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The Spectrum

Newsletter of the Rocky Mountain Chapter



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<http://www.scte-rockymountain.org/>

March 2017

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Greetings!

Hello Rocky Mountain SCTE Friends! If you're like us, you to are wondering how in the world we're tiptoeing up on the end of the first quarter of 2017 - ! Why, seems like just yesterday that some of us were stomping the snow off our feet (and vehicles) to attend the Nov. 17 "Tech Exec-It-Out" festivities at **The Cable Center**. (More on that within.)

This edition contains valuable information about chapter goings-on, a handy article by **our own Tom "Flash" Gorman** about the importance of Layer 1 (physical) components (and people), and an update on our chapter's pioneering work to support **cableFIRST**, which helps local high school robotics teams with engineering and business mentors -- or, in this case, with **plain old cash money**. Friendly reminder: Our chapter is still (always!) need technical mentors at local-area schools. Contact **Tom Gorman** (Tom.Gorman@opXL.net) or **Leslie Ellis** (Leslie@Ellisedits.com) for more info and to join in the fun.

And thanks again for staying tuned-in and active with the Rocky Mountain SCTE Chapter. We couldn't do it without you!

Rocky Mountain Tech Exec-It-Out Summary

It was (literally) a dark and stormy night on Nov. 17, 2016, when your Rocky Mountain SCTE chapter hosted our annual "Tech Exec-It-Out" soiree at the Cable Center. Like in 2015, we shared the "Tech It Out" theme with our friends over at **Rocky Mountain WICT**, who hosted their all-day program at nearby **Infinity Park** the same day. If they were lunch, we were dinner. And both were delicious!



From left: Tom Gorman, President, opXL and RM SCTE Chapter President; Larry Wolcott, Distinguished Engineer, Comcast; Nimrod Ben-Natan, SVP/GM, Harmonic; John Heslip, SVP/Next-Gen Access Networks, Comcast; Charlotte Field, SVP/Applications Platforms, Charter; Balan Nair, CTO, Liberty Global

A quick review: Tech Exec-It-Out began at 5:30 with drinks and appetizers in the Great Hall, after which attendees settled into the theatre for the discussion.

And what a line up! Daresay, our best yet. Moderator Tom **“Flash” Gorman** kept the conversation lively and informative, aided by a **blue-chip roster of panellists** representing **Comcast, Harmonic** (which also sponsored the evening, and thanks again for that!), **Charter**, and **Liberty Global**. Topics ran the gamut from the **State of Denver Cable**; **bandwidth, capacity** and network stuff (as in a whole lotta **DOCSIS 3.1 and fiber deep**); diplex filters and what the heck to do with them all in the coming days of **passive networks**; **Energy2020** and **APSYS** (what the heck is APSIS? Let **Frank Sandoval** explain it to you in [this handy video!](#)); **WiFi and RDK-B**; **open source** projects; and, of course, **the competition**.

Afterwards, more drinks and food, with a bonus and **very hands-on fundraiser** with **George Washington High School’s FIRST Robotics team** (which we sponsor!), with their robot, “the Kraken.” That’s “hands on” in that attendees got to drive the ‘bot around the Great Hall for a small (fundraising-oriented) fee. Big fun!

A hearty thanks from all of us -- and the kids, robot and mentors of GWHS -- to everyone who braved Mother Nature to join in the annual fun! And to you, Harmonic: Thanks again for underwriting the evening. Good stuff.

How We’re Supporting S.T.E.M Through Local FIRST Robotics Teams

We’re glad and grateful to report that we’re **supporting three local FIRST Robotics teams** with this year’s **“Steamworks”** Challenge -- which is particularly fun and tricky this year. (Click [here](#) to watch a three-minute video about it.)

Specifically, we donated \$500 apiece to three local high school organizations: Team #1410, “The Kraken,” built by the kids at **George Washington High School**; Team #5493, “SMARobotics,” built by the **all-girl team at St. Mary’s Academy**; and to Team #4293, built by the **Young Engineers Association**, which aggregates students from schools that don’t have enough interested kids to build competition robots. (Because their meetings are held at **Focused on Machining**, in Sedalia, the Young Engineers team also helps to fabricate parts and materials for other local clubs.)



A shot from the March 8, 2017 FIRST Robotics regionals in St. Louis. One of the teams we support, #1410 (George Washington High School) is the 125-pound blue robot on the right that successfully climbed the rope to the tower on several occasions!

SCTE Chapter Leadership Conference: Denver, April 5-6 2017

The annual **Chapter Leadership Conference**, affectionately abbreviated “the CLC,” **comes to Denver on April 5-6** at the **Embassy Suites Hotel**, located at **1420 Stout Street**, downtown. This educational leadership program is geared to the **issues most important to SCTE members**, and will be energized and informed by the successes of other chapters.

The theme this year: **Achieving Peak Performance**.

The CLC starts at **1P** on **April 5th** with an update on the **Chapter Ambassador Program** (1:15-1:45), then **regional roundtables** from 1:45-2:45, designed to discuss **chapter challenges**. The (**outstanding!**) **Grace Killelea** will be in town to deliver a **keynote** titled “**Thriving and Surviving In Challenging Times**” from 4-5:15. Then, a reception, followed by the **Chapter Awards Dinner**, from 7:30-8:30.

Expect a jam-packed day on Thursday, April 6th:

8-9A: Working Breakfast

9-10:15: Concurrent Training Sessions: President/VP Training, Treasurer Training, Best Practices in Chapter Technical Training, and Success Planning / Board Member Recruitment

10:30-11:45: Concurrent Training Sessions: Awards & Compliance Matrix, Using Chapter Events as a Recruitment Tool, Effective Chapter Communications; Best Practices in Chapter

Technical Training

Noon -1: Lunch with Energy2020 Overview, and an SCTE Foundation update

1-2:15: Concurrent Training: A New Way To Webinar, Energy2020 Deeper Dive, So You're Running an SCTE Chapter; Succession Planning and Board Member Recruitment

2:30-3:45: Concurrent Training: President/VP Training, Effective Chapter Communications, Secretary Training

4-5:15: Closing Panel: The Future of the Industry

7-10P: Closing Reception hosted by the Rocky Mountain Chapter (woot!)

As the host chapter, we of Rocky Mountain SCTE will be throwing a reception on April 6th, from 7-10P, with lots of food -- and poker, of course! But: The reception is for CLC attendees only. Click [here](#) to register... Hope to see you there!

The Broadband Mechanic and Layer 1 Physical

By **Thomas J. Gorman**, President, opXL and President, Rocky Mountain SCTE Chapter

While companies scramble to create higher skilled technical personnel, **the need for basic skills may get left in the dust**. With so much attention on Layer 2 (switching), Layer 3 (routing) and higher, there's a good chance that Layer 1 (physical) gets little attention. If you look at the titles given to new hired service and install personnel, invariably they are called "techs" (Broadband Tech, or Commtech, to name a few). But I wonder if the start point should be as a "mech," to ensure that the finer points of making good physical connections are focused on, and then once that proficiency is achieved, the promotion to "tech" can occur.

Between a headend and a customer, there's **no lack of things that can go wrong**. IP configurations, QAM modulator failures, digital insertion gear, and streaming servers all have their hiccups. But consider that between the headend and the customer, there are potentially hundreds of failure points that require tender loving care. Following that path to the customer, there are fiber connectors, jumpers, splices, coax connectors, taps, drop hangers, siding clips, ground lugs, heat shrink, and RJ-45 connectors, all presenting a problem waiting to happen.

In a typical customer's home, with an average of four outlets, let's count the number of physical connectors. With splitters, wall outlets, HDMI cables, and even Cat5 from a modem to a wireless router, **23 (or more) opportunities to fail exist in any one home**.

TAP	1
4-WAY SPLIT	5
WALL OUTLET	8
INPUT TO CPE	4
HDMI TO THREE TVS	3
RJ-45 TO A WIRELESS ROUTER	2
TOTAL	23

The effort to make good connectors is assisted by good tools and it truly is hard to make a bad connector nowadays. But there's a caveat to that. **Tools must be maintained!** Replacing blades in a cable prep tool is the most important thing that an installer or service tech can do to make good connectors, but also taking time in team meetings to verify that tools are in good working condition makes sure that good connectors will be installed. Compression tools do wear out and may not compress the ferrule correctly.

Finally, **the 7/16 wrench is a tech's best friend** for making tight connections. Why? Making a good physical contact reduces the likelihood of signal loss. The higher the frequencies, the more the signal rides on the surface of the coax center conductor (the "skin effect"). A nick in that center conductor will interrupt electron flow, and can cause signal issues, and packet loss.

Weatherproofing an outside connector is an obvious step to keep the cable and connector in a pristine state. Water migration into a cable will drive a customer (and a tech) crazy with intermittent issues for a long time. This water migration creates a breakdown in shielding integrity, creating opportunities for signal leakage and ingress of interfering signals. **When a repeat customer has regular resolution codes of "replaced outside connector," that can be a clue that it's time to replace that drop.**

Manufacturers have created connectors that maintain a good connection even when the connector is loose (primarily aimed at solving issues related to self-installs), but techs should not leave them to chance. Always **make sure that connector is tightened every time.**

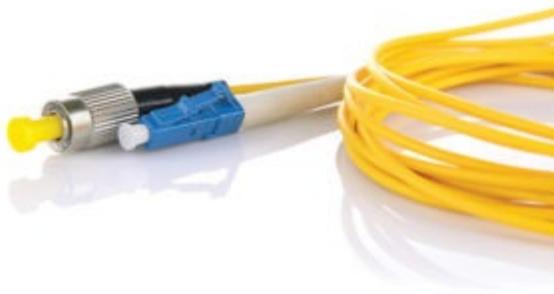
I will also suggest that on the opposite side of this situation is one in which techs will replace connectors arbitrarily, hoping that will solve a problem. I've actually ridden with techs who replaced every connector in a home, a week after a previous tech did the same thing. Why? A lack of trust in the previous tech's connectorization skills! **There's an opportunity for teams to evaluate each other's test connectors** and build that trust.

The “C” in HFC is the weakest link of the network. In the distribution network, **there can be 20 hardline connectors between a node and a customer**. As before, tools must be in good shape to make good connections. Techs damage hardline cables by using a metallic blade, resulting in loss of copper and negatively impacting the skin effect. Many techs use drills with their coring tools, which give a false feeling of quality in the tools. Blades should be evaluated and replaced as necessary. Weatherproofing those connectors with heat shrink keeps them in good condition, but in haste, techs will turn up the heat to speed up the heat shrink process, without considering that excessive heat may be melting the coax dielectric and degrading the cable’s impedance.

Fiber

Contamination is the number one killer for all things fiber. Where there is a connector, there is the opportunity for contamination, and it can be an insidious problem. Consider using test equipment to evaluate networks, such as **optical time domain reflectometers (OTDRs)**, **optical spectrum analyzers (OSAs)**, etc. The jumper on that device should be cleaned before each test to ensure that the test is as accurate as can be, and more importantly, that the fiber connecting to the transmitter (or receiver) doesn’t get contaminated just by connecting to the test jumper.

I have noticed where companies have invested in proper cleaning kits as they’ve grown networks, but that there isn’t an ongoing purchase of cleaning equipment, which can be an indicator that technicians may be haphazard with maintaining the integrity of its fiber terminations.



A particle that partially or completely blocks the core generates strong back reflections, which can cause instability in the laser system. A 1-micrometer dust particle on a single-mode core can block up to 1% of the light (a 0.05 dB loss). As a matter of fact, **a 9-micrometer speck is still too small to see without a microscope, but it can completely block the fiber core.** These contaminants can be more difficult to remove than dust particles.

Contamination in the optical connection can cause a component failure or certainly a system failure. **My war story is troubleshooting a headend** in the mid 1990s with 3,000 mechanical terminations. Every node being served from this headend was registering a signal-to-noise ratio (SNR) of anywhere from 3 to 6 dB worse than calculated. I asked the

system engineer for a fiber scope to look at connectors, and his response was, “A fiber what?” Needless to say, after acquiring a fiber scope we found that **all 3,000 terminations were contaminated by a dirty OTDR jumper**. The very piece of test equipment used to verify the integrity of the network was in fact, ruining that integrity!

With the incredible volume of fiber connections in the field, proper handling and dressing of fibers in cabinets and enclosures is complicated. There are going to be **more hands than ever touching** enclosures, splice trays, and storage devices. That means more opportunity for microbends, increasing attenuation, and weakening the fiber itself.

Nowhere in this discussion is DOCSIS® 3.1, remote PHY, dense wavelength division multiplexing (DWDM) and advanced architectures. That’s because none of them work if the physical continuity of cable (outside and inside plant) and fiber is not working. So is it time to brush up on mechanical skills? Look at the topics where you are spending your time training, and where you are spending the most time resolving customer problems. It might be a clue!

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Upcoming Events

(For a full listing of chapter events, please visit www.scte-rmc.org)

UPCOMING SEMINARS

DATE	LOCATION	SUBJECT
April 5-6, 2017	Embassy Suites, Denver	Chapter Leadership Conference
April 13, 2017	Webinar	All Things Optical/PHY
May 11, 2017	TBD	WiFi Troubleshooting
June 6-7	Inverness Hotel	Annual Engineering Symposium & Golf Outing
August 10 2017		

That’s it from us for now! **Happy (soon to be) SPRING** and see you soon. Until then, here’s how to reach us....

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