



## Certified Network Systems Technician (CNST) Competencies-2007

*Certified Network Systems Technician is a network professional who is expected to obtain knowledge of computer network basic concepts, which are applicable to all the various specialty areas of the computer industry. Once the CNST has acquired these skills and knowledge, the technician will be able to enter employment in any part of the computer networking industry. With minimal training in areas unique to the specific products, the CNST should become a productive member of computer industry workforce. Candidates who are interested in taking the CNST exam are not required to pass the Associate, or basic electronics, exam. However, potential CNST's **must** have already acquired one of the following:*

- 1) *The CST (Computer Service Technician)*
- 2) *The CNCT (Certified Network Computer Technician)*
- 3) *The A+ as a prerequisite to sitting for the CNST examination.*

### Course Objectives/Competencies:

#### 1.0 Computer Network Terminology

- 1.1 Define and work with the terminology, standards and specifications associated with computer local area networks (LANs) and wide area networks (WANs).
- 1.2 Describe the characteristics, advantages, disadvantages, relative cost and installation procedures for cables and connectors
- 1.3 Explain the theory and use of network access protocols.
- 1.4 Define the purpose and use of communications protocols.
- 1.5 Explain the basis for how computers gain access to and share the network communications media.
- 1.6 Explain the characteristics and features of peer-to-peer and client/server networks.
- 1.7 Describe the definitions and structures of the terms packets, frames, messages and datagrams.
- 1.8 Explain the structure of the OSI reference model used in network architectures.
- 1.8 Interpret acronyms and names for network standards organizations.
- 1.9 Describe the differences, advantages and disadvantages of synchronous and asynchronous communications protocols.
- 1.10 Define the basis for simplex, half duplex and full duplex transmission systems.
- 1.11 Explain the various Fiber Optics terminologies.
- 1.12 Define the term "access method" used by LANs.
- 1.13 Describe the fundamental terms and nomenclature for EtherNet and Token-Ring networks.
- 1.14 Define the terms multiplexing, demultiplexing, bandwidth and backbone links.
- 1.15 Distinguish the differences between baud rate, bit rate and bit error rate terms when applied to communication links.
- 1.16 Describe the difference between circuit switching and packet switching.

#### 2.0 Network Administration

- 2.1 Set up user and group accounts using Windows 2000/2003/2003sbs server based platform utilities.
- 2.2 Describe security level access terms

- 2.3 Set up access levels for groups and user accounts using Windows 2000/2003/2003sbs server based platforms.
- 2.4 Distinguish between "access protected shares" and "access permissions" in Windows 2000/2003/2003sbs server based platforms.
- 2.5 Utilize network administration tools contained in Windows 2000/2003/2003sbs server based platforms.
- 2.6 Describe the purpose and use of diskless workstations.
- 2.7 Describe, use and understand the information provided by network performance monitoring tools used with Windows 2000/2003/2003sbs server based platforms and Windows operating systems (2000/XP)

### 3.0 Wide Area Networks and Devices Used to Extend Networks

- 3.1 Explain how repeaters function and when and where they should be used in networks.
- 3.2 Describe what a bridge does and when and where it should be deployed.
- 3.3 Define the basic theory of operation and deployment purposes of gateways and routers.
- 3.4 Explain the purpose, advantages and disadvantages of dial up and dedicated circuits.
- 3.5 Explain the function of a switch.
- 3.6 Explain the services and advantages offered by ISDN and FDDI type networks.
- 3.7 Explain the difference between half-duplex and full-duplex transmission.
- 3.8 Describe the protocols and languages used on the Internet and WWW.
- 3.9 Describe modulation, error correction and compression standards associated with modems.

### 4.0 Network Architectures

- 4.1 Recognize LAN topologies and explain advantages, limitations and characteristics of each.
- 4.2 Explain the types of media and the IEEE standards for all variations of EtherNet LANS.
- 4.3 Define the theory and classifications of signaling for EtherNet.
- 4.4 Describe how MSAUs are used with token-ring networks.
- 4.5 Explain how Manchester signaling maintains timing synchronization in EtherNet and other LAN types.
- 4.6 Explain the use and function of the ODI and NDIS specification for network drivers.
- 4.7 Describe the difference between connection and connectionless transmission paths and protocols.
- 4.8 Explain the theory of operation for the ISDN.
- 4.9 Define the distinction between analog and digital communications techniques.
- 4.10 Explain the basics of broadband and baseband transmission standards.
- 4.11 Define the differences and uses of bipolar and unipolar signaling in digital communications.
- 4.12 Describe the use and functions of CSUs and DSUs.

## 5.0 Computer Network Topologies and Classifications

- 5.1 Describe software support systems, the purpose, design relative advantages and disadvantages, and proper deployment of client/server and peer-to-peer LANS.
- 5.2 Identify and establish criteria for using wireless communications devices in networks.
- 5.3 Explain the benefits of using combination networks.

## 6.0 Network Services

- 6.1 Explain how to setup file and print sharing utilities on a network using Windows server based platforms.
- 6.2 Describe the file systems used by network operating systems.
- 6.3 Explain how file integrity is maintained when multiple users are accessing the same files.
- 6.4 Describe network services available with Netware, Windows 2000/2003/2003sbs based platforms and Unix.

## 7.0 Network Operations

- 7.1 Describe the structure, formats, fields and standards for packets and frames.
- 7.2 Describe the use and purpose of LAN protocols.
- 7.3 Explain how and why protocol suites are structured.
- 7.4 Explain binding order and binding process used in protocol suites.
- 7.5 Explain what protocols reside at each level of the OSI reference model.
- 7.6 Explain where and why routable and nonroutable protocols are used.
- 7.7 Define protocols associated with the WWW and Internet.

## 8.0 Network Standards

- 8.1 Explain the seven OSI layers and what functions are performed at each layer as well as the importance of the OSI reference model in modem network design.
- 8.2 Explain the rationale for the OSI sublayers.
- 8.3 Describe the features of Wireless local area network standards 802.11x.
- 8.4 Explain the basic features of the 802.15 standard Bluetooth.
- 8.5 Understand the features of basic optical standards.
- 8.6 Describe cable termination standards.
- 8.7 Explain the T1, T2, T3 and T4 hierarchy.
- 8.9 Explain the content and identity of IEEE EtherNet standards.

## 9.0 Troubleshooting LAN/WAN Test Equipment

- 9.1 Describe the main tools available within network operating systems that can be used to measure network performance.
- 9.2 Describe the common causes and symptoms of network bottlenecks.
- 9.3 Explain the purpose and use of TDRs, oscilloscopes, network analyzers and software-based network monitors.
- 9.4 Explain the criteria for selection of an UPS.

## 10.0 Network Server and Workstation Computer System Hardware

- 10.1 Identify the primary components and minimum performance standards for servers and workstations used in a networking environment.
- 10.2 Identify critical performance criteria for hard disks, buses, CPUs and memory.
- 10.3 Define the advanced SCSI standards used in high-end server systems.
- 10.4 Explain the limitations of the ATA/IDE/SATA hard disk drive standards.
- 10.5 Recognize the proper parameters for network interface adapter cards.

## 11.0 Network Operating Systems

- 11.1 Explain basic network performance and monitoring tools contained within NetWare, Windows 2000/2003/2003sbs based platforms and UNIX.
- 11.2 Identify protocol stacks native to each network operating system.
- 11.3 Describe the essential file structures used in booting.
- 11.4 Explain the criteria and procedure for setting up separate hard disk partitions for different operating systems.
- 11.5 Define the basic administration and security control features of network operating systems.

## 12.0 Disaster and Security Planning for Networks

- 12.1 Identify key points required for a typical network enterprise disaster plan.
- 12.2 Identify tools and procedures to safeguard networks against virus attacks.
- 12.3 Identify backup tools including the software and hardware used in safeguarding critical resources.
- 12.4 Describe the functionality of the various levels of RAID and circumstances appropriate for each level.

The CNST course is designed to provide computer service technicians with an advanced working knowledge of computer networks. The course includes 152 classroom hours of instructor-led classroom theory and laboratory instruction. Students are taught the concepts of computer network operation, maintenance, installation, troubleshooting, upgrade and disaster recovery procedures and disaster prevention planning. The course covers 12 major topics. The course prepares the students for the Electronics Technicians Association, Int'l certification exam for Certified Network Systems Technician.

Students will be able to meet the requirements for termination of the various types of network connections coupled with in-depth knowledge of cable specifications required for in EIA/TIA standards and IEEE specifications for Ethernet and Token ring Networks. The course covers the latest updates to the IEEE wireless network standard 802.11 as well as advanced transmission standards for FDDI, microwave systems and satellite communications networks. Students will observe and work with the various network topologies. The foundation for understanding the modular concept of network components is introduced with the study and analysis of the Open Systems Interconnection (OSI) Reference Model. International standards for network management and development are covered as well as exercises in planning and costing typical network upgrades and installations.

## The text book study references are as follows:

**A Guide to Designing and Implementing Local and Wide Area Networks-** Michael Palmer and Robt. Sinclair-  
Course Technology; SBN 0-7600-1093-5  
**Mastering LANs;** Christa Anderson, Mark Minasi; Sybex; ISBN 0-7821-2258-2  
**Systems and Networks** by Ray Horak and Mark A. Miller; M & T Books; Network Technologies Series; ISBN 1-55851-485-6  
**The Complete Network Upgrade and Maintenance Guide** by Mark Minasi; Jim Blaney & Chris Benton – Sybex  
ISBN 0-7821-2259-0  
**Network+ Certification Training Guide-** Marcraft set includes Theory and Lab book plus CDROM.  
ISBN 1-58122-012-x  
**Microsoft Press - Networking Essentials Self Paced Training Kit.** Includes CD-ROM. ISBN 1-55615-806-8  
**Upgrading and Repairing Networks - Published by Que.** ISBN 0-7897-0181-2  
**Network+ Study Guide;** Sybex; ISBN 0-7821-2547-6  
**Installer's Guide to Local Area Networks-** by Buddy Shipley; Available from ETA by calling 800-288-3824  
**Premises Cabling 2<sup>nd</sup> Edition-** by Donald J. Sterling, Jr. and Les Baxter; Available from ETA by calling 800-288-3824  
**Networking by Example;** Paul Boger; Que; May 2000; 0-7897-2356-5

## Chairman: Arlene Tincher, CNST

### Committee Members – 2007

Abbott, John, Wadsworth, OH, jabbott1@neo.rr.com  
Abel, Randy, FL; jr.abel@wtecmss.com  
Adams, Roderick C., CETa, APO,AE, MAdams9002@aol.com  
Anwar, Sohail – PSU, Ph.D., Altoona, PA, sxa15@psu.edu  
Bailey, Jeff, Charleston, WV, jeferb33@yahoo.com  
Beattie, Audrey; audreybeattie@frontiernet.net  
Blackburn, Anita A., CNSTsr, Kernersville, NC, Ablackburn@wesed.org  
Cardwell, Bob; bcardwell@okefenokeetech.edu  
Cooper, Rusty, CNST, San Antonio, TX, Rusty.cooper@teexmail.tamu.edu  
Courson, Chris, Tampa, FL, chris@chrisbot.com  
Ewert, Van; w.ewert@att.net  
Flowers, Richard, CCNA, Houston, TX, flowersr@sbcglobal.net  
Gannon, Paul, CETma, Universal City, TX, ucgannon@swbell.net  
Hake, Gregory S., CST; sidvision@prodigy.net,  
Hankins, Daniel, CST; spizak@guphi.com  
Hankins, Mike, CNST, Temple, TX, mikeandrea@sbcglobal.net  
Highum, Mark, CETsr, A+, Net+; bayelex@yahoo.com  
Houser, Tcat; tcat.houser@gmail.com  
Hunter, Ben, CNST, CIBOLO, TX, hvconsulting@satx.rr.com  
Kendall, Sr., Walter, CNST, Hudson Falls, NY, necs5221@capital.net  
Kirkland, Richard, CETsr; rbkirk@interact.ccsd.net  
Latimer, Mark; mlat@hotmail.com  
Lau, Roy, CNST, NYC, NY, rlau@tcicollege.net  
Linderok, Karl, Net+; linderok@baycollege.edu  
Lister, George, CETma; supertech@cox.net  
Pinkava, Rick, CVCC; rick.pinkava@cvcc.k12.oh.us  
Plotz, Meryn, N Mankato, MN, hmplotz@chartermi.net  
Powers, Michael, MSEE; mnpowers@mtu.edu  
Reed, Larry, Mt Carmel, IL, reed@iecc.cc.il.us  
Reusser, Randy, CETsr, Kenosha, WI, randalreusser@att.net  
Rivers, Bill, CETsr, Columbia, SC, riversb@yahoo.com  
Roberts, Art; artr@charter.net  
Rondeau, Robert; rrondeau@whittier.tec.ma.us  
Salice, William C., FOI; wsalice@ECPI.edu  
Siddall, Daniel, CETsr, Boise, ID, siddall@cableone.net  
Stroud, Ray, CETma, Schertz, TX, Ron\_Stow@hotmail.com  
Sutton, Bill; bsutton@itt-tech.edu  
Tincher, Arlene, CNST; Greencastle, IN, arlene@eta-i.org  
Wahl, Heinz, CST; hwahl@mail.boces.com  
Whiteman, Del, CETR, A+, ISCET, HEB; dcwjr@charter.net  
Woods, Curtis W., Niles, OH, curtis\_w\_woods@hotmail.com  
Woznick, Michael, CNST, Holland, MA, mikew34@cox.net  
Yang, Biwu, CNST, Greenville, NC, yangb@mail.ecu.edu  
Zielinski, John; zielinski.j@att.net