

## Broadband Premises Expert (BPE) Competencies

### Scope

The **Broadband Premises Expert** 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 demonstrates that he or she has the knowledge to install and troubleshoot a variety of triple-play installations, from easy to complex, as well as the knowledge to mentor and coach junior employees.

The Broadband Premises Expert certification is one of three stand-alone Broadband Premises certifications. Content includes “the why” of the basic installation. The other stand-alone BPS certifications are Broadband Premises Installer (BPI) and Broadband Premises Technician (BPT).

Specific categories include:

- I. Technology, Systems & Requirements
- II. Premises Devices
- III. Installation
- IV. Troubleshooting and Maintenance
- V. Standards
- VI. Safety
- VII. Coaching/Mentoring

### I. Technology, Systems & Requirements

Competency	Knowledge, Skills, and Abilities
A. Explain the basics of analog signal and why the NTSC was developed.	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
	(a) Sampling
	(b) Quantizing
	(c) Encoding
	ii. Define decoding
	iii. Define pulse-code modulation (PCM)
	iv. Define codec
	v. Define IPTV
	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. MPEG	
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
	a. Explain the difference between analog and digital EAS
	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)
	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
	(a) Forward Error Correction (FEC)
	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	1. Describe coaxial cable attenuation properties



the characteristics of cables and wire used within the drop system and at the customer's premises	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. Classifications	
	4. Define the different data rates for CAT3, CAT5 & CAT5E data cables
E. Identify the differences and similarities between voice services provided by the cable operator and voice services provided by other operators	1. Public Switched Telephone Network (PSTN)
	2. Define the following:
	a. Ported number
	b. Native number
	c. On- net
	d. Off-net
	e. Dial tone
	f. Call Features
	3. Fundamentals of broadband telephony
	a. Define circuit switched (CBR)
	b. Define Voice over internet protocol (VoIP )
	i. Packet switching
	ii. PacketCable™
	(a) eMTA
	c. Define Tier 2 & Tier 3 voice services (Vonage)
d. Define SIP	
4. Powering	
a. Twisted pair powering (AC)	
b. Coaxial powering	
c. Batteries	
d. Network power vs. home power	
F. Explain why competition has led to differences and similarities between cable operator-provided high-speed data (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



## II. Premises Devices

Competency	Knowledge, Skills, and Abilities
<p>A. Identify and describe customer provided devices used to offer video, voice and data services at the customer's premises</p>	1. Televisions
	a. Explain basic analog (NTSC) television operation
	i. Block diagram functions
	ii. Powering
	iii. Signal sourcing
	(a) Channel characteristics
	(i) Channel assignments
	(ii) Channel bandwidth
	b. Describe the characteristics of a cable compatible television
	i. Cable compatible interface
	ii. Channel capacity
	iii. Define Tru2way Televisions
	iv. Describe the difference between ATSC and QAM tuners
	c. Describe common television controls
	i. User Controls
	ii. Service Controls
	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
	ii. High definition (HD)
	e. Name the types of TV Receivers:
	i. Cathode Ray Tube (CRT) - Direct view (
	ii. Projection devices
	iii. Liquid Crystal Display (LCD)
	iv. Plasma
	v. HDTV
	(a) Aspect ratio
(i) 4:03	



	(ii) 16:09
	(b) Screen resolution
	(i) 480i
	(ii) 480p
	(iii) 720p
	(iv) 1080i, p
	(v) Describe the impact of refresh rates on screen resolution
	(vi) Scaling
	(c) Connections
	(i) Component
	(ii) High-Definition Multimedia Interface (HDMI)
	(iii) Audio
	(iv) Digital Visual Interface (DVI)
	(v) PC interface
	(d) Effects of aspect ratio mismatch:
	(i) Letter box
	(ii) Pillaring
	(iii) Postage stamp
	(e) Digital Light Processor (DLP)
	2. Digital Video Recorder (DVR)
	3. Digital Video Disc/Digital Versatile Disc (DVD)
	4. Network DVR service
	5. Video Cassette Recorder (VCR)
	6. Define the following navigation devices/interfaces:
	a. Remote Control
	b. Parental Control
	c. IR Blaster
	7. Game Consoles
	8. Home Theater Receiver
	9. Dolby AC3
	10. Define "video switches" and describe purpose
	11. Define "Slingbox" and describe purpose
	12. Define "iPod Touch" and describe purpose
	13. Define in basic terms "Media Center" and describe purpose
	14. Audio
	a. Analog stereo TV



	<ul style="list-style-type: none"> <li>i. Baseband</li> <li>ii. Sony/Philips Digital Interconnect Format (S/PDIF) (Digital RCA)</li> <li>iii. Coaxial cable               <ul style="list-style-type: none"> <li>(a) RCA jacks (analog)</li> </ul> </li> <li>b. Optical fiber               <ul style="list-style-type: none"> <li>i. TOSLink</li> </ul> </li> </ul>
	15. Interactive TV
	<ul style="list-style-type: none"> <li>a. VOD</li> <li>b. SVOD</li> </ul>
B. Explain why voice services provided by broadband providers are important	1. Telephones
	<ul style="list-style-type: none"> <li>a. Telephone components               <ul style="list-style-type: none"> <li>i. Base</li> <li>ii. Ringer</li> <li>iii. Handset                   <ul style="list-style-type: none"> <li>(a) Side tone</li> </ul> </li> <li>iv. Hook switch</li> <li>v. Dial pad</li> </ul> </li> <li>b. Powering               <ul style="list-style-type: none"> <li>i. Loop start/ground start</li> <li>ii. Loop current</li> <li>iii. Ringing                   <ul style="list-style-type: none"> <li>(a) REN</li> <li>(b) Loop resistance and distance limitations</li> </ul> </li> </ul> </li> <li>c. Cordless phones               <ul style="list-style-type: none"> <li>i. Frequencies of operation                   <ul style="list-style-type: none"> <li>(a) Duplex frequency</li> </ul> </li> <li>ii. Powering/UPS</li> <li>iii. Modulation techniques                   <ul style="list-style-type: none"> <li>(a) Digital Spread Spectrum (DSS)</li> </ul> </li> </ul> </li> <li>c. Other Devices               <ul style="list-style-type: none"> <li>i. Dial-up modems                   <ul style="list-style-type: none"> <li>(a) V.90/92</li> </ul> </li> <li>ii. Alarm service equipment                   <ul style="list-style-type: none"> <li>(a) Line seizing</li> </ul> </li> <li>iii. External Caller ID Devices</li> <li>iv. FAX</li> </ul> </li> </ul>



	v. TTY/TDD devices
	vi. Medic alert devices
	vii. House arrest tethers
	viii. Credit card machines
	ix. Multi-line Telephone Systems
C. Explain why HSD services provided by broadband providers are important	1. Personal computers (PCs)
	a. Software
	i. Operating systems (OS)
	(a) Windows
	(b) 2000
	(c) NT
	(d) XP
	(e) Vista
	ii. Macintosh
	iii. Linux
	iv. Installation of cable-supplied data services
	(a) Service provider applications
	(i) Mail
	(ii) Security
	(1.) Define encryption
	b. Hardware
	i. CPU/motherboard
	ii. Expansion bus
	(a) ISA expansion bus
	(b) Peripheral Component Interconnect (PCI)
	(c) PCMCIA
	(d) Universal Serial Bus (USB)
	(e) IEEE 1394 multimedia connection
	(f) Firewire (Apple)
	iii. Define computer Memory
	iv. Storage devices/media (internal/external)
	c. Input/Output
i. Serial interface	
ii. Parallel interface	
iii. Peripheral devices	
iv. Routers and gateways	
d. Application configuration	



	i. Browsers
	e. Email
D. 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 boxes (STB) (middleware)
	a. Features/functions
	b. Set-top applications
	i. Navigation aids
	(a) Onscreen displays
	(b) Program guides
	2. Modem
	a. DOCSIS
	i. Boot process
	ii. Security
	(a) BPI
	(b) Secret Key
	(c) DES
	3. Embedded Multimedia Terminal Adapter (eMTA)
	4. Conditional access techniques
	5. CableCard/STB integration
	a. Define
	b. Provisioning
	6. T-commerce
	7. Third party applications
	a. Program guides
	b. News
	c. Sports
	d. Weather
e. Caller ID on television	
8. Explain why integration of consumer electronic devices play an important role in the consumer's home.	
9. Explain why Small office/ Home office applications are becoming more popular in the customers home	



### III. Installation

Competency	Knowledge, Skills, and Abilities
<p>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.</p>	<p>1. Describe the following coaxial cable types and explain when each is used:</p>
	<p>a. Underground (flooded)</p>
	<p>b. Aerial messenger</p>
	<p>c. National Electrical Code (NEC) Classification</p>
	<p>d. CATV</p>
	<p>e. CATVX</p>
	<p>f. CATVR</p>
	<p>g. CATVP</p>
	<p>2. Define coaxial compression connectors</p>
	<p>3. Explain the purpose of security shields and demonstrate installation and removal</p>
	<p>4. Explain how drop cable preparation is accomplished for each cable preparation stage.</p>
	<p>5. Explain how the following cable handling techniques must be practiced:</p>
	<p>a. Minimum bend radius</p>
	<p>b. Drip loops</p>
	<p>c. Structural considerations</p>
	<p>i. Fastening</p>
	<p>ii. Attachments</p>
	<p>iii. Structural return loss</p>
	<p>a. Describe the impact of improper handling techniques</p>
	<p>b. Describe the impact of improper fastening techniques</p>
	<p>6. Mechanical and electrical integrity</p>
<p>a. Describe torque specifications for connecting coaxial drop cable to:</p>	
<p>i. Consumer equipment</p>	
<p>ii. Exterior wiring</p>	
<p>b. Weatherproofing</p>	
<p>B. Explain the cable types, handling techniques, connectorization and splicing, and methods and procedures for</p>	<p>1. Describe how to construct the following drop fiber splices/connectors:</p>
	<p>a. Fusion</p>
	<p>b. Mechanical</p>
	<p>c. Connectors</p>



installing optical fiber drop used to provide service to the customer's premises.	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 =
	a. Describe differences/ similarities of coax vs. FTTH installation
	i. Home
ii. Curb	
iii. NID	
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
	(d) RJ-48
	(e) RJ-25
	b. Unshielded Twisted pair(UTP) color codes
	c. Polarity
	2. Describe wire handling
	a. Describe the impact of improper handling techniques
	b. Describe the difference between straight through and cross-over wiring of satin cord
	c. Describe the different RJ-45 wiring schemes for USOC, 568A & 568B
	3. Differentiate between the data cable types:
	a. Cat 1
	b. Cat 3
	c. Cat 5 /5e /6
	i. P568 A B
	d. Plenum
	e. Describe the different cable rating of CM, CMX, CMR & CMP and where each would be used
4. Describe the following terminal blocks/punch downs	



	a. 66
	b. 110
	c. Building Industry Cross-connect (BIX)
	d. Binding post
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
	3. Explain residential coaxial drop cable inspection process
	a. Identify proper bonding locations
	4. 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
	2. Describe the generally accepted practices for performing a reconnect
	3. Describe the generally accepted practices for performing a disconnect
	4. Describe the general accepted practices for performing a change of service (up/downgrade)
F. Describe the methods and procedures for installing voice service at the customer's premises.	1. Describe the generally accepted practices for how to perform a full-service voice installation
	a. Inspect and test the wire for good performance
	b. Describe the different return options available for a monitored alarm system
	c. Describe 2 pair vs. 3 pair alarm wiring
	d. Describe the requirements for interfacing with remote door buzzers in apartment complexes
G. Describe the methods and procedures for installing high-speed data (HSD) service at the customer's	1. Describe the generally accepted practices how to perform a full-service high-speed data installation, including connection to
	2. Describe the different ways to interface the cable modem to the inside wiring (IW) - any jack, spare pair, dedicated wiring.



premises.	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
	3. Computer system requirements
	4. Operating system (OS) compatibility
	5. Installation overview
6. Birth / service certificate	
H. Describe the methods and procedures for installing passive and active devices used to provide video, voice and data service at the customer's premises.	1. Drop splitters/couplers/traps
	a. Explain isolation as related to splitters and couplers
	b. Explain voltage blocking as related to splitters/couplers (with respect to house amplifiers)
	c. Describe passive return path house amplifiers and when and why they would be used



#### IV. Troubleshooting and Maintenance

Competency	Knowledge, Skills, and Abilities
A. Describe the function, use, care, and maintenance of test equipment.	1. 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:
	i. QAM Analyzer
	(a) Noise analysis
	(b) Phase analysis
	(c) CW interference/ingress
	(d) Reflections/microreflections
	ii. Modulation Error Rate (MER)
	iii. Bit Error Ratio (BER)
	iv. Constellation analysis
	v. DOCSIS stats
	vi. Protocol Analyzer
	c. Return test
	i. Signal generator (for example, DSAM, RSVP)
	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
	2. Test TV
	3. Volt Ohm Meter (VOM)/Digital Multi-Meter(DMM)
a. Using resistance function for shorts, opens, cable id	
b. Using voltage function	
i. Checking for hot (electrified) chassis condition	
ii. Verify AC receptacle polarity	



	c. Using ammeter function
	d. VOM (voice applications)
	4. Signal leakage detector
	a. Ingress
	b. Egress
	c. System monitoring
	5. Cable Locator
	6. Time Domain Reflectometer (TDR)
	7. Line toner
	8. Polarity tester
	9. Return path tester (example, RSVP)
	10. Butt set (voice applications)
	11. Wire ID (voice applications)
	12. Wire mapper (voice applications)
	13. Brown meter (loop tester) (voice applications)
	14. T&N Tester (example: Sidekick)
	15. Banjo (voice applications)
	16. Cable modem emulator / Web-based application
	17. Foreign Voltage Detector (FVD)
	18. Spectrum Analyzer
B. Describe best procedures for locating sources of degradation, and why they are optimum.	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 or 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 for troubleshooting	1. Describe the loopback test
	2. Equipment problems
	3. Symptoms/causes



common voice service problems at the customer's premises.	a. Poor connection
	b. Wiring Faults
	c. Powering
	d. Interference/Ingress
	e. Upstream
	f. Hum on voice line
	4. Remote diagnostics
	5. Troubleshoot common voice issues
6. Digital Voice Testing	
D. Describe various HSD problem symptoms, sources, and remedies -- emphasizing isolating network, modem, and computer issues.	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. Identify and troubleshoot analog and digital signal impairments.	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. Snowy picture
	i. Low signal
	d. Snowy picture on channels 2 - 6 only; lines in picture
	e. Ghosting
	i. Ingress
	g. Flash or blip in picture
	h. Herringbone pattern
	i. Horizontal bars (hum bars)
	j. Diagonal lines (Intermodulation beats)
	k. CB radio interference
	i. Interfering signals
	l. Randomly flashing lines or flashing picture
	i. Electrical interference (Interfering signals within the premises)
	m. "Sparklies"
	i. Terrestrial interference - Interference from satellite/sun outages (spring/fall)
	n. 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



	<ul style="list-style-type: none"> <li>i. BER</li> <li>ii. Latency</li> <li>iii. Jitter</li> <li>iv. Packet Loss</li> </ul>
	4. List the procedures for troubleshooting the set-top box 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 the types of tool that may be used to access SNMP tools – examples: <ul style="list-style-type: none"> <li>a. Auspice</li> </ul>
	3. Describe dynamic dispatch
H. Describe the provisioning process.	1. Define Provisioning
	2. List the configuration files
	3. List the provisioning steps
	4. Identify why it is important to certify a customer's home
	5. Explain why Quality of Service (QoS) is an important part of the telecommunication platform



## V. Standards

Competency	Knowledge, Skills, and Abilities
<p>A. Explain/define the regulatory agencies and/or standards that govern practices for providing video, voice and data services at the customer's premises.</p>	1. Federal Communications Commission (FCC) Part 76
	a. Define the FCC
	b. Explain the FCC's role in the telecommunications industry
	c. Define the Telecommunications Act of 1996/ explain purpose
	2. National Cable Television Association (NCTA)
	a. Define NCTA standards
	b. Explain NCTA's role in the telecommunications industry
	i. Define the on-time guarantee
	3. Society of Cable Telecommunications Engineers (SCTE)
	a. Define SCTE/ANSI standards
	b. Explain SCTE's role in the telecommunications 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 telecommunications industry
	6. Occupational Safety & Health Administration (OSHA)
	a. Define the OSHA
	b. Explain OSHA's role in the telecommunications industry
	7. Motion Picture Experts Group (MPEG) standards
	a. Define MPEG standards
	b. Explain MPEG's role in the telecommunications industry
	8. Data Over Cable Service Interface Specifications (DOCSIS)
	a. Define DOCSIS
	b. Describe frequency hopping
	c. Explain DOCSIS' role in the telecommunications 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. Belcore
	a. Define Belcore
	b. Explain Belcore's role in the telecommunications industry
	13. Modified Final Judgment (MFJ)
	a. Define Modified Final Judgment (MFJ)
	b. Define demarcation point
	c. Explain MFJ's role in the telecommunications industry
	14. Wiring Standards – telephone cables (EIA / TIA)
	a. Define the following wiring codes / standards
	i. TIA 568-B
	ii. TIA 569-B
	iii. TIA 570-B
	b. Name the color codes for telephone jacks/plugs
	15. 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
	16. Network domains:
	a. Define Local Area Network (LAN)
	b. Define Metropolitan Area Network (MAN)



	c. Define Wide Area Network (WAN)
	17. Define the following network standards and protocols:
	a. IEEE 802.2
	b. IEEE 802.3
	i. Network Interface Card (NIC)
	ii. Media access control (MAC) Addressing
	iii. Cables
	a. Define in basic terms the OSI model
	b. Define in basic terms the TCP/IP model
	c. Packets
	d. 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)
	18. Communications Assistance for Law Enforcement Act (CALEA)
	19. Define the changes to NTSC standards for Broadcast TV after the Digital Transition occurs.
	20. Local Franchise Agreement
	21. Electronics Industry Association (EIA)
	22. OpenCable



## VI. Safety

Competency	Knowledge, Skills, and Abilities
<p>A. Recognize the industry standard safe work practices, for Personal Protective Equipment (PPE) and other job-related tools and equipment.</p>	1. Describe the eye protection used during installation and service work; explain the minimum industry-adopted rating
	a. ANSI rating
	2. Describe hearing protection used during installation and service work; explain the minimum industry-adopted rating:
	a. ANSI rating
	3. Describe footwear worn during installation and service work; explain the minimum industry-adopted rating:
	a. ANSI rating
	4. Describe clothing worn (and not worn) during installation and service work.
	5. Describe work gloves worn during installation and service work.
	6. Describe hardhats used during installation and service work; explain the minimum industry-adopted rating:
	a. ANSI rating
	7. Describe voltage testers used during installation and service work; explain use and maintenance.
	a. Foreign voltage detector
	8. Describe safety vest used during installation and service work; explain the following types of safety vests and when each is used:
	a. Class 1
	i. School crossing
	b. Class 2
	i. Up to 50 MPH
	c. Class 3
	i. Over 50 MPH
	9. Identify the climbing equipment used during installation and service work
	a. Fall arrest systems
b. Pole climbers (hooks)	
c. Body belt	
d. Gloves	
i. Gauntlet	
ii. High voltage gloves (rubber gloves, liners, outer protectors)	



	e. Safety Strap
	10. Be aware of proper pole climbing techniques
	11. Ladders
	a. Define the following types of ladders and when used:
	i. Step ladder
	ii. Extension ladder
	iii. Combination step/extension ladder
	b. Identify the parts of a ladder
	c. Describe ladder inspection before and during use
	i. Explain what to do with defective ladders
	d. Describe ladder placement on the strand (including midspan) and at the pole
	e. Describe ladder usage
	f. Describe the following ladder techniques:
	i. Removing and replacing ladders on the vehicle racks
	ii. Carrying methods
	iii. Ascend and descend
	iv. Risks
	12. Poles
	a. Demonstrate pole inspections
	b. Demonstrate voltage testing
	c. Define climbing space
	d. Describe electrical hazards that could be encountered
B. Recognize the industry standard safe work practices with respect to vehicle use.	1. Describe safe operation and maintenance of the company vehicle
	a. Describe how to conduct daily inspections
	b. Describe how the vehicle's appearance, how it is driven, and how it is parked, reflects good customer relations
	2. Describe the following traffic control devices:
	a. Signs
	b. Flagger requirements
	c. Cones
	3. Aerial Lift (bucket truck)
	a. Describe when an aerial lift vehicle is used
	b. Describe safe operation practices:
	i. Use of wheel chocks
ii. Proximity awareness	



C. Recognize the industry standard safe work practices with respect to work zone safety.	1. Describe the process of analyzing risks when driving the company vehicle
	2. Identify and describe the following work zone traffic control devices and how the Manual on Uniform Traffic Control Devices (MUTCD), along with state and local policies, establishes:
	a. Cones
	b. Sign placement (warning devices)
	3. Describe traffic flow techniques
D. Recognize the industry standard safe work practices with respect to the work environment.	1. Describe the following hazardous materials – HAZCOM that may be encountered on the job and what to do if encountered:
	a. Identify the potential for asbestos at the job site
	b. Identify the potential for solvents at the job site
	c. Identify the potential for fiberglass Insulation
	d. Identify the potential for lead paint at the job site
	2. Describe the following extreme weather conditions and the safety precautions associated with each:
	a. Heat
	b. Cold
	c. Storms
	3. Describe proper ergonomics while on the job as related to repetitive motion activities
	4. Identify potential animal encounters while on the job and describe the safety precautions to employ
	5. Demonstrate proper battery handling
	a. Stand-by power supplies
b. Customer back-up	
c. eMTA	



## VII. Coaching/Mentoring

Competency	Knowledge, Skills, and Abilities
<p>A. Describe the importance of effective communication with internal and external customers</p>	<p>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:</p>
	<p>a. Explain the technician’s role in customer retention in:</p>
	<p>i. Retaining customers</p>
	<p>(a) Problem identification</p>
	<p>(b) Taking responsibility</p>
	<p>(c) Solving the problems</p>
	<p>(d) Following up with customer</p>
	<p>ii. Internal vs. external customers</p>
	<p>(a) Interactions with “front office”</p>
	<p>(b) Interactions with other technicians</p>
	<p>(c) Responsibility and accountability</p>
	<p>(d) Interactions with the general public and non-customers</p>
	<p>b. Explain how effective communications skills contribute to good customer interactions:</p>
	<p>i. Listening</p>
	<p>ii. Clarity of speech</p>
	<p>iii. Empathy</p>
	<p>iv. Probing</p>
	<p>v. Telephone etiquette</p>
	<p>(a) Listening</p>
	<p>(b) Voice inflections</p>
	<p>(c) Background noise</p>
	<p>(d) Ending a call</p>
	<p>vi. After-hours calls</p>
	<p>c. Explain proper use of company-provided and/or personal communications devices</p>
	<p>d. Describe conflict resolution</p>
	<p>e. Describe problem resolution</p>
	<p>f. Customer compensations</p>
	<p>2. Explain the steps to take to effectively communicate with difficult customers</p>



	3. Explain how to present technical information to non-technical people
	4. Describe why the generational gaps between the technician and customer could create potential communication problems
	5. Why do we need to be sensitive to different personality types?
	6. Identify why listening skills are important
	7. How to respond to co-worker feedback
B. Explain how adults learn differently from each other	1. Identify how learning styles play a key role in application and retention
	2. Why we need to be sensitive to learning differences
	3. What are the steps in teaching a "craft skill?"
	4. The learning cycle
	a. Avid learner
	b. Disillusioned beginner
	c. Reluctant learner
	d. Expert
	5. How do we recognize difficulties in comprehension?
	6. Influencing behavior change
C. Identify the qualities of a positive role model	1. Qualities of effective mentors
	a. Good listener
	b. Respectful
	c. Trustworthy
	d. Caring
	e. Patient
	f. Non-judgmental
	g. Motivational
	h. Focus upon growth and development of the trainee
	i. Cultivate confidence in the mentee's ability
	2. Behavior of effective mentors
	a. Involve the trainee in deciding how the pair will spend their time together
	b. Respect the trainee's viewpoint
	c. Value the organization and its mission
	d. Treat everyone with dignity and respect
	e. Are confident and secure
	f. Seek /use help and advice from staff and or supervisors



	3. Behavior of ineffective mentors
	a. Attempt to transform the trainee and take an authoritative stance
	b. Emphasize behavior changes over the development of mutual trust and respect in the relationship
	c. Attempt to instill a value system counter to the trainee's values
	d. Ignore the advice of program staff or supervisor about how to respond to difficulties in the relationship
	4. Attitudes & Latitudes
	a. Generational differences
	b. Degree of loyalty toward the relationship, goals, and business.
	c. Two separate standards (business expectations vs. my way)
	d. Peer pressure
	e. Supervisor without commitment
	f. Relationships that purposefully undermine mentoring progress
	g. Dominant learning styles should be matched between mentor/mentee as much as possible
	5. The roles and responsibilities of a mentor are many and may include but are not limited to:
	a. Provide the mentee with encouragement and support
	b. Train the mentee on the core competencies
	c. Teach specific skills that are necessary for success in all products or areas
	d. Evaluate and give feedback regarding the mentee's observed performance
	e. Be a positive role model through words & actions
	f. Guide and inspire the mentee through the early stages of training
D. Describe the benefits, expectations and responsibilities of mentoring/coaching	1. Expectations of a Mentee
	a. Interest in professional and personal growth
	b. Open and receptive to feedback
	c. Commitment to learning
	d. Open and sincere communication
	e. Utilize active listening



f. Sensitive to the needs of the mentor
2. Benefits for the mentee
a. Commitment to learning
b. Greater awareness of organizational culture
c. Appreciation and effective use of networking
d. Proactive approaches to tasks and projects
e. Improved organizational performance
f. Expanded effective communication skills
g. Movement toward expert status
h. Increased compensation, promotions, rewards
3. Expectations of a Mentor
a. Teacher, guide, counselor, sponsor, facilitator
b. Genuine interest in advancing others
c. Sensitivity to other's needs and development
d. Active listening skills
e. Time availability
f. Commitment
g. Confidentiality
h. Communication Skills
i. Motivation
4. Benefits to the Mentor
a. Professional development
b. Respect
c. Organizational exposure
d. Success
e. Influence
f. Change agent
5. Management Skills
a. Goal setting
b. Planning for performance
c. Appraising performance
d. Modeling
e. Delegating