



เอกสารประกอบการฝึกอบรมและสอบมาตรฐานสากล
ระดับพื้นฐาน

หลักสูตรการดูแลและบำรุงรักษาระบบสารสนเทศ (CompTIA A+)

รหัสวิชา CompTIA A+ 220-801

สำนักวิทยบริการและเทคโนโลยีสารสนเทศ
มหาวิทยาลัยเทคโนโลยีราชมงคลพระนคร

RMUTP : CompTIA A+ Pacing Guide (14 - 23 December 2015)

D1	TIME	Topic/Activity	Materials	Instructors
14-Dec-2015	0900-1030	Introduction : Objtives, Outline, Materials Pre-Test	A+ (220-801,220-802) Objectives, Slides, Others LMS : 20 Questions Test	
	1030-1045	- break -		
	1045-1200	Hardware Fundamentals	Slides (36)	
	1200-1300	- lunch -		
	1300-1430	Peripheral Components	Slides (23)	
	1430-1445	- break -		
	1445-1600	Demo : Inside Desktop PC Tutorials	Desktop PC 17+18 Questions (Lecture)	
D2	TIME	Topic/Activity	Materials	Note
15-Dec-2015	0900-1030	Managing System Components	Slides (49)	
	1030-1045	- break -		
	1045-1200	Customized Client Environments Tutorials	Slides (16) 55+16 Questions (Lecture)	
	1200-1300	- lunch -		
	1300-1430	Network Technologies	Slides (67)	
	1430-1445	- break -		
	1445-1600	Network Technologies (cont'd) Tutorials	Slides (67) 64 Questions (Lecture)	
D3	TIME	Topic/Activity	Materials	Note
16-Dec-2015	0900-1030	Installing, Configuring, and Maintaining SOHO Networks Tutorials	Slides (19) 22 Questions (Lecture)	
	1030-1045	- break -		
	1045-1200	Support Laptops Tutorials	Slides (15) 26 Questions (Lecture)	
	1200-1300	- lunch -		
	1300-1430	Support Printers Tutorials	Slides (25) 24 Questions (Lecture)	
	1430-1445	- break -		
	1445-1600	Operational Procedures Tutorials	Slides (35) 36 Questions (Lecture)	

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D4	TIME	Topic/Activity	Materials	Note
17-Dec-2015	0900-1030	A+ Essentials (220-801) Wrap-Up / Q&A	Slides	
	1030-1045	- break -		
	1045-1200	Practical Test : A+ Essentials (220-801)	LMS 74 Questions Test	
	1200-1300	- lunch -		
	1300-1430	Practical Test Review : A+ Essentials (220-801)	LMS 74 Questions Test Results	
	1430-1445	- break -		
	1445-1600	Operating System Fundamentals	Hands On : Installing Windows 7	
D5	TIME	Topic/Activity	Materials	Note
18-Dec-2015	0900-1030	Operating System Fundamentals Tutorials	Slides (52)	
	1030-1045	- break -		
	1045-1200	Operating System Fundamentals (cont'd) Tutorials	Slides (52) 56 Questions (Lecture, Hands On)	
	1200-1300	- lunch -		
	1300-1430	Installing and Configuring Operating Systems Tutorials	Slides (36) 32 Questions (Lecture, Hands On)	
	1430-1445	- break -		
	1445-1600	Security Tutorials	Slides (29) 49 Questions (Lecture, Hands On)	
D6	TIME	Topic/Activity	Materials	Note
19-Dec-2015	0900-1030	Mobile Computing Tutorials	Slides (18) 27 Questions (Lecture, Demo)	
	1030-1045	- break -		
	1045-1200	Troubleshooting Hardware Components Tutorials	Slides (30) 71 Questions (Lecture, Demo)	
	1200-1300	- lunch -		
	1300-1430	Troubleshooting System-Wide Issues Tutorials	Slides (18) 64 Questions (Lecture, Hands On)	
	1430-1445	- break -		
	1445-1600	A+ Practical Application (220-802) Simulation Quiz Demo	3 Questions (Demo)	

RMUTP : CompTIA A+ Pacing Guide (14 - 23 December 2015)

D7	TIME	Topic/Activity	Materials	Note
22-Dec-2015	0900-1030	A+ Practical Application (220-802) Wrap-Up / Q&A	Slides	
	1030-1045	<i>- break -</i>		
	1045-1200	Practical Test : A+ Practical Application (220-802)	LMS 73 Questions Test	
	1200-1300	<i>- lunch -</i>		
	1300-1430	Practical Test Review : A+ Practical Application (220-802)	LMS 73 Questions Test Results	
	1430-1445	<i>- break -</i>		
	1445-1600	CompTIA A+ (220-801,220-802) Wrap-Up / Q&A		
D8	TIME	Topic/Activity	Materials	Note
23-Dec-2015	0900-1030	Practical Test : A+ Essentials (220-801)	LMS 94 Questions	
	1030-1045	<i>- break -</i>		
	1045-1200	Practical Test Review : A+ Essentials (220-801)	LMS Review Test Results	
	1200-1300	<i>- lunch -</i>		
	1300-1430	Practical Test : A+ Practical Application (220-802)	LMS 93 Questions	
	1430-1445	<i>- break -</i>		
	1445-1600	Practical Test Review : A+ Practical Application (220-802)	LMS Review Test Results	



CompTIA A+ Certification Exam Objectives

Exam Number: 220-801

Introduction

In order to receive CompTIA A+ certification a candidate must pass two exams. The first exam is CompTIA A+ 220-801 Certification Exam. The CompTIA A+ 220-801 examination measures necessary competencies for an entry-level IT professional with the equivalent knowledge of at least 12 months of hands-on experience in the lab or field. 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 while applying troubleshooting skills. Successful candidates will also provide appropriate customer support; understand the basics of virtualization, desktop imaging, and deployment.

CompTIA A+ is ISO 17024 Accredited (Personnel Certification Accreditation) and, as such, undergoes regular reviews and updates to the exam objectives. The following CompTIA A+ 220-801 exam objectives result from subject matter expert workshops and industry-wide survey results regarding the skills and knowledge required of an entry-level IT professional. The percentages in this document represent the relative importance of the subject areas (domains) in the associated body of knowledge, and together establish the foundation of an entry-level IT professional.

This examination blueprint includes domain 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 of this examination.

Candidates are encouraged to use this document to guide their studies. The table below lists the domains measured by this examination and the extent to which they are represented. The CompTIA A+ 220-801 exam is based on these objectives.

Domain	Percentage of Examination
PC Hardware	40%
Networking	27%
Laptops	11%
Printers	11%
Operational Procedures	11%
Total	100%

**Note: The lists of examples provided in bulleted format below each objective 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

CompTIA A+ 220-801 Certification Exam Objectives

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exams based on existing exam objectives. Please know that all related exam preparation materials will still be valid.

1.0 PC Hardware

1.1 Configure and apply BIOS settings.

- Install 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, lo-jack)
- Use built-in diagnostics
- Monitoring
 - Temperature monitoring
 - Fan speeds
 - Intrusion detection/notification
 - Voltage
 - Clock
 - Bus speed

1.2 Differentiate between motherboard components, their purposes, and properties.

- Sizes
 - ATX
 - Micro-ATX
 - ITX
- Expansion slots
 - PCI
 - PCI-X
 - PCIe
 - miniPCI
 - CNR
 - AGP2x, 4x, 8x
- RAM slots
- CPU sockets
- Chipsets
 - North Bridge
 - South Bridge
 - CMOS battery
- Jumpers
- Power connections and types
- Fan connectors
- Front panel connectors
 - USB
 - Audio
 - Power button
 - Power light

CompTIA A+ 220-801 Certification Exam Objectives

- Drive activity lights
 - Reset button
- Bus speeds
- 1.3 Compare and contrast RAM types and features.**
- Types
 - DDR
 - DDR2
 - DDR3
 - SDRAM
 - SODIMM
 - RAMBUS
 - DIMM
 - Parity vs. non-parity
 - ECC vs. non-ECC
 - RAM configurations
 - Single channel vs. dual channel vs. triple channel
 - Single sided vs. double sided
- RAM compatibility and speed
- 1.4 Install and configure expansion cards.**
- Sound cards
- Video cards
- Network cards
- Serial and parallel cards
- USB cards
- Firewire 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.**
- Optical drives
 - CD-ROM
 - DVD-ROM
 - Blu-Ray
- Combo drives and burners
 - CD-RW
 - DVD-RW
 - Dual Layer DVD-RW
 - BD-R
 - BD-RE
- Connection types
 - External
 - USB
 - Firewire
 - eSATA
 - Ethernet
 - Internal SATA, IDE and SCSI
 - IDE configuration and setup (Master, Slave, Cable Select)
 - SCSI IDs (0 – 15)
 - Hot swappable drives
- Hard drives
 - Magnetic

CompTIA A+ 220-801 Certification Exam Objectives

- 5400 rpm
- 7200 rpm
- 10,000 rpm
- 15,000 rpm
- Solid state/flash drives
 - Compact flash
 - SD
 - Micro-SD
 - Mini-SD
 - xD
 - SSD
- RAID types
 - 0
 - 1
 - 5
 - 10
- Floppy drive
- Tape drive
- Media capacity
 - CD
 - CD-RW
 - DVD-RW
 - DVD
 - Blu-Ray
 - Tape
 - Floppy
 - DVD DL

1.6 Differentiate among various CPU types and features and select the appropriate cooling method.

- Socket types
 - Intel: LGA, 775, 1155, 1156, 1366
 - AMD: 940, AM2, AM2+, AM3, AM3+, FM1, F
- Characteristics
 - Speeds
 - Cores
 - Cache size/type
 - Hyperthreading
 - Virtualization support
 - Architecture (32-bit vs. 64-bit)
 - Integrated GPU
- Cooling
 - Heat sink
 - Fans
 - Thermal paste
 - Liquid-based

1.7 Compare and contrast various connection interfaces and explain their purpose.

- Physical connections
 - USB 1.1 vs. 2.0 vs. 3.0 speed and distance characteristics
 - Connector types: A, B, mini, micro
 - Firewire 400 vs. Firewire 800 speed and distance characteristics
 - SATA1 vs. SATA2 vs. SATA3, eSATA, IDE speeds
 - Other connector types
 - Serial
 - Parallel
 - VGA

CompTIA A+ 220-801 Certification Exam Objectives

- HDMI
 - DVI
 - Audio
 - RJ-45
 - RJ-11
 - Analog vs. digital transmission
 - VGA vs. HDMI
- Speeds, distances and frequencies of wireless device connections
 - Bluetooth
 - IR
 - RF

1.8 Install an appropriate power supply based on a given scenario.

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

1.9 Evaluate and select appropriate components for a custom configuration, to meet customer specifications or needs.

- Graphic / CAD / CAM design workstation
 - Powerful 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
 - Powerful processor
 - High-end video/specialized GPU
 - Better 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 running Windows
- Thin client
 - Basic applications

- Meets minimum requirements for running Windows
- Home Server PC
 - Media streaming
 - File sharing
 - Print sharing
 - Gigabit NIC
 - RAID array

1.10 Given a scenario, evaluate types and features of display devices.

- Types
 - CRT
 - LCD
 - LED
 - Plasma
 - Projector
 - OLED
- Refresh rates
- Resolution
- Native resolution
- Brightness/lumens
- Analog vs. digital
- Privacy/antiglare filters
- Multiple displays

1.11 Identify connector types and associated cables.

- Display connector types
 - DVI-D
 - DVI-I
 - DVI-A
 - DisplayPort
 - RCA
 - HD15 (i.e. DE15 or DB15)
 - BNC
 - miniHDMI
 - RJ-45
 - miniDin-6
- Display cable types
 - HDMI
 - DVI
 - VGA
 - Component
 - Composite
 - S-video
 - RGB
 - Coaxial
 - Ethernet
- Device connectors and pin arrangements
 - SATA
 - eSATA
 - PATA
 - IDE
 - EIDE
 - Floppy
 - USB
 - IEEE1394
 - SCSI

- PS/2
- Parallel
- Serial
- Audio
- RJ-45
- Device cable types
 - SATA
 - eSATA
 - IDE
 - EIDE
 - Floppy
 - USB
 - IEEE1394
 - SCSI
 - 68pin vs. 50pin vs. 25pin
 - Parallel
 - Serial
 - Ethernet
 - Phone

1.12 Install and configure various peripheral devices.

- Input devices
 - Mouse
 - Keyboard
 - Touch screen
 - Scanner
 - Barcode reader
 - KVM
 - Microphone
 - Biometric devices
 - Game pads
 - Joysticks
 - Digitizer
- Multimedia devices
 - Digital cameras
 - Microphone
 - Webcam
 - Camcorder
 - MIDI enabled devices
- Output devices
 - Printers
 - Speakers
 - Display devices

2.0 Networking

2.1 Identify 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

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2.2 Categorize characteristics of connectors and cabling.

- Fiber
 - Types (single-mode vs. multi-mode)
 - Speed and transmission limitations
- Twisted pair
 - Types: STP, UTP, CAT3, CAT5, CAT5e, CAT6, plenum, PVC
 - Speed and transmission limitations
- Coaxial
 - Types: RG-6, RG-59
 - Speed and transmission limitations

2.3 Explain properties and characteristics of TCP/IP.

- IP class
 - Class A
 - Class B
 - Class C
- IPv4 vs. IPv6
- Public vs. private vs. APIPA
- Static vs. dynamic
- Client-side DNS
- DHCP
- Subnet mask
- Gateway

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

- Ports
 - 21 – FTP
 - 23 – TELNET
 - 25 – SMTP
 - 53 – DNS
 - 80 – HTTP
 - 110 – POP3
 - 143 – IMAP
 - 443 – HTTPS
 - 3389 – RDP
- Protocols
 - DHCP
 - DNS
 - LDAP
 - SNMP
 - SMB
 - CIFS
 - SSH
 - SFTP
- TCP vs. UDP

2.5 Compare and contrast wireless networking standards and encryption types.

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

2.6 Install, configure, and deploy a SOHO wireless/wired router using appropriate settings.

- MAC filtering
- Channels (1 – 11)
- Port forwarding, port triggering
- SSID broadcast (on/off)

CompTIA A+ 220-801 Certification Exam Objectives

- Wireless encryption
- Firewall
- DHCP (on/off)
- DMZ
- NAT
- WPS
- Basic QoS

2.7 Compare and contrast Internet connection types and features.

- Cable
- DSL
- Dial-up
- Fiber
- Satellite
- ISDN
- Cellular (mobile hotspot)
- Line of sight wireless internet service
- WiMAX

2.8 Identify various types of networks.

- LAN
- WAN
- PAN
- MAN
- Topologies
 - Mesh
 - Ring
 - Bus
 - Star
 - Hybrid

2.9 Compare and contrast network devices, their functions, and features.

- Hub
- Switch
 - PoE
- Router
- Access point
- Bridge
- Modem
- NAS
- Firewall
- VoIP phones
- Internet appliance

2.10 Given a scenario, use appropriate networking tools.

- Crimper
- Multimeter
- Toner probe
- Cable tester
- Loopback plug
- Punchdown tool

3.0 Laptops

3.1 Install and configure laptop hardware and components.

- Expansion options

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- Express card /34
- Express card /54
- PCMCIA
- SODIMM
- Flash
- Hardware/device replacement
 - Keyboard
 - Hard Drive (2.5 vs. 3.5)
 - Memory
 - Optical drive
 - Wireless card
 - Mini-PCIe
 - screen
 - DC jack
 - Battery
 - Touchpad
 - Plastics
 - Speaker
 - System board
 - CPU

3.2 Compare and contrast the components within the display of a laptop.

- Types
 - LCD
 - LED
 - OLED
 - Plasma
- Wi-Fi antenna connector/placement
- Inverter and its function
- Backlight

3.3 Compare and contrast laptop features.

- Special function keys
 - Dual displays
 - Wireless (on/off)
 - Volume settings
 - Screen brightness
 - Bluetooth (on/off)
 - Keyboard backlight
- Docking station vs. port replicator
- Physical laptop lock and cable lock

4.0 Printers

4.1 Explain the differences between the various printer types and summarize 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

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- Special thermal paper
- Impact
 - Print head, ribbon, tractor feed
 - Impact paper
- 4.2 Given a scenario, install, and configure printers.**
 - Use appropriate printer drivers for a given operating system
 - Print device sharing
 - Wired
 - USB
 - Parallel
 - Serial
 - Ethernet
 - Wireless
 - Bluetooth
 - 802.11x
 - Infrared (IR)
 - Printer hardware print server
 - Printer sharing
 - Sharing local/networked printer via Operating System settings
- 4.3 Given a scenario, perform 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

5.0 Operational Procedures

- 5.1 Given a scenario, use appropriate safety procedures.**
 - ESD straps
 - ESD mats
 - Self-grounding
 - Equipment grounding
 - Personal safety
 - Disconnect power before repairing PC
 - Remove jewelry
 - Lifting techniques
 - Weight limitations
 - Electrical fire safety
 - CRT safety – proper disposal
 - Cable management
 - Compliance with local government regulations
- 5.2 Explain environmental impacts and the purpose of environmental controls.**
 - MSDS documentation for handling and disposal
 - Temperature, humidity level awareness and proper ventilation
 - Power surges, brownouts, blackouts
 - Battery backup
 - Surge suppressor
 - Protection from airborne particles
 - Enclosures
 - Air filters
 - Dust and debris
 - Compressed air

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- Vacuums
- Component handling and protection
 - Antistatic bags
- Compliance to local government regulations
- 5.3 Given a scenario, demonstrate proper communication and professionalism.**
 - Use proper language – avoid jargon, acronyms, slang when applicable
 - Maintain a positive attitude
 - Listen and do not interrupt the customer
 - Be culturally sensitive
 - Be on time (if late contact the customer)
 - Avoid distractions
 - Personal calls
 - Talking to co-workers while interacting with customers
 - Personal interruptions
 - Dealing with difficult customer or situation
 - Avoid arguing with customers and/or being defensive
 - Do not minimize customer's problems
 - Avoid being judgmental
 - Clarify customer statements (ask open ended questions to narrow the scope of the problem, restate the issue or question to verify understanding)
 - Set and meet expectations/timeline and communicate status with the customer
 - Offer different repair/replacement options if applicable
 - Provide proper documentation on the services provided
 - Follow up with customer/user at a later date to verify satisfaction
 - Deal appropriately with customers confidential materials
 - Located on a computer, desktop, printer, etc
- 5.4 Explain the fundamentals of dealing with prohibited content/activity.**
 - First response
 - Identify
 - Report through proper channels
 - Data/device preservation
 - Use of documentation/documentation changes
 - Chain of custody
 - Tracking of evidence/documenting process

CompTIA A+ Acronyms

Introduction

The following is a list of acronyms which 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.

ACRONYM	SPELLED OUT
AC	alternating current
ACL	access control list
ACPI	advanced configuration power interface
ACT	activity
ADSL	asymmetrical digital subscriber line
AGP	accelerated graphics port
AHCI	Advanced host controller interface
AMD	advanced micro devices
APIPA	automatic private internet protocol addressing
APM	advanced power management
ARP	address resolution protocol
ASR	automated system recovery
ATA	advanced technology attachment
ATAPI	advanced technology attachment packet interface
ATM	asynchronous transfer mode
ATX	advanced technology extended
A/V	Audio Video
BIOS	basic input/output system
BNC	Bayonet-Neill-Concelman or British Naval Connector
BTX	balanced technology extended
CAPTCHA	Completely Automated Public Turing Test To Tell Computers and Humans Apart
CCFL	Cold Cathode Fluorescent Lamp
CD	compact disc
CD-ROM	compact disc-read-only memory
CD-RW	compact disc-rewritable
CDFS	compact disc file system
CFS	Central File System, Common File System, Command File System
CMOS	complementary metal-oxide semiconductor

CompTIA A+ 220-801 Certification Exam Objectives

CNR	Communications and Networking Riser
COMx	communication port (x=port number)
CPU	central processing unit
CRIMM	Continuity Rambus Inline Memory Mode
CRT	cathode-ray tube
DAC	discretionary access control
DB-25	serial communications D-shell connector, 25 pins
DB-9	9 pin D shell connector
DC	direct current
DDOS	distributed denial of service
DDR	double data-rate
DDR RAM	double data-rate random access memory
DDR SDRAM	double data-rate synchronous dynamic random access memory
DFS	distributed file system
DHCP	dynamic host configuration protocol
DIMM	dual inline memory module
DIN	Deutsche Industrie Norm
DIP	dual inline package
DLT	digital linear tape
DLP	digital light processing
DMA	direct memory access
DMZ	demilitarized zone
DNS	domain name service or domain name server
DOS	denial of service
DRAM	dynamic random access memory
DSL	digital subscriber line
DVD	digital video disc or digital versatile disc
DVD-RAM	digital video disc-random access memory
DVD-ROM	digital video disc-read only memory
DVD-R	digital video disc-recordable
DVD-RW	digital video disc-rewritable
DVI	digital visual interface
ECC	error correction code
ECP	extended capabilities port
EEPROM	electrically erasable programmable read-only memory
EFS	encrypting file system
EIDE	enhanced integrated drive electronics
EMI	electromagnetic interference
EMP	electromagnetic pulse
EPROM	erasable programmable read-only memory
EPP	enhanced parallel port
ERD	emergency repair disk
ESD	electrostatic discharge
EVGA	extended video graphics adapter/array

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EVDO	evolution data optimized or evolution data only
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
GDI	graphics device interface
GHz	gigahertz
GUI	graphical user interface
GPS	global positioning system
GSM	global system for mobile communications
HAL	hardware abstraction layer
HAV	Hardware Assisted Virtualization
HCL	hardware compatibility list
HDD	hard disk drive
HDMI	high definition media interface
HPFS	high performance file system
HTML	hypertext markup language
HTPC	Home theater PC
HTTP	hypertext transfer protocol
HTTPS	hypertext transfer protocol over secure sockets layer
I/O	input/output
ICMP	internet control message protocol
ICR	intelligent character recognition
IDE	integrated drive electronics
IDS	Intrusion Detection System
IEEE	Institute of Electrical and Electronics Engineers
IIS	Internet Information Services
IMAP	internet mail access protocol
IP	internet protocol
IPCONFIG	internet protocol configuration
IPP	internet printing protocol
IPSEC	internet protocol security
IR	infrared
IrDA	Infrared Data Association
IRQ	interrupt request

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ISA	industry standard architecture
ISDN	integrated services digital network
ISO	Industry Standards Organization
ISP	internet service provider
JBOD	just a bunch of disks
Kb	kilobit
KB	Kilobyte or knowledge base
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
LPT	line printer terminal
LVD	low voltage differential
MAC	media access control / mandatory access control
MAPI	messaging application programming interface
MAU	media access unit, media attachment unit
Mb	megabit
MB	megabyte
MBR	master boot record
MBSA	Microsoft Baseline Security Analyzer
MFD	multi-function device
MFP	multi-function product
MHz	megahertz
MicroDIMM	micro dual inline memory module
MIDI	musical instrument digital interface
MIME	multipurpose internet mail extension
MIMO	Multiple Input Multiple Output
MMC	Microsoft management console
MMX	multimedia extensions
MP3	Moving Picture Experts Group Layer 3 Audio
MP4	Moving Picture Experts Group Layer 4
MPEG	Moving Picture Experts Group
MSCONFIG	Microsoft configuration
MSDS	material safety data sheet
MUI	multilingual user interface
NAC	network access control
NAS	network-attached storage
NAT	network address translation
NetBIOS	networked basic input/output system
NetBEUI	networked basic input/output system extended user interface

CompTIA A+ 220-801 Certification Exam Objectives

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NFS	network file system
NIC	network interface card
NiCd	nickel cadmium
NiMH	nickel metal hydride
NLX	new low-profile extended
NNTP	network news transfer protocol
NTFS	new technology file system
NTLDR	new technology loader
NTP	Network Time Protocol
OCR	optical character recognition
OEM	original equipment manufacturer
OLED	Organic Light Emitting Diode
OS	operating system
PAN	personal area network
PATA	parallel advanced technology attachment
PC	personal computer
PCI	peripheral component interconnect
PCIe	peripheral component interconnect express
PCIX	peripheral component interconnect extended
PCL	printer control language
PCMCIA	Personal Computer Memory Card International Association
PDA	personal digital assistant
PGA	pin grid array
PGA2	pin grid array 2
PII	Personally Identifiable Information
PIN	personal identification number
PKI	public key infrastructure
PnP	plug and play
POP3	post office protocol 3
PoS	Point of Sale
POST	power-on self test
POTS	plain old telephone service
PPP	point-to-point protocol
PPTP	point-to-point tunneling protocol
PRI	primary rate interface
PROM	programmable read-only memory
PS/2	personal system/2 connector
PSTN	public switched telephone network
PSU	power supply unit
PVC	permanent virtual circuit
PXE	preboot execution environment
QoS	quality of service
RAID	redundant array of independent (or inexpensive) discs
RAM	random access memory

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RAS	remote access service
RDRAM	RAMBUS [®] dynamic random access memory
RDP	Remote Desktop Protocol
RF	radio frequency
RFI	radio frequency interference
RGB	red green blue
RIMM	RAMBUS [®] inline memory module
RIP	routing information protocol
RIS	remote installation service
RISC	reduced instruction set computer
RJ	registered jack
RJ-11	registered jack function 11
RJ-45	registered jack function 45
RMA	returned materials authorization
ROM	read only memory
RS-232 or RS-232C	recommended standard 232
RTC	real-time clock
SAN	storage area network
SAS	Serial Attached SCSI
SATA	serial advanced technology attachment
SC	subscription channel
SCP	secure copy protection
SCSI	small computer system interface
SCSI ID	small computer system interface identifier
SD card	secure digital card
SDRAM	synchronous dynamic random access memory
SEC	single edge connector
SFC	system file checker
SFF	Small Form Factor
SGRAM	synchronous graphics random access memory
SIMM	single inline memory module
SLI	scalable link interface or system level integration or scanline interleave mode
S.M.A.R.T.	self-monitoring, analysis, and reporting technology
SMB	server message block or small to midsize business
SMTP	simple mail transfer protocol
SNMP	simple network management protocol
SoDIMM	small outline dual inline memory module
SOHO	small office/home office
SP	service pack
SP1	service pack 1
SP2	service pack 2
SP3	service pack 3
SP4	service pack 4
SPDIF	Sony-Philips digital interface format

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SPGA	staggered pin grid array
SRAM	static random access memory
SSH	secure shell
SSID	service set identifier
SSL	secure sockets layer
ST	straight tip
STP	shielded twisted pair
SVGA	super video graphics array
SXGA	super extended graphics array
TB	terabyte
TCP	transmission control protocol
TCP/IP	transmission control protocol/internet protocol
TDR	time domain reflectometer
TFTP	trivial file transfer protocol
TKIP	Temporal Key Integrity Protocol
TPM	trusted platform module
UAC	user account control
UART	universal asynchronous receiver transmitter
UDF	user defined functions or universal disk format or universal data format
UDMA	ultra direct memory access
UDP	user datagram protocol
UNC	universal naming convention
UPS	uninterruptible power supply
URL	uniform resource locator
USB	universal serial bus
USMT	user state migration tool
UTP	unshielded twisted pair
UXGA	ultra extended graphics array
VESA	Video Electronics Standards Association
VFAT	virtual file allocation table
VGA	video graphics array
VM	Virtual Machine
VoIP	voice over internet protocol
VPN	virtual private network
VRAM	video random access memory
WAN	wide area network
WAP	wireless application protocol
WEP	wired equivalent privacy
WIFI	wireless fidelity
WINS	windows internet name service
WLAN	wireless local area network
WPA	wireless protected access
WUXGA	wide ultra extended graphics array
XGA	extended graphics array

CompTIA A+ 220-801 Certification Exam Objectives

ZIF	zero-insertion-force
ZIP	zigzag inline package

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 who wish to create a lab component to their training offering. The bulleted lists below each topic are a sample list and not exhaustive.

Equipment

- iPad tablet
- Android tablet
- Laptop
- Desktop
- Monitors
- SOHO Router/switch
- Access point
- Printer (laser/wireless)
- Power strips
- Surge suppressor
- UPS

Spare parts/hardware

- Motherboards
- RAM
- Hard drives

CompTIA A+ 220-801 Certification Exam Objectives

- Power supplies
- Video cards
- Sounds cards
- Network cards
- Wireless NICs
- Fans/cooling devices
- CPUs
- Connectors/cables
- Adapters
- Network cables/connectors
- AC adapters
- Optical drives
- Jumpers/screws/stand-offs
- Cases
- Bulk cable
- Maintenance kit

Tools

- Screw drivers
- Multimeter
- Wire cutters
- Punchdown tool
- Crimper
- Power supply tester
- Cable stripper
- POST cards
- Standard technician toolkit
- ESD strap

Software

- Operating system disks (WinXP, Vista, Windows 7)
- Antivirus software
- Virtualization software
- Anti-malware
- Driver software
- Anti-spyware

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Version 2.0

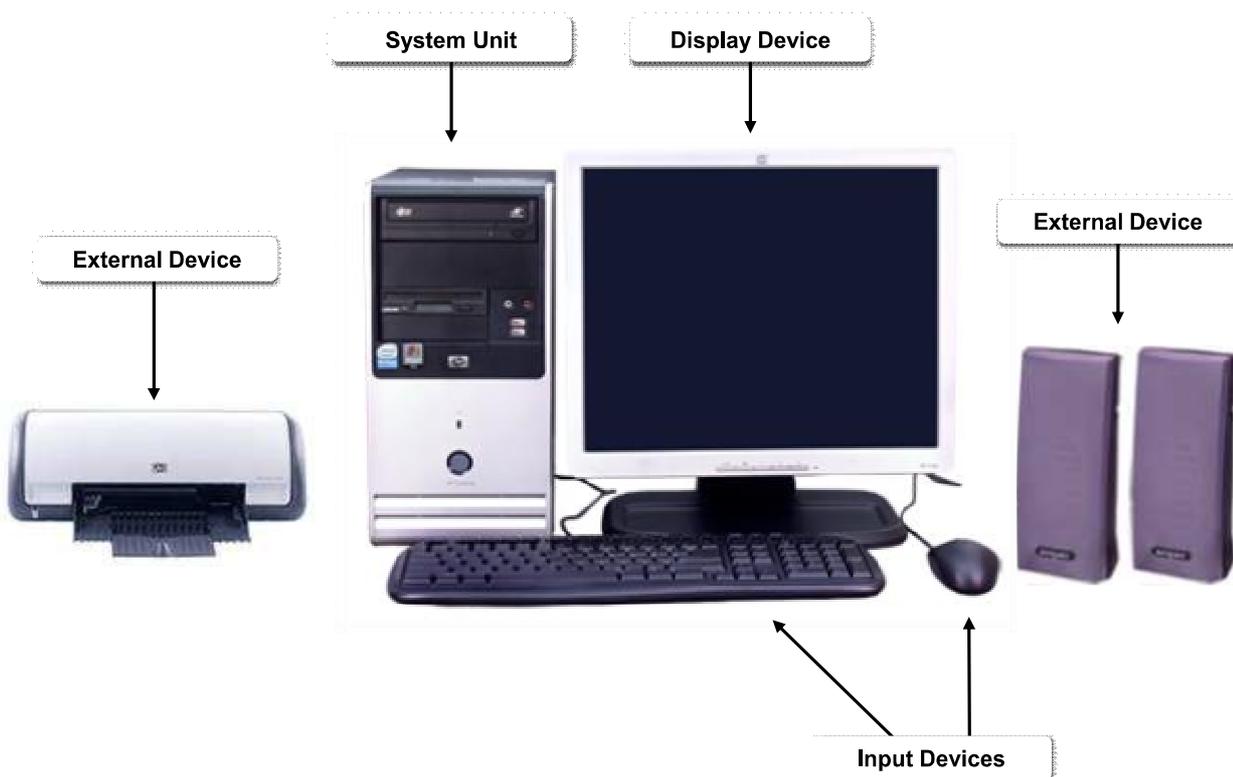
CompTIA A+ 220-801 Certification Exam Objectives

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- **Computer System Components**
- **Storage Devices**
- **Device Connections and Interfaces**

OV 1 - 1

Common Computer Components



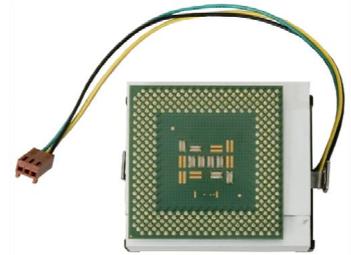
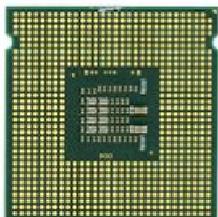
OV 1 - 2

The Motherboard

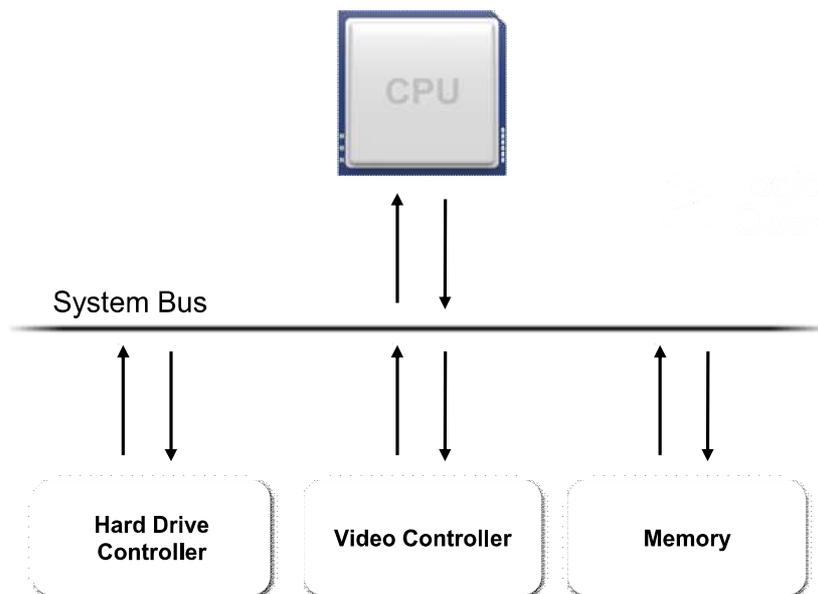


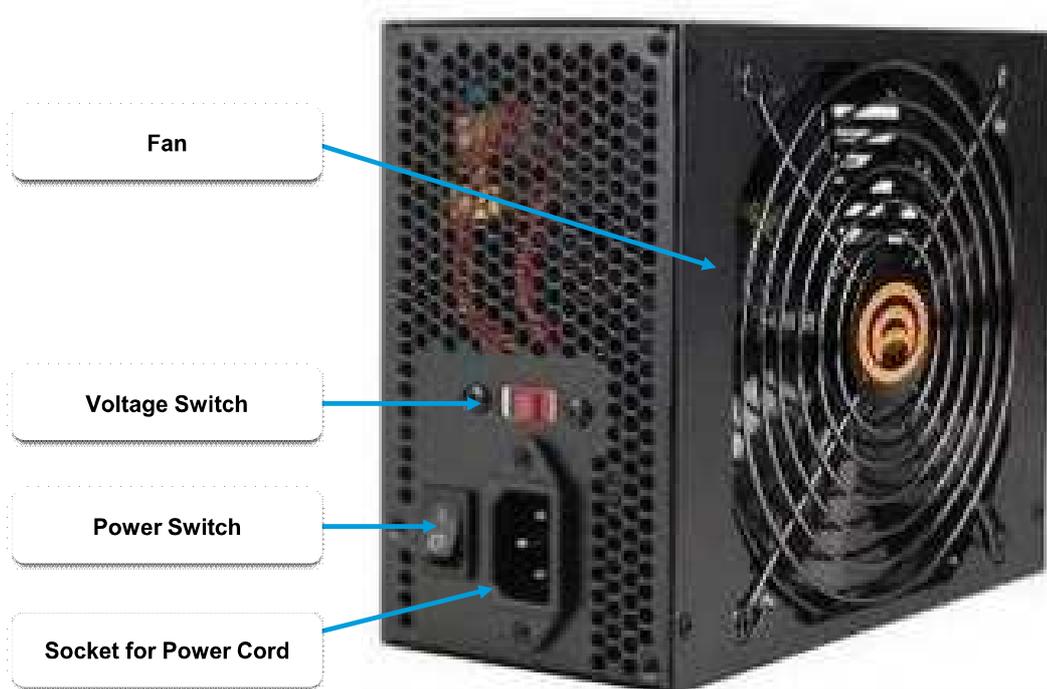
OV 1 - 3

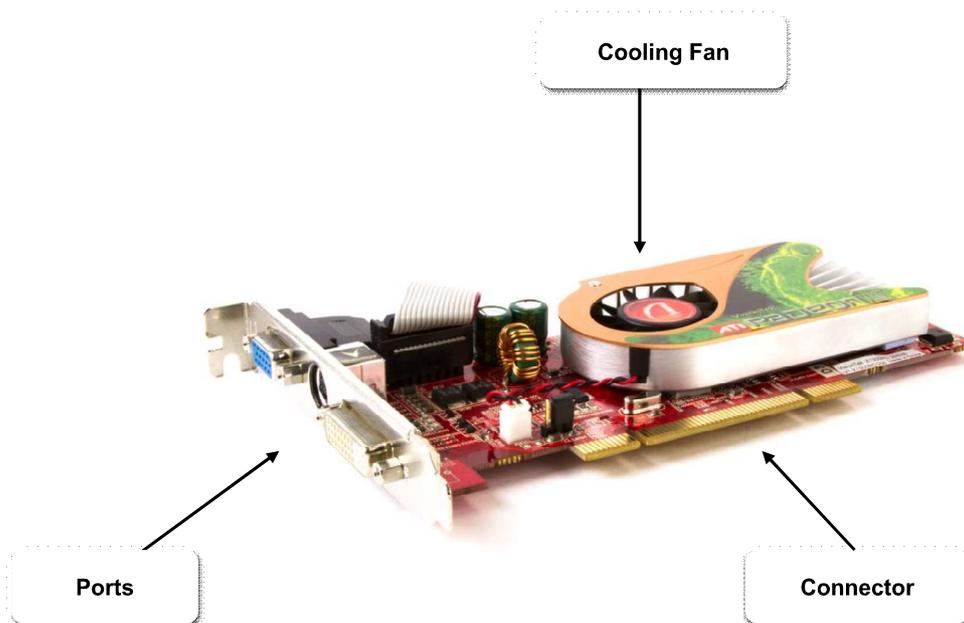
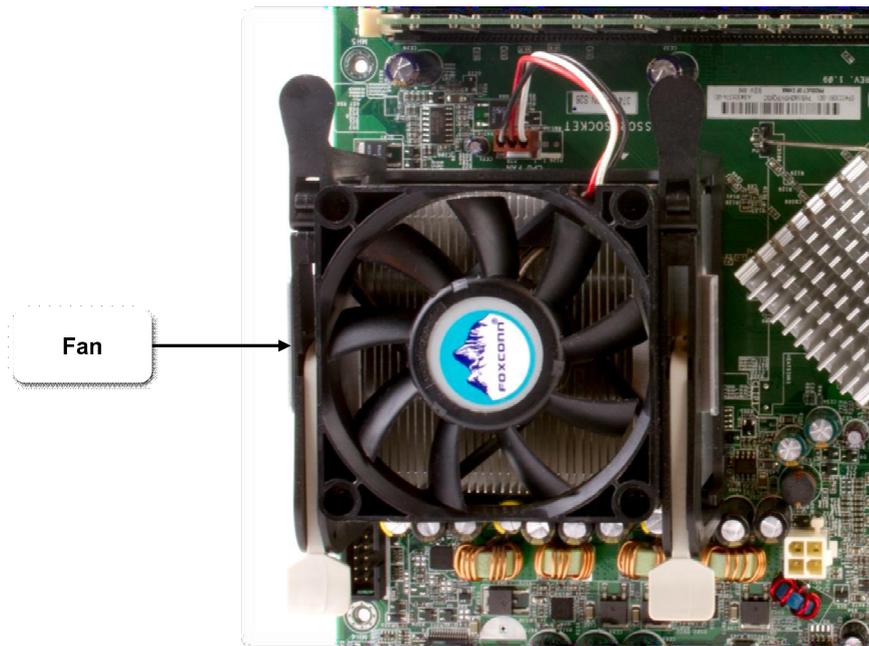
The CPU

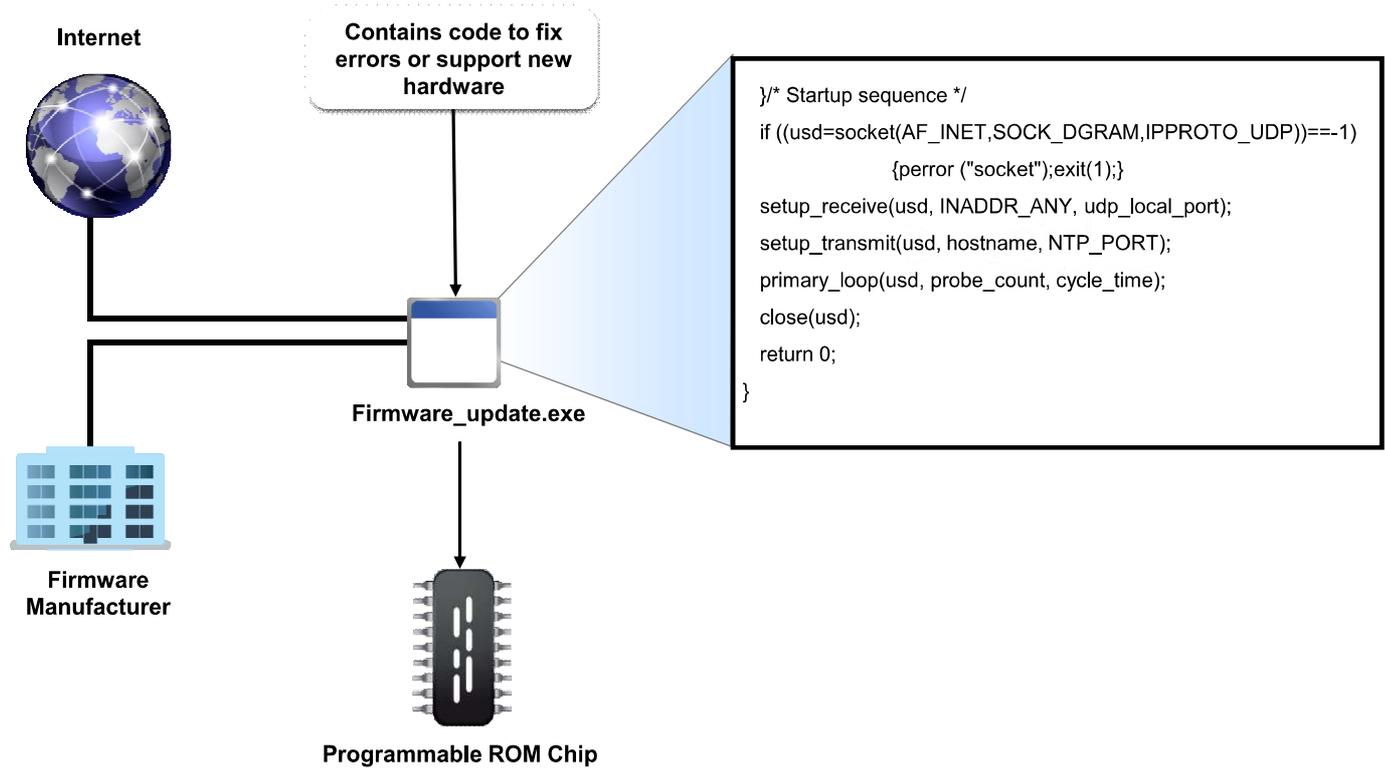
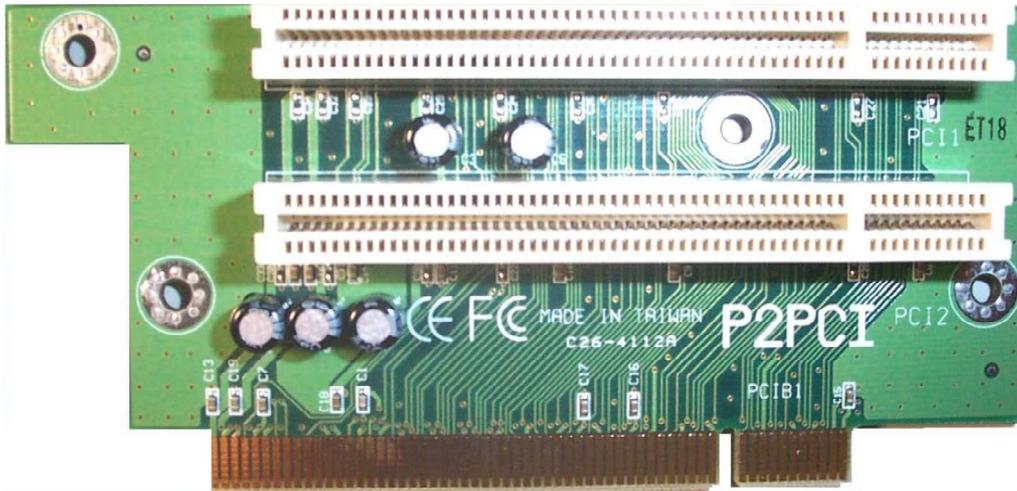


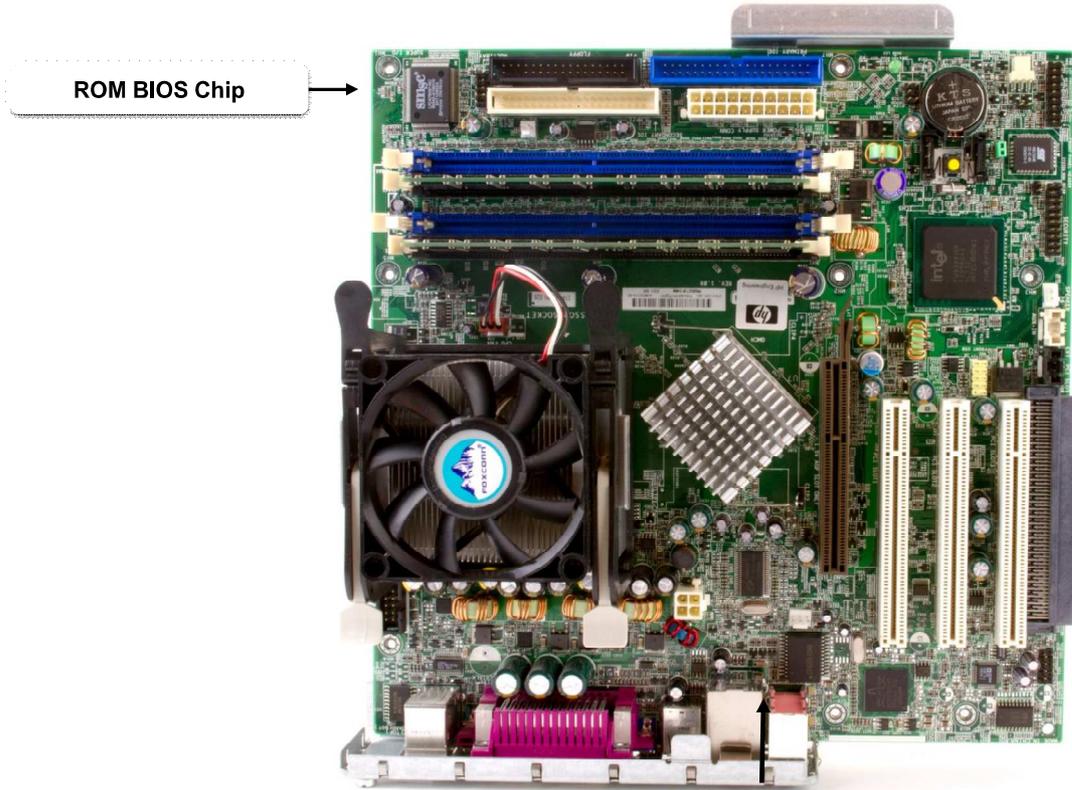
OV 1 - 4











OV 1 - 13

- Power supply
- CPU
- BIOS
- BIOS memory
- Memory
- I/O bus or I/O controller

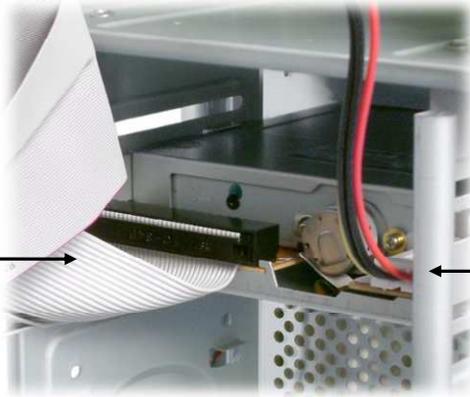


OV 1 - 14

Floppy Drives



Front view of 3.5-inch floppy disk drive



Data Cable

Power Cable

Rear view of floppy disk drive



3.5-inch floppy disk

Hard Drives



- PATA
- SCSI
- SATA



OV 1 - 17

Optical Disks

- CD-ROM
- CD-R
- CD-RW
- DVD-ROM
- DVD-R
- DVD+R
- DVD+R DL
- DVD-RW
- Dual Layer DVD-RW
- DVD+RW
- DVD-RAM
- BD-ROM
- BD-R
- BD-RE



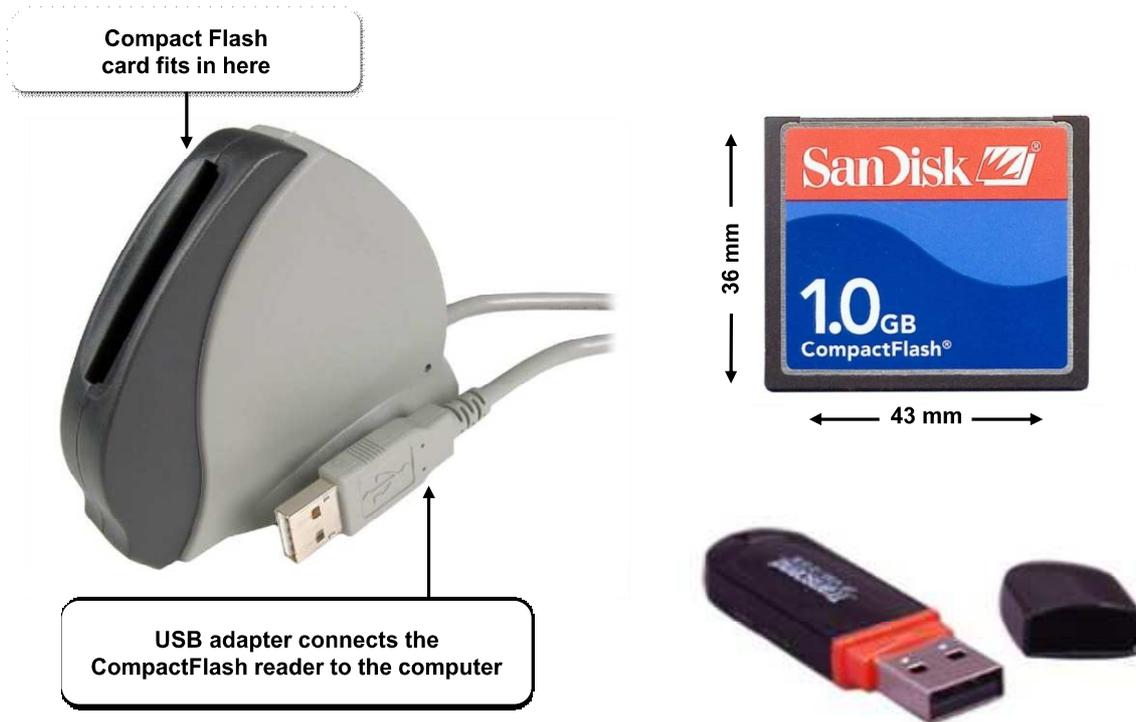
OV 1 - 18

Optical Drives



Tape Drives

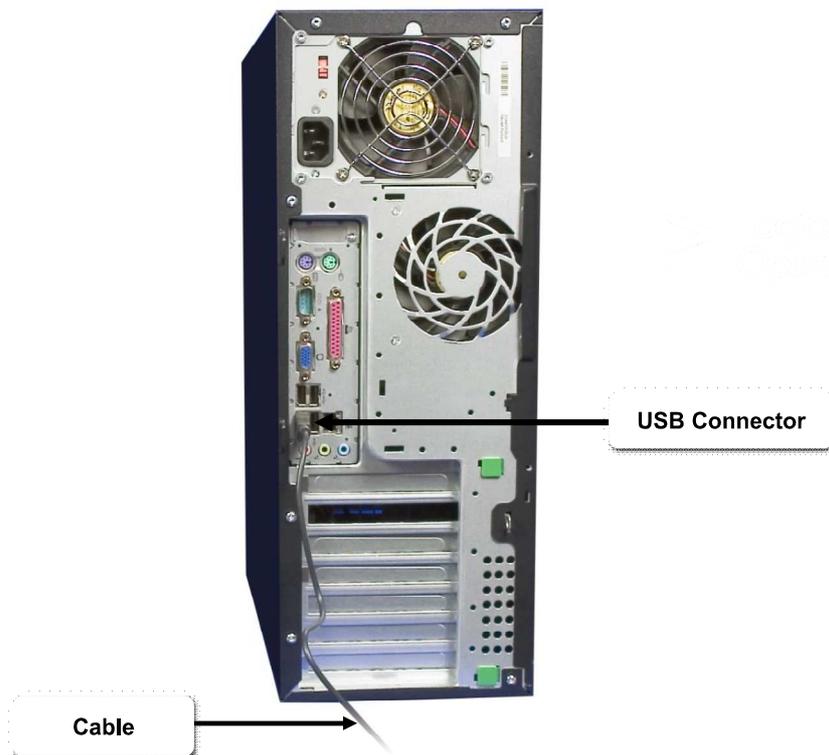
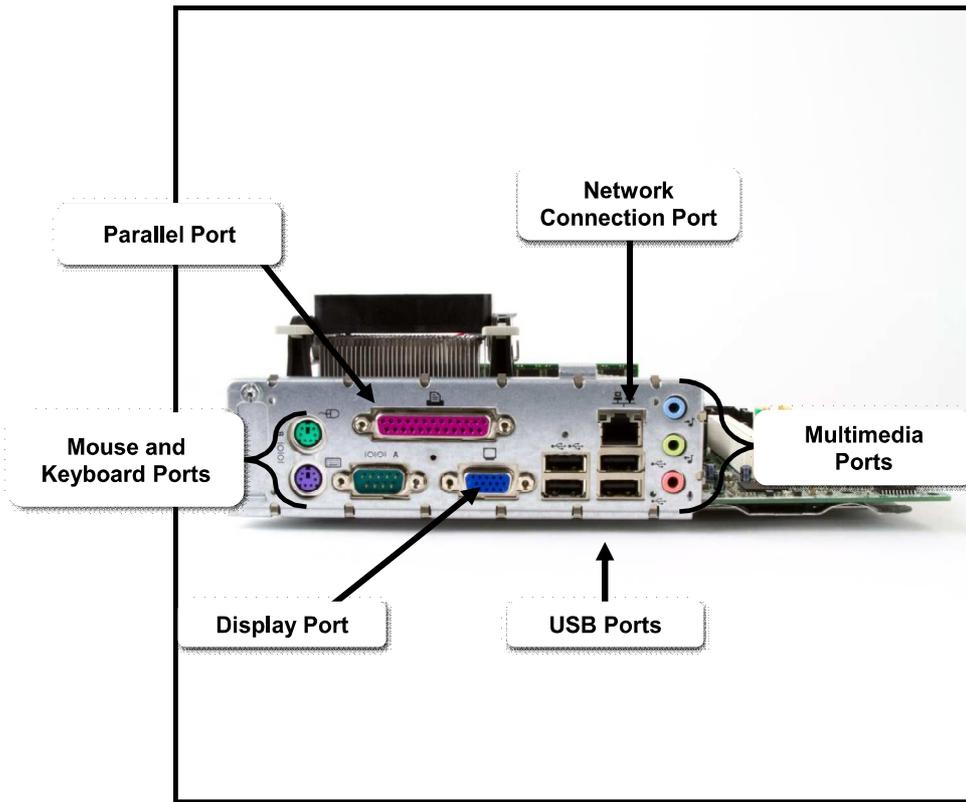




Types of Solid State Storage

- USB flash drives
- SSDs
- CF cards
- SM cards
- xD-Picture Cards
- MSes
- SD cards
- MMCs





25-pin serial port
on a serial device



25-pin end of serial cable connects
to modem and 9-pin end
connects to computer's serial port

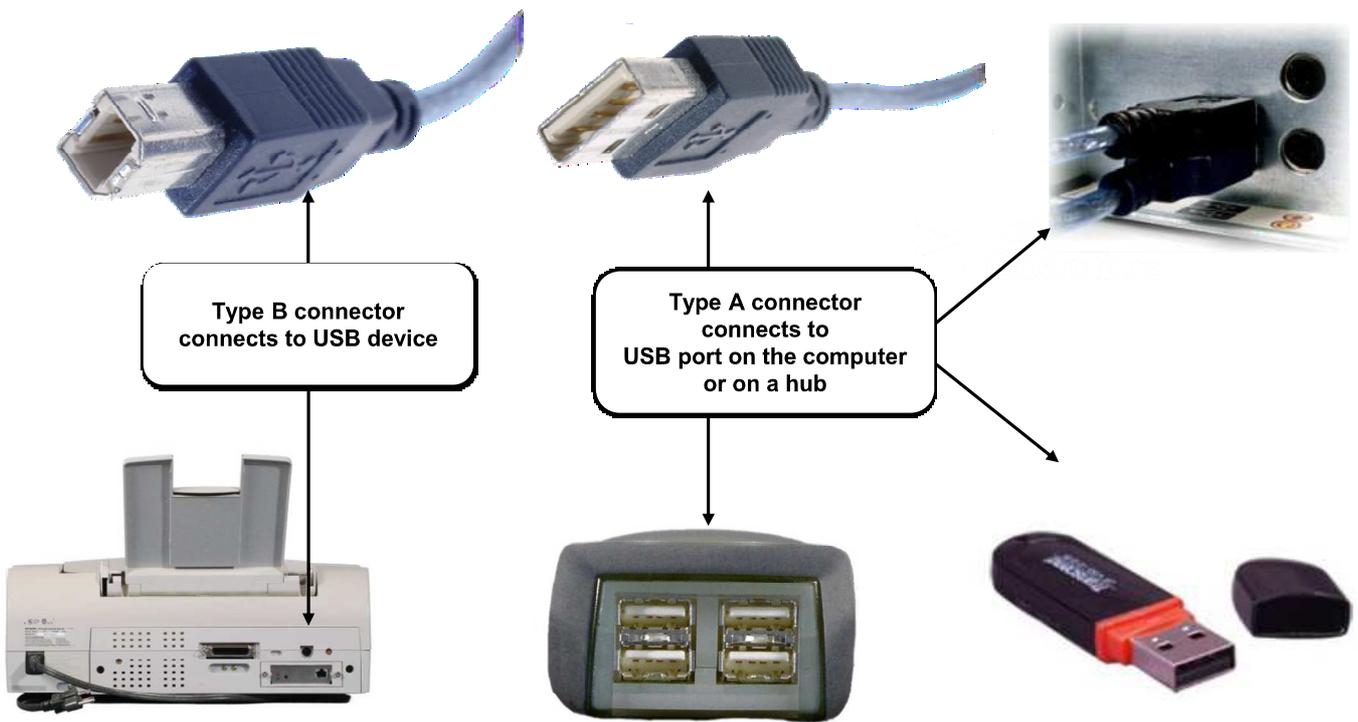


Parallel Connector

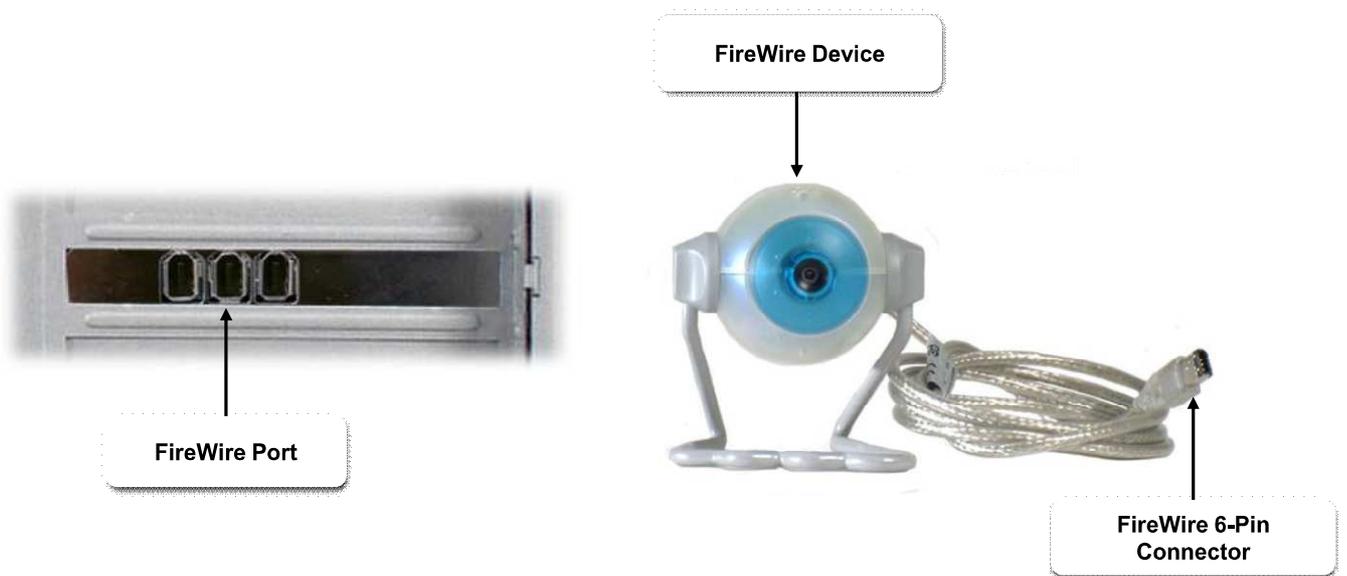
Parallel Cable



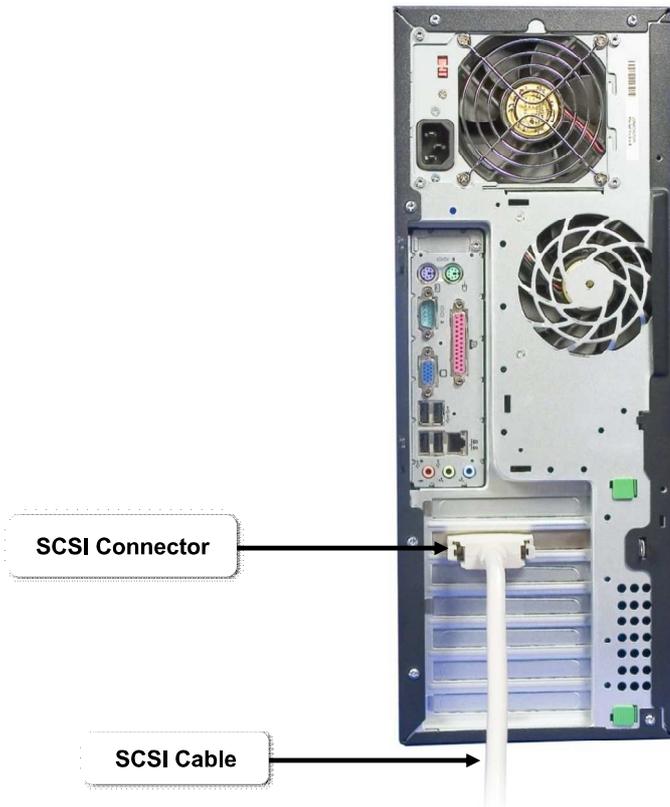
USB Connections



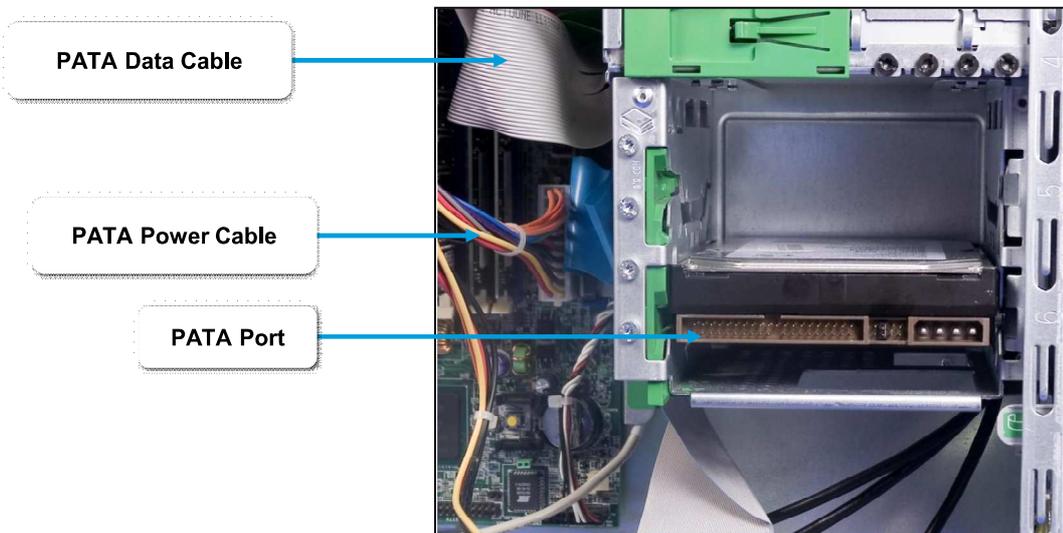
IEEE 1394 and FireWire Connections

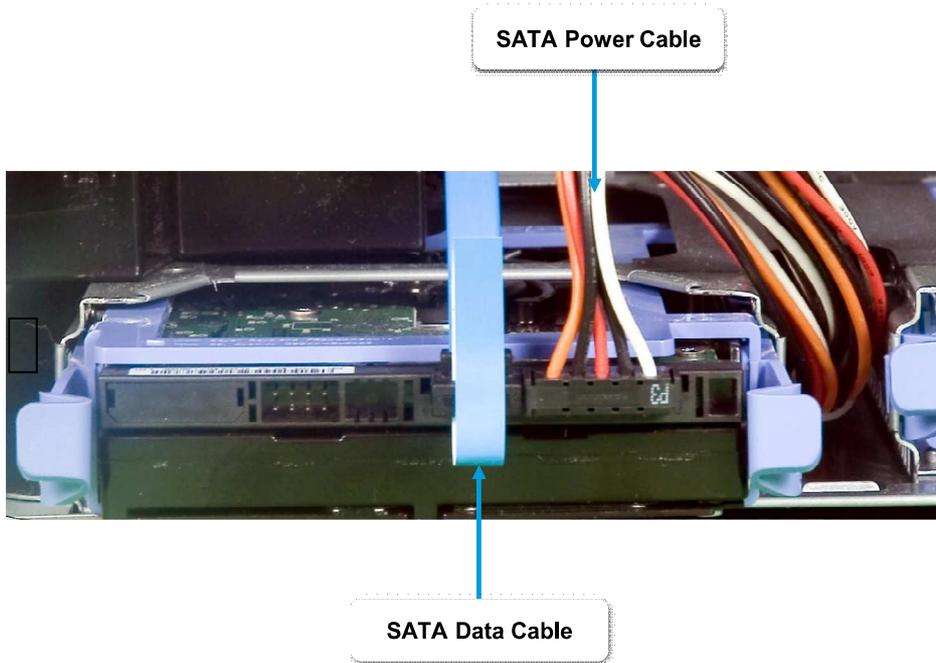


SCSI Connections



PATA Connections



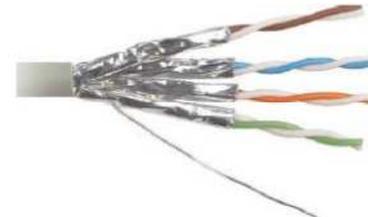


Display Cable and Connector Types

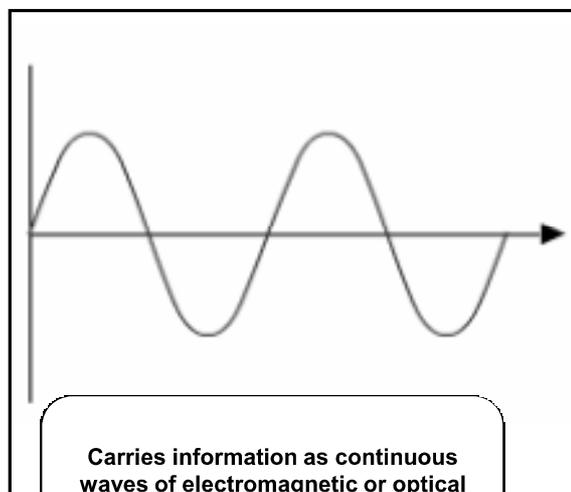
- **VGA**
- **DVI**
- **HDMI**
- **Mini-HDMI**
- **S-Video**
- **Component/RGB**
- **Composite video**
- **Coaxial**
- **DisplayPort**
- **RCA**
- **BNC**



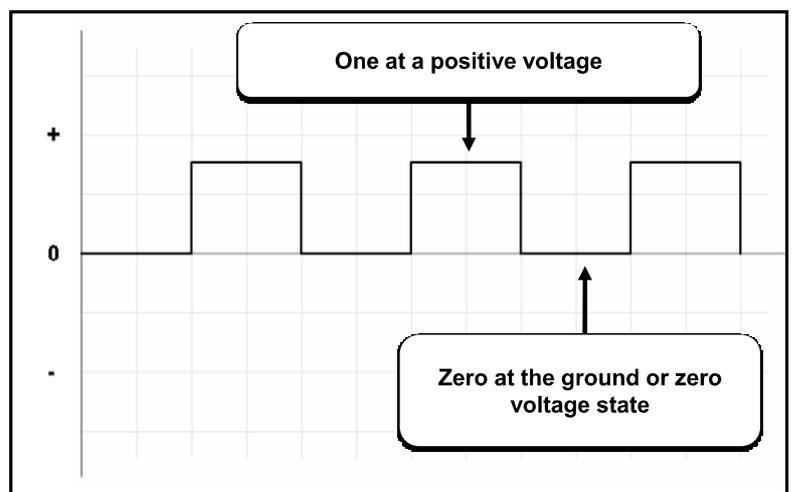
- **Single-core/shielded cable**
- **One pair/shielded cable**
- **TS and TRS connectors**
- **3-pin XLR connectors**



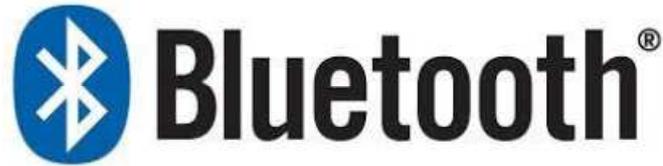
Analog Transmissions



Digital Transmissions



- Bluetooth
- IR
- RF



OV 1 - 35

Reflective Questions

1. How many of the personal computer components described are familiar to you?
2. Which of the device connections discussed were familiar to you? Which were new?

OV 1 - 36

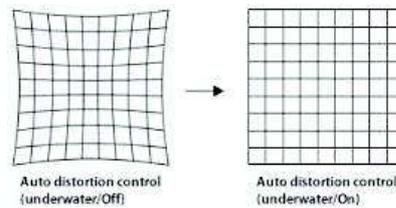
- **Install and Configure Display Devices**
- **Install and Configure Input Devices**
- **Install and Configure Expansion Cards**
- **Install and Configure Multimedia Devices**

Display Device Types

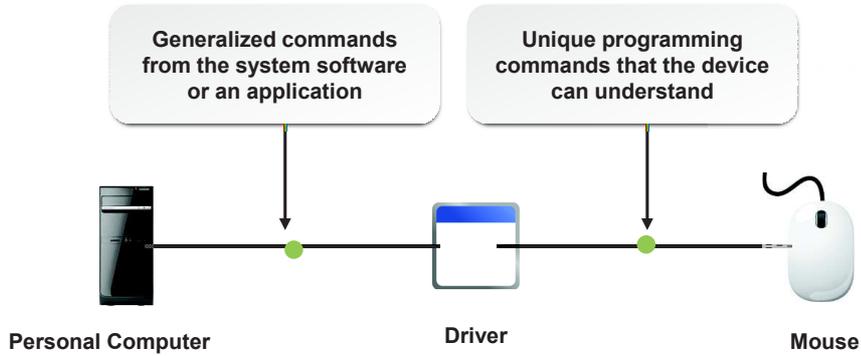
- **CRT**
- **LCD**
- **LED**
- **OLED**
- **Plasma**
- **Projector**



- Resolution
- Native resolution
- Refresh rate
- Brightness
- Multiple displays
- Analog vs. digital
- Privacy/antiglare filters
- Color depth (quality)
- Font
- Contrast
- Image position
- Distortion control



<i>Resolution</i>	<i>Number of Pixels</i>	<i>Aspect Ratio</i>
320 x 200	64,000	8:5
640 x 480	307,200	4:3
800 x 600	480,000	4:3
1,024 x 768	786,432	4:3
1,280 x 1,024	1,310,720	5:4
1,600 x 1,200	1,920,000	4:3



- **Size**
- **Technical needs**
- **Efficiency**
- **Cost**



Do you have:

- Cables and connectors?
- Expansion card installed?
- Drivers installed?
- Power source available?



Standard Keyboard



Ergonomic Keyboard



Dvorak Keyboard



Mouse



Trackball



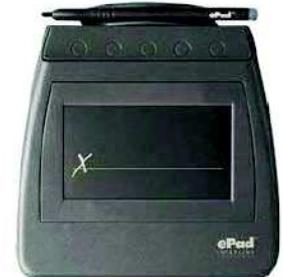
Touch Pad



Trackpoint

Biometric Input Device Types

- Fingerprint scanner/reader
- Retina scanner
- Voice recognition
- Signature recognition
- Keyboard
- Mouse
- Storage device



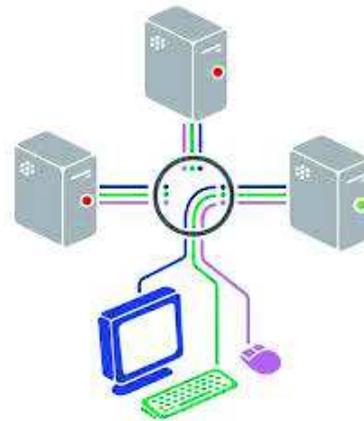
OV 4 - 9

Specialized Input Device Types

- Touch screen
- Scanner
- Barcode reader
- Microphone
- Gamepad
- Joystick
- Digitizer
- Interactive whiteboard



OV 4 - 10



OV 4 - 11

Input Device Selection Tips

- For keyboards, consider ergonomics, features, and wireless connectivity.
- For pointing devices, consider optical mice, wireless mice, and user preference.
- For biometric devices, consider security reasons, functionality, and hardware requirements.
- For specialty devices, consider user productivity, user need, or user preference, and hardware requirements.

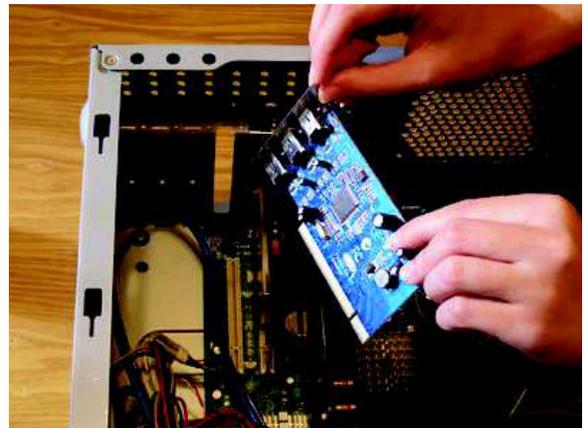


OV 4 - 12

- **Drivers**
- **Ports**
- **Manufacturer's instructions**

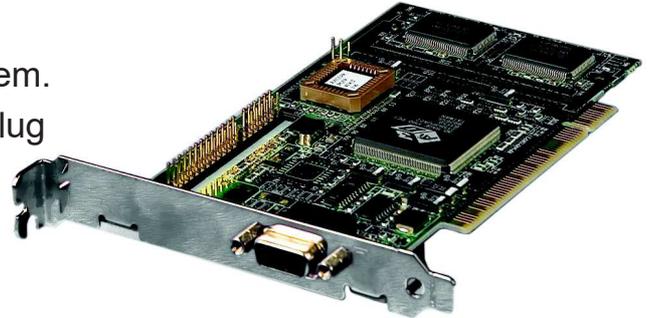


- **Sound cards**
- **Video cards**
- **Network cards**
- **Serial and parallel cards**
- **USB cards**
- **FireWire cards**
- **Storage cards**
- **Modem cards**
- **Wireless/cellular cards**
- **TV tuner cards**
- **Video capture cards**
- **Riser cards**



Verify that:

- The card has a bus that is compatible with the computer.
- The card has a driver that is compatible with the operating system.
- Both card and computer support Plug and Play.



- Check for an available slot on the computer.
- Make sure the latest drivers are installed.
- Unplug the computer and discharge electricity.
- Make sure there is enough space for the card's airflow system to function properly.



Configuration methods include:

- Use plug-and-play installation
- Install the manufacturer's driver
- Use the Add Hardware wizard
- Scan for new hardware
- Choose the device from the device list in Windows

Multimedia devices are either peripheral or internal components that transfers sound, images, or a combination of both from a personal computer.



Common Multimedia Devices

- Digital camera
- Camcorder
- Webcam
- MIDI-enabled device
- Microphone
- Speakers



OV 4 - 19

Multimedia Device Selection Tips

- What type of output does the user need? How will the transfer photos?
- What type of output does the user need (analog vs. digital)? What costs will accrue for storage?
- Does the computer have the necessary hardware/OS/memory needed? What features does the user need?
- What does the user need or want to do with the device? Does the computer have the necessary hardware/software required?
- What does the user need to do? What quality of sound is required?
- What will they be used for? What quality of sound is needed?

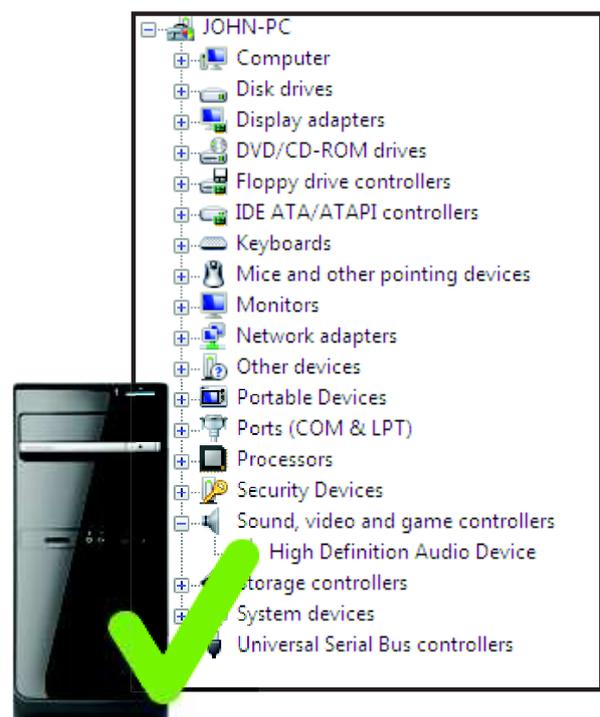
OV 4 - 20

Multimedia Device Installation Considerations

- **What expansion card slots are available?**
- **Do you have the appropriate device drivers?**
- **Do you have the necessary cables and connectors for the device?**
- **What type of cameras and card readers do you plan on using?**

Multimedia Device Configuration

- **Enabling or disabling a device**
- **Selecting a default device**
- **Viewing and configuring device features and properties**
- **Updating drivers**



- 1. What types of peripheral components do you anticipate having to install and configure most often in your current job role?**
- 2. Will there be any specialty input devices that you will need to install or configure at your workplace? How might this affect your day-to-day activities as an IT professional?**

- **Motherboards**
- **CPUs and Cooling Systems**
- **Select and Install Power Supplies**
- **RAM Types and Features**
- **Install and Configure Storage Devices**
- **Configure the System BIOS**

Motherboard Sizes/Form Factors

- **ATX**
- **Mini-ATX**
- **microATX**
- **Mini-ITX**

Form Factor	Length	Width
ATX	12.0" (30.5cm)	9.6" (24.4cm)
Mini ATX	11.2" (28.4cm)	8.2" (20.8cm)
Flex ATX	9.0" (22.9cm)	7.5" (19.1cm)
Micro ATX	9.6" (24.4cm)	9.6" (24.4cm)
ITX	8.5" (21.5cm)	7.5" (19.1cm)
Mini-ITX	6.7" (17cm)	6.7" (17cm)
Nano-ITX	4.7" (12cm)	4.7" (12cm)



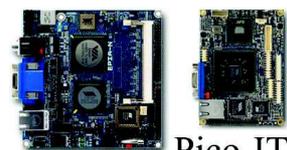
Standard-ATX



Micro-ATX



Mini-ITX



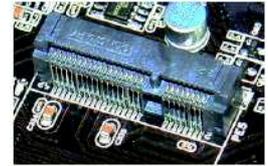
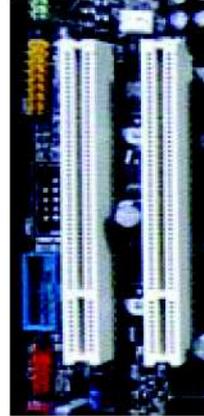
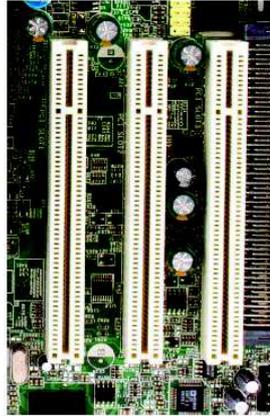
Nano-ITX

Pico-ITX



Expansion Slots

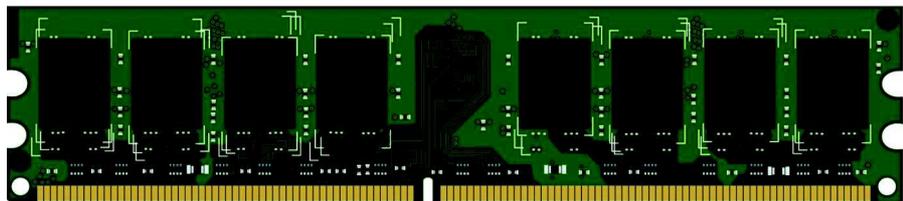
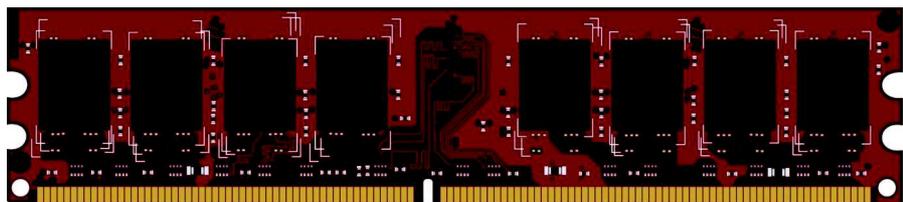
- PCI
- PCI-X
- PCIe
- MiniPCI
- CNR
- AGP



OV 5 - 3

RAM Slots

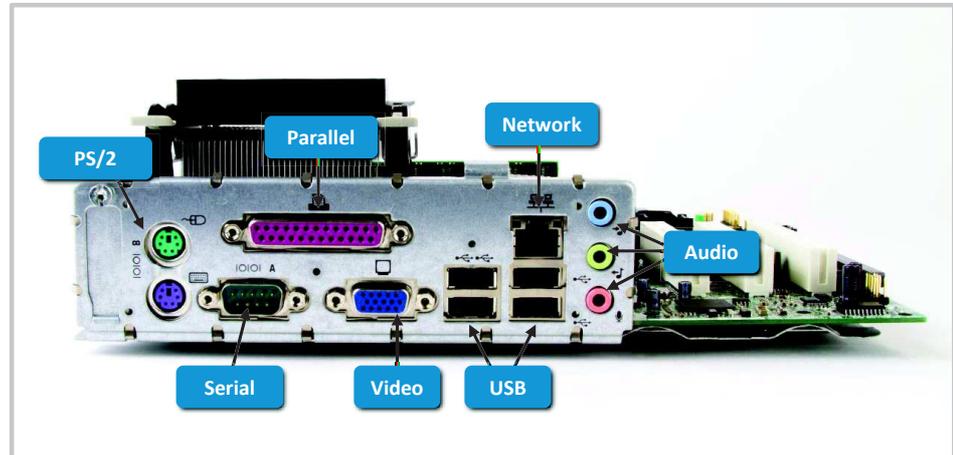
- SIMM
- DIMM
- SODIMM
- RIMM



OV 5 - 4

Integrated I/O Port Types

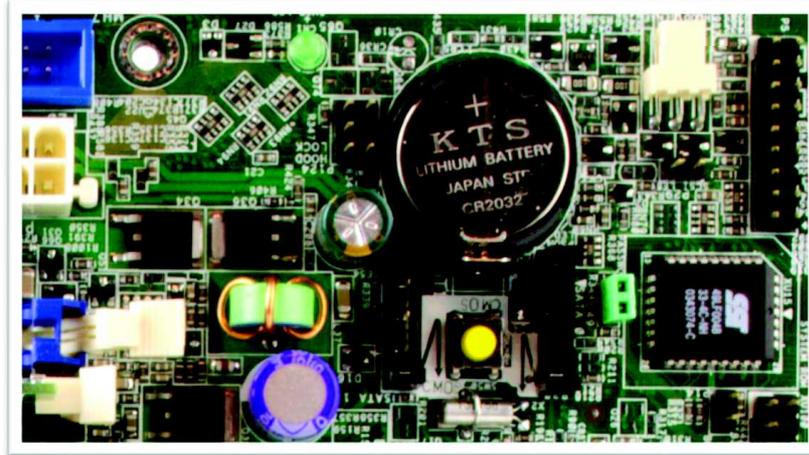
- Sound
- Video
- Network
- Modem
- USB
- Serial
- FireWire
- Parallel
- PS/2



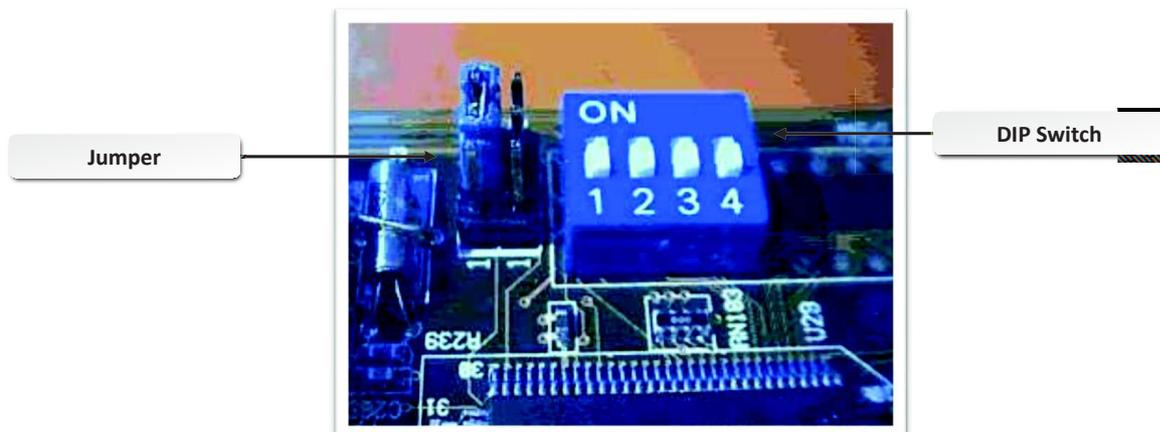
Chipsets



- Provides real-time system clock



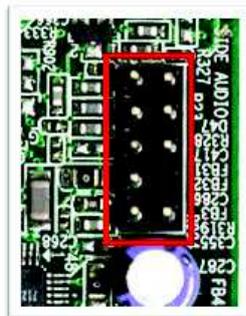
OV 5 - 7



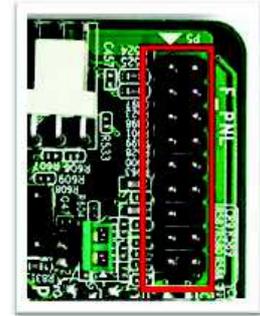
OV 5 - 8



USB Panel



Audio Panel



Front Panel

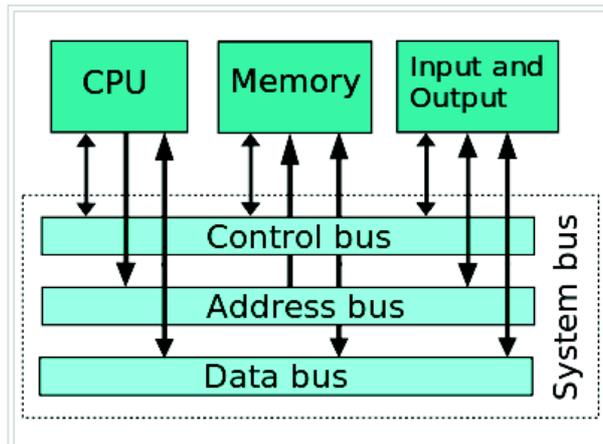
Common connectors include:

- 3-pin molex
- 4-pin molex



Bus Speeds

- Determines how fast data is transmitted
- Speed varies based on bus
- Bus speed depends on installed components



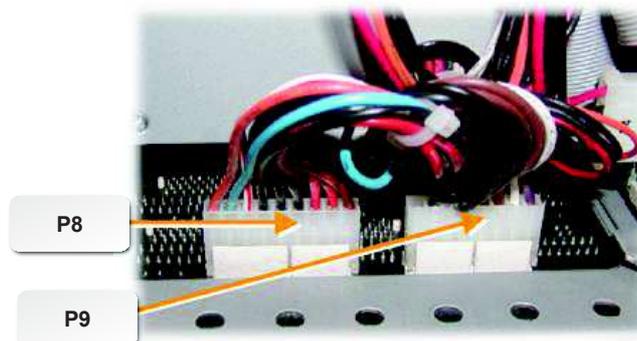
OV 5 - 11

Motherboard Power Connectors



A Single Keyed Connector

Notch for keyed connector



A Pair of Connectors

OV 5 - 12

Motherboard Selection Tips



- Does the system board support enough RAM to meet the user's needs?
- What type of processor can you install?
- Does the system board have the necessary ports to meet the user's needs?
- How many expansion slots will the user need?
- Does the system board include drive interfaces?
- Will the system board fit inside the case of the computer?
- Does the system board operate at a high enough frequency to support processor?

OV 5 - 13

Motherboard Installation Considerations

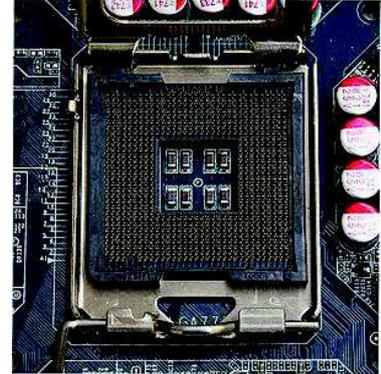
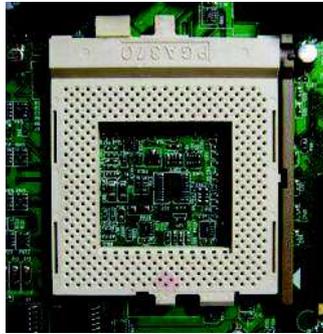
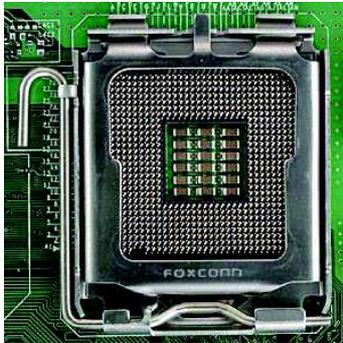


- Check manufacturer's requirements
- Verify that the board fits your case
- Check any specific system requirements

OV 5 - 14

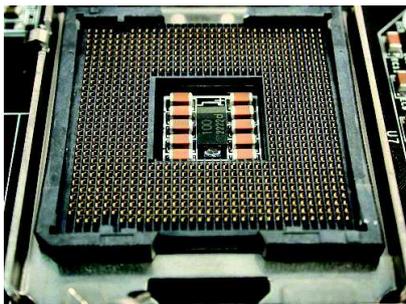
CPU Sockets

- Slots
- Sockets

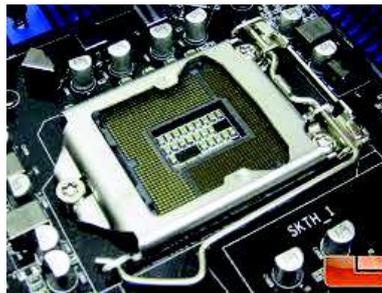


OV 5 - 15

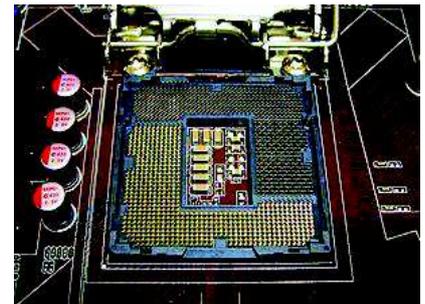
Intel CPU Socket Types



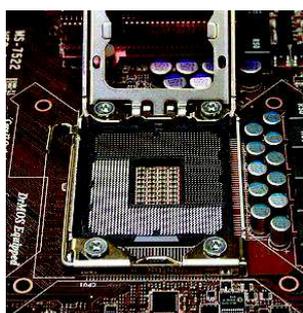
LGA 775



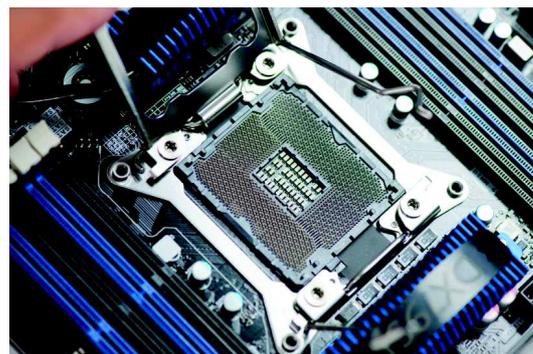
LGA 1155



LGA 1156



LGA 1366



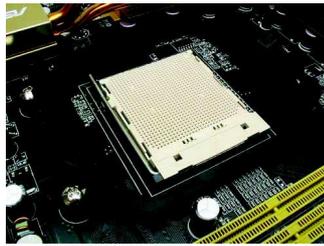
LGA 2011

OV 5 - 16

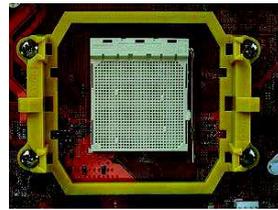
AMD CPU Socket Types



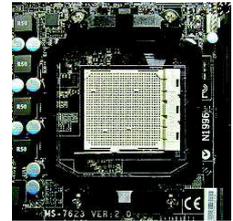
AMD 940



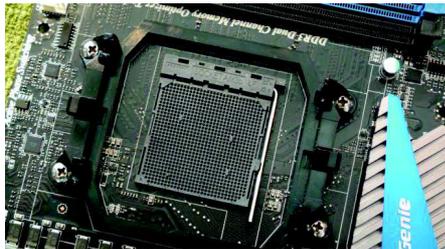
AMD2



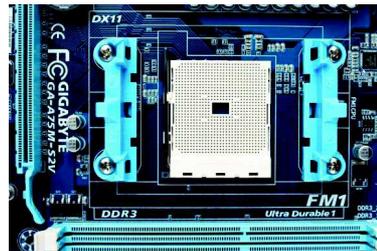
AMD2+



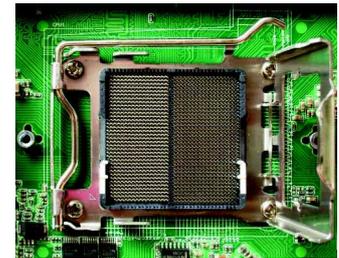
AMD3



AMD3+

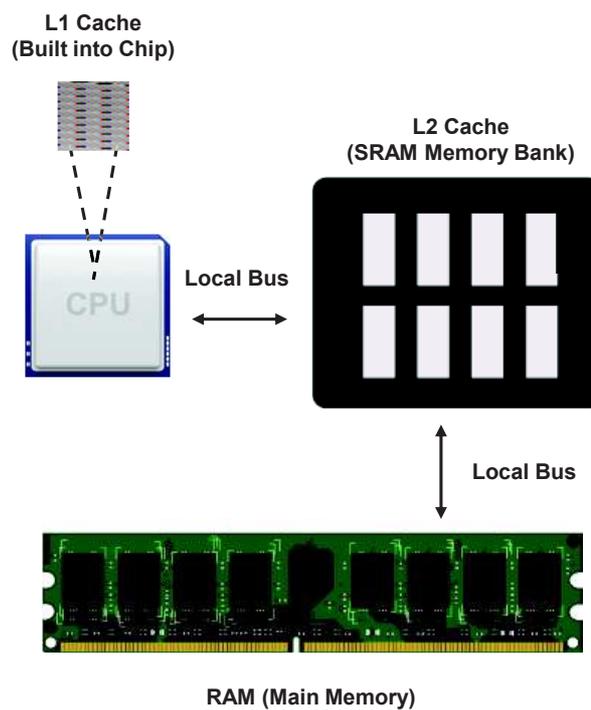


FM1



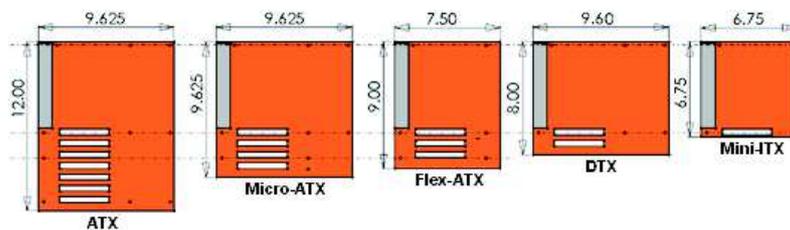
F

Cache



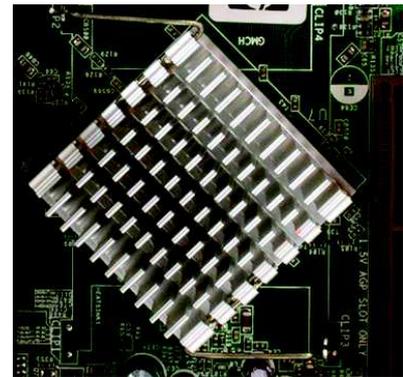
- Architecture
- Clock speed
- Overclocking
- CPU speed
- Throttling
- HT
- Integrated GPU
- Virtualization support
- Cores
- Cache
- VRM
- MMX

- Compatibility with other components in the system.
- Design and form factors of the motherboard.
- Weigh out the pros and cons of performance and price.



Cooling System Types

- Fans
- Vents
- Heat sinks
- Thermal paste
- Liquid-based



OV 5 - 21

Cooling System Selection Factors

- What components need to be cooled?
- Will the system fit within the case?
- Will you need multiple systems?
- What size fan do you need?

OV 5 - 22

Power Supply Specifications

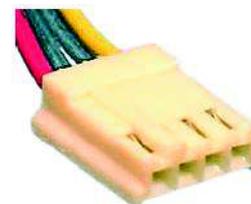
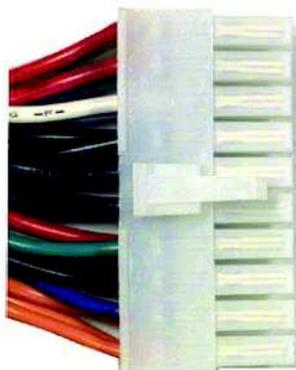
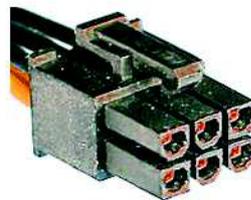
- Size
- Connections
- Wattage
- Voltage



OV 5 - 23

Power Supply Connections

- SATA
- 4/8-pin 12v
- PCIe 6/8-pin
- Main power connectors
 - 20-pin
 - 24-pin
- Floppy



OV 5 - 24

Power Supply Safety Recommendations

- Check for UL certification
- Replace instead of repairing
- Keep the computer case closed during normal operation
- Protect the power supply



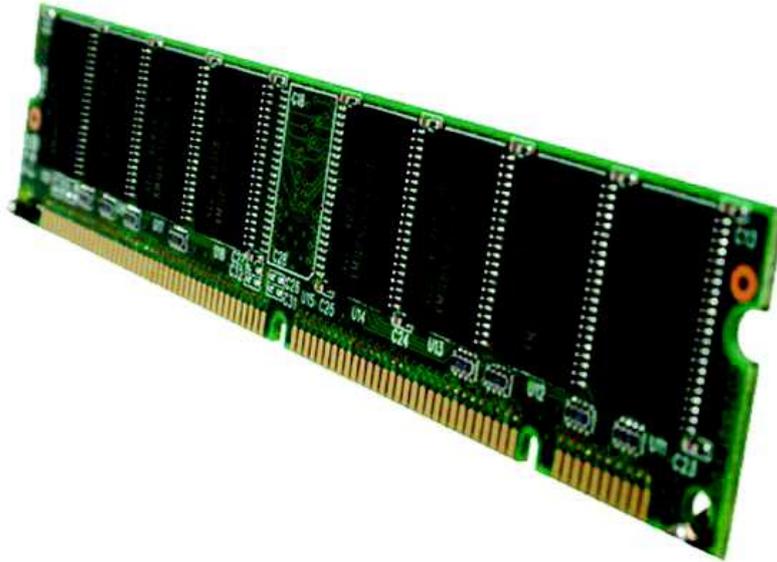
OV 5 - 25

Selecting the Right Power Supply

- Power supply rating
- Form factor
- Cooling



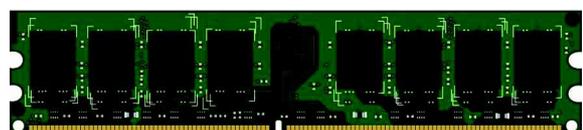
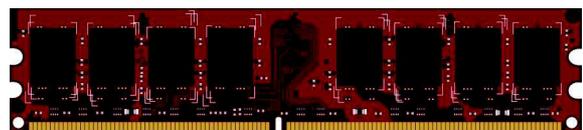
OV 5 - 26



OV 5 - 27

Single-Sided and Double-Sided Memory

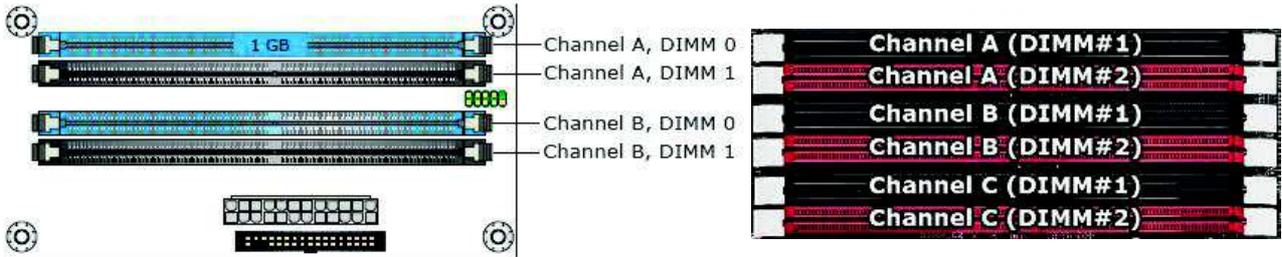
- **Single-sided memory:**
 - All of its memory is accessible
- **Double-sided memory:**
 - Only one bank at a time is accessible



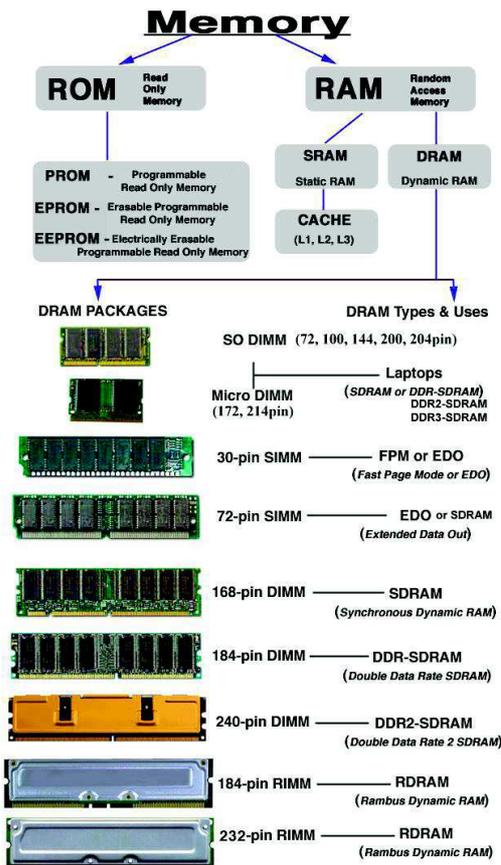
OV 5 - 28

RAM Configurations

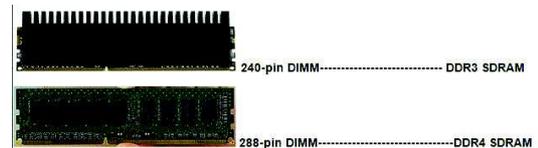
- Single channel
- Double channel
- Triple channel
- Quadruple channel in the works



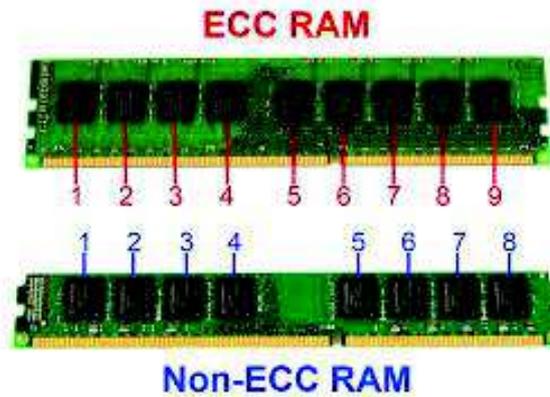
Types of RAM



- SRAM
- DRAM
- DRDRAM
- SDRAM
- DDR SDRAM
- DDR2 SDRAM
- DDR3 SDRAM



- Uses several bits of a data string to check for errors
- Used only in upper-end systems such as high-end workstations and servers



- Error-checking method that is found used in RAM to detect errors that occur during transmission
- Uses a single parity bit to determine pieces of data match

Parity Error Detection

Odd Parity		Even Parity	
Data Bits	Parity Bit	Data Bits	Parity Bit
1 1 1 1 1 1 1 1	1	1 1 1 1 1 1 1 1	0
0 0 0 0 0 0 0 0	1	0 0 0 0 0 0 0 0	0
1 1 0 0 1 1 0 1	0	1 1 0 0 1 1 0 1	1
0 1 1 1 1 1 1 1	0	0 1 1 1 1 1 1 1	1

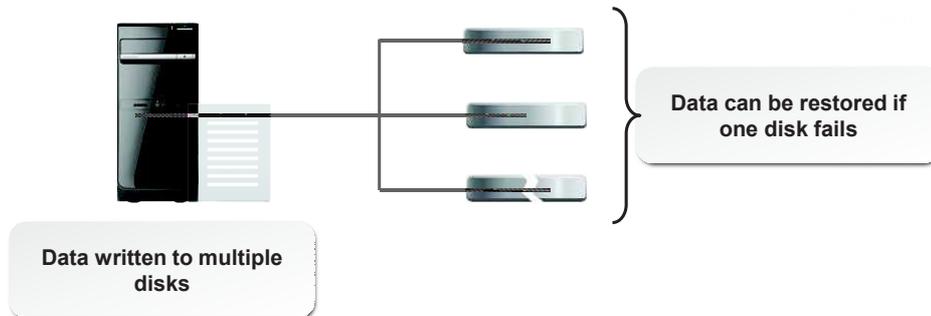
Each time new data is stored in a byte, the RAM, hard disk or serial port's parity generation circuit computes the correct value of the parity bit. In the case of even parity, the value of the parity bit is chosen to ensure the number of 1s in the byte is even. In the case of odd parity, the parity bit is given a value that causes the total number of 1s to be odd.

When data is read from a byte, the RAM, hard disk or serial port's parity-checking circuit determines whether the parity bit's value is consistent with the other bits of the byte. If not, one or more bits has changed.

- Is the RAM compatible with the system's motherboard?
- What is the maximum size supported by the motherboard?
- What is the current speed of the RAM in the computer?
- What is the bus speed of the computer?
- Do you need to install RAM in pairs?
- What is the connector size for the RAM chips?

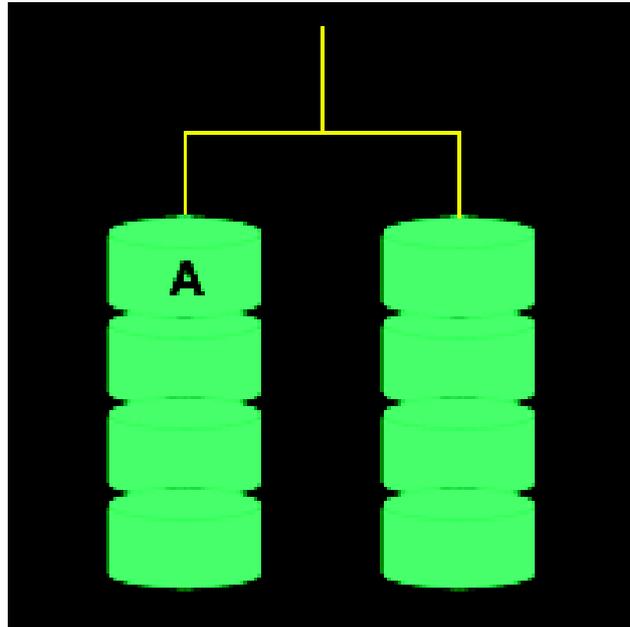
- CD/CD-RW (700 – 860 MB)
- DVD/DVD-RW (4.7 GB – 17.08 GB)
- Blu-ray (25 GB per layer, up to 128 GB)
- Tape (5 TB)
- Floppy (720KB, 1.44 MB; Super Floppy 100 and 200 MB)
- DL DVD (8.5 GB)





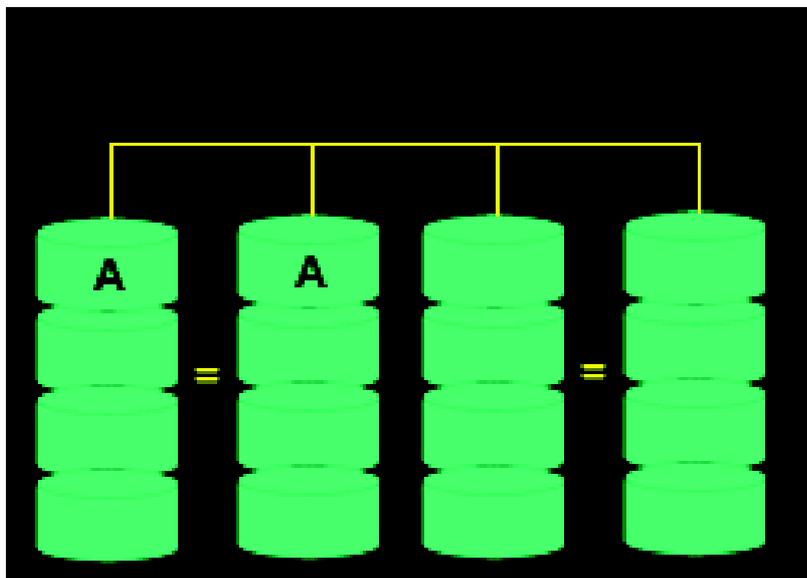
- **RAID 0: Striping**
- **RAID 1: Mirroring or duplexing**
- **RAID 5: Striping with parity spread across multiple drives**
- **RAID 10: Combines two levels to provide both mirroring and striping**

RAID 0: Striping



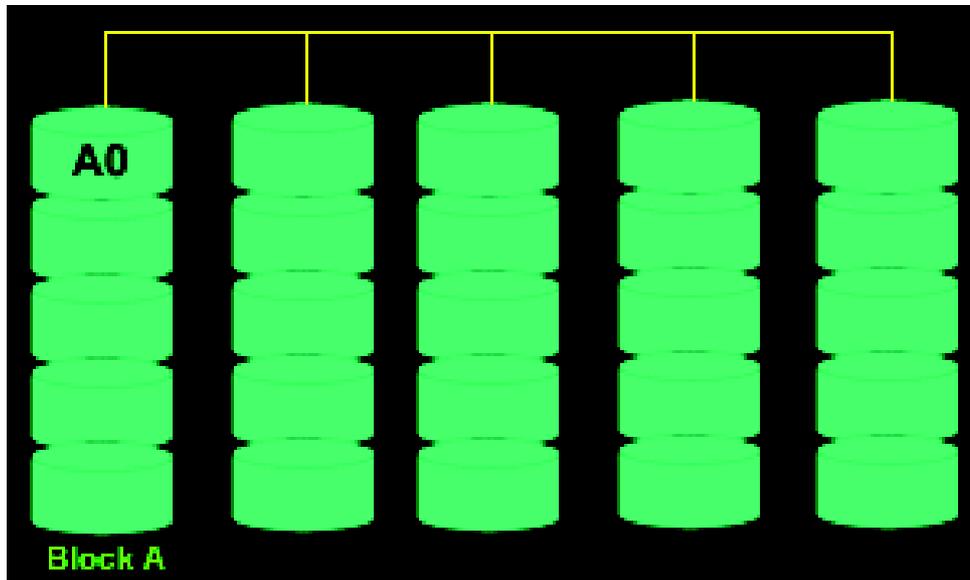
OV 5 - 37

RAID 1: Mirroring or duplexing



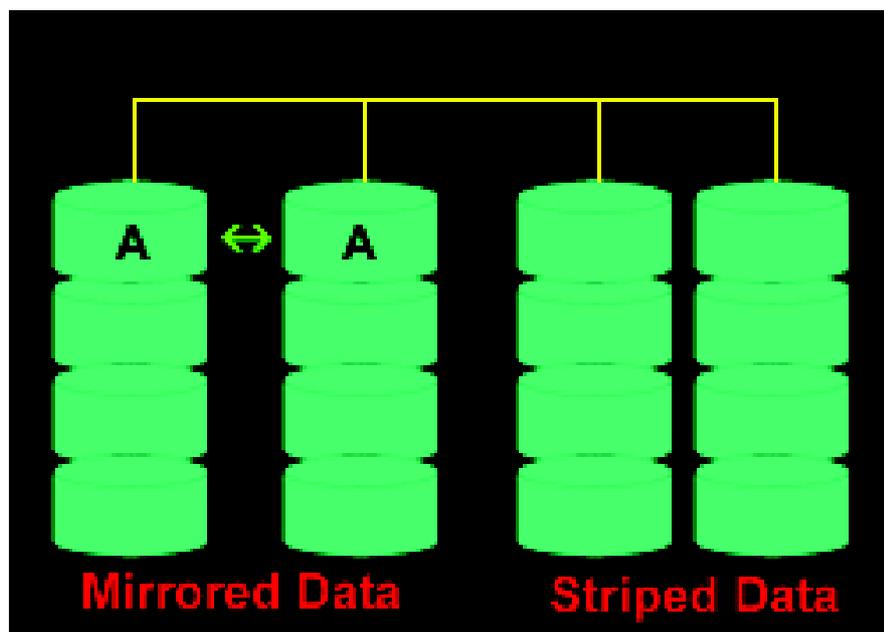
OV 5 - 38

RAID 5: Striping with parity spread across multiple drives



OV 5 - 39

RAID 10: Combines two levels to provide both mirroring and striping



OV 5 - 40

Internal Storage Device Considerations



- Does the computer have existing internal storage devices?
- Does the device need additional drivers installed?
- Does the computer have an available power supply cable to supply power to the device?
- Does the computer have an available drive bay for the storage device?
- Do you have the necessary data cables to connect the storage device to the controller?
- Does the placement of the device interrupt the air flow of the case?

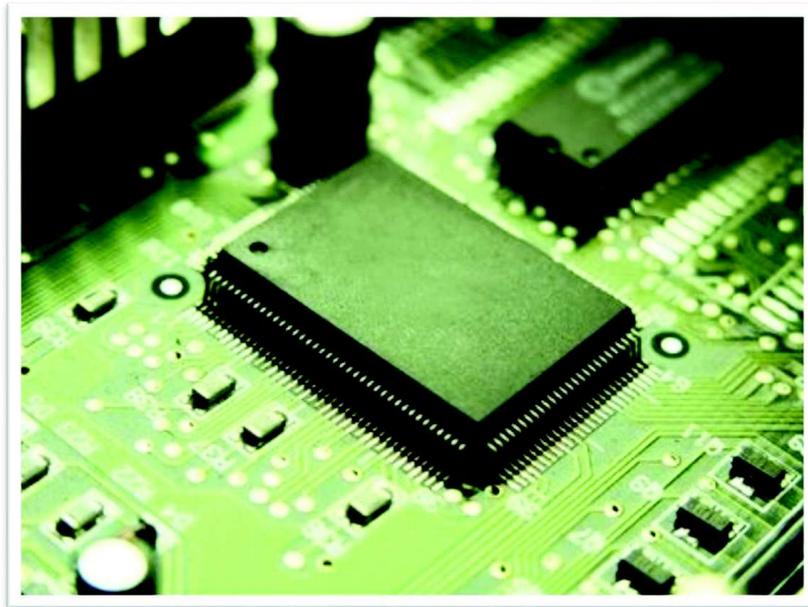
OV 5 - 41

External Storage Device Considerations



- What interface does the external storage device require (USB, FireWire, or SCSI)?
- Do you need a cable to connect the external storage device to the computer?
- Do you have an available source of power for the storage device?

OV 5 - 42



A number of system components that can be configured through the system BIOS:

- RAM
- Hard drives
- Optical drives
- CPU

- **Security patches**
- **Performance updates**
- **Known issue updates**



- **General settings**
- **Security settings**
- **Memory configurations**
- **Enabling and disabling devices**
- **Clock speed**
- **System configuration**
- **Video**
- **Performance**
- **Virtualization support**
- **Power management**
- **Maintenance**

Diagnostics Menu

InsydeH20 Setup Utility Rev. 3.5

Main	Security	Diagnostics	System Configuration	Exit
System Time [9 : 28 4b				Item Specific Help
System Date [04 24 2011				<Tab>, <Shift-Tab>, or <Enter> selects field.
NoteBook Model HP G71 Notebook PC				Video memory is included in the total memory and the size is dynamically changed in the OS based on the usage.
Product Number OP7SKU3#ABA				
System Board ID 306B				
Processor Type Pentium® Dual-Core CPU T4200				
Processor Speed 2.00GHz				
Total Memory 4096 MB				
BIOS Version F.01				
Serial Number CNF85027X8				
UUID Number 434E4638-3530-3237-5838-00238B52A028				
Product configuration ID 01100000100C20000				
Factory installed OS Vista				

F1 Help ↑↓ Select Item F5/F6 Change Values F9 Setup Defaults
Esc Exit ←→ Select Menu Enter Select ▶ SubMenu F10 Save and Exit

- Temperature
- Fan speeds
- Intrusion detection
- Voltage
- Clock
- Bus speed

- 1. In your current job role, what system components have you worked with the most?**
- 2. In future job roles as an A+ technician, what system components do you think you will be working with the most?**

- Standard Clients
- Custom Client Environments



OV 7 - 1

What is a Standard Client?

There are two types of standard clients:

- Thin client
- Thick client



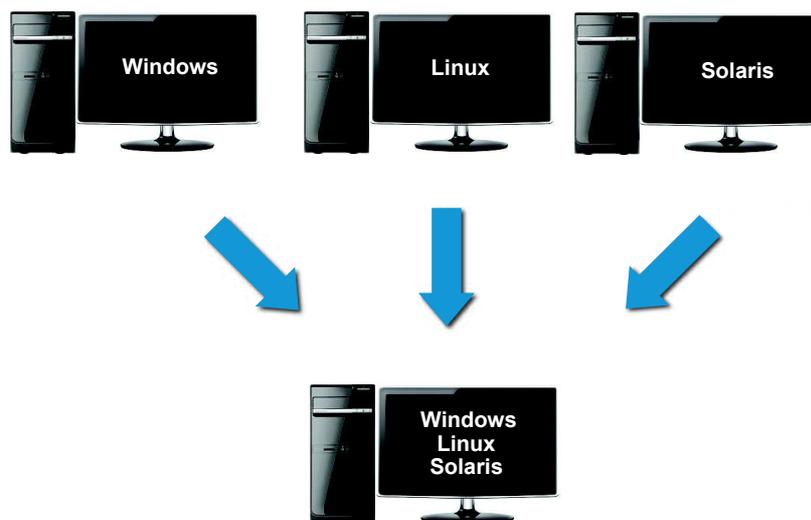
OV 7 - 2

Thin client requirements:

- Minimum Windows requirement
- Basic applications
- Fast network connection
- Specialized software for server access
- Specific browser needs

Thick client requirements:

- Meets standard Windows requirements
- Full applications
- Access to local storage locations
- Network storage path
- Robust hardware to meet application needs.



Virtualization Workstation Requirements



- **Maximum RAM the motherboard can support**
- **Maximum CPU cores**
- **Virtualization OS or client software depending on needs.**
- **Fast network connection for server-side VM hosting.**

OV 7 - 5

Media Design Workstations



OV 7 - 6

Media Design Workstation Requirements



- **Powerful processor**
- **High-end video/graphics card with integrated GPU**
- **Large flat panel display, or multiple monitors**
- **Maximum RAM supported by the motherboard and CPU**

OV 7 - 7

Audio/Video Editing Workstations

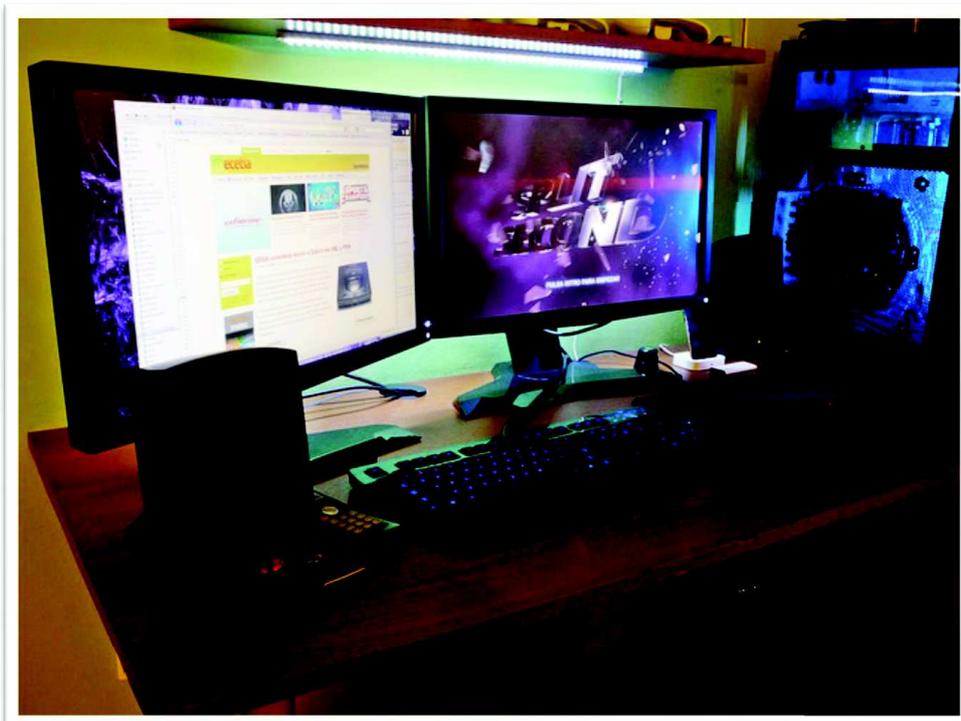


OV 7 - 8

Audio/Video Editing Hardware Requirements

- Specialized audio and video card
- Large fast hard drive
- A high-end GPU
- Large flat panel or multiple displays

Gaming PCs



Gaming PC Requirements



- **Powerful processor**
- **High-end video/graphics card with GPU**
- **High quality sound card**
- **High-end cooling system**
- **Maximum RAM that is supported by motherboard**
- **Fast internet connection**
- **Real-time video and audio input/output capabilities**
- **In some cases, HDMI output**

OV 7 - 11

Home Theater PC



OV 7 - 12

Home Theater PC Requirements



- A TV tuner card
- A cable card
- Optical disk player that supports DVD and Blu-ray
- Maximum RAM supported by motherboard
- Video card with GPU and HD capabilities
- Bluetooth or wireless for specialized remotes or input devices

OV 7 - 13

Home Server PC



OV 7 - 14

Home Server Requirements



- **Media streaming**
- **File sharing for all home users**
- **Print sharing**
- **A gigabit NIC**
- **Router that can support gigabit speeds**
- **RAID array to provide redundancy**

OV 7 - 15

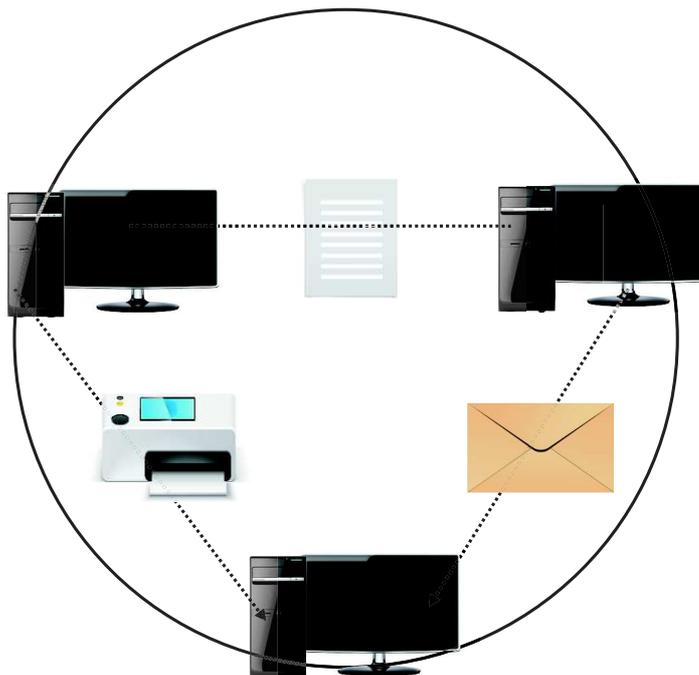
Reflective Questions



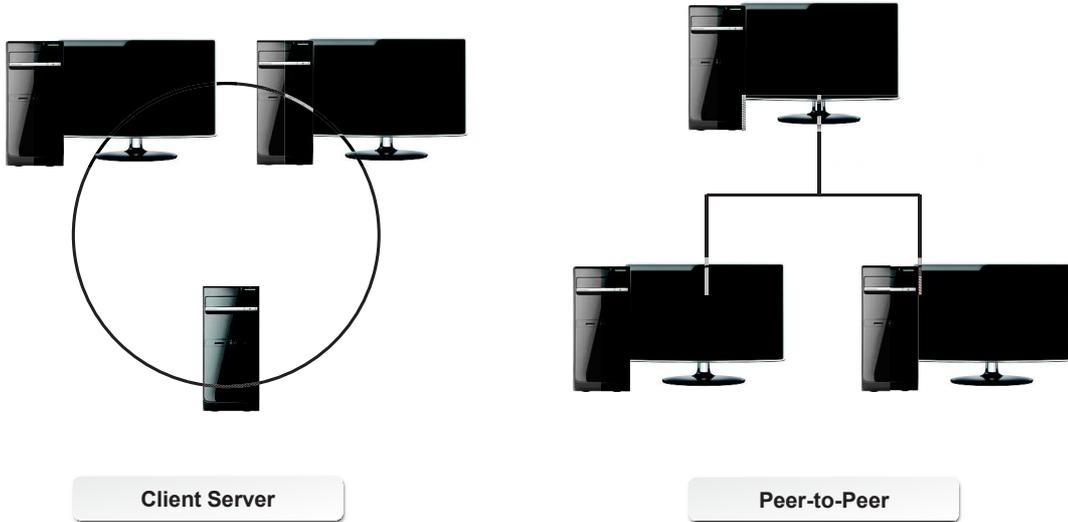
- 1. Have you had any experience with any of the workstation or server setups presented in this lesson?**
- 2. What types of custom client setups do you think you will encounter the most in your role as an A+ technician?**

OV 7 - 16

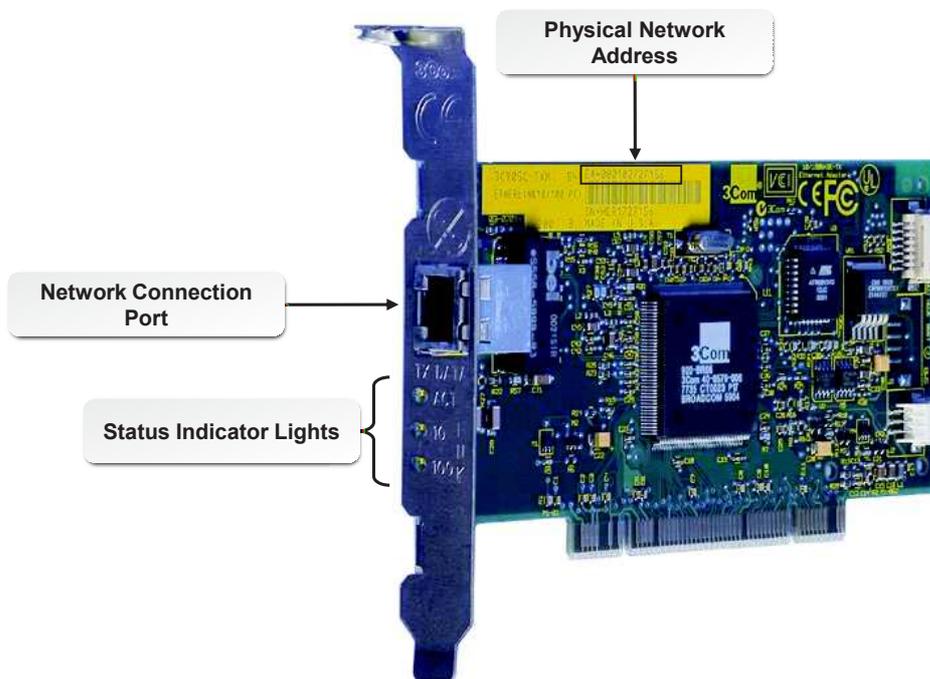
- **Physical Network Connections**
- **TCP/IP**
- **Network Connectivity**
- **Ports and Protocols**
- **Set Up and Configure Windows Networking**
- **Networking Tools**



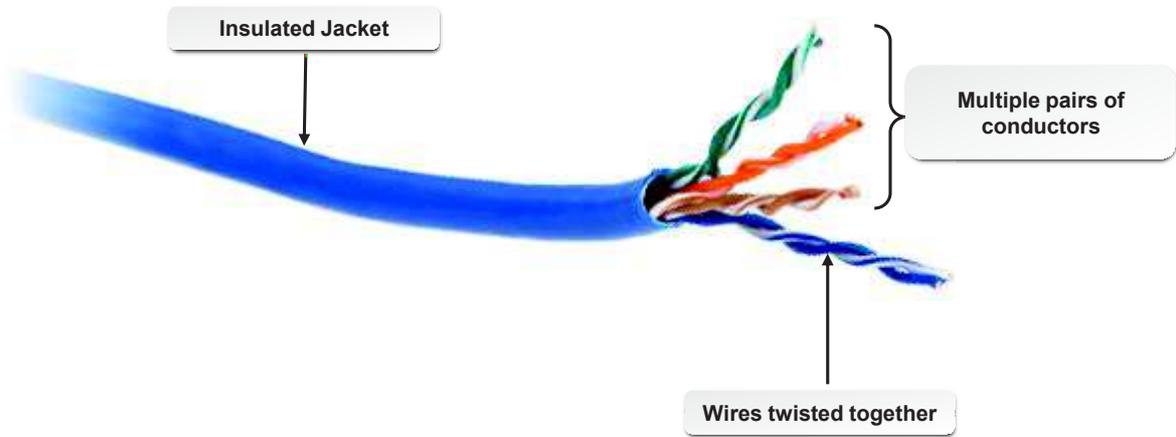
Network Models



Network Interface Card Characteristics



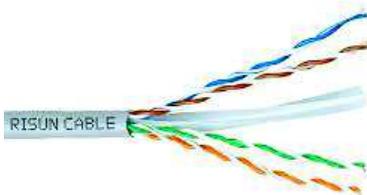
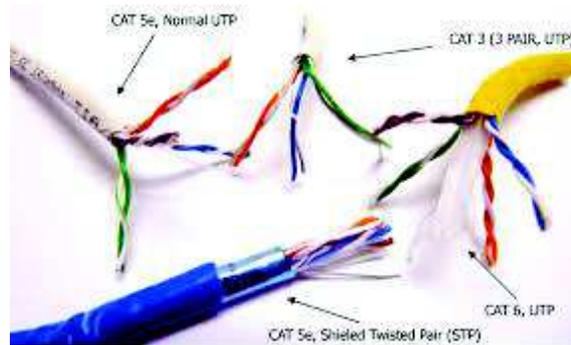
Twisted Pair Cables



OV 8 - 5

Types of Twisted Pair Cable

- CAT 3
- CAT 5
- CAT 5e
- CAT 6
- CAT 6a
- CAT 7



OV 8 - 6

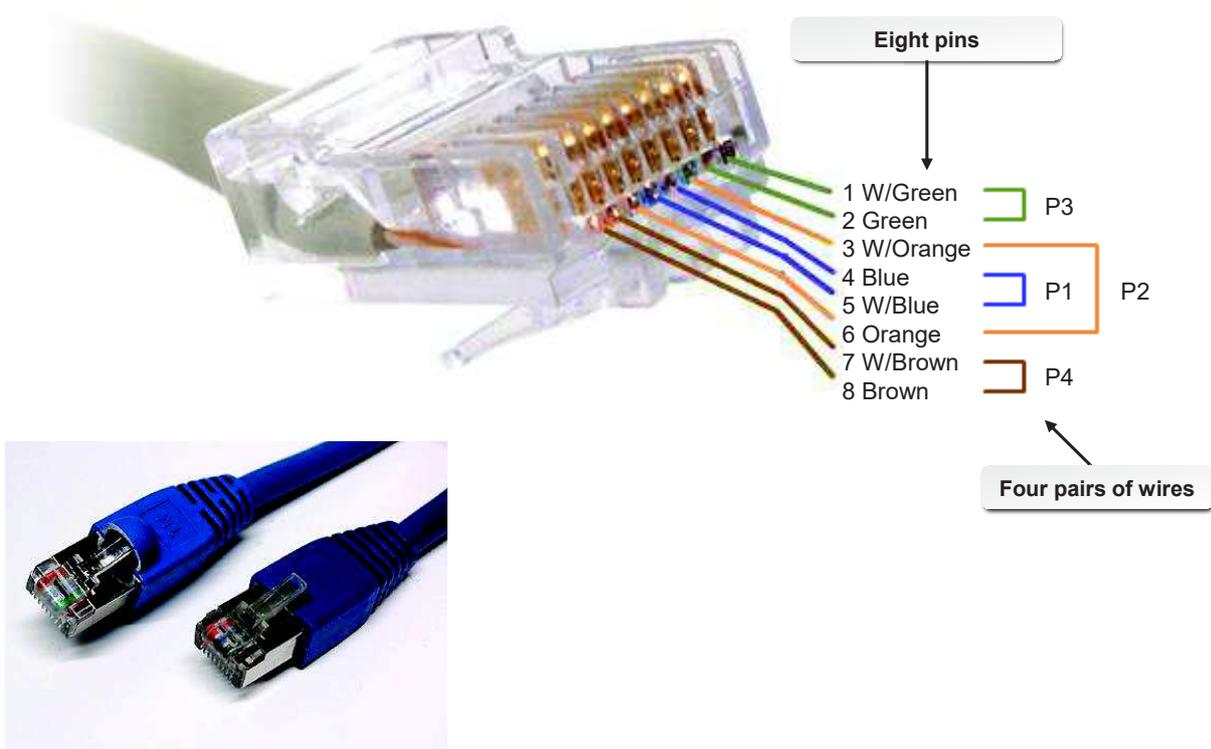
PVC Cable vs. Plenum Cabling

- PVC is inexpensive and flexible used to cover with twisted pair cabling.
- Plenum jacketing does not give off noxious or poisonous gas when burned



OV 8 - 7

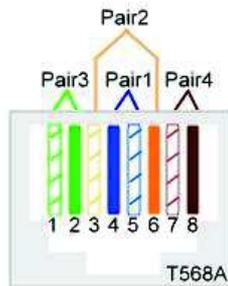
Twisted Pair Connectors



OV 8 - 8

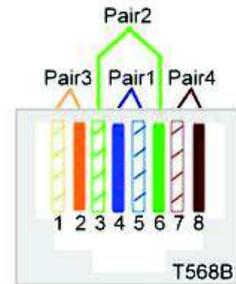
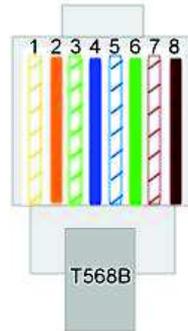
Twisted Pair Wiring Standards

T568A



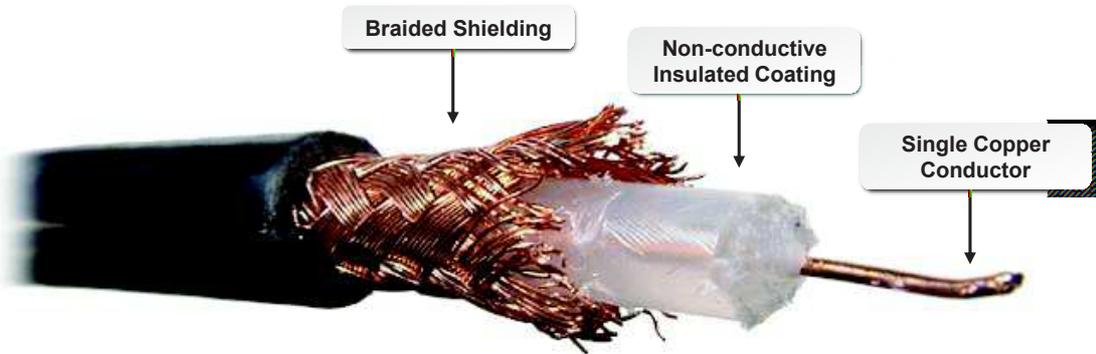
- PIN 1: green/white
- PIN 2: green
- PIN 3: orange/white
- PIN 4: blue
- PIN 5: blue/white
- PIN 6: orange
- PIN 7: brown/white
- PIN 8: brown

T568B



- PIN 1: orange/white
- PIN 2: orange
- PIN 3: green/white
- PIN 4: blue
- PIN 5: blue/white
- PIN 6: green
- PIN 7: brown/white
- PIN 8: brown

Coaxial Cables



Coaxial Cable and Connector Types



BNC Connector



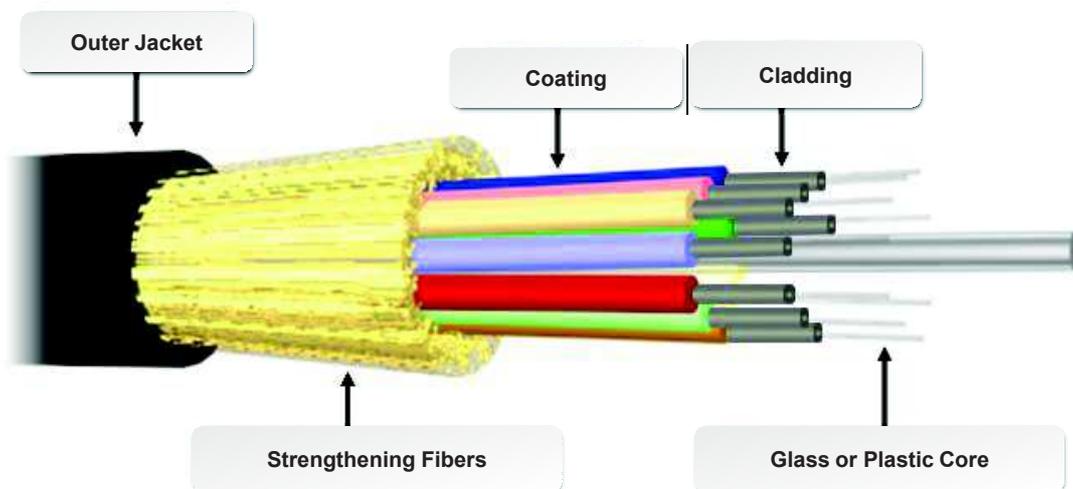
RG-6/U Connector



RG8 Connector

OV 8 - 11

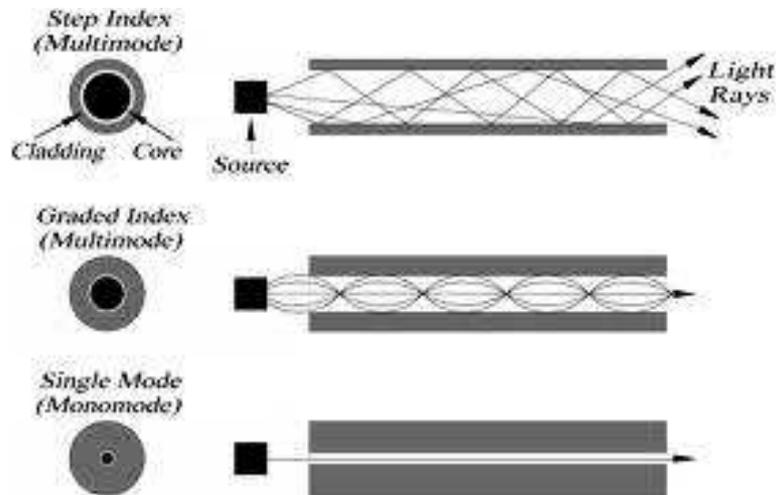
Fiber Optic Cables



OV 8 - 12

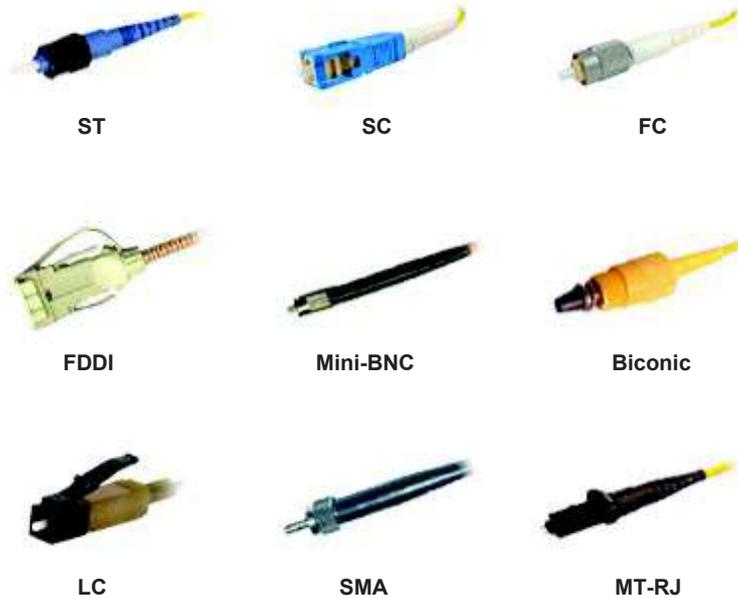
Fiber Optic Cable Types

- Single-mode fiber
- Step index multimode fiber
- Graded index multimode fiber



OV 8 - 13

Fiber Optic Connector Types



OV 8 - 14



Infrared



Satellite



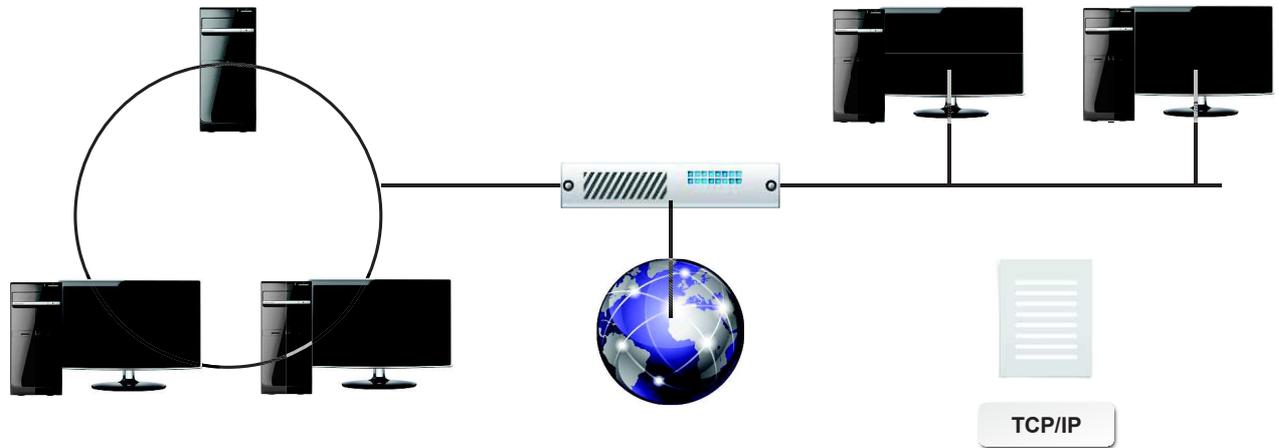
Wireless

- **USB**
- **FireWire**
- **RS-232 null-modem cable**

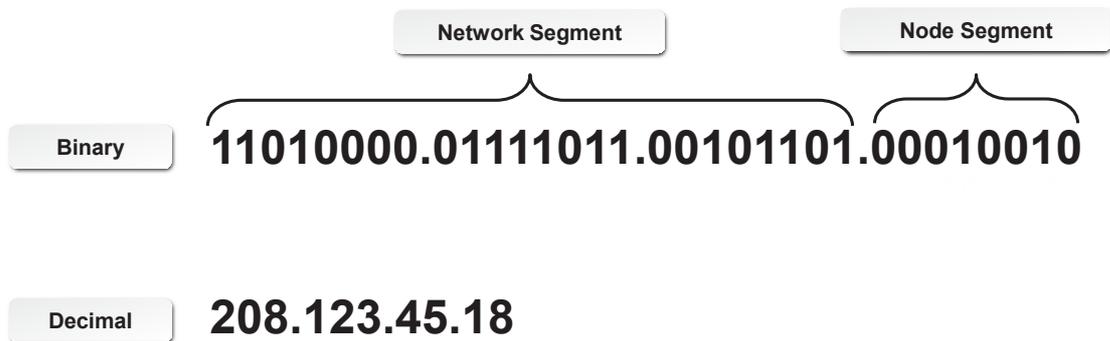


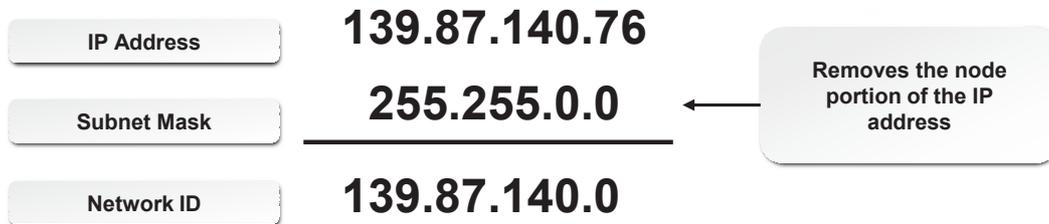
USB to USB
NULL MODEM CABLE

TCP/IP

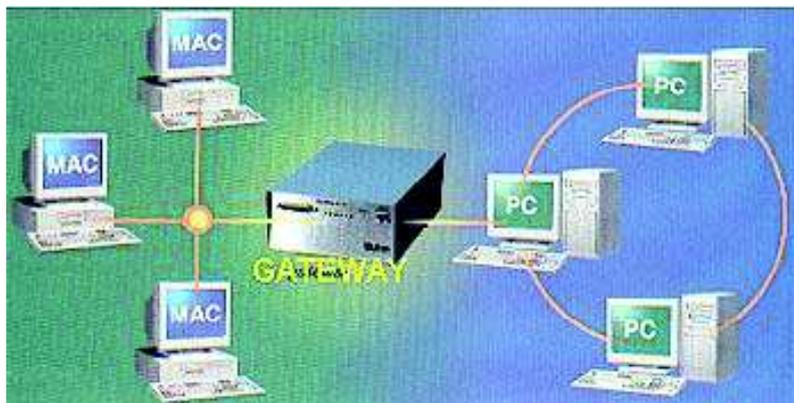


IPv4 Addresses





- Converts data between incompatible systems or devices
- Translates data between different operating systems
- Implemented as hardware, software, or both



Address Class	Subnet Mask	Nodes
Class A	255.0.0.0	Up to 16,777,214 nodes
Class B	255.255.0.0	Up to 65,534 nodes
Class C	255.255.255.0	Up to 254 nodes

- Increases the available pool of IP addresses
- Includes new efficiency features
- Not compatible with IPv4, so its deployment is limited

An example IPv6 address

2001:0DB8:AC10:FE01:0056:0000:0000:0000/64

The IPv6 Address Format



2001:0DB8:AC10:FE01:0056:0000:0000:0000

Hexadecimal Format

**1000000000000001:0000110110111000:1010110000010000:1111111000000001:
0000000000000000:0000000000000000:0000000000000000:0000000000000000**

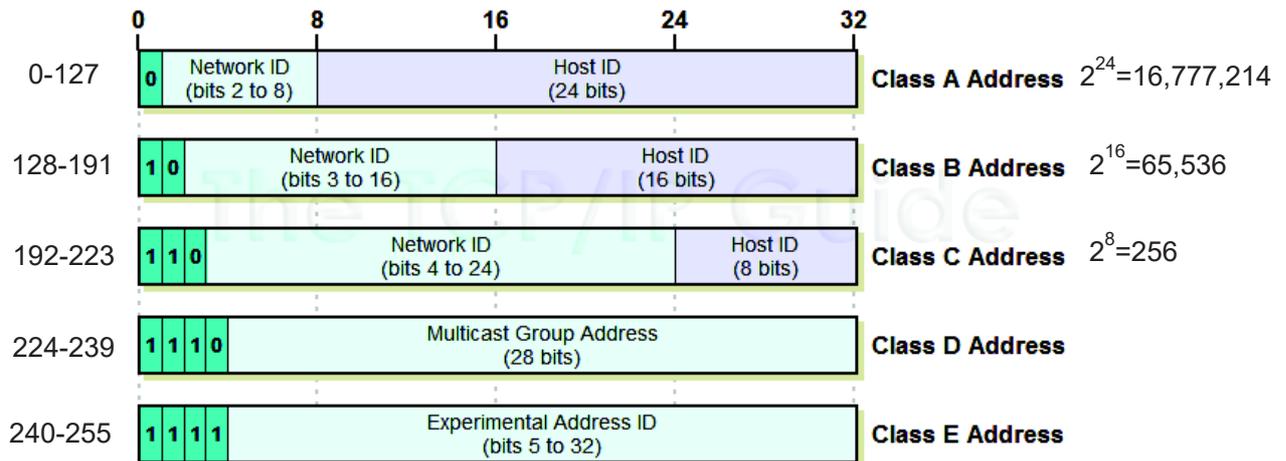
128 Bit Binary Format

IPv4 vs. IPv6



IPv4	IPv6
32 bits	128 bits
IPSec is optional	IPSec is required

- Private
- Public
- APIPA



Static vs. Dynamic Addressing

Static Addressing

Use the following IP address:

IP address:

Subnet mask:

Default gateway:

Dynamic Addressing

Obtain an IP address automatically

Use the following IP address:

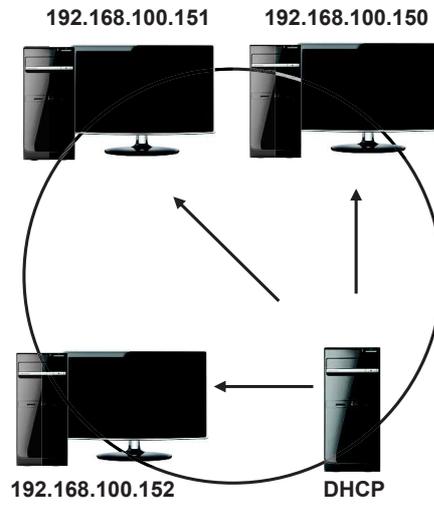
IP address:

Subnet mask:

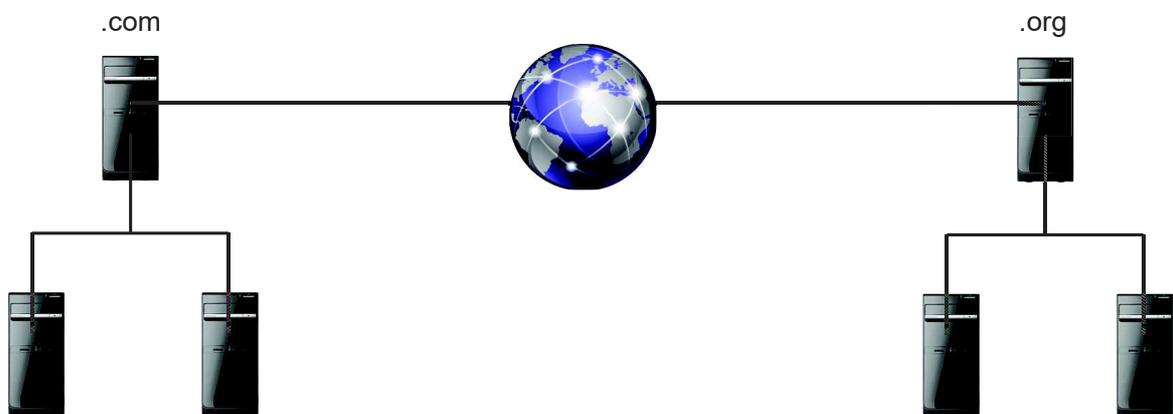
Default gateway:

Obtain DNS server address automatically:

DHCP



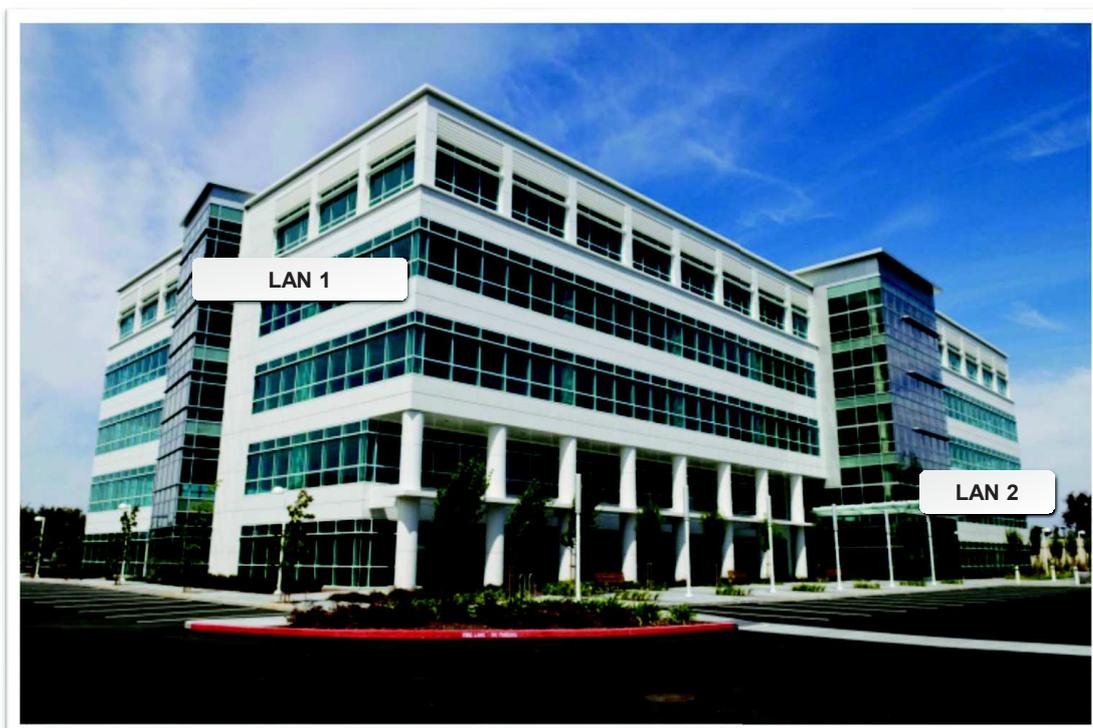
DNS



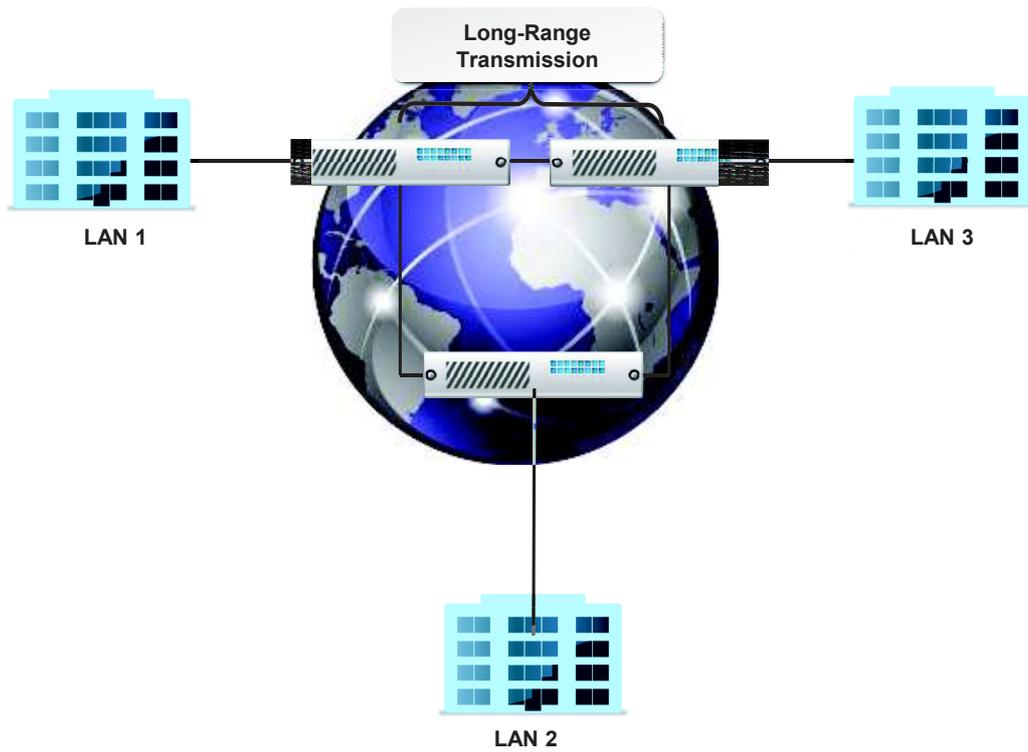
Client-Side DNS

- Can be used by running a DNS service on a client computer.
- Enables client to perform basic DNS lookups without connecting to a server.

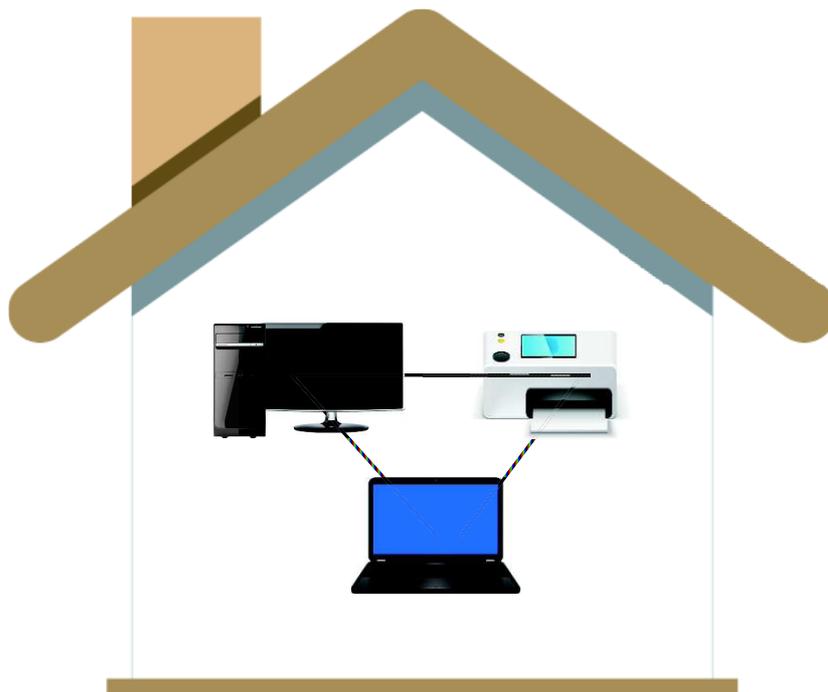
LANs



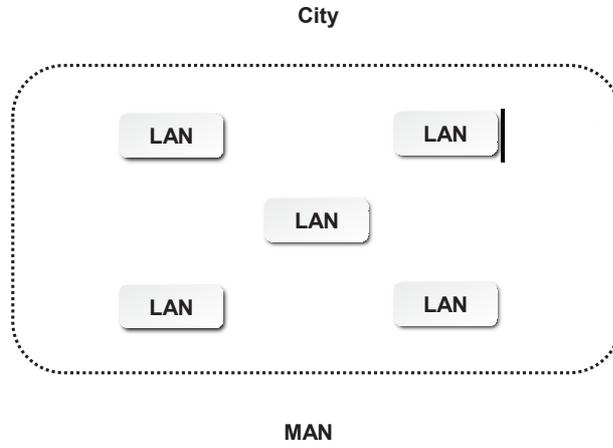
WANs



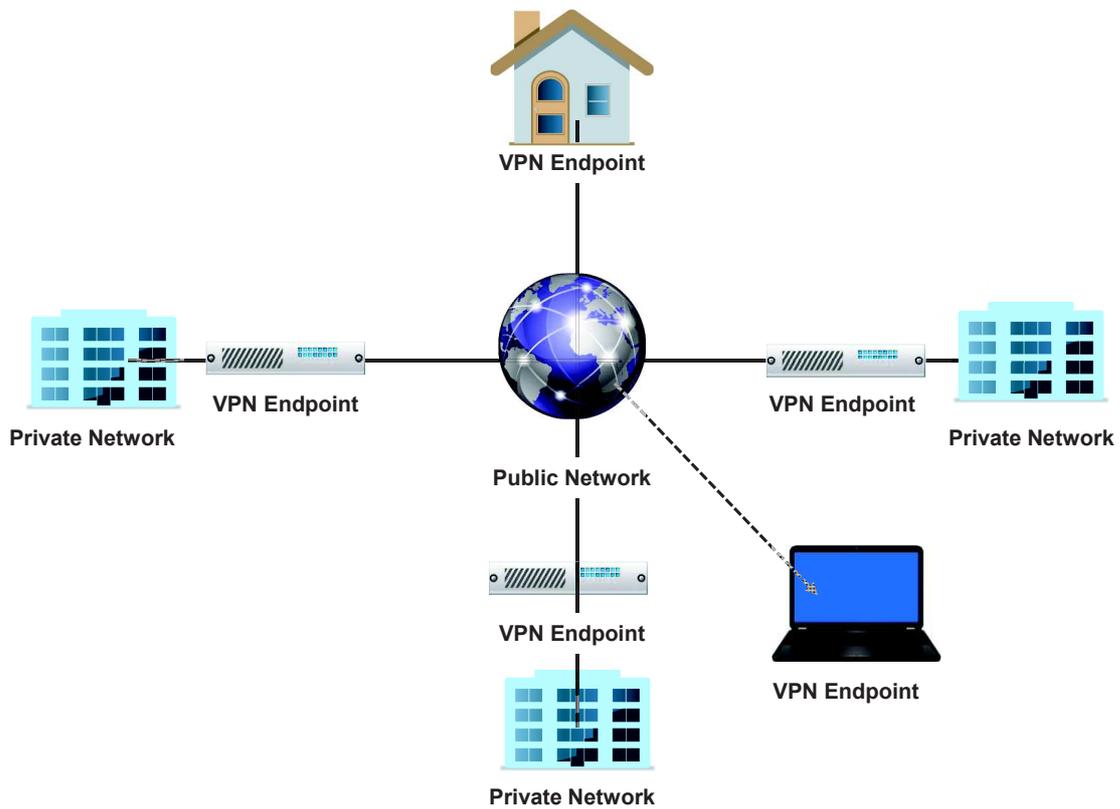
PANs

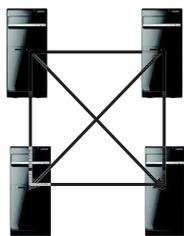
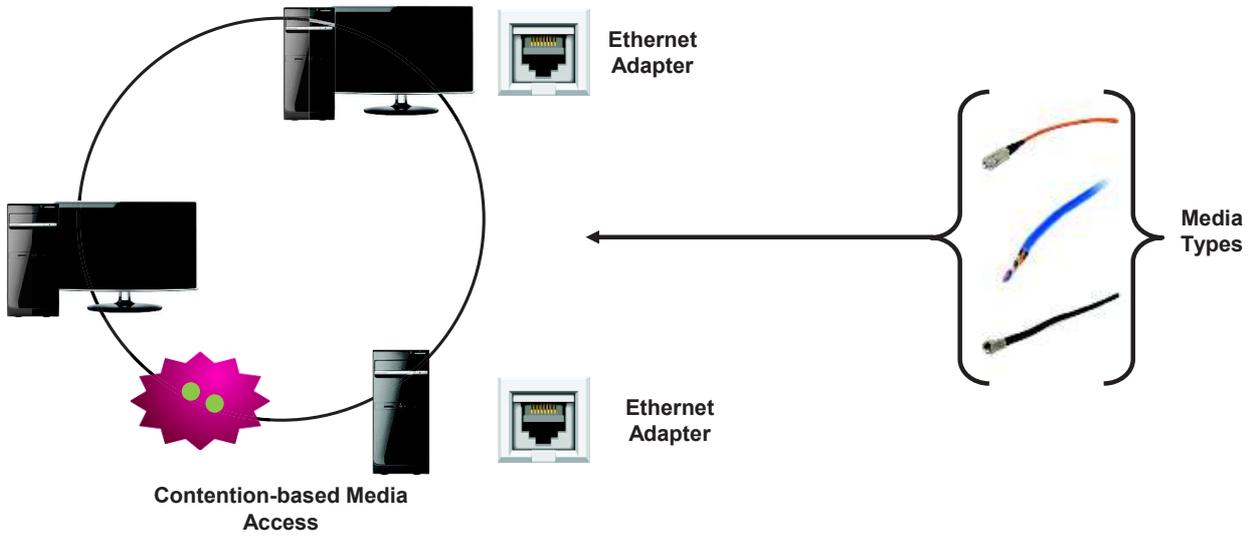


MANs

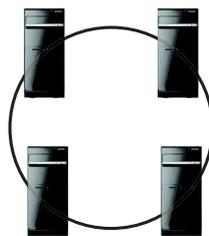


VPNs





Mesh



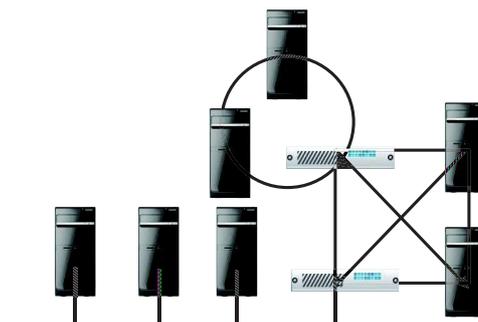
Ring



Star



Bus



Hybrid

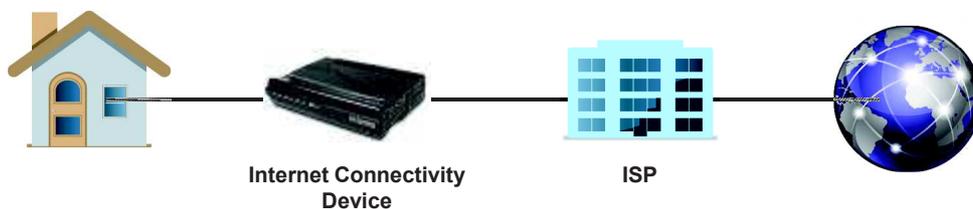
Network Device Types and Features

- Hub
- Switch
- Router
- Bridge
- Access Point
- Modem
- NAS
- Firewall
- VoIP Phone
- Internet appliance



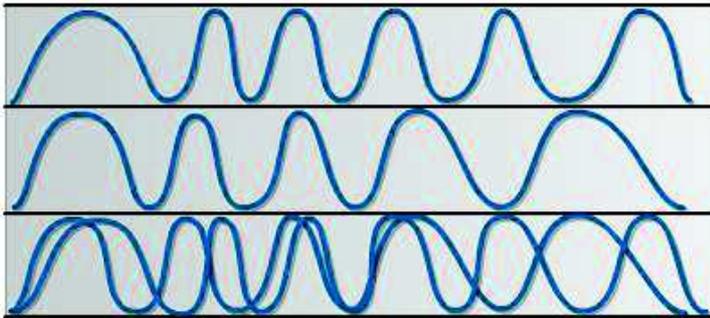
OV 8 - 37

ISPs



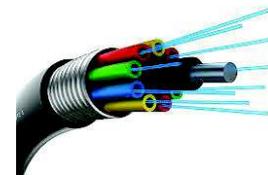
OV 8 - 38

Multiple Channels



Internet Connection Types and Features

- Cable
- DSL
- Dial-up
- Fiber
- Satellite
- ISDN
- Cellular
- WiMAX
- Bluetooth



- **The endpoint of a logical connection**
- **All ports are assigned a port range from 0 to 65,535**
- **IANA separates port numbers into three blocks**

TCP

- **A connection oriented, guaranteed delivery protocol**
- **Breaks up data into datagrams, reassembling, resending, and resequencing**
- **Complex slower service**

UDP

- **A connectionless, best effort protocol**
- **Transmits data and ensures integrity, but lacks reliability, flow-control, and error recovery functions**
- **Less complex than TCP, faster service**

Port Ranges



- **Well-known ports: 0 to 1,023**
- **Registered ports: 1,024 to 49,151**
- **Dynamic or private ports: 49,152 to 65,535**

OV 8 - 43

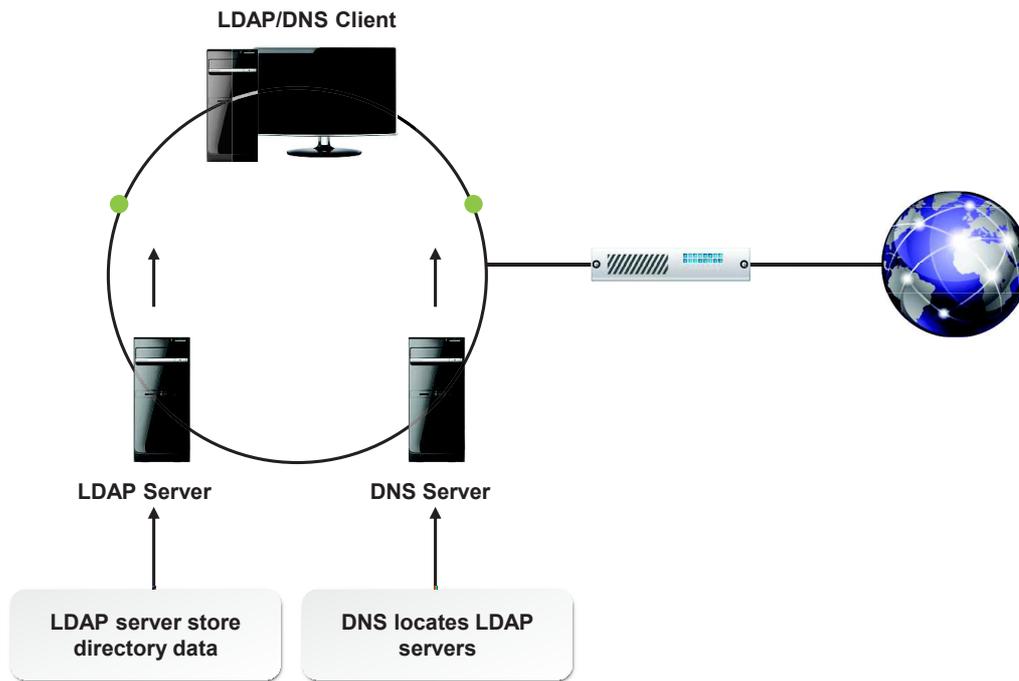
Common Ports



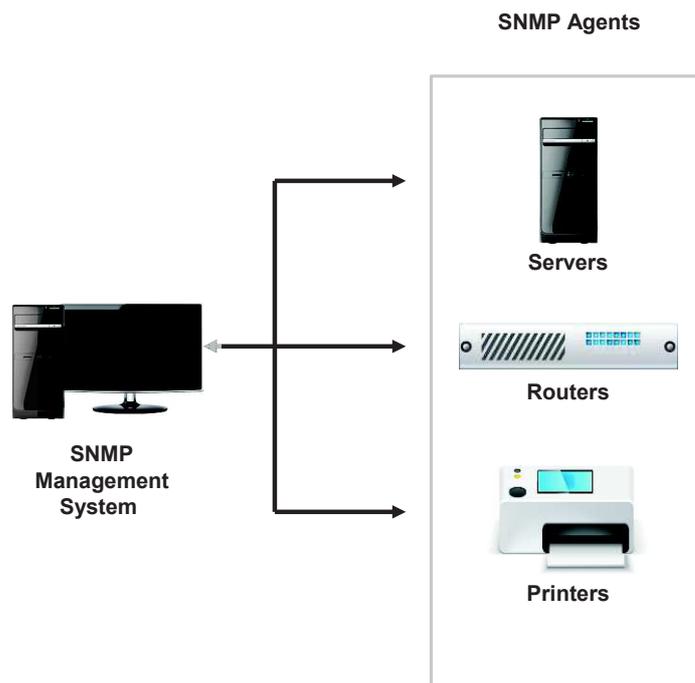
- **21 – FTP**
- **22 – SSH**
- **23 – TELNET**
- **25 – SMTP**
- **53 – DNS**
- **80 – HTTP**
- **110 – POP3**
- **143 – IMAP**
- **443 – HTTPS**
- **3389 - RDP**

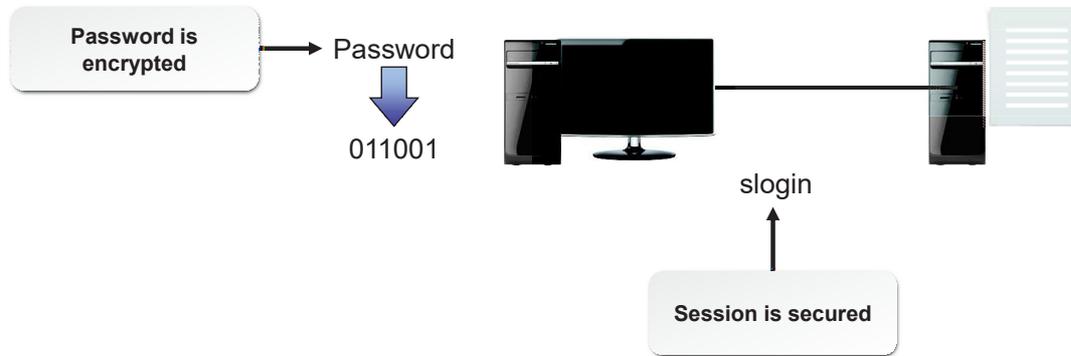
OV 8 - 44

LDAP

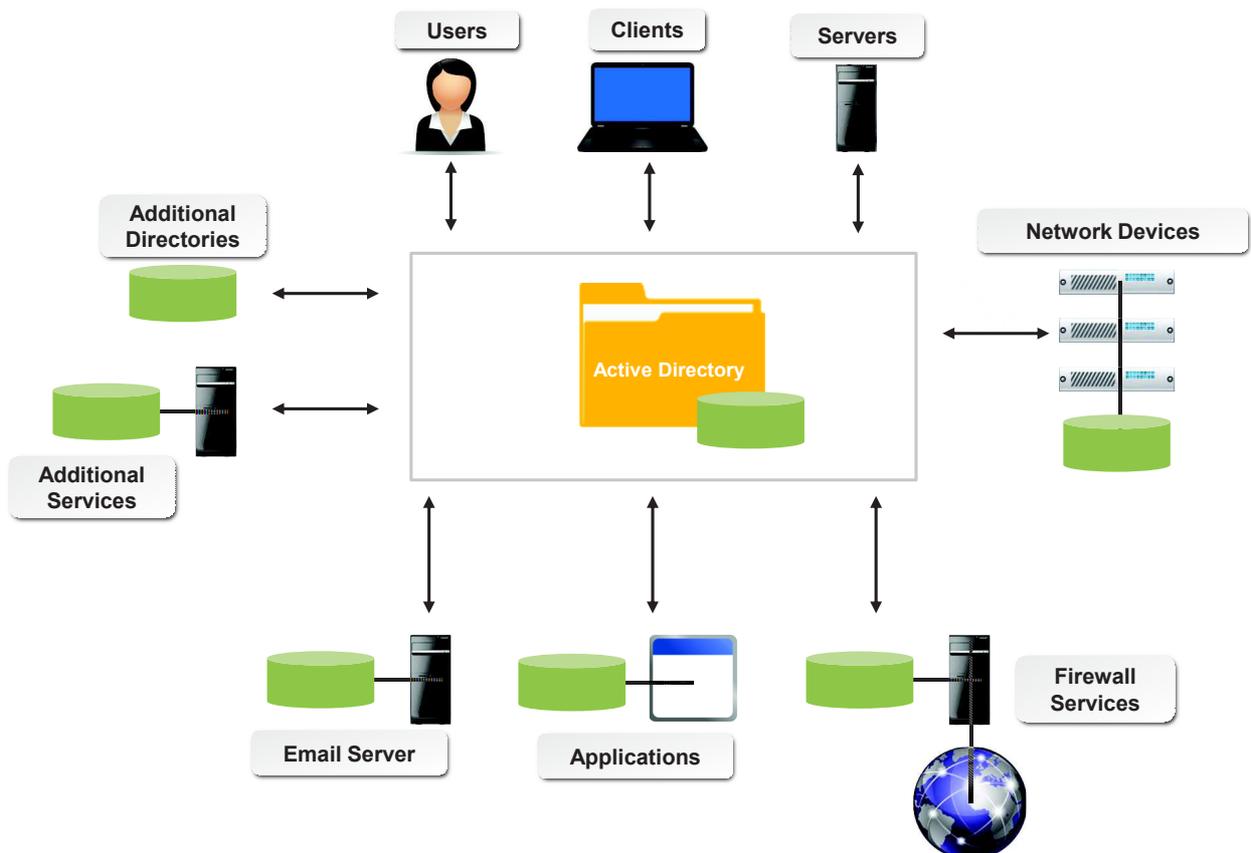
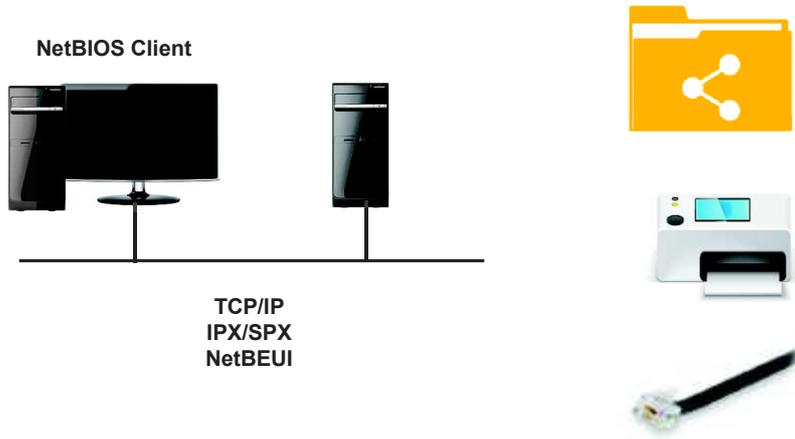


SNMP





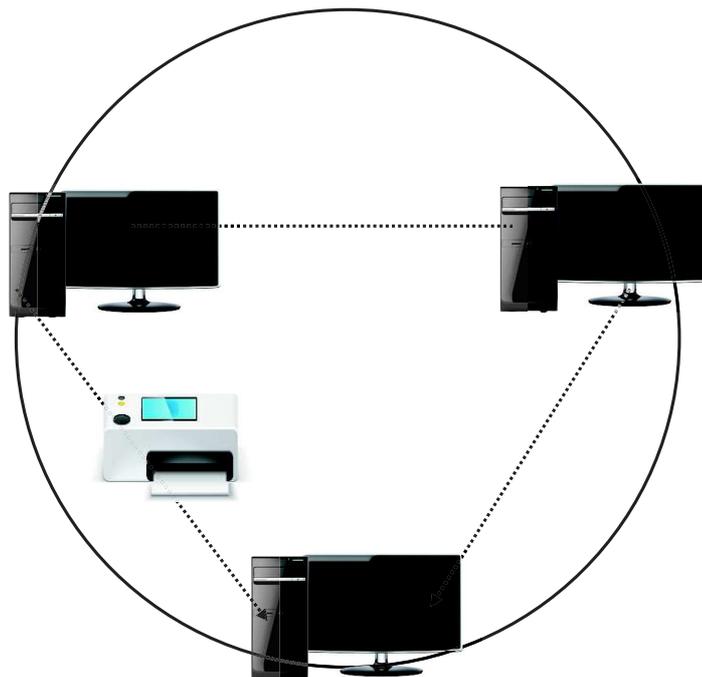
- **A secure replacement for FTP**
- **Uses SSH protocol to manage, transfer, and access files over a secured connection**



Windows Networking Options

- Workgroup
- Homegroup
- Domain

Network Shares



- **VPN**
- **Dialup**
- **Wirelessly (Bluetooth, infrared, or a WAP)**
- **Wired**
- **WWAN cellular**

When configuring a client computer to be used with a proxy:

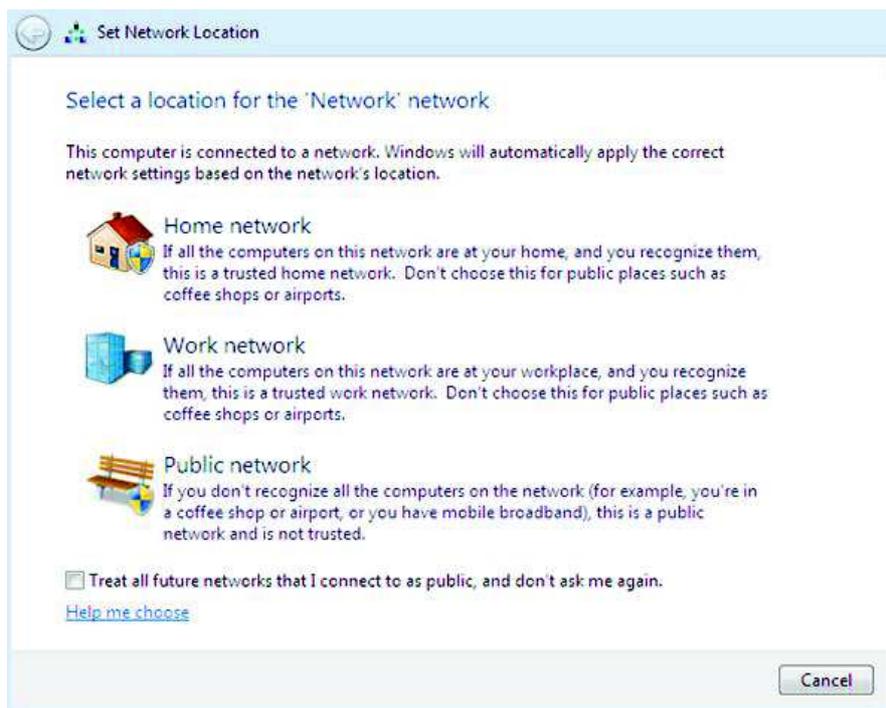
- Set the proxy server settings to the correct address.
- Set the exceptions to include ranges.
- Configure the HTTP or FTP connections

Remote Desktop



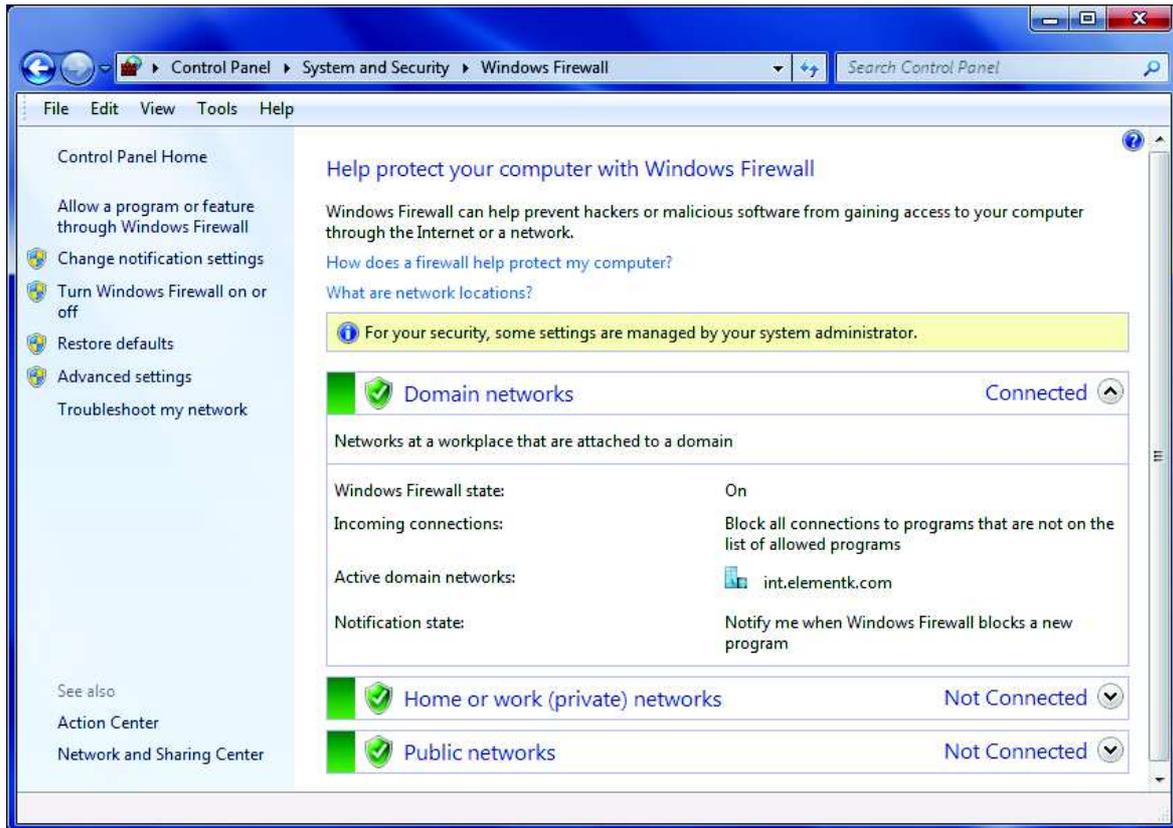
OV 8 - 55

Network Location Settings

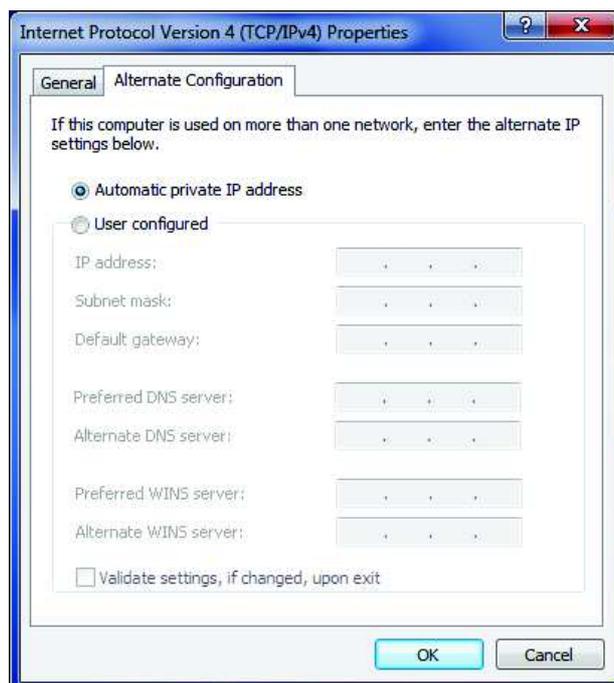


OV 8 - 56

Firewall Settings



Alternative IP Address Configuration Methods



Network Card Properties

- Speed and duplex settings
- Wake-on-LAN
- PoE
- QoS

Cable Testers



Crimpers



OV 8 - 61

Multimeter



Digital Multimeter



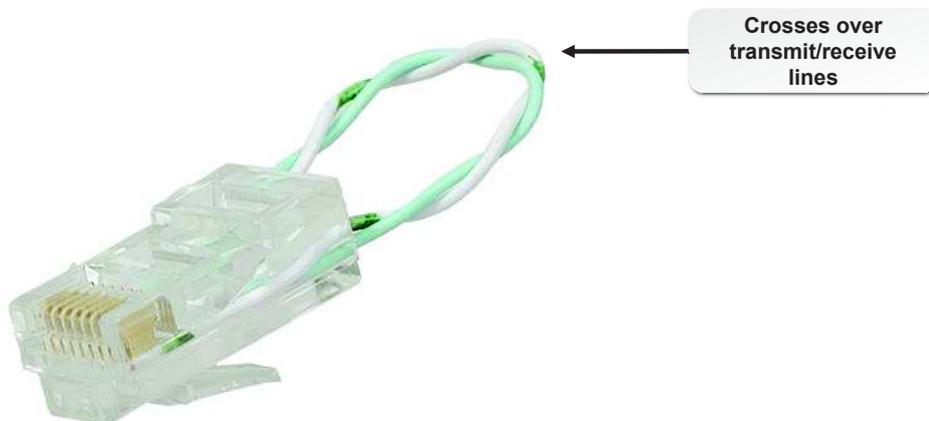
Analog Multimeter

OV 8 - 62

Toner Probe



Loopback Plug



Punch Down Tool



OV 8 - 65

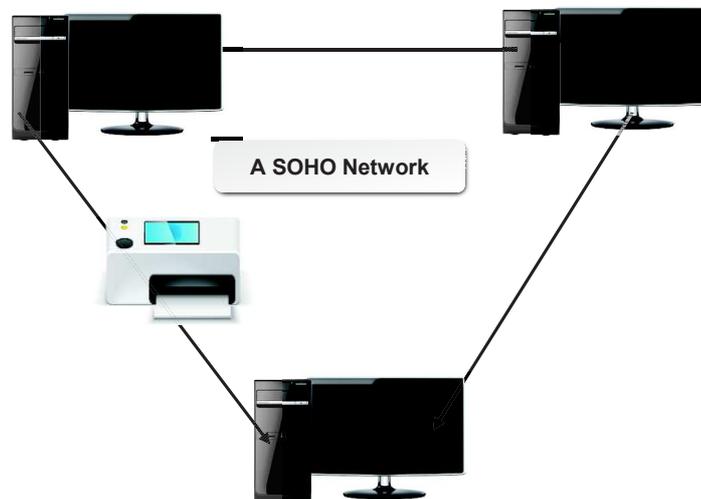
Networking Utilities

- **ipconfig**
- **ping**
- **nslookup**
- **tracert**
- **netstat**
- **net**
- **Device connection status**
- **Network troubleshooters**

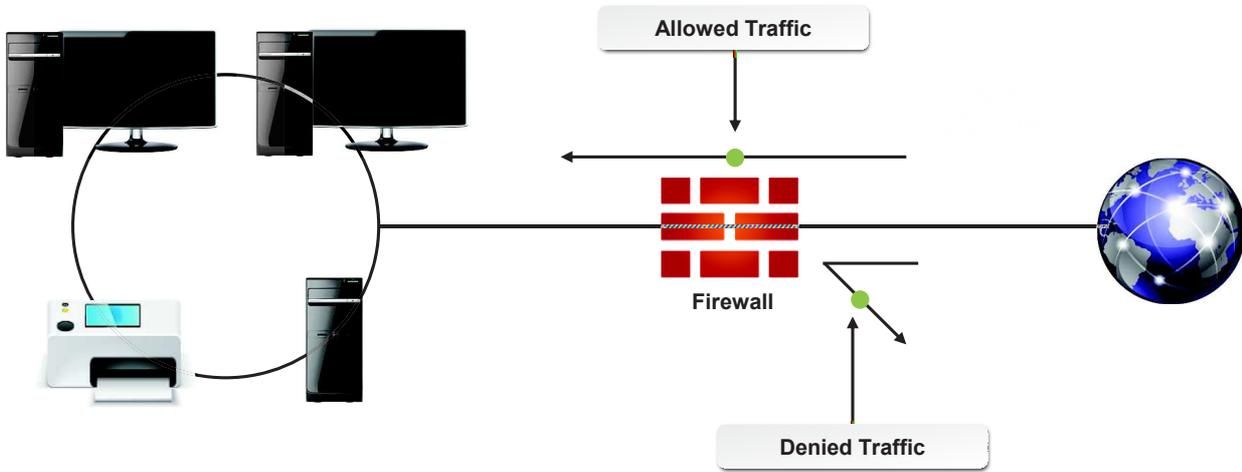
OV 8 - 66

- 1. What do you think are the most important network concepts covered in this lesson?**
- 2. Do you have any experience working with any of these technologies?**

- Install and Configure SOHO Networks
- SOHO Network Security

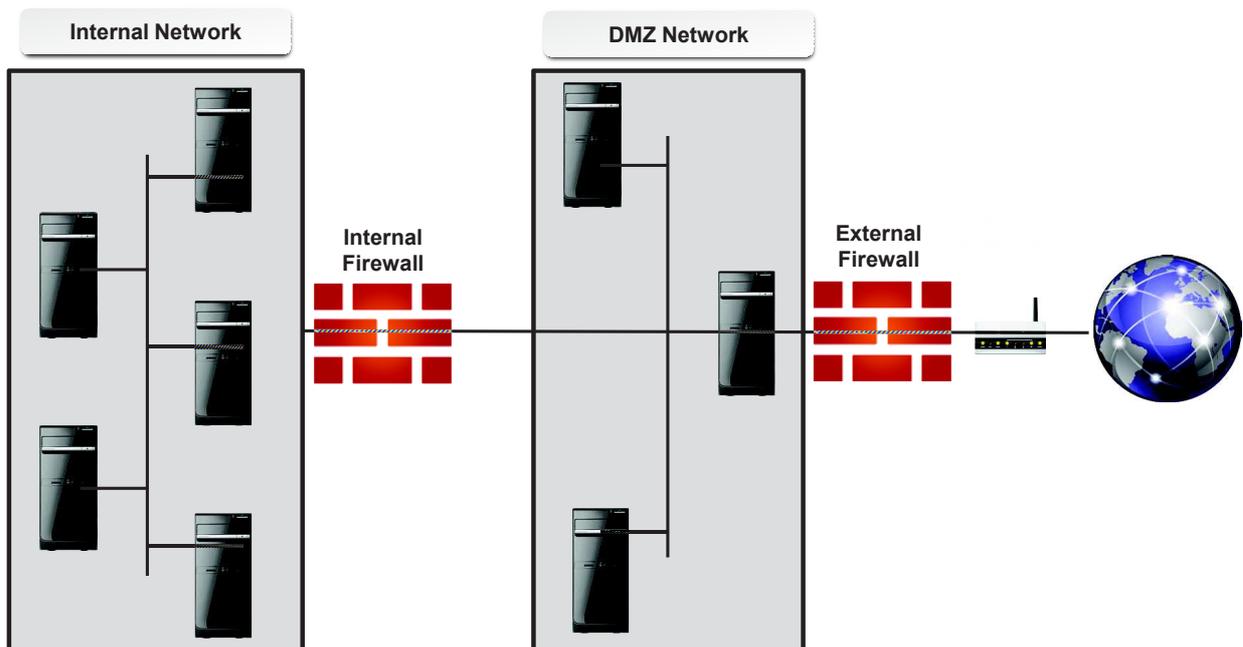


Firewalls and SOHO Networks

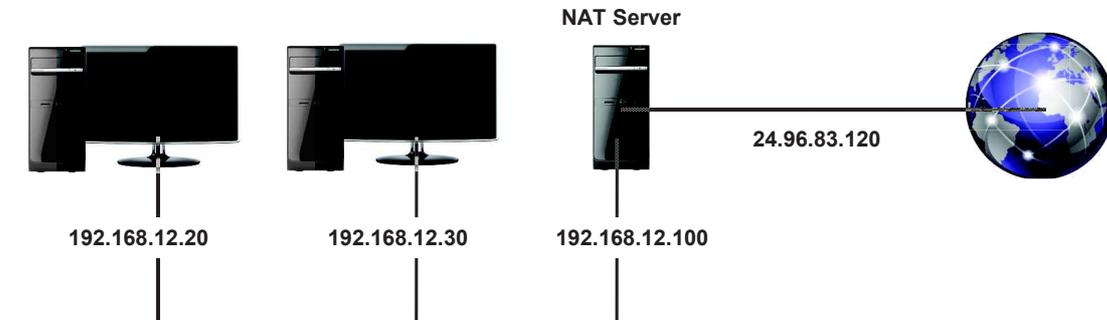


OV 9 - 3

DMZs



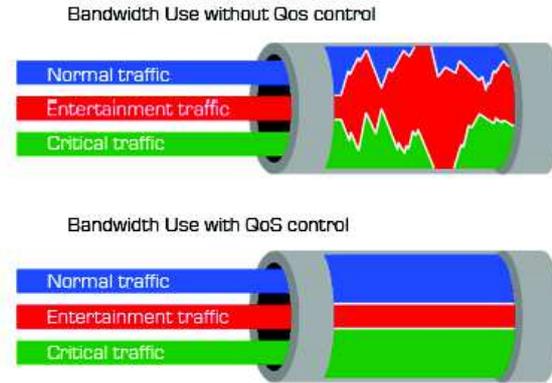
OV 9 - 4



- Enables easy secure setup of small home networks
- Eases the setup of complicated configuration settings of wireless routers
- Comes installed on some routers, however it may risk security
- Verifies whether the software is installed before connecting to your network

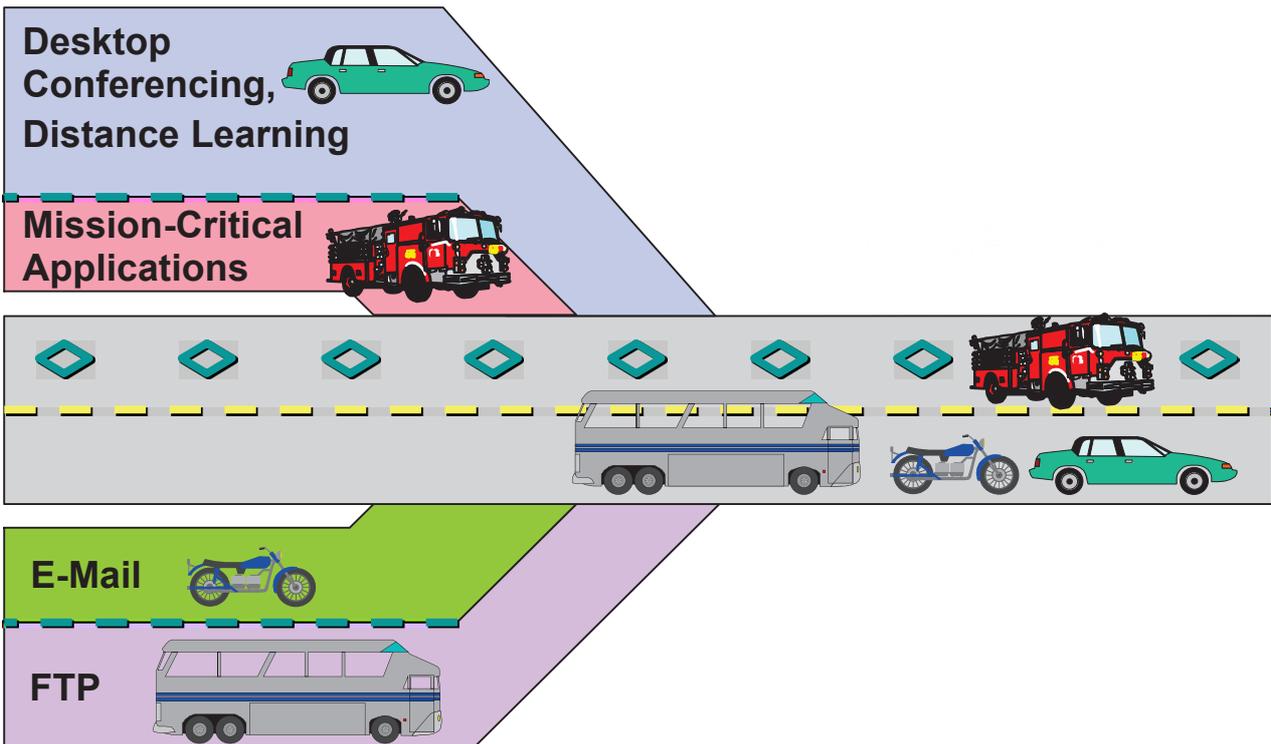


- A set of parameters that controls the quality provided to network traffic.
- Parameters include delay amounts, signal loss, and noise limits for a particular type of network traffic.



OV 9 - 7

What is Quality of Service



OV 8 8

802.11 Wireless Standards

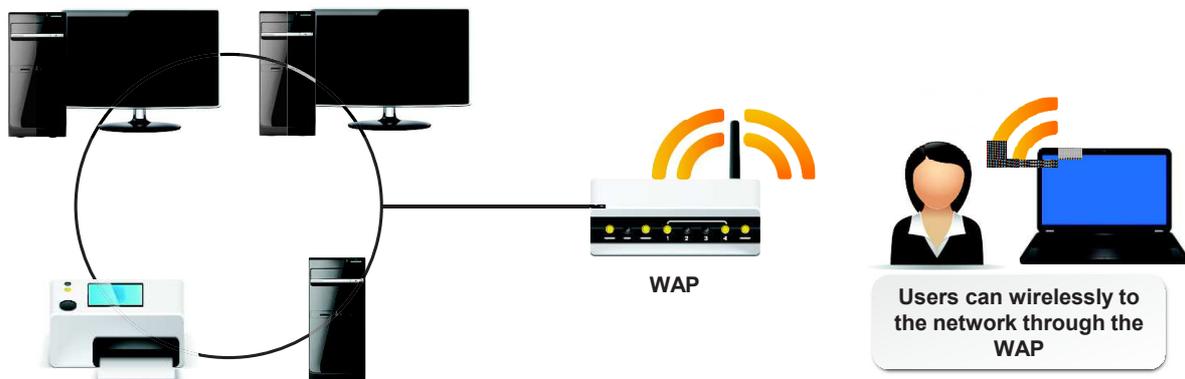
- 802.11a
- 802.11b
- 802.11e
- 802.11g
- 802.11n



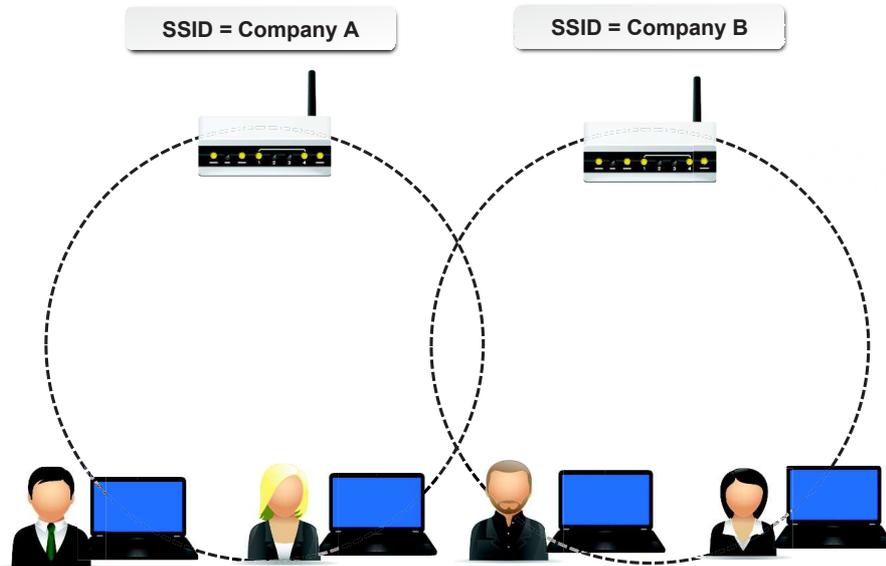
Evolving 802.11 standards for wireless communications

มาตรฐาน	วันออกข้อกำหนด	ย่านความถี่ (กิกะเฮิรตซ์)	แบนด์วิดธ์ช่องของ (เมกะเฮิรตซ์)	อัตราเร็วต่อหนึ่งช่องวงจร (เมกะบิตต่อวินาที)	จำนวนช่องวงจรแบบ MIMO	การมอดูเลตสัญญาณ	ระยะการใช้งานสูงสุดภายในอาคาร (เมตร)
802.11-2007	มี.ย. 2540	2.4	20	1, 2	1	DSSS	20
802.11a	ก.ย. 2542	5	20	6, 9, 12, 18, 24, 36, 48, 54	1	OFDM	35
		3.7					0
802.11b	ก.ย. 2542	2.4	20	1, 2, 5.5, 11	1	DSSS	38
802.11g	มี.ย. 2548	2.4	20	1, 2, 6, 9, 12, 18, 24, 36, 48, 54	1	OFDM, DSSS	38
802.11n	ต.ค. 2552	2.4, 5	20	7.2, 14.4, 21.7, 28.9, 43.3, 57.8, 65, 72.2	4	OFDM	70
			40	15, 30, 45, 60, 90, 120, 135, 150			70

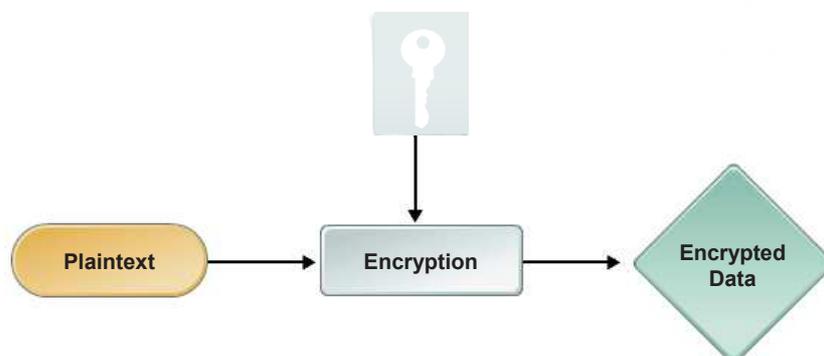
WAPs



SSID



Encryption



Wireless Encryption Types



- WEP
- WPA
- WPA2 or 802.11



Router Settings and Configurations



- Basics
- SSID
- MAC filtering
- Channels
- DHCP

Wireless Settings

Operation Mode:

SSID:

Region:

Warning: Ensure you select a correct country to conform local law. Incorrect settings may cause interference.

Channel:

Mode:

Channel Width:

Max Tx Rate:

Enable Wireless Radio

Enable SSID Broadcast

DHCP Settings

DHCP Server: Disable Enable

Start IP Address:

End IP Address:

Address Lease Time: minutes (1~2880 minutes, the default value is 120)

Default Gateway: (optional)

Default Domain: (optional)

Primary DNS: (optional)

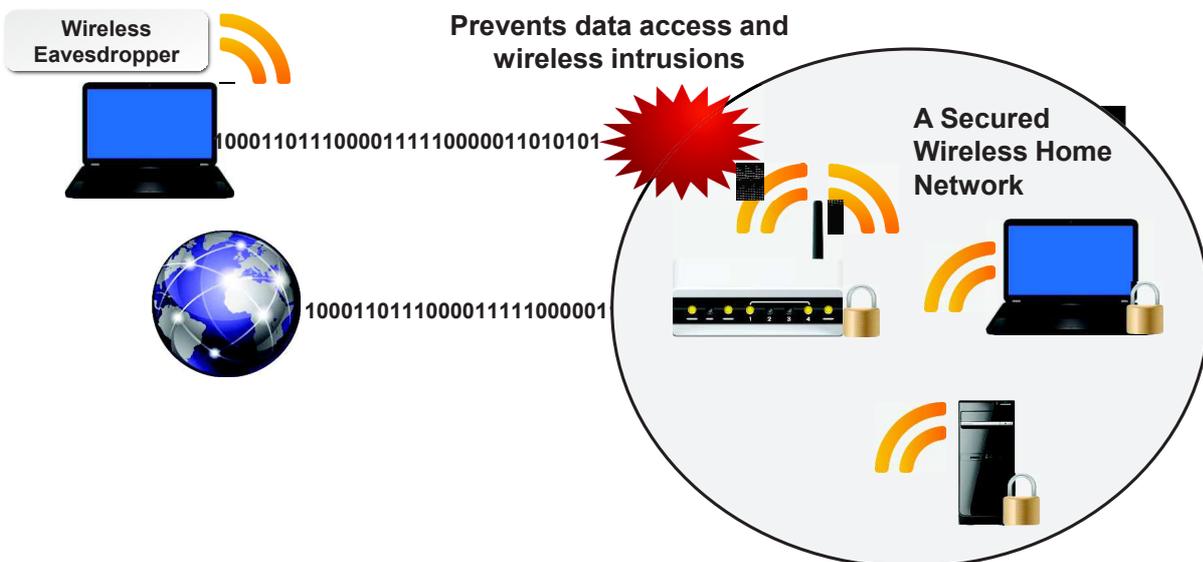
Secondary DNS: (optional)

The change of DHCP config will not take effect until the Router reboots, please [click here](#) to reboot.

Common SOHO Security Methods

- Change default user name and password
- Enable MAC filtering
- Assign static IP addresses
- Disable ports
- Apply physical security controls
- Perform assessments

Wireless Security



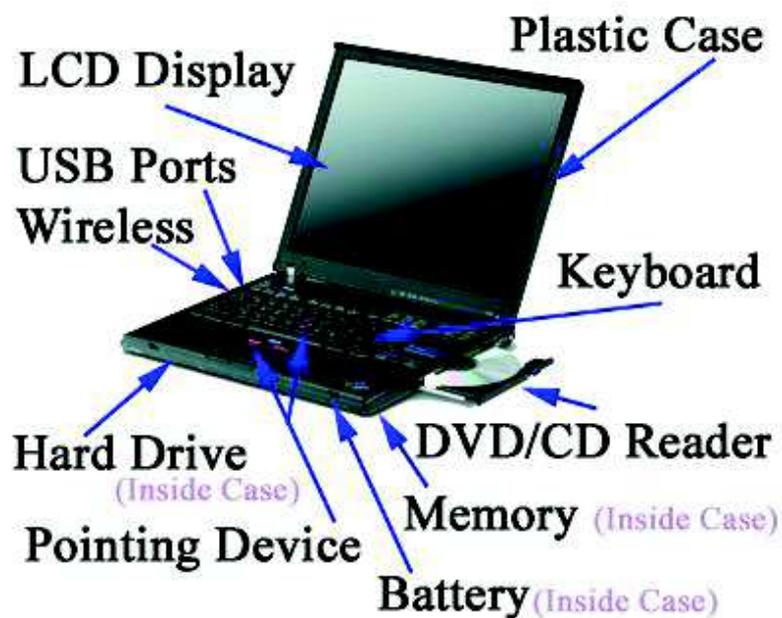
- **Configure the network settings.**
- **Configure the SSID.**
- **Enable encryption**
- **Properly place the antenna and access point**
- **Secure the WAP**
- **Configure the workstation properly**

- **Implement a security protocol that requires over-the-air data encryption.**
- **Install antivirus software, and/or adware and spyware blockers.**
- **Update client regularly with any software security patches.**

- 1. Do you have any experience working with SOHO networks? What do you expect to support in future job functions?**
- 2. What do you think is the most important SOHO network security measure?**

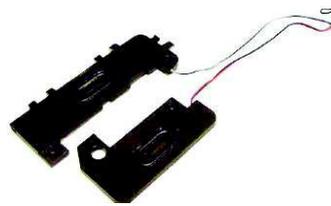
- Laptop Hardware and Components
- Install and Configure Laptop Hardware Components

Laptop Components



Laptop Hardware Components

- Keyboard
- Touchpad
- Trackpoint
- Plastics
- Speakers
- Battery
- DC jack
- Screen



OV 10 - 3

Types of Laptop Displays

- LCD
- LED
- OLED
- Plasma



OV 10 - 4

Laptop Display Components

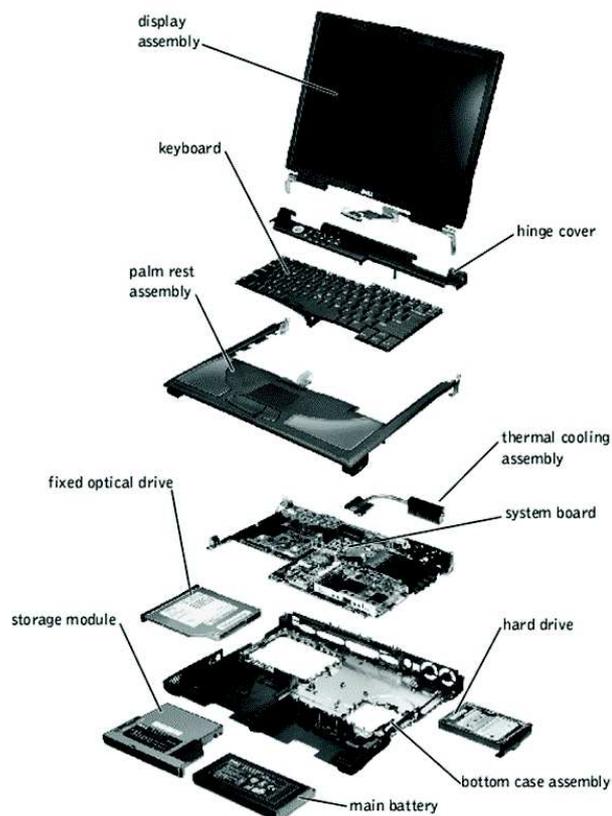
- Inverter
- Backlight
- Wi-Fi antenna



OV 10 - 5

Internal Laptop Components

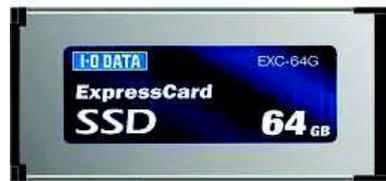
- System board
- CPU
- Hard drive
- Memory
- Optical drive
- Wireless card



OV 10 - 6

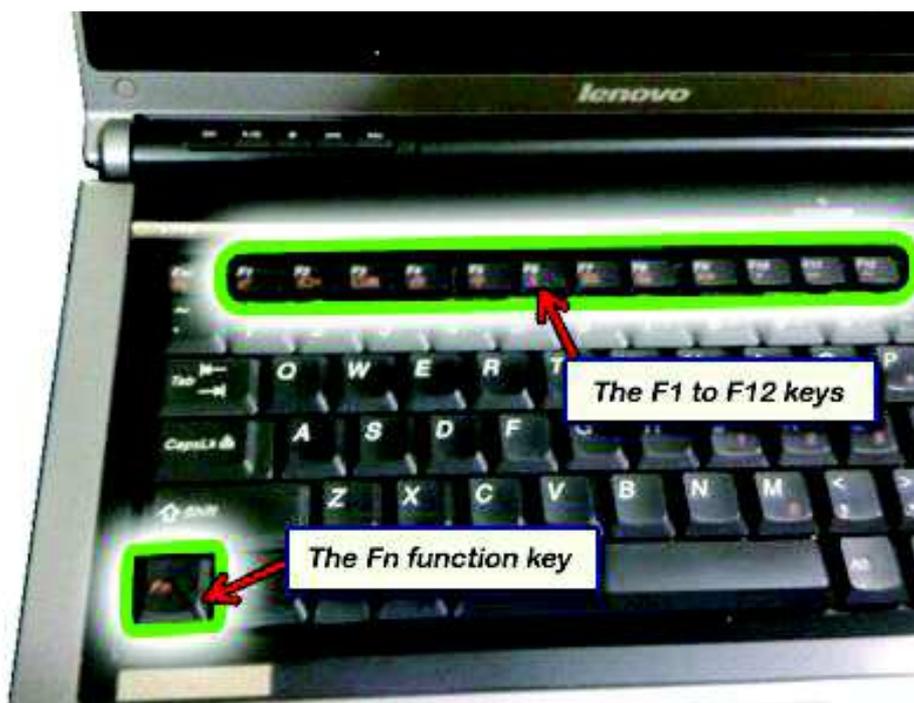
Laptop Expansion Options

- PC cards
- Express Cards
- Mini-PCle
- SODIMM and flash memory



OV 10 - 7

Special Function Keys



OV 10 - 8

Laptop Docking Solutions

- Docking station
- Port replicator
- Media/accessory bay



Docking Station



Port Replicator

OV 10 - 9

Laptop Locks



OV 10 - 10

Laptop Power Supplies and Batteries



OV 10 - 11

Auto-Switching and Fixed Input Power Supplies

- Most laptops use auto-switching power adapters.
- Fixed power supplies support only single voltage and frequencies.



OV 10 - 12

Laptop Cooling Considerations

- Laptop CPUs
- Fans
- Battery use
- Cooling pads



OV 10 - 13

General Laptop Support Guidelines

- **Verify that there is adequate cooling methods installed and used.**
- **Be aware of device warranty restrictions and guidelines.**
- **Be careful of the wires that pass through the hinges of the laptop when replacing hardware components.**



OV 10 - 14

- 1. What is your experience with replacing laptop components?**
- 2. What type of laptop support do you foresee having to provide to clients in the future?**

- Printer Technologies
- Install, Configure, and Maintain Printers

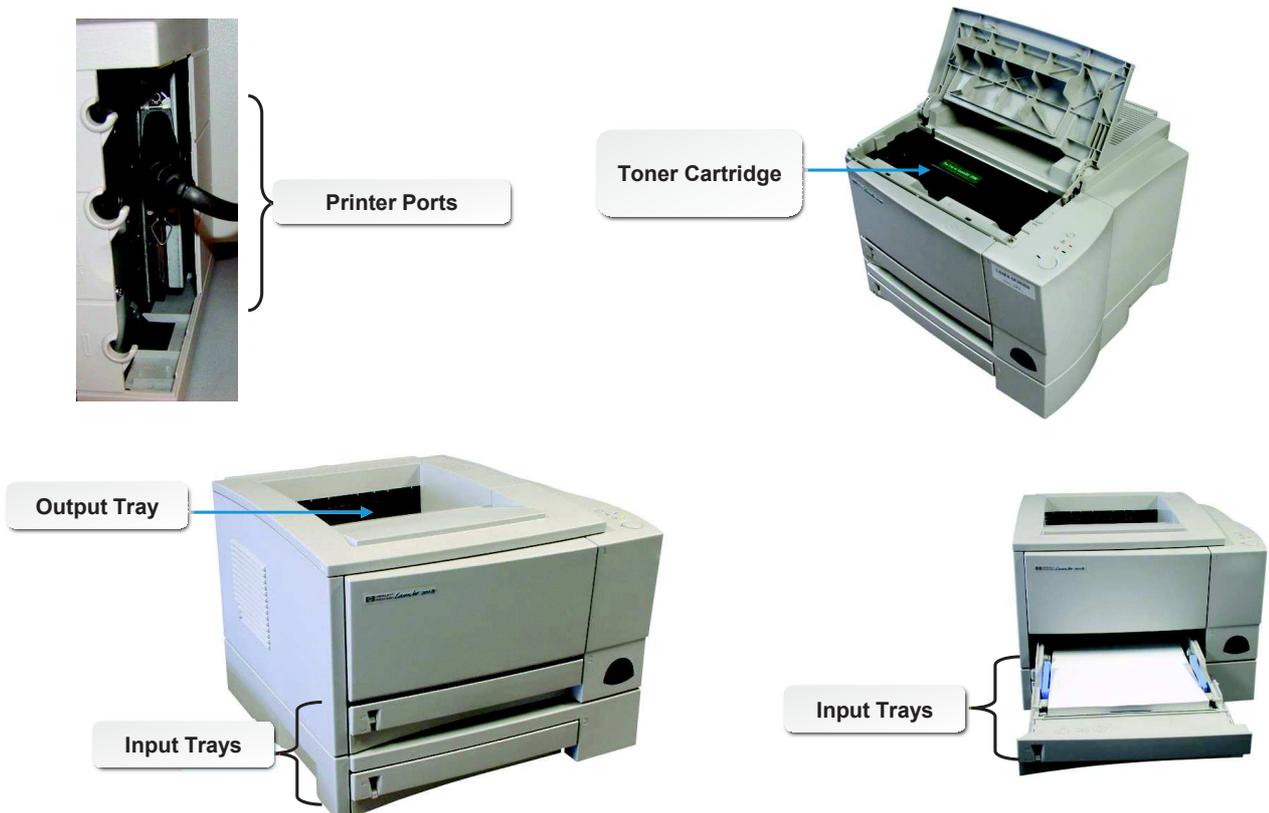


An MFD



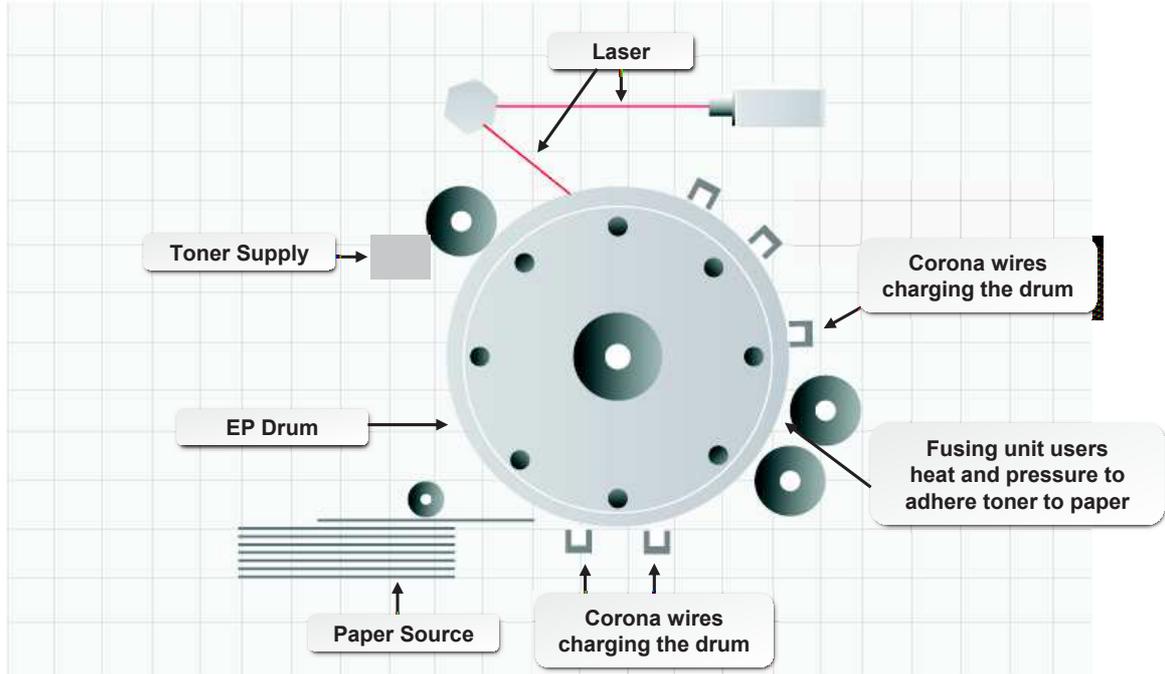
OV 12 - 3

Laser Printers



OV 12 - 4

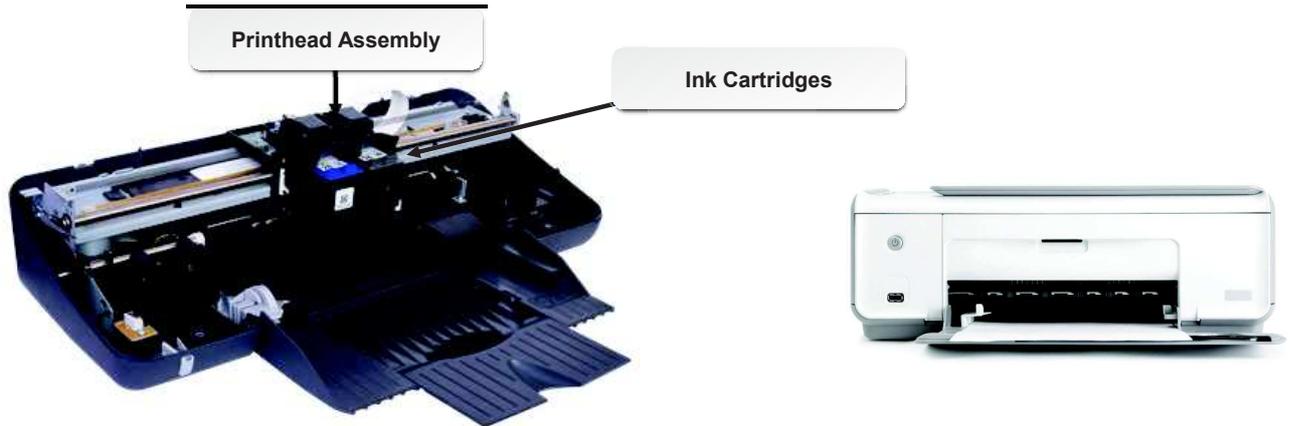
The Laser Print Process



How Laser Print Process

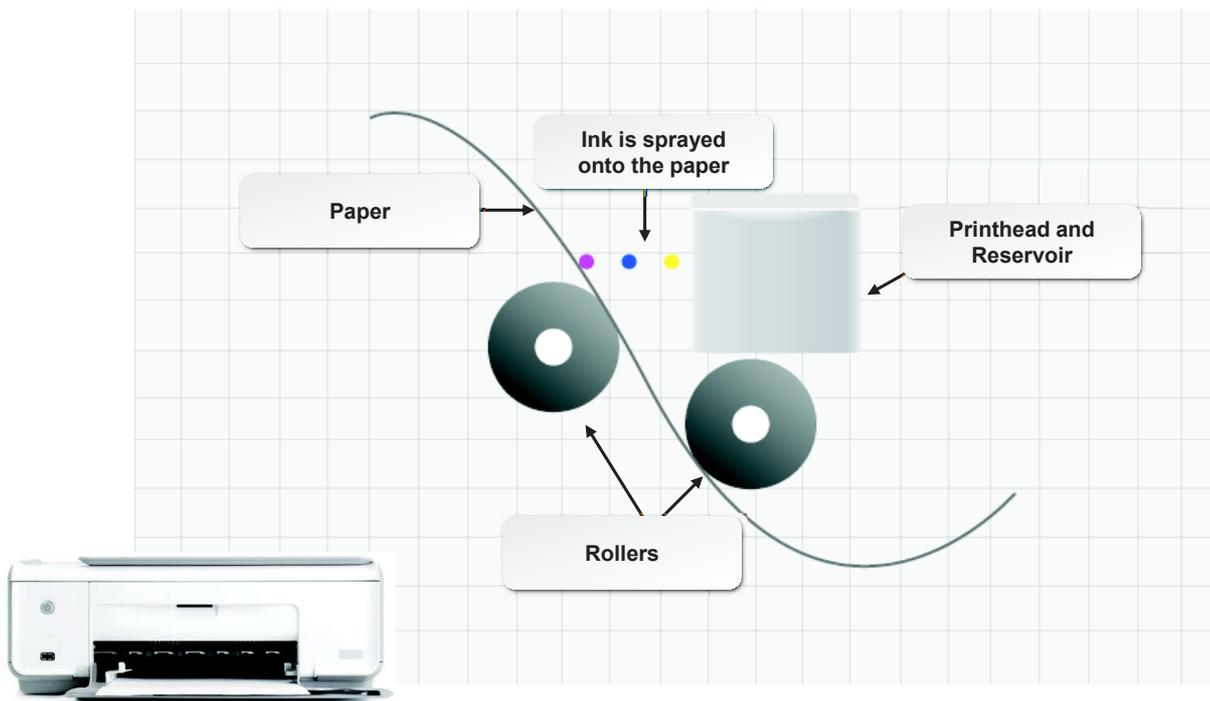


Inkjet Printers

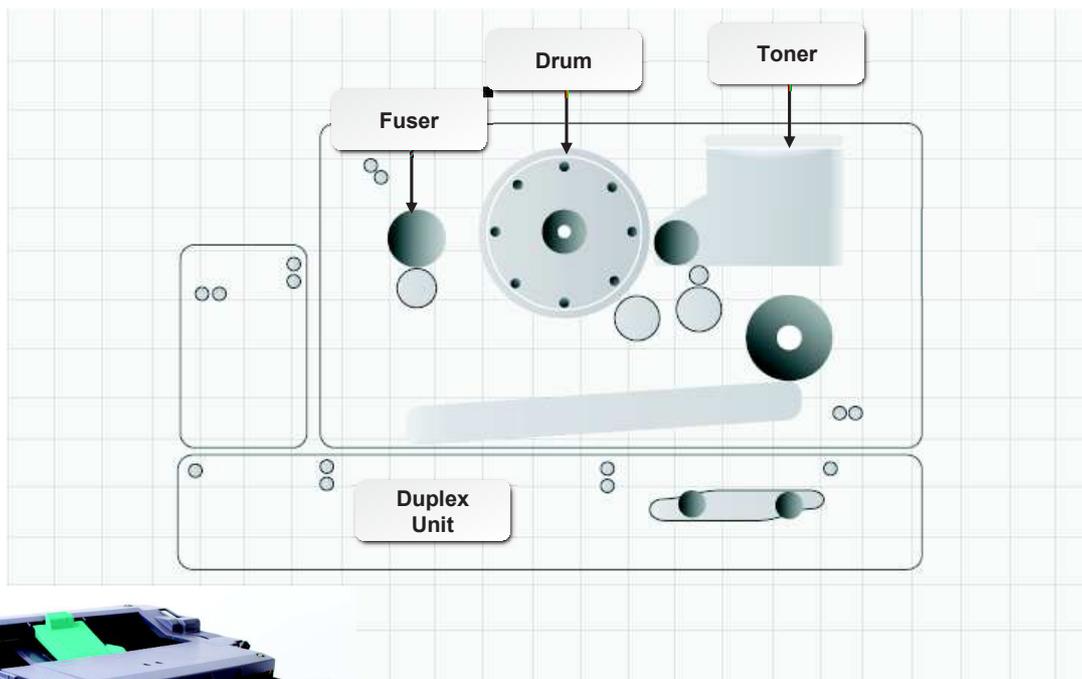


OV 12 - 7

The Inkjet Print Process



OV 12 - 8

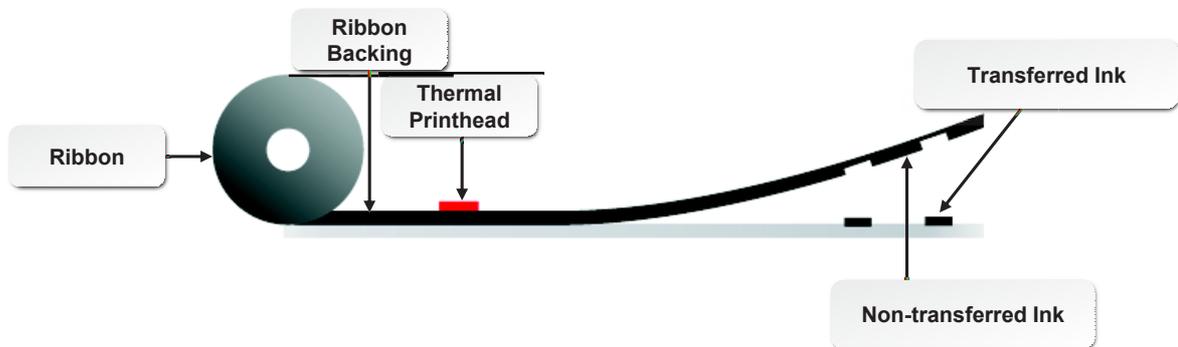


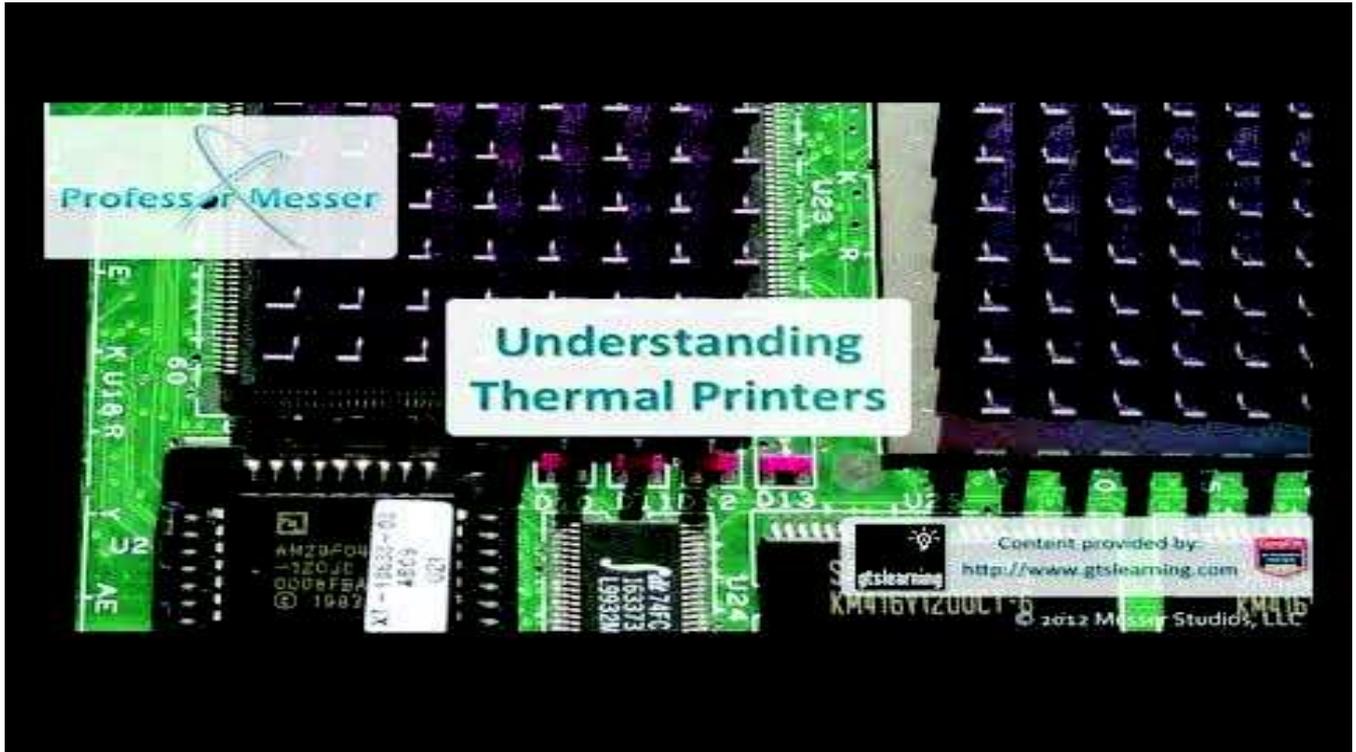
Thermal Printers



Can produce photo-quality output

Thermal Print Processes



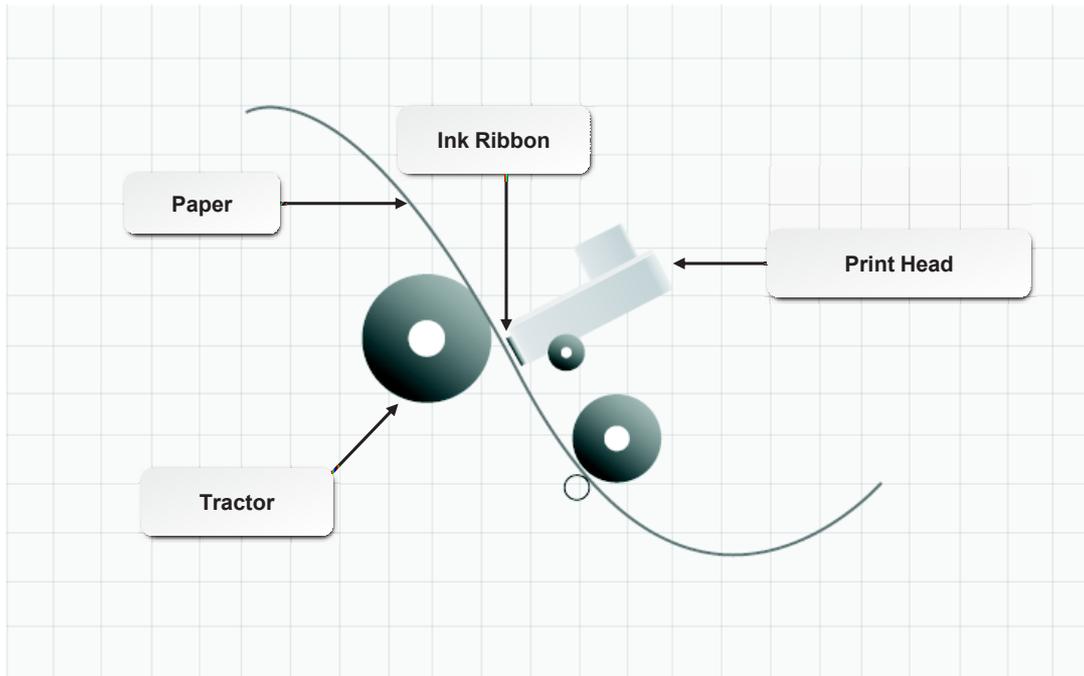


OV 12 - 13

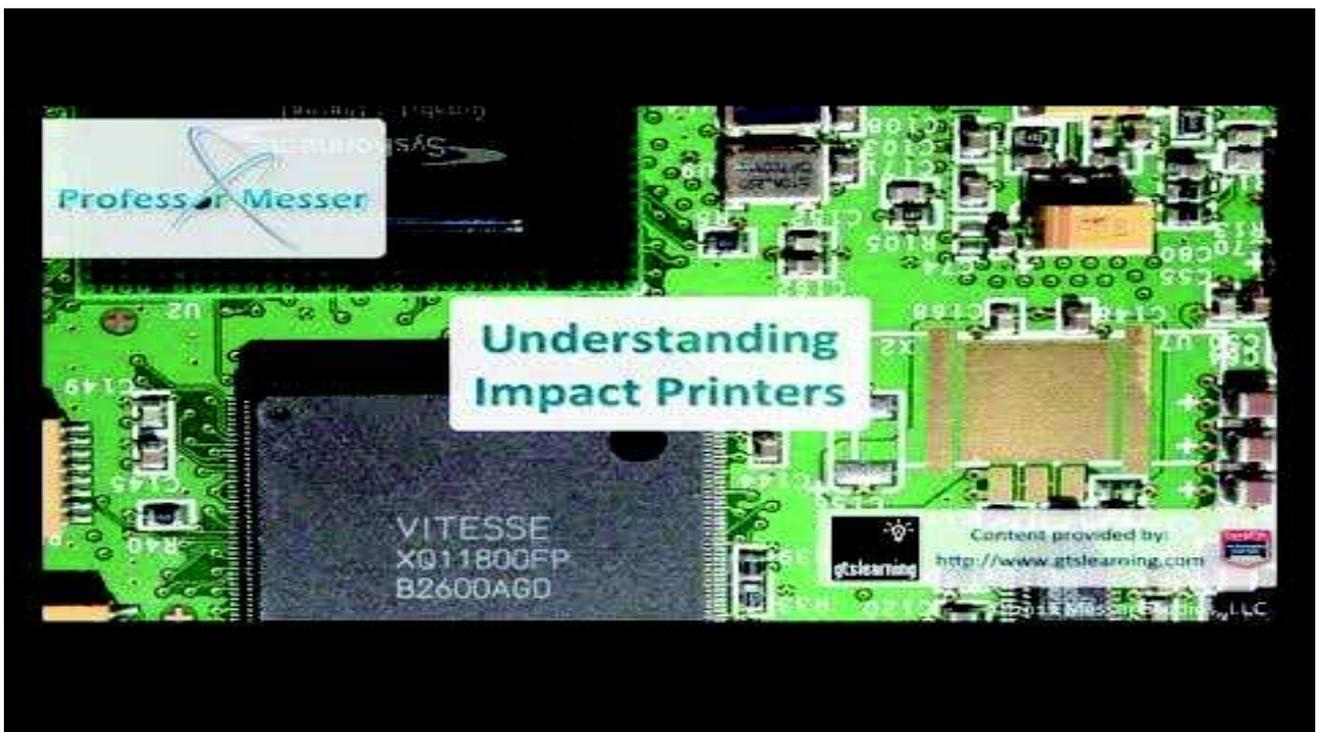


OV 12 - 14

The Impact Print Process



The Impact Print Process



Technical Printer Components

- **Printer memory**
- **Printer drivers**
- **Printer firmware**
- **Printer interfaces**

OV 12 - 17

Printer Supplies and Media

- **Printer toner**
- **Ink and ink cartridges**
- **Paper and other media**



OV 12 - 18

Printer Driver Types



- PPD
- PCL
- UPD
- Raster/bitmap
- Plotter/vector

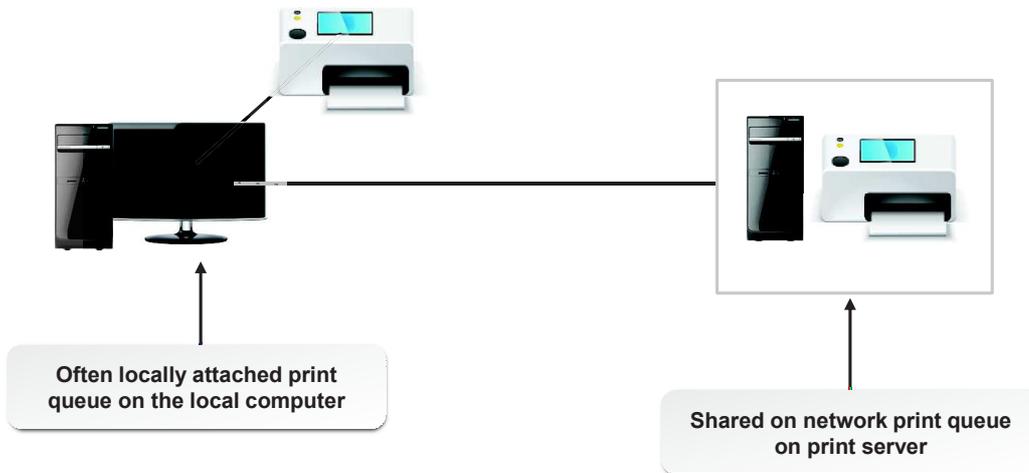
OV 12 - 19

Printer Driver Compatibility



- **Verify that a compatible print driver is installed.**
- **Drivers can be checked within Printer Properties.**
- **Drivers are available on installation discs, or can be downloaded from the manufacturer's website**

OV 12 - 20



Printers can be shared using a variety of methods:

- Wired, generally via USB or Ethernet.
- Wirelessly, using Bluetooth, 802.11x, or IR.
- Using a printer server to manage the print queue for network shared printers.
- Using the devices and printers option in Windows 7.

- **Device calibration**
- **Tray assignments**
- **Tray switching**
- **Print spool settings**
- **Printer availability**
- **Color management**
- **Printer ports**



- **Follow proper printer cleaning instructions.**
- **Replace the paper when needed and clean the paper path.**
- **Replace toner and ink cartridges when needed**

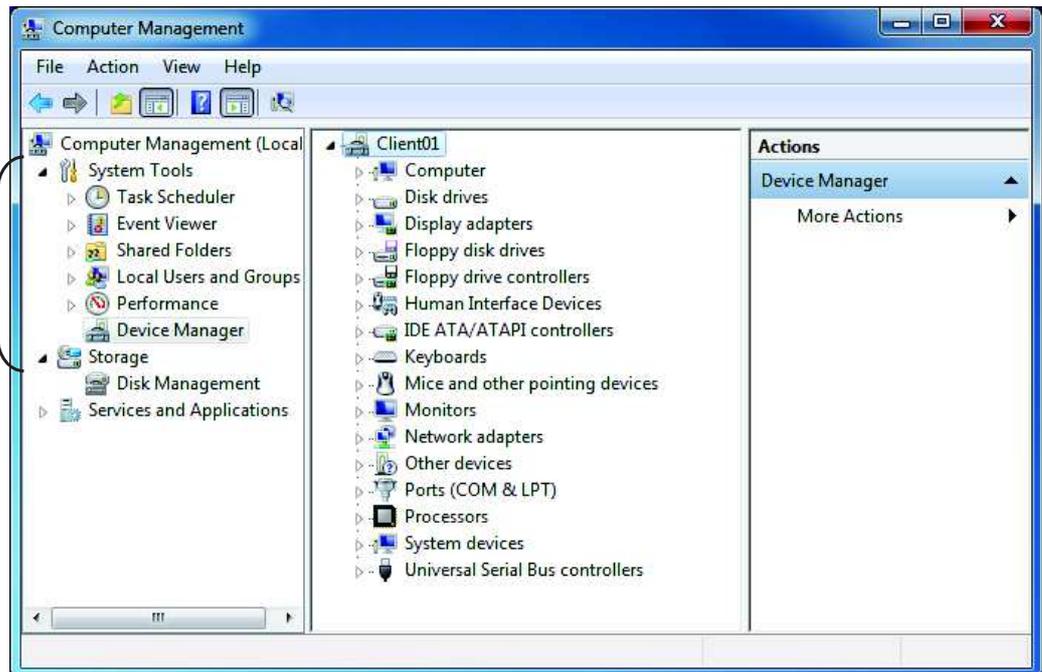
- 1. What types of printer have you had experience with in your current job role?**
- 2. In your experience, what printer maintenance tasks are you most familiar with?**

- **Basic Maintenance Tools and Techniques**
- **Electrical Safety**
- **Environmental Safety and Materials Handling**
- **Professionalism and Communication**

Types of Hardware Toolkits

- **Basic**
- **Network**
- **Circuit board**



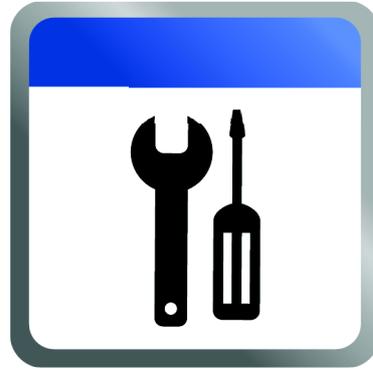


Software diagnostic tools available in Windows 7

- Diagnostic tool that enables a hard disk drive to test itself when the computer starts
- Can be built into drive's firmware
- Can be a separate utility available drive manufacturer



- **Detecting problems**
- **Repairing problems**
- **Preventing problems**



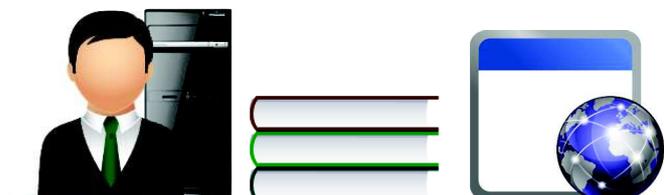
- **Use proper power devices.**
- **Clean peripheral components.**
- **Clean internal system components.**

- Wipes and cloths
- Cleaning solutions
- Cleaning tools
- Compressed air canister
- Computer or electronics vacuum
- Mask and gloves



OV 3 - 7

- User/installation manuals
- Internet/web-based
- Training materials



OV 3 - 8

The screenshot shows the OSHA website's "Law & Regulations" page. At the top, it features the "UNITED STATES DEPARTMENT OF LABOR" header and a search bar. Below this is a navigation menu with categories like "Home", "Workers", "Regulations", "Enforcement", "Data & Statistics", "Training", "Publications", "Newsroom", and "Small Business". The main content area is titled "OSHA Law & Regulations" and contains a welcome message, a "Find an OSHA standard:" section with filters for "General Industry", "Construction", "Maritime", "Agriculture", "Recordkeeping", "State Plans", and "All", and a "Public Resources" section. On the right side, there are sections for "Open for Comment" and "Quick Links".

OSHA **OSHA QuickTakes** Newsletter RSS Feeds Print This Page Text Size

Occupational Safety & Health Administration **We Can Help** What's New | Offices

Home Workers **Regulations** Enforcement Data & Statistics Training Publications Newsroom Small Business **OSHA**

OSHA Law & Regulations

Welcome to OSHA's Law and Regulations page. This page contains links to all current OSHA standards, provides information on the rulemaking process used to develop workplace health and safety standards, and includes links to all Federal Register notices that are currently open for comment. This page also provides links to the Occupational Safety and Health Act of 1970 (OSH Act) and other relevant laws. Finally, this page includes resources to explore the Federal Register, the Code of Federal Regulations, and [RegInfo.gov](#) the federal government's public portal for all agency regulatory information.

Under the OSH Act, employers are responsible for providing a safe and healthful workplace. OSHA's mission is to assure safe and healthful workplaces by setting and enforcing standards, and by providing training, outreach, education and assistance. Employers must comply with all applicable OSHA standards. Employers must also comply with the General Duty Clause of the OSH Act, which requires employers to keep their workplace free of serious recognized hazards.

Find an OSHA standard:

General Industry Construction Maritime Agriculture Recordkeeping State Plans All

1910 Full Table of Contents TOP 10 Viewed

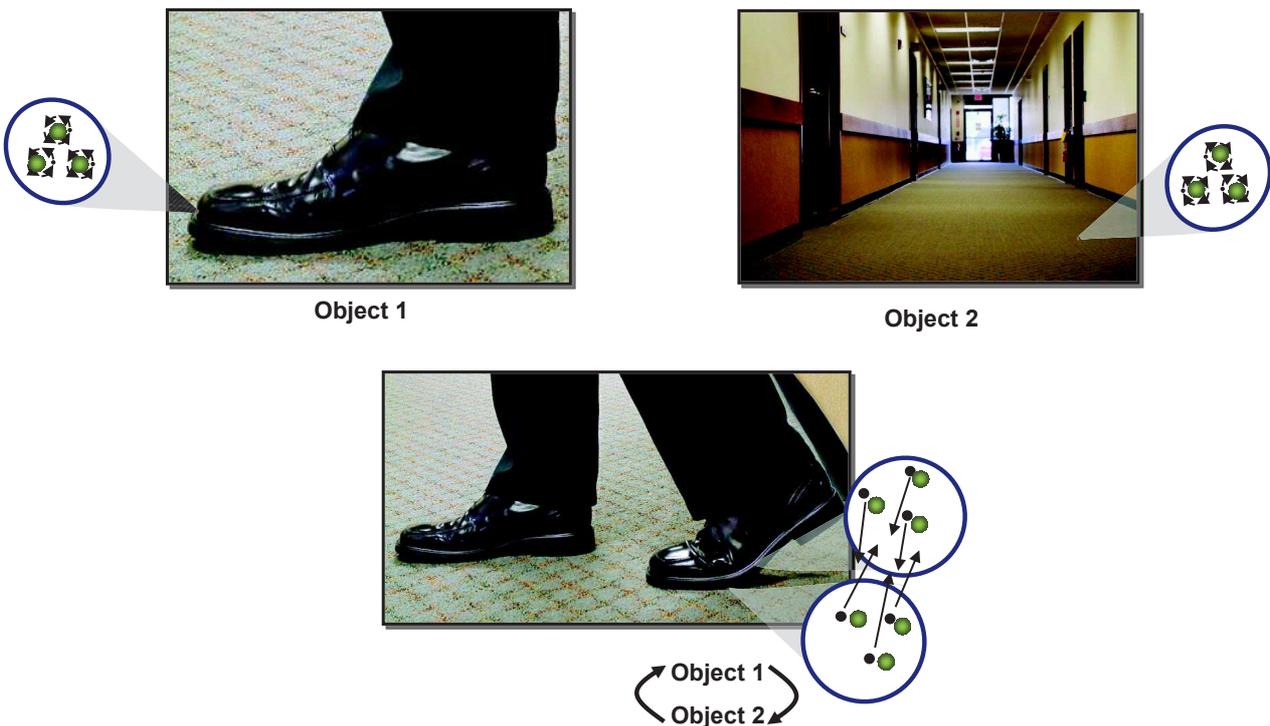
Open for Comment

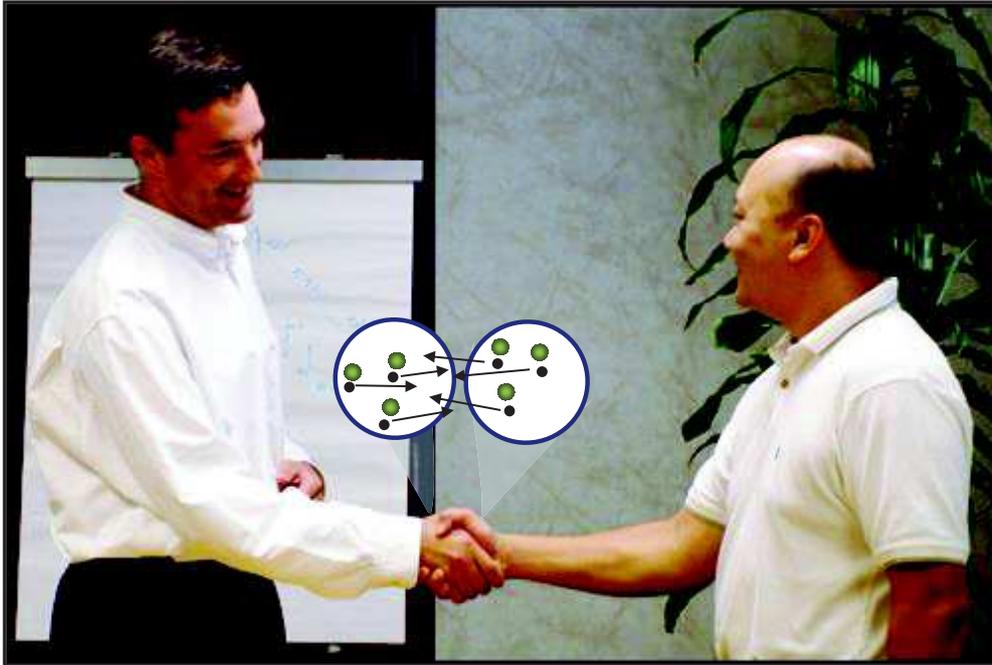
- [View Items Currently Open for Comment](#)

Quick Links

- [Latest Federal Register Notices](#)
- [Key Terms](#)
- [Submitting a Comment on Regulations.gov](#)
- [Related Acts & Legislation](#)
- [Roadmap to Rulemaking](#)
- [Contact Us](#)

Public Resources





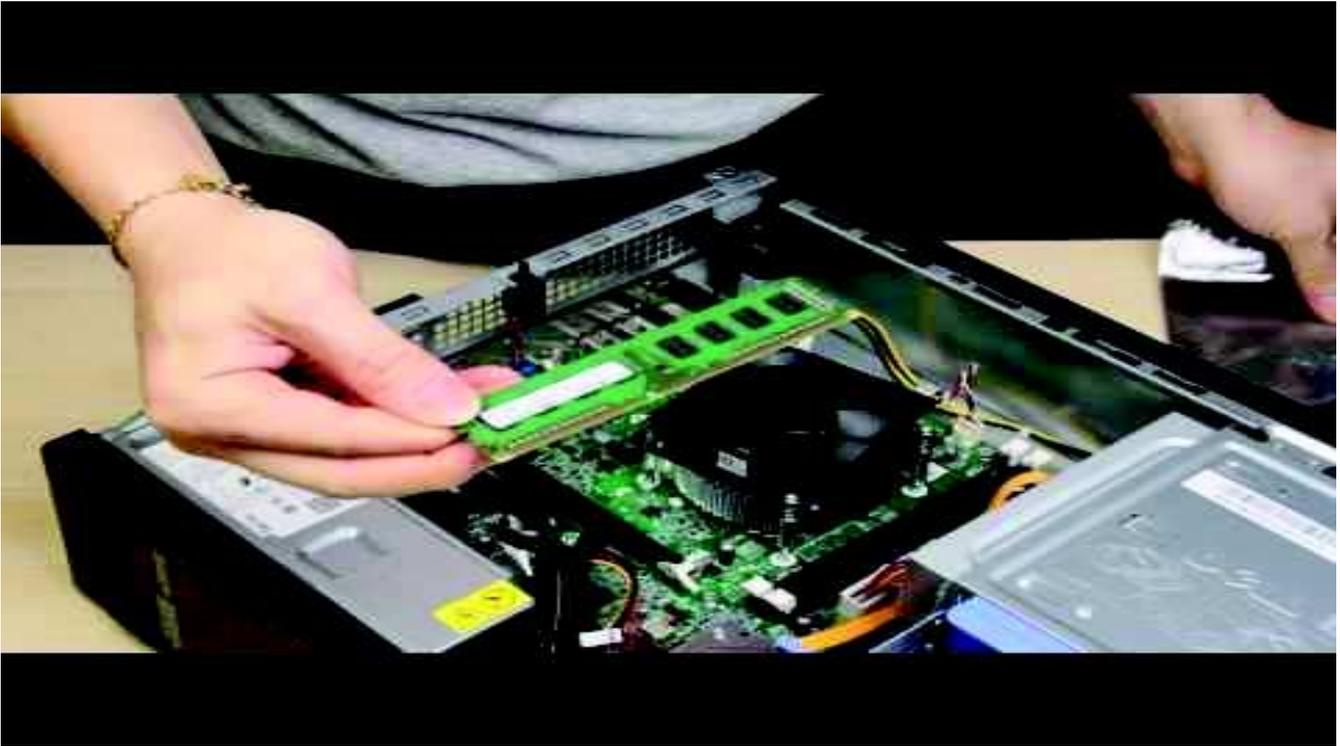
OV 3 - 11

ESD Prevention Techniques

- **Eliminate activities and tasks.**
- **Use self grounding methods.**
- **Use equipment grounding methods.**
- **Maintain air quality.**

OV 3 - 12

How to avoid Electrostatic Discharge (ESD) damage



OV 3 - 13

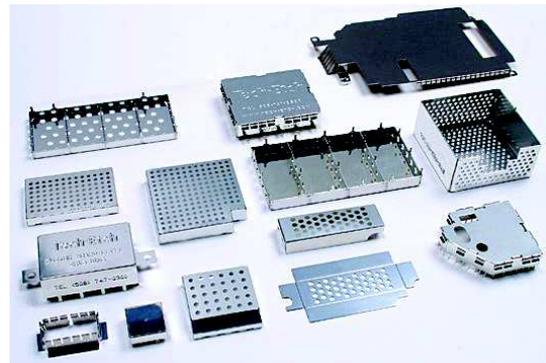
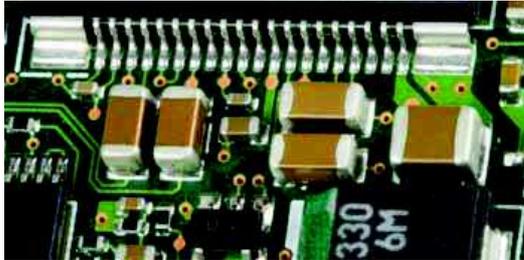
EMI



OV 3 - 14

EMI Prevention Techniques

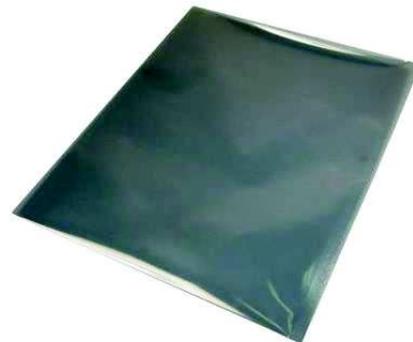
- Twisted-pair implementations
- Cautious wiring techniques
- SMD technology implementation
- Electromagnetic shielding



OV 3 - 15

An ESD Toolkit

- Wrist or ankle strap
- Grounded floor mat or grounded work-surface mat
- Anti-static bags
- ESD smock



OV 3 - 16

- **Electric shock**
- **Electrocution (fatal shock)**
- **Burns**
- **Collateral injuries**



OV 3 - 17

- **Be aware of personal safety measures.**
- **Be aware of the environmental conditions you are working in.**
- **Prevent static electricity from damaging components by using anti-static equipment.**
- **Use safety guidelines when disassembling computer equipment.**
- **Use caution when working with power supplies.**
- **Follow all CRT monitor safety precautions.**
- **Be aware of the electrical fire safety procedures.**

OV 3 - 18

- **Ozone gas**
- **Temperature and Humidity**
- **Dust and debris**
- **Airborne particles**



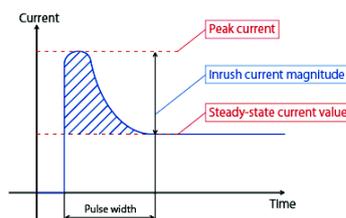
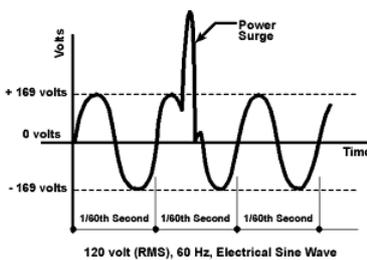
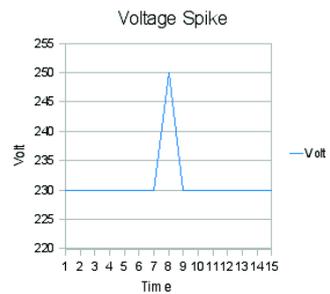
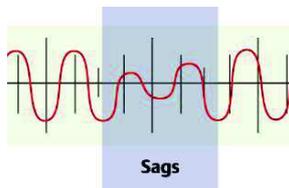
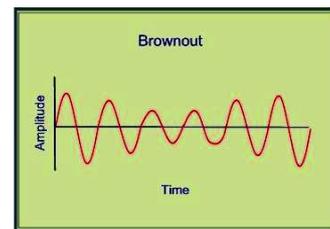
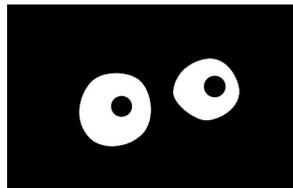
OV 3 - 19

- **Falling and tripping**
- **Equipment storage**
- **Component handling and protection**
- **Cable management**
- **Lasers**
- **RSI**
- **Eye strain**
- **Radiation**
- **Noise**
- **Hot components**
- **Food and drink**
- **Moving equipment**

OV 3 - 20

- Keep cords and cables organized.
- Be careful of lasers
- Be aware of RSI complications
- Be aware eye strain
- Implement noise precautions when applicable
- Use lifting techniques when handling equipment

- Blackout
- Brownout
- Sag
- Spike
- Surge
- In-rush



- UPS or battery backup
- Generators
- Surge suppressor



OV 3 - 23

- Compounds are used to clean or condition equipment.
- Read the labels and follow instructions carefully when disposing of materials.



OV 3 - 24

- Laser printer toner
- Batteries
- Capacitors



MATERIAL SAFETY DATA SHEET
Metal Cleaner

Page: 1

<table border="1"> <tr> <td>HEALTH</td> <td>3</td> </tr> <tr> <td>FLAMMABILITY</td> <td>1</td> </tr> <tr> <td>PHYSICAL HAZ.</td> <td>1</td> </tr> <tr> <td>PPE</td> <td>n</td> </tr> </table>		HEALTH	3	FLAMMABILITY	1	PHYSICAL HAZ.	1	PPE	n	Revision: 11/27/1996 Printed: 12/01/2003 Date Created: 12/09/1996	
HEALTH	3										
FLAMMABILITY	1										
PHYSICAL HAZ.	1										
PPE	n										
1. Product and Company Identification											
Product Code:	DX579										
Product Name:	Metal Cleaner										
Manufacturer Name and Address	Company Name: PPG Industries, Inc. 4325 Rosanna Drive P.O. Box 9 Allison Park, PA 15101										
Emergency Contact 1	Emergency Medical/Spill Info: (304)842-1300										
Information Contact	Technical Information: (614)363-9610										
Chemical Family:	ACID										
2. Composition/Information on Ingredients											
Hazardous Components (Chemical Name)	CAS#	Percentage	OSHA TWA	ACGIH TWA	Other Limits						
1. Ethanol 2-Butoxy-	111-76-2	10.0 - 20.0 %	(S) 25 ppm	(S) 25 ppm	No data.						
2. Diethylene glycol monobutyl ether	112-34-5	10.0 - 20.0 %	Not Estab.	Not Estab.	No data.						
3. Phosphoric acid	7664-38-2	30.0 - 40.0 %	1 mg/m3	1 mg/m3	No data.						
3. Hazards Identification											
Emergency Overview											
Harmful or fatal if swallowed. May be corrosive. This product contains a material which causes skin burns. This product contains a material which causes irreversible eye damage. May be harmful if absorbed through the skin. Vapor and/or spray mist harmful if inhaled. Vapor irritates eyes, nose, and throat. Vapor generated at elevated temperatures irritates eyes, nose, and throat.											
Route(s) of Entry: Inhalation? No Skin? No Eyes? No Ingestion? No											
Potential Health Effects (Acute and Chronic)											
INGESTION: Harmful or fatal if swallowed.											

CITIZENSINFO.ORG

Computer Safety Incident Report

Fill out as completely as possible

1. Nature of incident: _____
2. Location of incident: _____
3. Time of incident: _____
4. Date of incident: _____
5. Your name, position, and phone number: _____
6. Date and time this report was filed: _____
7. Was there any injury? Place an "X" after one – Yes ___ or No ___ – and elaborate in description below.
8. Is there an ongoing hazard? Place an "X" after one – Yes ___ or No ___ – and elaborate in description below.

Names, addresses, phone numbers, and ID numbers of individuals involved.
Please identify as complainant(s), perpetrator(s), witness(es).

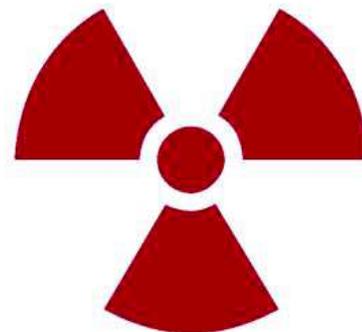
Name	Address	Phone Number	Employee Number	Status <small>(Employee, Guest, Client)</small>

Sequence or Description of Events. Be concise and thorough.

Office Use Only Incident # _____

Actions taken: Copies to: _____

- Liquid cleaners and empty containers
- Toner
- Display devices
- Ozone filter
- Batteries



- **Use proper language**
- **Use proper non-verbal communication**
- **Use good listening skills**



Acceptable Use Policy

Overview of Policy

This policy outlines the general use guidelines of any computer equipment within the organization. The guidelines are in place to protect both the employee and the company. Inappropriate use of equipment and resources can compromise the company network, systems and services.

Scope

This policy applies to all employees, clients, contractors, and any other individuals that work within the organization.

Policy Guidelines

1. General Use and Ownership Guidelines

- Use good judgment regarding the amount of use of all company equipment.
- Systems should be audited on a monthly basis.
- Properly secure all computer equipment when not in use.

2. Security and Sensitive Information

3. Unacceptable Use Activities

4. Internet and Networking Guidelines

- **Appearance**
- **Respect**
- **Accountability**
- **Confidentiality**
- **Honesty**
- **Prioritizing**
- **Expectations**
- **Ethics**



OV 3 - 31

Prohibited content can include:

- **Distasteful**
- **Inappropriate**
- **Illegal**

OV 3 - 32

- **First response**
 - Identification of data and/or hardware
 - Reporting the details of a discovery and evidence through proper channels
 - Preserving the data and/or device as evidence
- **Chain of custody**
 - Record tracking of evidence from collection to presentation in court
- **Documentation**
 - An organization's documented procedures should always be followed

Forensics deals with the recovery and investigation of potential evidence.

Basic forensic response procedures for IT include:

- Capture system image
- Examine network traffic and logs
- Capture video
- Record time offset
- Take hashes
- Take screenshots
- Identify witnesses
- Track man hours and expense



- 1. Which of the best practices discussed in this lesson apply in your workplace?**
- 2. Have you ever been in a situation where you uncovered inappropriate conduct or prohibited activity?**