

Course overview:

CompTIA

Convergence+ Certification

(N001eng, 5-days)



www.gtslearning.com
sales@gtslearning.com

Three Elysium Gate
126-128 New King's Road
London SW6 4LZ
Tel: +44 (0) 20 7887 7999
Fax: +44 (0) 20 7887 7988

Overview and objectives

This 5-day course prepares you for the CompTIA Convergence+ Certification Exam CT0-101. Beyond certification preparation, this comprehensive course gives you a thorough understanding of the essential concepts of networking, voice, and data communications and their convergence on a single network.

This course also prepares you for many real-world tasks you will likely face each day as a network administrator. You will learn the basics for converged data, voice, and multimedia network requirements analysis, how to specify, implement, and manage the basic network components. And, you will learn basic problem analysis, troubleshooting, and issue resolution for converged technologies. This course will show how different types of network engineering quality of service issues affect payload transport between devices in different network structures. You will be able to differentiate between VoIP communication protocols and encoding schemes. This course covers the essential principles of network operation, maintenance, and design as you learn to use network devices to optimize network traffic for multimedia traffic. You will learn the essential requirements for building reliable, redundant, and recoverable multi-payload type network infrastructures.

By studying these and other intricate details of network design, operation, and administration, from network engineering to protocols, management, and security, you will gain valuable knowledge and the experience needed to implement a complete network solution to suit a converged network environment.

During this course students will learn to:

- Demonstrate application of traffic engineering concepts, quality of service (QoS) and network performance
 - Describe fundamentals of voice systems including dialing plans and identification of network endpoints
 - Describe networking technologies used in a converged network including the OSI model layers and network models
 - Identify methods of encoding, decoding, and compression for rich media transmission
 - Identify different types of messaging, collaboration, contact center, and mobility applications
 - Identify benefits of using different video and audio standards and the impact on the performance on the network
 - Identify the functions of hardware components as used on a converged network
 - Identify common symptoms and problems on a converged network
 - Describe and use tools and commands to monitor network performance including proper administration procedures
 - Explain concepts and components of security design and how they affect the converged network
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Target audience

This course has been developed to meet the objectives of the Comp- TIA Convergence+ Certification Exam CT0-101. Certification is a worthwhile goal, and is probably the reason that you bought this book. However, this is not an “exam cram” study guide that guarantees that you will pass the test with a minimum of effort.

We recommend CompTIA Network+ Certification as an essential prerequisite for this course.

Candidates are also encouraged to have had 18 to 24 months of work experience in the areas of data networking, VoIP, and other convergence related technologies. Occasional Internet access will help you explore links to information beyond this text, but this is not required.

Course content

Telecommunications Traffic Engineering

Trunks • Types of Trunks • Special Access Trunks • Carried Load • Probability • Grade of Service • Trunk Usage Measurements • The Erlang B Traffic Formula • Erlang C and Poisson Tables • No Formula Is Perfect • Estimating Total System Capacity • Data Prioritization • Protocol Reservation • Session Fairness • Traffic Shaping

Voice System Fundamentals

Legacy Hybrid and IP Telephony Systems • Key Systems • Hybrid Systems • IP Telephony Systems • Voice Transmission Fundamentals • Encoding, Decoding, and Compression • Digitizing the Voice • How a Call is Made • Long Distance Voice Routing • Signaling

Number and Dialing Plan Components

Prefixes • Telephone Numbering System • Special Area Codes • Number Formats • Number Blocking • Digit Translation • Toll Fraud • ENUM • Local Number Portability (LNP) • Emergency Service

Converged Network Endpoints

Voice Terminals • IP Phones • TDM Phones • Analog Phones • Dialup Hard Phone • PC-Based Soft Phones • Microphones and Headsets or Speakers • USB Hand Sets • SIP Phones • PDA Soft Phones • WiFi Phones

General QoS Concepts

Network Requirements for Convergence • Converged Network Architecture • Voice Quality • The QoS Parameters • IP Header Features • RSVP • CBQ • COPS • MPLS • Policy Routing • RED • WFQ • WRED • Traffic Prioritization • 802.1Q VLAN Standard • 802.1p Traffic Prioritization Standard • Using QoS to Optimize Voice Quality in VoIP Networks

Network Performance

Network Performance Issues • Voice Quality • Latency • Packet Loss • Port Settings • Bandwidth • Network Capacity Baselineing • Bottlenecks • Network Throughput • Link Utilization • Throughput • Impact to the Network when Adding/Modifying Converged Applications

Switches

LAN Switching • LAN Switch Features • Switching Techniques • Ethernet Switch Bandwidth • Multilayer Switch Technology • Process of Switching Frames • Redundancy and Active Loops • Spanning Tree Algorithm • Selecting Switches • Switch Configurations • Switch Features and Backbone Switch Considerations • Summary of Switch Features

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Physical and Logical Port Settings

Features Common to Both User Datagram Protocol and Transmission Control Protocol

Network Classifications and Topologies

Network Classification • Network Topologies

Routing

Introduction to Routers • How Routers Move Packets Between Networks • Routing Tables • Related Devices • Direct Routing • Indirect Routing • Static Routing • Default Routes • Dynamic Routing

Protocols

The TCP/IP Protocol Suite • TCP/IP Protocol Layers and the OSI Model • Communication Using TCP/IP • Features Common to Both UDP and TCP • UDP • TCP • IP • Real-time Transport Protocol • Compressed RTP • Real-Time Transport Control Protocol

Transmission Mediums

Cables • Coaxial Cable • Twisted Pair Cabling • Other Twisted Pair Cabling Characteristics • Fiber Optic Cable • Digital Subscriber Line • Wireless Transmission • How Wireless Transmission Works • Competition for the Finite RF Spectrum • Wireless Networking Applications • Ethernet • Advantages and Disadvantages of Ethernet • Ethernet Configurations • Fast Ethernet • Gigabit Ethernet • Evolution-Data Optimized (EVDO) • Cable Applications • Virtual Private Networks (VPNs)

Signaling Basics

Types of Signals • Supervisory Signals • Address Signals • Alerting Signals • Control Signals • In-Band vs. Out-of-Band Signaling

Methods of Encoding, Decoding and Compression

Analog to Digital • Voice Conversations • Standards • MPEG, MP3 • MPEG.x

Messaging Applications

Voice Mail Systems • Voice Mail Features • Automated Attendants • Text Messaging: E-Mail, News, and Chat • E-Mail • E-Mail Addresses • E-Mail Protocols • Mail Server Configuration • Store-and-Forward Mail Systems • Chatting • Instant Messaging • Video Messaging • Unified Messaging

Collaboration Applications

Audio Conferencing • Internet Multimedia • Basic IP Videoconferencing System • Types of Videoconferencing Systems • Data Sharing

Computer Telephony Integration and Call Center Automation

CTI in Action • Evolution of CTI • Levels of Call Center Automation

Computer Telephony Integration Concepts

Media Processing and Call Control • CTI Components • Key CTI Implementation Issues • Enabling CTI in the Avaya Communication Manager

Web-Enabled Call Centers

Internet Callback • Callback Architectures • Web Chats • Customer Interaction

Call Routing

Call Routing Patterns • Reports • Configurations • Customer Handling Procedures • Priority Queuing • ANI Routing • DNIS Routing • SBR • EBR • Intelligent Call Queuing • Call Queuing • Call Recording

Interactive Voice Response

Audio Computer Application • Data Input • Links to Outside Systems • Data Output • Trend Toward Integrated Solutions • System Configurations • Common IVR Mistakes

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Mobility Components

Softphone • Application Layer • Transport Layer • Network Layer • Network Interface Layer • Destination Station • Presence • Cellular Integration Services • Find-Me/Follow-Me: 500 Numbers

H.323 Standard for Packet Multimedia

Overview of the H.323 Standard • Other Standards of the H.323 Family • Fundamental H.323 Network Components • MGCP • The H.323 Protocols and Their Effect • on Voice Stream QoS • Integration with the Digital PSTN • Network Infrastructure Requirements

H.323 Call Processing

H.323 Call Progression Phases • H.323v2 fastStart • SIP • SS7 to ITSP Call Progression

Session Initiation Protocol

SIP • SIP Messages • SIP Servers • SIP Clients • SDP • Creating a SIP Session

Rich Media Transmission Methods

Webcasting • Audio and Video Streaming • Unicasting vs. Multicasting (audio and video)

Video Standards

H.323 • H.320 • H.261 • H.263 and H.263+ • H.264 (MPEG-4 Part 10) or Advanced Video Coding (AVC) • Advanced video coding for generic audiovisual services • MPEG (MPEG-1, MPEG-2, MPEG-4) • CIF/FCIF • SIF • QCIF • HD • G.711 Companding Algorithms • G.722 • G.724—ADPCM • G.729a • Document Conferencing: T.120 Series • iLBC • NTSC • PAL • SECAM

The OSI Model Layers

The Physical Layer • The Network Layer • The Transport Layer • The Session Layer • The Presentation Layer • The Application Layer

Network Modules

Centralized Network vs. Decentralized Network • Configuration of Converged Application Resources • Branch vs. Edge Network Solutions • Network Flattening vs. Tier Network

Routers and Switches

Routers • Router Functionality • Multiprotocol Routing • How Routers Move Packets Between Networks • Switches—Managed vs. Unmanaged • Switch Functionality • Traffic Isolation With Switches

Media Servers

S8700 Media Server • S8500 • S8300 Media Server with G700 Gateway • S8100

Gateways

Media Gateways • TDM/IP Gateway • SIP Gateway

Private Branch Exchange

PBX Components • Making a Call on a PBX • Call Routing • Supplementary PBX Features • PBX Enhancements • PBX Costs and Requirements • Hybrid PBX • IP Only PBX

Router Firewalls

LAN Firewalls • Internet Firewalls • Types of Firewalls

CSU and DSU

Channel Service Unit (CSU) • Data Service Unit (DSU) • Connecting to Digital Networks • DTE/CSU Interface • Smart Jack • Subrate Facilities • Digital Data Services (DDS)

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Network Termination Device One (NT1)

NT1: Network Termination Device, Type 1

Admission Control and Traffic Shaping

Admission Control • Traffic Shaping • Network Admission Policies • Admission Control and Traffic Shaping Applications

Session Border Controller

Session Border Controller Overview

In-line Power Components

In-line Power Components (Power over Ethernet) • PoE

Access Points

What Is a Wireless Access Point? • Wireless APs • Access Point Modes • Common Access Point Options • Access Point Configuration and Management • Mounting

Modems

Modem Concepts • Analog Modem Standards • Cable Modem Technology • DSL • DSLAMs

Converged Network Analysis and Problem Solving

Network Troubleshooting Steps • Troubleshooting Methods

Common Symptoms and Problems

Symptoms • Problems

Network Performance Monitoring Tools

LAN Monitoring Tools • Baselineing • Software Tools for Baselineing and Testing • SNMP • Ping • Pathping • Traceroute • QoS Monitoring Tools • LAN and WAN Bandwidth Monitoring Tools • Voice/Video Quality Monitoring Tools

LAN Protocol Analyzer Operations

Analyzers Overview

Traffic Management

Data Sources • Gathering Data • Experiments • Sampling • Planning a Study

QoS Parameters, Router Parameters, Load Balancing

IP Header Features • DiffServ • IntServ • CBQ • COPS • MPLS • Policy Routing • PQ • RED • Traffic Shaping • WFQ • WRED

Mean Opinion Score

Mean Opinion Score • Administration Tasks and Procedures • Monitoring Log Files • Reporting • Managing Configuration Changes • Policy Management (e.g., QoS, Admission Controls, Registration) • Patching, Upgrades, and Backups • Grandfather/Father/Son • MAC (Moves, Adds, Changes) • Call Detail Record

Firewalls

Firewalls • Firewall Functions • Firewalls Components • Screened Subnet Firewall

Internet Firewalls

Types of Firewalls • Stance of a Firewall • Cost of a Firewall • Components of a Firewall System

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Authentication

User Authentication • Wireless Authentication • IEEE 802.1x • EAP

Proxies

Web Servers • Servers

Virtual Private Networks

VPNs in Action • Why Enterprises are Using VPNs • Tunneling: The Underlying Technology for VPNs • Point-to-Point Tunneling Protocol (PPTP) • Layer 2 Forwarding Protocol • Layer 2 Tunneling Protocol • PPP Authentication Protocols • Internet Protocol Security • Open Standards Help Ensure Interoperability • Providing Effective Security • Data Encryption • PPP Callback Control • Filtering • Firewalls and VPNs • User Administration • Considerations For Choosing a VPN Solution • VPN Tunnel

NAPT

NAT • A NAT Overview • Static Address Translation • Dynamic Address Translation • Masquerading/NAPT

Encryption

Commonly Used Encryption Systems

IDS and IPS

IDS • IPS • Types of IPSs

Antivirus

Antivirus • Malicious Programming

VLANs

Switched VLANs • Routed VLANs • VLAN Tagging • QoS • The Future of VLANs

Demilitarized Zone

Demilitarized Zone

Glossary

Course Quiz

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