

CompTIA A+ Core 2 Exam 220-1102

# Lesson 14



## Managing Windows Networking

# Objectives

- Configure Windows networking
- Troubleshoot Windows networking
- Configure Windows security settings
- Manage Windows shares

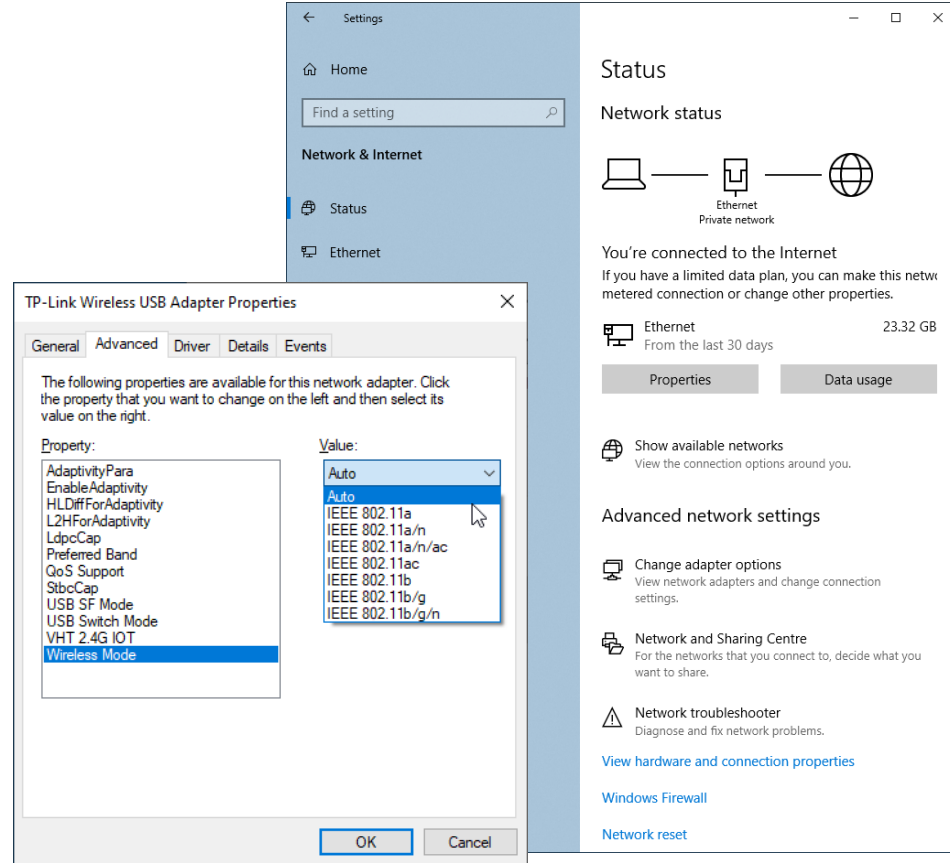
Lesson 14

# Topic 14A

## Configuring Windows Networking

# Windows Network Connection Types

- Wired (Ethernet)
  - Device Manager properties
- Wireless
  - Network name/service set ID (SSID) list
  - Joining a non-broadcast network
  - Adapter properties
    - Standards support, transmit power, and roaming aggressiveness



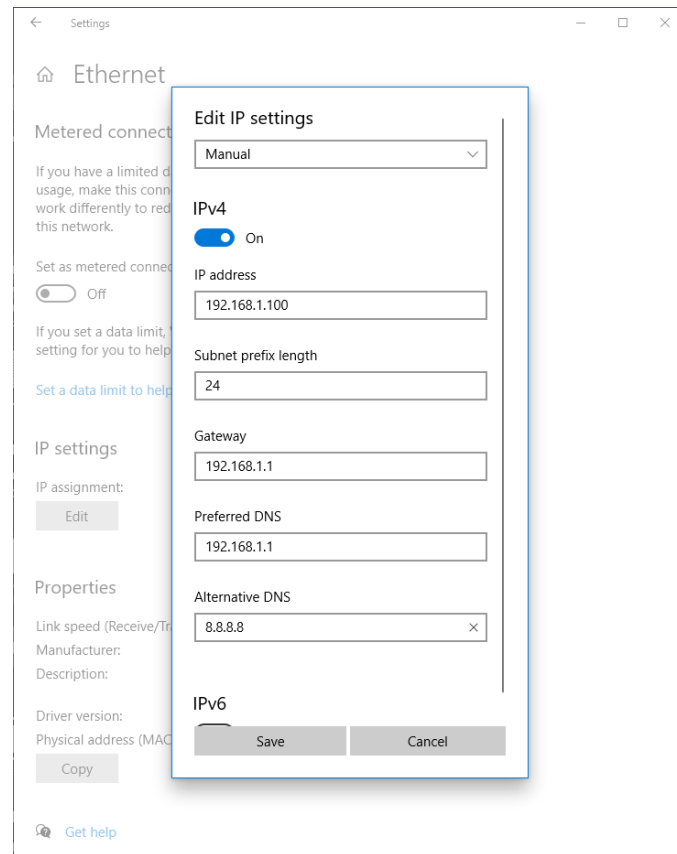
*Screenshots courtesy of Microsoft*

# IP Addressing Schemes

- Internet Protocol (IP) addressing scheme
  - IPv4 address and subnet mask
  - IPv6 address and network prefix
- Default gateway
- Domain Name System (DNS) settings
- Static versus dynamic configuration

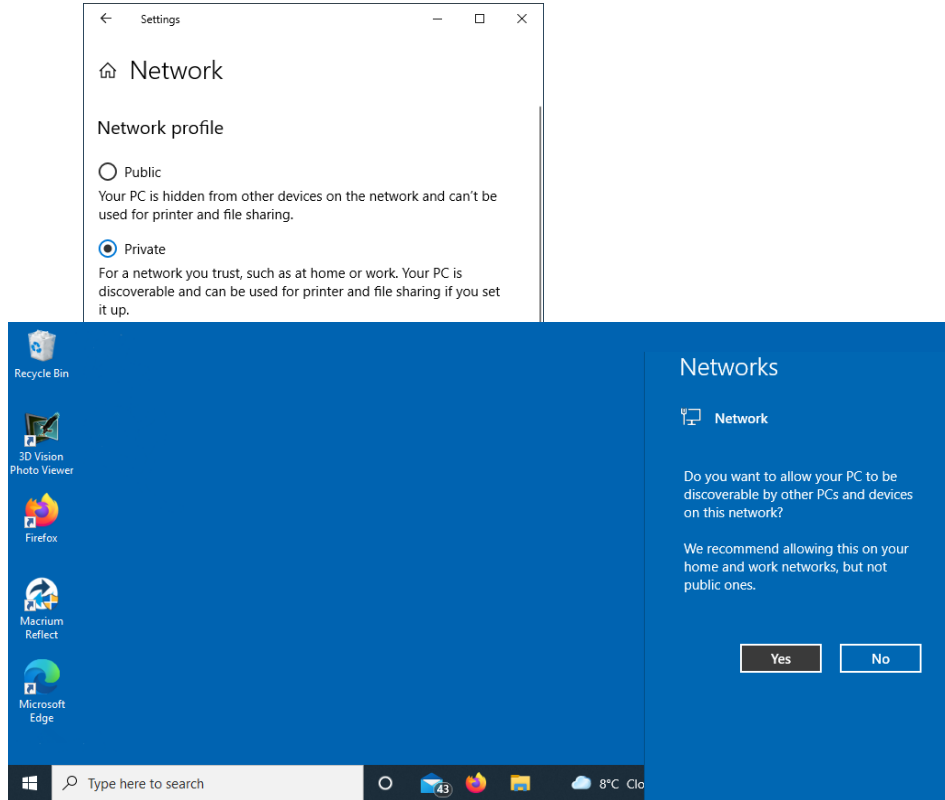
# Windows Client Configuration

- Clients, protocols, and services
- IPv4 properties
  - Obtain an IP address automatically
  - Static configuration
  - Alternate configuration



*Screenshot courtesy of Microsoft*

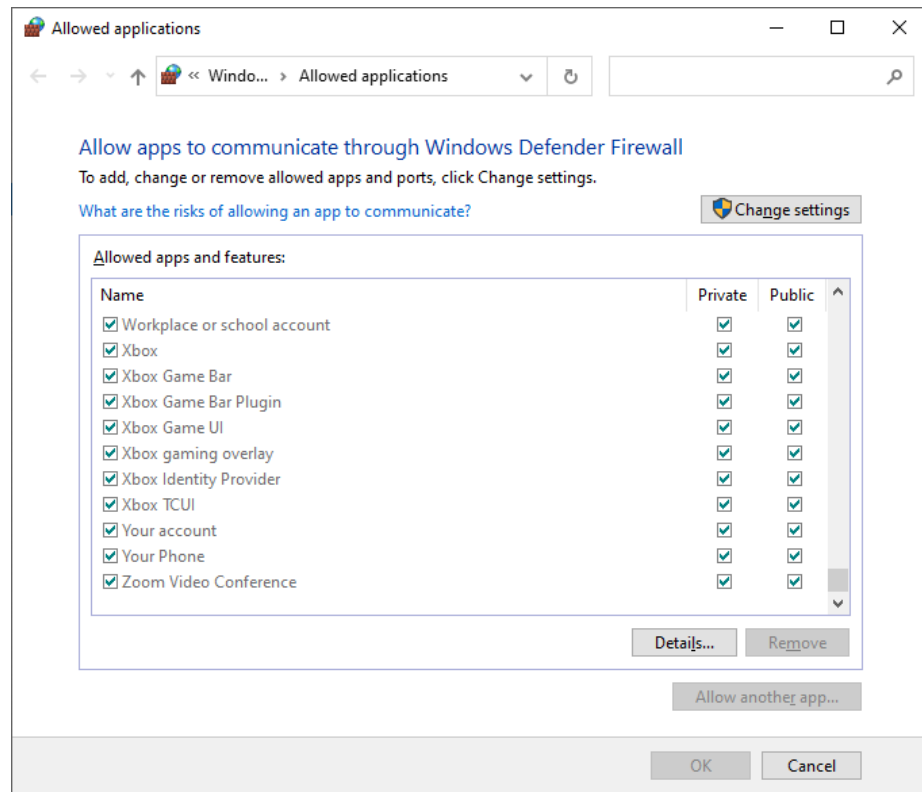
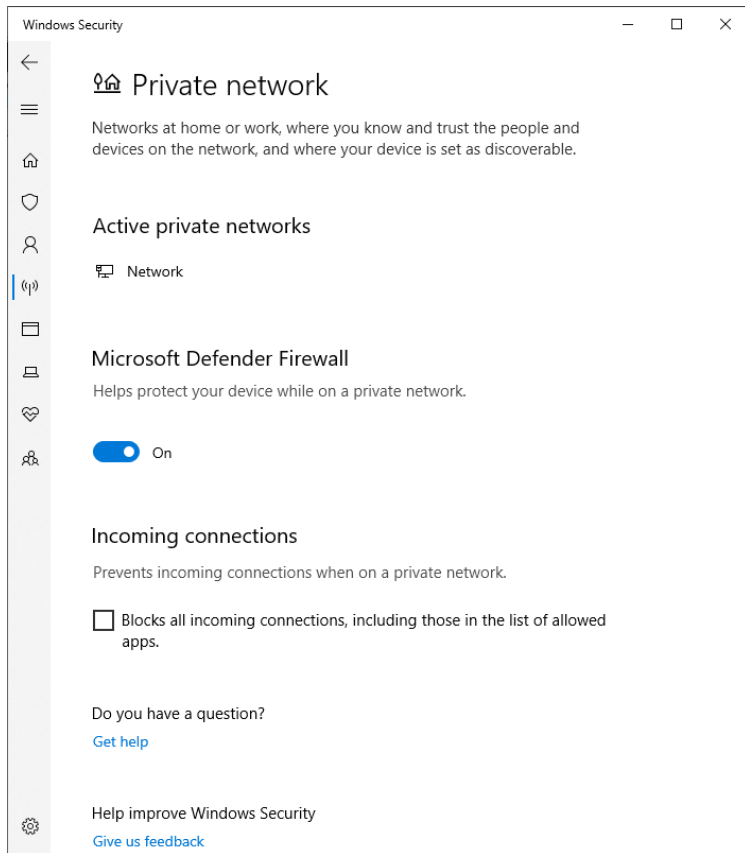
# Network Location



*Screenshots courtesy of Microsoft*

- Public versus private
- Network Location Awareness
- Controls whether host discovery and sharing is enabled
- Network navigation in File Explorer

# Windows Defender Firewall Configuration

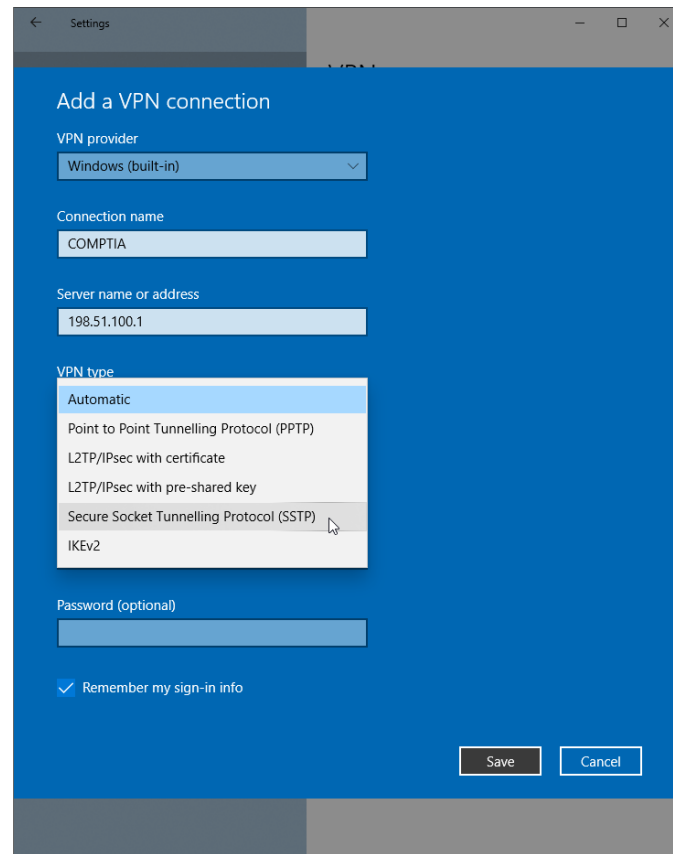


Screenshots courtesy of Microsoft



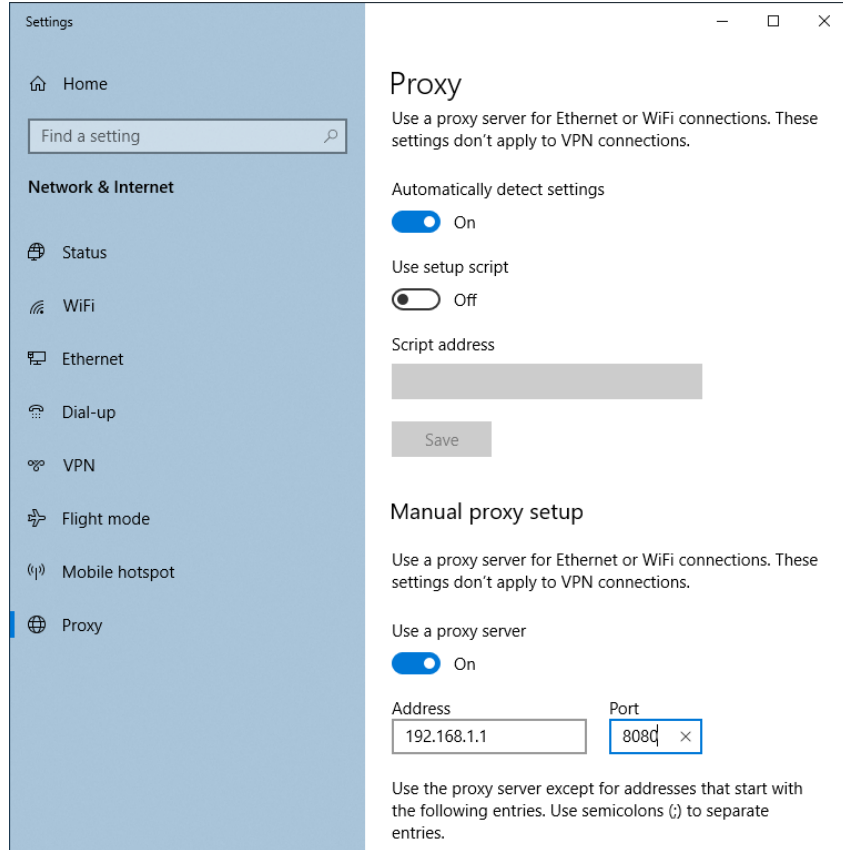
# VPN and WWAN Connection Types

- Virtual private network (VPN)
  - Protocol support in Windows versus third-party clients
  - Remote network address
  - Connecting and disconnecting
- Wireless wide area network (WWAN)
  - Cellular adapter and SIM card
  - Metered connections and limitations



*Screenshots courtesy of Microsoft*

# Proxy Settings



*Screenshot courtesy of Microsoft*

- Clients connect to Internet via server
  - Content filtering and security
  - Caching to improve performance
- Non-transparent configuration
  - Proxy server address
  - Port

## Review Activity: Windows Networking

- Windows Network Connection Types
- IP Address Schemes
- Windows Client Configuration
- Network Location
- Windows Defender Firewall Configuration
- VPN and WWAN Connection Types
- Proxy Settings

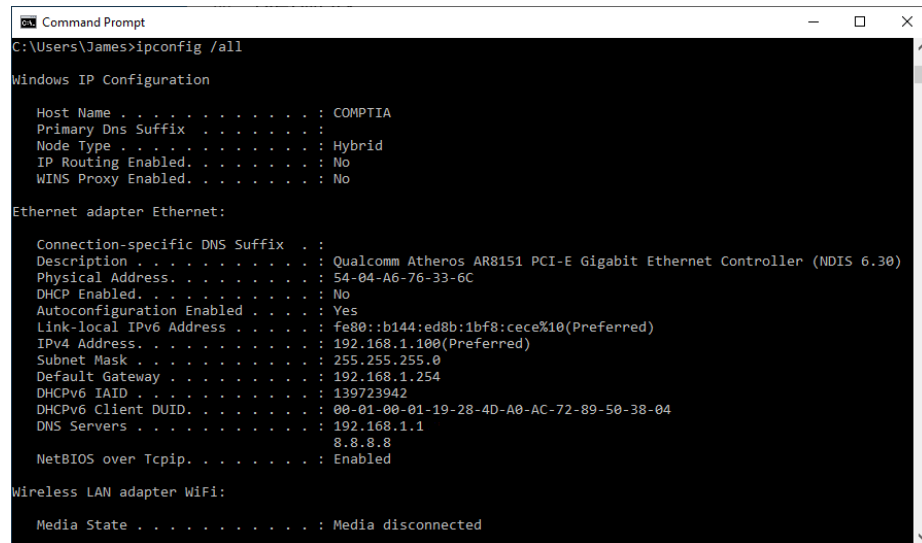
Lesson 14

# Topic 14B

## Troubleshooting Windows Networking

# Troubleshoot IP Configuration

- Windows adapter error states
  - Limited connectivity versus No Internet
- ipconfig Command
  - Basic versus detailed (/all)
  - Manage DHCP (/release and /renew)
  - Manage DNS cache (/displaydns and /flushdns)
- hostname Command
- Network reset



```
Command Prompt
C:\Users\James>ipconfig /all

Windows IP Configuration

Host Name . . . . . : COMPTIA
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No

Ethernet adapter Ethernet:

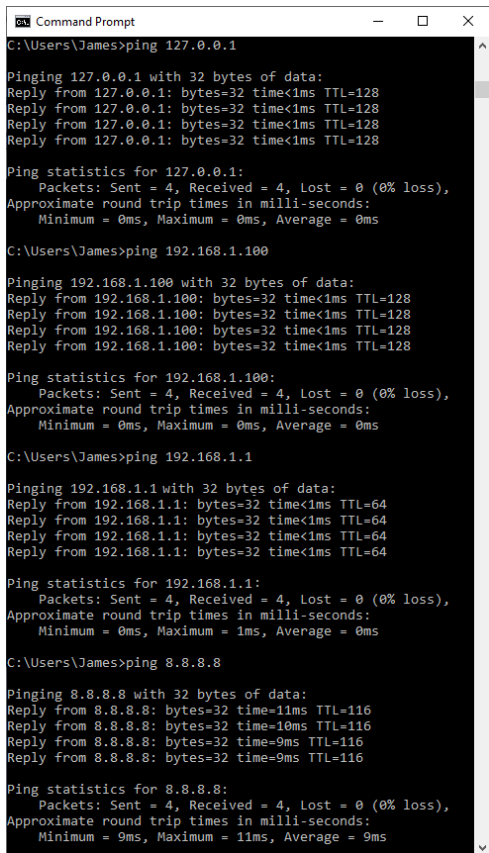
Connection-specific DNS Suffix . :
Description . . . . . : Qualcomm Atheros AR8151 PCI-E Gigabit Ethernet Controller (NDIS 6.30)
Physical Address. . . . . : 54-04-A6-76-33-6C
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::b144:ed8b:1bf8:cece%10(Preferred)
IPv4 Address. . . . . : 192.168.1.100(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.1.254
DHCPv6 IAID . . . . . : 130723942
DHCPv6 Client DUID. . . . . : 00-01-00-01-19-28-4D-A0-AC-72-89-50-38-04
DNS Servers . . . . . : 192.168.1.1
                        8.8.8.8
NetBIOS over Tcpip. . . . . : Enabled

Wireless LAN adapter WiFi:

Media State . . . . . : Media disconnected
```

*Screenshots courtesy of Microsoft*

# Troubleshoot Local Network Connectivity



```

C:\Users\James>ping 127.0.0.1

Pinging 127.0.0.1 with 32 bytes of data:
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 127.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\James>ping 192.168.1.100

Pinging 192.168.1.100 with 32 bytes of data:
Reply from 192.168.1.100: bytes=32 time<1ms TTL=128
Reply from 192.168.1.100: bytes=32 time<1ms TTL=128
Reply from 192.168.1.100: bytes=32 time<1ms TTL=128
Reply from 192.168.1.100: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\James>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:
Reply from 192.168.1.1: bytes=32 time<1ms TTL=64
Reply from 192.168.1.1: bytes=32 time<1ms TTL=64
Reply from 192.168.1.1: bytes=32 time<1ms TTL=64
Reply from 192.168.1.1: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\Users\James>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:
Reply from 8.8.8.8: bytes=32 time=11ms TTL=116
Reply from 8.8.8.8: bytes=32 time=10ms TTL=116
Reply from 8.8.8.8: bytes=32 time=9ms TTL=116
Reply from 8.8.8.8: bytes=32 time=9ms TTL=116

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 9ms, Maximum = 11ms, Average = 9ms

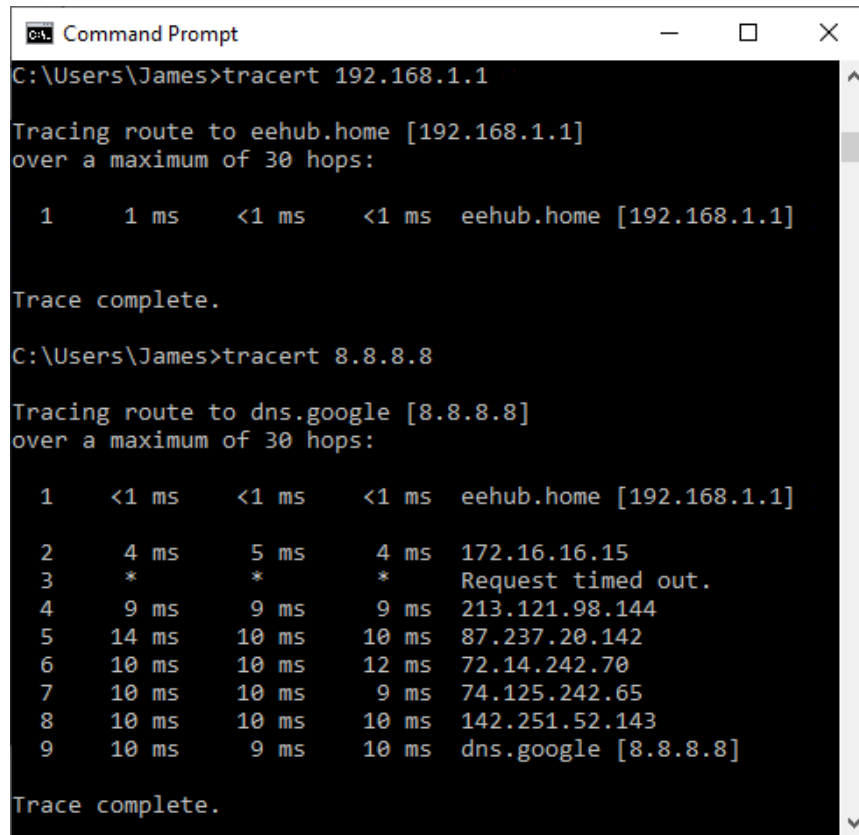
```

*Screenshots courtesy of Microsoft*

- ping to test connectivity with host
  - ping loopback and own IP
  - ping gateway
  - ping remote host
- Response types
  - Round-trip time (RTT) if responses received
  - Destination unreachable
  - No reply (request timed out)
- ping by name

# Troubleshoot Remote Network Connectivity

- `tracert`
  - Path from gateway to remote hosts
  - Hop count
  - Router ingress interface
  - RTT
- pathing
  - Measure more accurate latency statistics



```
Command Prompt
C:\Users\James>tracert 192.168.1.1

Tracing route to eehub.home [192.168.1.1]
over a maximum of 30 hops:

  1    1 ms    <1 ms    <1 ms    eehub.home [192.168.1.1]

Trace complete.

C:\Users\James>tracert 8.8.8.8

Tracing route to dns.google [8.8.8.8]
over a maximum of 30 hops:

  1    <1 ms    <1 ms    <1 ms    eehub.home [192.168.1.1]
  2     4 ms     5 ms     4 ms    172.16.16.15
  3     *        *        *        Request timed out.
  4     9 ms     9 ms     9 ms    213.121.98.144
  5    14 ms    10 ms    10 ms    87.237.20.142
  6    10 ms    10 ms    12 ms    72.14.242.70
  7    10 ms    10 ms     9 ms    74.125.242.65
  8    10 ms    10 ms    10 ms    142.251.52.143
  9    10 ms     9 ms    10 ms    dns.google [8.8.8.8]

Trace complete.
```

*Screenshot courtesy of Microsoft*

# Troubleshoot Name Resolution

```
C:\Users\Admin>nslookup -type=mx comptia.org 8.8.8.8
Server: dns.google
Address: 8.8.8.8

Non-authoritative answer:
comptia.org      MX preference = 10, mail exchanger = comptia-org.mail.protection.outlook.com

C:\Users\Admin>nslookup -type=ns comptia.org 8.8.8.8
Server: dns.google
Address: 8.8.8.8

Non-authoritative answer:
comptia.org      nameserver = ns2.comptia.org
comptia.org      nameserver = ns1.comptia.org

C:\Users\Admin>nslookup -type=mx comptia.org ns1.comptia.org
Server: UnKnown
Address: 209.117.62.56

comptia.org      MX preference = 10, mail exchanger = comptia-org.mail.protection.outlook.com
C:\Users\Admin>
```

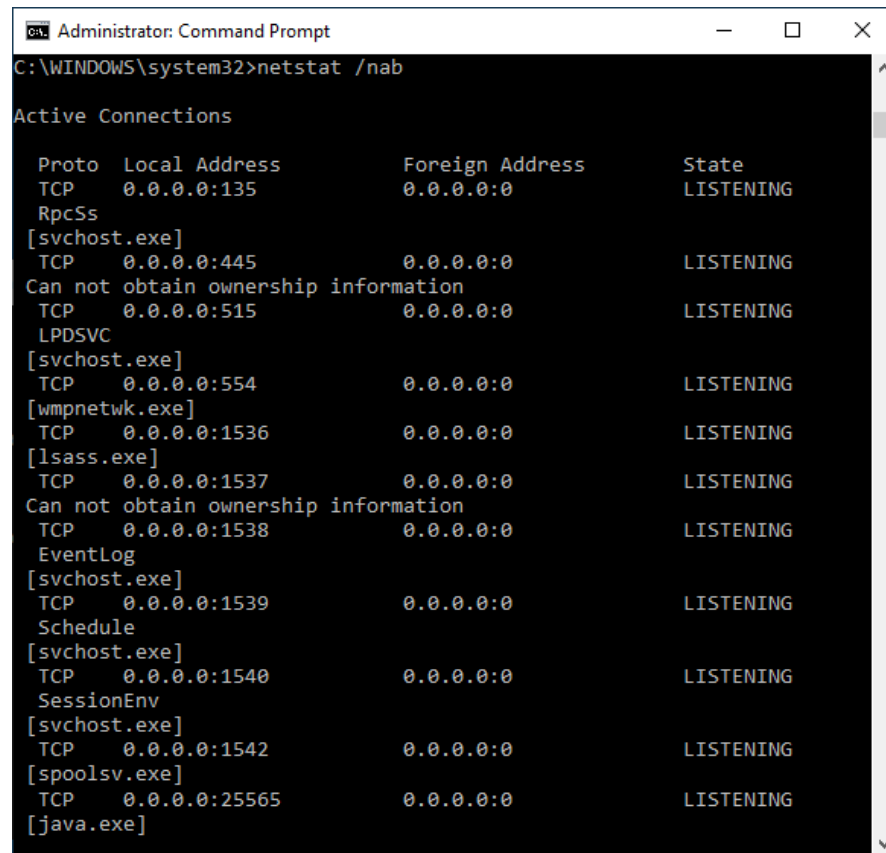
*Screenshot courtesy of Microsoft*

- Troubleshooting beyond basic connectivity
  - Security, name resolution, and service availability
- Diagnose DNS issues with nslookup
  - Domain/host and record type to query
  - Server to use to perform queries



# Troubleshoot Network Ports

- netstat
  - Report port status and connections
- Switches
  - -a to show all
  - -b and -o report process that opened the port
  - -n use numerical formats
  - -e and -s to report statistics



```
Administrator: Command Prompt
C:\WINDOWS\system32>netstat /nab

Active Connections

Proto Local Address           Foreign Address         State
TCP   0.0.0.0:135              0.0.0.0:0               LISTENING
RpcSs
[svchost.exe]
TCP   0.0.0.0:445              0.0.0.0:0               LISTENING
Can not obtain ownership information
TCP   0.0.0.0:515              0.0.0.0:0               LISTENING
LPDSVC
[svchost.exe]
TCP   0.0.0.0:554              0.0.0.0:0               LISTENING
[wmpnetwk.exe]
TCP   0.0.0.0:1536             0.0.0.0:0               LISTENING
[lsass.exe]
TCP   0.0.0.0:1537             0.0.0.0:0               LISTENING
Can not obtain ownership information
TCP   0.0.0.0:1538             0.0.0.0:0               LISTENING
EventLog
[svchost.exe]
TCP   0.0.0.0:1539             0.0.0.0:0               LISTENING
Schedule
[svchost.exe]
TCP   0.0.0.0:1540             0.0.0.0:0               LISTENING
SessionEnv
[svchost.exe]
TCP   0.0.0.0:1542             0.0.0.0:0               LISTENING
[spoolsv.exe]
TCP   0.0.0.0:25565            0.0.0.0:0               LISTENING
[java.exe]
```

## **Review Activity: Windows Network Troubleshooting**

- Troubleshoot IP Configuration
- Troubleshoot Local Network Connectivity
- Troubleshoot Remote Network Connectivity
- Troubleshoot Name Resolution
- Troubleshoot Network Ports

## Lab Activity

- Assisted Lab: Configure Windows Networking
  - Diagnose and remediate a network connectivity issue

## Lesson 14

# Topic 14C

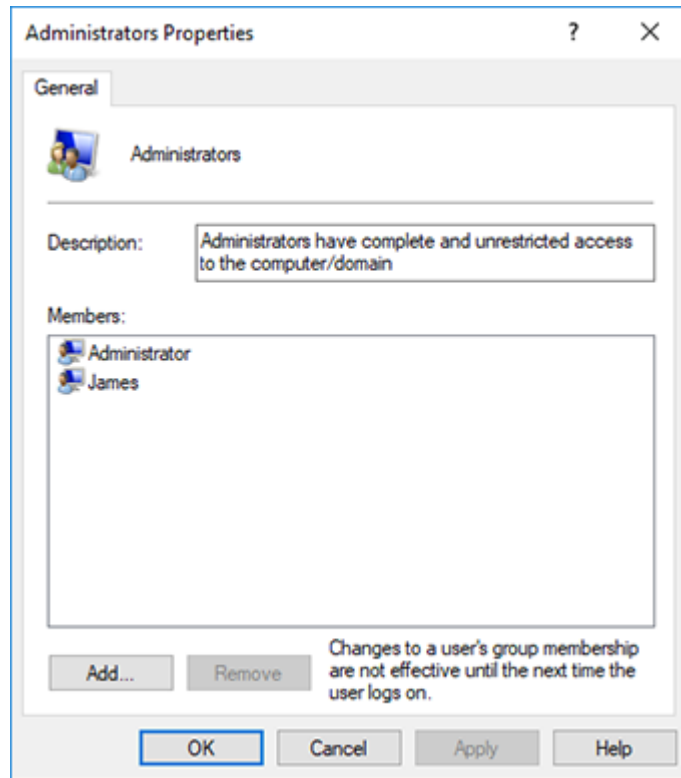
## Configure Windows Security Settings

# Logical Security Controls

- Security control types
  - Physical, procedural, logical
- Logical security
  - Access control system enforced by software
  - Authentication, authorization, and accounting
- Access control lists (ACLs)
  - Subjects receive permissions over resources (objects)
- Implicit deny
- Least privilege

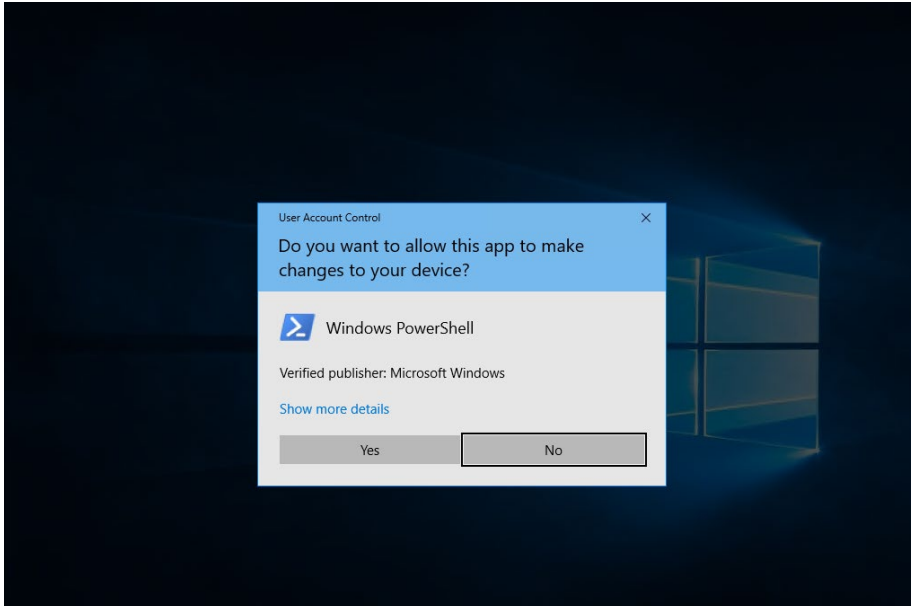
# User and Group Accounts

- User accounts
  - Local versus Microsoft account
- Security groups
  - Administrator
  - Users (standard accounts)
  - Guests
  - Power users
- Managing user and group accounts
  - Local Users and Groups management console
  - net user Commands



*Screenshot courtesy of Microsoft*

# User Account Control



*Screenshot courtesy of Microsoft*

- Least privilege
  - Require consent even if user is administrator
  - Allow temporary escalation of privileges in standard user session
- Run as administrator
- UAC settings

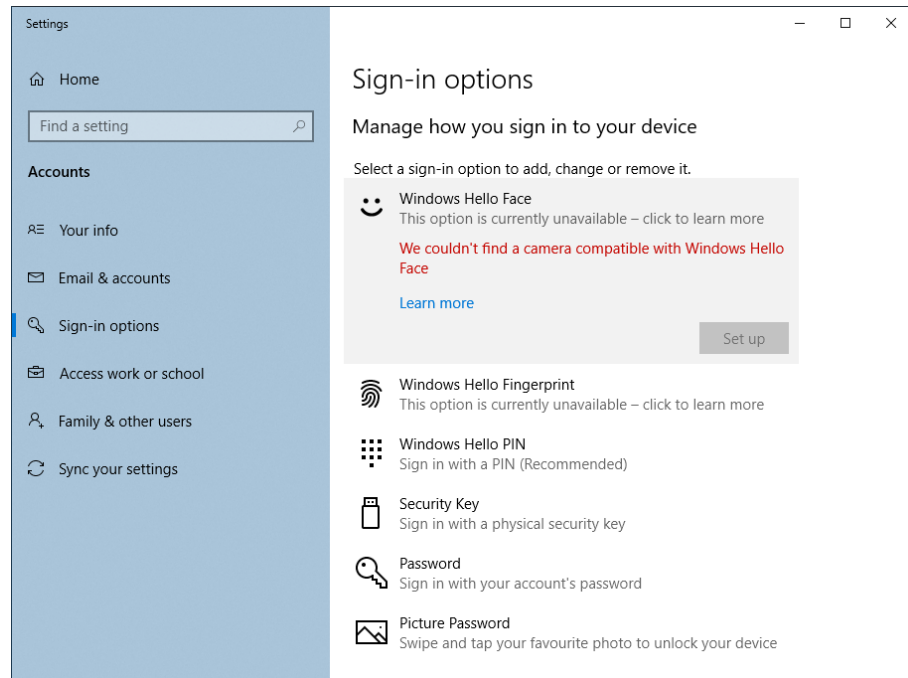
# Authentication Methods

- Multifactor authentication (MFA)
- 2-step verification
  - Validate sign-in by sending a soft token to a registered account, device, or phone number
  - Email, short message service (SMS), voice call
- Authenticator application
- Hard token authentication

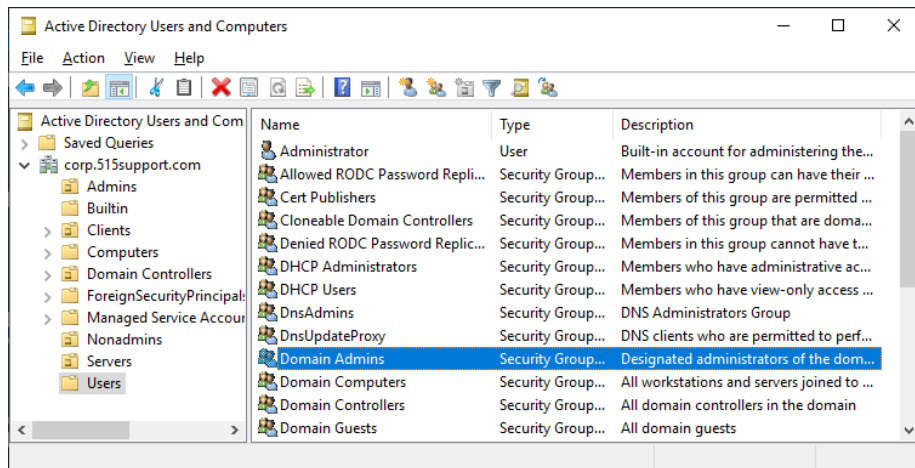


# Windows Login Options

- Windows authentication
  - Local, network, and remote
- Username and password
- Windows Hello
  - Personal identification number (PIN)
  - Fingerprint
  - Facial recognition
- Single sign-on (SSO)
  - Kerberos authentication and authorization
  - Password-less SSO



# Windows Domains and Active Directory

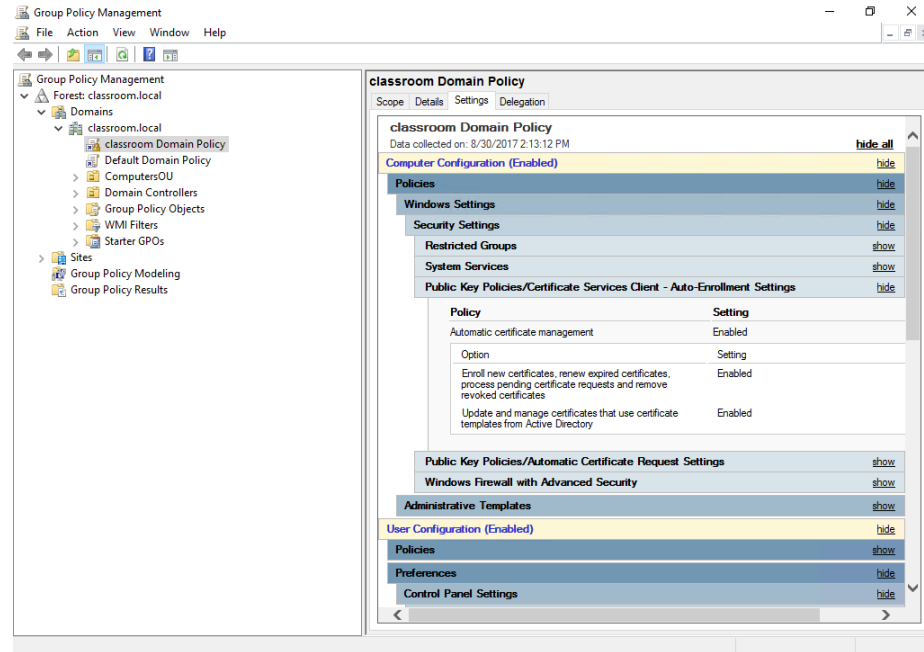


*Screenshot courtesy of Microsoft*

- Local security accounts versus Active Directory (AD) accounts
- Domain Controller (DC)
- Member server
  - Kerberos SSO
- Security groups
- Organizational units (OU)

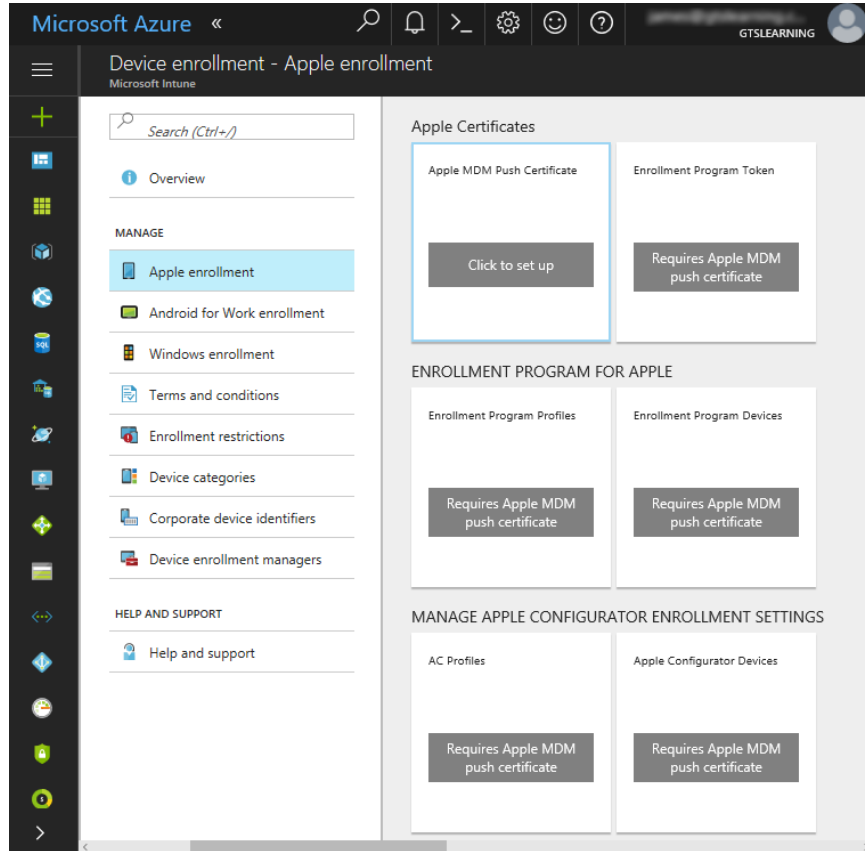
# Group Policy and Login Scripts

- Group Policy Objects (GPOs)
  - Attach to domains and OUs
  - Apply to computer and user accounts
  - Administrative Templates
- Updating and monitoring policies
  - gpupdate
  - gpresult
- Login scripts



*Screenshots courtesy of Microsoft*

# Mobile Device Management



*Screenshot courtesy of Microsoft*

- Register mobile devices when they connect to network
- Control use of apps and device features

## Review Activity: Security Settings

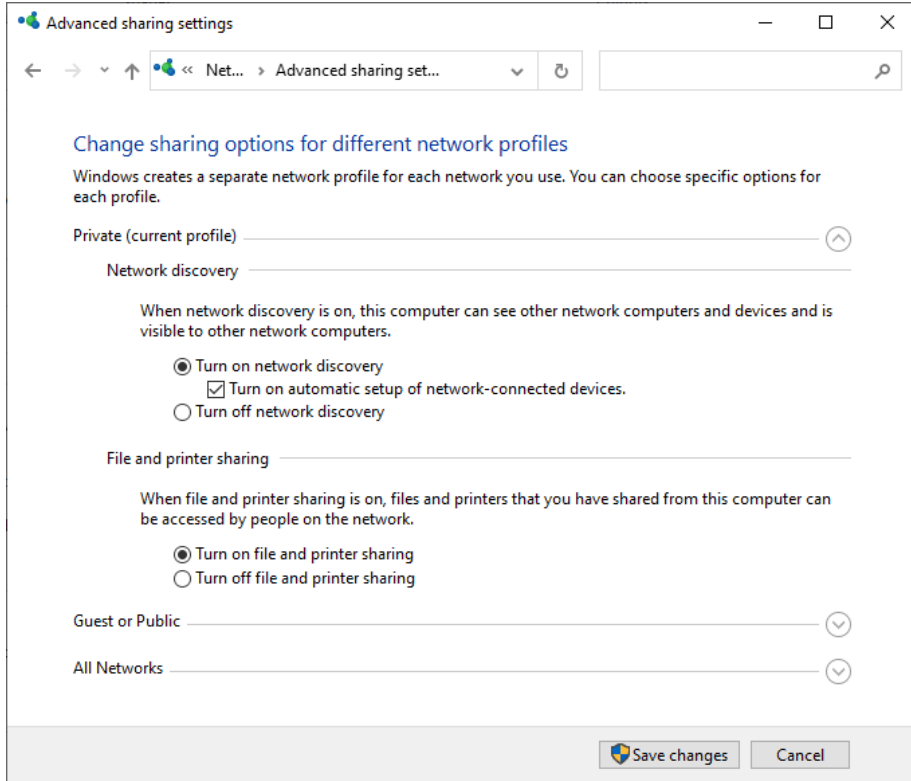
- Logical Security Controls
- User and Group Accounts
- User Account Control
- Authentication Methods
- Windows Login Options
- Windows Domains and Active Directory
- Group Policy and Login Scripts
- Mobile Device Management

Lesson 14

# Topic 14D

## Manage Windows Shares

# Workgroup Setup

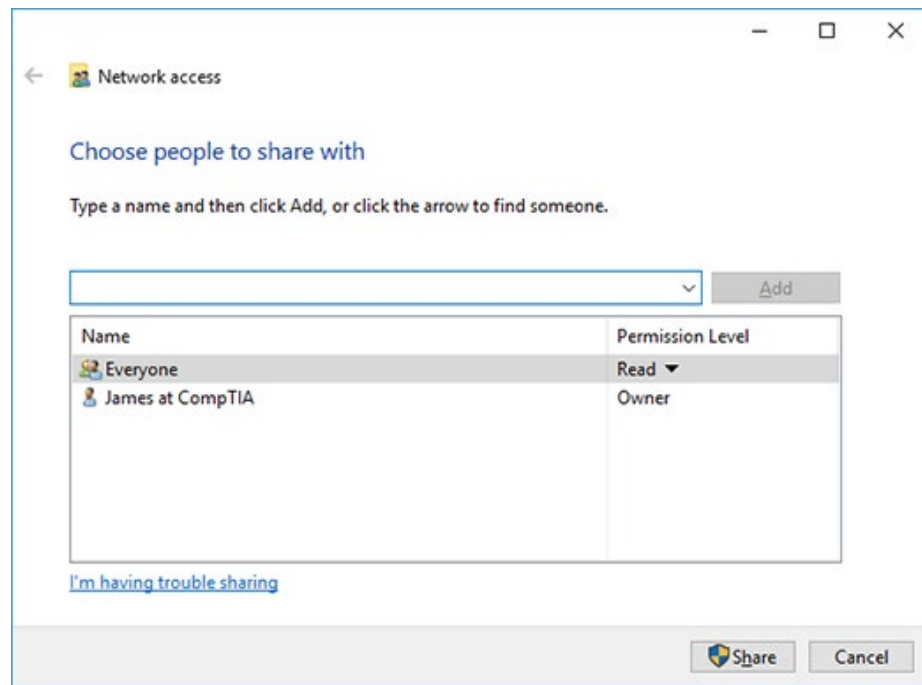


*Screenshot courtesy of Microsoft*

- Workgroup networking versus domain networking
  - Peer-to-peer versus centralized client/server models
- Network discovery and file sharing
  - Advanced sharing settings
  - Password-protected sharing

# File Share Configuration

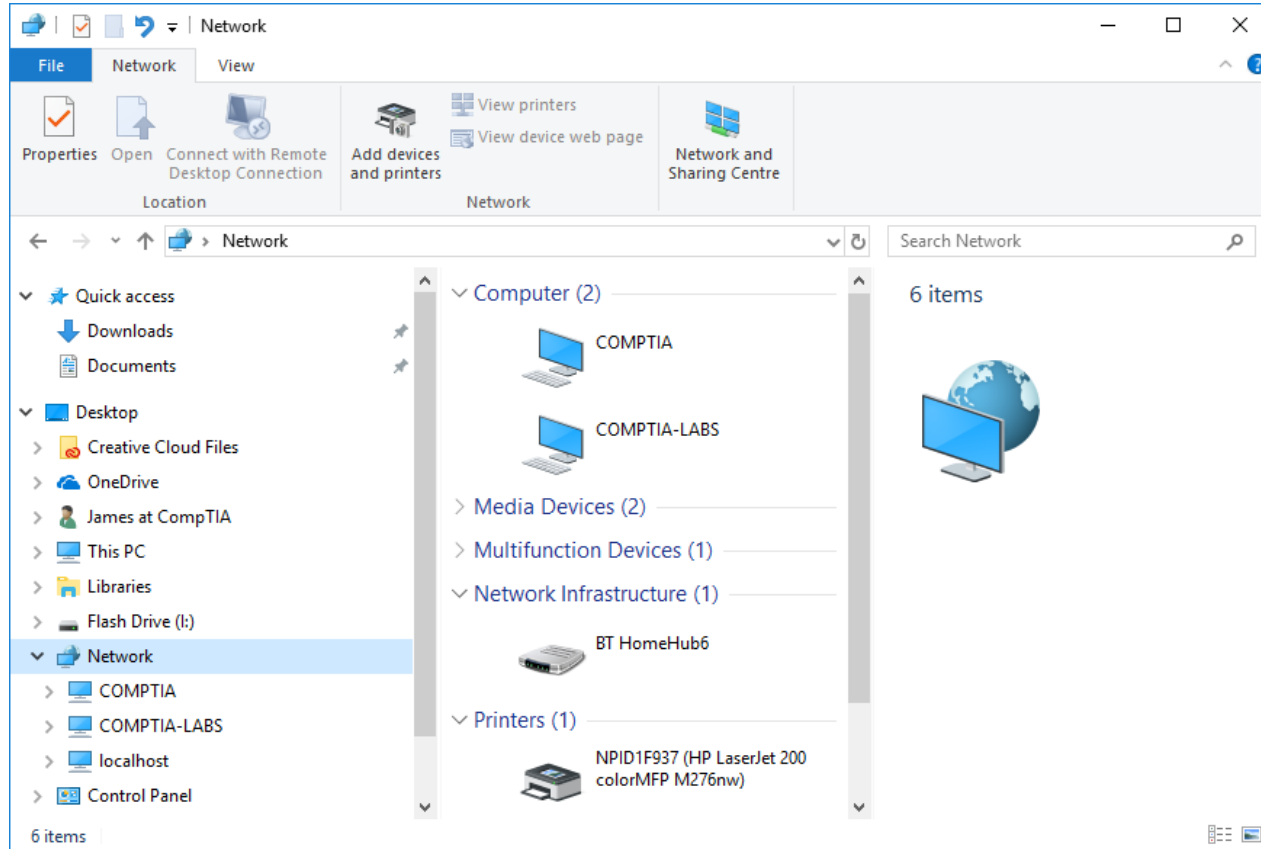
- Public folder sharing
- Custom shares
  - Read versus Read/write
- Administrative shares
  - C\$
  - ADMIN\$



*Screenshot courtesy of Microsoft*



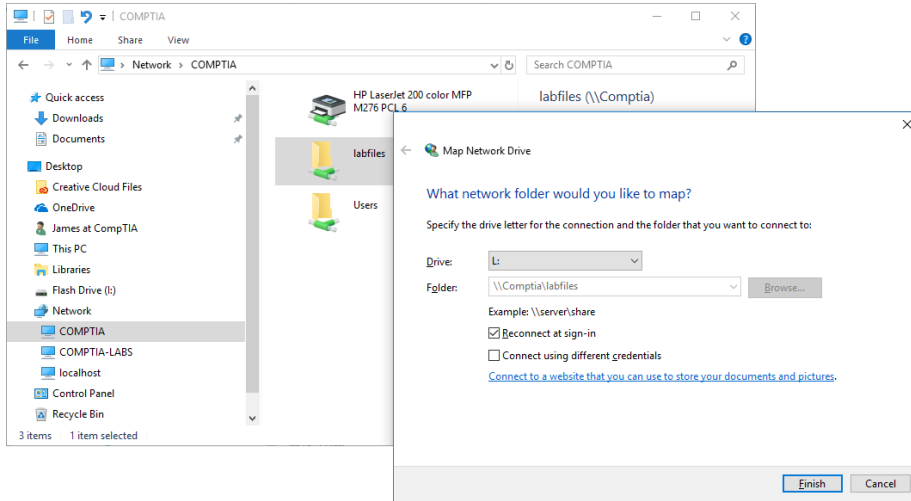
# Network Browsing Mapping Drives (Slide 1 of 2)



*Screenshot courtesy of Microsoft*

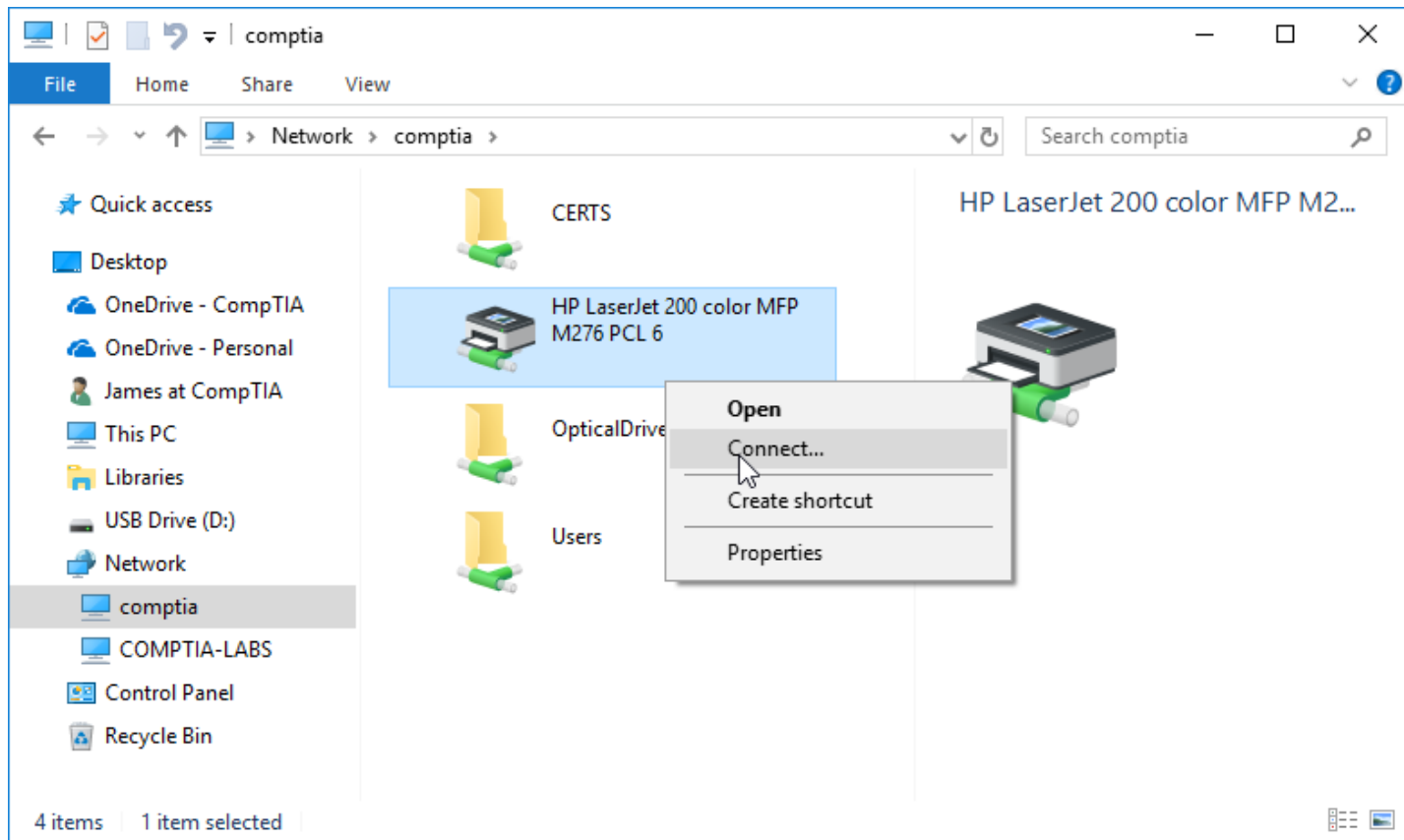
# Network Browsing and Mapping Drives (Slide 2 of 2)

- Mapped drives
- net commands
  - net use X: \\Host\Share
  - net use X: /delete
  - net view



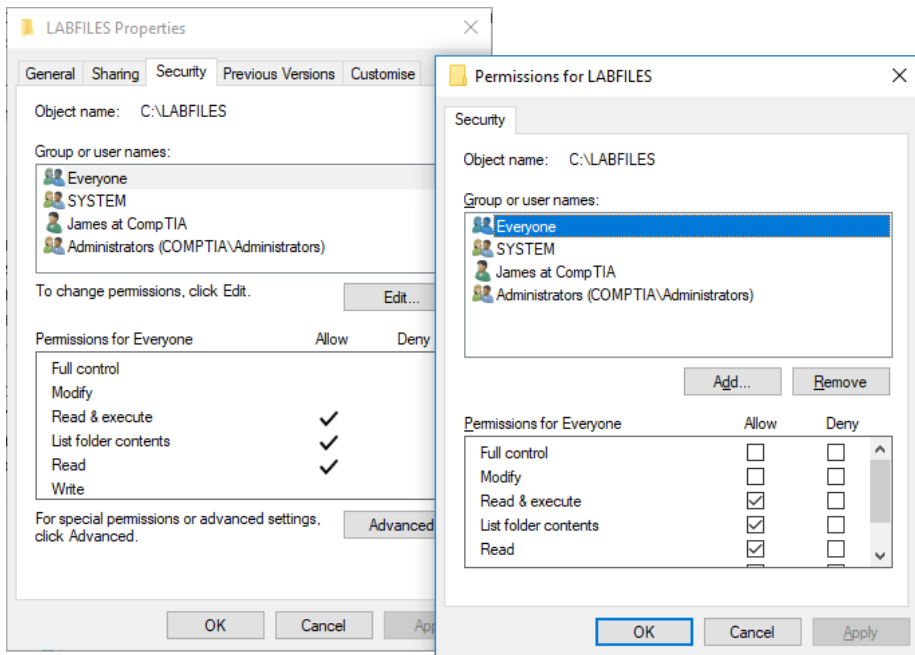
*Screenshots courtesy of Microsoft*

# Printer Sharing



*Screenshot courtesy of Microsoft*

# NTFS versus Share Permissions

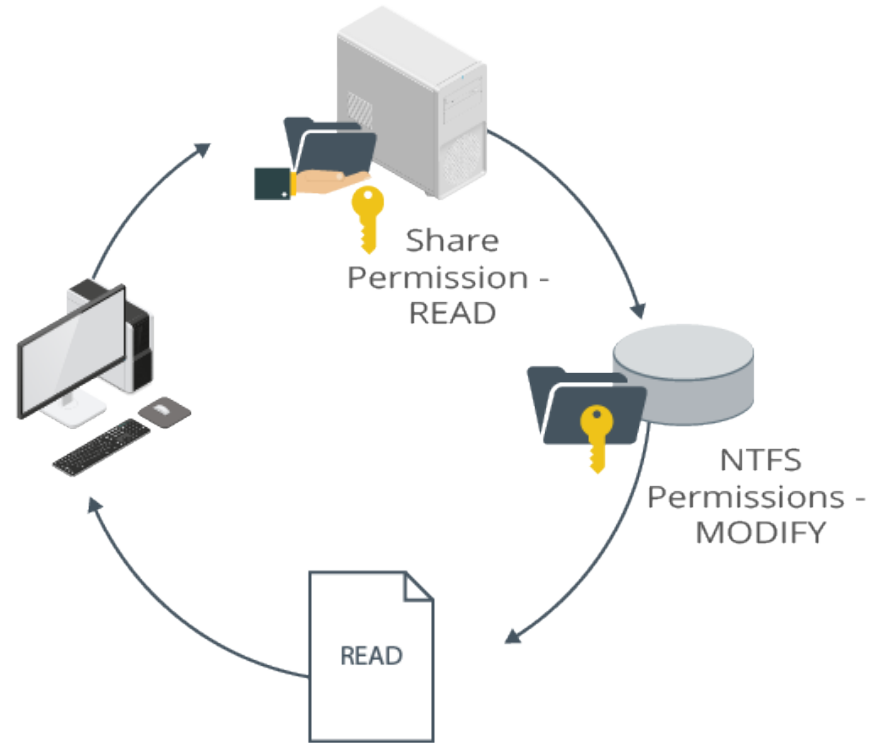


*Screenshot courtesy of Microsoft*

- Advantages of NTFS permissions over share permissions
- NTFS ACLs
  - Principal (user or group account)
  - Permissions (read/list/execute, write, modify, full control)
  - Allow versus deny
  - Effective permissions

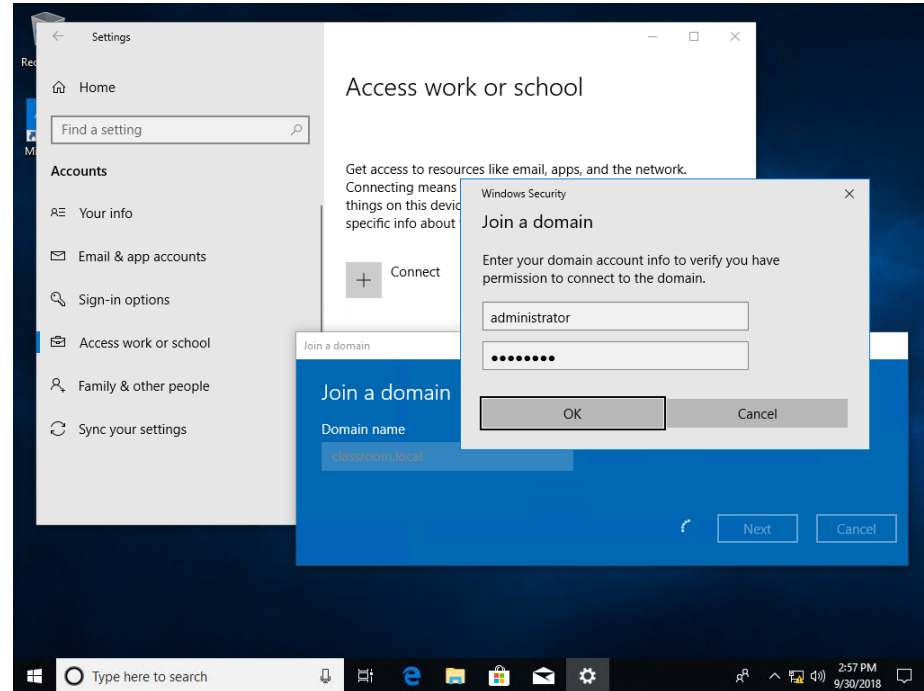
# Permissions Inheritance

- NTFS permissions are inherited from parent (unless inheritance is disabled)
- Share and NTFS permissions inheritance
  - Share permissions are always inherited but only apply to network access
  - Effective permissions are most restrictive of share versus NTFS
- Configure Full Control share permissions and use NTFS permissions to achieve policy design



# Domain Setup

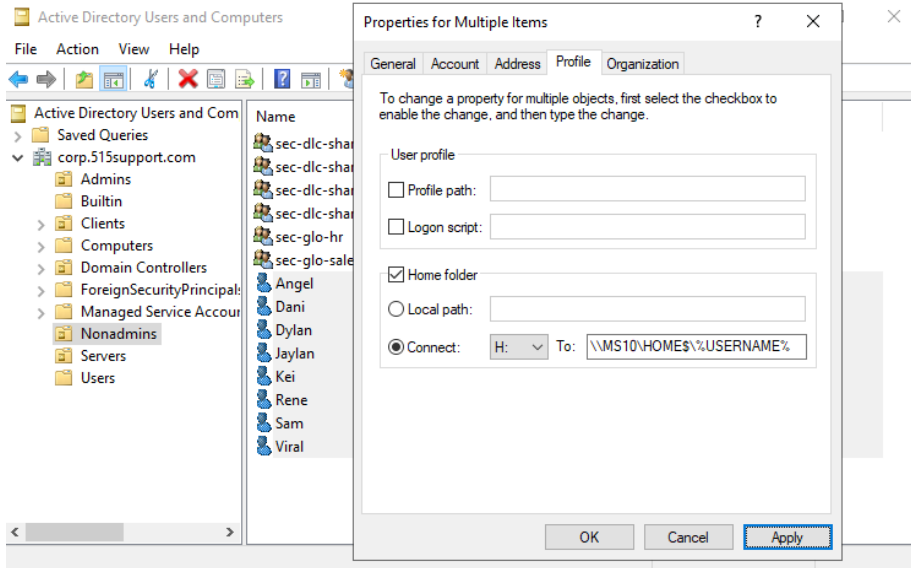
- Joining a domain
  - Network requirements
  - Appropriate IP configuration (DHCP)
  - DNS servers
  - Administrator approval
- Domain sign-in



*Screenshots courtesy of Microsoft*

# Home Folders

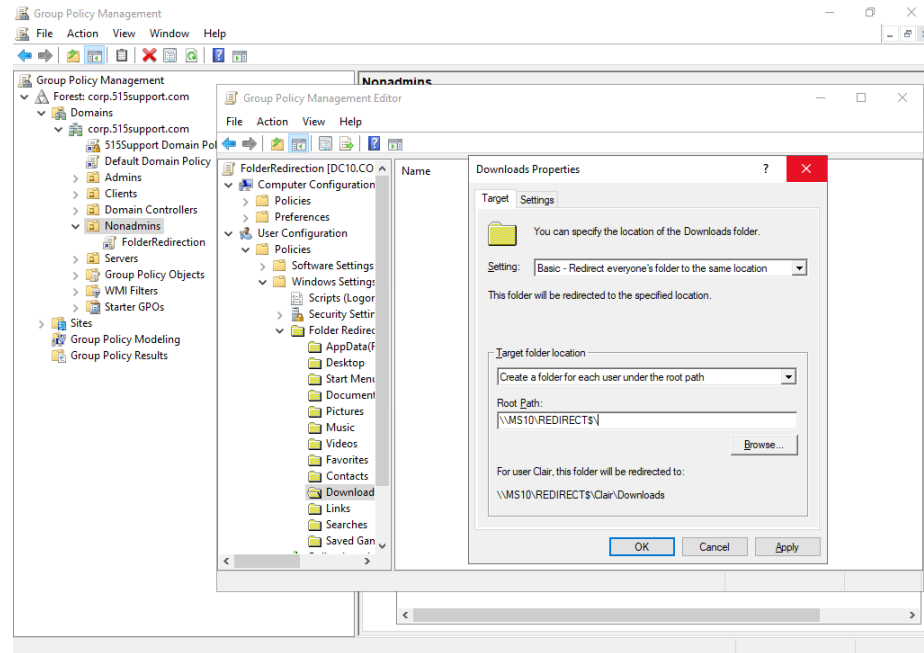
- Configure personal share for each user on file server
- User accesses home folder as mapped drive



*Screenshot courtesy of Microsoft*

# Roaming Profiles and Folder Redirection

- Roaming profile
  - Profile is copied to workstation at login
  - Copied back to file share at logoff
- Folder redirection
  - Personal folders are redirected to file share
  - Centralizes data storage and reduces load on profile copying



*Screenshot courtesy of Microsoft*



## Review Activity: Windows Shares

- Workgroup Setup
- File Share Configuration
- Network Browsing and Mapping Drives
- Printer Sharing
- NTFS versus Share Permissions
- Permissions Inheritance
- Domain Setup
- Home Folders
- Roaming Profiles and Folder Redirection

## Lab Activity

- Assisted Lab: Configure Folder Sharing in a Workgroup
  - Configure and test a file share on a Windows host
- Assisted Lab: Support Active Directory Networking
  - Join a computer to a domain and implement a logon script and folder redirection policy

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# Lesson 14



## Summary