

Protocol Deep Dive: DHCP

COURSE OVERVIEW AND DHCPV4



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Course Overview



Discuss DHCP in-depth

DHCPv4/DHCPv6

- Protocol functions
- Packet exchange
- Workstation lease processing
- Advanced options
- Implementation

Troubleshooting

- Common implementation mistakes
- Network failures

DHCPv4 In-Depth

Dynamic Host Configuration Protocol



Used for endpoint configuration

- ISPs configure WAN equipment
- Enterprises configure workstations
- Home routers provide private addresses

Otherwise static configuration is required

Started life as BOOTP (Bootstrap Protocol)

- BOOTP is still used for some diskless workstations

Client-Server model

Uses UDP

Port 67 - Server

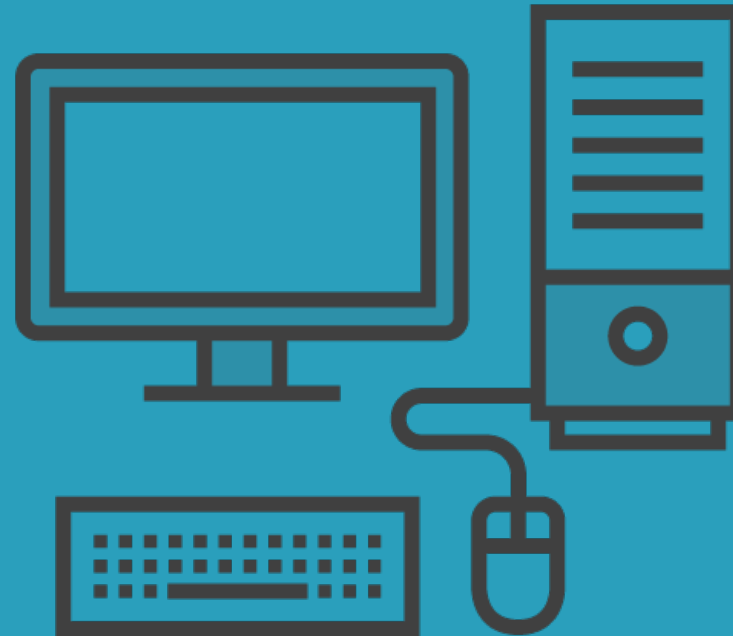
Port 68 - Client

Four-packet exchange

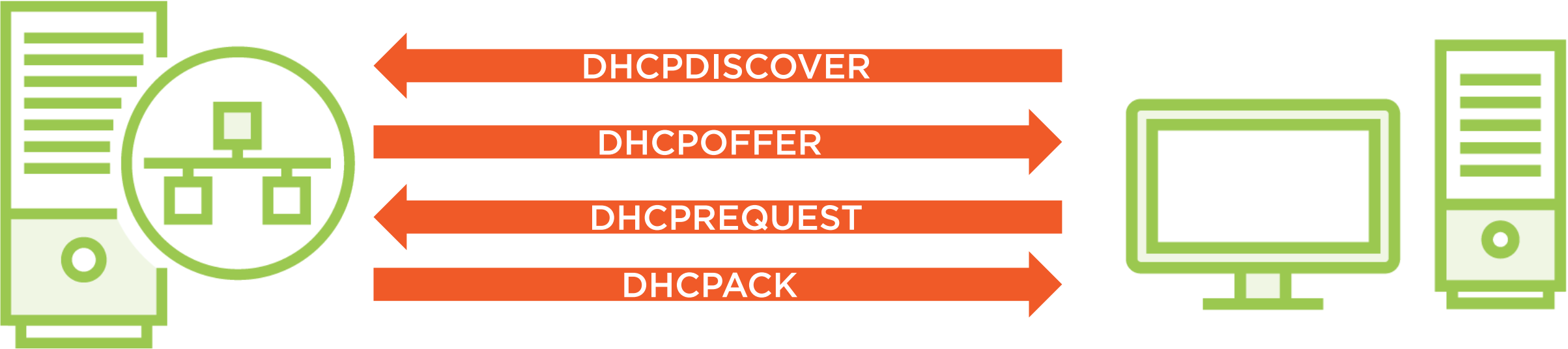
Broadcast/Unicast

Relay to central server

Client options



DHCPv4 Address Assignment Packet Flow



DHCP Address Allocation Methods

Dynamic

Most common, address is leased for a fixed period of time

Automatic

Assigns a permanent IP address using the DORA method

Manual (Static)

Administrator manually assigns addresses based on MAC address

DHCP Lease Time Events

T1 Timer expires (50% of lease)

- Client goes to **Renewing** state
- Sends DHCPREQUEST to server

T2 Timer expires (87.5% of lease)

- Transitions to **Rebinding** state
- Client broadcasts DHCPREQUEST
- Only servers that have seen the client responds

Lease expires

- Client releases address
- Transitions to **INIT** state
- Starts lease process “from scratch”

DHCPv4 Options

DHCP Options



Used to pass configuration information

Every implementation uses options

Many are IETF assigned (RFC 2132)

Vendors can use special options

Common DHCP Options

Option 53
Message type

Option 1
Subnet mask

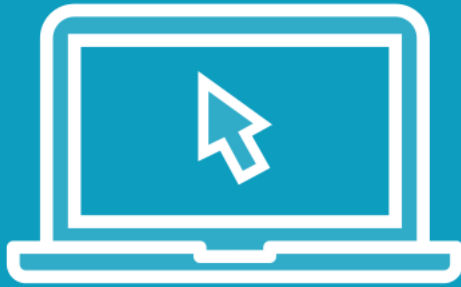
Option 3
Router

Option 6
Domain server

Options 51
Lease time

Option 150
TFTP server

Demo



Examine DHCPv4 transaction

- Available for download

Configure DHCP

- Windows Server
- Cisco router
- DHCP relay agent