Society of Cable Telecommunications Engineers

SCTE Broadband Premises Technician (BPT) Competencies

Scope

The Society of Cable Telecommunications Engineers (SCTE) **Broadband Premises Technician** certification describes the knowledge of an experienced field technician who will install and troubleshoot telecommunications services (video, voice, and data) at the customer's premises. The successful certification candidate has the knowledge to install and service most "triple-play" installations.

The Broadband Premises Technician certification is one of three stand-alone Broadband Premises Specialist certifications. Content includes "the how" of the telecommunications installation and service.

I. Technology, Systems & Requirements

Competency	Knowledge, Skills, and Abilities
A Explain the basic components of NTSC video.	1. Explain basic analog (NTSC) television operation
	a. Name the components of the video signal
	i Describe picture construction
	ii Describe signal structure
	iii Describe composite video
	2. Explain the following transmission techniques:
	a. Define analog modulation
	i Amplitude
	ii Frequency
	iii Phase
	b. Describe frequency assignments
	i Bandwidth
	ii Frequency plans (forward/reverse)
	iii Visual carrier
	iv Aural carrier
	v Color sub-carrier
B Explain the basics of digital signals.	1. Explain digital fundamentals:
	a. Binary system
	i Fundamentals
	ii Numbering
	iii Coding of information
	2. Name the components of the digital signal

	a. Basics of digital signals
	i Define digital
	b. Explain analog to digital (A/D) conversion
	i Fundamentals of conversion
	ii Define decoding
	iii Define pulse-code modulation (PCM)
	iv Define codec
	3. Explain the following digital modulation techniques
	a. Digital Modulation
	i Quadrature Phase-Shift Keying (QPSK)
	ii Quadrature Amplitude Modulation (QAM)
	iii Frequency-Shift Keying (FSK)
	4. Digital multiplexing
	a. Multiple Streams in 6 MHz bandwidth
	b. Moving picture experts group (MPEG) 2 and 4
	c. Compression ratios
	d. Multiplexing (with respect to DOCSIS)
	i Time division multiplexing (TDM)
	ii Frequency division multiplexing (FDM)
	(a) Broadband spectrum digital signal frequency allocation
	e. Describe two-way signal flow
	5. Explain signal distribution methods
	a. Wireless
	b. Wired
	i Coaxial cable
	ii Twisted pair
	iii Optical
	6. Explain channel mapping
	7. Explain structure of messages through the introduction of the following:
	a. Frames
	b. Packets
	c. Open Systems Interconnection Basic Reference Model (OSI Reference Model; OSI Model)
	i Physical
	(a) Definition
	(b) Services
	ii Data Link
	(a) Definition
	(b) Services
	iii Network

	(a) Definition
	iv Transport
	(a) Definition
	v Session
	(a) Definition
	vi Presentation
	(a) Definition
	vii Application
	(a) Definition
	(b) Services
	8. Identify RF carrier levels for digital QAM/channel
	9. Define the following transmission metrics:
	a. Data rate
	b. Symbol rate
	i Payload
	ii Overhead
	iii Throughput
	(a) QoS-quality vs. quantity of signal
	(b) Service Level Agreement (SLA)
C Identify the components and characteristics of fiber-optic cable used within the drop system and at the customer's premises.	1. Optical fiber
	a. Define
	i Composition
	ii Characteristics
	(a) Attenuation
	(b) Wavelength
	b. Benefits
	c. Applications
	d. Safety
	2. Calculate fiber loss and expected signal levels
D Identify and describe the characteristics of cables and wire used within the drop system and at the customer's premises.	1. Describe coaxial cable attenuation properties
	a. Define dB
	i Explain the difference between dB and dBmV
	b. Define attenuation
	c. Explain the effect cable length has on coaxial cable
	d. Explain the effect temperature has on coaxial cable
	e. Explain the effect frequency has on coaxial cable
	f. Define in basic terms velocity of propagation
	g. Define in basic terms DC loop resistance
	h. Define in basic terms impedance
	i. Define in basic terms frequency response
	j. Define in basic terms return loss

	2. Given device inputs/outputs, cable attenuation, and insertion losses, be able to calculate coaxial cable loss and expected signal levels
	3. Describe the following twisted pair properties:
	a. Cross talk
	b. Capacitance
	c. Frequency Response
	d. Inductance
	e. Classifications
E Identify the differences and similarities between the cable operator-provided and other voice services.	1. Public Switched Telephone Network (PSTN)
	2. Define the following:
	a. Ported number
	b. Native number
	c. On-net
	d. Off-net
	3. Fundamentals of broadband telephony
	a. Define circuit switched
	b. Define Voice over internet protocol (VoIP)
	i Packet switching
	ii PacketCable™
	(a) eMTA
	4. Powering
	a. Twisted pair powering (AC)
	i Advantages
	ii Disadvantages
	b. Coaxial powering
	i Advantages
	ii Disadvantages
	c. Batteries
	d. Network power vs. home power
F Identify the differences and similarities between cable operator-provided high-speed services (HSD) and other HSD services.	1. Internet
	a. Define the Internet
	b. Public vs. private (managed network)
	c. Firewall
	d. Define fundamentals of high-speed data

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II. Premises Devices

Competency	Knowledge, Skills, and Abilities
A Identify and describe customer provided devices used to offer video, voice and data services at the customer's premises.	1. Televisions
	a. Explain basic analog (NTSC) television operation
	i Block diagram functions
	ii Powering
	iii Signal sourcing
	(a) Channel characteristics
	(b) Channel assignments
	(c) Channel bandwidth
	b. Describe the characteristics of a cable compatible television
	i Cable compatible interface
	ii Channel capacity
	c. Describe common television controls
	i User Controls
	ii Service Controls
	(a) Second Audio Programming (SAP)
	(b) Closed captioning
	d. Describe typical interfaces for the following TV types and components:
	i Standard definition (SD)
	(a) RF
	(b) Composite (as it relates to the interface)
	(i) RCA
	(c) S-video
	(d) Super video graphics array (SVGA)
	ii Enhance Definition (ED) Television
	(a) Component
	(b) Digital Visual Interface (DVI)
	iii High definition (HD)
	iv 3D Television (3D TV)
	e. Name the types of TVs and receivers:
	i Cathode Ray Tube (CRT)-direct view
	ii Projection devices
	iii Liquid Crystal Display (LCD)
	iv Plasma
	v Light emitting diode (LED)
	vi Standard Definition and High Definition TV
	(a) Aspect ratio

	(i) 4:3
	(ii) 16:9
	(b) Screen resolution
	(i) 480i
	(ii) 480p
	(iii) 720p
	(iv) 1080i, p
	(c) Connections
	(i) Component
	(ii) High-Definition Multimedia Interface (HDMI)
	1. Includes audio
	(iii) Digital Visual Interface (DVI)
	(iv) PC interface
	(d) Effects of aspect ratio mismatch:
	(i) Letter box
	(ii) Pillaring
	(e) Digital Light Processor (DLP)
	f. Digital TV Transition (DTV)
	2. Digital Video Recorder (DVR)
	a. Define a DVR and describe its purpose
	b. Explain the interface with service provider device
	3. Digital Video Disc/Digital Versatile Disc (DVD)
	a. Define DVD and describe its purpose
	b. Define Blu-Ray
	c. Explain the interface with service provider device
	4. Network DVR service
	a. Define a DVR and describe its purpose
	b. Explain the interface with service provider device
	c. Networked DVR (MoCA)
	d. Remote DVR (rDVR)
	5. Video Cassette Recorder (VCR)
	a. Define a VCR and describe its purpose
	b. Explain the interface with service provider device
	6. Define the following navigation devices/interfaces:
	a. Remote control
	i Identify the keys on a remote control
	b. Parental control
	i Define parental control
	c. (IR) Blaster
	i Define Infrared (IR) Blaster and describe its purpose

	7. Game Consoles
	a. Identify types of game consoles
	8. Home theater receiver
	a. Identify the components of a home theater system
	9. Dolby AC3
	10. Video switches
	a. Define “video switches” and describe purpose
	11. Slingbox
	a. Define “Slingbox” and describe purpose
	12. Untethered Devices
	a. Smartphone
	i Define “smartphones” and describe purpose
	ii Example: iPod Touch
	b. Tablet PC
	i Define “Tablet PC” and describe purpose
	ii Example: iPad
	13. Media Center
	a. Define “Media Center” and describe purpose
	14. Audio
	a. Analog stereo TV
	i Baseband
	ii Sony/Philips Digital Interconnect Format (S/PDIF) (Digital RCA)
	iii Coaxial cable
	(a) RCA jacks (analog)
	b. Optical fiber
	i TOSLink
	15. Interactive TV
	a. VoD
	b. SVoD
	16. Telephones
	a. Telephone components
	i Base
	ii Ringer
	iii Handset
	iv Hook switch
	v Dial pad
	b. Powering
	i Loop start/ground start
	ii Loop current
	iii Ringing
	(a) REN

	c. Cordless phones
	i Frequencies of operation
	(a) Duplex frequency
	ii Powering/UPS
	iii Modulation techniques
	(a) Digital Spread Spectrum (DSS)
	d. Other Devices
	i Alarm service equipment
	(a) Line seizing
	ii External Caller ID Devices
	iii FAX
	17. Personal computers (PCs)
	a. Software
	i Define operating system (OS)
	ii Name the typical operating systems found on customers' PCs
	(a) Windows
	(i) 98 SE
	(ii) NT
	(iii) XP
	(iv) Vista
	(b) Macintosh
	(c) Linux
	iii IPv4/IPv6
	b. Name typical basic IP commands for the PC and Macintosh, such as:
	i Ipconfig
	ii Ping
	iii Release/renew
	iv GUI commands (Macintosh)
	(a) Ifconfig
	(b) Disable NIC
	v IP addressing
	(a) http://192.168.100.1
	(b) Basic address ID
	(c) Define public address
	(d) Define private address
	(e) Define local address
	(f) IPv6, IPv4 2001 address
	b. Installation of cable-supplied data services
	i Service provider applications
	(a) Mail

	(b) Security
	(i) Define encryption
	c. Hardware
	i CPU/motherboard
	ii Expansion bus
	(a) ISA expansion bus
	(b) Peripheral Component Interconnect (PCI)
	(c) PC Express Card/PCMCIA
	(d) Universal Serial Bus (USB)
	(e) IEEE 1394 multimedia connection
	(f) Firewire (Apple)
	iii Define computer Memory
	(a) RAM
	(b) ROM
	(c) CMOS
	iv Storage devices/media
	(a) Internal storage
	(b) External storage
	d. Input/Output
	i Serial interface
	(a) EIA-232
	(b) USB
	(c) Infrared (IR blaster)
	(d) Network interface card (NIC)
	(e) Wireless USB
	(f) PC Express card
	(g) USB Adapter
	(h) RJ-45 Ethernet port
	ii Parallel interface
	iii Peripheral devices
	e. Application configuration
	i Browsers
	(a) Internet Explorer
	(b) Mozilla Firefox
	(c) Safari (Apple)
	(d) Chrome (Google)
	f. Email
	i Client
	ii Web-based
	g. Digital rights management (DRM)
	h. Internet Cloud

B Identify and describe the function and use of company-provided devices used to offer voice and data at the customer's premises.	1. Digital set-top box (STB) (middleware)
	a. Features/functions
	b. STB applications
	i Navigation aids
	(a) Onscreen displays
	(b) Program guides
	c. STB types
	i Digital consumer terminal (DCT)
	ii Digital terminal adapter (DTA)
	iii High-definition
	iv DVR
	(i) Dual tuner
	v Tru2way
	vi Internet Protocol Television (IPTV)
	vii SDV tuning adapter
	viii Commercial gateways
	ix Network adapters
	x Wireless gateway router (WGR)
	xi Home Phoneline Networking Alliance (HomePNA)
	xii Multimedia over Coax Alliance (MoCA®)
	xiii OpenCable™ Home Networking Protocol (OHNP)
	2. Cable Modem
	3. Multimedia terminal adapter (MTA)
	4. embedded digital voice adapter (eDVA)
	5. Embedded multimedia terminal adapter (eMTA)
	6. CableCARD/STB integration
	a. Define
	b. Provisioning
	7. T-commerce
	8. Third party applications
	Program guides
	a. News
	b. Sports
	c. Weather
	d. Caller ID on television

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III. Installation

Competency	Knowledge, Skills, and Abilities
A Describe the cable types, handling techniques, connectorization, and methods and procedures for installing coaxial drop cable used to provide service to the customer's premises.	1. Describe the following coaxial cable types and explain when each is used:
	a. Underground (flooded)
	b. Aerial messenger
	c. National Electrical Code (NEC) Classification
	i CATV
	ii CATVX
	iii CATVR
	iv CATVP
	2. Define coaxial compression connectors
	a. Identify connector components
	3. Explain the purpose of security shields and demonstrate installation and removal
	4. Explain how drop cable preparation is accomplished for each of the following cable preparation stages:
	a. Jacket removal
	b. Dielectric
	c. Braid
	d. Center conductor
	i Explain correct center conductor length
	e. Braid
	i Describe how cable prep tools differ, depending upon cable type and size
	5. Explain how the following cable handling techniques must be practiced:
	a. Minimum bend radius
	b. Drip loops
	c. Structural considerations
	i Fastening
	ii Attachments
	iii Structural return loss
	d. Describe the impact of improper handling techniques
	e. Describe the impact of improper fastening techniques
	6. Mechanical and electrical integrity
	a. Describe the torque specifications for connecting coaxial drop cable to:
	i Consumer equipment

	ii Exterior wiring
	b. Weatherproofing
	i Silicone grease
	ii Thread protectors
	(a) Length variations
	iii Boots and grease
	iv Shrink tube
	v Encapsulating devices (splice enclosure)
	vi Aqua seals/rubber gaskets
B Describe the cable types, handling techniques, connectorization and splicing, and methods and procedures for installing optical fiber drop used to provide service to the customer's premises.	1. Describe how to construct the following drop fiber splices/connectors:
	a. Fusion
	b. Mechanical
	c. Connectors
	2. Describe fiber preparation
	a. Identify safety considerations
	3. Describe fiber handling
	a. Describe the impact of improper handling techniques
	4. Define fiber to the customer's premises (FTTx) where x is
	a. Home
	b. Curb
	c. NID
	d. Node
C Describe the wire types, handling techniques, termination, and methods and procedures for installing twisted pair wire used to provide service to the customer's premises.	1. Describe the twisted pair wire in the premises
	a. Category 5 twisted pair
	i Plugs and jacks
	ii RJ31x
	iii RJ-etc.
	(a) RJ-11
	(b) RJ-14
	(c) RJ-45
	b. Unshielded Twisted pair (UTP) color codes
	c. Polarity
	2. Describe wire handling
	a. Describe the impact of improper handling techniques
	3. Differentiate between the data cable types:
	a. CAT1
	b. CAT3
	c. CAT5 /5e /6

	d. Plenum
	e. Station Wire
	4. Describe the following terminal blocks/punch downs
	a. 66, 110 punch down blocks
	b. Mini 66
	c. IDC Rocker box (block, panel)
	d. NID Binding post
	e. Building Industry Cross-connect (BIX)
D Describe the methods and procedures for inspecting an existing residential bond and for ensuring the bond meets industry standards.	1. Explain why bonding is necessary
	2. Explain the purpose and function of the following bonding hardware:
	a. Bonding blocks
	b. Bonding wire
	i Drop attachment
	ii Ground electrode attachment
	iii Ground wire warning tag
	iv Grounding materials (strap, bolts, clamps)
	3. Explain residential drop inspection process
	4. Identify the proper bonding locations for bonding residential coaxial drop cable
	5. Identify the proper bonding methods for bonding residential coaxial drop cable:
	a. Intersystem Bonding Termination (IBT)
	b. Electrical service ground wire
	c. Electrical service ground rod
	d. Electrical service mast or service raceway
	e. Electrical service metal enclosure
	f. Bond to all-metal cold water/meter bypass
	6. Describe the proper bonding techniques in the following special circumstances:
	a. Mobile homes
	b. MDUs
E Describe the methods and procedures for installing video service at the customer's premises	1. Describe generally accepted practices for full-service video installation of the following devices:
	a. Analog television
	i RF Hook-up digital transport adapter (DTA) to television
	b. Standard definition television (SDTV)
	i RCA hook-up to STB
	(a) Digital consumer terminal (DCT)
	(b) Digital video recorder (DVR)
	ii Configure STB
	iii Verify Two-way operation

	iv Use Diagnostic Screens
	c. High definition television (HDTV)
	i Hook up to STB
	(a) Component hook-up to STB
	(b) HDMI hook-up to STB
	ii Configure STB
	iii Verify Two-way operation
	iv Use Diagnostic Screens
	d. Multimedia over Coax Alliance (MoCA)
	i Hook up to MoCA STB
	ii Point of entry (POE) for MoCA filter placement
	iii Ethernet/Coax Bridge (ECB)
	a. Video service customer education
	2. Inspect/proof the drop
	3. Describe the generally accepted practices for performing a reconnect
	4. Describe the generally accepted practices for performing a disconnect
	5. Describe the general accepted practices for performing a change of service (upgrade/downgrade)
F Describe the methods and procedures for installing telephony service at the customer's premises.	1. Describe the generally accepted practices for how to perform a full-service voice installation:
	a. List the MTA/eMTA installation steps
	b. Describe the following hook-ups/tasks:
	i Home run (eMTA to service jack to NID)
	ii Outlet replacement-duel jack (loop through)
	iii MDU (eMTA to cordless phone)
	2. Define ported vs. native telephone number
	3. Explain provisioning/provision MTA/eMTA
	4. Use Diagnostic Tools
	5. Define VoIP (managed service)
	6. Define voice CODEC
	7. Define HD voice (722 vs. 711 codec)
	8. Describe powering and battery back-up
	9. Explain station and category wire color coding and understand the cross connection between them
	10. Explain DOCSIS cable modem reference design
	11. Voice service customer education
	a. Explain voice mail
	b. Explain common service features and functions
	i Call waiting
	ii Call forwarding
	iii Busy line redial

	iv Battery back-up
	12. Inspect and test the wire for good performance
G Describe the methods and procedures for installing high-speed data (HSD) service at the customer's premises.	1. Describe the generally accepted practices how to perform a full-service high-speed data installation
	a. Equipment
	b. Ethernet/USB
	i Cross-over/straight through
	c. Directional coupler and/or splitter
	i High pass filter
	ii Step attenuator
	d. Cable modem/eMTA
	2. Computer system requirements
	a. Minimum RAM
	i Define
	b. Minimum hard drive space
	i Define
	3. Operating system (OS) compatibility
	a. Macintosh
	b. Windows
	c. Linux
	4. Installation overview
	a. List the cable modem/eMTA installation steps
	b. Describe how to perform the following hook-ups:
	i Cable modem to CPE
	ii eMTA to CPE
	iii Wireless gateway router (WGR) to the cable modem to CPE (PC, Mac, or untethered device)
	c. Define the following:
	i Service set identifier (ssid) passphrase
	(a) WEP
	(b) WPA
	(c) WPA2
	d. Explain provisioning
	e. Provision cable modem/eMTA to work order requirements
	5. Birth/service certificate
	6. Set up a virtual private network (VPN)
B Describe the methods and procedures for installing passive and active devices used to provide video, voice and data	1. Drop splitters/couplers
	a. Explain isolation as related to splitters and couplers
	b. Explain voltage blocking as related to splitters/couplers (with respect to house amplifiers)

service at the customer's premises.	
C Describe the methods and procedures for conflict resolution with customers.	1. Define customer interaction and describe how each of the following is affected by (or could affect) the image the customer has of the company:
	a. Explain the field technician's role in customer retention in the following situations:
	i Retaining customers
	ii Problem identification
	iii Taking responsibility
	iv Solving the problems
	v Following up with customer
	b. Internal vs. external customers
	i Interactions with "front office"
	ii Interactions with other technicians
	iii Responsibility and accountability
	iv Interactions with the general public and non-customers
	c. Explain the following effective communications skills and explain how these skills contribute to good customer interactions:
	i Listening
	ii Clarity of speech
	iii Empathy
	iv Probing
	v Telephone etiquette
	(a) Listening
	(b) Voice inflections
	(c) Background noise
	(d) Ending a call
	vi After-hours calls
	d. Explain proper use of company-provided and/or personal communications devices
	e. Describe conflict resolution
	f. Describe problem resolution
	g. Customer compensations
	2. Explain the steps to take to effectively communicate with difficult customers
	3. Suggest additional products (sales)

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IV. Troubleshooting and Maintenance

Competency	Knowledge, Skills, and Abilities
A Describe the function, use, care, and maintenance of test equipment.	1. Handheld Digital Signal Analyzer (H-DSA)
	a. Features
	b. Contract to the signal level meter
	2. Signal Level Meter (SLM)
	a. Display readouts of an analog channel features
	i Full scan
	ii Adjacent channel level
	b. Identify the following digital display features of the H-DSA and SLM:
	i Forward analog and digital RF levels at specified frequencies
	ii Carrier to noise ratio (C/N)
	iii Maximum-allowed DOCSIS® return digital carrier RF level
	iv Signal to Noise Ratio (SNR)
	v Bit Error Ratio (or Rate) (BER) Pre and Post FEC
	vi Modulation Error Ratio (MER)
	vii Reverse Ingress test
	viii Home health check
	(a) Define
	(b) Explain why it is important
	ix QAM Analyzer
	(a) Noise analysis
	(b) Phase analysis
	(c) CW interference/ ingress
	(d) Reflections/microreflections
	x Modulation Error Rate (MER)
	xi Bit Error Ratio (BER)
	xii Constellation analysis
	xiii Code Word Error Rate (CWER)
	xiv DOCSIS reference modem tests
	c. Return test
	i Signal generator
	ii Birth/service certificate
	d. Video and audio carrier measurements
	e. Maintenance
	i Charging

	ii Known source- accuracy verification
	iii Channel plans
	f. DOCSIS 2.0/RF Operating Parameters
	i Definition
	ii Provide examples for:
	(a) Downstream
	(b) Upstream
	3. Test TV
	a. Tracking picture and/or sound impairments
	b. Diagnosing bad customer TV
	4. Volt Ohm Meter (VOM)/Digital Multi-Meter(DMM)
	a. Using resistance function
	i Isolating shorts
	ii Identifying opens
	iii Cable identification
	b. Using voltage function
	i Checking for hot (electrified) chassis condition
	c. Using ammeter function
	d. VOM (voice applications)
	5. Signal leakage detector
	a. Ingress
	i Definition
	ii Symptoms
	iii Appearance
	iv Sources
	v Detection
	vi Repair
	vii Technician's role; escalation procedures
	b. Egress
	i Definition
	ii Symptoms
	iii Sources
	iv Detection
	(a) Measuring 20µV/m
	v Repair
	vi Technician's role; escalation procedures
	c. System monitoring
	i Cumulative Leakage Index (CLI)
	(a) Definition/requirement
	6. Cable Locator
	a. Locating underground cables

	b. Identifying utility colors and flags
	7. Time Domain Reflectometer (TDR)
	a. Definition
	b. Application and use
	i Velocity of propagation
	ii Locating defects
	iii Shorts
	iv Opens
	v Determining cable lengths
	8. Line toner and probe
	a. Definition
	b. Application and use
	i Voice applications
	9. Polarity tester
	a. Definition (power/phone)
	b. Application and use
	i Indentify tip and ring
	10. Return path tester
	a. Definition
	b. Application and use
	11. Butt set (voice applications)
	a. Definition
	b. Application and use
	12. Wire ID/Mapper (voice applications)
	a. Definition
	b. Application and use
	13. Brown meter (line loop tester) (voice applications)
	a. Definition
	b. Application and use
	14. T&N Tester (example: Sidekick)
	a. Definition
	b. Application and use
	15. Banjo (voice applications)
	a. Definition
	b. Application and use
	16. Cable modem emulator/Web-based application
	a. Definition
	17. UTP (Ethernet) LAN Tester
	a. Definition
	b. Application and use
	c. Speech quality assessment

	d. Application and use (a) Spoofing/cloning modem
B Describe the divide and conquer (isolation) method of troubleshooting.	1. Explain the steps in the troubleshooting process:
	a. Symptom analysis
	i Verify problem symptoms with customer
	b. Problem isolation
	c. Divide and conquer
	d. Problem resolution/repair
	e. Confirm problem resolution/repair
	2. Diagnose equipment problems:
	a. Identify signal issues
	b. Interpret premises signal level readings (too high; too low)
	3. Set-top terminals
	a. Self diagnostics
	i Power on self diagnostics
	4. Describe the process to troubleshoot forward and return path
C Describe the procedures to troubleshoot common voice service problems at the customer's premises.	1. Describe the loopback test
	2. Equipment problems
	3. Symptoms/causes
	a. Poor connection
	b. Wiring Faults
	c. Powering
	d. Interference/Ingress
	e. Upstream
	4. Remote diagnostics
	5. Troubleshoot common voice issues
	6. Digital Voice Testing
	a. MOS–Mean Opinion Score
	i Define what constitutes this score
	b. Perceptual Evaluation of Speech Quality (PESQ)
	c. Speech quality assessment
	d. Real-time Transport Protocol (RTP) tests (for Packet Loss, Jitter, and Latency, etc.)
	i if these are out of limits, understand when to escalate
D Describe the procedures to troubleshoot common high-speed data (HSD) service problems at the customer's premises.	1. Describe typical HSD troubleshooting issues for the following:
	a. Cable modems
	b. Computer
	c. Operating systems
	d. Utilities
	i Internet Control Message Protocol (ICMP)

	2. Error types and testing
	a. Bit errors
	i BER
	b. Protocol errors
	c. Routing errors
	i Latency
	ii Jitter
	d. Error Detection
	i Parity
	ii Carrier Sense Multiple Access with Collision Detection (CSMA/CD)
	e. Error Control
	3. Helpful PC applications
	a. IPconfig
	b. Ping
	c. Trace route
	d. Throughput Testing
	4. Troubleshoot common high-speed data issues
E Describe common analog and digital signal impairments that occur when providing video, voice and data service at the customer's premises.	1. Identify the name, cause, and repair/remedy for each of the following analog signal impairments:
	a. Snow (no picture)
	i Loss of signal
	b. Blue TV screen
	i Loss of signal
	c. Missing color/oversaturated
	d. Snowy picture/No RF signal
	i Low signal
	e. Snowy picture on channels 2 through 6 only; lines in picture
	f. Interference
	g. Letterbox format
	h. Ghosting
	i Ingress
	i. Two pictures (co-channel)
	i Simultaneously receives two TV signals
	j. Radio Frequency Interference (RFI) (Herringbone pattern)
	k. Digital video impairments
	l. Network Video Artifacts
	i No picture/blank screen
	ii Trailing
	iii Error blocks from lost packets

	iv Jerkiness
	v Blocking/freezing
	vi Object retention
	vii Lip Sync/lip flap
	m. Compression Artifacts
	i Gibbs Effect (ringing, mosquito noise)
	ii Blockiness (some viewers call this “pixilation”)
	n. Other Digital Artifacts/Issues
	i Interlacing artifacts (“mice teeth”)
	ii Incompatible resolution
	o. Flash or blip in picture
	p. Horizontal bars (hum bars)
	q. Diagonal lines (Intermodulation beats)
	r. CB radio interference
	i Interfering signals
	s. Randomly flashing lines or flashing picture
	i Electrical interference
	(a) Interfering signals within the premises
	t. "Sparklies"
	i Terrestrial interference
	(a) Interfering from satellite/sun outages (spring/fall)
	u. Scrambled picture
	2. Identify the name, cause, and repair/remedy for each of the following digital signal impairments:
	a. Tiling
	b. Blocking
	c. Freezing
	d. Jerkiness
	e. Smearing
	f. Artifacts
	g. Object Retention
	h. Robotic voice
	i. Echo
	j. Dropped call
	k. Voice break up
	l. Slow web page
	m. Server not found
	n. Lip synch
	o. No picture/black screen
	3. Media Impairments
	a. Name a typical cause of the following digital

		impairments
		i BER
		ii Latency
		iii Jitter
		iv Packet Loss
		2. Troubleshooting common video impairments
		3. Troubleshooting Whole Home DVR/MoCA®
		4. List the procedures for troubleshooting the set-top box (STB) and interactive program guide (IPG)
F	Describe DOCSIS tools used when troubleshooting video, voice and data service at the customer's premises.	1. Define Simple Network Management Protocol (SNMP)
G	Describe work force management tools used when troubleshooting voice and data service at the customer's premises.	1. Define work force management
		2. Describe SNMP tools that may be used to manage IP devices on LANs - examples:
		a. Auspice
H	Describe the provisioning process.	1. Define Provisioning
		2. List the configuration files
		3. List the provisioning steps

Society of Cable Telecommunications Engineers

V. Standards

Competency	Knowledge, Skills, and Abilities
A Explain/define the regulatory agencies and/or standards that govern practices for providing video, voice and data services at the customer's premises.	1. Federal Communications Commission (FCC) Part 76
	a. Define the FCC
	b. Explain the FCC's role in the telecomm. industry
	c. Define the Telecommunications Act of 1996 and explain its purpose
	2. National Cable Television Association (NCTA)
	a. Define NCTA standards
	b. Explain NCTA's role in the telecomm. industry
	i Define the on-time guarantee
	3. Society of Cable Telecommunications Engineers (SCTE)
	a. Define SCTE standards
	b. Explain SCTE's role in the telecomm. industry
	4. National Electrical Code (NEC)
	a. Define the NEC
	b. Explain NEC's role in installing/inspecting residential bonds in the telecommunications industry
	5. National Electrical Safety Code (NESC)
	a. Define the NESC
	b. Explain NESC's role in the telecomm. industry
	6. Occupational Safety & Health Administration (OSHA)
	a. Define the OSHA
	b. Explain OSHA's role in the telecomm. industry
	7. Motion Picture Experts Group (MPEG) standards
	a. Define MPEG standards
	b. Explain MPEG's role in the telecomm. industry
	8. Data Over Cable Service Interface Specifications (DOCSIS)
	a. Define DOCSIS
	b. Describe frequency hopping
	c. Explain DOCSIS' role in the telecomm. industry
	9. Dolby digital
	a. Define the Dolby digital standards
	b. Explain Dolby digital standards' role in the telecommunications industry
	10. Emergency Alert System (EAS)
	a. Define EAS
	b. Explain EAS' role in the telecommunications industry
	11. PacketCable specification

	a. Define the PacketCable specification
	b. Explain the PacketCable specifications' role in the telecommunications industry
	12. Wiring Standards – telephone cables (EIA/TIA)
	a. Define the following wiring codes/standards
	i 568 (A or B)
	ii 569
	iii 570
	b. Name the color codes for telephone jacks/plugs
	13. Define the following in-home networks standards
	a. Wire Based
	i Home PNA
	ii Powerline (Home Plug)
	iii Structured wiring/smart home
	iv Multimedia over Coax Alliance (MoCA)
	b. Wireless
	i Bluetooth
	ii 802.11x
	iii 802.16x
	14. Network domains:
	a. Define Local Area Network (LAN)
	b. Define Metropolitan Area Network (MAN)
	c. Define Wide Area Network (WAN)
	15. Define the following network standards and protocols:
	a. IEEE 802.2 (802)
	b. IEEE 802.3
	i Network Interface Card (NIC)
	ii Media access control (MAC) Addressing
	iii Cables
	c. Define in basic terms the OSI model
	d. Define in basic terms the TCP/IP model
	i Packets
	e. Define the basic processes for each of the following provisioning protocols
	i Dynamic Host Configuration Protocol/ Domain Name System (DHCP/DNS)
	ii Time of Day (ToD)
	iii Trivial File Transfer Protocol (TFTP)
	16. Communications Assistance for Law Enforcement Act (CALEA)
	a. Define
	17. Be aware of the term Advanced Televisions Systems Committee (ATSC)

	18. Local Franchise Agreement