Professional Capacity Building (PCB) for Communications, Phase 5

Project Description:

A variety of training options for communications are commercially available from academic institutions, trade organizations, and industry. However, training opportunities particular to transportation communications is limited, with even fewer options directly addressing professional capacity development for rural transportation communications. It was due to the lack of commercially available training options, the lack of institutional knowledge within Caltrans, and the challenges of deploying communication systems in rural areas that the Professional Capacity Building for Communications project was initiated within the Rural PSC of DRISI.

The goals of this project are to develop a comprehensive curriculum and to conduct training for ITS communications. This will build the professional capacity of ITS engineers and maximize the benefits of a more efficient and higher quality transportation information and communications system. The project has an educational focus and its primary objective is to have leading subject matter experts provide a hands-on, "nuts and bolts" learning experience for ITS practitioners.

Previous Coursework:

Radio Frequency (RF) System Design, October 4-7, 2010 — key elements needed for designing RF communications systems.

Mastering Fiber Optic Network Design and Installation, September 24-28, 2012 – design of fiber optic networks, and installation, maintenance, and testing of installed networks.

Hands-On Ethernet and TCP/IP Fundamentals, September 23-27, 2013 – systems engineering approach to Ethernet and IP Networking with training in IP networking basics, LANs, and WANs.

Telecom Wireless Fundamentals, March 9-13, 2015 – design principles and practical application techniques for leased wireless communications systems.

Hands-On Ethernet and TCP/IP Fundamentals, 2017-2019 – updated repeat of previous training, pre-requisite course.

Telecom Wireless Fundamentals, 2018-2019 – updated repeat of previous training.

Small Data Center Design, Structured Cabling, and Grounding, October 8-12, 2018 - design fundamentals for a new TMC data center as well as upgrading and retrofitting an existing TMC; focus on structured cabling and grounding related to TMC data centers.

Hands-On Advanced IP Networks/Protocols, March 4-6, 2019 – advanced understanding and application of the TCP/IP protocol suite and IP network operation/behavior skills, network security, and Quality of Service.

Curriculum Overview:

The proposed sequence for the training curriculum is based on the identified needs of Caltrans rural ITS engineers as well as the prerequisite skills required to participate in and fully benefit from the subject area trainings. Six subject areas are suggested for inclusion in the ITS communications curriculum: Plant Wireless, Telco Wireless, Plant Wired, Telco Wired, IP Fundamentals, and Small Data Center Design for TMCs. Suggested topics are presented for each subject area.

Topics within each of the subject areas are organized so that students receive training in the basic terminology and concepts before moving on to more specific technologies. For example, under the Plant Wireless subject area, it is recommended that students cover plant wireless core and RF system design fundamentals before moving on to training in 802.11 (WiFi), microwave, and short haul radio. This helps ensure that students begin a course on a level playing field with adequate background to maximize learning. It also facilitates more in-depth training on specific topics if less time can be spent on background and terminology because students are already familiar and comfortable with the basics. Beyond this sequence suggestion, there is some flexibility based on need as to the order of the remaining topics within subject areas.

The present curriculum consists of the following subject areas and topics:

Telco Wireless
- o Telco Wireless Core, Cellular/PCS Basics
- o GSM data, 3G and Beyond
- o CDMA data, 3G and Beyond
- o LTE, 4G and Next Generations

Telco Wired
- o Telco Wired Core
- o POTS
- o Analog Data Circuits
- o ISDN
- o xDSL
- o DS1/T1
- o Fractional DS1/T1
- o Frame relay
- o MPLS

Plant Wireless
- o Plant Wireless Core, RF System Design
- o 802.11 (WiFi) and Related
- o Microwave
- o Short Haul Radio

Plant Wired
- o Plant Wired Core, Plant Wiring Basics
- o Serial Connectivity
- o xDSL
- o Optical Fiber

IP Fundamentals
- o Understanding IP Networks, IP Networking Core
- o Local Area Networks (LANs)
- o Wide Area Networks (WANs)
- o Network Security
- o Vendor Specific Equipment

Small Data Center Design for TMCs
- o TMC Overview
- o Data Center Design Short Course for TMC Managers
- o Data Center Design for TMC/ITS Engineers
- o Site and Facility Tours

For further information, please visit www.westernstates.org/Projects/PCB/, or contact:

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