Broadband Voice over Internet Protocol
B - VoIP TECHNICIAN, Competencies:

1.0 HISTORY – TELEPHONE COMMUNICATIONS
   1.1 Generate a chronology of the major steps leading to modern telephone communications
   1.2 List major events in telephone history and their corresponding dates
   1.3 Diagram a PSTN system
   1.4 Name and describe major sections of a simple phone system
   1.5 Outline the power requirements for PSTN systems
   1.6 Name the hardware components required for a PSTN and a B-VoIP System

2.0 BASIC PSTN (PUBLIC SWITCHED TELEPHONE NETWORKS)
   2.1 Describe the power requirements for PSTN and compare full power with downtime levels
   2.2 Identify hardware components used in the Central Office, distribution plant and end user location
   2.3 List PSTN services currently offered by commercial telephone providers

3.0 INTERNET AND WORLD WIDE WEB
   3.1 Outline major events in the history of the Internet and World Wide Web
   3.2 Describe how the Internet and WWW operate
   3.3 Define IPv4 and explain its application
   3.4 Compare URL/IRL and describe their usage
   3.5 Explain HTTP (Hypertext Transfer Protocol) and show where it is used

4.0 DIGITAL FUNDAMENTALS – SWITCHING TECHNIQUES
   4.1 Explain the purpose and location of the SSP (Service Switching Point)
   4.2 Describe Common Channel Signaling System 7
   4.3 Explain the purpose and location of the STP (Signal Transfer Point)
   4.4 Explain the purpose and location of the SCP (Service Control Point)
   4.5 Explain the reasons for Sampling, Quantizing, and Encrypting B-VoIP signals
   4.6 Define and compare Baud/Bit/Byte
   4.7 Compare a Datagram with common PSTN signals
   4.8 Contrast a Virtual Circuit with a discrete wired circuit
   4.9 Contrast the difference between Segmentation and Reassembly (SAR) of telephone signals

5.0 CODECS (CODER/DECODER)
   Summarize the purposes of each of the following standards and explain the need for each:
   5.1 Audio Standards
   5.2 Video Standards
   5.3 G.711a, u
   5.4 G.729
   5.5 G.726
   5.6 CLEP
   5.7 H.261
   5.8 H.263
   5.9 H.264
   5.10 Describe a codec hybrid
   5.11 CELP (Code Excited Linear Prediction)
   5.12 Describe how digital and analog converters accomplish their tasks and how analog to digital converters work

6.0 LANS – LOCAL AREA NETWORKS
   Define the following and locate where in a phone circuit or network they are used:
6.1 Bridges
6.2 Gateways
6.3 Routers
6.4 Hubs
6.5 Servers
6.6 Summarize how Ethernet10/100Base-T are used in networks and compare with other types of cabling
6.7 Describe what the TIA/EIA-568.B Commercial Building Standard codes are and their importance to telecom technicians

7.0 WANS – WIDE AREA NETWORKS
7.1 Define connection and connectionless network configurations
7.2 Define a connection oriented network
7.3 Compare topologies currently in use in computer networks
7.4 Define telecom switches and demonstrate knowledge of PSTN and digital network switches
7.5 Explain the need for network management
7.6 Name common Classes of Service and show advantages of each

8.0 NETWORK INTERWORKING
8.1 Define 'IP' and explain its need
8.2 Define 'Ethernet' and explain how it differs from other interconnection systems
8.3 Define 'ATM' (Asynchronous Transfer Mode) and describe how it is used
8.4 Explain the purpose of Frame Relay and describe its purpose and benefits
8.5 Explain the purpose of MPLS (Multiprotocol Label Switching) and show where it is used
8.6 Explain Service Interworking
8.7 List the seven (7) OSI layers and define their specific functions and features

9.0 BROADBAND A/V/D SCHEMES
9.1 Summarize the purposes of broadband communication and explain advantages over narrowband communication
9.2 Dramatize the current needs for wide bandwidth and give examples of modern usage
9.3 Define 'bandwidth' and compare for audio/video/data transmission applications and the advantages of various bandwidth sizes

10.0 MODULATION
10.1 Distinguish between the major modulation schemes currently in use
10.2 Match common acronyms associated with B-VoIP technology and their definitions
10.3 Describe PCM (Pulse Code Modulation)
10.4 Describe DPCM (Digital Pulse Code Modulation)
10.5 Describe DWDM (Dense Wavelength Division Multiplexing)

11.0 TRANSMISSION MEDIA
11.1 Classify copper telecommunication cables, comparing bandwidths and common usage
11.2 Explain the advantages of coaxial cables, compare types and describe termination fittings
11.3 Illustrate a D connector and explain where it is commonly used in telecommunication systems
11.4 Describe fiber optic cabling and list advantages over copper cables
11.5 Explain why and where wireless telephone communication is preferred

12.0 VoIP SERVICES
12.1 Compare common PSTN audio phone conversation technology with VoIP service and list advantages
12.2 Compare common PSTN video signaling with VoIP and list advantages of VoIP
12.3 Compare common PSTN data signaling with VoIP and list advantages of VoIP
13.0 QoS - REAL TIME APPLICATIONS  
13.1 Discuss human opinion when judging Quality of Service and compare with other objective measurement methods  
13.2 Define 'latency' as it applies to telephone signals  
13.3 Define 'jitter' as it applies to telephone signals

14.0 VoIP NETWORK ARCHITECTURES  
14.1 Illustrate a LAN (Local Area Network) and describe how it differs from a WAN (Wide Area Network)  
14.2 List common broadband signal transmissions and compare with narrowband and PSTN (i.e., PSTN @ 3 kHz, TV station @ 6 kHz, multiplexed data packets @ 100 MHz)  
14.3 Name common types of broadband services currently in use  
14.4 Describe the Internet system and explain how it functions within the wired and wireless worldwide telephone online system  
14.5 Define 'domains' as related to telephone networks  
14.6 Define 'client' in the VoIP system

15.0 PROTOCOLS  
15.1 Describe the applications of the Transmission Control Protocol (TCP) within the protocol suite and why it is needed  
15.2 Define User Datagram Protocol (UDP), explain its purpose and advantages as a datagram delivery process  
15.3 Define IP (Internet Protocol), its origin and purpose

16.0 CONTROL PROTOCOLS – IP TRANSPORT  
16.1 Describe H.245, its origination, purpose and where commonly used  
16.2 Describe 'Megaco', its purpose, length of existence and where commonly used  
16.3 Define 'MGCP' (Media Gateway Control Protocol) and explain its common usage  
16.4 Explain the purpose of RTP (Real-time Transport Protocol)  
16.5 Explain the purpose of RSVP (Resource Reservation Protocol)

17.0 ADDRESS PROTOCOLS  
17.1 Define NAT (Network Address Translation)  
17.2 Identify the four (4) host classes of an IP address  
17.3 Describe network & host addresses (I.D.s) and their bit range relation to the host classes  
17.4 DHCP (Dynamic Host Configuration Protocol)

18.0 VoIP SIGNALING PROTOCOLS  
Differentiate between the following signaling protocols and explain the purpose of each in VoIP application:  
18.1 SIP (Session Initiation Protocol)  
18.2 SAP (Service Advertising Protocol)  
18.3 H.323  
18.4 SDP (Session Description Protocol)  
18.5 H.931

19.0 CABLING STANDARDS  
Explain the purposes and requirements of the following cabling and communications standards in relation to VoIP applications:  
19.1 TIA/EIA-568  
19.2 TIA/EIA-569  
19.3 TIA/EIA 570A (Residential Telecom Cabling Standard)  
19.4 IEEE 802
20.0 NETWORK PROVISIONING
   20.1 Describe the mechanics of PSTN Gateways
   20.2 Explain the purpose of Media Gateways and how they packetize information
   20.3 Describe a Proxy Server and explain its purpose

21.0 USER AGENT PROVISIONING
   21.1 Describe the difference between IP and PSTN phones
   21.2 Explain the purposes of the analog telephone adapter
   21.3 Define UAC (User Agent Client) and how it is used
   21.4 Describe the ITU’s T-120 standard for multiple user participation

22.0 SOFTPHONE PROVISIONING
   22.1 Describe the process a computer uses to interface with phone lines

23.0 SAFETY
   Describe the following Safety related standards:
   23.1 ANSI/TIA/EIA 607
   23.2 CSA T527
   23.3 NFPA 70
   23.4 ISO/IEC 1180

24.0 TROUBLESHOOTING
   Explain the following troubleshooting processes:
   24.1 Trouble Analysis
   24.2 Minimum cable tests for networking protocols:
      24.2.1 Wire mapping
      24.2.2 Length
      24.2.3 Attenuation
      24.2.4 NEXT
      24.2.5 Propagation delay
      24.2.6 Delay skew
      24.2.7 PS-NEXT
      24.2.8 ELFNEXT
      24.2.9 PS-ELFNEXT
      24.2.10 Return loss
   24.3 Testing Nics:
      24.3.1 Data packets and link pulses
   24.4 Network utilities:
      24.4.1 Ipcinflg
      24.4.2 Ping
   24.5 Systematically using network utilities to test your network

End of B - VoIP Technician Competencies Listings
(with 24 major Categories)

Find An ETA Approved School Site:  http://www.eta-i.org/eta_schools.html
Find An ETA Test Site:  http://www.eta-i.org/testing.html
Suggested Study Materials:

- **BVoIP Convergence**: ISBN 1-58122-089-8; Max Main; eITPREP-2007; Available through ETA at 800-288-3824 or eta@eta-i.org

**Legacy Common Telecom Acronyms**

1. PBX (Private Branch Exchange)
2. PSTN (Public Switched Telephone Network)
3. PCS (Personal Communication Service)
4. TDMA/CDMA (Time/Code Division Multiple Access)
5. AMPS (Advanced Mobile Phone Service)
6. TIA/EIA (Telecom/Electronic Industry Assoc.)
7. ISDN (Integrated Service Digital Network)
8. 2G/3G/4G (2nd/3rd/4th Generation)
9. MTA/BTA (Mobile/Business Transaction Authority)
10. ANSI (American National Standards Institute)
11. NEC (National Electric Code)
12. UTP (Universal Transmission Protocol)
13. ATM (Asynchronous Transfer Mode)
15. TI/EI (Text/Electronic information)
16. DSL (Digital Subscriber Line)

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