

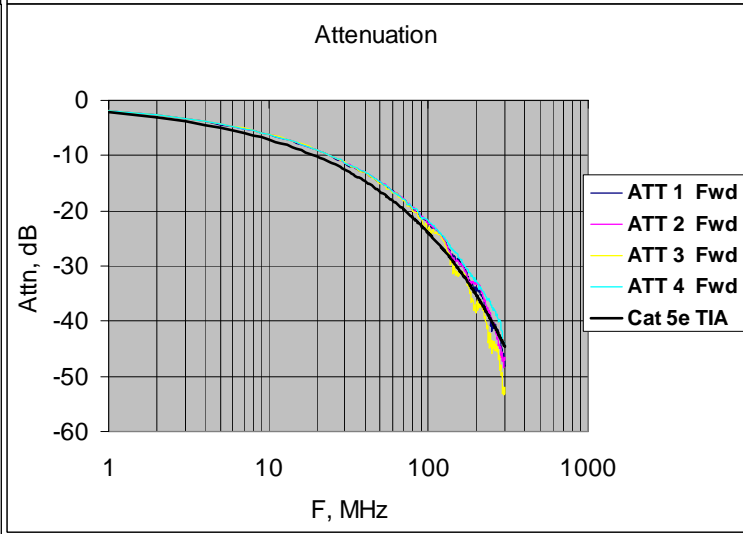
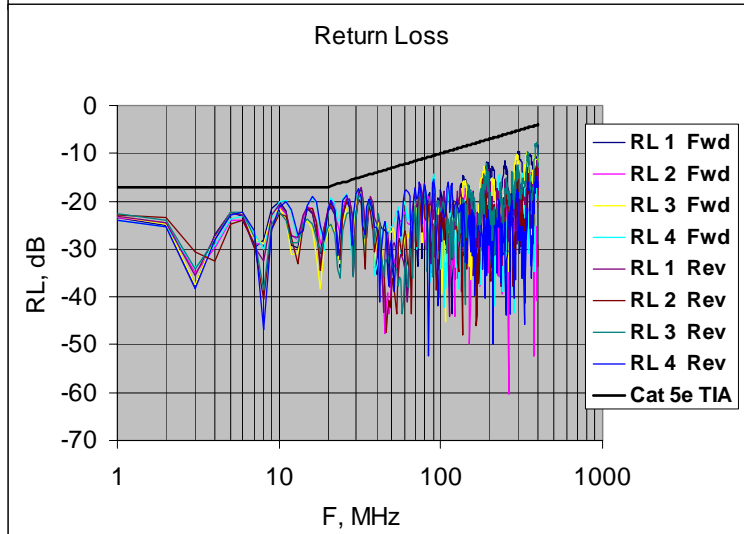
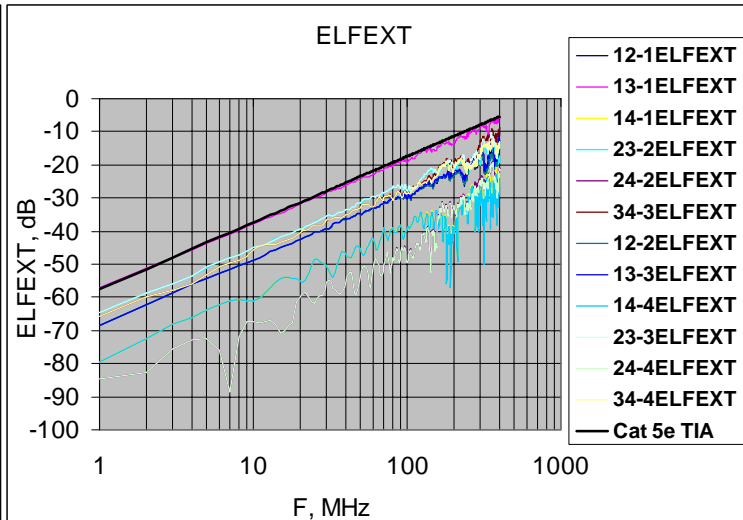
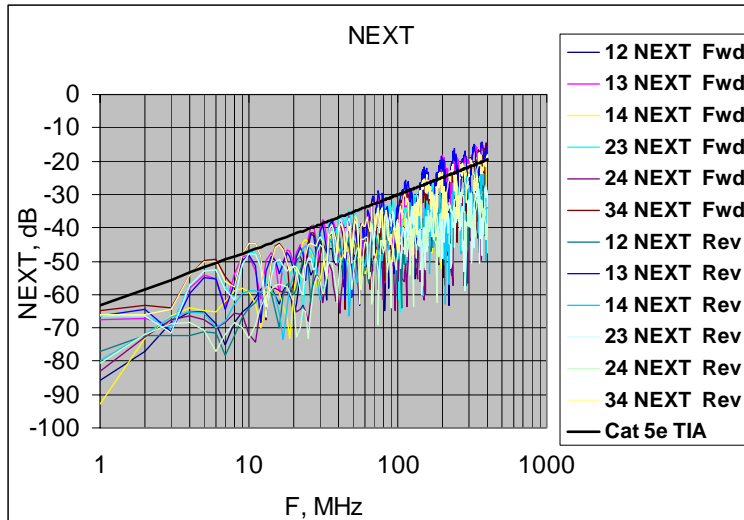
Copper Cabling Performance

- ***Cat5 Installed base performance***
- ***Cat5e performance***
- ***Cat6 performance***
- ***Noise immunity for applications***
- ***Alien NEXT and ELFEXT***
- ***Extended Frequency Performance***

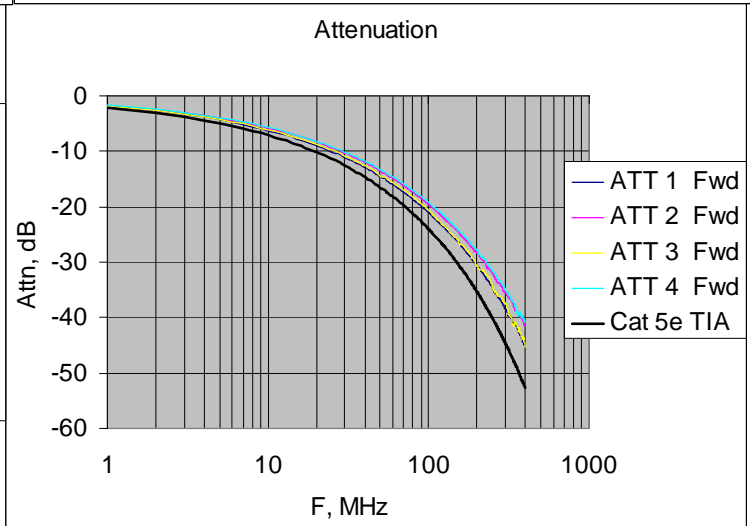
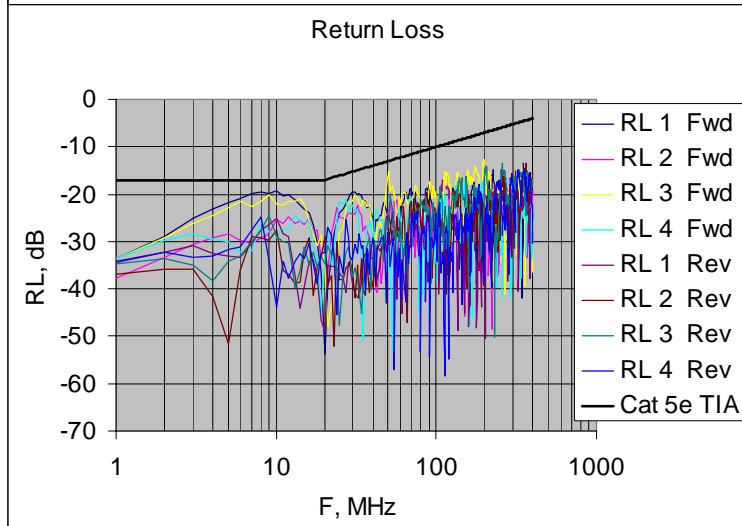
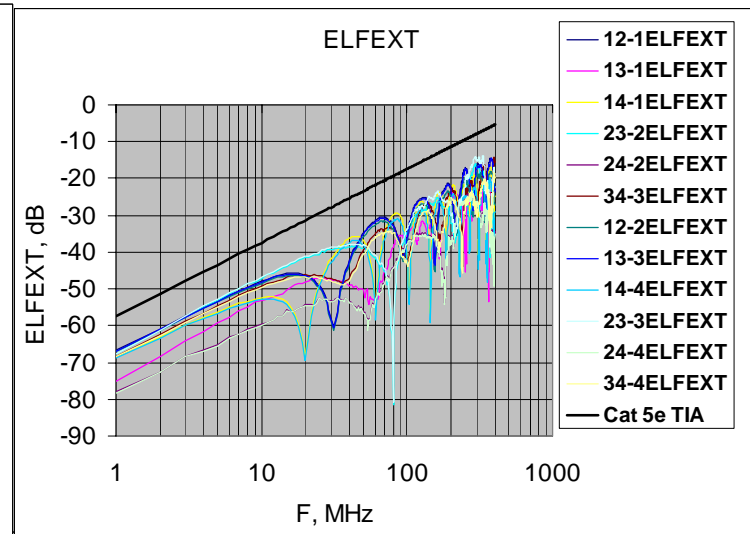
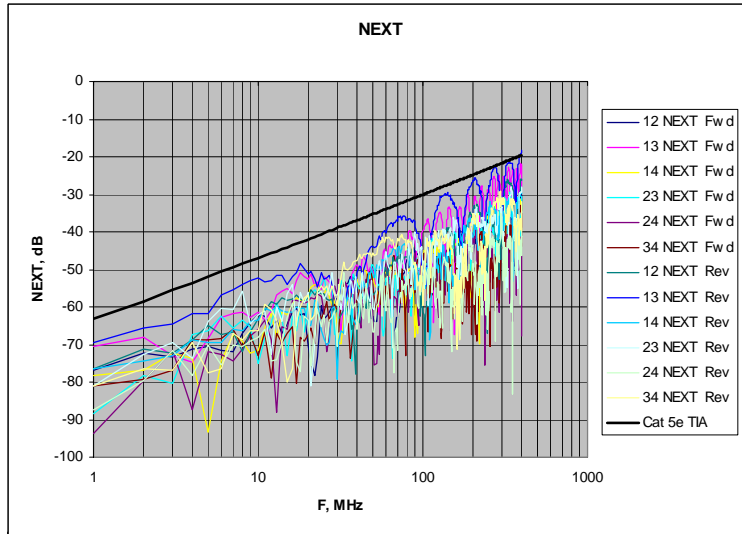
Cat5 Installed Base

- ***Component performance specified for NEXT, Insertion Loss, and Return Loss***
- ***Channel performance not field verified, Cabling measurement specifications (TIA TSB-67) came later.***
- ***After the fact, Channel Return Loss and ELFEXT were specified in TIA TSB-95.***
- ***During this time, connector design was not well understood, so cabling installed performance varied widely.***
- ***Even so, many installed channels may meet Cat5e performance requirements (with a handwave).***

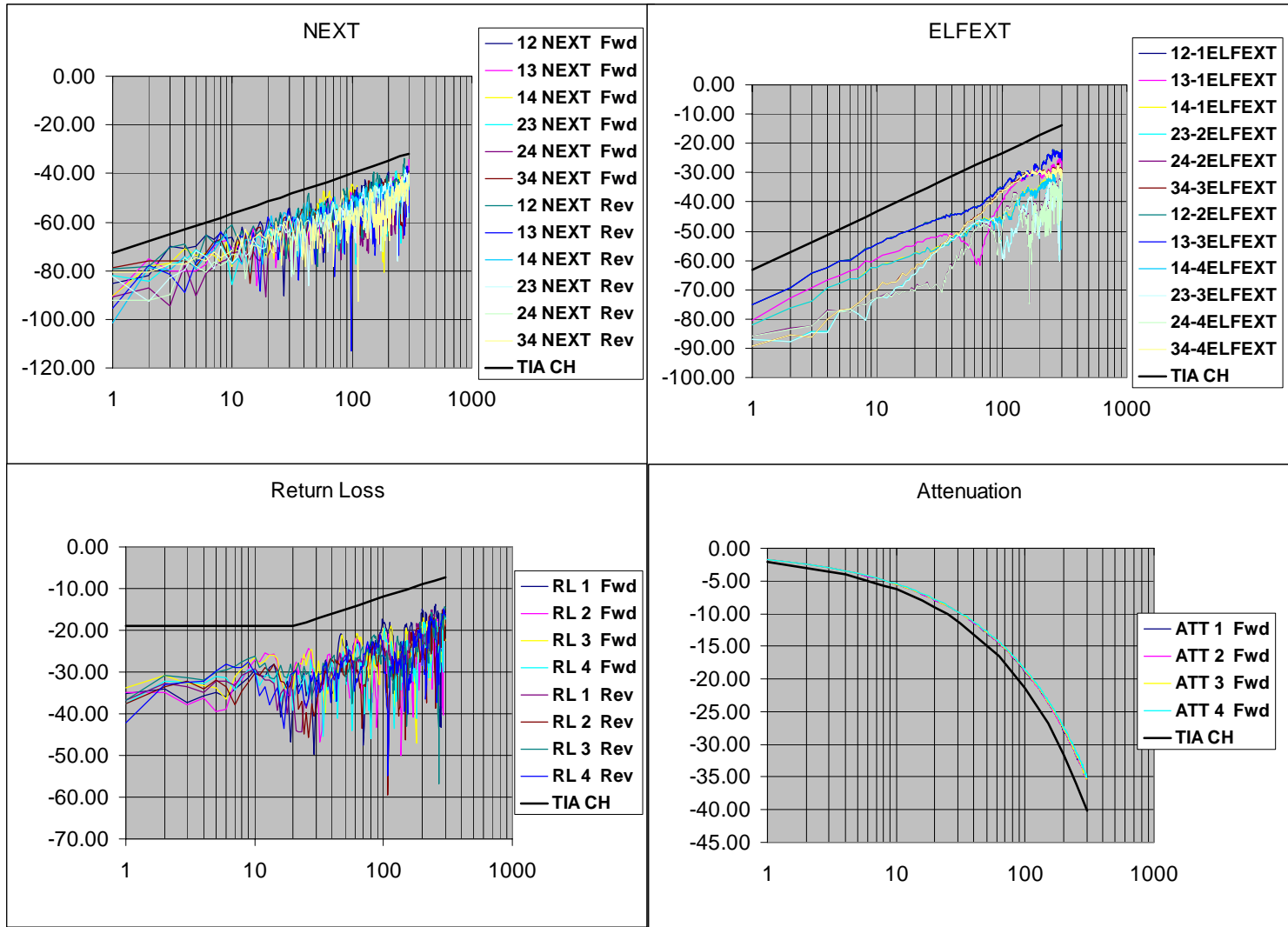
Cat5 Channel Performance



Cat5e Channel Performance



Cat6 Channel Performance



Channel Performance

- ***Channel performance for Cat5 and Cat5e was compared to Cat5e limits.***
- ***Cat5 and 5e limits are only specified to 100 MHz. Limit lines beyond 100 MHz are for information only.***
- ***Cat6 limits are specified to 250 MHz. Limit lines beyond 250 MHz are for information only.***
- ***Cat5e and Cat6 Cabling is expected to conform to the specified requirements with some margin. This is commonly verified by field testing.***

Cable Bundling and Alien Crosstalk

- ***Category 5e***
- ***Category 6***

Alien Crosstalk in Cat5e and Cat6 installations

- **Cat 5e Alien PSNEXT cable only spec (for Bundled and Hybrid Cables)**

$$35.3-15\log(f/100)+3 \text{ dB}$$

-or-

$$38.3-15\log(f/100) \text{ dB}$$

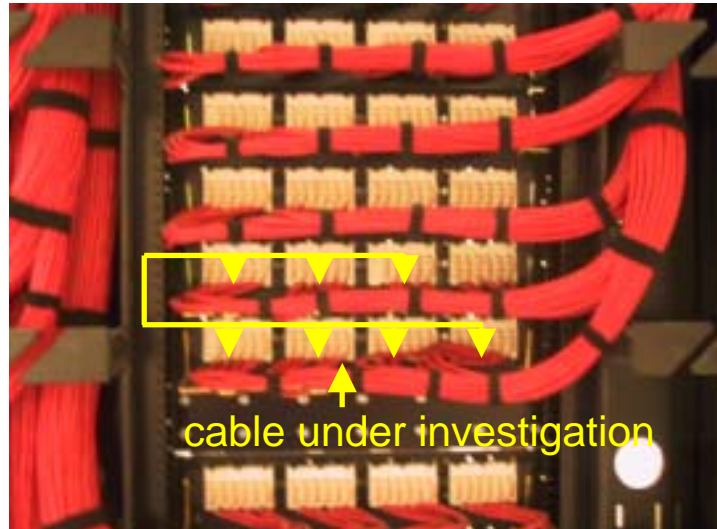
- **Cat 6 Alien PSNEXT cable only spec (for Bundled and Hybrid Cables)**

$$41.1-15\log(f/100) \text{ dB}$$

Both reverting to 65dB for PSNEXT values higher than 65dB

Alien Crosstalk in Cat5e and Cat6 installations

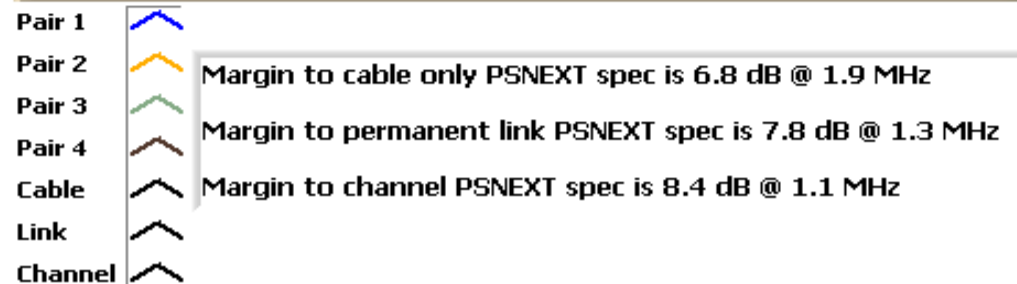
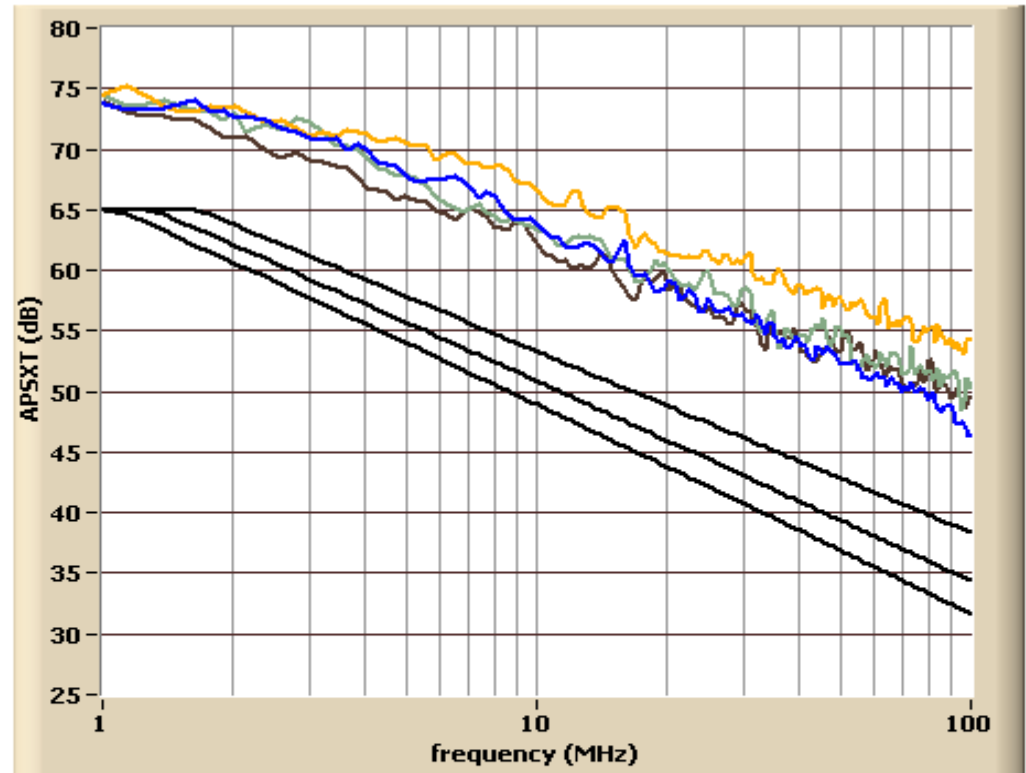
- ***Real world installation on existing network***
- ***cables tightly bound with velcro straps***
- ***Cable of interest at center of bundle***
- ***Bundle leading into ceiling on cable runway***



Alien Crosstalk in Cat5e installation

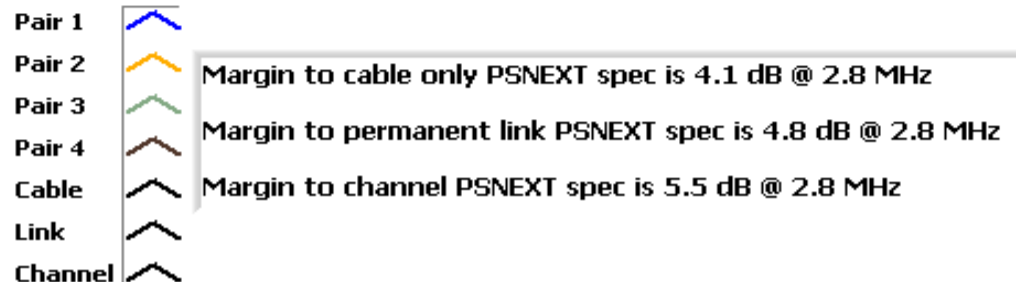
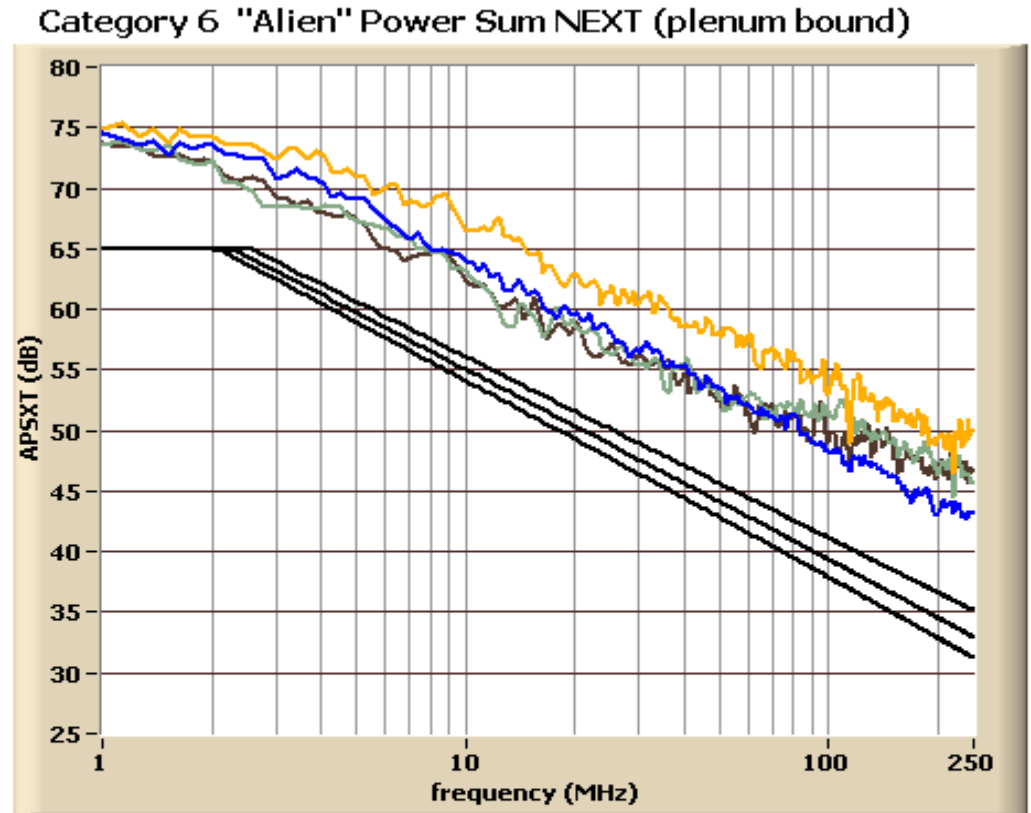
- **24 Cat 5e cables**
- **Bound configuration**
- **Permanent links**
- **6.8dB margin to cable spec**
- **7.8dB margin to link spec**
- **8.4dB margin to channel spec**

Category 5e "Alien" Power Sum NEXT (plenum -bound)



Alien Crosstalk in Cat6 installation

- **24 Cat 6 cables**
- **Bound configuration**
- **Permanent links**
- **4.1dB margin to cable spec**
- **4.8dB to link spec**
- **5.5dB margin to channel spec**



Evaluation of Alien Crosstalk in Cat5e and Cat6 installations

- ***Cat5e, and Cat6 installations were evaluated for Alien NEXT***
- ***Positive margin to current TIA/EIA specifications for Cat5e and Cat6 cable link and channel measurements were demonstrated.***
- ***It is important to follow installation guidelines for bundled cabling.***

Contributors to this paper

- ***Alien Crosstalk and Network Performance***

***Source: Trent Hayes
SYSTIMAX
Technical Manager
AVAYA Inc.
1300 E. Lookout Dr.
Richardson, TX 75082***

Date: May 7th 2002

Location: BICSI Las Vegas, NV

- ***Horizontal Cabling Selection Market Study***

***Source: Luc Adriaenssens
SYSTIMAX Director of R&D
AVAYA, Inc
1300 E. Lookout Dr.
Richardson, TX 75082***

- ***Fast vs Gigabit Noise Immunity***

***Source: Ray Emplit
The Wiremold Company
71 Sweet Water Road
Glen Mills, PA 19342
Phone:(610) 459-4986
Fax:(610) 328-7940
Email:ray.emplit@wiremold.com***

Date: 10-03-02

Location: Scottsdale, AZ

Distribution: Participants of TIA TR-42.3

- ***Channel Performance***

***Sterling Vaden
V.P. Research and Development
33 Superior Way
Swannanoa, NC, USA
828 298-2260, Fax 828 298-2320
savaden@superiormod.com***