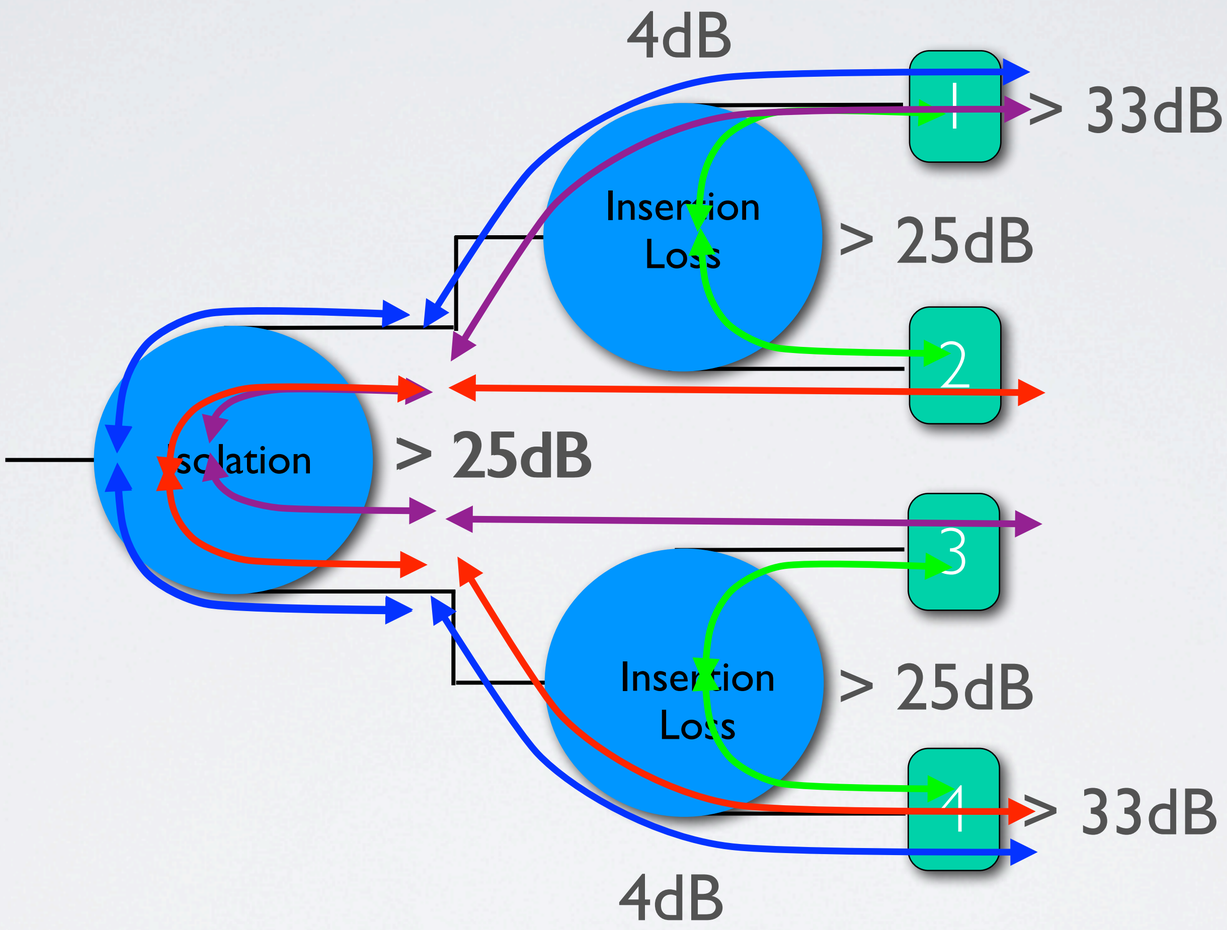
Splitter Frequency Response



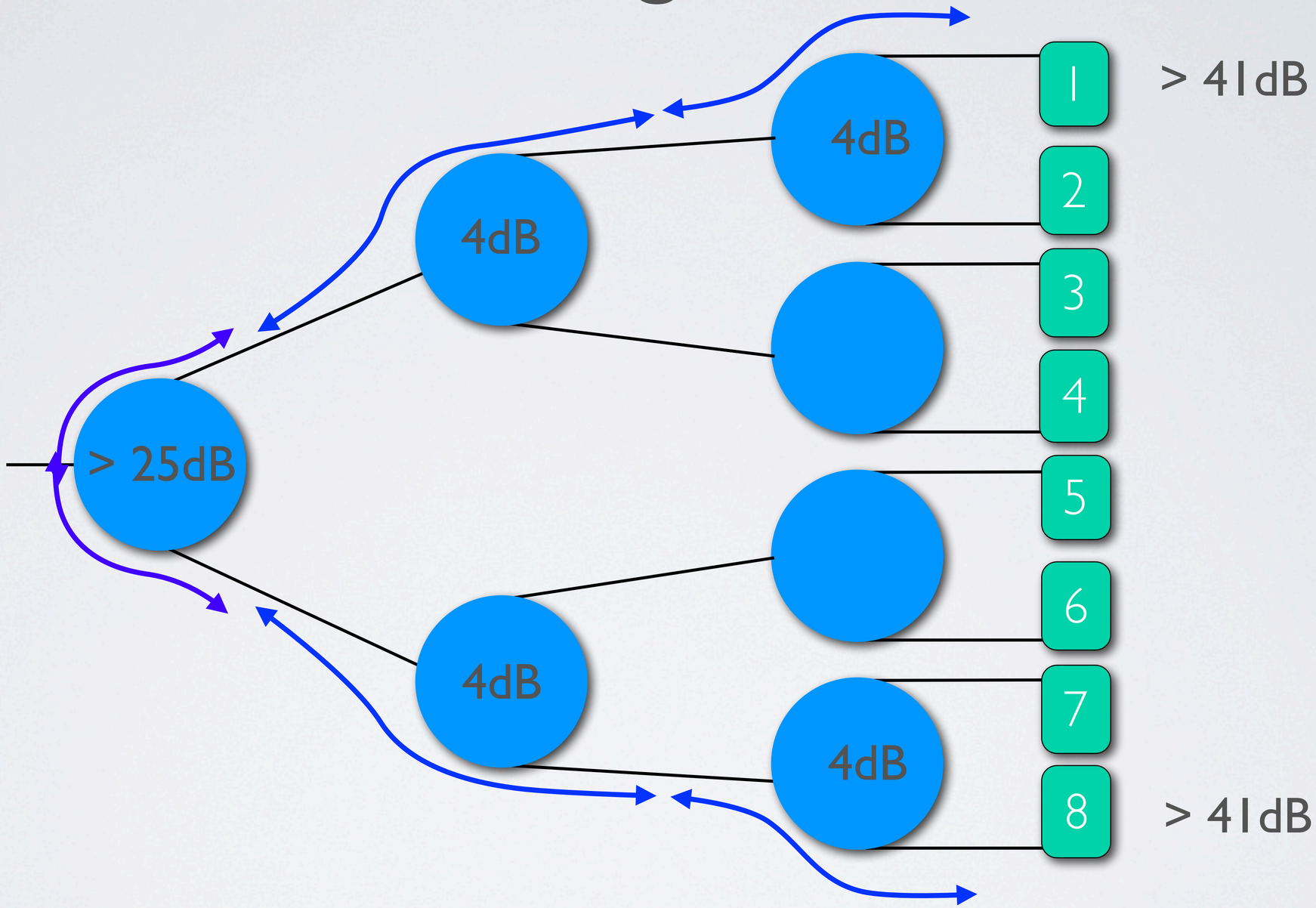
Port to Port Isolation

Amphenol
Broadband Solutions

Isolation Signal Flow



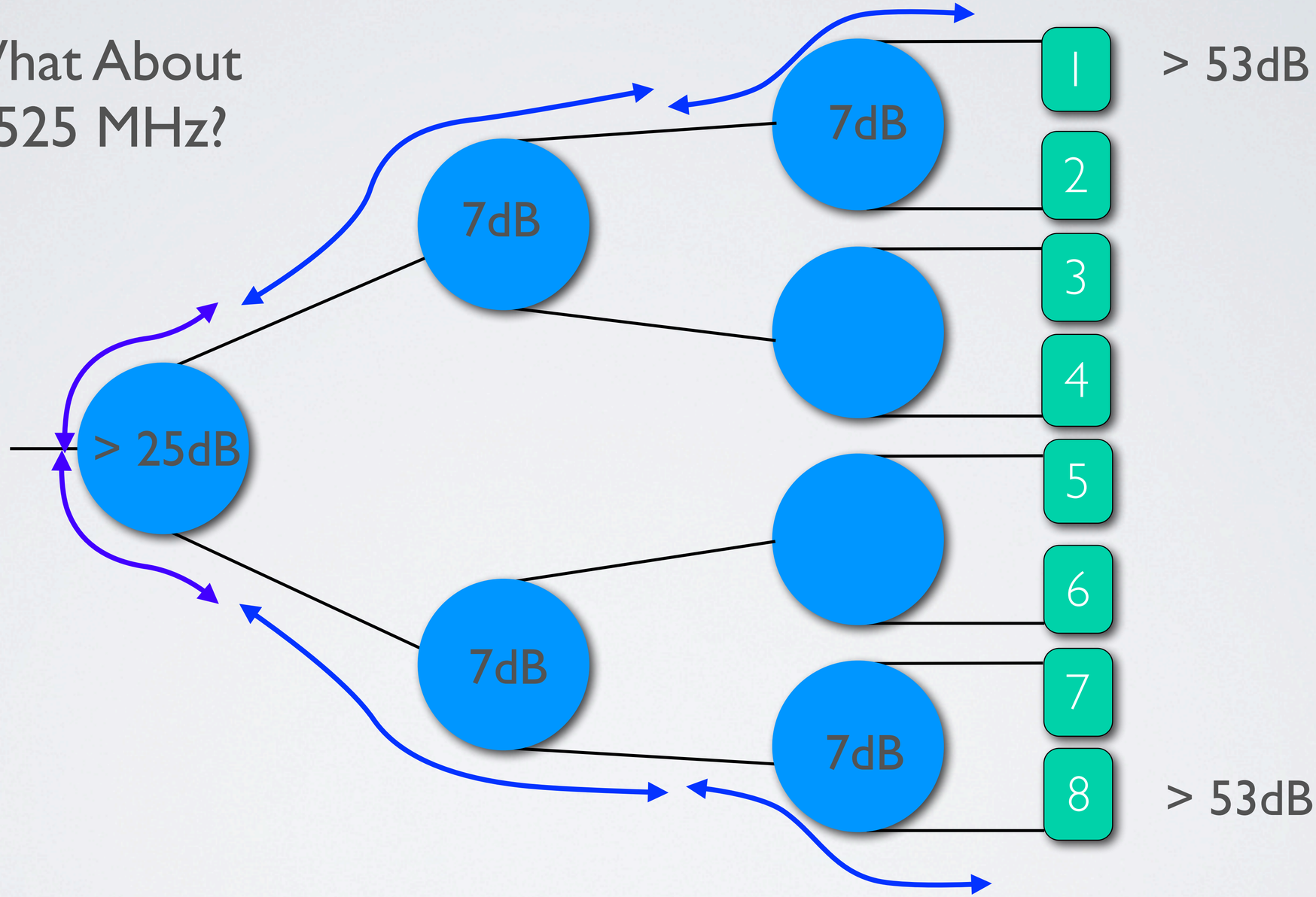
Isolation Signal Flow



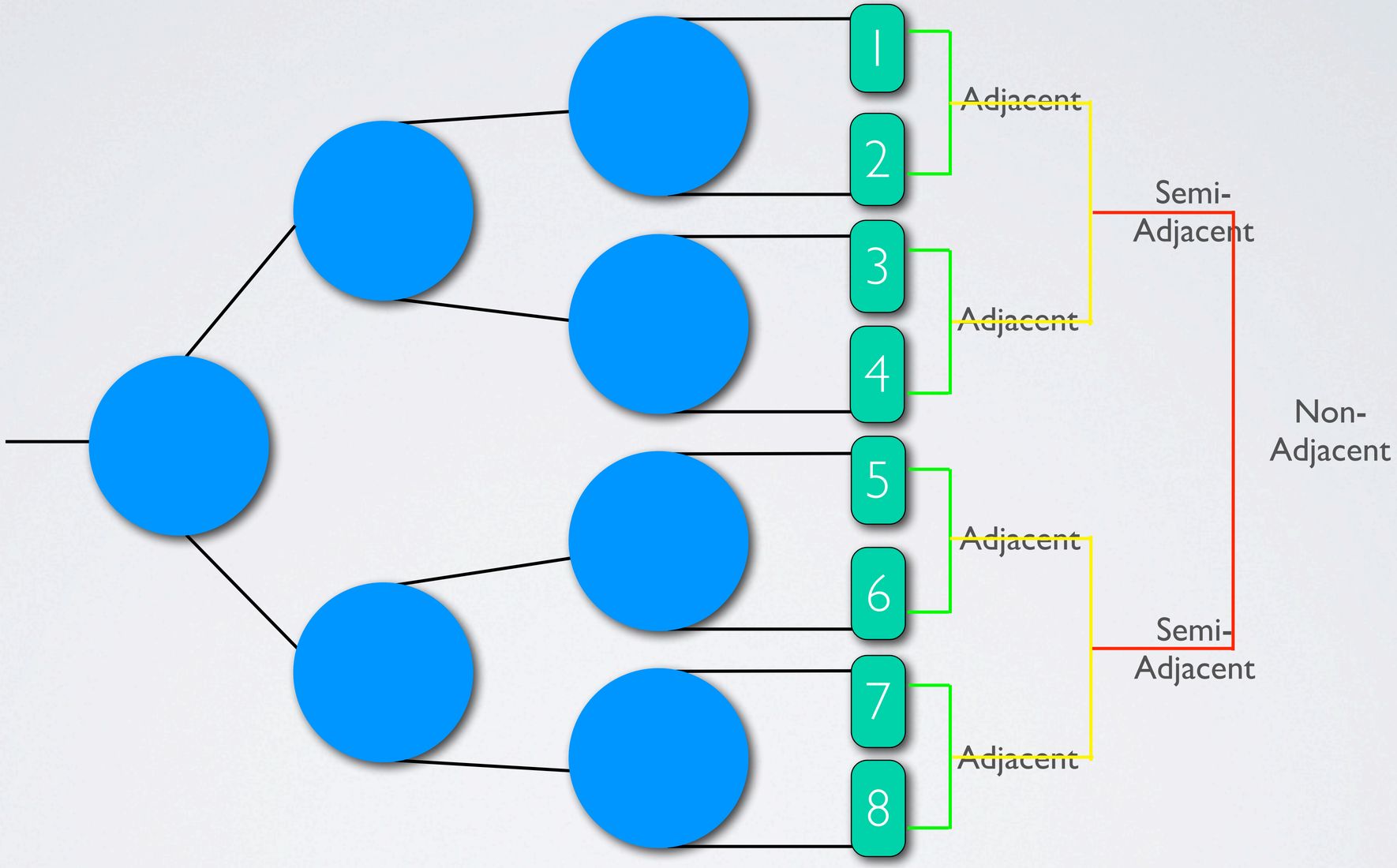
Amphenol
Broadband Solutions

Isolation Signal Flow

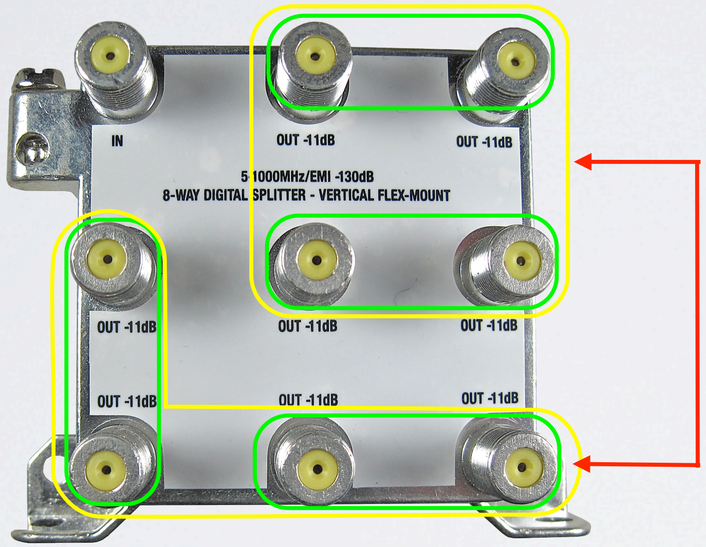
What About
1525 MHz?

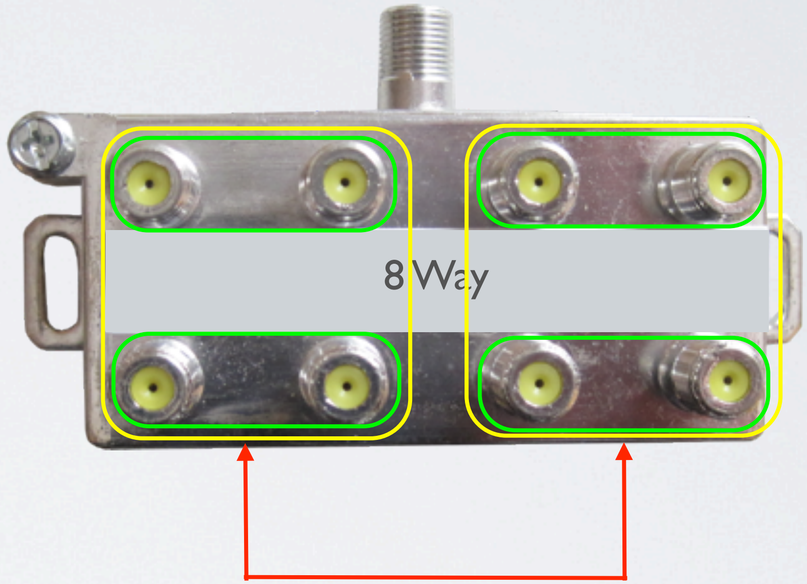


Isolation Signal Flow



Port Isolation Configuration





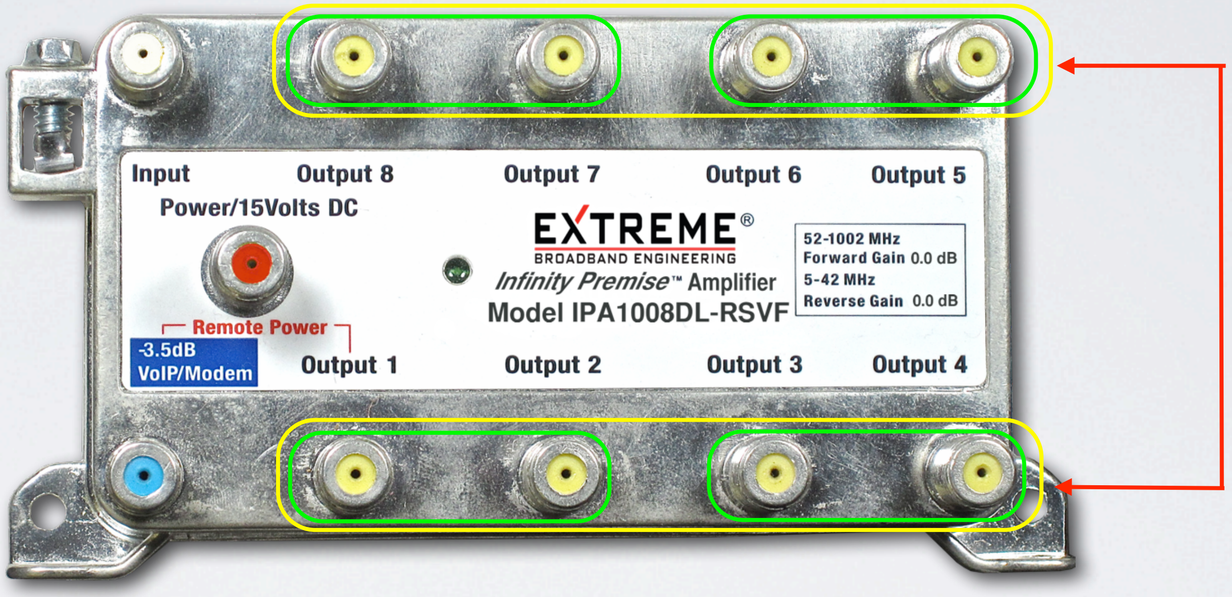
= Adjacent Ports

= Semi-Adjacent Ports

= Non-Adjacent Ports

Amphenol
Broadband Solutions

Port Isolation Configuration



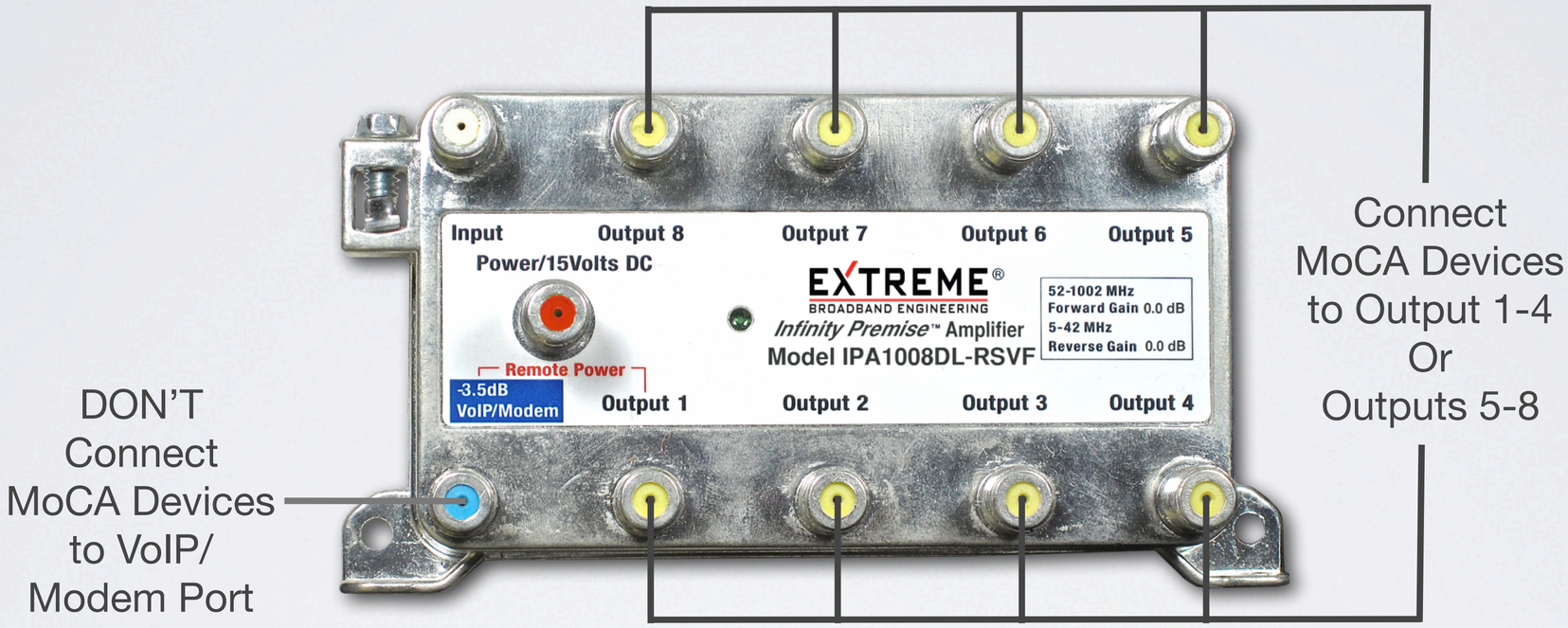
= Adjacent Ports

= Semi-Adjacent Ports

= Non-Adjacent Ports

Amphenol
Broadband Solutions

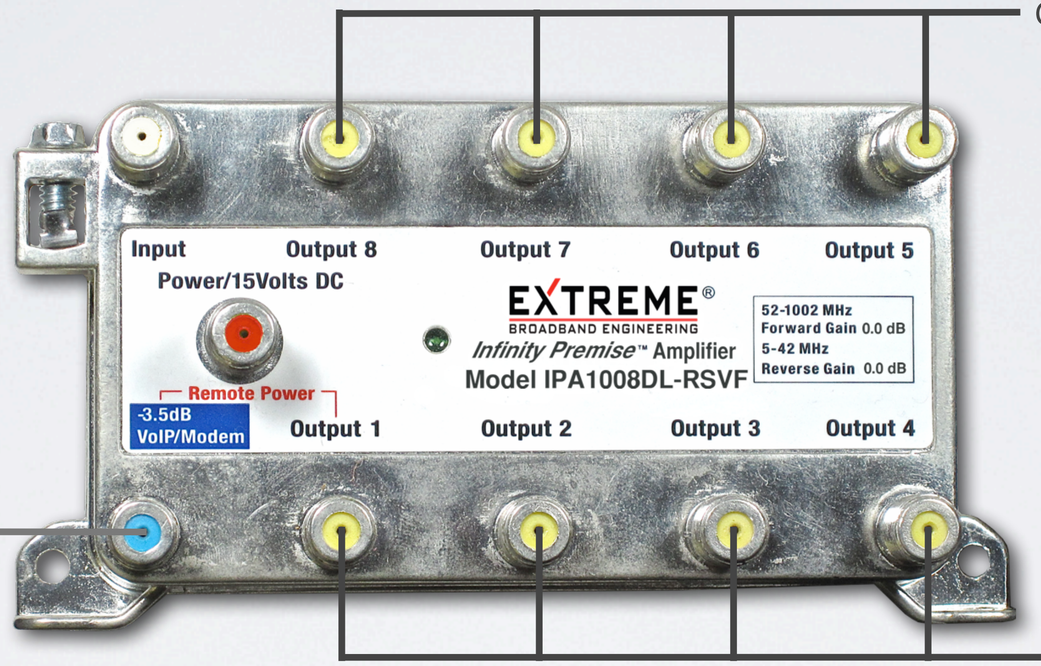
MoCA Installation



DON'T Connect MoCA Devices to VoIP/ Modem Port

Connect MoCA Devices to Output 1-4 Or Outputs 5-8

MoCA Installation



Connect The MoCA Devices With The Shortest Coaxial Cable Runs To Ports 5-8

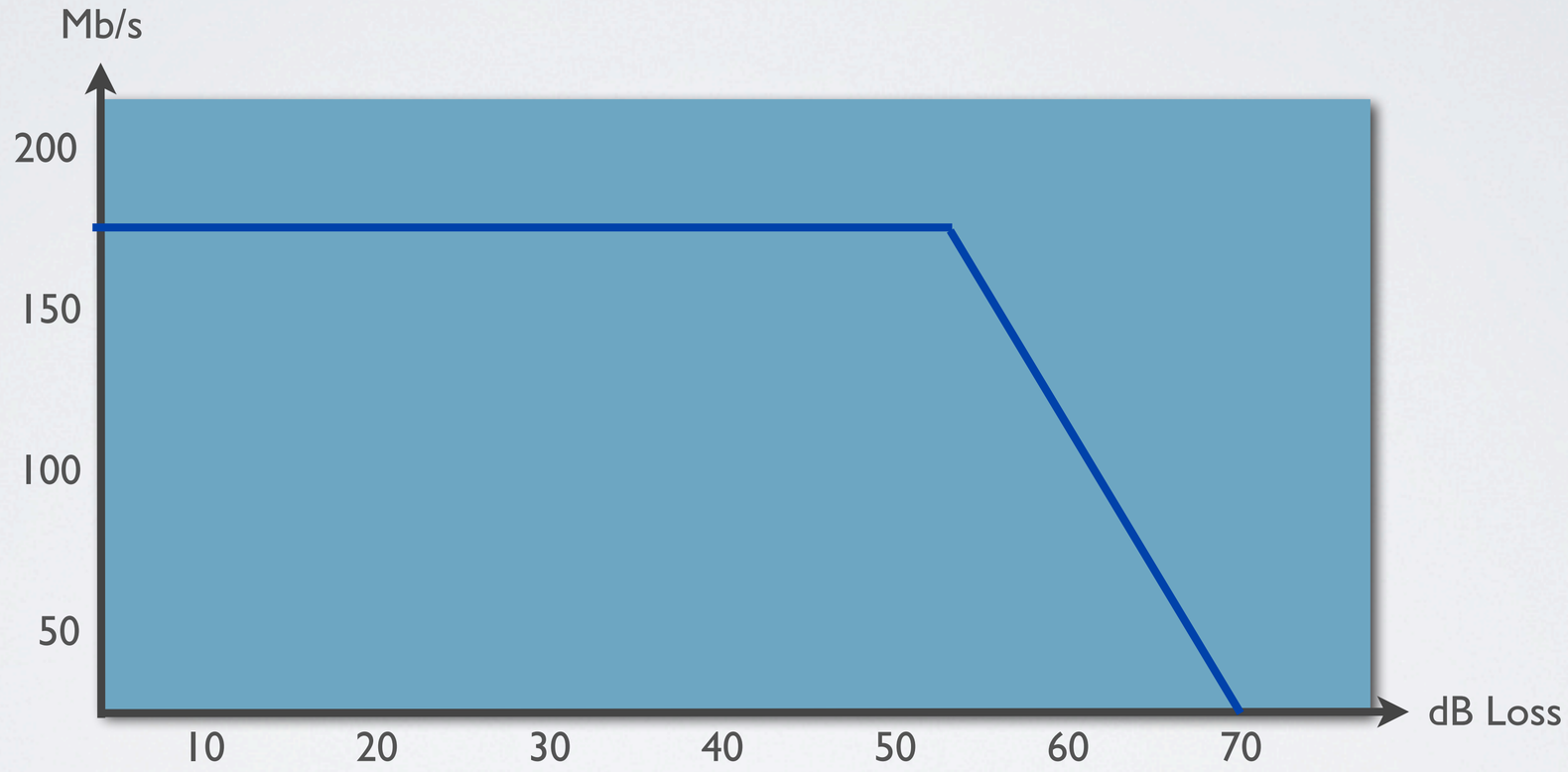
DON'T Connect MoCA Devices to VoIP/ Modem Port

Connect Gateway and MoCA Devices With The Longest Coaxial Cable Runs To Ports 1-4

IPA2000DL
MoCA Amplifier

MoCA® Loss Budget

MoCA 1.0/1.1 systems have been tested, and show 175 Mbps rates at loss budgets of 57dB and lower. The system has a very steep bit rate cliff above 57 dB

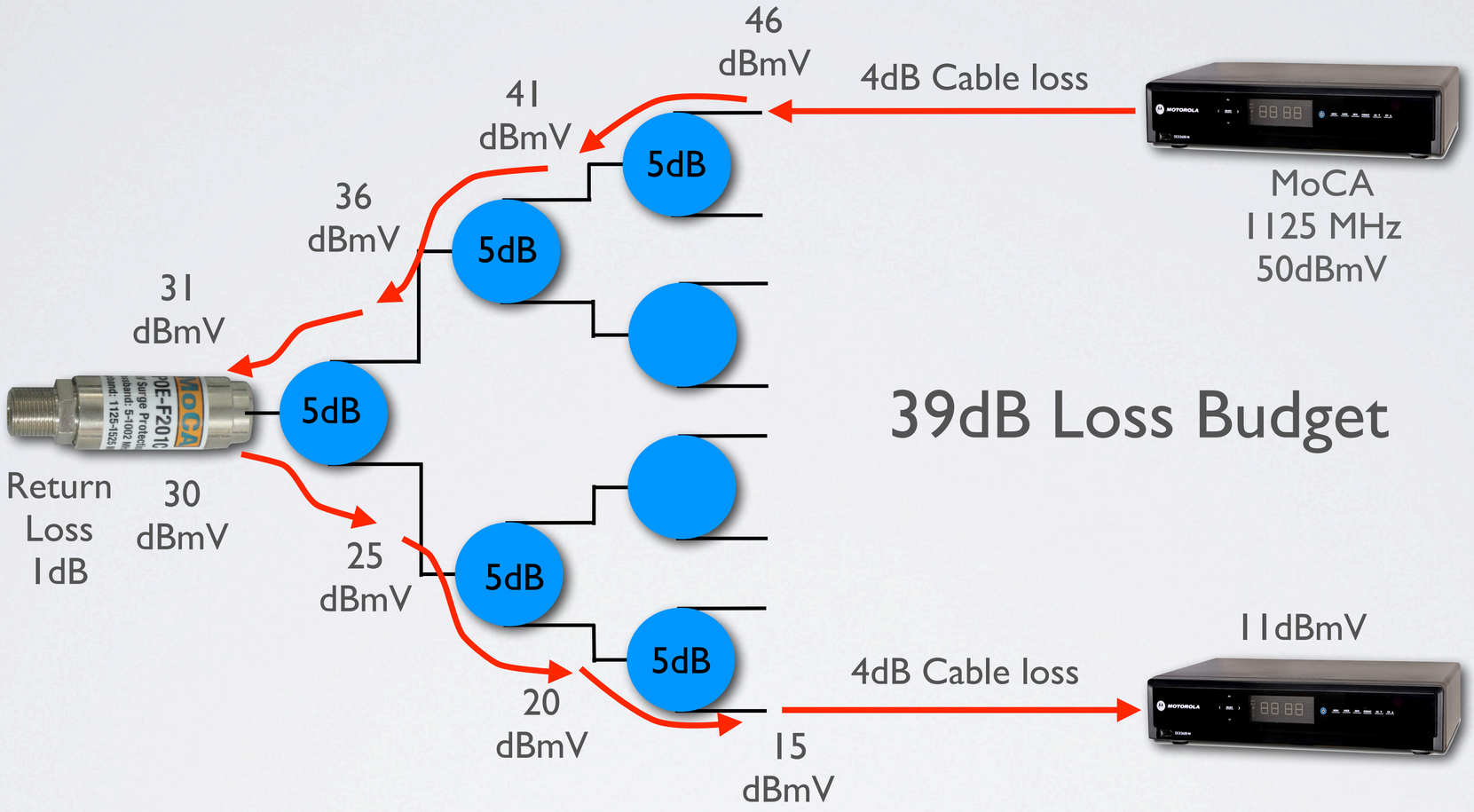


MoCA® Loss Budget

MoCA 1.0/1.1 systems have been tested, and show 175 Mbps rates at loss budgets of 57dB and lower. The system has a very steep bit rate cliff above 57 dB

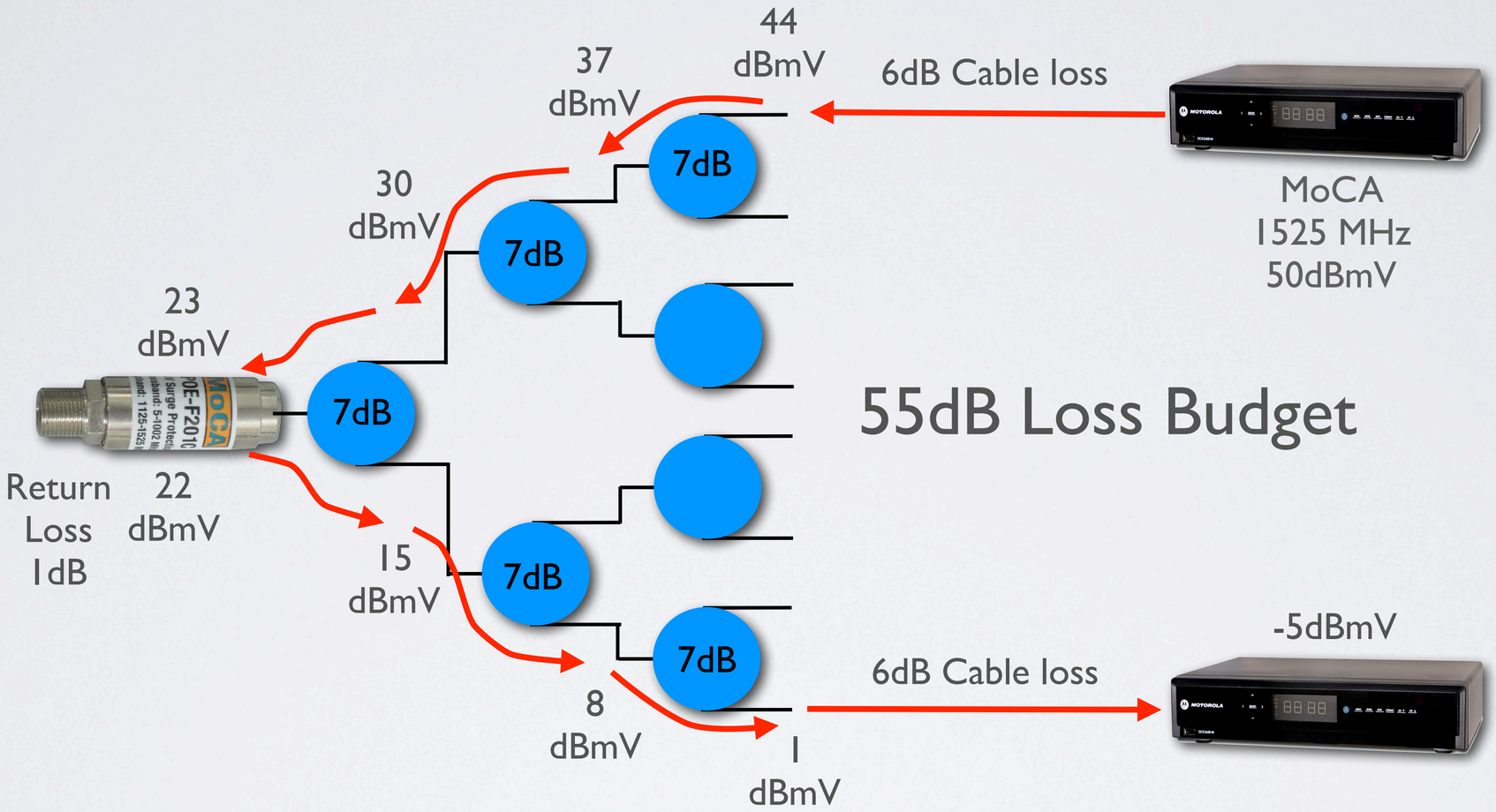
- Isolation path loss: Normally one isolation device in path
- Splitter losses: Several dB higher at MoCA frequencies
- Cable losses: Several dB higher at MoCA frequencies
- Should retain some margin of operation

MoCA® Loss Budget



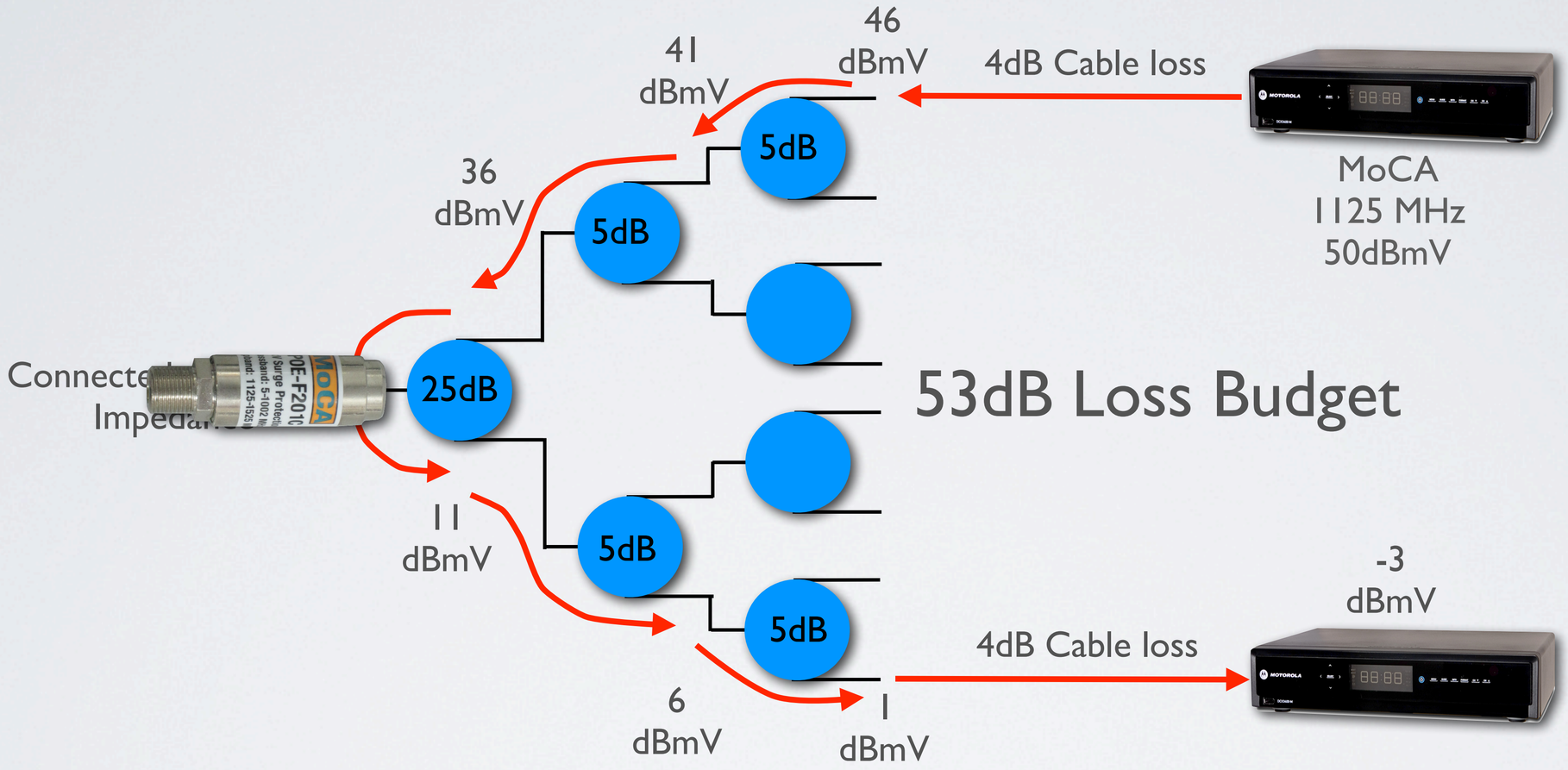
Amphenol
Broadband Solutions

MoCA® Loss Budget



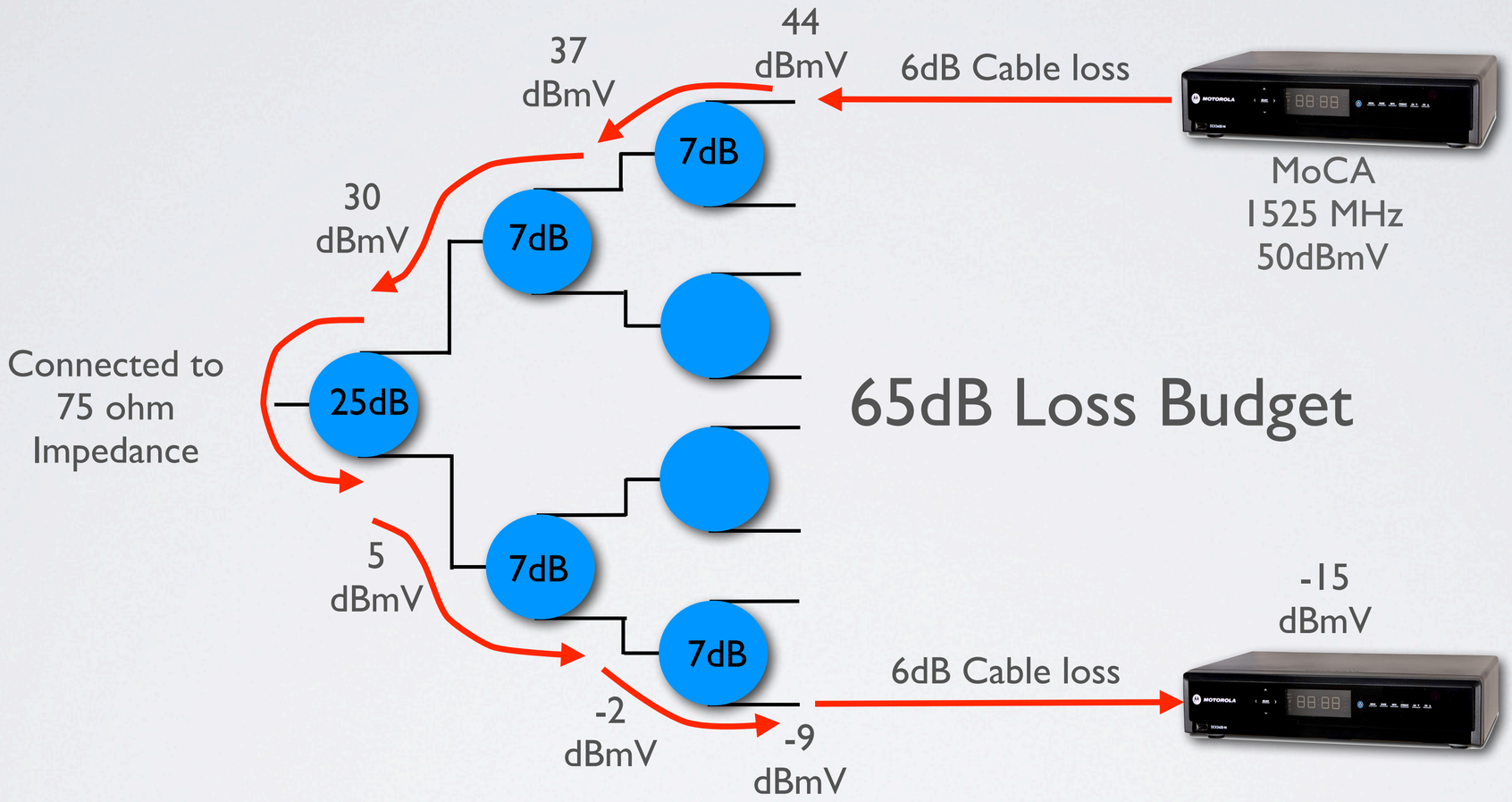
Amphenol
Broadband Solutions

MoCA® Loss Budget



Amphenol
Broadband Solutions

MoCA® Loss Budget

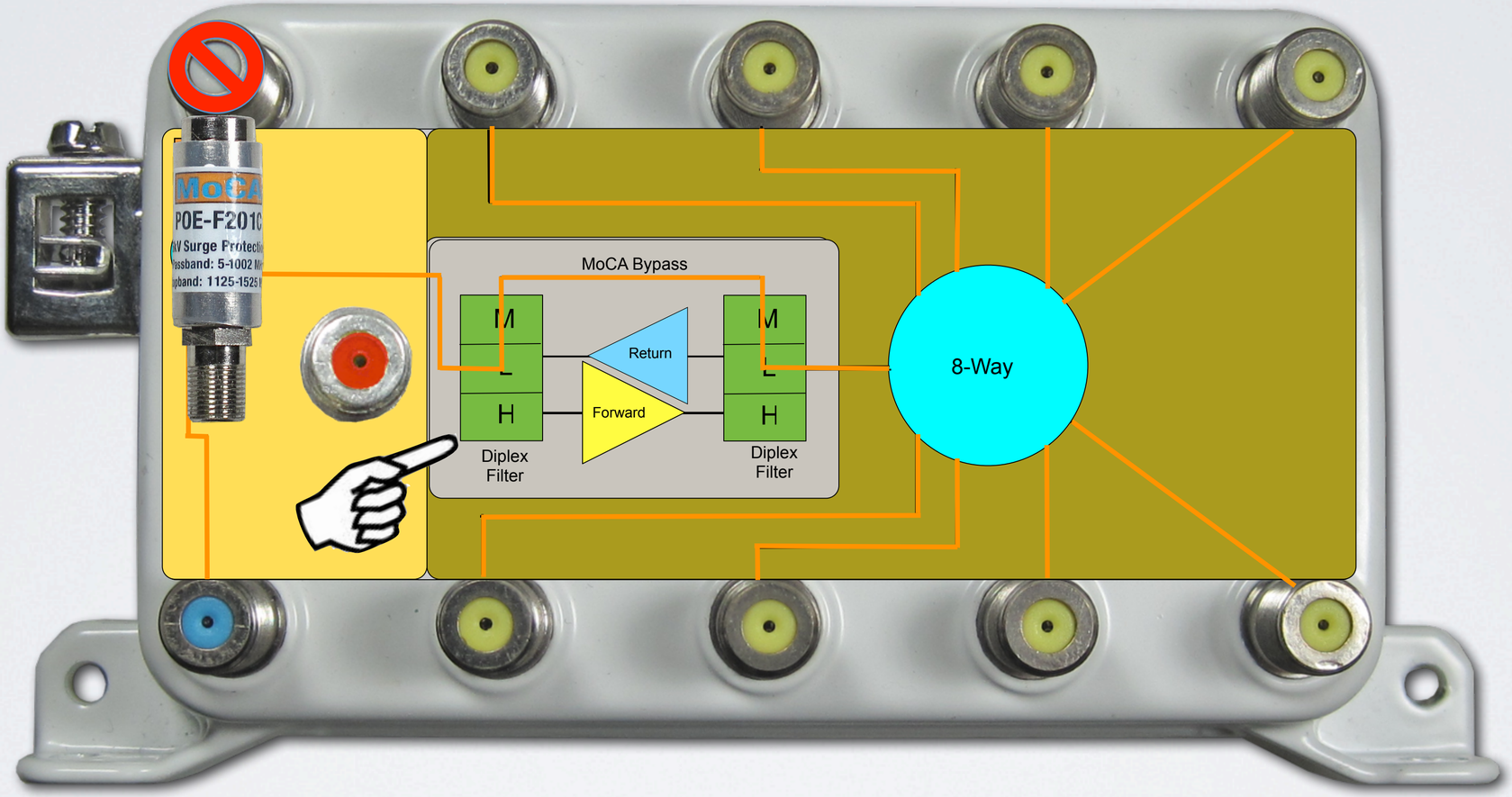


Amphenol
Broadband Solutions

MoCA® Amplifier

Amphenol
Broadband Solutions

DL2 Data Plus Amp
MoCA Signal Flow



DataComm™

CrossTalk™

Amphenol
Broadband Solutions

MoCA Resources

- www.scte.org - MoCA Primers
  - Communications Technology, Nov 2012, OFDM, Ron Hranac on SCTE site under Archives
- www.mocalliance.org - MoCA Technology, Presentations
- www.moca4installers.com - MoCA Installation
- www.amphenolbroadband.com - MoCA Training Videos

MoCA® Overview
Summary

- MoCA can network a home by carrying large amounts of information and data through existing coaxial wiring
- MoCA uses the frequencies 1125MHz - 1675 MHz
- Explained MoCA Filters
- MoCA Signal Will Pass Through 1002MHz Passives
- Showed Examples of MoCA Loss Budget

Amphenol Broadband Solutions

Thank You For Viewing This Training

MoCA Overview

For Additional Training Topics See Our Website At

www.amphenolbroadband.com