Digital Home Technology Integrator Certification
CEA-CompTIA DHTI+ Examination Objectives
HT0-201

September, 2006

Introduction

The CEA-CompTIA DHTI+ certification is a vendor neutral cross-industry credential providing recognition that a home technology integration professional has attained a standard of excellence in the integrated home networks industry. The CEA-CompTIA DHTI+ certification is based on a set of standards designed to measure the mastery of important skills and knowledge necessary to configure, integrate, maintain, troubleshoot, and comprehend basic design concepts of electronic/digital home systems. In order to achieve the CEA-CompTIA DHTI+ certification, the candidate must pass the Digital Home Technology Integrator certification exam HT0-201.

This exam targets individuals in the multiple industries that touch the home, including technology integrators, security system technicians, cable, satellite, telecommunications, and A/V installers, electricians, and network administrators. Individuals with the ability to install/connect one or more residential subsystems but cannot troubleshoot and/or configure without significant aid of technical support are prime candidates for this certification. Individuals with a strong background in a single discipline wishing to expand their expertise are also very good candidates for this certification. CompTIA recommends individuals have 18-24 months experience in the home integration industry.

The CEA-CompTIA DHTI+ certification exam assumes candidates possess the skills and knowledge of basic PC hardware, hand and tool skills, safety precautions, basic electrical awareness, local regulations and building codes. This certification is not intended to provide basic installation skills such as wire termination and basic hand/tool skills. This certification is not intended to provide project management, sales, or master system design skills.

The skills and knowledge measured by this examination are derived from a job task analysis with emphasis on North America and Europe. A publicly available worldwide survey supplemented the job task analysis.

Note: This examination blueprint for the CEA-CompTIA DHTI+ examination includes weighting, test objectives, and example content. Example topics and concepts are included to clarify the test objectives and should not be construed as a comprehensive listing of all the content covered by this examination. This blueprint may undergo additional minor modifications during the test development phase.

The table below lists the domain areas measured by this examination and the approximate extent to which they are represented in the examination.

Domain	Percentage of Examination
1.0 Networking	20%
2.0 Audio/Video	22%
3.0 Telephone / VoIP	10%
4.0 Security and Surveillance	15%
5.0 Home Control Management	15%
6.0 Documentation and Troubleshooting	18%
Total	100%

Response Limits

The examinee selects, from four (4) or more options, the option that best completes the statement or answers the question. Distracters or wrong answers are response options that examinees with incomplete knowledge or skill would likely choose, but are generally plausible responses fitting into the content area. Test item formats used in this examination are:

Multiple-choice: The examinee selects one option that best answers the question or completes a statement. The option can be embedded in a graphic where the examinee “points and clicks” on their selection choice to complete the test item.

1.0 Networking

1.1 Identify basic networking protocols and their uses and know when / how to apply them.

- DHCP
- UDP
- DNS
- TCP/IP
- Subnet masks

1.2 Recognize and implement methods of network security.

- Personal Computer (PC) security
- Antivirus
- Home networking security
- Firewall knowledge

1.3 Configure setup and maintain a residential LAN (Local Area Network).

- Client Configuration
  - Resource sharing
  - Peer-to-Peer
- Remote access setup
- Network device setup and integration
  - Broadband configuration (e.g. DSL, Cable, and Satellite)
  - Routers
  - Hubs
  - Switches
  - PoE (Power over Ethernet)

1.4 Configure setup and maintain a secure wireless network.

- Differentiate applications of hardwired vs. wireless networks.
- Assess networking security and encryption standards.
  - WEP
  - WPA
  - MAC filtering
  - SSID
  - WPA2
- Wireless networking integration and troubleshooting
  - Frequency management
- Wireless protocol standards
  - 802.11 a/b/g/n

1.5 Identify and define network cabling characteristics and performance.

- Cable types
  - CAT5
  - CAT5e
  - CAT6
  - Fiber
  - COAX
- Cable length limitations
- Protocols
  - 10BaseT
  - 100BaseT
  - 1000BaseT
- Shielded (STP) vs. Unshielded (UTP)

- Plenum vs. Non-plenum
- Importance of conductor colors

2.0 Audio / Video

2.1 Implement, maintain and troubleshoot multiroom audio systems. Identify common interference sources.

- Control devices
  - Keypads
  - Rotary volume controls
  - Sliders
  - Push button controls
  - Touch screen
  - Wireless keypads
  - Handheld devices
- Differentiate and define single source, multi-source, and local source.
  - Analog audio system
  - Analog CAT5 audio system
  - Digital CAT5 audio system
- Proper cable use
  - Line level vs. speaker level
- Amplification
  - Ohm's Law (e.g. Impedance matched or non-impedance matched)
  - Watts vs. dB
  - Local amplification
  - Centralized amplification
- Speaker types
  - Inwall
  - Surface mounted
  - Ceiling mounted
  - Freestanding
  - Fixed
  - Animated
- Speaker specifications
  - Frequency response
  - Efficiency
  - Power handling

2.2 Install, configure and maintain a residential home theater system.

- Audio Components
  - Define basics of acoustics (e.g. Sound reflection, speaker placement, sound cancellation, sound balance)
  - Audio/Video components setup and integration (e.g. Digital signal cables and lengths, Legacy devices)
  - Multichannel Surround (e.g. SACD, DVDA, DTS, DTSES, DDEX, DD, etc.) (e.g. Crossovers and speaker setup)
- Video components
  - Display types (e.g. Plasma, DLP, LCD, LCOS, CRT, Rear projection, Front projection, Direct view.)
  - Hi Definition resolutions options (e.g. 720p, 1080i, 1080p, etc.)
  - Tuner types (e.g. NTSC, PAL, ATSC, QAM, Cable card, VSB, NDVBT, DVBS)
  - Video Processing (e.g. Scalers, processors, up-conversion)
  - Aspect Ratios
  - Video setup (Calibration e.g. color balance, contrast, brightness, etc.)

    - Digital video cable and connector types (e.g. DVI and HDMI – compatibility and interoperability issues)
- Use MRAV (Multi-Room Audio/Video) standards if/when applicable.

2.3 Assess, install and configure content management systems and describe their applications in a residential environment.

- Describe typical applications and physical connections of sources
    - Media servers
    - Media PC
    - MP3 players
    - DVD players
    - Satellite
    - Cable
    - DVR
    - Gaming systems
    - Satellite radio
    - Legacy devices
    - Streaming media
- Summarize types of media storage, methods to transfer and backup data.
    - Memory cards
    - NAS devices (Network Attached Devices)
    - Remote storage
    - Local storage
    - Frequency of backup
- Other connection considerations
    - Digital Right Management

2.4 Implement, maintain and troubleshoot multiroom video systems.

- Define signal types and their applications
    - Digital Distribution (e.g. Analog to IP converters, IP to Analog converters, Wireless distribution, IEEE 1394)
    - RF Distribution characteristics. Identify and troubleshoot noise and interference. (e.g. Splitters and taps, active and passive, Attenuators, Bi-directional, Modulation and filtration, Amplification, IR over COAX.)
    - Analog Distribution (e.g. Composite, Component, and S-Video, Balun.)
- Identify cable types and their applications
    - COAX (e.g. RG-59, RG-6, RG-6 QS, DV, Serial data, CCS, BC)
    - CAT5/5e/6
- Termination (e.g. RCA, BNC, and F)
- Satellite
    - Multi-switches
    - Diplexer
    - LNB (Low Noise Block Down Converter)

3.0 Telephony / VoIP

3.1 Differentiate and describe POTS vs. VoIP delivery. Identify and troubleshoot common issues.

- VoIP
    - Compatibility issues
    - Whole house distribution of VoIP
    - Performance and Quality of Service (QoS)
- POTS
    - Cross talk
    - Radio interference

- Dead ports
- REN (Ringer Equivalence Number)

3.2 Describe and define fundamentals of telephone systems.

- Multi-line
- Paging
- Intercom
- Voice messaging / Unified messaging
- Door entry / gate entry
- PBX
- Key systems
- Telecommunication services (e.g. caller ID, voice mail, roll-over)

4.0 Security and Surveillance Systems

4.1 Maintain, configure and troubleshoot basic security systems and applications.

- Define monitored and notification methods.
  - Phone line
  - Cell phone
  - Radio frequency
  - IP based

4.2 Describe basic security terminology and apply installation procedures and methodologies.

- Installation and configuration of security panel
  - Zone types
  - Delays
  - Battery backup and power supply requirements
- Monitoring formats
  - SIA and Contact ID
  - 4/2 and 3/1
- Define types of peripherals and accessories.
  - Motion sensors
  - Glass break detectors
  - Magnetic contacts
  - Smoke fire (e.g. smoke detection, heat detection)
  - Environmental sensors (e.g. carbon monoxide, gas, water, temperature)
  - Vehicle detection
  - Photo-electric beam devices
  - Microwave beam devices
  - Pressure sensors
  - Sirens, strobes
  - Security keypads
  - Keyfobs
  - Panic buttons
- Describe security infrastructure types.
  - Wired
    - 22/4- standard power devices
    - 22/2- Magnetic contacts
    - 2 and 4 conductor fire wire (e.g. keypads, sounders, power supplies, smoke and fire detectors)
    - Power supervision relays
    - Polarity reversal relays
    - Line seizure
    - End of line resistors.)

    - Wireless
- Identify access control devices and protocols
    - Devices (e.g. Keypads, Card readers, Biometric readers, Proximity readers, Door strikes, Electronic deadbolts, Magnetic Locks.)
    - Protocols (e.g. Weigand)

4.3 Identify, configure, install, maintain and troubleshoot security and surveillance cameras.

- Camera Types
    - IP
    - Analog
    - Hybrid
- Camera specifications
    - Lens type
    - Lux rating
    - Resolution
    - B&W vs. Color
    - IR illumination
    - Power consumption
- Camera applications
    - Indoor/outdoor
    - Day/Night
    - Fixed vs. animated
    - Surveillance (e.g. door cams, nanny cams)
    - Recording (e.g. DVR, Triggers – internal vs. external detection)
    - Sequencing vs. multiplexing

5.0 Home Control and Management

5.1 Identify user interfaces and their appropriate applications.

- Device types
    - Remote controls
    - Keypads
    - Touchscreens
    - Keyfobs
    - Telephones
    - Smartphones
    - Cell phones
    - PDA's
    - Web tablets
    - Personal computers
    - laptops
- Describe the importance of simplicity and ease of use as it pertains to the end user.

5.2 Define and recognize control systems which integrate subsystems in the home. Describe their functionality, characteristics and purpose.

- Embedded control systems and Personal computer (PC) based control systems
    - Compatibility and interoperability issues

5.3 Identify commonly used communication protocols and their application.

- IR
- Serial
- IP
- RF
- Bluetooth

- Contact closure
- Inputs (zones)
- Z-wave and Zigbee
- ASCII
- Proprietary protocols

5.4 Describe basic HVAC (Heating Ventilation and Air Conditioning) terminology and install peripheral control devices.

- Control layer
  - Compatibility
- Communication layer
  - Compatibility
  - IP based, wireless, serial and proprietary
- Zones HVAC
  - Master slave configuration
  - Microprocessor controlled configuration
- Programmable thermostats
- Importance of referencing manufacturer specification and compatibility.

5.5 Describe basic lighting terminology and install peripheral control devices.

- Identify lighting control applications
  - Indoor and outdoor
  - Centralized and distributed
  - Dimming
  - Scenes
  - Relay/ switching
  - Occupancy / motion sensing
  - Time and event driven
  - Window treatments
  - Energy management
  - Security interface
  - Lighting connectivity
  - Motor speed control
- Communication interface / bridge
  - Power line phase couplers
- Identify lighting control protocols (Open standards)
  - Z-wave
  - ZigBee
  - Powerline carrier (X10 protocol /PLC)
  - UPB (Universal Powerline Bus)
- Proprietary RF and proprietary low voltage
  - Recognize compatibility issues

5.6 Identify and install component power protection devices.

- Identify whole house protection options
  - Surge Suppression
  - Power Conditioning
- Identify and install point protection
  - Surge protectors (high voltage and ancillary low voltage devices: e.g. satellite, CATV, etc.)
  - UPS (Uninterruptible Power Supply)
  - Power Conditioning

6.0 Troubleshooting Methodology and Documentation

6.1 Identify and apply the fundamentals of troubleshooting and diagnostics.

- Use of testing equipment
    - Multimeter
    - Telephone buttset
    - Toner
    - Signal generation
    - Cable tester
- Refer to prior documentation
- Demonstrate when to communicate with technical support and what information is relevant.
- Troubleshoot common wireless interference issues: Infrared, Radio Frequency, etc.
- Identify demarcation and responsibilities of associated trades and /or utilities.

6.2 Given a scenario, demonstrate how to apply troubleshooting skills to integrate subsystems.

- Networking
- Audio/Video
- Telephony
- Security
- Home control

6.3 List and describe the benefits of verification of installation.

- Properly label wires
- Wire mapping
- Importance of documenting work upon completion
    - Input / Output verification for all systems
    - Document wire placement
- Certification of cable installation

6.4 Deliver appropriate manuals and documentation to the end user upon completion of installation.

- Select, archive and appropriately distribute critical system information: Passwords, access codes, user ID's, credentials, etc.

DHTI+ ACRONYM LIST

A/C	Alternating Current
ADSL	Asymmetrical Digital Subscriber
AGC	Automatic Gain Control
AP	Access Point
ARP	Address Resolution Protocol
ASCII	American Standard Code for Information Interchange
ATM	Asynchronous Transfer Mode
ATSC	Advanced Televisions Standards Committee
AVI	Audio Video Interleaved
BC	Bare Copper
BNC	British Naval Connector
CAT5	Category 5
CATV	Community Antenna TV/Cable Television
CCS	Copper Clad Steel
CCTV	Closed Circuit TV
CDMA	Call Centre Management Association
CEBus	Consumer Electronics Bus
CMS	Content Management System
COAX	Coaxial
CRT	Cathode Ray Tube
D/C	Direct Current
dB	Decibel
DD	Dolby Digital
DDEX	Digital Data Exchange
DDNS	Dynamic Domain Name Servers
DDP	Datagram Delivery Protocol
DES	Data Encryption Standard
DHCP	Dynamic Host Configuration Protocol
DID	Direct Inward Dialing
DLP	Digital Light Processing
DMM	Digital Multi-Meter
DMZ	Demilitarized Zone
DNS	Domain Name System or Domain Name Server
DOCSIS	Data over Cable Service Interface Specification
DRM	Digital Rights Management
DSL	Digital Subscriber Link
DSS	Direct Station Select
DTS	Digital Theater Sound
DTSES	Digital Theater Sound- Extended Surround
DVB-S	Digital Video Broadcasting Satellite
DVB-T	Digital Video Broadcasting Terrestrial
DVD	Digital Versatile Disc
DVDA	Digital Versatile Disc Audio
DVI	Digital Visual Interface
DVR	Digital Video Recorder
ELV	Electronic Low Voltage
EMF	Electromotive Force
EMI	Electromagnetic Interference
FTP	File Transfer Protocol

GFCI	Ground Fault Circuit Interrupter
GPRS	General Packet Radio Service
GPS	Global Positioning System
HD	High Definition
HDCP	High Definition Copy Protocol
HDMI	High Definition Multimedia Interface
HTTP	HyperText Transfer Protocol
HVAC	Heating Ventilation and Air Conditioning
ICMP	Internet Control Message Protocol
IEEE	Institute of Electrical and Electronics Engineers
IKE	Internet Key Exchange
IP	Internet Protocol
IR	Infrared
IrDA	Infrared Data Association
ISO	International Standards Organization
ISP	Internet Service Provider
KSU	Key Service Unit
LAN	Local Area Network
LCD	Liquid Crystal Display
LCoS	Liquid Crystal on Silicon
LED	Light Emitting Diode
LFE	Low Frequency Effects
LNB	Low Noise Block Down Converter
MAC	Media Access Control
MLV	Magnetic Low Voltage
MP3	Motion Picture Standards Group Layer 3
MPEG	Moving Picture Experts Group
MRAV	Multiroom Audio/Video
MTU	Maximum Transmission Unit
NAS	Network Attached Storage
NAT	Network Address Translation
NEXT	Near End Cross Talk
NIC	Network Interface Card
NTSC	National Televisions Standards Committee
OSI	Open Systems Interconnection Model
OTA	Over the Air
P2P	Peer to Peer
PAL	Phase Alternative Line
PBX	Private Branch Exchange
PC	Personal Computer
PDA	Personal Digital Assistant
PIR	Passive Infrared Sensor
PLC	Powerline Carrier
PoE	Power over Ethernet
POTS	Plain Old Telephone Service
PPPoE	Point to Point Protocol Over Ethernet
PTZ	Pan Tilt Zoom
QAM	Quadrature Amplitude Modulation
QoS	Quality of Service
QS	Quad Shield
RADSL	Rate Adaptive Digital Subscriber Line

RCA	The Radio Corporation of America
REN	Ringer Equivalence Number
RF	Radio Frequency
RFI	Radio Frequency Interference
RGB	Red Green Blue
SACD	Super Audio Compact Disc
SDSL	Symmetrical Digital Subscriber Line
SIA	Security Industry Association
SIP	Session Initiation Protocol
SKIP	Simple Key Management for Internet Protocol
SMDR	Station Message Detail Reporting
SMTP	SimpleMail Transfer Protocol
SSID	Security Set Identifier
STP	Shielded Twisted Pair
SVGA	Super Video Graphics Array
TCP/IP	Transmission Control Protocol / Internet Protocol
TDR	Time Domain Reflectometer
TIA	Telecommunications Industry Association
UDP	Universal Datagram Protocol or User Datagram Protocol
UPB	Universal Powerline Bus
UPnP	Universal Plug and Play
UPS	Uninterruptible power supply
URL	Universal Resource Locator
USB	Universal Serial Bus
UTP	Unshielded Twisted Pair
UV	Ultraviolet
VBR	Variable Bit Rate
VGA	Video Graphics Array
VoIP	Voice over IP
VPN	Virtual Private Network
VSB	Vestigial Side Band
WAN	Wide Area Network
WAP	Wireless Access Point
WEP	Wired Equivalent Privacy
WPA	WiFi Protected Access
WPA2	WiFi Protected Access 2