

**IEEE SA SCC-18
NFPA70 / NEC
Liaison Report
Joel Goergen
Cisco Systems, Inc.**

2017 IEEE-SA SCC-18 Officers

- Chair – Christel Hunter
- Vice Chair – Dennis Nelson
- Secretary/Treasurer – Paul Myers
- Membership Officer – Bill McCoy

IEEE SA SCC-18

- IEEE802.3 Representation on SCC-18
 - Chad Jones / Cisco Systems, Inc.
 - Joel Goergen / Cisco Systems, Inc.
 - Dave Tremblay / HPE (still in process)
 - Bill Szeto retired and now is an independent on SCC-18

SCC-18 Meetings

- Only an Executive meeting has been held.
- Membership is still an issue – looking for more members that fall into an “NEC User” description.

Direct NFPA / NEC Approach

- SCC-18 Committee members supporting IEEE may not align with the interests of IEEE 802.3 regarding power and grounding.
- Working to promote committee nominees in NEC through a direct approach or through Ethernet Alliance (as an industry).

Relevant NEC Information

- NFPA70
 - National Fire Prevention Association - Group 70 National Electrical Code (NEC).
 - Writes the National Electrical Code book every 3 years.
- The current NEC2017 code released September 2016 and is currently adopted by MA, with several other states in process.
- Next code cycle is 2017 – 2019 for release Jan 2020.
- www.nfpa.org/70
- There are 19 Code Making Panels. SCC-18 has member positions on all panels.

Relevant NEC Information

- Relevant CMPs for IEEE802.3
 - CMP3 – Section 725 class 1, 2, and 3 Power Sources.
 - CMP5 – Section 250 Grounding.
 - CMP6 – Table 310.15 Wire Gauge Ampacity ratings and adjustments.
 - CMP12 – Special Equipment and ITE (data centers).
 - CMP16 – Communications Systems and power over those communications conductors.

NFPA Code Making Panel (CMP) New Members

- CMP3 includes article 725 covering power-limited circuits not necessarily an integral part of equipment.
 - New members added:
 - Chris Bullock / Cisco Systems – Principle Member
 - Joel Goergen / Cisco Systems – Alternate Member
 - Raymond Horner / NEMA – Principle Member
- CMP12 includes article 645 covering power and grounding of Information Technology Equipment.
 - No new members added:
- CMP16 includes article 840 covering premise-powered broadband communications circuits.
 - New members added:
 - Jean Blanc / NEMA – Alternate Member

NFPA 2020 Code Schedule

Process Stage	Process Step	Dates for TC with CC
Public Input Stage (First Draft)	Public Input Closing Date*	9/07/2017
	Final Date for TC First Draft Meeting	1/20/2018
	Posting of First Draft and TC Ballot	3/09/2018
	Final date for Receipt of TC First Draft ballot	3/23/2018
	Final date for Receipt of TC First Draft ballot - recirc	3/30/2018
	Posting of First Draft for CC Meeting	4/06/2018
	Final date for CC First Draft Meeting	5/11/2018
	Posting of First Draft and CC Ballot	6/15/2018
	Final date for Receipt of CC First Draft ballot	6/22/2018
	Final date for Receipt of CC First Draft ballot - recirc	6/29/2018
	Post First Draft Report for Public Comment	7/06/2018
Comment Stage (Second Draft)	Public Comment Closing Date*	8/30/2018
	Notice Published on Consent Standards (Standards that received no Comments) Note: Date varies and determined via TC ballot.	
	Appeal Closing Date for Consent Standards (Standards that received no Comments)	
	Final date for TC Second Draft Meeting	11/03/2018
	Posting of Second Draft and TC Ballot	12/21/2018
	Final date for Receipt of TC Second Draft ballot	1/11/2019
	Final date for receipt of TC Second Draft ballot - recirc	1/18/2019
	Posting of Second Draft for CC Meeting	2/01/2019
	Final date for CC Second Draft Meeting	2/22/2019
	Posting of Second Draft for CC Ballot	3/15/2019
	Final date for Receipt of CC Second Draft ballot	3/22/2019
	Final date for Receipt of CC Second Draft ballot - recirc	3/29/2019
	Post Second Draft Report for NITMAM Review	4/05/2019
Tech Session Preparation (& Issuance)	Notice of Intent to Make a Motion (NITMAM) Closing Date	4/26/2019
	Posting of Certified Amending Motions (CAMs) and Consent Standards	5/17/2019
	Appeal Closing Date for Consent Standards	
	SC Issuance Date for Consent Standards	

NEC 2020

1st Public Input Ends 7Sept17

- Identify relevant sections of interest to IEEE802.3 Members.
- Request time at IEEE 802.3 March or May meetings to review for possible comments / changes.
- Request time at IEEE 802.3 July meeting for final comment review and request any IEEE 802.3 support letters.

Back Up Slides

Proposed Text Changes in NEC TG

725.144

840.160

Proposed Text to NEC TG

Relevant to POE

Joel Goergen / George Zimmerman

725.121 (C) Marking. The power sources for limited power circuits in 725.121(A)(3) and limited power circuits for listed audio, video, information technology (equipment), and listed industrial equipment in 725.121(A)(4) shall have a label indicating the maximum voltage and current output for each connection point. Where multiple connection points have the same maximum voltage and current output, a single label shall be permitted to be used. The effective date shall be January 1, 2018/2019.

725.130 (C) Marking The user accessible outlets for limited power circuits in 725.121(A)(3) and limited power circuits for listed audio, video, information technology (equipment), and listed industrial equipment in 725.121(A)(4) rated at greater than 0.36 Amperes per conductor shall have a label indicating the ampacity for each connection point. The effective date shall be January 1, 2018.

725.144 Transmission of Power and Data. The requirements of 725.144(A) and (B) shall apply to Class 2 and Class 3 circuits that transmit power and data to a powered device. The requirements of Parts I and III of Article 725 and 300.11 shall apply to Class 2 and Class 3 circuits that transmit power and data. The conductors that carry power for the data circuits shall be copper. The current in the power circuit shall not exceed the current limitation of the connectors. 8 position 8 contact (8P8C) connectors shall have a rating of 1.0A maximum per contact at 60°C (140°F) unless marked otherwise.

Informational No. 1: One example of the use of cables that transmit power and data is the connection of closed-circuit TV cameras (CCTV).

Informational Note No. 2: The 8P8C connector is in widespread use with powered communications systems. These connectors are typically rated at 1.3 amperes maximum at 20°C (68°F). See IEC 60603-7, Connectors for electronic equipment – Part 7: Detail specification for 8-way, unshielded, free and fixed connectors; for more information on reduced ampacity at higher temperatures.

Informational Note #3: The requirements and ampacity tables of 725.144 were derived for carrying power and data over 4-pair copper LAN cabling such as that described in ANSI/TIA 568-C.2, Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components.

Informational Note #4: See TIA-TSB-184-A, Guidelines for Supporting Power Delivery Over Balanced Twisted-Pair Cabling for information on installation and the management of temperature rise in LAN cabling.

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- (A) **Use of Class 2 or Class 3 Cables to Transmit Power and Data.** Where Types CL3P, CL2P, CL3R, CL2R, CL3 or CL2 transmit power and data, the following shall apply, as applicable:
- (1) The ampacity ratings in Table 725.144 shall apply at an ambient temperature of 30°C (86°F).
 - (2) For ambient temperature above 30°C (86°F), the correction factors of 310.15(B)(2) shall apply.

Exception: Systems supplying a current of less than or equal to 0.36 Amperes per conductor on all 8 conductors shall be permitted using conductor sizes of 24 AWG or greater in bundles of 192 cables or fewer cables with all conductors carrying current.

Informational Note: One example of the use of Class 2 cables is a network of closed-circuit TV cameras using 24AWG, 60C rated, Type CL2R, Category 5e local area network (LAN) cables.

(B) Use of Class 2-LP or Class 3-LP Cables to Transmit Power and Data. Types CL3P-LP, CL2P-LP, CL3R-LP, CL2R-LP, CL3-LP, or CL2-LP shall be permitted to supply power to equipment at a current level up to the marked ampere limit located immediately following the suffix LP and shall be permitted to transmit data to the equipment. For ambient temperature above 30C (86F), the correction factors of 310.15(B)(2) shall apply. The Class 2-LP and Class 3-LP cables shall comply with the following, as applicable:

Informational Note 1: The “(xxA)” following the suffix -LP indicates the ampacity of each conductor in a cable.

Informational Note 2: An example of a limited power (LP) cable is a cable marked Type CL2-LP(0.5A), 23 AWG, A Type CL2-LP(0.5), 23 AWG could be used in any location where Type CL2 could be used per 725.144(B); however, the LP cable would be suitable for carrying up to 0.5 A per conductor, regardless of the number of cables in a bundle. ~~If used in a 7 cable bundle, the same cable could carry up to 1.2 amperes per conductor.~~

- (1) Cables with the suffix “-LP” shall be permitted to be installed in bundles, raceways, cable trays, communications raceways, and cable routing assemblies.
- (2) Cables with the suffix “-LP” and a marked ampere level shall follow the substitution hierarchy of Table 725.154 and Figure 725.154(A) for the cable type without the suffix “LP” and without the marked ampere level.
- (3) System design shall be permitted by qualified persons under engineering supervision.

Table 725.144 Ampacities of Each Conductor in Amperes in 4-Pair Class 2 or Class 3 Data Cables Based on Copper Conductors at an Ambient Temperature of 30°C (86°F) with All Conductors in All Cables Carrying Current, 60°C (140°F), 75°C (167°F), and 90°C (194°F) Rated Cables

AWG	Number of 4-Pair Cables in a Bundle																				
	1			2-7			8-19			20-37			38-61			62-91			92-192		
	Temperature Rating			Temperature Rating			Temperature Rating			Temperature Rating			Temperature Rating			Temperature Rating					
	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C
26	1	1	1	1	1	1	0.7	0.8	1	0.5	0.6	0.7	0.4	0.5	0.6	0.4	0.5	0.6	NA	NA	NA
24	2	2	2	1	1.4	1.6	0.8	1	1.1	0.6	0.7	0.9	0.5	0.6	0.7	0.4	0.5	0.6	0.3	0.4	0.5
23	2.5	2.5	2.5	1.2	1.5	1.7	0.8	1.1	1.2	0.6	0.8	0.9	0.5	0.7	0.8	0.5	0.7	0.8	0.4	0.5	0.6
22	3	3	3	1.4	1.8	2.1	1	1.2	1.4	0.7	0.9	1.1	0.6	0.8	0.9	0.6	0.8	0.9	0.5	0.6	0.7

Note 1: For bundle sizes over 192 cables, or for conductor sizes smaller than 26 AWG, ampacities shall be permitted to be determined by qualified personnel under engineering supervision.

Note 2: Where only half of the conductors in each cable are carrying current, the values in the table shall be permitted to be increased by a factor of 1.4.

Note 3: Health Care facilities and other essential electrical systems in addition to complying with other requirements in the code, shall only be permitted to use the 75°C (167°F) or higher temperature operation under engineering supervision.

Note 4: The current in the power circuit shall not exceed the per-contact current limitation of the connectors. 8P8C connectors in wide-spread use have an ampacity of 1.0 amperes per contact at 60°C (140°F).

Informational Note 1: For information on practices for 4 pair LAN cabling see ANSI/TIA-568-C.2 and TIA-TSB-184-A. The conductor sizes in data cables in wide-spread use are typically 22-24-26 AWG. Per the exception of 310.15(A)(2), conductor sizes smaller than 24 AWG are allowed for equipment cords.

Informational Note 2: Transmission parameters for data cables in common use are often unspecified at temperatures above 60°C (140°F), communications can be unreliable at these temperatures.

840.160 Powering Circuits. Communications cables, in addition to carrying the communications circuit, shall also be permitted to carry circuits for powering communications equipment. Where the power sourcing current is greater than 0.36 Amperes per conductor, the communications ~~Where the power supplied over a communications cable to communications equipment is greater than 60 watts,~~ communication cable and the power circuit shall comply with 840.160 (A), (B), and (C) below.

The conductors that carry power for the communications equipment shall be copper. The current in the power circuit shall not exceed the current limitation of the connectors. 8 position 8 contact (8P8C) connectors shall have a rating of 1.0A maximum per contact at 60°C (140°F) unless marked otherwise.

Informational No. 1: Examples of the use of cables that transmit power and power communications equipment is the connection of internet protocol (IP) telephones and wireless access points.

Informational Note No. 2: The 8P8C connector is in widespread use with powered communications systems. These connectors are typically rated at 1.3 amperes maximum at 20°C (68°F). See IEC 60603-7 for more information on reduced ampacity at higher temperatures.

Informational Note No. 3: The requirements and ampacity tables of 840.160 were derived for carrying power and data over 4-pair copper LAN cabling such as that described in ANSI/TIA 568-C.2.

Informational Note No. 4: See TIA-TSB-184-A, Guidelines for Supporting Power Delivery Over Balanced Twisted-Pair Cabling for information on installation and the management of temperature rise in LAN cabling.

(A) Use of Communications Cables to Transmit Power and Data.

Where Types CMP, CMR, CMG, CM and CMX cables are used to transmit power and data, the following shall apply, as applicable:

- (1) The ampacity ratings in Table 840.160 shall apply at an ambient temperature of 30°C (86°F).
- (2) For ambient temperature above 30°C (86°F), the correction factors of 310.15(B)(2) shall apply.

Exception: Systems supplying a current of less than or equal to 0.36 Amperes per conductor on all 8 conductors shall be permitted using conductor sizes of 24 AWG or greater in bundles of 192 cables or fewer cables with all conductors carrying current.

(B) Use of Communications Limited Power (LP) Cables to Transmit Power and Data. Types CMP-LP, CMR-LP, CMG-LP, CM-LP, or CMX-LP shall be permitted to supply power to equipment at a current level up to the marked ampere limit located immediately following the suffix LP and shall be permitted to transmit data to the equipment. For ambient temperature above 30C (86F), the correction factors of 310.15(B)(2) shall apply. The Communications LP cables shall comply with the following, as applicable:

Informational Note 1: The “(xxA)” following the suffix -LP indicates the ampacity of each conductor in a cable.

Informational Note 2: An example of a limited power (LP) cable is a cable marked Type CMP-LP(0.5A), 23 AWG, A Type CMP-LP(0.5), 23 AWG could be used in any location where Type CMP could be used per 840.160(B); however, the LP cable would be suitable for carrying up to 0.5 A per conductor, regardless of the number of cables in a bundle.

- (1) Cables with the suffix “-LP” shall be permitted to be installed in bundles, raceways, cable trays, communications raceways, and cable routing assemblies.
- (2) Cables with the suffix “-LP” and a marked ampere level shall follow the substitution hierarchy of Table 725.154 and Figure 725.154(A) for the cable type without the suffix “LP” and without the marked ampere level.
- (3) System design shall be permitted by qualified persons under engineering supervision.

(C) Marking Powered Communications Circuits

- (1) The power sources for limited power circuits in 725.121(A)(3) and limited power circuits for listed audio, video, information technology (equipment), and listed industrial equipment in 725.121(A)(4) shall have a label indicating the maximum voltage and current output for each connection point. Where multiple connection points have the same maximum voltage and current output, a single label shall be permitted to be used. The effective date shall be January 1, 2019.
- (2) The user accessible outlets for limited power circuits in 725.121(A)(3) and limited power circuits for listed audio, video, information technology (equipment), and listed industrial equipment in 725.121(A)(4) rated at greater than 0.36 Amperes shall have a label indicating the ampacity for each connection point. The effective date shall be January 1, 2018.

Table 840.160 Ampacities of Each Conductor in Amperes in 4-Pair Class 2 or Class 3 Data Cables Based on Copper Conductors at an Ambient Temperature of 30°C (86°F) with All Conductors in All Cables Carrying Current, 60°C (140°F), 75°C (167°F) and 90°C (194°F) Rated Cables

AWG	Number of 4-Pair Cables in a Bundle																				
	1			2-7			8-19			20-37			38-61			62-91			92-192		
	Temperature Rating			Temperature Rating			Temperature Rating			Temperature Rating			Temperature Rating			Temperature Rating					
	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C
26	1	1	1	1	1	1	0.7	0.8	1	0.5	0.6	0.7	0.4	0.5	0.6	0.4	0.5	0.6	NA	NA	NA
24	2	2	2	1	1.4	1.6	0.8	1	1.1	0.6	0.7	0.9	0.5	0.6	0.7	0.4	0.5	0.6	0.3	0.4	0.5
23	2.5	2.5	2.5	1.2	1.5	1.7	0.8	1.1	1.2	0.6	0.8	0.9	0.5	0.7	0.8	0.5	0.7	0.8	0.4	0.5	0.6
22	3	3	3	1.4	1.8	2.1	1	1.2	1.4	0.7	0.9	1.1	0.6	0.8	0.9	0.6	0.8	0.9	0.5	0.6	0.7

Note 1: For bundle sizes over 192 cables, or for conductor sizes smaller than 26 AWG, ampacities shall be permitted to be determined by qualified personnel under engineering supervision.

Note 2: Where only half of the conductors in each cable are carrying current), the values in the table shall be permitted to be increased by a factor of 1.4.

Note 3: Health Care facilities and other essential electrical systems in addition to complying with other requirements in the code, shall only be permitted to use the 75°C (167°F) or higher temperature operation under engineering supervision.

Informational Note 1: For information on practices for 4 pair LAN cabling see ANSI/TIA-568-C.2 and TIA-TSB-184-A. The conductor sizes in data cables in wide-spread use are typically 22–24 AWG. Per the exception of 310.15(A)(2), conductor sizes smaller than 24 AWG are allowed for equipment cords.

Informational Note 2: Transmission parameters for data cables in common use are often unspecified at temperatures above 60°C (140°F), communications may be unreliable at these temperatures

840.170 Equipment and Cables. Premises-powered broadband communications systems equipment and cables shall comply with 840.170(A) through (I)~~(H)~~.

Insert 840.170 (I), as follows:

(I) Limited Power (LP) Cables. Limited power (LP) cables shall be listed as suitable for carrying power and data circuits up to a specified current limit for each conductor without exceeding the temperature rating of the cable where the cable is installed in cable bundles in free air or installed within a raceway, cable tray, or cable routing assembly. The cables shall be marked with the suffix “-LP” with the ampere limit located immediately following the suffix LP, where the current limit is in amperes per conductor.

Informational Note: The ampere limit located immediately following the suffix LP is the ampacity of each conductor in a cable. For example, 1 ampere Communications limited-power cables would be marked CMP-LP (1.0A), CMR-LP (1.0A), CMG-LP (1.0A), CM-LP (1.0A) or CMX-LP (1.0A).

NFPA Code Making Panel (CMP) Proposed Changes

- CMP 6 & 7 have been recommended to be combined. When these changes occur, the combined panel will be CMP 6
- CMP 19 will become CMP 7.
- The existing panels 6 & 7 will be dissolved and all members of the new CMP 6 must re-apply to NFPA due to the scope change.
- CMP 10 will pick up articles 215, 225, 230.
- CMP 10 will be dissolved and all members must re-apply to NFPA due to the scope change.

CMP Coverage After Change

- **CMP 6 and 7 Combination**
 - **Articles 310, 400, 402, Chapter 9, Tables 5 through 9, and Annex B**
 - **Articles 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 382, 394, 396, 398, 399**
- **CMP 10**
 - articles 215, 225, 230
 - **Article 240**
- **Impacts target service entrance and solar systems.**