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HUNTSVILLE, AL - MARCH 13-15, 2018

“Understanding Alien Crosstalk in LANs and Methods for Mitigating It”

March 14, 2018

Presented by:

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IMPROVING NETWORK INFRASTRUCTURE
RELIABILITY AND SUSTAINABILITY

WiFi is where it's at!





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So what's the problem???

- The deployment of so-called “Wave 2” 802.11ac wireless access points continues to ramp up
- With multi-gig a reality for users of 802.11ac technologies, the horizontal cabling that provides the backhaul for wireless transmission must be able to support, at a minimum, the same speed



So Will It Work?

0m <= Bundled cabling length <= 50m	Category 5e	Category 6	Category 6A
2.5GBASE-T	Green	Green	Assured
5GBASE-T Assured	Light Green	Green	Assured
50m <= Bundled cabling length <= 75m	Category 5e	Category 6	Category 6A
2.5GBASE-T	Light Green	Green	Assured
5GBASE-T Assured	Yellow	Light Green	Assured
75m <= Bundled cabling length <= 100m	Category 5e	Category 6	Category 6A
2.5GBASE-T	Yellow	Light Green	Assured
5GBASE-T Assured	Red	Yellow	Assured
ALSNR Risk	High	Medium	Low



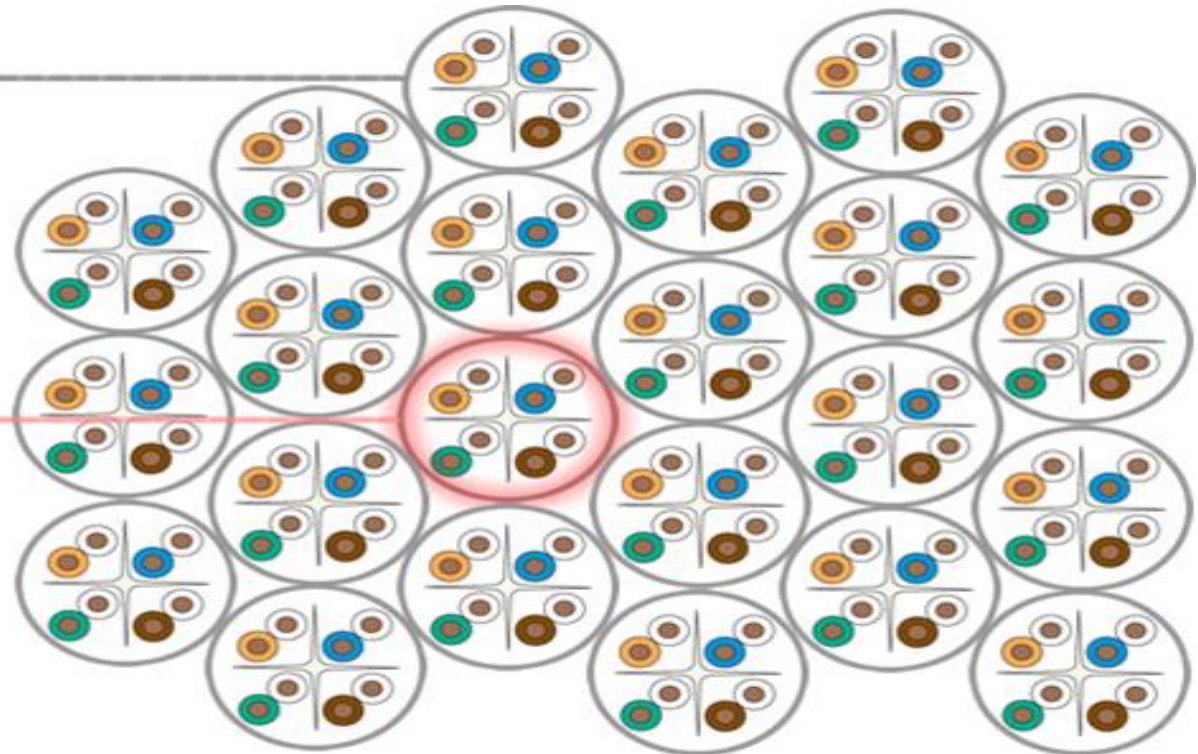
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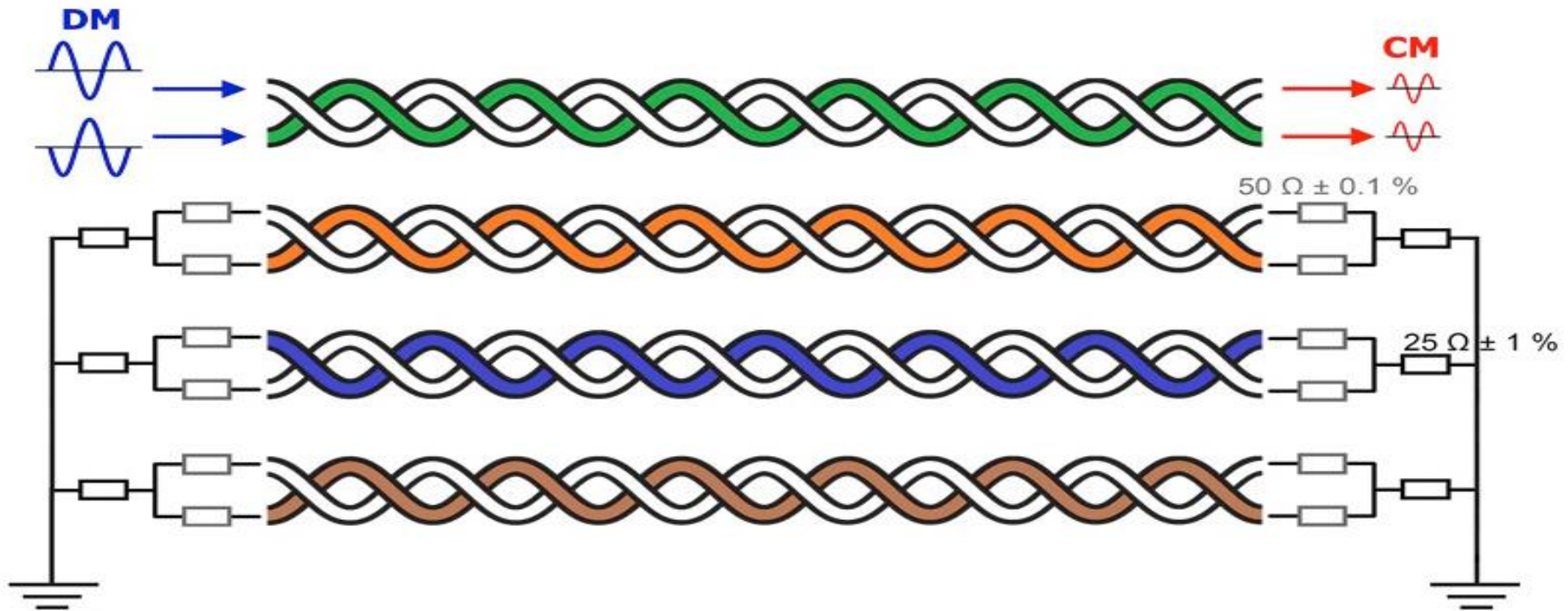
Alien Crosstalk Explained and Measured

Disturbers

Disturbed (Victim)



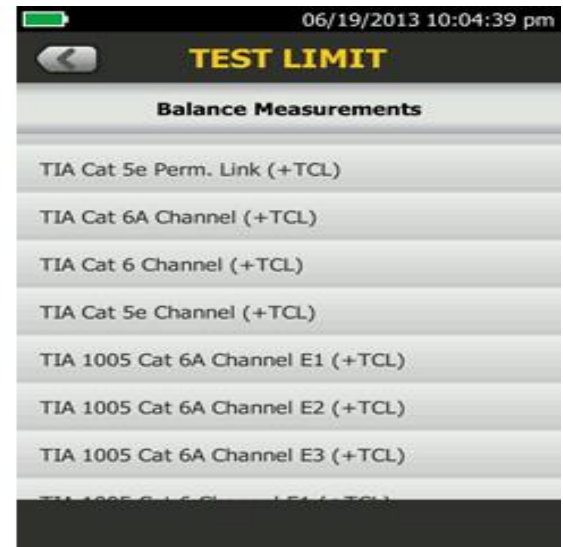
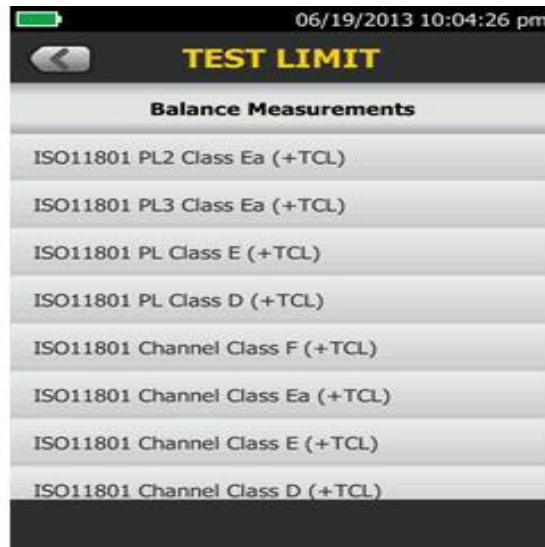
But what is **ELTCTL**????





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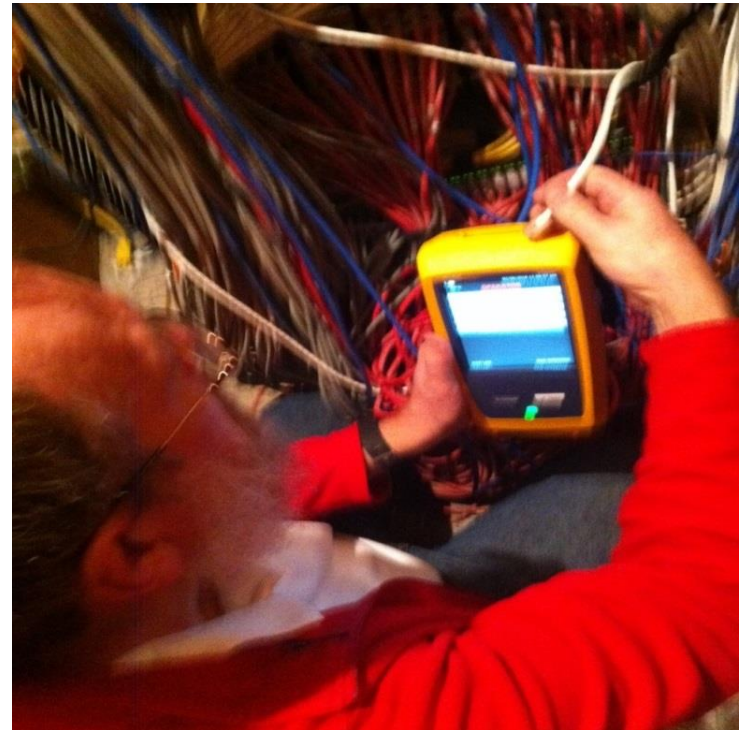
New **UH** Research Project



“**ALSNR**” is nothing more than the same old inductive interference issues the telecom industry has been dealing with all these years!

Did someone say **Foreign** EMF???

Fluke ALSNR testing at **UH**



Cat 5e Ethernet circuit at UH's **AT&T Technology Lab** <http://uh.edu/tech/att/>



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ALSNR Mitigation Techniques

- Use “Enhanced Performance Patch cords”
- Increase physical separation between cables and ports and unbundle the horizontal cables
- Limit the length of paralleling cables
- Provide additional shielding conductors, such as grounding unused pairs or possible use of POE
- Install Induction Neutralizing Transformers?



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1995 Letter to Editor *Cabling Installation & Maintenance* still on the web!

<http://www.cablinginstall.com/articles/print/volume-3/issue-11/crosstalk-feedback/to-the-editor/grounding-and-bonding.html>

Grounding and bonding

November 1, 1995

Russ Gundrum
Kingwood, TX

Just wanted to add a few comments to Mark Waller's article "Grounding and bonding ensure a safe installation" (see September 1995, page 21). **Instead of using modems, opto-isolators or data-port protectors, or replacing copper cable with fiber-optic cabling**, I'd like to suggest a less-expensive and more-effective solution to the problem of induced voltages and currents on data lines. And shielded cable isn't the answer either--as the telephone industry learned years ago.

Neutralizing transformers were developed more than 60 years ago for use on open-wire telephone lines to reduce induced voltages and currents simultaneously. You don't need to specify an operating threshold for this device because it doesn't clamp the circuit and shunt it to ground. There is no time delay, because it operates instantaneously, and it is a multi-pair device, so you only need it at one end of the circuit.

In the 1960s, large units were built for critical telecommunications and data circuits serving substations and power plants that might be exposed to thousands of volts. In the 1970s, smaller and less-expensive units were designed to suppress hundreds of volts. **Now I'm waiting for one to be designed for the local area network market to solve an even lower voltage problem. Any takers out there?**



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References

- Russ Gundrum's **Research Project on Alien Crosstalk** at the University of Houston beginning 11/15/17 <https://www.researchgate.net/project/ALSNR-is-nothing-more-than-the-same-old-inductive-interference-issues-the-telecom-industry-has-been-dealing-with-all-these-years>
- February 3, 2014 Superior Essex White Paper "**Why Alien Crosstalk is the Most Important Factor in Category 6A U/UTP Cabling Systems**" <http://ce.superioressex.com/uploadedFiles/docs/pdf/white-papers/WP-Alien-Crosstalk.pdf>
- February 21, 2018 Cabling Installation & Maintenance article by Mark Mullins, Fluke Networks on "**Will my existing cable plant support 2.5/5GBASE-T?**" <http://www.cablinginstall.com/articles/2018/02/fluke-mullins-blog.html>
- Russ Gundrum's Letter to the Editor of Cabling Installation & Maintenance magazine over 22 years ago about "**The Need For A Low Voltage INT For The LAN Market**" <http://www.cablinginstall.com/articles/print/volume-3/issue-11/crosstalk-feedback/to-the-editor/grounding-and-bonding.html>
- May 1, 2017 Cabling Installation & Maintenance article by Patrick McLaughlin on "**There's plenty of wiring behind the latest generation of wireless networks**" <http://www.cablinginstall.com/articles/print/volume-25/issue-5/features/technology/there-s-plenty-of-wiring-behind-the-latest-generation-of-wireless-networks.html>
- May 1, 2017 Cabling Installation & Maintenance article by Mike Klempa on "**Protocol and hardware testing for 2.5GBase-T and 5GBase-T**" <http://www.cablinginstall.com/articles/print/volume-25/issue-5/features/standards/protocol-and-hardware-testing-for-2-5gbase-t-and-5gbase-t.html>
- Fluke Networks [**Application Note: Mode Conversion Testing Prevents Your Network from Hanging in the Balance**](#)
- Dr. Paulo Marin's Fall 2010 BICSI presentation on "**Alien Crosstalk Response of Augmented Category 6 Balanced Cables Due to Proximity Effect**" https://www.bicsi.org/pdf/presentations/fall_2010/Alien%20Crosstalk%20Response.pdf
- Ron Nordin and Paul Vanderlaan July 2003 IEEE 802.3 Plenary 10G Base-T Study Group Presentation on "**Alien Crosstalk Mitigation Technique**" www.ieee802.org/3/10GBT/public/jul03/nordin_1_0703.pdf
- Leviton Tech Brief "**Structured Cabling Considerations for 2.5GBASE-T and 5GBASE-T**" https://www.leviton.com/.../Leviton_StructuredCablingConsiderations_2.5GBASET_5
- **NBASE-T Performance and Cabling Guidelines** White Paper August 2016 http://www.nbaset.org/wp-content/uploads/2016/08/NBT_CablingWhitePaper_082916.pdf
- "**Mitigation of Alien Crosstalk for Downstream DSL Impaired by Multiple Interferers**", IEEE Communication Letters, November 2017 <http://ieeexplore.ieee.org/document/8013158>
- Fluke Networks' [**Datasheet: DSX-5000 CableAnalyzer™**](#)
- Fluke Networks' Blog by Barry Lindsley on July 21, 2016 "**All About Alien Crosstalk Measurement**"
- Russ Gundrum's PEG presentation March 14, 2017 in Dallas on a "New Secondary Network Protection Element" http://www.atis.org/peg/2017/New_Secondary_Network_Protection_Elements-RussGundrum.pdf
- Russ Gundrum's First DSL INT patent awarded on September 4, 2007 **U.S. Patent # 7,266,154** <https://www.google.com/patents/US7266154>



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Questions??????

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Appendix



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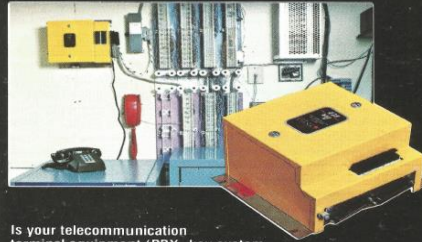
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Introducing... the
Best Protector on
the market today
...the SNC



TELECOMMUNICATION INTERFERENCE FILTER



Is your telecommunication terminal equipment (PBX, key system, alarms, data modems, etc.) experiencing these problems:

- False rings or signaling malfunctions?
- Unexplainable electronic equipment failure or damage?
- Noisy circuits?
- Unsafe AC voltages on the line terminals?
- Excessive "secondary" protector operations sporadically shutting the system down?
- Can't call out or receive calls on occasions?
- Impulse noise on data circuits causing errors?

The solution to these problems may be an SNC Telecommunication Interference Filter (TIF)!

The TIF is the best protector on the market today (when coupled with the telephone company provided "primary" protector) because it will substantially reduce:

- Steady-state or transient 50/60 Hz power line induced AC voltages up to 300 volts (rms)
 - Excessive power influence levels (induced harmonic voltages and currents) that can cause circuit noise.
- And it does all of this instantaneously and on a continuous basis without disrupting the circuit's operation!

Find out why over 500,000 telephone, railroad and power utility communication and signaling circuits around the world have utilized this equipment for the last 13 years to keep their lines in service.

For more information, contact:



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TLC - Telecom Line Conditioner

