



Broadband Premises Installer (BPI) Competencies

Scope

The Society of Cable Telecommunications Engineers (SCTE) **Broadband Premises Installer** certification describes the knowledge of an entry-level 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 carry out a basic “triple-play” installation but is not yet proficient.

The Broadband Premises Installer certification is the foundation and one of three stand-alone Broadband Premises certifications. Content includes “the what” of the basic installation.

I. Technology, Systems & Requirements

Competency	Knowledge, Skills, and Abilities
A Recognize basic analog cable network configuration and understand how signal flows from the network to the customer’s television.	1. Define in basic terms “analog signal levels”
	a. Minimum signal levels at the customer terminal per FCC
	b. Examples of expected signal levels at customer premises
	i Analog signal faults and limitations
	ii Comparison of analog and digital signals
B Understand basic digital signal characteristics and how digital signals are used in cable telecommunications system.	1. Basics of digital signals
	a. Define in basic terms “digital”
	b. Digital signal levels
	i Transmission loss and expected signal levels at the line endpoint or the device input.
	ii Knowledge of expected signal levels at customer premises test point locations
	c. Analog to digital (A/D) conversion
	i Describe the fundamentals of A/D conversion
	ii Define in basic terms “encoding”
	2. Digital modulation
	a. Define in basic terms “digital modulation”
	b. Digital multiplexing i Multiple video programs in 6 MHz



	bandwidth
	ii Motion picture experts group (MPEG) 2 and 4
	iii Define in basic terms “compression ratios”
	c. Describe two-way signal flow
	3. Signal distribution methods
	4. Virtual channel mapping
C Recognize the components of a Hybrid Fiber Coaxial (HFC) cable system.	1. Define hybrid fiber-coax (HFC) and its components:
	a. Telecom center (headend and hub)
	b. Optical Transport Network (OTN)
	c. Distribution network
	d. Customer’s premises
	2. Describe the purpose and function of the following network devices:
	a. Passive devices
	i Taps
	(a) Non-power passing taps
	(b) Port power-passing taps
	(c) Tap function
	(d) Troubleshooting the tap
	ii Splitters
	iii Directional couplers
	iv Power inserters
	b. Active devices
	i Optical node
	ii Amplifiers
	(a) Line extenders
	3. Define in basic terms the following cable system frequency allocations:
	a. Reverse
	i Frequency spectrum
	ii Shared frequencies
	b. Forward
	i Frequency spectrum
	ii Shared frequencies
	iii Spectrum allocation (analog, digital, SDV, VoD, HSD, Channel bonding)
	a. Define in basic terms two-way frequency division [multiplexing]
	i Frequency division
	ii Effects on signal
	iii Applications
	iv Calculate cable attenuation
	v Recognize the symbols and letters that represent electrical units



<p>D Describe the common cable system services and their sources.</p>	<ol style="list-style-type: none"> 1. Describe each of the following cable system services sources: <ol style="list-style-type: none"> a. Off-air or Over-the air (OTA) feeds b. Studio feeds c. Satellite feeds d. Community access/public, education, and government (PEGs) e. Local origination (LO) 2. Describe each of the following cable system premium services: <ol style="list-style-type: none"> a. Impulse pay per view (IPPV) b. Video on Demand (VoD) c. Interactive services d. Premium services (i.e., HBO, Showtime) 3. Describe each of the following cable system digital services: <ol style="list-style-type: none"> a. High-speed data installation <ol style="list-style-type: none"> i Windows ii Macintosh iii Linux iv IPv4/IPv6 b. Online gaming c. Telephony <ol style="list-style-type: none"> i Switched telephony ii VoIP (DOCSIS) iii PacketCable iv SIP/IMS d. Digital video <ol style="list-style-type: none"> i Standard definition (SD) ii Enhanced definition (ED) iii High definition (HD) iv Switched Digital Video (SDV) v Digital simulcast 2. Describe competitive services <ol style="list-style-type: none"> a. Digital subscriber line (DSL) b. FiOS c. Satellite delivery (e.g. DirecTV) d. Broadband wireless e. Telephone company
<p>E Recognize the characteristics of the cables and wire used within the drop system.</p>	<ol style="list-style-type: none"> 1. Define the following coaxial drop cable physical and electrical properties: <ol style="list-style-type: none"> a. Impedance <ol style="list-style-type: none"> i 75 ohm b. Frequency characteristics c. Describe coaxial drop cable construction



	i List the physical coaxial drop cable components:
	(a) Center conductor
	(b) Dielectric
	(c) Shield
	(i) Braid percentages
	(d) Jacket
	(i) Color
	ii Contrast the difference between aerial and underground drop cable
	d. List typical coaxial drop cable sizes (by diameter)
	i Series 59
	ii Series 6
	iii Series 11
	iv Quantum reach (e.g. QR-320)
	e. Describe coaxial cable attenuation properties:
	i Define in basic terms "dB"
	ii Define in basic terms "attenuation"
	iii Explain the effect cable length has on coaxial cable
	iv Calculate cable attenuation
	2. Describe in basic terms the following twisted pair properties:
	a. Cross talk
	b. Capacitance
	c. Frequency response
	d. Inductance
	e. Classifications
	f. List the physical twisted pair wire components:
	i Wire-type
	ii Shielding
	iii Insulation
	3. Describe in basic terms the following optical fiber properties:
	a. Optical fiber types:
	i Multimode
	ii Single-mode
	b. Optical fiber/cable components:
	i Core
	ii Cladding
	iii Coating
	iv Strength fibers
	v Jacket



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	vi Buffer tube
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II. Premises Devices

Competency	Knowledge, Skills, and Abilities
<p>A Recognize the function of customer-provided devices used for video, voice and data services.</p>	1. Televisions
	a. Describe 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) Closed captioning
	d. Describe typical interfaces for the following TV types and components:
	i Standard definition (SD)
	(a) RF
	(b) Composite
	(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 TV displays/ receivers:
	i Cathode ray tube (CRT)
	ii Home theater projection devices
iii Liquid crystal display (LCD)	
iv Plasma	
v Light emitting diode (LED)	
vi HDTV	
(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)
	(d) Effects of aspect ratio mismatch:
	(i) Letter box
	(ii) Pillaring
	vii Digital Light Processor (DLP)
	viii OLED/LED
	f. Digital TV Transition (DTV)
	2. Digital Video Recorder (DVR)/PVR
	a. Define a DVR and describe its purpose
	b. Explain the interface with service provider device
	c. Networked DVR (MoCA)
	d. Remote DVR / rDVR
	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. Video Cassette Recorder (VCR)
	a. Define a VCR and describe its purpose
	b. Explain the interface with service provider device
	5. 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
	6. Game consoles
	a. Identify a game console
	7. Home theater receiver
	a. Identify a home theater center
	8. Video switches
	a. Define in basic terms "video switches" and describe purpose
	9. Slingbox
	a. Define in basic terms "Slingbox" and describe purpose
	10. Untethered devices



	a. Define in basic terms “smartphones” and describe purpose
	i Example: iPod Touch
	b. Define in basic terms “Tablet PC” and describe purpose
	i Example: iPad
	11. Telephones - Identify the following telephone set components:
	a. Base
	b. Ringer
	c. Handset
	d. Hook switch
	e. Dial pad
	12. Personal computers (PCs)
	a. Define operating system (OS)
	i Windows
	ii Macintosh
	iii Linux
	b. Components of a PC
	c. Name the typical operating systems found on a customer’s PC
B Recognize the function, use, and connection of company-provided devices used for video, voice and data services at the customer’s premises.	1. Set-top boxes (converters) and other network interface devices/services
	a. Name typical types of set-top boxes (STB)
	i Analog
	ii Addressable
	iii Digital
	(a) Digital consumer terminal (DCT)
	(b) Digital terminal adapter (DTA)
	(c) High-definition
	(d) DVR
	(i) Dual tuner
	iv Interfacing
	v IP
	vi Tru2way
	b. Describe in basic terms “CableCARD™”
	c. Describe in basic terms “cable modems”
	d. Describe in basic terms “Internet Protocol Television (IPTV)”
	e. Describe in basic terms “SDV tuning adapter”
	f. Describe in basic terms “embedded multimedia terminal adapter (eMTA)”
	g. Describe in basic terms “embedded digital voice adapter (eDVA)”
	h. Describe in basic terms “multimedia terminal adapter (MTA)”
	i. Describe in basic terms “commercial gateways”



	j. Describe in basic terms “network adapters”
	k. Describe in basic terms “wireless gateways”
	l. Describe in basic terms “Home Phoneline Networking Alliance (HomePNA)”
	m. Describe in basic terms “Multimedia over Coax Alliance (MoCA [®])”
	n. Describe in basic terms “OpenCable™ Home Networking Protocol (OHNP)”
	2. Explain the hook-ups of a set-top box to consumer devices for requested services:
	a. Verify 2-way operation (test VOD features)
	b. Set up pin number/parental control
	3. Explain the connection of the following customer peripheral equipment to allow requested operation of the features:
	a. Picture in picture (PIP)
	b. DVD recorder/player
	c. Computer monitor
	d. Home theater
	e. Phone Equipment (e.g. fax)
	4. Define the following telephone service features
	a. POTS (Plain Old Telephone Service)
	b. Basic understanding of Custom Local Area Signaling Services (CLASS features)
	c. Call features
	i Call waiting
	ii Caller ID
	iii 3-way Calling
	iv Network based voice mail/advanced v-mail features
	v Call forwarding
	vi Call blocking
	5. Define “Lifeline” service
	a. E911



III. Installation

Competency	Knowledge, Skills, and Abilities
<p>A Recognize the types of cables and wire used within the drop system; describe proper handling techniques.</p>	<ol style="list-style-type: none"> 1. Differentiate between the coaxial cable types: <ol style="list-style-type: none"> a. Underground (flooded) b. Aerial Messenger c. National Electrical Code (NEC) classification <ol style="list-style-type: none"> i CATV ii CATVX iii CATVR iv CATVP 2. Demonstrate use of the correct cable type for various customer installations 3. Demonstrate proper cable handling techniques: <ol style="list-style-type: none"> a. Minimum bend radius b. Drip loops c. Structural considerations <ol style="list-style-type: none"> i Fastening ii Attachments d. Describe the impact of improper handling techniques e. Describe the impact of improper fastening techniques 4. Fiber to the "x" (FTTx) <ol style="list-style-type: none"> a. Define FTTx in basic terms (introduction) where x = <ol style="list-style-type: none"> i Home ii Node iii Curb iv NID b. Describe fiber drop fundamentals 5. Station/twisted pair wire <ol style="list-style-type: none"> a. Identify the types of wire in the home <ol style="list-style-type: none"> i CAT1 ii CAT3 iii CAT5 /5e /6 iv Station wire b. Placement
<p>B Recognize the function and use of interfaces and terminations within the customer's premises.</p>	<ol style="list-style-type: none"> 1. Understand the types of F-connectors used at the premises <ol style="list-style-type: none"> a. Compression 2. Explain the purpose and need of security shields and demonstrate installation and removal 3. Explain drop cable preparation and demonstrate each of the following cable



	preparation stages:
	a. Center conductor
	b. Braid
	c. Messenger separation
	d. Jacket removal
	e. Cable preparation tools
	i Use
	ii Maintenance
	4. Describe the following equipment interfaces and explain any unique characteristics:
	a. Torque specifications
	i Consumer equipment (CE)
	ii Exterior wiring
	b. Waterproofing
	i Silicone grease
	ii Aqua seals/rubber gaskets
	iii Thread protectors
	(a) Length variations
	5. Describe the following terminal blocks/punch downs
	a. 66, 110 punch down blocks
	b. Mini 66
	c. IDC Rocker Box
	d. NID Binding post
	6. Drop fiber
	a. Identify types
	b. Components
	c. Fiber splices/connectors
	i Fusion
	ii Mechanical
	iii Connector types
	d. Fiber preparation
	e. Fiber handling
	i Safety
C Recognize the use and function of passive devices within the customer's premises.	1. Differentiate drop system splitters/couplers and define the following:
	a. Specifications and definition
	i Splitter/coupler loss (insertion loss)
	(a) Explain how the design and installation of splitters and couplers can lead to efficient configurations for best signal strength
	b. Describe when splitters and couplers are used in the drop system
	i Explain isolation as it relates to splitters and couplers
	ii Explain voltage blocking as it relates to splitters and couplers (with respect to powering house amplifiers)



	<ul style="list-style-type: none"> c. Describe the installation and placement of splitters and couplers in the drop system
	2. Explain impedance matching and why it is necessary (50 ohm cable issues)
	3. Describe A/B switches and when they are used
	4. Define the following (channel) filters and their characteristics:
	<ul style="list-style-type: none"> a. Low pass b. High pass <ul style="list-style-type: none"> i Band rejection ii Ingress mitigation c. Band pass filter d. Band rejection filter e. Windowed filter f. Diplex filter g. Point of Entry (POE) for MoCA filter
D Recognize the use and function of active devices used within the customer's premises.	<ul style="list-style-type: none"> 1. Define in-house amplifiers and the following characteristics: <ul style="list-style-type: none"> a. Gain of device b. Applications <ul style="list-style-type: none"> i Forward without reverse ii Forward with passive reverse iii Forward with active reverse c. Specifications d. Placement e. Describe situations when an in-house amplifier is necessary 2. Define RF modulators and the following application: <ul style="list-style-type: none"> a. In-home signal distribution
E Recognize the use and function of security devices used within the customer's premises.	<ul style="list-style-type: none"> 1. Define need for traps and how they work 2. Define the need for security sleeves (security shields) and the following as related to security sleeves: <ul style="list-style-type: none"> a. Use b. Location c. Shield tool 3. Define locking terminators and the following: <ul style="list-style-type: none"> a. Locking terminator tool b. Use 4. Define lock box/house box <ul style="list-style-type: none"> a. Describe installations procedures
F Recognize the use and function of hand and power tools.	<ul style="list-style-type: none"> 1. Demonstrate the correct and safe methods of using the following hand tools: <ul style="list-style-type: none"> a. Nut drivers b. Adjustable wrenches c. Screwdrivers d. Wire cutters e. Scratch awl



	f. Knife
	g. Pliers
	i Coaxial cable
	ii Telephony
	h. Hammer
	i. Torque wrench
	j. Cable preparation tool
	k. Channel locks
	l. Hammer
	m. IDC pliers
	n. Telephone tools
	i Modular connector crimper preparation tool
	2. Demonstrate the correct and safe methods of using the following powered tools:
	a. Cordless screwdriver
	b. Cordless drills
	c. Electric drill
	3. Demonstrate the correct and safe methods of using the following cable placement tools:
	a. Hand line
	b. Lay-up sticks
	c. Wall fishing devices
	i Fish tape
	ii Glow rod
G Recognize how building construction affects routing choices for interior and exterior wiring.	1. Distinguish between typical house framing types
	2. Describe commonly-encountered wall stud floor joist locations and dimensions, and explain their relevance to drop cable installation
	3. Describe the following construction situations, and explain their relevance to drop cable installation:
	a. Slab
	b. Pier and beam
	c. Crawlspace
	d. Ceiling types
	e. Plenum
	f. Mobile homes
	g. Attic
H Recognize the basic methods and procedures of planning and installing aerial drop cable at the customer's premises.	1. Explain each of the following considerations regarding aerial drop cable routing techniques during aerial drop installation:
	a. Site survey and layout of the exterior customer premises
	b. Obstacles to avoid when routing the aerial drop cable
	c. Clearances to maintain when routing the following drops:



	<ul style="list-style-type: none"> i Non-powered drops ii Powered drop (minimal content) <ul style="list-style-type: none"> (a) Riser Conduit <ul style="list-style-type: none"> (i) 8 feet and below (ii) Underground <ul style="list-style-type: none"> 1. Up to 8 feet d. Maximum allowable drop sag 2. Demonstrate proper pole attachments. <ul style="list-style-type: none"> a. Explain each of the following attachment methods or considerations when working with strand at the pole: <ul style="list-style-type: none"> i Span clamps <ul style="list-style-type: none"> (a) Cable guard/tree guard ii Climbing space iii Cable routing iv Drop hanger clamps v Wrapping methods vi Drip loops vii Use of support ties 3. Explain each of the following pole or strand attachments when routing the drop cable from the pole: <ul style="list-style-type: none"> a. J-hook <ul style="list-style-type: none"> i New attachments <ul style="list-style-type: none"> (a) Jump poles (notification of attachment) b. Mid-spans 4. Define aerial trespass and explain how and why it should be avoided.
I Recognize the basic methods and procedures of planning and installing underground drop cable at the customer's premises.	<ul style="list-style-type: none"> 1. Describe underground cable layout, and how to locate, identify, open, and inspect a pedestal 2. Explain the purpose of using a utility location service. 3. Explain the following placement methods used to bury the underground drop cable: <ul style="list-style-type: none"> a. Hand digging b. Plowing c. Trenching <ul style="list-style-type: none"> i Utilizing joint trenches ii Hand trenching d. Bores e. Conduits 4. Explain each of the following considerations regarding underground drop cable routing techniques: <ul style="list-style-type: none"> a. Site survey of the exterior customer premises b. Cable locates before the underground drop cable is buried



	<ul style="list-style-type: none"> c. Obstacles to avoid when routing the underground drop cable: <ul style="list-style-type: none"> i Ornamental lighting ii Sprinkler system iii Invisible dog fence
J Recognize the basic methods and procedures of attaching the drop cable at the tap.	<ul style="list-style-type: none"> 1. Define tap and each of the following as applicable to the tap; explain purpose and installation method for each of the following: <ul style="list-style-type: none"> a. Weatherproofing b. Terminators c. Traps and filters d. Step attenuators e. Drop tagging <ul style="list-style-type: none"> i Purpose ii By service level iii By service status 2. Describe how to inspect the tap and its associated equipment <ul style="list-style-type: none"> a. Measure signal levels
K Recognize the methods and procedures of installing exterior wire and cable at the customer's premises.	<ul style="list-style-type: none"> 1. Demonstrate the ability to perform a coaxial cable house attachment in a typical cable television system. <ul style="list-style-type: none"> a. Demonstrate proper house attachment procedures <ul style="list-style-type: none"> i P-Hook ii Underground routing b. Distinguish between the following types of surfaces and explain how the installation would be accomplished for each surface: <ul style="list-style-type: none"> i Wood ii Siding iii Aluminum iv Steel v Vinyl vi Slate vii Asbestos viii Brick ix Stucco c. Explain drop cable routing at the house d. Explain how to route cable around gutters e. Knowledge of the codes governing attachments to electrical masts
L Demonstrate coaxial cable bonding practices at the customer's premises.	<ul style="list-style-type: none"> 1. Explain the purpose and function of the grounding electrode system. 2. Identify the proper locations for bonding the residential cable television drop cable 3. Describe the following: <ul style="list-style-type: none"> a. Bonding blocks



	<ul style="list-style-type: none"> b. Ground (bonding) wire <ul style="list-style-type: none"> i Drop attachment ii Ground electrode attachment 4. Demonstrate the proper bonding techniques in the following circumstances: <ul style="list-style-type: none"> a. Single family homes b. Mobile homes c. Multiple dwelling units (MDUs)
M Recognize the methods and procedures of installing interior wire and cable within the customer's premises.	<ul style="list-style-type: none"> 1. Explain how to perform the following multiple dwelling unit (MDU) installations: <ul style="list-style-type: none"> a. Prewire b. Postwire c. Wiring topologies <ul style="list-style-type: none"> i Home run ii Loop-through 2. Explain the following cable placement practices for residential installations: <ul style="list-style-type: none"> a. Cable entry <ul style="list-style-type: none"> i Drilling through barriers/substances, including: <ul style="list-style-type: none"> (a) Walls (interior and exterior) (b) Floors (c) Carpet (d) Basements, crawl spaces, attics, utility rooms b. Materials <ul style="list-style-type: none"> i Feed-thru bushings <ul style="list-style-type: none"> (a) Purpose ii Wall plates iii Sealants/weatherproofing c. Use of existing entry points d. Wiring Topologies <ul style="list-style-type: none"> i Home run ii Loop through e. Explain each of the following interior drop cable routing options: <ul style="list-style-type: none"> i Through flooring ii Stud cavities iii Attic iv Crawl space v Through basement vi Wall fish vii Prewire viii Postwire
N Understand the methods and procedures for installing broadband services to the customer's premises.	<ul style="list-style-type: none"> 1. Describe the methods and procedures for installing video service at the customer premises <ul style="list-style-type: none"> a. Provision digital box



	b. Verify two-way operation
	c. Use diagnostic screens
	2. Describe the methods and procedures for installing cables and wire used to provide voice service to the customer's home.
	a. Provision eMTA
	b. Measure signal levels
	c. Verify eMTA health
	d. Connect to customer's telephone Equipment
	i List phone materials
	e. Use diagnostic tools
	f. Port Telephone Number
	3. Describe the methods and procedures for installing cables and wire used to provide high-speed data service to the customer's home.
	a. Provision modem
	b. Measure signal levels
	c. Verify Modem Health
	d. Connect to customer's PC
	e. Use diagnostic tools
	f. Set-up Email
	g. Set-up Internet
	h. Wireless (as applicable)
	i. Networking
	4. Miscellaneous installation tasks
	a. Define "single play," "double play," "triple play"
	b. Pole-only work
	c. Describe the procedures for performing a reconnect
	i Inspect / proof the drop
	d. Describe the procedures for performing a change of service
	i Upgrade
	ii Downgrade
	e. Describe the procedures for performing a disconnect
O Understand the basic principles of customer care and recognize methods for satisfying the customer when installing the video, voice and data services.	1. Explain professionalism with respect to the field technician's position; describe each of the following:
	a. Professionalism on the job
	i Conduct
	ii Identification
	(a) Individual
	(b) Vehicle
	iii Job performance



	(a) Job preparation
	(b) NCTA standards (minimum standards)
	(i) On-time Guarantee
	(c) Work verification
	(i) Verify correct services installed
	(ii) Verify proper operation of installed services
	(iii) Record signal level readings; identify and repair any problems
	1. Identify and repair any problems
	2. Automated close-out testing
	(d) Work sign-off
	(i) List the steps for proper job completion
	(ii) Explain the importance of task codes
	(e) Customer education
	(i) Parental control
	(ii) Awareness of current product promotions
	(iii) Product knowledge
	(iv) Meeting previously unmet service needs
	iv Customer property
	(a) Clean up
	(b) Damage reporting
	(c) Repair order escalation
	(d) Entering the premises
	(i) Unusual circumstances
	1. Observable illegal activities
	(ii) Unsafe circumstances
	1. Animal control
	b. Professionalism reflected when driving the company vehicle
	i Parking
	ii Driving
	iii Vehicle appearance
	c. Professionalism reflected in personal appearance
	i Grooming
	ii Attitude
	iii Interpersonal skills
	iv Clothing
	d. Professionalism reflected when off the job
	i Stores and restaurants in company uniform
	(a) Public behavior



	e. Stress management for cable personnel
	i Handling an unhappy customer
	ii Handling the workload
	iii Time management skills
	2. 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
	(a) Problem identification
	(b) Taking responsibility
	(c) Solving the problems
	(d) Following up with customer
	ii Internal vs. external customers
	(a) Interaction with "front office"
	(b) Interaction with other technicians
	(c) Responsibility and accountability
	(d) Interaction with the general public and non-customers
	b. Explain the following effective communications skills and explain how these skills contribute to good customer relations:
	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
	c. Explain proper use of company-provided and/or personal communications devices
	d. Describe conflict resolution
	e. Describe problem resolution
	i Customer compensations



IV. Troubleshooting and Maintenance

Competency	Knowledge, Skills, and Abilities
<p>A Recognize the function, use, care, and maintenance of test equipment.</p>	1. Signal Level Meter (SLM)
	a. Display readouts of an analog channel features
	b. Identify the following digital display features:
	i QAM analyzer
	(a) Modulation Error Rate (MER)
	(b) Bit Error Ratio (BER)
	(c) Code Word Error Rate (CWER)
	(d) DOCSIS statistics
	c. Return test
	i Signal generator (for example, DSAM, RSVP)
	ii Modem service certificate
	(a) Web-based application / modem emulator
	d. Video and audio carrier measurements
	e. Maintenance and care
	i Charging
	ii Calibration-accuracy verification
	iii Channel plans
	f. RF operating parameters
	2. Test TV
	a. Tracking picture and/or sound impairments
	b. Diagnosing bad customer TV
	3. 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
	4. 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 Equipment
	v Detection
	(a) Measuring 20 μ V/m
	vi Repair
	vii Technician's role; escalation procedures
	c. System monitoring
	i Cumulative Leakage Index (CLI)
	(a) Definition/requirement
	5. Cable Locator
	a. Locating underground cables
	b. Identifying utility colors and flags
	6. Time Domain Reflectometer (TDR)
	a. Definition
	b. Application and use
	7. Line toner [tone and probe kit]
	a. Definition
	b. Application and Use
	8. Polarity tester
	a. Definition
	b. Application and use
	9. Return Path tester (example, RSVP)
	a. Definition
	b. Application and use
	10. Butt set (voice applications)
	a. Definition
	b. Application and use
	11. VOM (voice applications)
	a. Definition
	b. Application and use
	12. Wire ID (voice applications)
	a. Definition
	b. Application and use
	13. Wire mapper (voice applications)
	a. Definition
	b. Application and use
	14. Brown meter (loop tester) (voice applications)
	a. Definition
	b. Application and use
	15. Banjo (voice applications)
	a. Definition
	b. Application and use
	16. Cable modem emulator
	a. Definition



	<ul style="list-style-type: none"> b. Application and use c. Definition d. Provide examples for: <ul style="list-style-type: none"> i Downstream ii Upstream
	17. MOS–Mean Opinion Score
	a. Definition (what constitutes this score)
	18. UTP (Ethernet) LAN Tester
	a. Definition
	b. Application and use
	19. Perceptual Evaluation of Speech Quality (PESQ)
	a. Speech quality assessment
B Recognize and understand the divide and conquer (isolation) method of troubleshooting.	<ul style="list-style-type: none"> 1. Explain the steps in the troubleshooting process: <ul style="list-style-type: none"> a. Symptom analysis <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> a. Identify signal issues b. Interpret premises signal level readings (too high; too low) c. List the procedures for troubleshooting the set-top box and interactive program guide (IPG) 3. Ability to troubleshoot forward and return path
C Recognize common analog and digital signal impairments.	<ul style="list-style-type: none"> 1. Identify the name and/or cause following analog signal impairments (from a photograph, graphic, or description) such as: <ul style="list-style-type: none"> a. Snow (no picture) b. Blue TV screen c. Snowy picture d. Snowy picture on channels 2 through 6 only; lines in picture e. Ghosting f. Two pictures (co-channel) g. Flash or blip in picture h. Herringbone pattern i. Horizontal bars (hum bars) j. Diagonal lines (Intermodulation beats) k. CB radio interference l. Randomly flashing lines or flashing picture <ul style="list-style-type: none"> i Electrical interference from appliance in the house ii FM noise m. "Sparklies"



	<ul style="list-style-type: none"> i Terrestrial interference-outage in spring/fall (satellite/sun outages) n. Scrambled picture
	2. Identify the name and/or cause following digital signal impairments (from a photograph, graphic, or description) such as:
	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"> i BER ii Latency iii Jitter iv Packet Loss
D Understand the basics of the provisioning process	<ul style="list-style-type: none"> 1. Define Provisioning 2. List the configuration files 3. List the provisioning steps
E Troubleshoot HSD	1. Ability to troubleshoot HSD service
F Troubleshoot VoIP	1. Ability to troubleshoot VoIP service



V. Standards

Competency	Knowledge, Skills, and Abilities
A Recognize the regulatory agencies and/or standards that govern practices for providing video, voice and data services to the customer's premises.	1. Identify the regulatory agencies that govern our workplace:
	a. Federal Communications Commission (FCC)
	b. National Electrical Code (NEC)
	c. National Electrical Safety Code (NESC)
	d. Occupational Safety & Health Administration (OSHA)
	e. Emergency Alert System (EAS)
	2. Be aware of the term the National Television System Committee (NTSC) standard
	3. Be aware of the local franchising authorities



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. Knowledge of Occupational Safety and Health Act of 1970
	2. Describe the eye protection used during installation and service work; explain the minimum industry-adopted rating
	a. ANSI rating
	3. Describe hearing protection used during installation and service work; explain the minimum industry-adopted rating:
	a. ANSI rating
	4. Describe footwear worn during installation and service work; explain the minimum industry-adopted rating:
	a. ANSI rating
	5. Describe clothing worn (and not worn) during installation and service work.
	6. Describe work gloves worn during installation and service work.
	7. Describe hardhats used during installation and service work; explain the minimum industry-adopted rating:
	a. ANSI rating
	8. Describe voltage testers used during installation and service work; explain use and maintenance.
	a. Foreign voltage detector
	9. 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
10. Identify the climbing equipment used during installation and service work; explain each of the following components:	
a. Fall arrest systems	
b. Body belt	
i D-rings	
ii Tool hooks	
c. Gloves	
i Gauntlet	



	<ul style="list-style-type: none"> ii High voltage gloves (rubber gloves, liners, outer protectors)
	d. Safety Strap
	<ul style="list-style-type: none"> i Snap hooks ii Nylon strap
	11. Be aware of proper climbing techniques
	12. Ladders
	a. Define the following types of ladders and when each is used:
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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. Be aware of proper ladder handling techniques; describe the following:
	<ul style="list-style-type: none"> i Removing and replacing ladders on the vehicle racks ii Carrying methods iii Ascend and descend iv Risks
	13. Poles
	a. Demonstrate pole inspections accomplished to ensure the pole and environment are safe
	b. Demonstrate voltage testing
	c. Define climbing space
	d. Describe electrical hazards that could be encountered when working at the pole
B Recognize the industry standard safe work practices with respect to vehicle use.	1. Describe safe operation and maintenance of the company vehicle
	<ul style="list-style-type: none"> 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:
	<ul style="list-style-type: none"> a. Signs b. Cones <ul style="list-style-type: none"> i Placement ii Tapering
	3. Aerial Lift Trucks (awareness)
	<ul style="list-style-type: none"> a. Describe when an aerial lift vehicle (bucket truck) is used



	<ul style="list-style-type: none"> b. Describe safe practices associated with aerial lift operation, including: <ul style="list-style-type: none"> i Use of wheel chocks ii Proximity awareness
C Recognize the industry standard safe work practices with respect to work zone safety.	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> a. Cone placement (channelization devices) b. Sign placement (warning devices) 3. Describe traffic flow techniques
D Recognize the industry standard safe work practices with respect to the work environment.	<ul style="list-style-type: none"> 1. Describe the following hazardous materials–HAZCOM that may be encountered on the job: <ul style="list-style-type: none"> a. Identify the potential for asbestos at the job site and what to do if encountered b. Identify the potential for solvents at the job site and what to do if encountered c. Identify the potential for fiberglass Insulation at the job site and what to do if encountered d. Identify the potential for lead paint at the job site and what to do if encountered 2. Describe the following extreme weather conditions and the safety precautions associated with each: <ul style="list-style-type: none"> a. Heat b. Cold c. Storms 3. Demonstrate proper ergonomics while on the job as related to lifting and repetitive motion activities 4. Identify potential animal encounters while on the job and describe the safety precautions to employ <ul style="list-style-type: none"> a. Wild animal b. Domestic animal 5. Demonstrate proper battery handling <ul style="list-style-type: none"> a. Stand-by power supplies b. Customer back-up c. eMTA 6. Describe the basics of electricity and precautions to take while working around energized conductors <ul style="list-style-type: none"> a. Electrical Safety b. AC power cord