

**CTC Business and Industry Leadership Team for Convergence
Technologies and related disciplines**

Knowledge Domains	
Unix / Linux	
Windows	
Mac OS	
Android	added
Apple IOS	added
Operating System Maintenance	Operating Systems Maintenance: Configuration modification, backup, restore and location (e.g. registry, INI files); Operating system administration (e.g., monitoring, process control, threads, upgrades and patching); Scheduler; Directory, file structures and systems; procedures for starting and stopping services; account management; installing applications; OS compatibility and interoperability; OS scripting
Configuration modification, backup, restore and location (e.g. registry, INI files)	
Operating system administration (e.g., monitoring, process control, threads, upgrades and patching)	
Scheduler; stopping & starting services	
Directory, file structures and systems	
Account management	
Installing applications	
CLI	
OS compatibility and interoperability	
OS Scripting	
Enter other subcategories that you would add:	
Servers/Application	
E-mail	
Print	
Fax	
Application	
Web	

Database	
Proxy	
Sharepoint	
Enter other subcategories that you would add:	
Infrastructure as a Service/Cloud computing	
Server Virtualization	
Desktop Virtualization	
Storage Virtualization	
Network virtualization	
I/O virtualization	
Insert a "piece" on each of the above virtualization types that teaches "as a service"	
Data Center management in general	Needs to be its own separate area
Data Center power management	
Security of the cloud	Needs to be its own separate area
Public/Private cloud issues	
Enter other subcategories that you would add:	
Mobile Device Integration	Strike the category and move to broadband wireless
Mobile app programming	
Mobile app platform	
Storage Devices and Mgmt	
SAN	
NAS	
Data Backup and Recovery	Remove and put in compliance area
Enter other subcategories that you would add:	
Other Hardware	
Smart Phones	
Tablets	
Gaming equipment	
Cellular phone	
Global positioning system (GPS)	
Biometric devices	

Data Link Layer	Delete - should not be separate
MAC addressing	Delete
Ethernet	Combine Ethernet, Transport Layer, network Layer, Datalink, TCPIP, OSI Basics
Bus topologies	
Transmission media (e.g., coaxial cable, wireless, fiber, unshielded twisted pair- UTP)	
BICSI certification?	Delete
Ethernet specifications (e.g., 10 Base-T, 100 Base-T, Gigabit, WiFi)	
Carrier Sense Multiple Access with Collision Detection (CSMA/CD)	
Hubs and Switches	
Gateway Router	
Switching/bridging	
Backbone technologies	
Higher bandwidth Ethernet	
Enter other subcategories that you would add:	
Network Layer	
IPv4 addressing	
Internet Protocol version 6 (IPv6)	
Subnetting	
Class full addressing	
CIDR (Classless Inter-Domain Routing) addressing	
Gateways	
Routing and routing protocols (Router Information Protocol - RIP, Open Shortest Path First - OSPF, Interior Gateway Routing Protocol - IGRP)	
Other network layer protocols (e.g., IPX SPX, SNA, NetBEUI)	
NAT	
Enter other subcategories that you would add:	
Transport Layer	
Reliable and connection-oriented service (Transmission Control Protocol - TCP)	

Unreliable and connection-less User Datagram Protocol (UDP)	
SIP, H323	
Enter other subcategories that you would add:	
TCP/IP Protocols	TCP/IP Protocols including Dynamic Host Configuration Protocol (DHCP/BootP); Domain Name System/Service (DNS); File Transfer Protocol (FTP); Telnet; Simple Mail Transfer Protocol (SMTP); Trivial File Transfer Protocol (TFTP); Hypertext Transfer Protocol (HTTP); Point of Presence - POP or POP3 (Post Office Protocol or Post Office Protocol v3); Simple Network Management Protocol (SNMP); Internet Control Message Protocol (ICMP); Address Resolution Protocol (ARP); Instant messaging; Videoconferencing; TCP/IP Services - IIS, FTP, SMTP, ISP-related (ICMP, IGMP)
File Transfer Protocol (FTP)	
Telnet	
Simple Mail Transfer Protocol (SMTP) and POP3 and IMAP	
Trivial File Transfer Protocol (TFTP)	
Hypertext Transfer Protocol (HTTP)	
Point of Presence (POP)	
Simple Network Management Protocol (SNMP)	
Internet Control Message Protocol (ICMP)	
Address Resolution Protocol (ARP) /Reverse ARP/ Extended ARP	
Instant messaging	
Videoconferencing	
Enter other subcategories that you would add:	

<p>Wireless and WLANs</p>	<p>Wireless topics including Wireless Local Area Networks (LAN); Cellular telephone (e.g., Global Systems for Mobile Communications (GSM), 2G, 2.5G, 3G, and 4G); Personal Area Networks - PAN (e.g., Bluetooth); Satellite data communications; Microwave point-to-point; Broadband Wireless Access (BWA); Fixed Broadband Microwave (e.g., Local Multipoint Distribution System (LMDS), Microwave Multipoint Distribution Systems (MMDS), Lightwave point-to-point; Wireless Equivalent Protocol (WEP)DELETE), Non-line-of-sight wireless networks; WAP (Wireless Application Protocol); Site Survey, Wireless gateways; wireless security; wireless standards</p>
<p>Cellular telephone (e.g., Global Systems for Mobile Communications (GSM), Code Division Multiple Access (CDMA), Time Code Division Multiple Access (TDMA) Delete), 2G, 2.5G, 3G, 4G)</p>	
<p>Personal Area Networks - PAN (e.g., Bluetooth)</p>	
<p>Satellite data communications</p>	
<p>Microwave point-to-point</p>	
<p>Broadband Mobile Access /LTE</p>	
<p>Fixed Broadband Microwave e.g., Local Multipoint Distribution System (LMDS)</p>	
<p>Lightwave point-to-point</p>	
<p>Testing devices (e.g., spectrum analyzer, network analyzer)</p>	
<p>Encryption - WEP and WPA and WPA2</p>	<p>Delete</p>
<p>Non-line-of-sight wireless networks</p>	
<p>Wireless IEEE 802 standards</p>	
<p>Wireless spectrum</p>	
<p>WML (Wireless Markup Language)</p>	
<p>Wireless Gateways</p>	
<p>Site Survey</p>	
<p>IP-based VSAT</p>	
<p>Mobile app programming</p>	<p>moved here</p>
<p>Mobile platform</p>	<p>moved here</p>

Enter other subcategories that you would add:	
Network Administration	Network Administration including ACL (Access Control Listings); RMA (Risk Management Application); RNA (Remote Network Access); BIND (Berkeley Internet Name Domain); Change control; Documentation
ACL (Access Control Listings)	
RMA (Risk Management and Assessment)	
DOS/Command Line	
RNA (Remote Network Access)	
Change control, incident reporting, and documentation	
Enter other subcategories that you would add:	
Other Network Protocols	Other Network Protocols including IMAP (Internet Message Access Protocol); UDDI (Universal Description, Discovery and Integration); NIS (Network Information System); NNTP (Network News Transport Protocol - RFC 977); NTP (Network Time Protocol); SMS (Systems Management Server); LDAP (Light weight Directory Access Protocol); SOAP (Simple Object Access Protocol); L2TP (Layer Two Tunneling Protocol); IPSEC; NFS (Network File System); IIOB (Internet Inter-ORB Protocol); SMB (Server Message Block protocol)
UDDI (Universal Description, Discovery and Integration)	
NIS (Network Information System)	
NNTP (Network News Transport Protocol - RFC 977)	
NTP (Network Time Protocol)	
SMS (Systems Management Server)	
LDAP (Light weight Directory Access Protocol)	
L2TP (Layer Two Tunneling Protocol) and IPSEC	
NFS (Network File System)	
IIOB (Internet Inter-ORB Protocol)	
SMB (Server Message Block protocol)	
	SIP added

Enter other subcategories that you would add:	
Network Security	
Firewalls (e.g., Network Address Translation, NAT)	
Password practices and procedures	
Encryption	
Network virus protection	
Anti-theft and tamper devices	
Biometrics	
Security protocols (e.g., Secure Socket Layer - SSL, IP security -- Ipsec, WEP, Secure Shell - SSH)	
Security tools (e.g., Root kits, scanners)	
Trojan horses (security threats)	
Demilitarized zone (DMZ)	
Hack attacks (e.g., Teardrop, Smurf, Ping-of-death)	
Services and daemons (e.g., FTP and telnet)	
Social engineering	
Public, private, symmetric and secret keys	
Virus, worm, honey pot, and backdoor concepts	
Digital certificates	
Physical security	
Authentication	
Vulnerability scanners	
Intrusion Detection Systems	
Risk assessment	
Enter other subcategories that you would add:	
Electronics Basics	Electronics Basics including X10; AC concepts; DC concepts; Test and measurement; Power measurements (e.g., signal strength - dB, dBm); Analog electronic devices; Digital electronics; Frequency response
X10	
AC and DC concepts	

Test and measurement	
Power measurements (e.g., signal strength - dB, dBm)	
Analog electronic devices	
Digital electronics	
Frequency response	
Power over Ethernet	
Enter other subcategories that you would add:	
OSI Model Basics - cover all layers	
Physical	
Data Link	
Network	
Transport	
Session	
Presentation	
Application	
Enter other subcategories that you would add:	
Telecommunications Basics	Telecommunications Basics Analog and digital modulation; Noise; Transmission media (e.g., copper, fiber, wireless); splicing and termination of media; Couplers and connectors; Antennas; Government regulations (e.g., FCC, ITU); Standards organizations (e.g., IEEE, TIA/EIA); Signals (e.g., audio frequencies, radio frequencies); Analog to digital conversion; Digital to analog conversion; Multiplexing (e.g., Frequency Division Multiplexing (FDM) and Time Division Multiplexing (TDM)); Caller ID, Voice Mail, Call Waiting, Call Blocking; Voice, video and data signal characteristics; Baseband, broadband and passband; RF signals; Batteries; Echo: acoustic, non-acoustic, and echo cancellation techniques; Codec
Analog and digital modulation	
Noise	
Transmission media (e.g., copper, fiber, wireless)	
Splicing and termination of media / couplers and connectors	
Antennas	

Government regulations (e.g., FCC, ITU)	
Standards organizations (e.g., IEEE, TIA/EIA)	
Signals (e.g., audio frequencies, radio frequencies)	
Analog - digital conversion /digital to analog (CODEC)	
Multiplexing (e.g., Frequency Division Multiplexing (FDM) and Time Division Multiplexing (TDM))	
Caller ID, Voice Mail, Call Waiting, Call Blocking	
Voice, video and data signal characteristics	
SIP added	
Baseband, broadband	
Power from RF signals	
Echo: accoustic, non-accoustic, and echo cancellation techniques	
Cable Media	Cable Media includingInfrastructure (e.g., head ends, trunks, distribution points, nodes); Splicing and termination; Couplers and connectors; Cable modems; DOCSIS project and standards; Modulation techniques (e.g., QAM, SCM, QPSK); Open cable project (interactive services); Cable Modem Termination System (CMTS); Voice and data over cable; Testing devices (e.g., communications analyzer, spectrum analyzer, network analyzer); Crosstalk
Infrastructure (e.g., head ends, trunks, distribution points, nodes)	
Split band plans	
Cable modems	
DOCSIS (CableLabs® Certified™ Cable Modem project Data Over Cable Service Interface Specification) project and standards	
Modulation techniques (e.g., QAM, SCM, QPSK)	
QoS (Quality of Service)	Delete here
Crosstalk	

Enter other subcategories that you would add:	
Broadband Access Methods	Broadband Access Methods including Local loop conditioning; Types of modulation (e.g., Discrete Multitone - DMT, Carrierless Amplitude Phase CAP); Types of DSL (e.g., ADSL, VDSL, HDSL, HDSL2, SDSL, IDSL); Standards for DSL; DSL modem; DSL Access Multiplexer (DSLAM)
Local loop conditioning	
types of modulation	
Types of DSL	
Wimax	
LTE	
Enter other subcategories that you would add:	
Server Network Devices and Services	Covered in other areas - can take off here
Midrange computers	
Mainframe computers	Remove
Client access control procedures	
Remote and distributed processing and storage (e.g., Microsoft.NET)	
Remote access protocols (e.g., Remote Access Service - RAS, Point to Point Protocols - PPP)	
Enter other subcategories that you would add:	
Network Devices-Connectivity Components	Network Devices-Connectivity Components including Network Interface Cards (NICs); Wireless repeater; Bridge; Routers; Gateways; RJ45, RJ11, RJ31X, F Type Connector, etc.; Cabling and connectors (e.g., fiber, coax, UTP/STP); Switches; Hub; Line Distribution Panel; Wireless access point; Channel Service Unit (CSU) and Data Service Unit (DSU); DTE (Data Terminal Equipment); DCE (Data Communications Equipment); Modems; Layer 3 switches
Network Interface Cards (NICs)	
Wireless repeater	Delete
Routers	
Gateway	

RJ45, RJ11, RJ31X, F Type Connector, ETC.	Delete RJ 45
Cabling and connectors (e.g., fiber, coax, UTP/STP)	
Switches	
Hub	
Line Distribution Panel	
Wireless access point	
Channel Service Unit (CSU) and Data Service Unit (DSU)	
DTE (Data Terminal Equipment)	
DCE (Data Communications Equipment)	
Modems	
Layer 3 switches	
Enter other subcategories that you would add:	
Troubleshooting and Equipment Repair	Troubleshooting and Equipment Repair Diagnostic software (e.g., Norton Utilities); Hand tools (e.g., screw drivers, wrenches, nut drivers); Test sets (e.g., cable verifier, specialty test sets, protocol analyzer, bit error rate tester); Powerline monitor; Error log and message analysis; Field Replaceable Units (FRUs); Hyperterminal; Telecommunications analyzers (e.g., T-Bird, ATM analyzer, SONET analyzer,wireshark); Using knowledge bases
Diagnostic software (e.g., Norton Utilities)	
Hand tools (e.g., screw drivers, wrenches, nut drivers)	
Test sets (e.g., cable verifier, specialty test sets, protocol analyzer, bit error rate tester)	
Powerline monitor	
Error log and message analysis	
Field Replaceable Units (FRUs)	
Hyperterminal	
Telecommunications analyzers (e.g., T-Bird, ATM analyzer, SONET analyzer,wireshark)	
Using knowledge bases	
Enter other subcategories that you would add:	

Safety and Environment Requirements	Safety and Environment Requirements including OSHA regulations; National Fire Protection Association; IEEE; Electrical Contractors Association; Local County and State Codes; National Electrical Code; FCC regulations; HAZMAT; Fire safety (fire extinguisher); Personal safety equipment; First aid; Vehicle usage; HIPAA
OSHA regulations	OJT
National Fire Protection Association	
IEEE	
Electrical Contractors Association	
Local County and State Codes	
National Electrical Code	
FCC regulations	
HAZMAT	
Fire safety (fire extinguisher)	
Personal safety equipment	
First aid	
Vehicle usage	
Tool usage	
HIPAA	
Homeland security	
Enter other subcategories that you would add:	
Public Switched Telephone Network	Public Switched Telephone Network including Telephone sets; Local loop; Evolution of the PSTN; switching infrastructure (local and long distance); North American Numbering Plan (NANP); Private Branch Exchanges (PBXs); Signaling (in-band and out of band); Intelligent network (SS7); Pulse Code Modulation (PCM); Time Division Multiplexing (TDM) for voice communications; T and E carrier systems for voice communications; Transport technologies basics (ATM - Asynchronous Transfer Mode and Synchronous Optical Network - SONET); Long haul networks (e.g., satellite, fiber optic, microwave); GSM; How to interface with legacy telephony
Telephone sets	
Local loop	
Evolution of the PSTN	

Switching infrastructure (local and long distance)	
North American Numbering Plan (NANP)	
Private Branch Exchanges (PBXs)	
Signaling (in-band and out of band)	
Intelligent network (SS7)	
Pulse Code Modulation (PCM)	
Time Division Multiplexing (TDM) for voice communications	
T and E carrier systems for voice communications	
Transport technologies basics (ATM - Asynchronous Transfer Mode and Synchronous Optical Network - SONET)	
Long haul networks (e.g., satellite, fiber optic, microwave)	
SS7 /SIGTRAN/GSM	
How to interface with legacy telephony	
Enter other subcategories that you would add:	
MAN and WAN Technologies	
Packet switching and circuit switching	
T and E carrier systems for data communications	
Data transport technologies basics (e.g., transmission grooming, multiplexing and concentrating)	
Asynchronous Transfer Mode	
Frame relay	
SONET/SDH - Synchronous Optical Network/Synchronous Digital Hierarchy	
Packet over SONET	
Integrated Services Digital Network (ISDN)	
Internet backbone infrastructure	
DSL	
VPLS	Added
MPLS	Added
Enter other subcategories that you would add:	

Network Infrastructure Monitoring and Restoration	Network Infrastructure Monitoring and Restoration including Network Operations Center (NOC) overview; Restoration protocols; Centralized log monitoring and correlation; Types of alarms; Network monitoring and provisioning software (e.g., simple network management protocol, SNMP, OAM&P - operations, administration, maintenance, and provisioning, sniffers); Fault tolerance
Network Operations Center (NOC) overview	
Restoration protocols	
Backup and Recovery added in here	Added/moved
Centralized log monitoring and correlation	
Types of alarms	
Network monitoring and provisioning software (e.g., simple network management protocol, SNMP, OAM&P - operations, administration, maintenance, and provisioning, sniffers, wireshark)	
Fault tolerance	
High Availability	Added
Video	Added?
Enter other subcategories that you would add:	
Convergent Network Technologies	Combine with Telecom/PSTN
Computer-Telephony Integration (CTI)	
Voice over IP (VoIP - e.g., 711, 729)	
Fax over IP	
Bandwidth compression (e.g., mpeg, jpeg, tiff)	
Streaming video and audio	
Video-conferencing /video over IP	BILT said this was missing, but it's here - Tiger Team to discuss
Cellular	
Soft switch	
IPTV	
Packet prioritization (e.g., RSVP, H.323)	

Enter other subcategories that you would add:	
Network Device Back-up and Recovery, Fault Tolerance	Network Device Back-up and Recovery, Fault Tolerance topics including Back-up and verification procedures; Emergency boot procedures; Mass storage and backup devices (e.g., RAID, tape); Network and computer system redundancy including storage, power, connectivity and hot-swapping; Disaster recovery plan creation
Back-up and verification procedures	
Emergency boot procedures	
Mass storage and backup devices (e.g., RAID, tape)	
Network and computer system redundancy including storage, power, connectivity and hot-swapping	
MPLS	
Voice quality monitoring	
Disaster recovery plan	
Enter other subcategories that you would add:	Know it exists;
Other topics added by BILT	
Make sure videoconferencing is there	
A+ Certification	
Network + Certification	
Should an entry level support employee have both a CCNA and Network+?	
OTHER CERTIFICATIONS	

Linux+ Certification	
Security + Certification	
Advanced Security+ Certification	
Convergence/CTP+ Certification	
Microsoft Windows 7 Certification (or client OS)	
MCITP Server Administration	
MCITP 2008 Network Infrastructure Certification	
MCITP Active Directory Certification	
CCNA Certification	
CCNA Voice Certification	
Cisco Unified Call Manager	
CCNA Security	
CCNA Wireless	
Wireless Certification CWNA	
Project+ Certification	
ITIL Certification	
VmWare Certification	
EMC Information and Storage Management Certification	

EMC Cloud Infrastructure and Services	
EMC Backup Recovery Systems and Architecture	
CITRIX	

Skip all of this and move under OS maintenance

Focus on system-level troubleshooting and combine this area with Backup/Recovery below

