# How Does DHCP Work?

# Introduction

DHCP is a protocol designed to automatically configure TCP/IP at the workstation. The only manual configuration required is to enable DHCP, and to give the client a name.

# Agenda

- Setting Up the DHCP Servers
- A Client Gets an Address
- Client Lease Renewal
- A Client Moves to a New Subnet
- DHCP Message Summary
- IP Helper Address
- Where to Get More Information

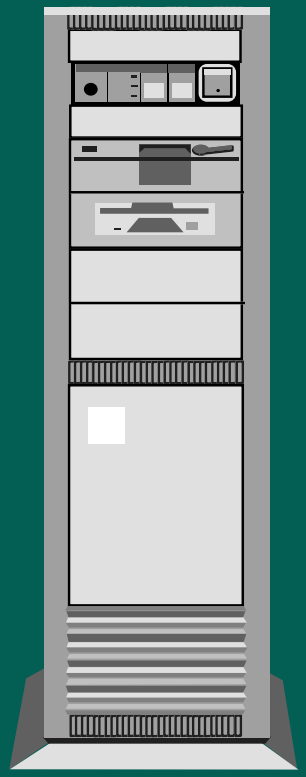
# Vocabulary

- DHCP: Dynamic Host Configuration Protocol
- Lease: An agreement between client and server to allocate an address for a specified time
- Scope: An object within the DHCP Server configuration that contains addresses for a single subnet

# Setting Up the DHCP Servers

- Create a DHCP service
- Create a “scope” to contain an address pool
  - Exclude addresses not to be issued
- Configure options to send to client
  - DNS server addresses
  - Routing gateway address
  - WINS server addresses
  - WINS node type

# Setting Up the DHCP Servers



Server address: 132.200.50.220

Global Options (*for all scopes*)
- DNS: 132.200.100.10
- DNS: 132.200.100.11
- WINS: 132.200.100.20
- WINS: 132.200.100.20
- Node type: H

Scope 132.200.50.0

Local Options (*for this scope*)
- Gateway: 132.200.50.201
- Exclude 132.200.50.201 - 254 (*for static devices*)

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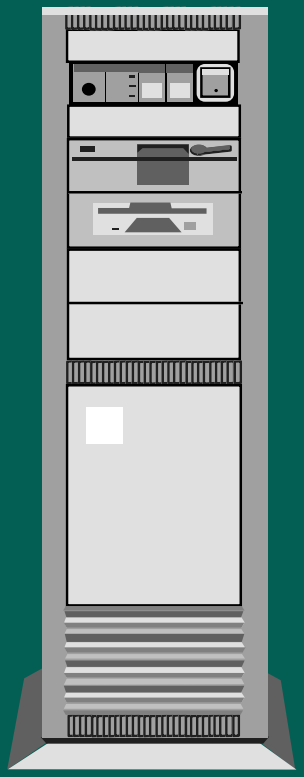
# Setting Up the DHCP Servers



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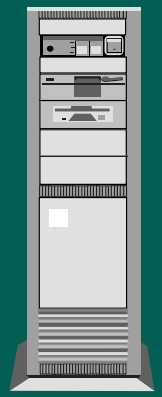

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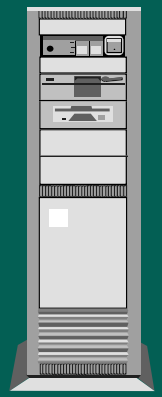

Create a second DHCP server

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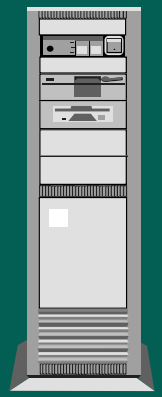

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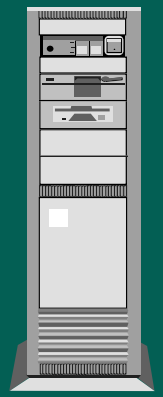

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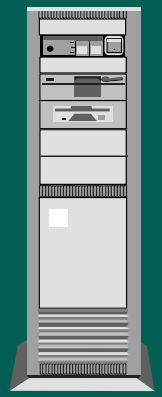

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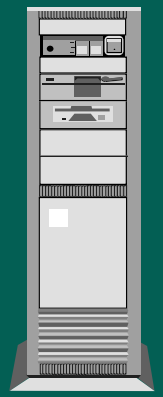
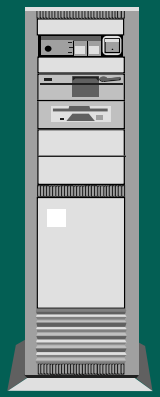
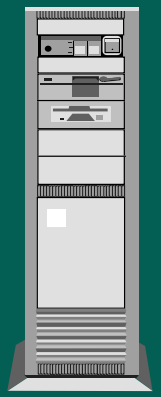


Exclude half of the addresses from each scope

# Setting Up the DHCP Servers



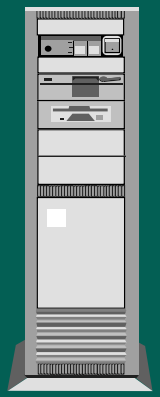
Serves addresses
132.200.50.1 through 100



Serves addresses
132.200.50.101 through 200

Exclude half of the addresses from each scope

# A Client Gets an Address



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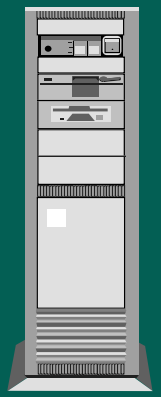
132.200.50.1 through 100



Serves addresses
132.200.50.101 through 200

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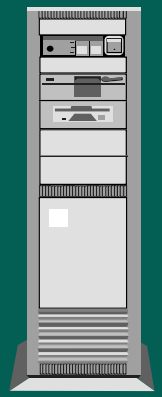

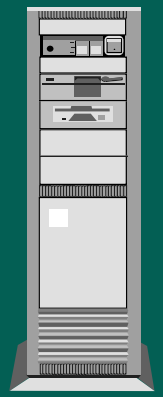

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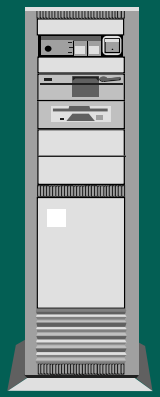
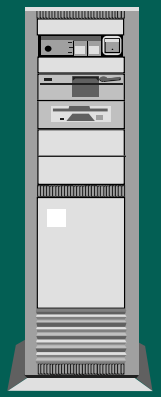
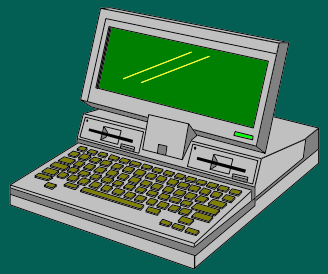




Boot



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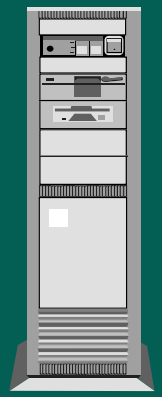
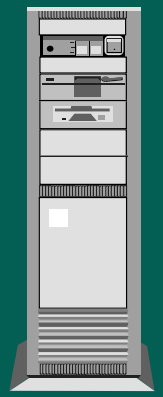
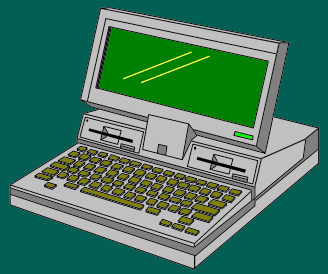




Send DHCP Discover



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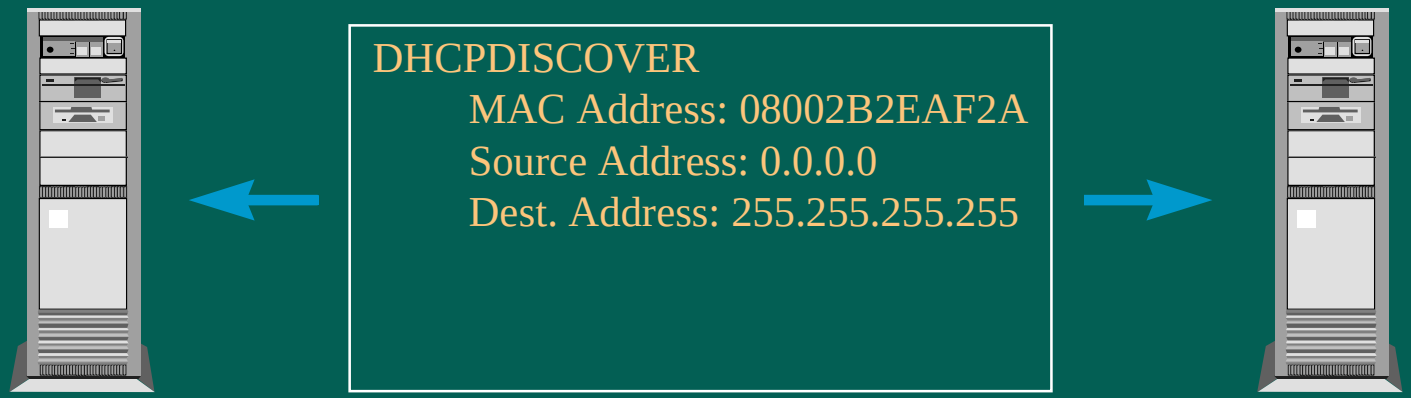


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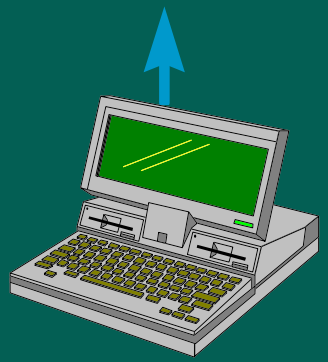

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# DHCP Messages

- DHCPDISCOVER

# DHCP Messages

- DHCPDISCOVER
  - Initialization message from client

# DHCP Messages

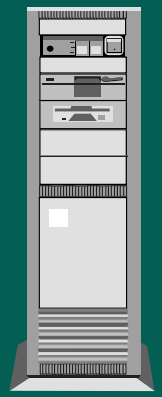
- DHCPDISCOVER
  - Initialization message from client
  - Broadcast

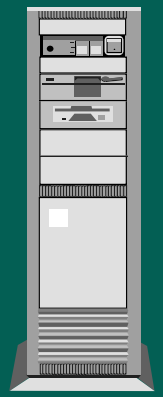
# DHCP Messages

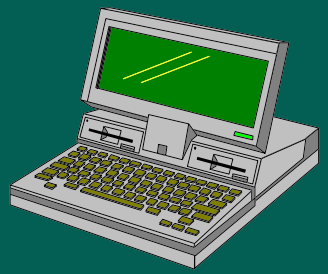
- DHCPDISCOVER
  - Initialization message from client
  - Broadcast
  - Client has no network address yet

# A Client Gets an Address

Servers offer an address







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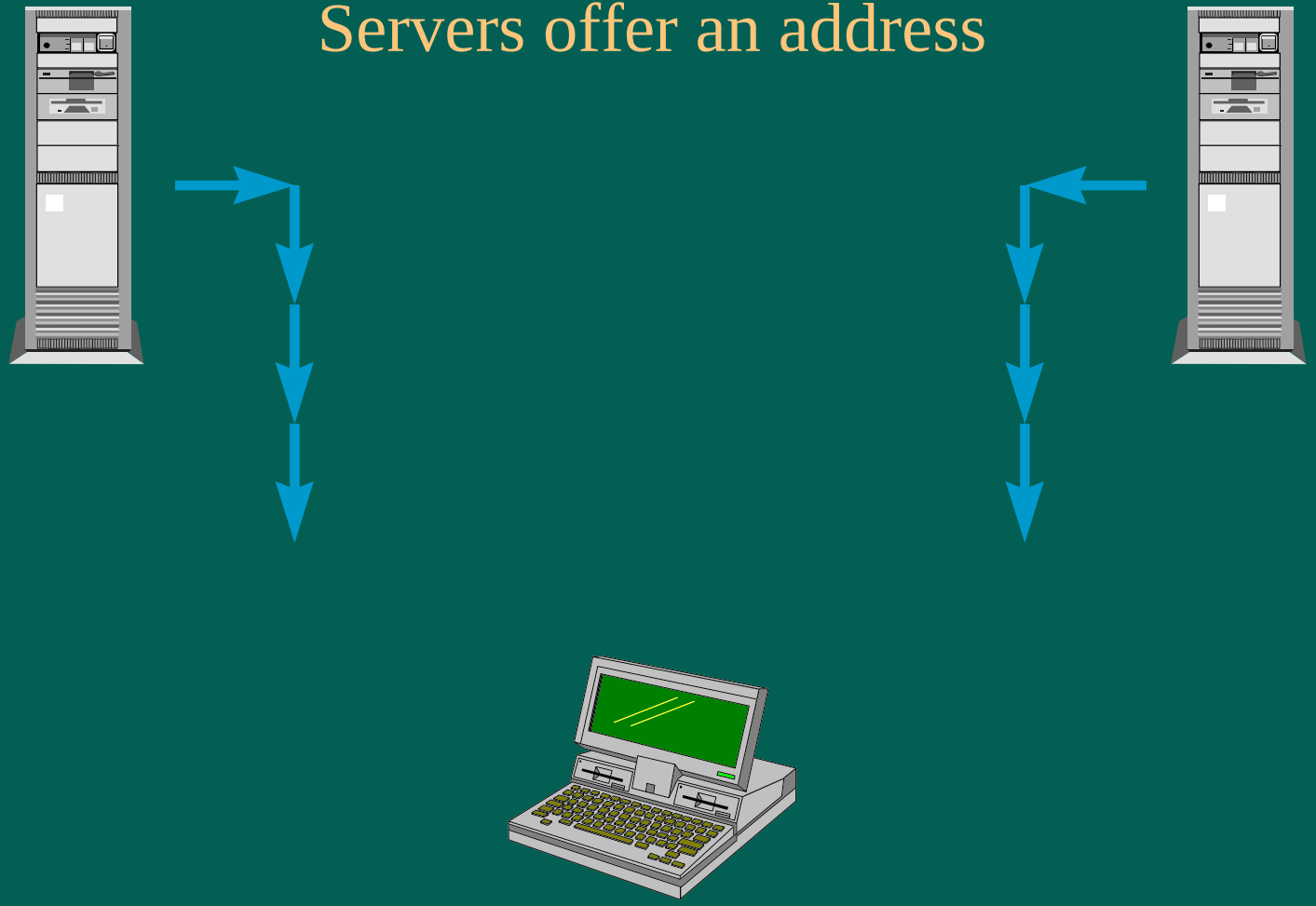

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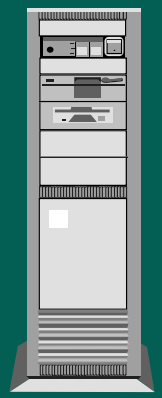
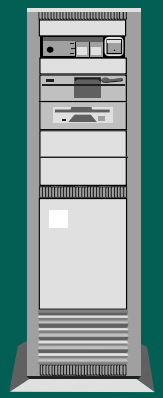
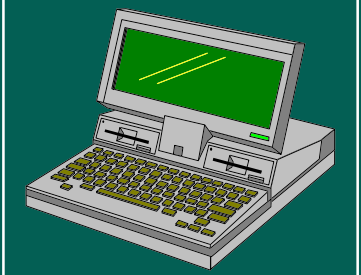




DHCPOFFER
MAC Address: 08002B2EAF2A
Source Address: 132.200.50.220
Dest. Address: 255.255.255.255
IP Address: 132.200.50.5
Subnet Mask: 255.255.255.0
Server Identifier: 132. 200.100.5
Lease Length: 504 Hours



DHCPOFFER
MAC Address: 08002B2EAF2A
Source Address: 132.200.50.230
Dest. Address: 255.255.255.255
IP Address: 132.200.50.105
Subnet Mask: 255.255.255.0
Server Identifier: 132. 200.100.6
Lease Length: 504 Hours

# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER

# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER
  - Each server offers an address

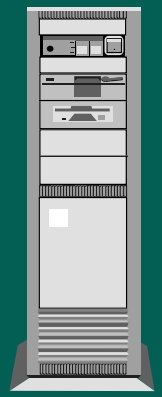
# DHCP Messages

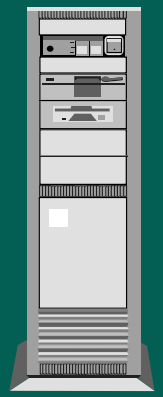
- DHCPDISCOVER
- DHCPOFFER
  - Each server offers an address
  - Address reserved in pool

# DHCP Messages

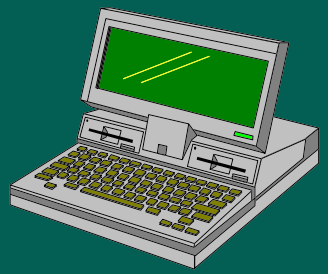
- DHCPDISCOVER
- DHCPOFFER
  - Each server offers an address
  - Address reserved in pool
  - Broadcast

# A Client Gets an Address





Send DHCP Request



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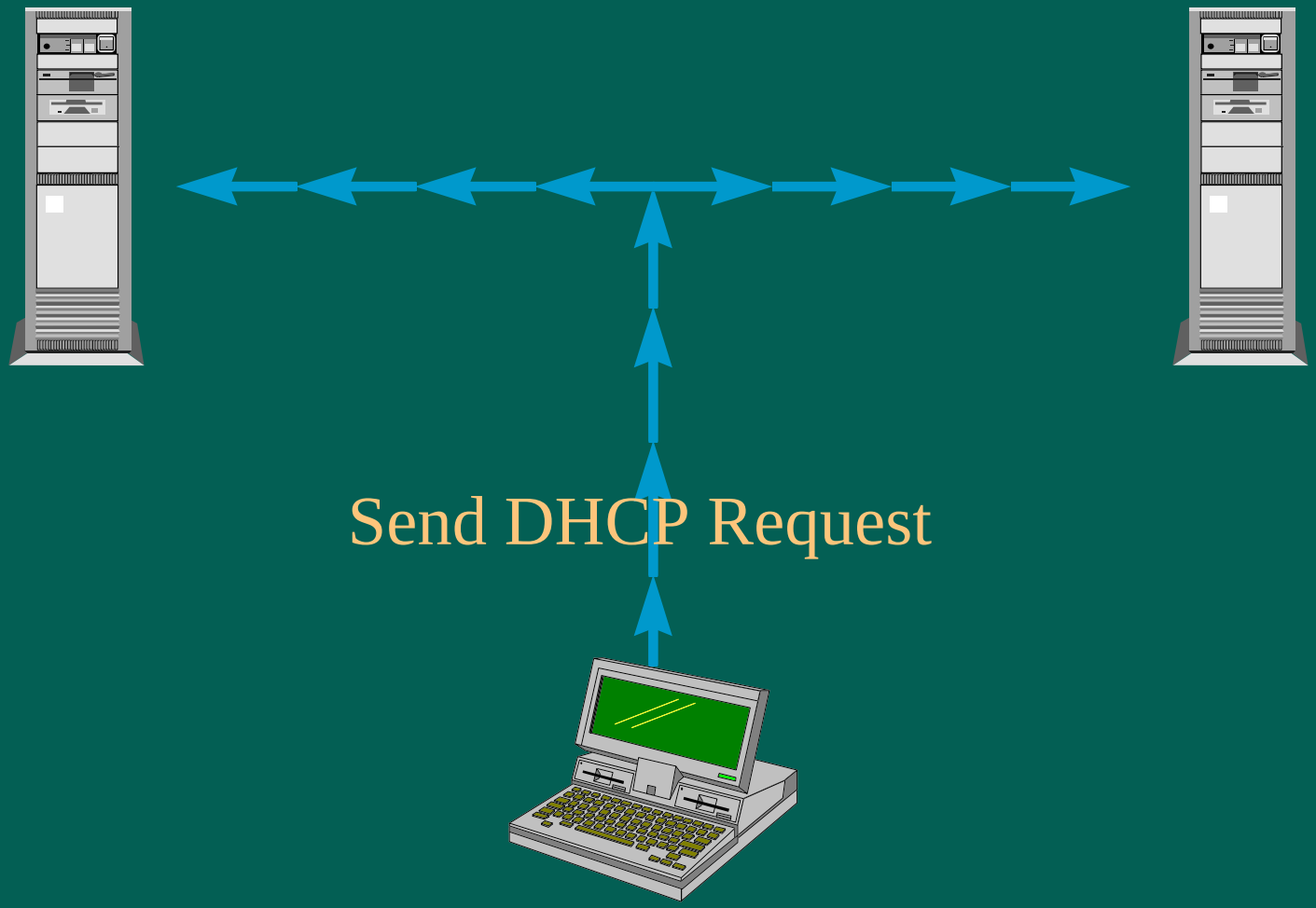

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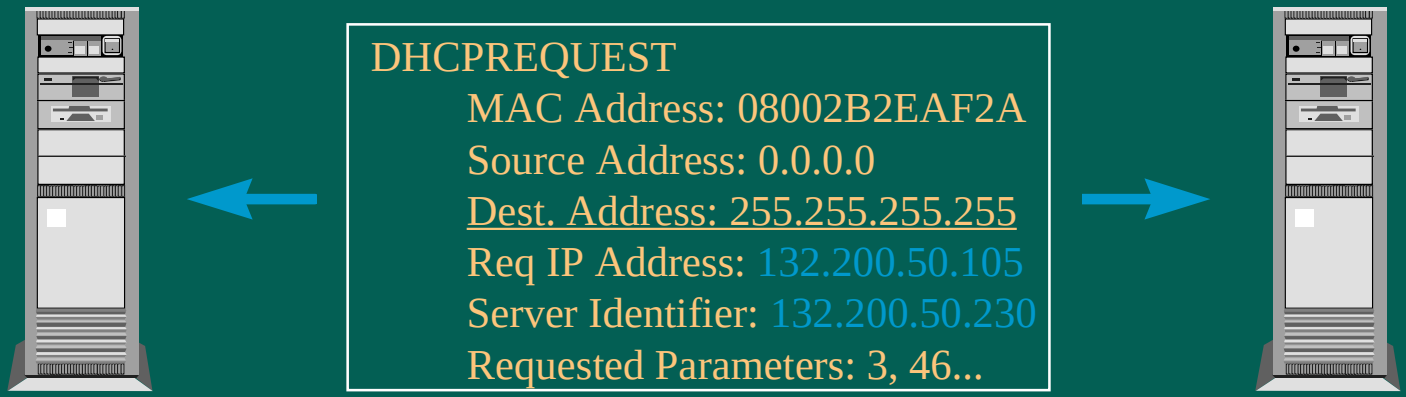


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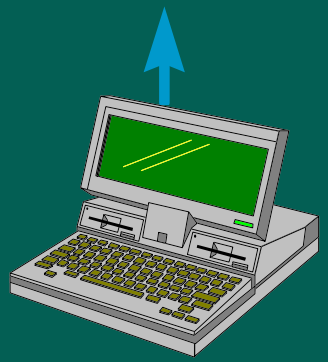

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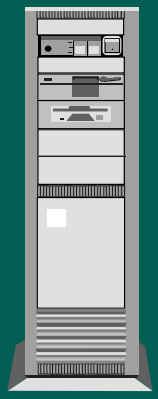
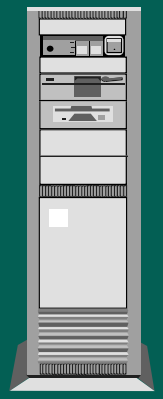


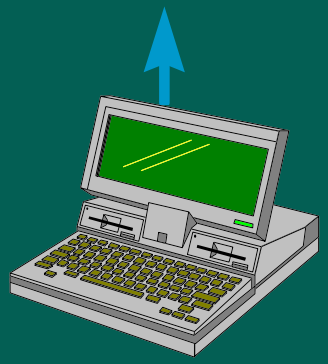
DHCPREQUEST
MAC Address: 08002B2EAF2A
Source Address: 0.0.0.0
Dest. Address: 255.255.255.255
Req IP Address: 132.200.50.105
Server Identifier: 132.200.50.230
Requested Parameters: 3, 46...



132.200.50.105…
That's not mine.
(Release reservation)

132.200.50.105…
Hey! That's mine!

Send DHCP Request



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# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST

# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST
  - Contains selected server, address

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  - Broadcast - all servers receive

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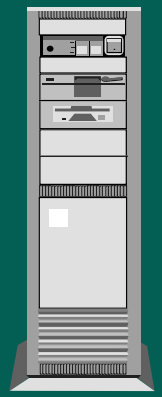
- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST
  - Contains selected server, address
  - Broadcast - all servers receive
  - Declined server releases reservation

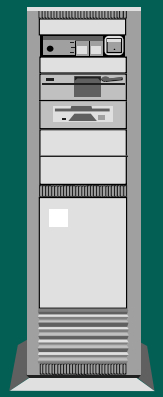
# DHCP Messages

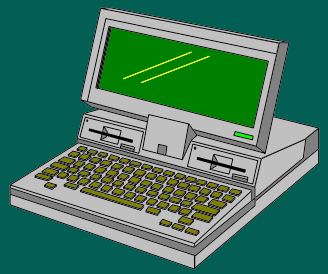
- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST
  - Contains selected server, address
  - Broadcast - all servers receive
  - Declined server releases reservation
  - Contains request for configuration options

# A Client Gets an Address

Send DHCP ACK







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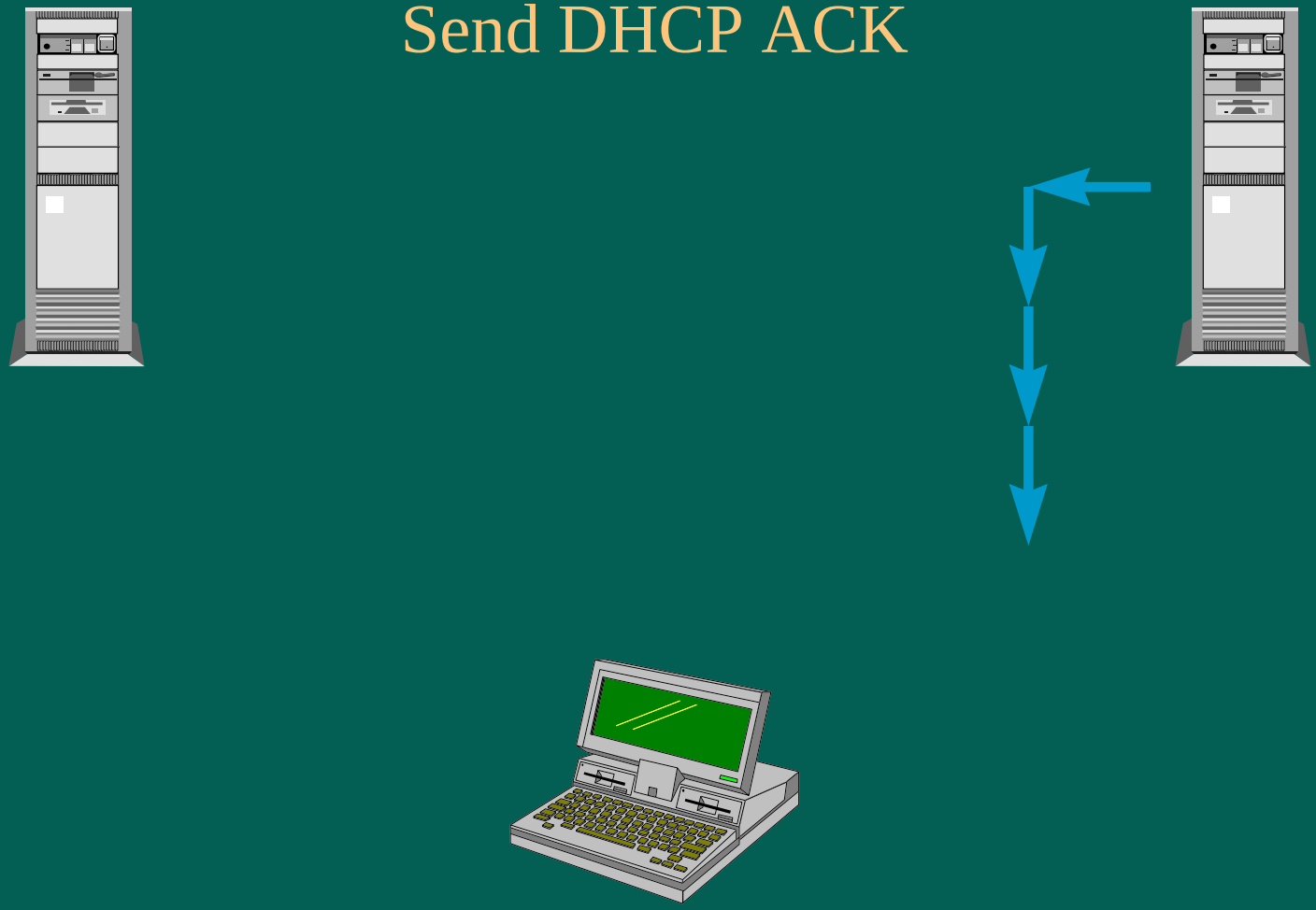
Send DHCP ACK



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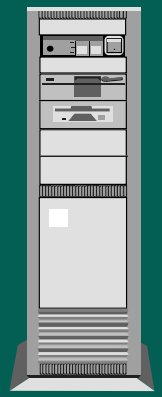
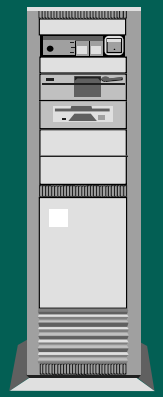
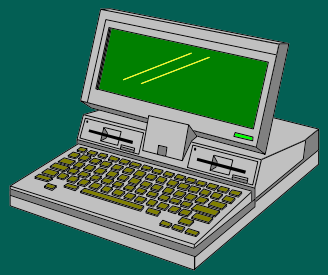
Send DHCP ACK





DHCPACK

MAC Address: 08002B2EAF2A
Source Address: 132.200.50.230
Dest. Address: 255.255.255.255
IP Address: 132.200.50.105
Subnet Mask: 255.255.255.0
Server Identifier: 132. 200.100.6
Lease Length: 504 Hours
Requested Parameters: Gateway...



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# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST
- DHCPACK

# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST
- DHCPACK
  - Contains valid lease

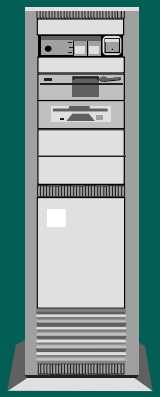
# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST
- DHCPACK
  - Contains valid lease
  - Broadcast

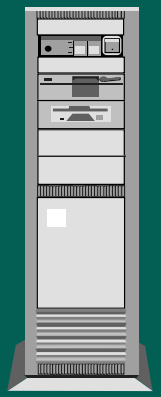
# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST
- DHCPACK
  - Contains valid lease
  - Broadcast
  - Contains requested configuration options

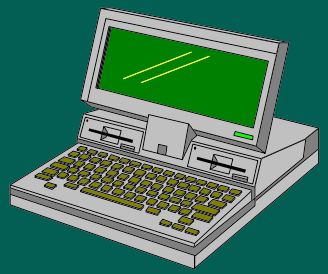
# A Client Gets an Address



Client is now initialized
Ready to communicate!



132.200.50.105



# Client Lease Renewal

A client will attempt to renew its lease...

# Client Lease Renewal

A client will attempt to renew its lease

- When it is rebooted

# Client Lease Renewal

A client will attempt to renew its lease

- When it is rebooted

- or -

# Client Lease Renewal

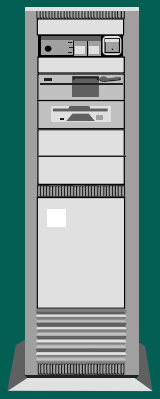
A client will attempt to renew its lease

- When it is rebooted

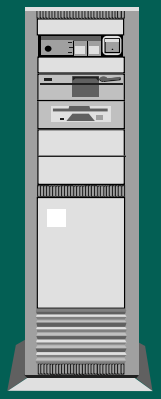
- or -

- When it reaches 50% of the lease duration

# Client Lease Renewal

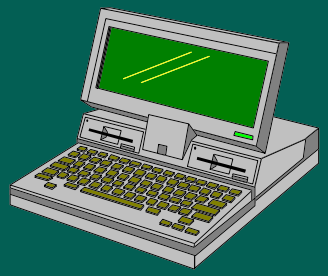


Serves addresses
132.200.50.1 through 100



Serves addresses
132.200.50.101 through 200

132.200.50.105



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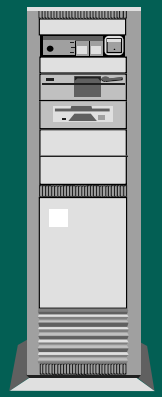
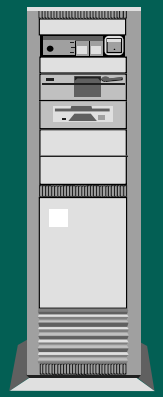
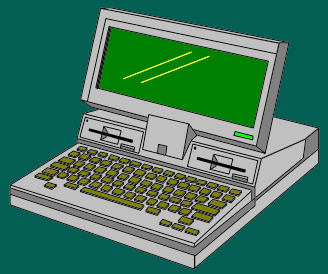
# Client Lease Renewal



252 Hours (50%) elapsed!
Time to renew...





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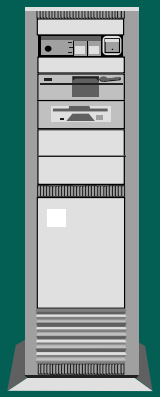
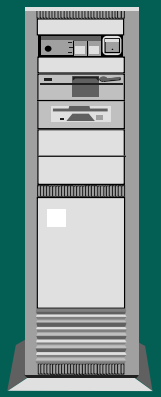
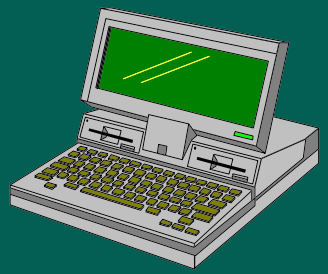
# Client Lease Renewal



252 Hours (50%) elapsed!
Time to renew...



Send DHCP Request
(*this time, direct to my DHCP server*)



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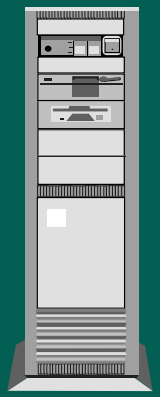
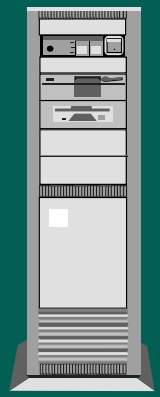
# Client Lease Renewal

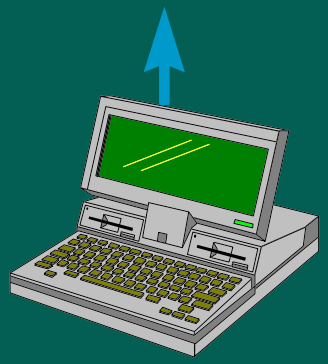
# Client Lease Renewal



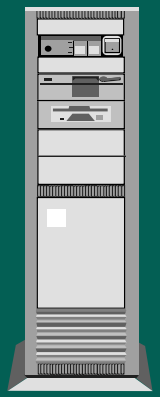
DHCPREQUEST
- MAC Address: 08002B2EAF2A
- Source Address: 132.200.50.105
- Dest. Address: 132.200.50.230
- Req IP Address: 132.200.50.105
- Server Identifier: 132.200.50.230
- Requested Parameters: 3, 46...



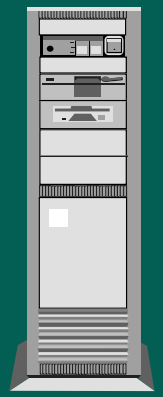
Send DHCP Request



# Client Lease Renewal

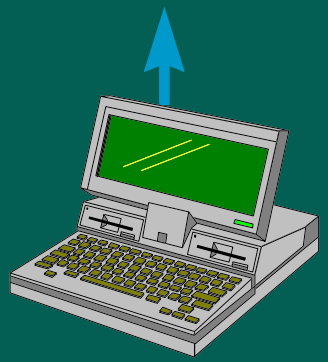


DHCPREQUEST
MAC Address: 08002B2EAF2A
Source Address: 132.200.50.105
Dest. Address: 132.200.50.230
Req IP Address: 132.200.50.105
Server Identifier: 132.200.50.230
Requested Parameters: 3, 46...



132.200.50.105…
Hey! That's my lease!

Send DHCP Request



# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST (client lease renew)

# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST (client lease renew)
  - Contains selected server, address

# DHCP Messages

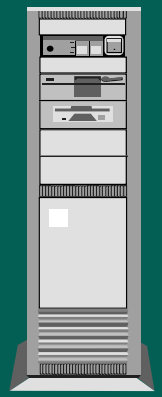
- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST (client lease renew)
  - Contains selected server, address
  - NOT Broadcast - NOT all servers receive

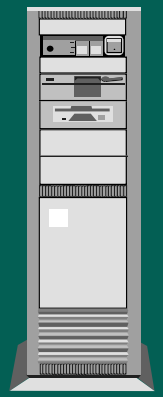
# DHCP Messages

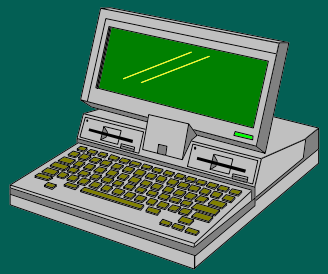
- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST (client lease renew)
  - Contains selected server, address
  - NOT Broadcast - NOT all servers receive
  - Contains request for configuration options

# Client Lease Renewal

Send DHCP ACK

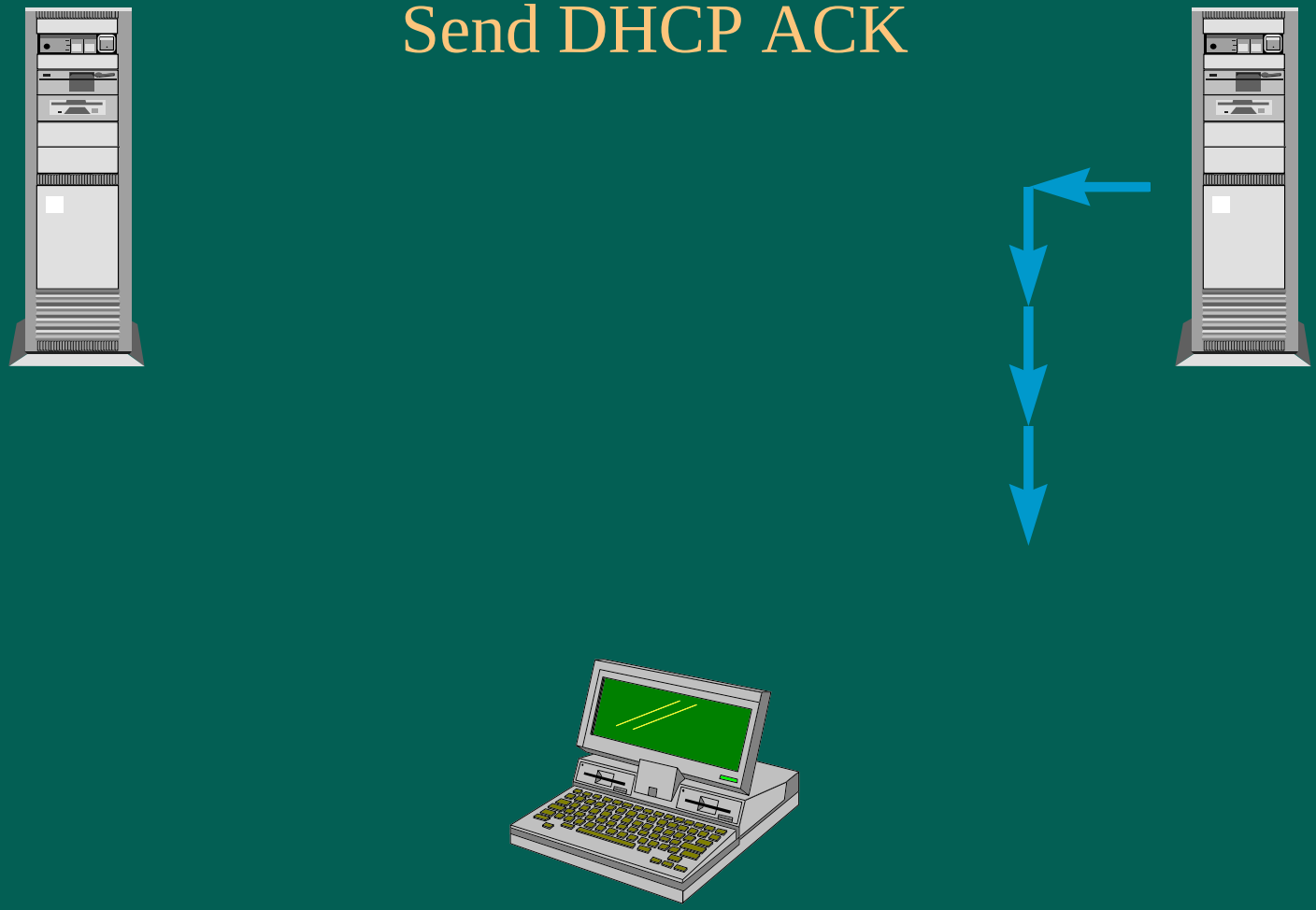






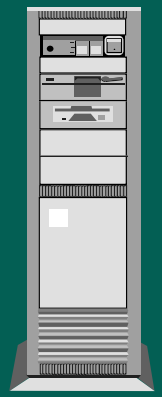
# Client Lease Renewal

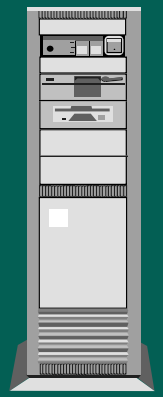
Send DHCP ACK



# Client Lease Renewal

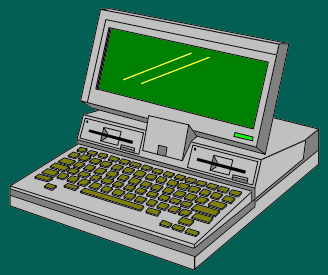
Send DHCP ACK





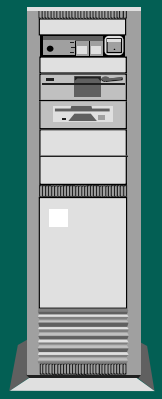
DHCPACK

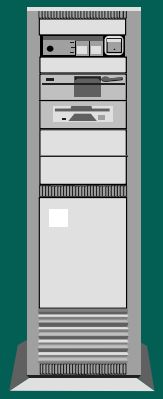
MAC Address: 08002B2EAF2A
Source Address: 132.200.50.230
Dest. Address: 132.200.50.105
IP Address: 132.200.50.105
Subnet Mask: 255.255.255.0
Server Identifier: 132. 200.100.6
Lease Length: 504 Hours
Requested Parameters: Gateway...



# Client Lease Renewal

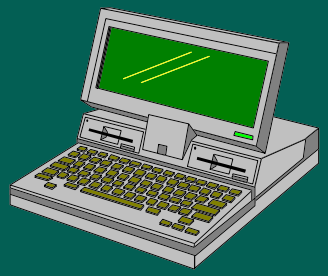
Send DHCP ACK





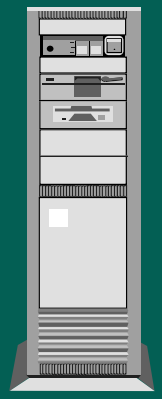
•Lease extended

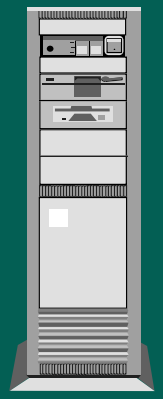
DHCPACK
MAC Address: 08002B2EAF2A
Source Address: 132.200.50.230
Dest. Address: 132.200.50.105
IP Address: 132.200.50.105
Subnet Mask: 255.255.255.0
Server Identifier: 132. 200.100.6
Lease Length: 504 Hours
Requested Parameters: Gateway...



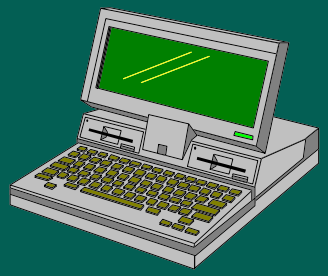
# Client Lease Renewal

Send DHCP ACK





- Lease extended
- Configuration options updated



DHCPACK
MAC Address: 08002B2EAF2A
Source Address: 132.200.50.230
Dest. Address: 132.200.50.105
IP Address: 132.200.50.105
Subnet Mask: 255.255.255.0
Server Identifier: 132. 200.100.6
Lease Length: 504 Hours
Requested Parameters: Gateway...

intel

# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST
- DHCPACK

# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST
- DHCPACK
  - Contains valid lease (extended)

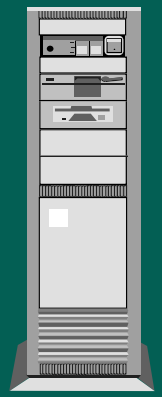
# DHCP Messages

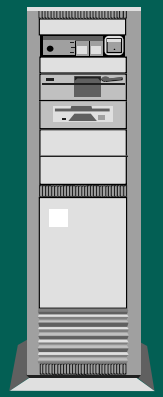
- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST
- DHCPACK
  - Contains valid lease (extended)
  - NOT Broadcast

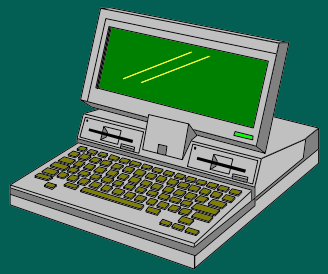
# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST
- DHCPACK
  - Contains valid lease (extended)
  - NOT Broadcast
  - Contains requested configuration options

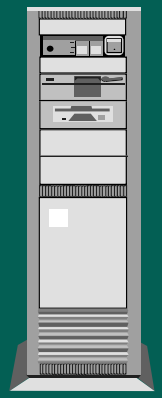
# Client Lease Renewal

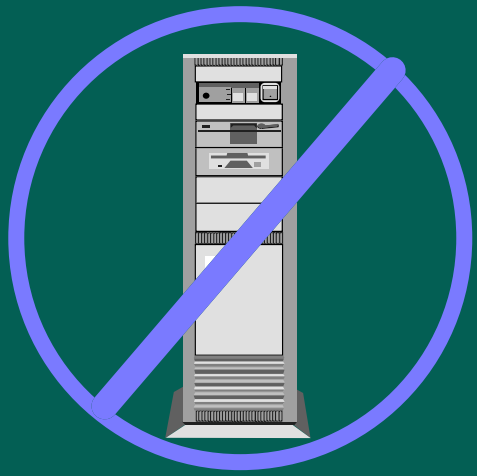


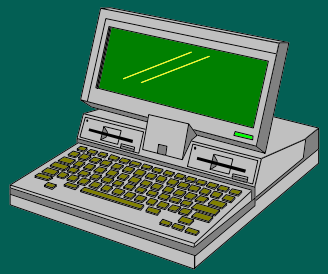




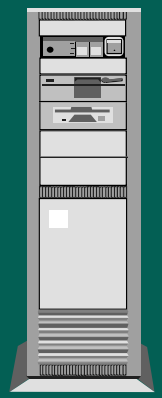
# Client Lease Renewal (Server Not Available)



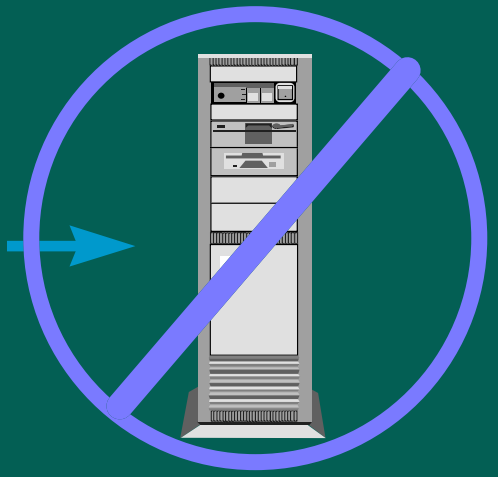




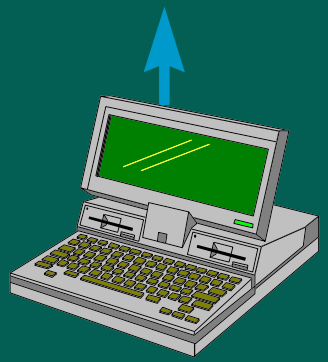
# Client Lease Renewal (Server Not Available)



DHCPREQUEST
MAC Address: 08002B2EAF2A
Source Address: 132.200.50.105
Dest. Address: 132.200.50.230
Req IP Address: 132.200.50.105
Server Identifier: 132.200.50.230
Requested Parameters: 3, 46...



Send DHCP Request



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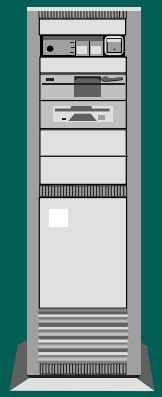
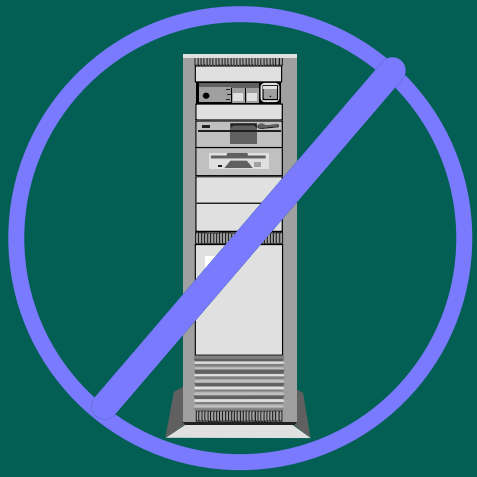
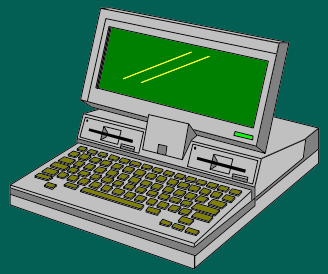
# Client Lease Renewal (Server Not Available)



No Answer

Keep Using Address





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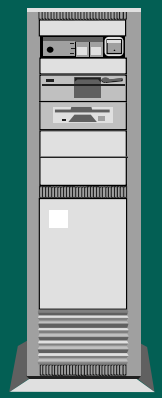
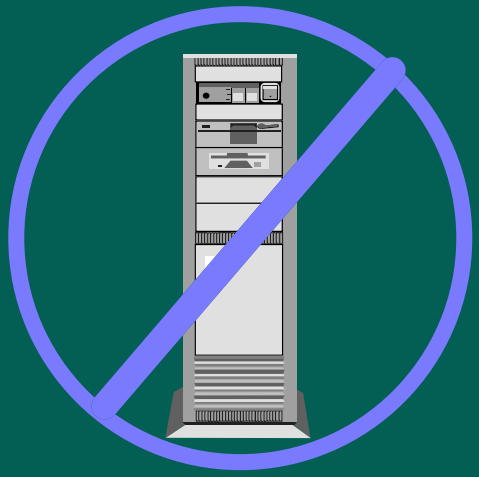
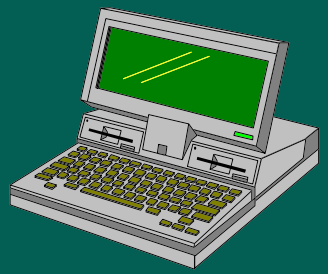
# Client Lease Renewal (Server Not Available)



441 Hours (87.5%) elapsed!





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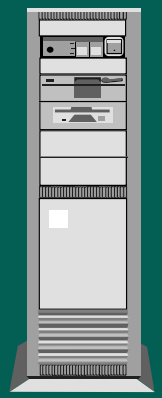
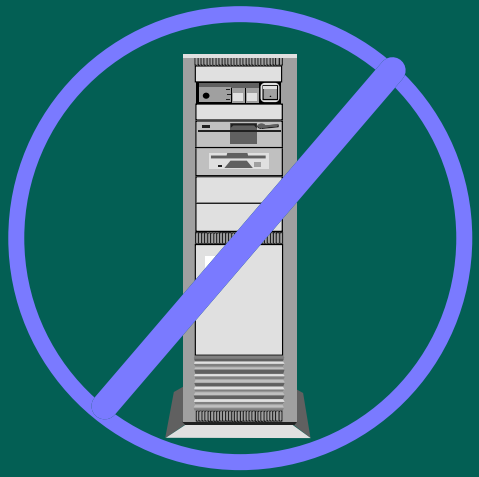
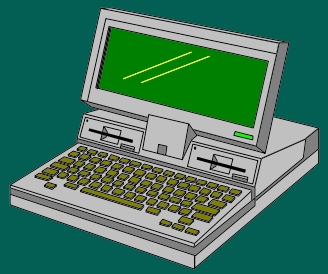
# Client Lease Renewal (Server Not Available)



441 Hours (87.5%) elapsed!

Still no answer...





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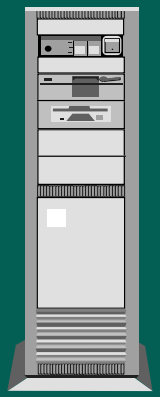
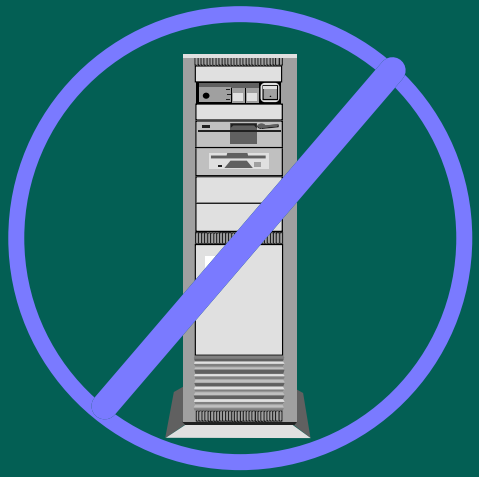
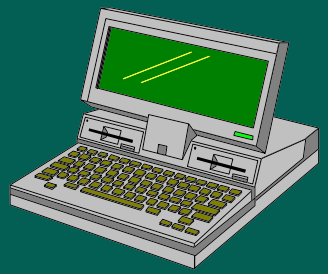
# Client Lease Renewal (Server Not Available)



441 Hours (87.5%) elapsed!
Still no answer...

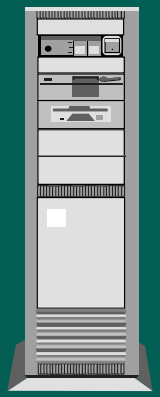


Send DHCP Request

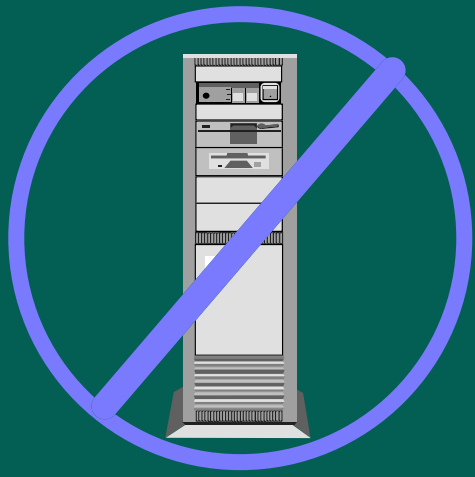


intel

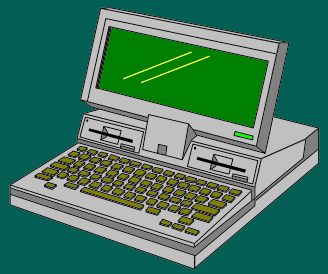
# Client Lease Renewal (Server Not Available)



441 Hours (87.5%) elapsed!
Still no answer...



Send DHCP Request
(*this time, Broadcast*)



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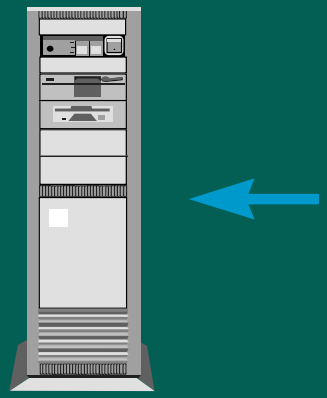
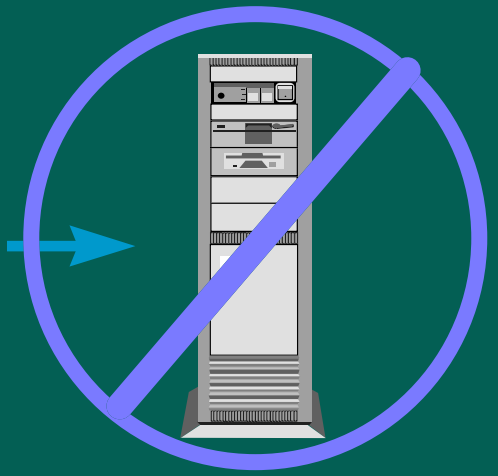
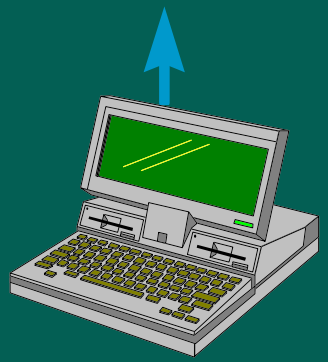
# Client Lease Renewal (Server Not Available)



DHCPREQUEST
MAC Address: 08002B2EAF2A
Source Address: 132.200.50.105
Dest. Address: 255.255.255.255
Req IP Address: 132.200.50.105
Server Identifier: 132.200.50.230
Requested Parameters: 3, 46...



Send DHCP Request



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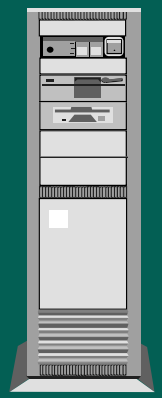
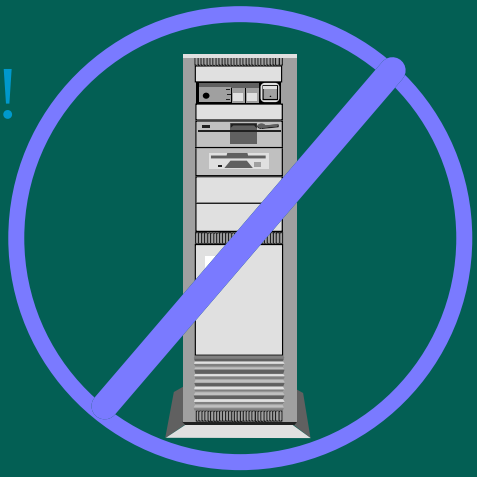
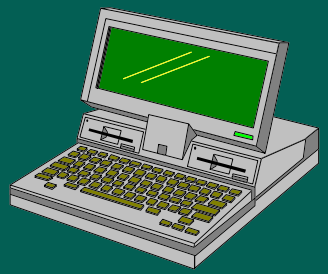
# Client Lease Renewal (Server Not Available)



504 Hours (100%) elapsed!





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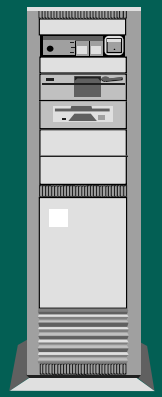
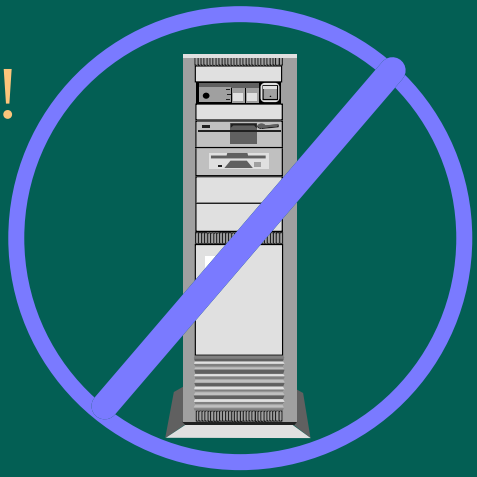
# Client Lease Renewal (Server Not Available)

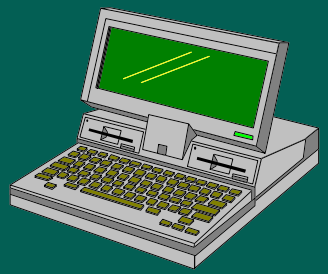


504 Hours (100%) elapsed!

Still no answer…

Lease has expired!





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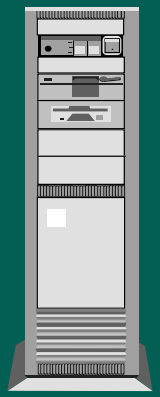
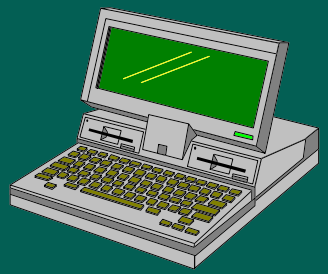
# Client Lease Renewal (Server Not Available)



504 Hours (100%) elapsed!
Still no answer…
Lease has expired!

Quit using address



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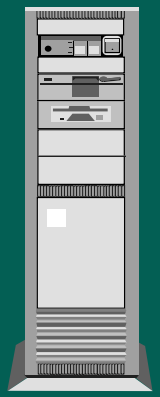
# Client Lease Renewal (Server Not Available)



504 Hours (100%) elapsed!
Still no answer…
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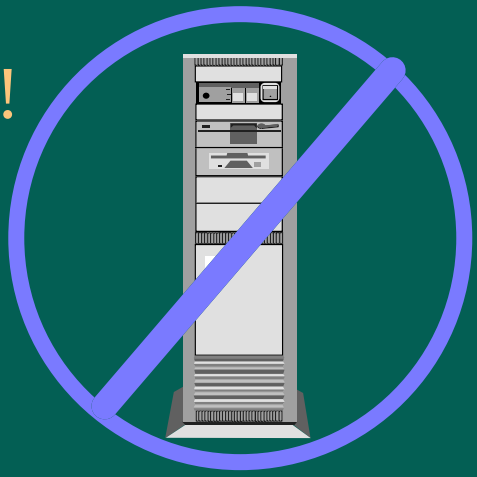
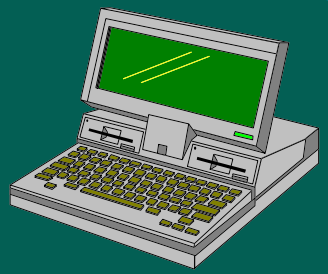


Quit using address
Send DHCP Discover
(*Start all over again*)



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# Summary

# Summary

- Client boots, broadcasts DHCPDISCOVER

# Summary

- Client boots, broadcasts DHCPDISCOVER
- Servers broadcast DHCPOFFER

# Summary

- Client boots, broadcasts DHCPDISCOVER
- Servers broadcast DHCPOFFER
- Client broadcasts choice in DHCPREQUEST

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- Servers broadcast DHCPOFFER
- Client broadcasts choice in DHCPREQUEST
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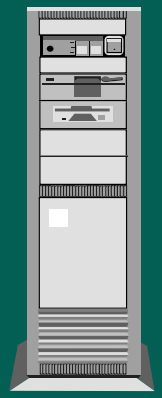
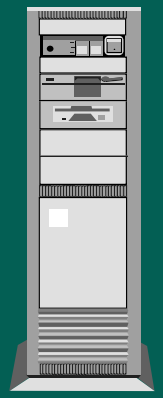
# Summary

- Client boots, broadcasts DHCPDISCOVER
- Servers broadcast DHCPOFFER
- Client broadcasts choice in DHCPREQUEST
- Chosen server broadcasts DHCPACK, with options
- At 50% of lease time, client sends DHCPREQUEST
- If available, server renews lease with DHCPACK
- At 87.5% lease time, client broadcasts DHCPREQUEST
- At 100% lease time, client relinquishes address, and attempts to reinitialize (DHCPDISCOVER)

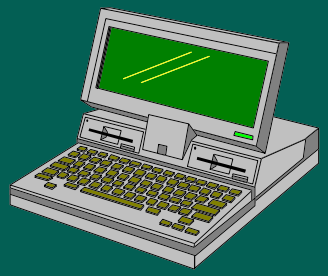
# Client Moves to a New Subnet

# Client Moves to a New Subnet





Send DHCP Request
(Broadcast)



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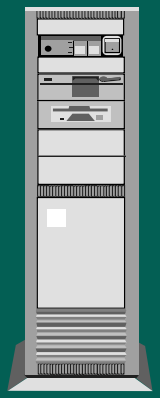
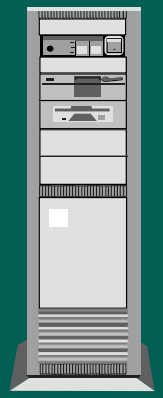
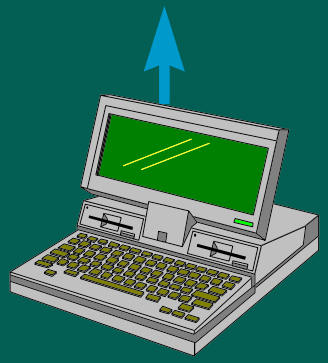
# Client Moves to a New Subnet



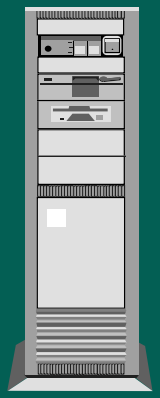
DHCPREQUEST
MAC Address: 08002B2EAF2A
Source Address: 0.0.0.0
Dest. Address: 255.255.255.255
Req IP Address: 132.200.25.105
Server Identifier: 132.200.50.230
Requested Parameters: 3, 46...



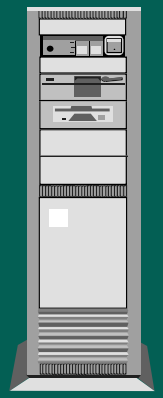
Send DHCP Request
(Broadcast)



# Client Moves to a New Subnet



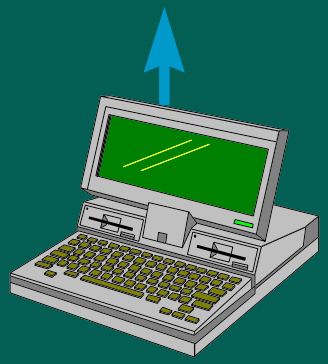
DHCPREQUEST
MAC Address: 08002B2EAF2A
Source Address: 0.0.0.0
Dest. Address: 255.255.255.255
Req IP Address: 132.200.25.105
Server Identifier: 132.200.50.230
Requested Parameters: 3, 46...



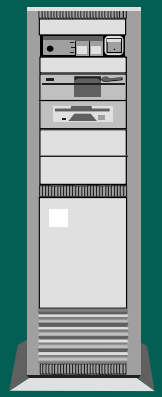
132.200.25.105?
Hey! That's the wrong subnet!

Send DHCP Request (Broadcast)

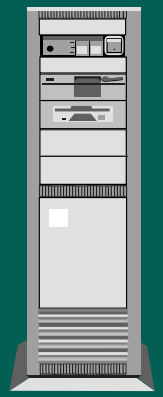
132.200.25.105?
Hey! That's the wrong subnet!

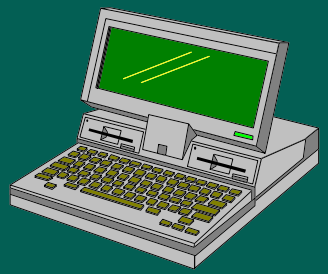


# Client Moves to a New Subnet



Servers issue NACK
(Negative acknowledgment)





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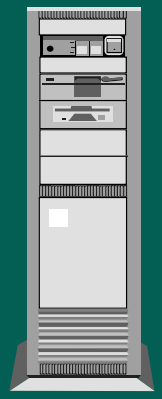
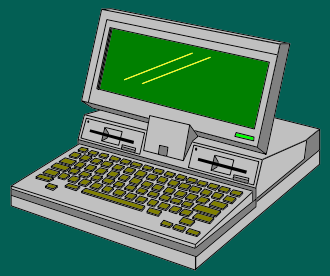
# Client Moves to a New Subnet



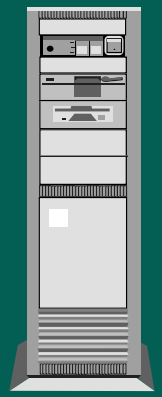
Servers issue NACK
(Negative acknowledgment)

DHCPNACK
MAC Address: 08002B2EAF2A
Source Address: 132.200.50.220
Dest. Address: 255.255.255.255

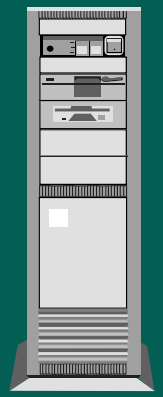


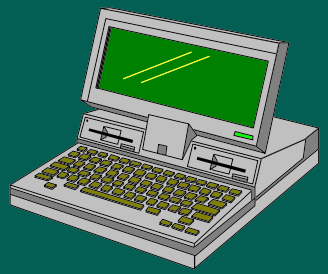
DHCPNACK
MAC Address: 08002B2EAF2A
Source Address: 132.200.50.230
Dest. Address: 255.255.255.255

# Client Moves to a New Subnet

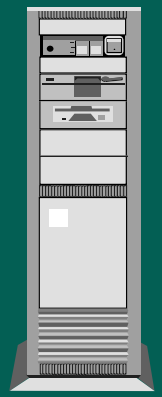


Don’t use address!

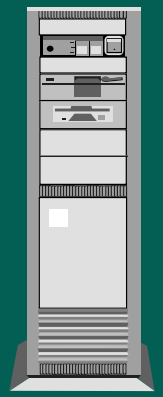




# Client Moves to a New Subnet

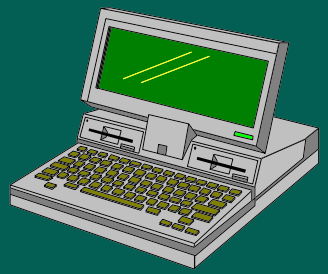


Don’t use address



Send DHCP Discover

(*Start all over again*)



# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST
- DHCPACK
- DHCPNACK

# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST
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# DHCP Messages

- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST
- DHCPACK
- DHCPNACK
  - Negative acknowledgement
  - Sent when client moves to new subnet
  - Sent if client has wrong MAC address for lease

# DHCP Messages
# Two More Types

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# Two More Types

- DHCPRELEASE

# DHCP Messages
# Two More Types

- DHCPRELEASE
  - Client tells server to release lease

# DHCP Messages
# Two More Types

- DHCPRELEASE
  - Client tells server to release lease
  - Caused by issuing IPCONFIG /RELEASE at the command line

# DHCP Messages
# Two More Types

- DHCPRELEASE
- DHCPDECLINE

# DHCP Messages
# Two More Types

- DHCPRELEASE
- DHCPDECLINE
  - Client broadcasts to server after receiving a lease with invalid configuration information

# DHCP Messages
# Two More Types

- DHCPRELEASE
- DHCPDECLINE
  - Client broadcasts to server after receiving a lease with invalid configuration information
  - Client then returns to initializing state, (DHCPDISCOVER)

# DHCP Messages
# The Complete List

- DHCPDISCOVER
- DHCPOFFER
- DHCPREQUEST
- DHCPACK
- DHCPNACK
- DHCPRELEASE
- DHCPDECLINE

# What Have We Covered?

- How a client gets an address
  - Discover
  - Offer
  - Request
  - Ack

# What Have We Covered?

- How a client gets an address
- How a client renews a lease
  - Request
  - Ack

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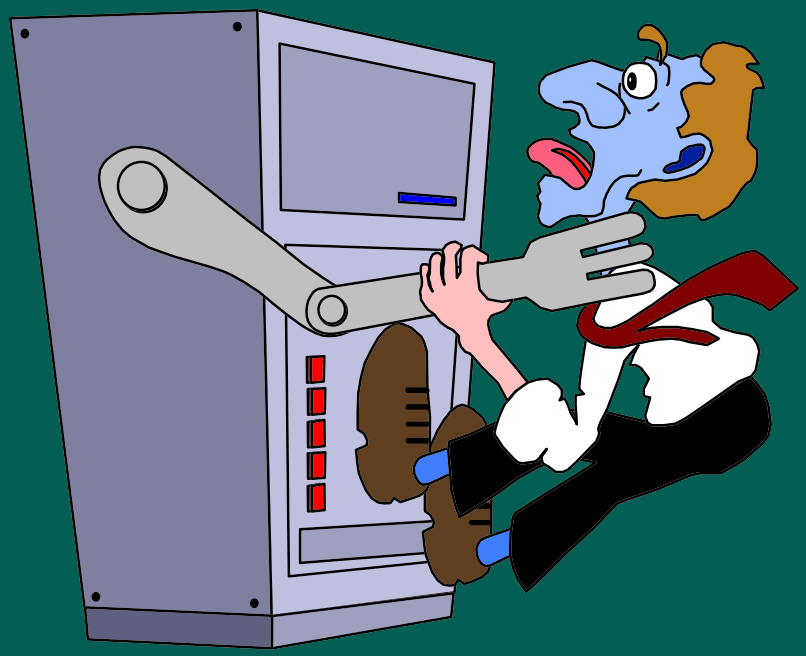
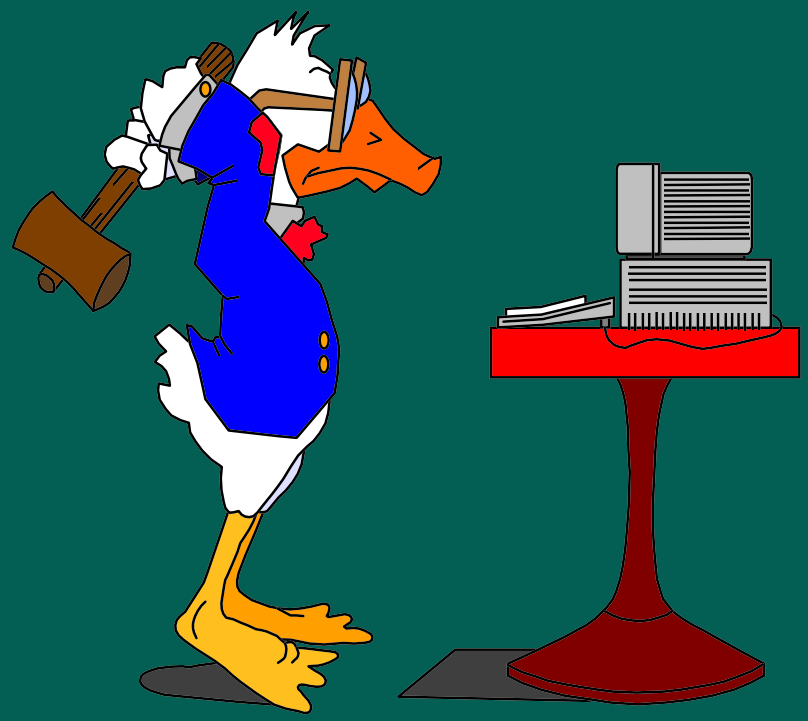
# What Have We Covered?

- How a client gets an address
- How a client renews a lease
- What happens if the client is moved, or incorrect info is passed
  - NACK
  - Decline

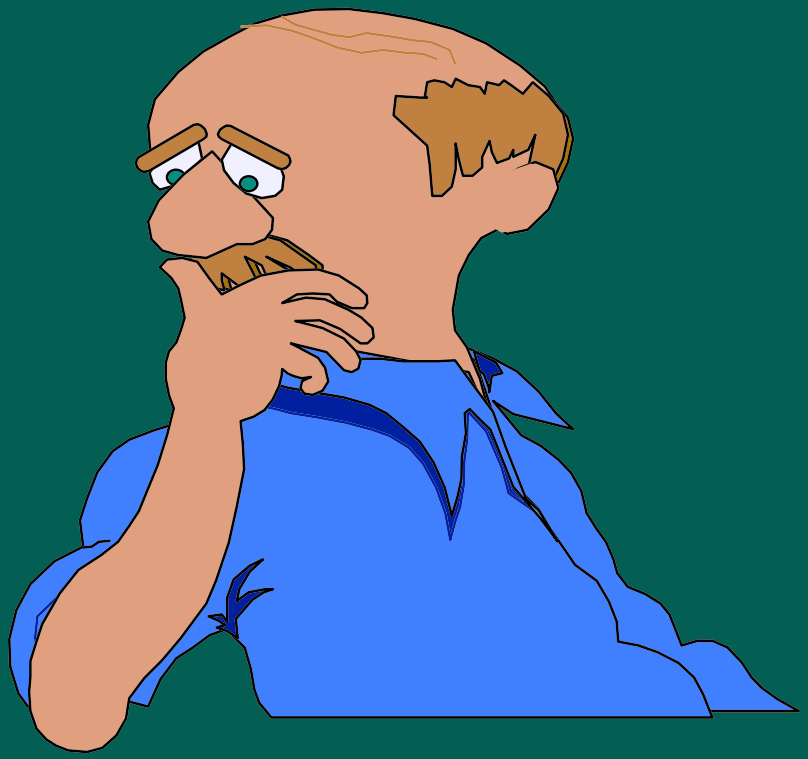


# What Have We Covered?

- How a client gets an address
- How a client renews a lease
- Client is moved, or incorrect info
- Client operator terminates lease
  - Release



# But How Does the Server Know Which Subnet to Offer?



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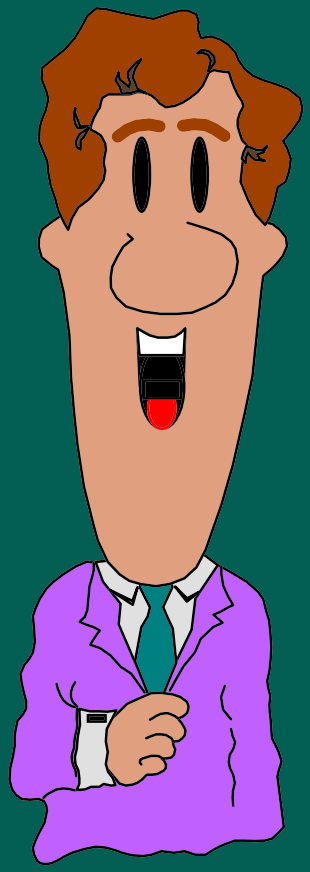
# But How Does the Server Know Which Subnet to Offer?

The server looks at the interface upon which it received the DHCPDISCOVER broadcast.

# But How Does the Server Know Which Subnet to Offer?

- The server looks at the interface upon which it received the DHCPDISCOVER broadcast.
- The broadcast is always local, because it has no TCP/IP address yet.



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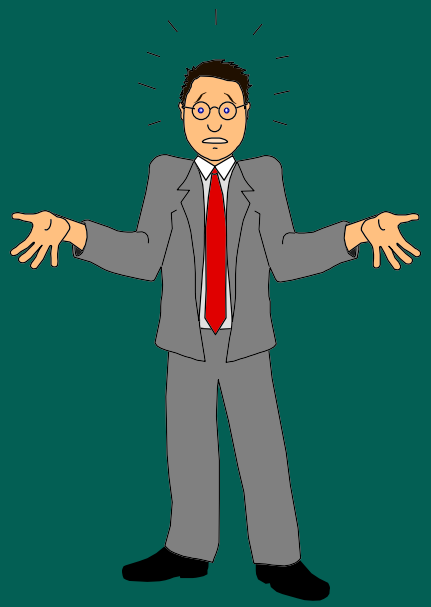
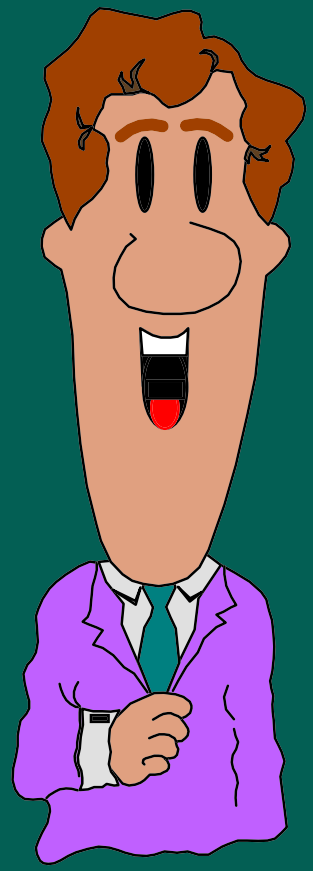
# Then How Does DHCP Work With Remote Subnets Using Routers?



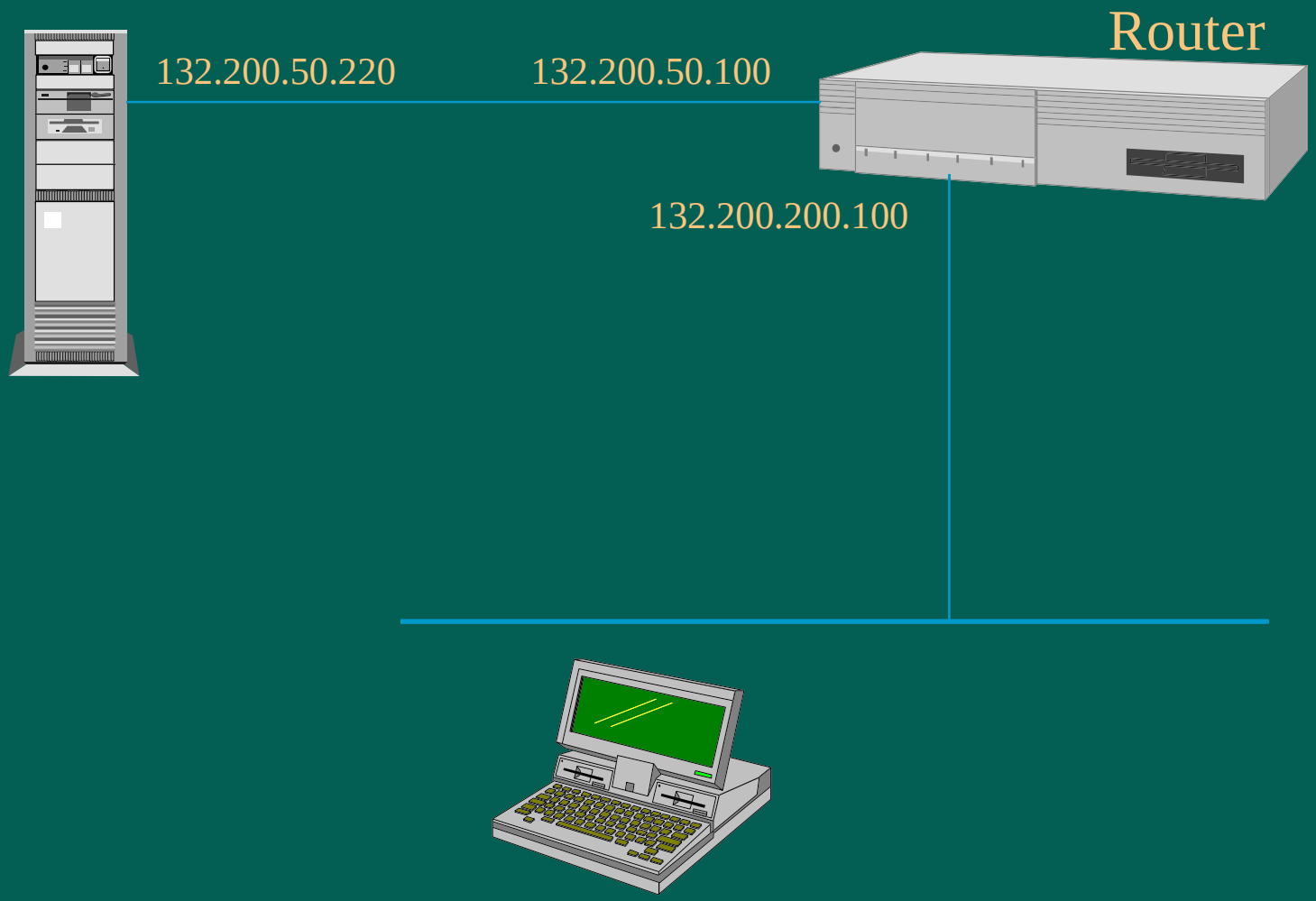
# I’m Glad You Asked That!

# I’m Glad You Asked That!

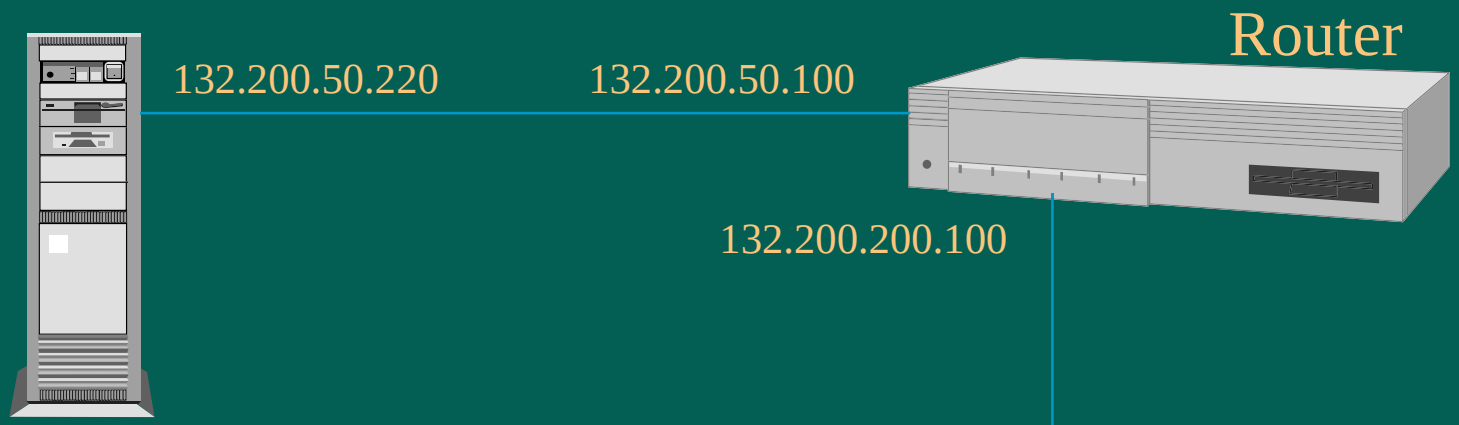
It uses something called
an IP Helper Address.



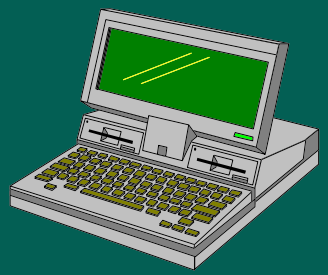
# IP Helper Address



# IP Helper Address




First, a scope is created on the server to service the remote subnet, in this case, 132.200.200.0



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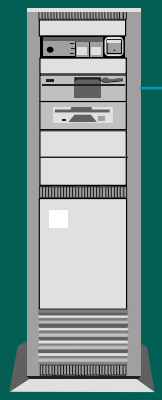
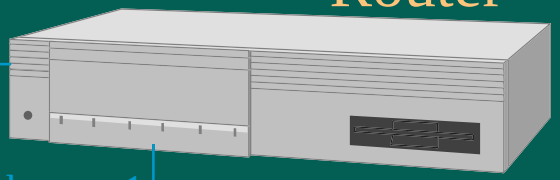
# IP Helper Address



132.200.50.220

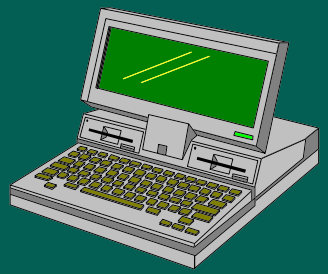
Router

ethernet 0
132.200.50.100

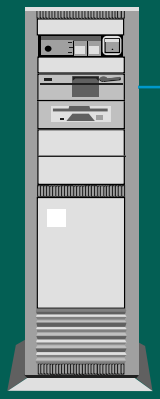


ethernet 1
132.200.200.100

Next, the Cisco *ethernet 1* interface is configured with the command: "ip helper-address 132.200.50.220"



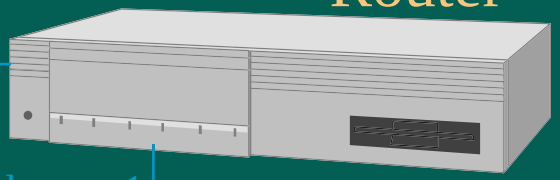
# IP Helper Address



132.200.50.220

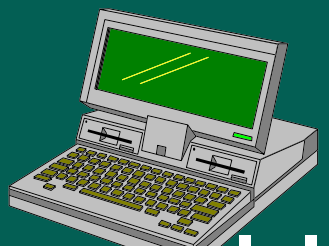
Router

ethernet 0
132.200.50.100

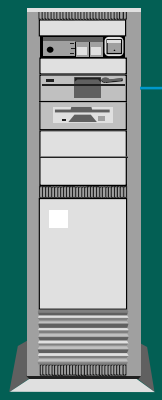


ethernet 1
132.200.200.100

Next, the Cisco *ethernet 1* interface is configured with the command:
"ip helper-address 132.200.50.220"
This is the interface facing the remote clients.



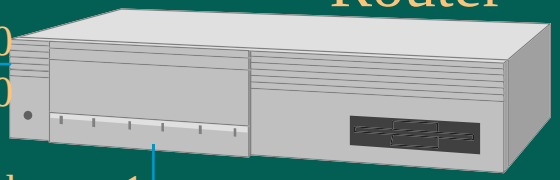
# IP Helper Address



132.200.50.220

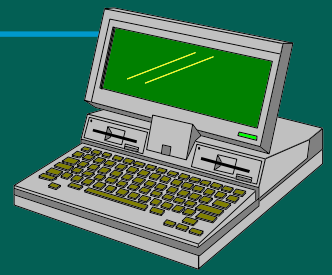
Router

ethernet 0
132.200.50.100



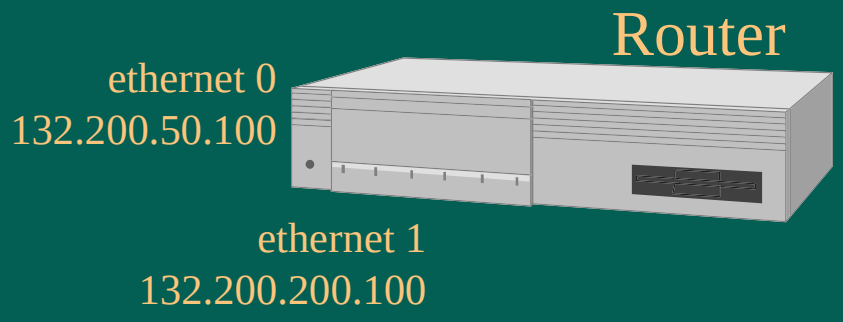
ethernet 1
132.200.200.100

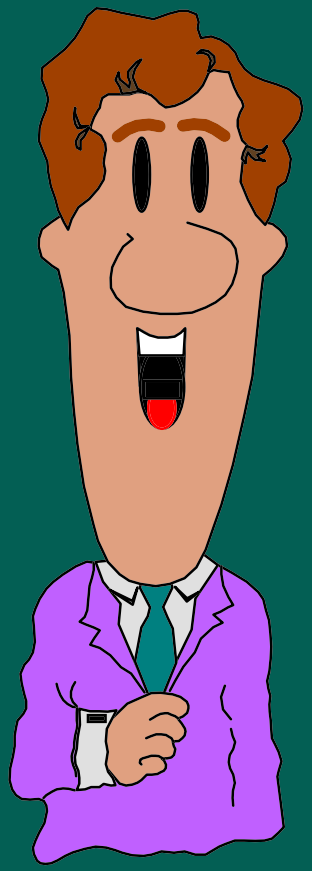
Next, the Cisco *ethernet 1* interface is configured with the command:
"ip helper-address 132.200.50.220"
This is the interface facing the remote clients
This is the address of the DHCP server.



# IP Helper Address

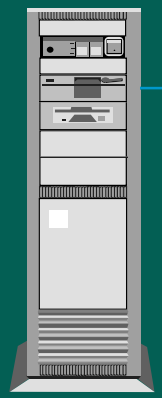
Now let's look at the initialization process again, but using the IP Helper Address from a remote subnet



intel

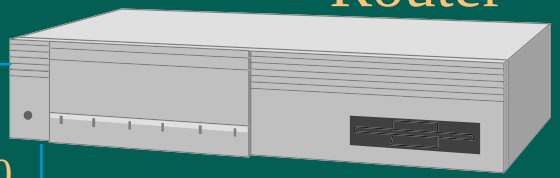
# IP Helper Address



132.200.50.220

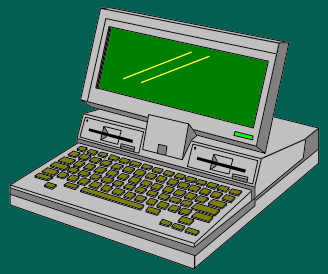
132.200.50.100

Router

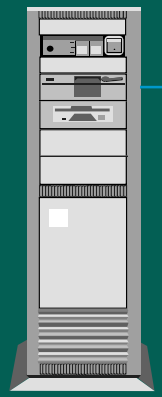


132.200.200.100

Send DHCP Discover



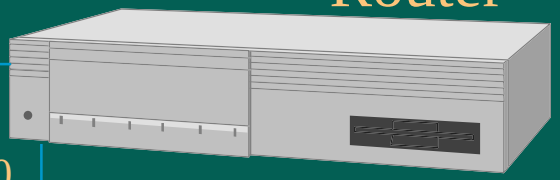
# IP Helper Address



132.200.50.220

132.200.50.100

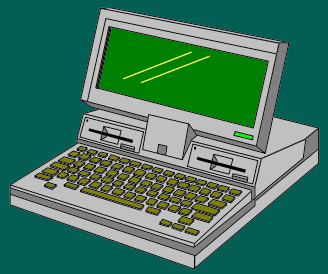
Router



132.200.200.100

DHCPDISCOVER
MAC Address: 08002B2EAF2A
Source Address: 0.0.0.0
Dest. Address: 255.255.255.255

Send DHCP Discover



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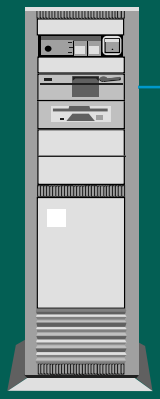
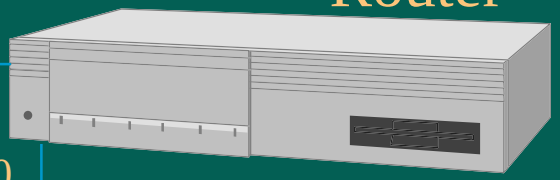
# IP Helper Address



132.200.50.220

132.200.50.100

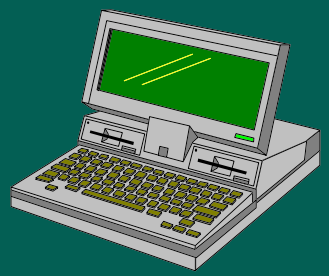
Router



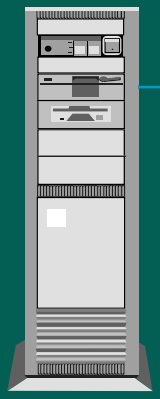
132.200.200.100

DHCPDISCOVER
MAC Address: 08002B2EAF2A
Source Address: 0.0.0.0
Dest. Address: 255.255.255.255

The router receives the DISCOVER, and inserts its interface address into a special field, (giaddr).



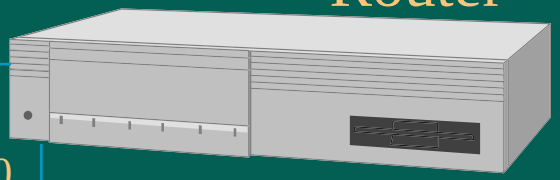
# IP Helper Address



132.200.50.220

132.200.50.100

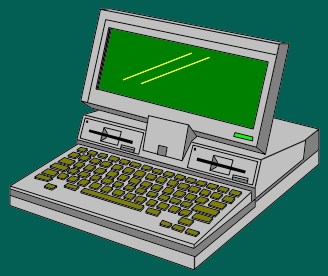
Router



132.200.200.100

DHCPDISCOVER
MAC Address: 08002B2EAF2A
Source Address: 0.0.0.0
Dest. Address: 255.255.255.255
giaddr: 132.200.200.100

The router receives the DISCOVER, and inserts its own interface address into a special field, (giaddr).



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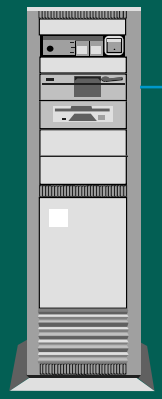
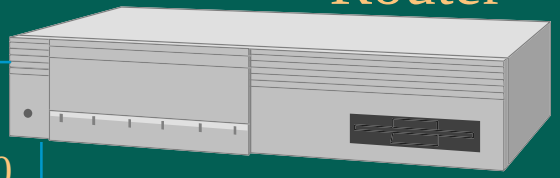
# IP Helper Address



132.200.50.220

132.200.50.100

Router

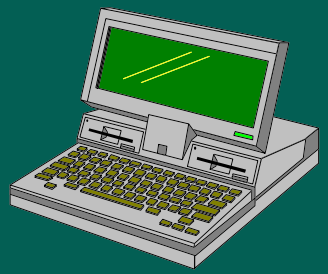


132.200.200.100

DHCPDISCOVER
Source Address: 132.200.200.100
Dest. Address: 255.255.255.255

giaddr: 132.200.200.100
chaddr: 08002B2EAF2A
(client MAC address)

The router sends the modified DISCOVER directly to the DHCP server.



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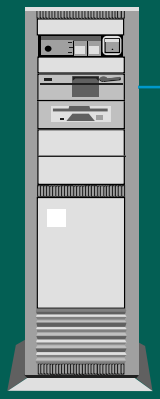
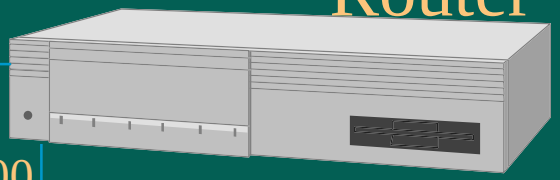
# IP Helper Address



132.200.50.220

132.200.50.100

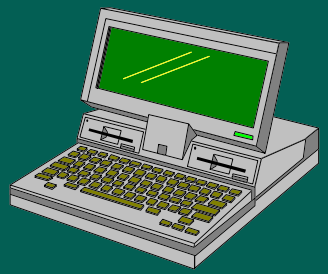
Router



132.200.200.100

DHCPDISCOVER
- Source Address: 132.200.200.100
- Dest. Address: 255.255.255.255
- giaddr: 132.200.200.100
- chaddr: 08002B2EAF2A
  (client MAC address)

The server sees the "giaddr" field is not "0", and uses it to determine the scope to use.



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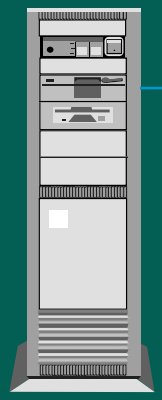
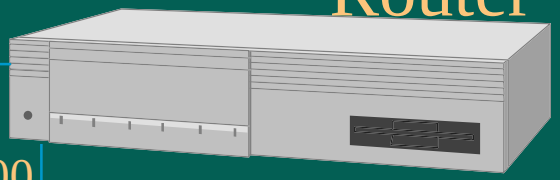
# IP Helper Address



132.200.50.220

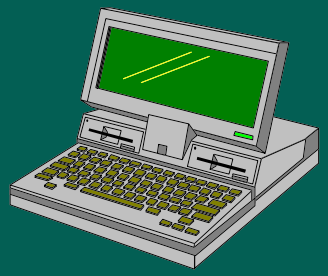
132.200.50.100

Router



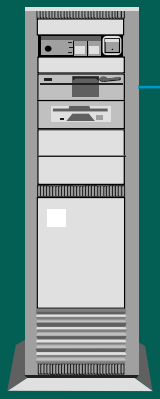
132.200.200.100

The server prepares a DHCPOFFER.



intel

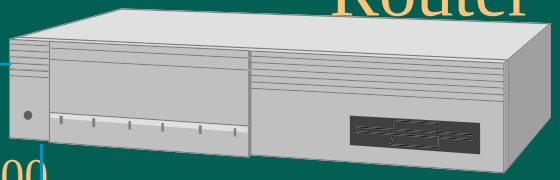
# IP Helper Address



132.200.50.220

132.200.50.100

Router

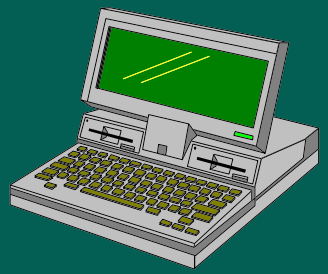


132.200.200.100

The server prepares a DHCPOFFER.

DHCPOFFER

Source Address: 132.200.50.220
Dest. Address: 132.200.200.100
IP Address: 132.200.200.5
Subnet Mask: 255.255.255.0
Server Identifier: 132. 200.50.220
MAC Address: 08002B2EAF2A
Lease Length: 504 Hours



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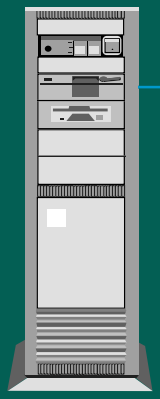
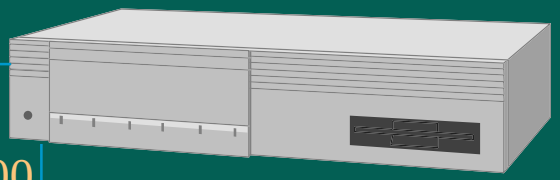
# IP Helper Address



132.200.50.220

132.200.50.100

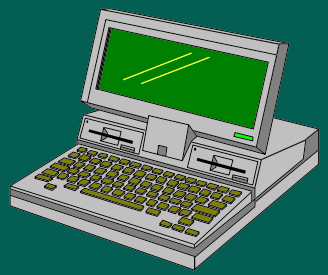
Router



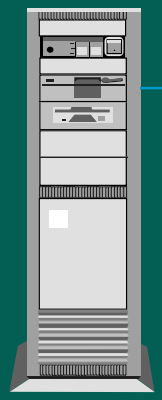
132.200.200.100

DHCPOFFER
- Source Address: 132.200.50.220
- Dest. Address: 132.200.200.100
- IP Address: 132.200.200.5
- Subnet Mask: 255.255.255.0
- Server Identifier: 132. 200.50.220
- MAC Address: 08002B2EAF2A
- Lease Length: 504 Hours

The server prepares a DHCPOFFER, and sends it to the router interface, (giaddr).



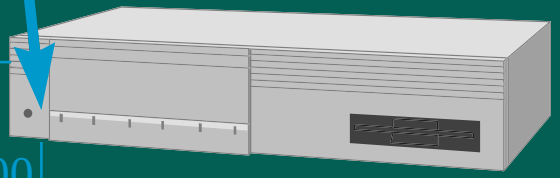
# IP Helper Address



132.200.50.220

132.200.50.100

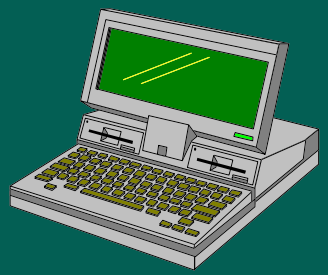
Router



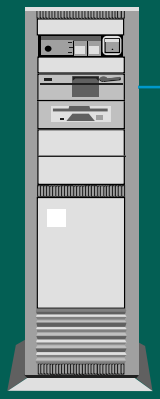
132.200.200.100

DHCPOFFER
- Source Address: 132.200.50.220
- Dest. Address: 132.200.200.100
- IP Address: 132.200.200.5
- Subnet Mask: 255.255.255.0
- Server Identifier: 132. 200.50.220
- MAC Address: 08002B2EAF2A
- Lease Length: 504 Hours

The server prepares a DHCPOFFER, and sends it to the router interface, (giaddr).



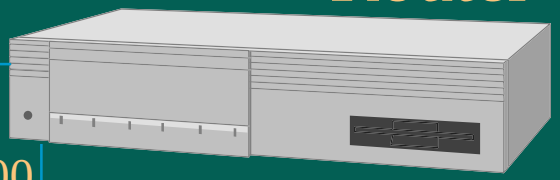
# IP Helper Address



132.200.50.220

132.200.50.100

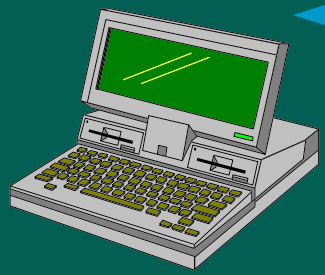
Router



132.200.200.100

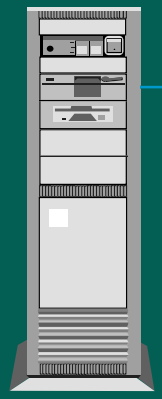
DHCPOFFER
- Source Address: 132.200.200.100
- Dest. Address: 255.255.255.255
- IP Address: 132.200.200.5
- Subnet Mask: 255.255.255.0
- Server Identifier: 132. 200.50.220
- MAC Address: 08002B2EAF2A
- Lease Length: 504 Hours

The router roadcasts the DHCPOFFER to the client's MAC address.

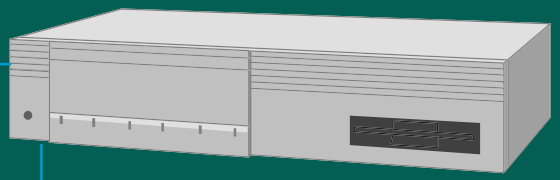


intel

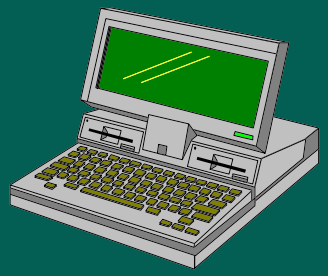
# IP Helper Address



Router



The remainder of the DHCP messages are handled in like manner...



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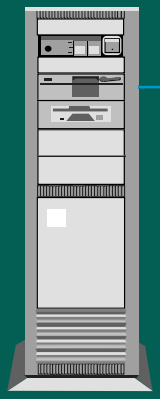
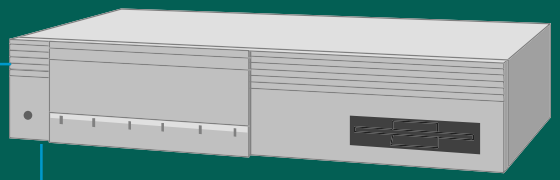
# IP Helper Address

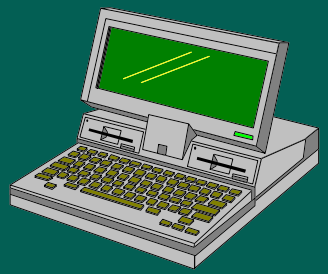


Router



DHCPDISCOVER
DHCPOFFER
DHCPREQUEST
DHCPACK
DHCPRELEASE
DHCPDECLINE
DHCPNACK

The remainder of the DHCP messages are handled in like manner...



# Agenda

- Setting Up the DHCP Servers
- A Client Gets an Address
- Client Lease Renewal
- A Client Moves to a New Subnet
- DHCP Message Summary
- IP Helper Address
- Where to Get More Information

# Where to get more information

- Microsoft Technet - search “DHCP”
- RFC 1533, 1534, 1541, and 1542

# Questions?