



# CompTIA A+ Certification Exam Objectives

**EXAM NUMBER: 220-901**



# About the Exam

Candidates are encouraged to use this document to help prepare for CompTIA A+ 220-901. In order to receive the CompTIA A+ certification, you must pass two exams: 220-901 and 220-902. CompTIA A+ 220-901 measures the necessary skills for an entry-level IT professional. Successful candidates will have the knowledge required to:

- **Assemble components based on customer requirements**
- **Install, configure and maintain devices, PCs and software for end users**
- **Understand the basics of networking and security/forensics**
- **Properly and safely diagnose, resolve and document common hardware and software issues**
- **Apply troubleshooting skills**
- **Provide appropriate customer support**
- **Understand the basics of virtualization, desktop imaging and deployment**

These content examples are meant to clarify the test objectives and should not be construed as a comprehensive listing of all the content of this examination.

## **EXAM ACCREDITATION**

CompTIA A+ is accredited by ANSI to show compliance with the ISO 17024 standard and, as such, undergoes regular reviews and updates to the exam objectives.

## **EXAM DEVELOPMENT**

CompTIA exams result from subject-matter expert workshops and industry-wide survey results regarding the skills and knowledge required of an entry-level IT professional.

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## **PLEASE NOTE**

The lists of examples provided in bulleted format are not exhaustive lists. Other examples of technologies, processes or tasks pertaining to each objective may also be included on the exam although not listed or covered in this objectives document. CompTIA is constantly reviewing the content of our exams and updating test questions to be sure our exams are current and the security of the questions is protected. When necessary, we will publish updated exams based on existing exam objectives. Please know that all related exam preparation materials will still be valid.

## TEST DETAILS

|                        |  |
|------------------------|--|
| Required exam          | 220-901  |
| Number of questions    | Maximum of 90  |
| Types of questions     | Multiple choice and performance-based                    |
| Length of test         | 90 minutes   |
| Recommended experience | Six to 12 months hands-on experience in the lab or field |
| Passing score          | 675 (on a scale of 100–900)                              |

## EXAM OBJECTIVES (DOMAINS)

The table below lists the domains measured by this examination and the extent to which they are represented:

| DOMAIN                                 | PERCENTAGE OF EXAMINATION |
|--|---------------------------|
| 1.0 Hardware                           | 34%                       |
| 2.0 Networking                         | 21%                       |
| 3.0 Mobile Devices                     | 17%                       |
| 4.0 Hardware & Network Troubleshooting | 28%                       |
| <b>Total</b>                           | <b>100%</b>               |



# 1.0 Hardware

## 1.1 Given a scenario, configure settings and use BIOS/UEFI tools on a PC.

- **Firmware upgrades/flash BIOS**
- **BIOS component information**
  - RAM
  - Hard drive
  - Optical drive
  - CPU
- **BIOS configurations**
  - Boot sequence
- Enabling and disabling devices
- Date/time
- Clock speeds
- Virtualization support
- BIOS security (passwords, drive encryption: TPM, LoJack, secure boot)
- **Built-in diagnostics**
- **Monitoring**
  - Temperature monitoring
  - Fan speeds
  - Intrusion detection/notification
  - Voltage
  - Clock
  - Bus speed

## 1.2 Explain the importance of motherboard components, their purpose and properties.

- **Sizes**
  - ATX
  - Micro-ATX
  - Mini-ITX
  - ITX
- **Expansion slots**
  - PCI
  - PCI-X
  - PCIe
  - miniPCI
- **RAM slots**
- **CPU sockets**
- **Chipsets**
  - Northbridge
  - Southbridge
- **CMOS battery**
- **Power connections and types**
- **Fan connectors**
- **Front/top panel connectors**
  - USB
  - Audio
  - Power button
  - Power light
  - Drive activity lights
- **Bus speeds**
- **Reset button**

## 1.3 Compare and contrast various RAM types and their features.

- **Types**
  - DDR
  - DDR2
  - DDR3
  - SODIMM
  - DIMM
  - Parity vs. non-parity
- ECC vs. non-ECC
- RAM configurations
  - Single channel vs. dual channel vs. triple channel
- Single sided vs. double sided
- Buffered vs. unbuffered
- **RAM compatibility**

## 1.4 Install and configure PC expansion cards.

- Sound cards
  - Video cards
  - Network cards
  - USB cards
  - Firewire cards
  - Thunderbolt cards
  - Storage cards
  - Modem cards
  - Wireless/cellular cards
  - TV tuner cards
  - Video capture cards
  - Riser cards
- 

## 1.5 Install and configure storage devices and use appropriate media.

- |  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li>• <b>Optical drives</b> <ul style="list-style-type: none"> <li>- CD-ROM/CD-RW</li> <li>- DVD-ROM/DVD-RW/DVD-RW DL</li> <li>- Blu-ray</li> <li>- BD-R</li> <li>- BD-RE</li> </ul> </li> <li>• <b>Magnetic hard disk drives</b> <ul style="list-style-type: none"> <li>- 5400 rpm</li> <li>- 7200 rpm</li> <li>- 10,000 rpm</li> </ul> </li> <li>• <b>Hot swappable drives</b></li> <li>• <b>Solid state/flash drives</b> <ul style="list-style-type: none"> <li>- Compact flash</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>- SD</li> <li>- microSD</li> <li>- MiniSD</li> <li>- xD</li> <li>- SSD</li> <li>- Hybrid</li> <li>- eMMC</li> <li>• <b>RAID types</b> <ul style="list-style-type: none"> <li>- 0</li> <li>- 1</li> <li>- 5</li> <li>- 10</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• <b>Tape drive</b></li> <li>• <b>Media capacity</b> <ul style="list-style-type: none"> <li>- CD</li> <li>- CD-RW</li> <li>- DVD-RW</li> <li>- DVD</li> <li>- Blu-ray</li> <li>- Tape</li> <li>- DVD DL</li> </ul> </li> </ul> |
|--|--|---|
- 

## 1.6 Install various types of CPUs and apply the appropriate cooling methods.

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• <b>Socket types</b> <ul style="list-style-type: none"> <li>- Intel: 775, 1155, 1156, 1366, 1150, 2011</li> <li>- AMD: AM3, AM3+, FM1, FM2, FM2+</li> </ul> </li> <li>• <b>Characteristics</b> <ul style="list-style-type: none"> <li>- Speeds</li> <li>- Cores</li> <li>- Cache size/type</li> <li>- Hyperthreading</li> <li>- Virtualization support</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>- Architecture (32-bit vs. 64-bit)</li> <li>- Integrated GPU</li> <li>- Disable execute bit</li> <li>• <b>Cooling</b> <ul style="list-style-type: none"> <li>- Heat sink</li> <li>- Fans</li> <li>- Thermal paste</li> <li>- Liquid-based</li> <li>- Fanless/passive</li> </ul> </li> </ul> |
|---|--|



## 1.7 Compare and contrast various PC connection interfaces, their characteristics and purpose.

- **Physical connections**
  - USB 1.1 vs. 2.0 vs. 3.0
    - Connector types: A, B, mini, micro
  - Firewire 400 vs. Firewire 800
  - SATA1 vs. SATA2 vs. SATA3, eSATA
  - Other connector types
    - VGA
    - HDMI
    - DVI
- Audio
  - Analog
  - Digital (Optical connector)
- RJ-45
- RJ-11
- Thunderbolt
- **Wireless connections**
  - Bluetooth
  - RF
- IR
- NFC
- **Characteristics**
  - Analog
  - Digital
  - Distance limitations
  - Data transfer speeds
  - Quality
  - Frequencies

## 1.8 Install a power supply based on given specifications.

- **Connector types and their voltages**
  - SATA
  - Molex
  - 4/8-pin 12v
  - PCIe 6/8-pin
  - 20-pin
  - 24-pin
- **Specifications**
  - Wattage
  - Dual rail
  - Size
  - Number of connectors
  - ATX
  - MicroATX
  - Dual voltage options

## 1.9 Given a scenario, select the appropriate components for a custom PC configuration to meet customer specifications or needs.

- **Graphic/CAD/CAM design workstation**
  - Multicore processor
  - High-end video
  - Maximum RAM
- **Audio/video editing workstation**
  - Specialized audio and video card
  - Large fast hard drive
  - Dual monitors
- **Virtualization workstation**
  - Maximum RAM and CPU cores
- **Gaming PC**
  - Multicore processor
- High-end video/specialized GPU
- High-definition sound card
- High-end cooling
- **Home theater PC**
  - Surround sound audio
  - HDMI output
  - HTPC compact form factor
  - TV tuner
- **Standard thick client**
  - Desktop applications
  - Meets recommended requirements for selected OS
- **Thin client**
  - Basic applications
  - Meets minimum requirements for selected OS
  - Network connectivity
- **Home server PC**
  - Media streaming
  - File sharing
  - Print sharing
  - Gigabit NIC
  - RAID array

## 1.10 Compare and contrast types of display devices and their features.

- **Types**
    - LCD
      - TN vs. IPS
      - Fluorescent vs. LED backlighting
    - Plasma
    - Projector
    - OLED
  - **Refresh/frame rates**
  - **Resolution**
  - **Native resolution**
  - **Brightness/lumens**
  - **Analog vs. digital**
  - **Privacy/antiglare filters**
  - **Multiple displays**
  - **Aspect ratios**
    - 16:9
    - 16:10
    - 4:3
- 

## 1.11 Identify common PC connector types and associated cables.

- **Display connector types**
    - DVI-D
    - DVI-I
    - DVI-A
    - DisplayPort
    - RCA
    - HD15 (i.e., DE15 or DB15)
    - BNC
    - miniHDMI
    - miniDin-6
  - **Display cable types**
    - HDMI
    - DVI
    - VGA
    - Component
    - Composite
    - Coaxial
  - **Device cables and connectors**
    - SATA
    - eSATA
    - USB
    - Firewire (IEEE1394)
    - PS/2
    - Audio
  - **Adapters and convertors**
    - DVI to HDMI
    - USB A to USB B
    - USB to Ethernet
    - DVI to VGA
    - Thunderbolt to DVI
    - PS/2 to USB
    - HDMI to VGA
- 

## 1.12 Install and configure common peripheral devices.

- **Input devices**
  - Mouse
  - Keyboard
  - Scanner
  - Barcode reader
  - Biometric devices
  - Game pads
  - Joysticks
  - Digitizer
  - Motion sensor
- **Touchpads**
- **Smart card readers**
- **Digital cameras**
- **Microphone**
- **Webcam**
- **Camcorder**
- **Output devices**
  - Printers
  - Speakers
  - Display devices
- **Input & output devices**
  - Touch screen
  - KVM
  - Smart TV
  - Set-top box
  - MIDI-enabled devices

### 1.13 Install SOHO multifunction device/printers and configure appropriate settings.

- **Use appropriate drivers for a given operating system**
    - Configuration settings
      - Duplex
      - Collate
      - Orientation
      - Quality
  - **Device sharing**
    - Wired
      - USB
      - Serial
      - Ethernet
    - Wireless
      - Bluetooth
      - 802.11 (a/b/g/n/ac)
      - Infrastructure vs. ad hoc
    - Integrated print server (hardware)
    - Cloud printing/remote printing
  - **Public/shared devices**
    - Sharing local/networked device via operating system settings
      - TCP/Bonjour/AirPrint
    - Data privacy
      - User authentication on the device
      - Hard drive caching
- 

### 1.14 Compare and contrast differences between the various print technologies and the associated imaging process.

- **Laser**
    - Imaging drum, fuser assembly, transfer belt, transfer roller, pickup rollers, separate pads, duplexing assembly
    - Imaging process: processing, charging, exposing, developing, transferring, fusing and cleaning
  - **Inkjet**
    - Ink cartridge, print head, roller, feeder, duplexing assembly, carriage and belt
    - Calibration
  - **Thermal**
    - Feed assembly, heating element
    - Special thermal paper
  - **Impact**
    - Print head, ribbon, tractor feed
    - Impact paper
  - **Virtual**
    - Print to file
    - Print to PDF
    - Print to XPS
    - Print to image
- 

### 1.15 Given a scenario, perform appropriate printer maintenance.

- **Laser**
  - Replacing toner, applying maintenance kit, calibration, cleaning
- **Thermal**
  - Replace paper, clean heating element, remove debris
- **Impact**
  - Replace ribbon, replace print head, replace paper
- **Inkjet**
  - Clean heads, replace cartridges, calibration, clear jams





## 2.0 Networking

### 2.1 Identify the various types of network cables and connectors.

- **Fiber**
  - Connectors: SC, ST and LC
- **Twisted Pair**
  - Connectors: RJ-11, RJ-45
  - Wiring standards: T568A, T568B
- **Coaxial**
  - Connectors: BNC, F-connector

### 2.2 Compare and contrast the characteristics of connectors and cabling.

- **Fiber**
  - Types (single-mode vs. multi-mode)
  - Speed and transmission limitations
- **Twisted pair**
  - Types: STP, UTP, Cat 3, Cat 5, Cat 5e, Cat 6, Cat 6e, Cat 7, plenum, PVC
  - Speed and transmission limitations
  - Splitters and effects on signal quality
- **Coaxial**
  - Types: RG-6, RG-59
  - Speed and transmission limitations
  - Splitters and effects on signal quality

### 2.3 Explain the properties and characteristics of TCP/IP.

- **IPv4 vs. IPv6**
- **Public vs. private vs. APIPA/link local**
- **Static vs. dynamic**
- **Client-side DNS settings**
- **Client-side DHCP**
- **Subnet mask vs. CIDR**
- **Gateway**

### 2.4 Explain common TCP and UDP ports, protocols and their purpose.

- **Ports**
  - 21 – FTP
  - 22 – SSH
  - 23 – TELNET
  - 25 – SMTP
  - 53 – DNS
  - 80 – HTTP
  - 110 – POP3
  - 143 – IMAP
  - 443 – HTTPS
  - 3389 – RDP
  - 137-139 – NetBIOS/NetBT
  - 445 – SMB/CIFS
  - 427 – SLP
  - 548 – AFP
  - LDAP
  - SNMP
  - SMB
  - CIFS
  - SSH
  - AFP
- **Protocols**
  - DHCP
  - DNS
- **TCP vs. UDP**

## 2.5 Compare and contrast various WiFi networking standards and encryption types.

- Standards
    - 802.11 (a/b/g/n/ac)
    - Speeds, distances and frequencies
  - Encryption types
    - WEP, WPA, WPA2, TKIP, AES
- 

## 2.6 Given a scenario, install and configure SOHO wireless/wired router and apply appropriate settings.

- Channels
  - Port forwarding, port triggering
  - DHCP (on/off)
  - DMZ
  - NAT/DNAT
  - Basic QoS
  - Firmware
  - UPnP
- 

## 2.7 Compare and contrast Internet connection types, network types and their features.

- Internet connection types
    - Cable
    - DSL
    - Dial-up
    - Fiber
    - Satellite
  - ISDN
  - Cellular
    - Tethering
    - Mobile hotspot
  - Line-of-sight wireless Internet service
  - Network Types
    - LAN
    - WAN
    - PAN
    - MAN
- 

## 2.8 Compare and contrast network architecture devices, their functions and features.

- Hub
  - Switch
  - Router
  - Access point
  - Bridge
  - Modem
  - Firewall
  - Patch panel
  - Repeaters/extenders
  - Ethernet over Power
  - Power over Ethernet injector
- 

## 2.9 Given a scenario, use appropriate networking tools.

- Crimper
- Cable stripper
- Multimeter
- Tone generator and probe
- Cable tester
- Loopback plug
- Punchdown tool
- WiFi analyzer



## 3.0 Mobile Devices

### 3.1 Install and configure laptop hardware and components.

- **Expansion options**
  - Expresscard /34
  - Expresscard /54
  - SODIMM
  - Flash
  - Ports/Adapters
    - Thunderbolt
    - DisplayPort
    - USB to RJ-45 dongle
    - USB to WiFi dongle
  - USB to Bluetooth
  - USB optical drive
- **Hardware/device replacement**
  - Keyboard
  - Hard drive
    - SSD vs. hybrid vs. magnetic disk
    - 1.8in vs. 2.5in
  - Memory
  - Smart card reader
  - Optical drive
  - Wireless card
  - Mini-PCIe
  - Screen
  - DC jack
  - Battery
  - Touchpad
  - Plastics/frames
  - Speaker
  - System board
  - CPU

### 3.2 Explain the function of components within the display of a laptop.

- **Types**
  - LCD
    - TN vs. IPS
    - Fluorescent vs. LED backlighting
  - OLED
- **WiFi antenna connector/placement**
- **Webcam**
- **Microphone**
- **Inverter**
- **Digitizer**

### 3.3 Given a scenario, use appropriate laptop features.

- **Special function keys**
  - Dual displays
  - Wireless (on/off)
  - Cellular (on/off)
  - Volume settings
  - Screen brightness
  - Bluetooth (on/off)
  - Keyboard backlight
  - Touchpad (on/off)
  - Screen orientation
  - Media options (fast forward/rewind)
  - GPS (on/off)
  - Airplane mode
- **Docking station**
- **Physical laptop lock and cable lock**
- **Rotating/removable screens**



### 3.4 Explain the characteristics of various types of other mobile devices.

- Tablets
  - Smartphones
  - Wearable technology devices
    - Smart watches
  - Fitness monitors
  - Glasses and headsets
  - Phablets
  - e-readers
  - Smart camera
  - GPS
- 

### 3.5 Compare and contrast accessories and ports of other mobile devices.

- **Connection types**
  - NFC
  - Proprietary vendor-specific ports (communication/power)
  - MicroUSB/miniUSB
  - Lightning
  - Bluetooth
- IR
- Hotspot/tethering
- **Accessories**
  - Headsets
  - Speakers
  - Game pads
  - Docking stations
- Extra battery packs/battery chargers
- Protective covers/water proofing
- Credit card readers
- Memory/MicroSD



## 4.0 Hardware and Network Troubleshooting

### 4.1 Given a scenario, troubleshoot common problems related to motherboards, RAM, CPU and power with appropriate tools.

- **Common symptoms**
  - Unexpected shutdowns
  - System lockups
  - POST code beeps
  - Blank screen on bootup
  - BIOS time and settings resets
  - Attempts to boot to incorrect device
  - Continuous reboots
- No power
- Overheating
- Loud noise
- Intermittent device failure
- Fans spin – no power to other devices
- Indicator lights
- Smoke
- Burning smell
- Proprietary crash screens (BSOD/pin wheel)
- Distended capacitors
- **Tools**
  - Multimeter
  - Power supply tester
  - Loopback plugs
  - POST card/USB

### 4.2 Given a scenario, troubleshoot hard drives and RAID arrays with appropriate tools.

- **Common symptoms**
  - Read/write failure
  - Slow performance
  - Loud clicking noise
  - Failure to boot
  - Drive not recognized
  - OS not found
  - RAID not found
- RAID stops working
- Proprietary crash screens (BSOD/pin wheel)
- S.M.A.R.T. errors
- **Tools**
  - Screwdriver
  - External enclosures
  - CHKDSK
- FORMAT
- File recovery software
- Bootrec
- DiskPart
- Defragmentation tool

### 4.3 Given a scenario, troubleshoot common video, projector and display issues.

- **Common symptoms**
  - VGA mode
  - No image on screen
  - Overheat shutdown
  - Dead pixels
- Artifacts
- Color patterns incorrect
- Dim image
- Flickering image
- Distorted image
- Distorted geometry
- Burn-in
- Oversized images and icons



#### 4.4 Given a scenario, troubleshoot wired and wireless networks with appropriate tools.

##### • Common symptoms

- No connectivity
- APIPA/link local address
- Limited connectivity
- Local connectivity
- Intermittent connectivity
- IP conflict
- Slow transfer speeds
- Low RF signal
- SSID not found

##### • Hardware tools

- Cable tester
- Loopback plug
- Punchdown tools
- Tone generator and probe
- Wire strippers
- Crimper
- Wireless locator

##### • Command line tools

- PING
  - IPCONFIG/IFCONFIG
  - TRACERT
  - NETSTAT
  - NBTSTAT
  - NET
  - NETDOM
  - NSLOOKUP
- 

#### 4.5 Given a scenario, troubleshoot and repair common mobile device issues while adhering to the appropriate procedures.

##### • Common symptoms

- No display
- Dim display
- Flickering display
- Sticking keys
- Intermittent wireless
- Battery not charging
- Ghost cursor/pointer drift
- No power
- Num lock indicator lights

- No wireless connectivity
- No Bluetooth connectivity
- Cannot display to external monitor
- Touchscreen non-responsive
- Apps not loading
- Slow performance
- Unable to decrypt email
- Extremely short battery life
- Overheating
- Frozen system

- No sound from speakers
- GPS not functioning
- Swollen battery

##### • Disassembling processes for proper re-assembly

- Document and label cable and screw locations
  - Organize parts
  - Refer to manufacturer resources
  - Use appropriate hand tools
- 

#### 4.6 Given a scenario, troubleshoot printers with appropriate tools.

##### • Common symptoms

- Streaks
- Faded prints
- Ghost images
- Toner not fused to the paper
- Creased paper
- Paper not feeding
- Paper jam
- No connectivity

- Garbled characters on paper
- Vertical lines on page
- Backed up print queue
- Low memory errors
- Access denied
- Printer will not print
- Color prints in wrong print color
- Unable to install printer
- Error codes

- Printing blank pages
- No image on printer display

##### • Tools

- Maintenance kit
- Toner vacuum
- Compressed air
- Printer spooler

# CompTIA A+ Acronyms

The following is a list of acronyms that appear on the CompTIA A+ exams. Candidates are encouraged to review the complete list and attain a working knowledge of all listed acronyms as a part of a comprehensive exam preparation program.

| <b>ACRONYM</b> | <b>SPELLED OUT</b>   | <b>ACRONYM</b> | <b>SPELLED OUT</b>   |
|----------------|--|----------------|--|
| AC             | Alternating Current  | CFS            | Central File System or Common File System or Command File System |
| ACL            | Access Control List  | CGA            | Computer Graphics and Applications                               |
| ACPI           | Advanced Configuration Power Interface                                     | CIDR           | Classless Inter-Domain Routing                                   |
| ACT            | Activity   | CIFS           | Common Internet File System                                      |
| ADSL           | Asymmetrical Digital Subscriber Line                                       | CMOS           | Complementary Metal-Oxide Semiconductor                          |
| AES            | Advanced Encryption Standard   | CNR            | Communications and Networking Riser                              |
| AGP            | Accelerated Graphics Port  | COMx           | Communication Port (x=Port Number)                               |
| AHCI           | Advanced Host Controller Interface   | CPU            | Central Processing Unit  |
| AP             | Access Point   | CRT            | Cathode Ray Tube   |
| APIPA          | Automatic Private Internet Protocol Addressing                             | DAC            | Discretionary Access Control                                     |
| APM            | Advanced Power Management  | DB-25          | Serial Communications D-Shell Connector, 25 Pins                 |
| ARP            | Address Resolution Protocol  | DB-9           | 9 Pin D Shell Connector  |
| ASR            | Automated System Recovery  | DC             | Direct Current   |
| ATA            | Advanced Technology Attachment   | DDoS           | Distributed Denial of Service                                    |
| ATAPI          | Advanced Technology Attachment Packet Interface                            | DDR            | Double Data Rate   |
| ATM            | Asynchronous Transfer Mode   | DDR RAM        | Double Data Rate Random-Access Memory                            |
| ATSC           | Advanced Television Systems Committee                                      | DDR SDRAM      | Double Data Rate Synchronous Dynamic Random-Access Memory        |
| ATX            | Advanced Technology Extended   | DFS            | Distributed File System  |
| AUP            | Acceptable Use Policy  | DHCP           | Dynamic Host Configuration Protocol                              |
| A/V            | Audio Video  | DIMM           | Dual Inline Memory Module  |
| BD-R           | Blu-ray Disk Recordable  | DIN            | Deutsche Industrie Norm  |
| BIOS           | Basic Input/Output System  | DLT            | Digital Linear Tape  |
| BNC            | Bayonet-Neill-Concelman or British Naval Connector                         | DLP            | Digital Light Processing or Data Loss Prevention                 |
| BSOD           | Blue Screen of Death   | DMA            | Direct Memory Access   |
| BTX            | Balanced Technology Extended   | DMZ            | Demilitarized Zone   |
| CAD            | Computer Aided Design  | DNAT           | Destination Network Address Translation                          |
| CAPTCHA        | Completely Automated Public Turing Test to tell Computers and Humans Apart | DNS            | Domain Name Service or Domain Name Server                        |
| CAS            | Column Access Strobe   | DoS            | Denial of Service  |
| CCFL           | Cold Cathode Fluorescent Lamp  | DRAM           | Dynamic Random Access Memory                                     |
| CD             | Compact Disc   | DRM            | Digital Rights Management  |
| CD-ROM         | Compact Disc-Read-Only Memory  | DSL            | Digital Subscriber Line  |
| CD-RW          | Compact Disc-Rewritable  | DVD            | Digital Video Disc or Digital Versatile Disc                     |
| CDFS           | Compact Disc File System   | DVD-RAM        | Digital Video Disc-Random-Access Memory                          |
| CERT           | Computer Emergency Response Team   |                |  |

| <b>ACRONYM</b> | <b>SPELLED OUT</b>  |
|----------------|---|
| DVD-ROM        | Digital Video Disc-Read-Only Memory                       |
| DVD-R          | Digital Video Disc-Recordable                             |
| DVD-RW         | Digital Video Disc-Rewritable                             |
| DVI            | Digital Visual Interface                                  |
| DVR            | Digital Video Recorder                                    |
| ECC            | Error Correcting Code or<br>Error Checking and Correction |
| ECP            | Extended Capabilities Port                                |
| EDO            | Extended Data Out (RAM)                                   |
| EEPROM         | Electrically Erasable Programmable<br>Read-Only Memory    |
| EFS            | Encrypting File System                                    |
| EIDE           | Enhanced Integrated Drive Electronics                     |
| ELP            | Electroluminescence Panel                                 |
| EMI            | Electromagnetic Interference                              |
| EMP            | Electromagnetic Pulse                                     |
| EPROM          | Erasable Programmable Read-Only Memory                    |
| EPP            | Enhanced Parallel Port                                    |
| ERD            | Emergency Repair Disk                                     |
| eSATA          | External Serial Advanced Technology Attachment            |
| ESD            | Electrostatic Discharge                                   |
| EULA           | End-User License Agreement                                |
| EVGA           | Extended Video Graphics Adapter/Array                     |
| EVDO           | Evolution Data Optimized or Evolution Data Only           |
| Ext2           | Second Extended File System                               |
| exFAT          | Extended File Allocation Table                            |
| FAT            | File Allocation Table                                     |
| FAT12          | 12-Bit File Allocation Table                              |
| FAT16          | 16-Bit File Allocation Table                              |
| FAT32          | 32-Bit File Allocation Table                              |
| FDD            | Floppy Disk Drive   |
| Fn             | Function (referring to the function key on a laptop)      |
| FPM            | Fast Page Mode  |
| FRU            | Field Replaceable Unit                                    |
| FSB            | Front Side Bus  |
| FTP            | File Transfer Protocol                                    |
| FQDN           | Fully Qualified Domain Name                               |
| Gb             | Gigabit   |
| GB             | Gigabyte  |
| GDDR           | Graphics Double Data Rate                                 |
| GDI            | Graphics Device Interface                                 |
| GHz            | Gigahertz   |
| GUI            | Graphical User Interface                                  |
| GPS            | Global Positioning System                                 |
| GPT            | GUID Partition Table                                      |
| GPU            | Graphics Processing Unit                                  |

| <b>ACRONYM</b> | <b>SPELLED OUT</b>   |
|----------------|--|
| GSM            | Global System for Mobile Communications  |
| HAL            | Hardware Abstraction Layer   |
| HAV            | Hardware-Assisted Virtualization   |
| HCL            | Hardware Compatibility List  |
| HDCP           | High-Bandwidth Digital Content Protection  |
| HDD            | Hard Disk Drive  |
| HDMI           | High-Definition Media Interface  |
| HIPS           | Host Intrusion Prevention System   |
| HPFS           | High-Performance File System   |
| HSF            | Heat Sink and Fan  |
| HTML           | Hypertext Markup Language  |
| HTPC           | Home Theater PC  |
| HTTP           | Hypertext Transfer Protocol  |
| HTTPS          | Hypertext Transfer Protocol Over<br>Secure Sockets Layer                           |
| I/O            | Input/Output   |
| ICMP           | Internet Control Message Protocol  |
| ICR            | Intelligent Character Recognition  |
| ICS            | Internet Connection Sharing  |
| IDE            | Integrated Drive Electronics   |
| IDF            | Intermediate Distribution Frame  |
| IDS            | Intrusion Detection System   |
| IEEE           | Institute of Electrical and Electronics Engineers                                  |
| IIS            | Internet Information Services  |
| IMAP           | Internet Mail Access Protocol  |
| IMEI           | International Mobile Equipment Identity  |
| IMSI           | International Mobile Subscriber Identity   |
| IP             | Internet Protocol  |
| IPCONFIG       | Internet Protocol Configuration  |
| IPP            | Internet Printing Protocol   |
| IPS            | In-Plane Switching   |
| IPSec          | Internet Protocol Security   |
| IR             | Infrared   |
| IrDA           | Infrared Data Association  |
| IRP            | Incident Response Plan   |
| IRQ            | Interrupt Request  |
| ISDN           | Integrated Services Digital Network  |
| ISO            | International Organization for Standardization/<br>Industry Standards Organization |
| ISP            | Internet Service Provider  |
| JBOD           | Just a Bunch Of Disks  |
| Kb             | Kilobit  |
| KB             | Kilobyte or Knowledge Base   |
| KVM            | Kernel-based Virtual Machine   |
| LAN            | Local Area Network   |
| LBA            | Logical Block Addressing   |
| LC             | Lucent Connector   |
| LCD            | Liquid Crystal Display   |
| LDAP           | Lightweight Directory Access Protocol  |
| LED            | Light Emitting Diode   |
| LI-ON          | Lithium-Ion  |
| LPD/LPR        | Line Printer Daemon/Line Printer Remote  |



| <b>ACRONYM</b> | <b>SPELLED OUT</b>   | <b>ACRONYM</b> | <b>SPELLED OUT</b>                                      |
|----------------|--|----------------|---|
| LPT            | Line Printer Terminal  | PAT            | Port Address Translation                                |
| LVD            | Low Voltage Differential                                       | PATA           | Parallel Advanced Technology Attachment                 |
| LVDS           | Low Voltage Differential Signaling                             | PC             | Personal Computer                                       |
| MAC            | Media Access Control or Mandatory Access Control               | PCI            | Peripheral Component Interconnect                       |
| MAN            | Metropolitan Area Network                                      | PCIe           | Peripheral Component Interconnect express               |
| MAPI           | Messaging Application Programming Interface                    | PCI-X          | Peripheral Component Interconnect Extended              |
| MAU            | Media Access Unit or Media Attachment Unit                     | PCL            | Printer Control Language                                |
| mATX           | Micro Advanced Technology Extended                             | PCMCIA         | Personal Computer Memory Card International Association |
| Mb             | Megabit  | PE             | Preinstallation Environment                             |
| MB             | Megabyte   | PGA            | Pin Grid Array  |
| MBR            | Master Boot Record   | PGA2           | Pin Grid Array 2  |
| MBSA           | Microsoft Baseline Security Analyzer                           | PGP            | Pretty Good Protection                                  |
| MDM            | Master Data Management   | PII            | Personally Identifiable Information                     |
| MFA            | Multifactor Authentication                                     | PIN            | Personal Identification Number                          |
| MFD            | Multi-Function Device  | PKI            | Public Key Infrastructure                               |
| MFP            | Multi-Function Product   | PnP            | Plug and Play   |
| MHz            | Megahertz  | POP3           | Post Office Protocol 3                                  |
| MicroDIMM      | Micro Dual Inline Memory Module                                | PoS            | Point of Sale   |
| MIDI           | Musical Instrument Digital Interface                           | POST           | Power On Self Test                                      |
| MIME           | Multipurpose Internet Mail Extension                           | POTS           | Plain Old Telephone Service                             |
| MIMO           | Multiple Input Multiple Output                                 | PPM            | Pages Per Minute  |
| MMC            | Microsoft Management Console                                   | PPP            | Point-to-Point Protocol                                 |
| MP3            | Moving Picture Experts Group Layer 3 Audio                     | PPTP           | Point-to-Point Tunneling Protocol                       |
| MP4            | Moving Picture Experts Group Layer 4                           | PRI            | Primary Rate Interface                                  |
| MPEG           | Moving Picture Experts Group                                   | PRL            | Preferred Roaming List                                  |
| MSCONFIG       | Microsoft Configuration  | PROM           | Programmable Read-Only Memory                           |
| MSDS           | Material Safety Data Sheet                                     | PS/2           | Personal System/2 Connector                             |
| MT-RJ          | Mechanical Transfer Registered Jack                            | PSTN           | Public Switched Telephone Network                       |
| MUI            | Multilingual User Interface                                    | PSU            | Power Supply Unit                                       |
| NAC            | Network Access Control   | PVA            | Patterned Vertical Alignment                            |
| NAS            | Network Attached Storage                                       | PVC            | Permanent Virtual Circuit                               |
| NAT            | Network Address Translation                                    | PXE            | Preboot Execution Environment                           |
| NetBIOS        | Networked Basic Input/Output System                            | QoS            | Quality of Service                                      |
| NetBEUI        | Networked Basic input/output system<br>Extended User Interface | RADIUS         | Remote Authentication Dial-In User Server               |
| NFC            | Near Field Communication                                       | RAID           | Redundant Array of Independent (or Inexpensive) Discs   |
| NFS            | Network File System  | RAM            | Random Access Memory                                    |
| NIC            | Network Interface Card   | RAMBUS         | Rambus Dynamic Random Access Memory                     |
| NiCd           | Nickel Cadmium   | RAS            | Remote Access Service                                   |
| NiMH           | Nickel Metal Hydride   | RDP            | Remote Desktop Protocol                                 |
| NLX            | New Low profile Extended                                       | RF             | Radio Frequency   |
| NNTP           | Network News Transfer Protocol                                 | RFI            | Radio Frequency Interference                            |
| NTFS           | New Technology File System                                     | RGB            | Red Green Blue  |
| NTLDR          | New Technology Loader  | RIP            | Routing Information Protocol                            |
| NTP            | Network Time Protocol  | RIS            | Remote Installation Service                             |
| NTSC           | National Transmission Standards Committee                      | RISC           | Reduced Instruction Set Computer                        |
| NVM HCl        | Non-Volatile Memory Host Controller Interface                  | RJ-11          | Registered Jack Function 11                             |
| OCR            | Optical Character Recognition                                  | RJ-45          | Registered Jack Function 45                             |
| OEM            | Original Equipment Manufacturer                                | RMA            | Returned Materials Authorization                        |
| OLED           | Organic Light Emitting Diode                                   | ROM            | Read-Only Memory  |
| OS             | Operating System   | RPO            | Recovery Point Objective                                |
| PAL            | Phase Alternating Line   | RTC            | Real-Time Clock   |
| PAN            | Personal Area Network  |                |   |

**ACRONYM**    **SPELLED OUT**

|            |   |       |   |
|------------|---|-------|---|
| RTO        | Recovery Time Objective   | UPnP  | Universal Plug and Play                           |
| SAN        | Storage Area Network  | UPS   | Uninterruptible Power Supply                      |
| SAS        | Serial Attached SCSI  | URL   | Uniform Resource Locator                          |
| SATA       | Serial Advanced Technology Attachment   | USB   | Universal Serial Bus                              |
| SC         | Subscription Channel  | USMT  | User State Migration Tool                         |
| SCP        | Secure Copy Protection  | UTM   | Unified Threat Management                         |
| SCSI       | Small Computer System Interface   | UTP   | Unshielded Twisted Pair                           |
| SCSI ID    | Small Computer System Interface Identifier                                      | UUID  | Universally Unique Identifier                     |
| SD Card    | Secure Digital Card   | UXGA  | Ultra Extended Graphics Array                     |
| SDRAM      | Synchronous Dynamic Random-Access Memory  | VA    | Vertical Alignment                                |
| SEC        | Single Edge Connector   | VDC   | Volts DC  |
| SFC        | System File Checker   | VDI   | Virtual Desktop Infrastructure                    |
| SFF        | Small Form Factor   | VESA  | Video Electronics Standards Association           |
| SFTP       | Secured File Transfer Protocol  | VFAT  | Virtual File Allocation Table                     |
| SIMM       | Single In-line Memory Module  | VGA   | Video Graphics Array                              |
| SLI        | Scalable Link Interface or System Level Integration or Scanline Interleave Mode | VM    | Virtual Machine                                   |
| S.M.A.R.T. | Self-Monitoring, Analysis, and Reporting Technology                             | VNC   | Virtual Network Computer                          |
| SMB        | Server Message Block or Small To Midsize Business                               | VoIP  | Voice over Internet Protocol                      |
| SMTP       | Simple Mail Transfer Protocol   | VPN   | Virtual Private Network                           |
| SNMP       | Simple Network Management Protocol  | VRAM  | Video Random-Access Memory                        |
| SoDIMM     | Small outline Dual Inline Memory Module   | WAN   | Wide Area Network                                 |
| SOHO       | Small Office, Home Office   | WAP   | Wireless Access Protocol or Wireless Access Point |
| SP         | Service Pack  | WEP   | Wired Equivalent Privacy                          |
| SPDIF      | Sony/Philips Digital Interface Format   | WiFi  | Wireless Fidelity                                 |
| SPGA       | Staggered Pin Grid Array  | WINS  | Windows Internet Name Service                     |
| SRAM       | Static Random-Access Memory   | WLAN  | Wireless Local Area Network                       |
| SSH        | Secure Shell  | WPA   | WiFi Protected Access                             |
| SSID       | Service Set Identifier  | WPA2  | WiFi Protected Access 2                           |
| SSL        | Secure Sockets Layer  | WPS   | WiFi Protected Setup                              |
| SSO        | Single Sign-On  | WUXGA | Wide Ultra Extended Graphics Array                |
| ST         | Straight Tip  | WWAN  | Wireless Wide Area Network                        |
| STP        | Shielded Twisted Pair   | XGA   | Extended Graphics Array                           |
| SXGA       | Super Extended Graphics Array   | ZIF   | Zero Insertion Force                              |
| TB         | Terabyte  | ZIP   | Zig-zag Inline Package                            |
| TCP        | Transmission Control Protocol   |       |   |
| TCP/IP     | Transmission Control Protocol/Internet Protocol                                 |       |   |
| TDR        | Time Domain Reflectometer   |       |   |
| TFT        | Thin Film Transistor  |       |   |
| TFTP       | Trivial File Transfer Protocol  |       |   |
| TKIP       | Temporal Key Integrity Protocol   |       |   |
| TLS        | Transport Layer Security  |       |   |
| TN         | Twisted Nematic   |       |   |
| TPM        | Trusted Platform Module   |       |   |
| UAC        | User Account Control  |       |   |
| UDF        | User Defined Functions or Universal Disk Format or Universal Data Format        |       |   |
| UDP        | User Datagram Protocol  |       |   |
| UEFI       | Unified Extensible Firmware Interface   |       |   |
| UNC        | Universal Naming Convention   |       |   |

# A+ Proposed Hardware and Software List

CompTIA has included this sample list of hardware and software to assist candidates as they prepare for the A+ exam. This list may also be helpful for training companies that wish to create a lab component to their training offering. The bulleted lists below each topic are sample lists and not exhaustive.

## EQUIPMENT

- Apple tablet/smartphone
- Android tablet/smartphone
- Windows tablet/smartphone
- Windows laptop/Mac laptop/Linux laptop
- Windows desktop/Mac desktop/Linux desktop
- Monitors
- Projectors
- SOHO router/switch
- Access point
- VoIP phone
- Printer
  - Laser/inkjet
  - Wireless
- Surge suppressor
- UPS

## SPARE PARTS/HARDWARE

- Motherboards
- RAM
- Hard drives
- Power supplies
- Video cards
- Sound cards
- Network cards
- Wireless NICs
- Fans/cooling devices/heat sink
- CPUs
- Assorted connectors/cables
  - USB
  - HDMI
  - etc

- Adapters
- Network cables
- Unterminated network cable/connectors
- AC adapters
- Optical drives
- Screws/stand-offs
- Cases
- Maintenance kit
- Mice/keyboards

## TOOLS

- Screw drivers
- Multimeter
- Wire cutters
- Punchdown tool
- Crimper
- Power supply tester
- Cable stripper
- POST cards
- Standard technician toolkit
- ESD strap
- Thermal paste
- Cable tester
- WiFi analyzer
- SATA to USB connectors

## SOFTWARE

- Operating system disks
- Antivirus software
- Virtualization software
- Anti-malware
- Driver software