IEEE 802.3af Power via MDI
Standard Compliant Mid-Span Insertion Solution

Presented by PowerDsine:

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Objectives

- Investigate the Channel /Link options
- Identify the requirements that Mid-Span Insertion solution should comply with
- Suggest a standards compliant solution
- Determine requirements for the proposed Mid-Span insertion device
- Present Lab test results

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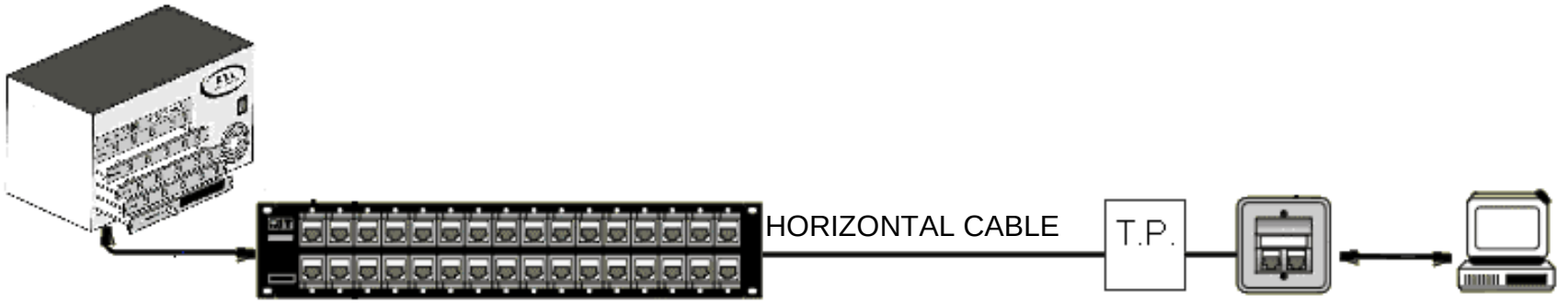
Standards Requirements - Cabling

- The Cat 5 Cabling components requirements are defined in ANSI/TIA/EIA -568-A, 1995
- It defines requirements for Horizontal cables, Connecting Hardware and Patch Cables
- The Standard defines two possible arrangements (p. 33) Interconnect & Cross connect

Interconnect = Link

Horizontal Cables represented on Patch Panel in Wiring Closet, User connects Patch Cables from Patch Panels directly to Equipment Port



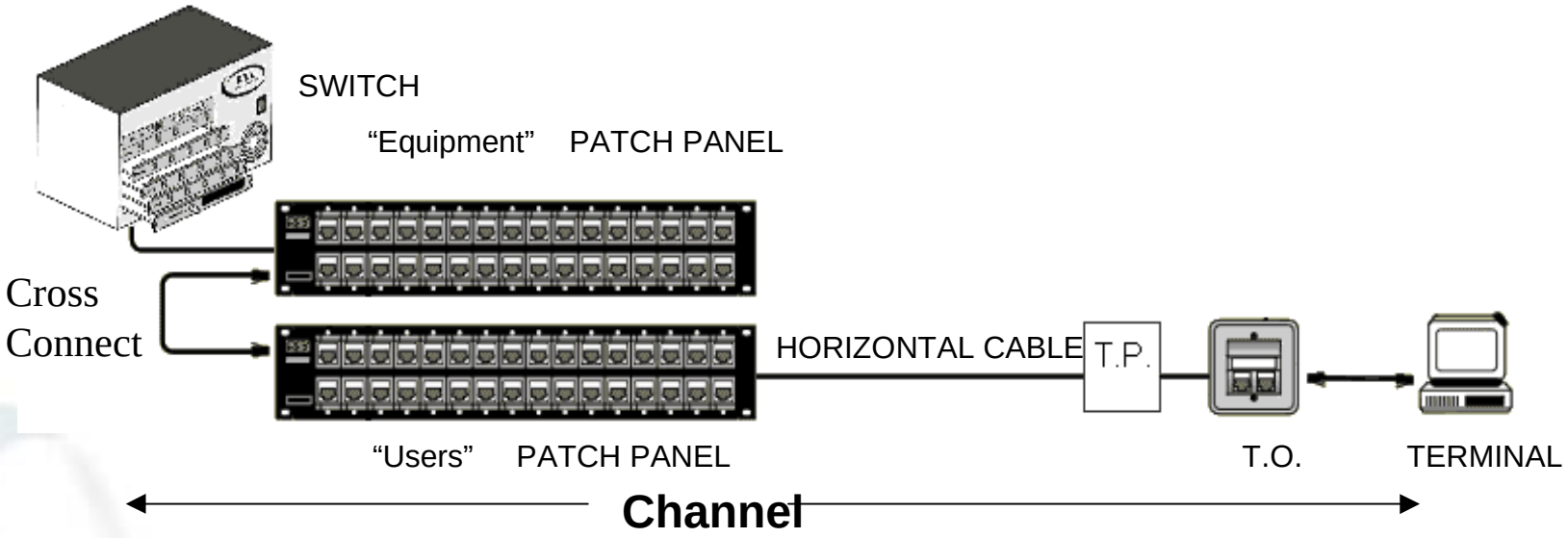
Basic Link=Generic Part

T.P.=Transition Point

T.O. = Telecommunications Outlet

Cross Connect = Channel

- Horizontal Cables represented on Patch Panel in wiring closet, Equipment ports represented on separate Patch Panel
- User connects Patch Cords between Patch Panel port representing “Users” to the port representing “Equipment”



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Link or Channel

- Both options are supported by the 568-A
- Both Channel & Link end-to-end performance parameters are specified in:
  - TIA/EIA TSB 67
  - ISO/IEC 11801

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Standards Requirements - Ethernet 10/100BaseTx

- The 100BaseTx requirements are defined in IEEE Std 802.3u, which links the electrical requirements to the FDDI Standard ANSI X3.261-1995
- The FDDI Standard defines the desired Tx signal (Para. 9.1.2.2) and the cabling model to be connected between Tx to Rx

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Standards Requirements - Ethernet Cabling Model

- The cabling model is specified in FDDI Annex A
- Specifying 5 Test Channels, the longest - hence representing “worst-case”, comprising:
  - Three Cat 5 “connectors”
  - 90 meters Cat 5 Horizontal cable
  - 10 meters Cat 5 Patch cable
- The specified Attenuation & NEXT values are based on the Channel requirements of EIA/TIA TSB67

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Conditions For Standard Compliant Mid-Span Solution

- The end-to-end Electrical Transmission parameters of all components connected between Switch Port to DTE should meet the “Channel” Transmission parameters as defined in the referenced standards

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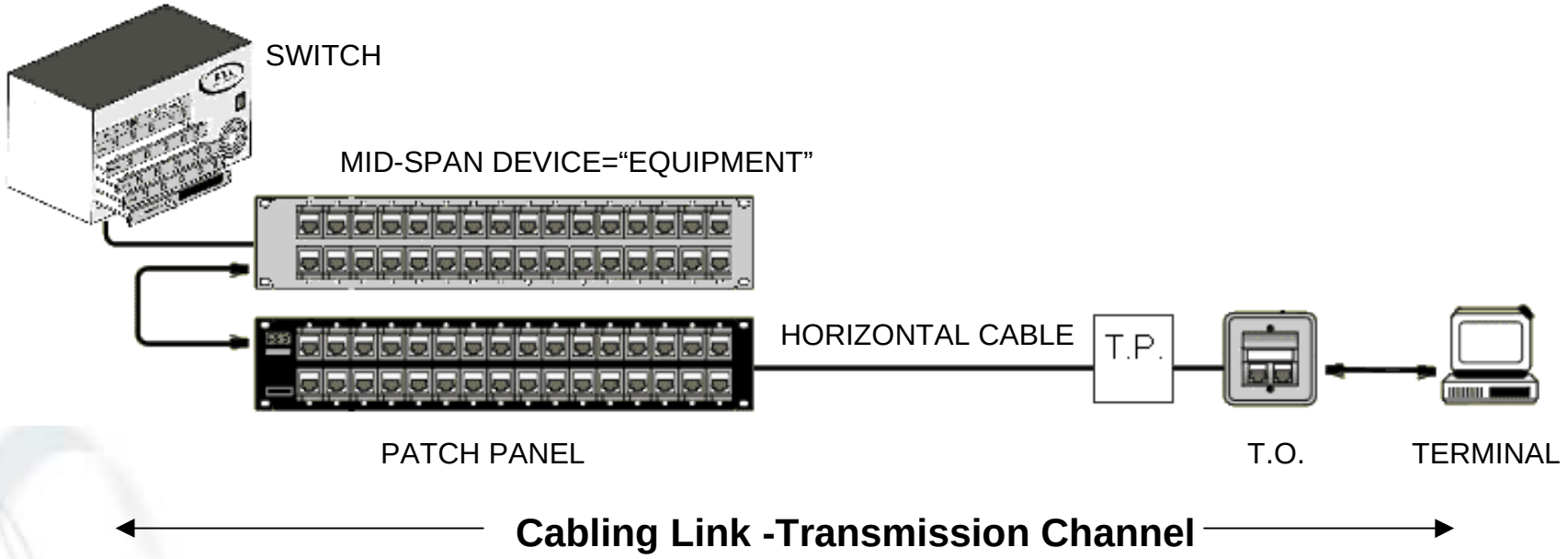
Suggested Solution

- To create a Mid-Span device which meets the Cat 5 “Connecting Hardware” requirements for pairs 1/2 & 3/6
- The Mid-Span device should be defined as an “Application Specific Equipment” and not as a generic 568-A “Connecting Hardware” = Patch Panel

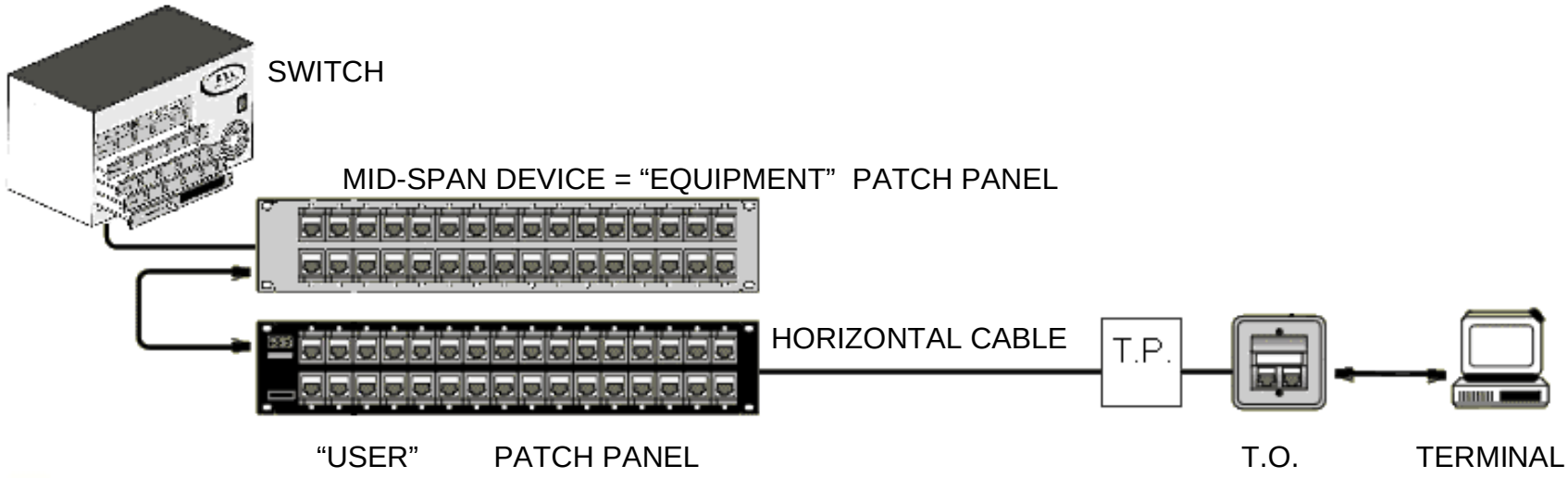
Interconnect Environment

Interconnect Environment can accommodate one additional connecting hardware element which may be the Mid-Span Insertion device



Cross Connect Environment

The Mid-Span device replaces the “Equipment “ representing Patch Panel while maintaining the Cross Connect functionality



Transmission Channel with Cross Connect Functionality

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Mid-Span Insertion Device Transmission Requirements

Supporting this solution require that for pairs 1/2 &3/6 the device complies to Cat 5 requirements for Connecting Hardware:

- NEXT 40dB @ 100Mhz
- Return Loss 14dB @ 100Mhz
- Attenuation 0.4dB@100Mhz

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Meeting the Performance Requirements

- The use of “back to back” ordinary RJ-45 connectors on the Mid-Span device may raise a performance issue
- There exist in the market “internally compensated RJ-45 ganged connectors” which performs better that a singe “generic” RJ-45 connector
- Use of such “internally compensated ganged RJ-45 connectors” will enable meeting the performance requirements

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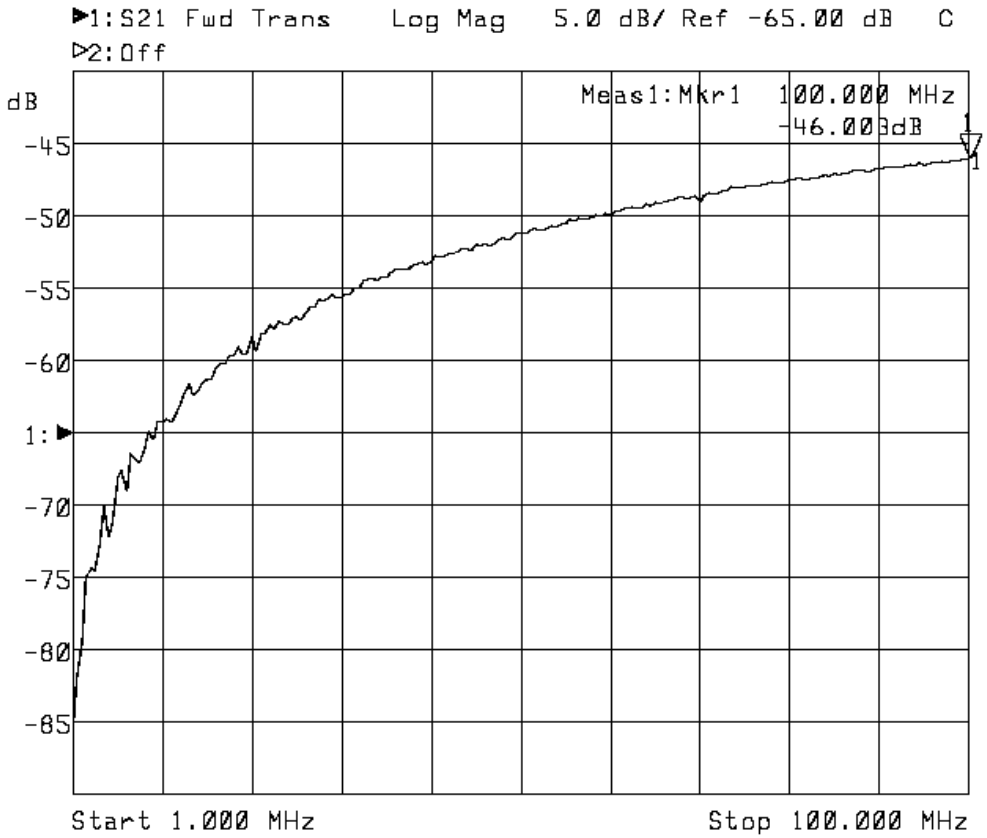
Typical Lab Testing Setup

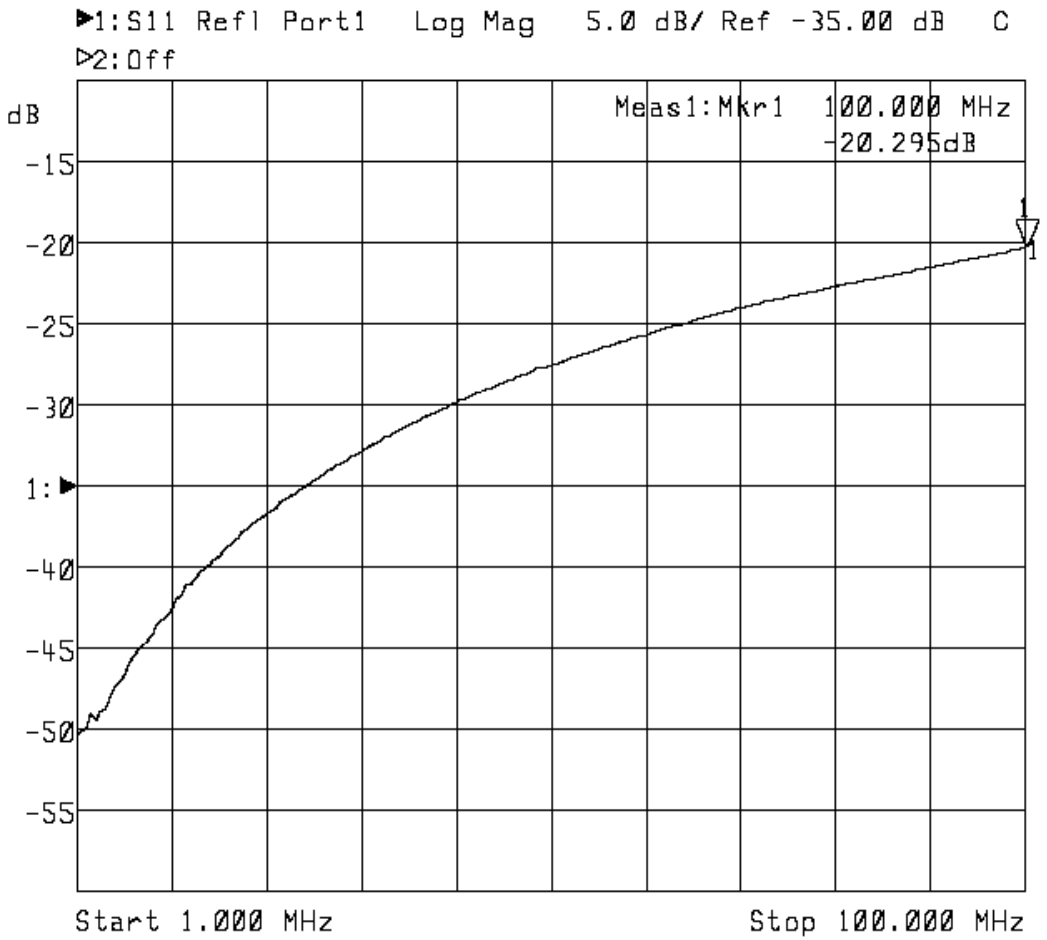
Measured Data - NEXT

Mid-Span Device



Measured Data - Return Loss

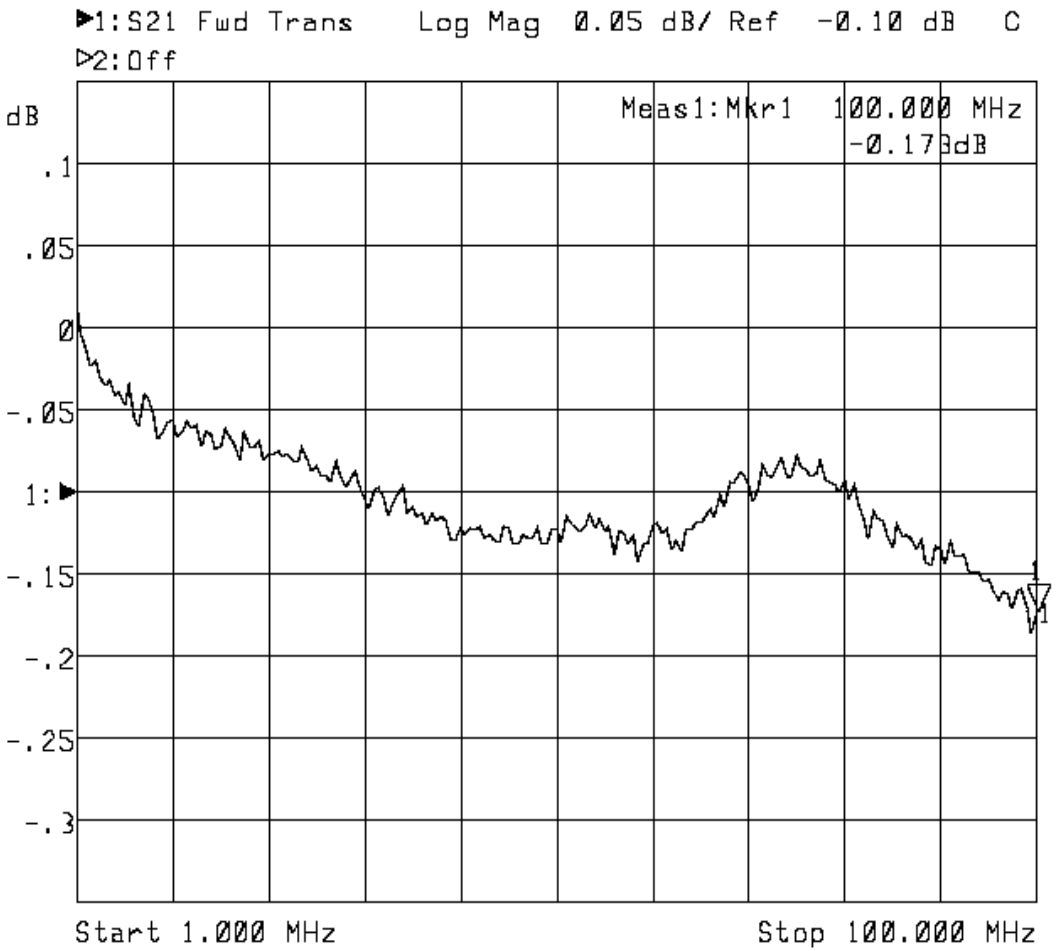
Mid-Span Device



1:Mkr (MHz) dB	2:Mkr (MHz) dB
1› 100.0000 -20.295	

Measured Data - Attenuation

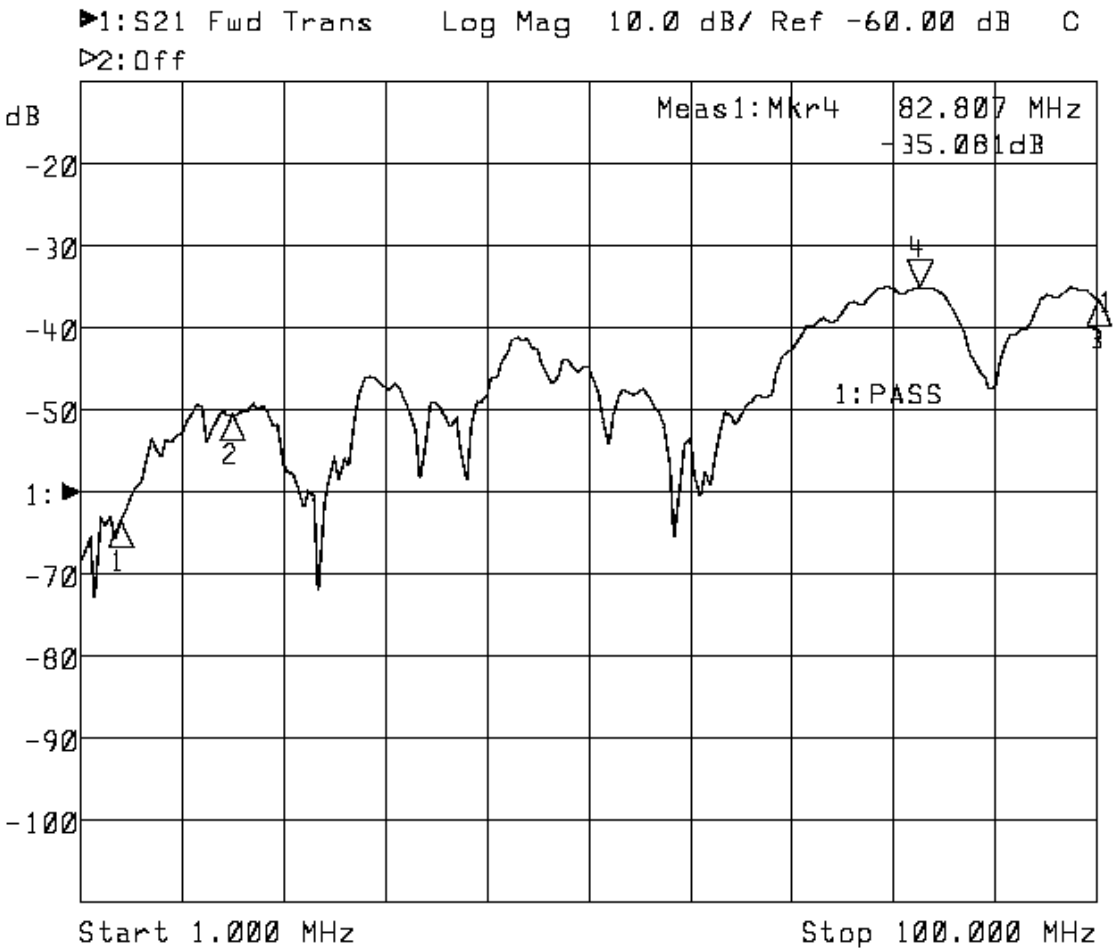
Mid-Span Device



1:Mkr (MHz)	dB	2:Mkr (MHz)	dB
1> 100.0000	-0.173		

Measured Data - NEXT

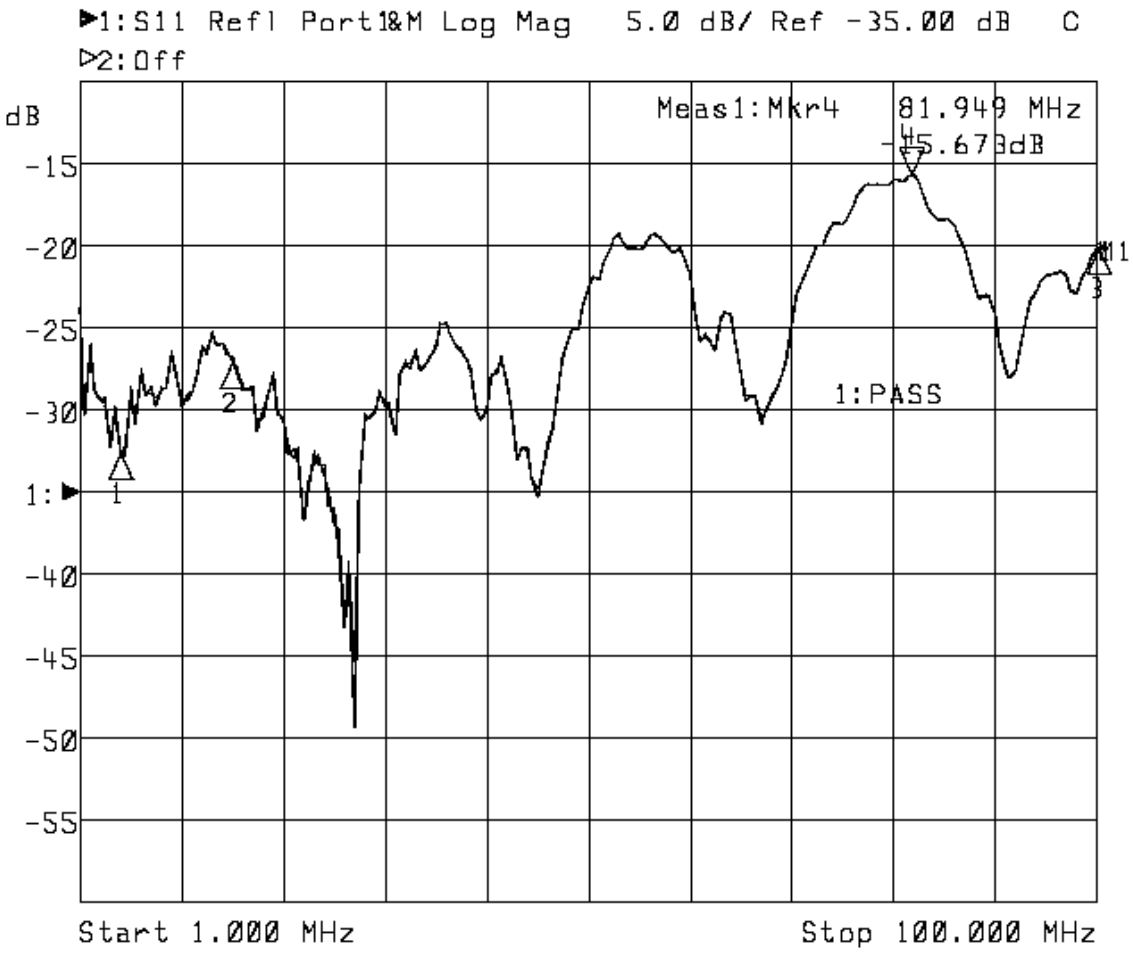
120m Channel including a Mid-Span Device



1: Mkr (MHz)	dB	2: Mkr (MHz)	dB
1: 5.0000	-63.413		
2: 16.0000	-50.621		
3: 100.0000	-36.517		
4› 82.8070	-35.081		

Measured Data - Return Loss

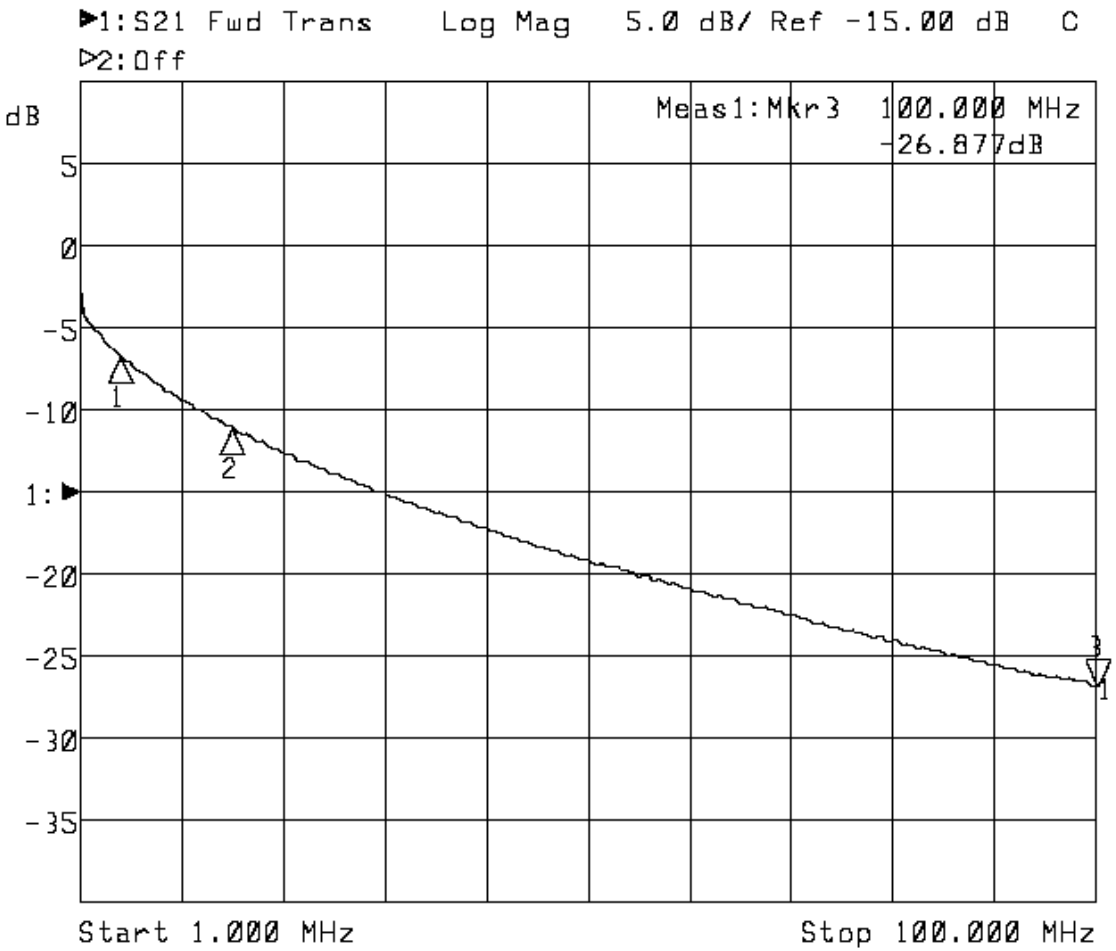
120m Channel including a Mid-Span Device



1:Mkr (MHz)	dB	2:Mkr (MHz)	dB
1: 5.0000	-32.596		
2: 16.0000	-27.144		
3: 100.0000	-20.143		
4> 81.9490	-15.673		

Measured Data - Attenuation

120m Channel including a Mid-Span Device



1:Mkr (MHz)	dB	2:Mkr (MHz)	dB
1: 5.0000	-6.733		
2: 16.0000	-11.088		
3> 100.0000	-26.877		

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Summary

- Mid-Span insertion solution is STANDARD COMPLIANT
- Building a Standard Compliant Mid-Span device which meets the transmission requirements for Cat 5 pairs 1/2 & 3/6 is possible using available components
- This device should be defined as an “Application Specific” hardware
- This device should be installed as the channel “Equipment representing Patch Panel”