

Windows 2012 DHCP Failover



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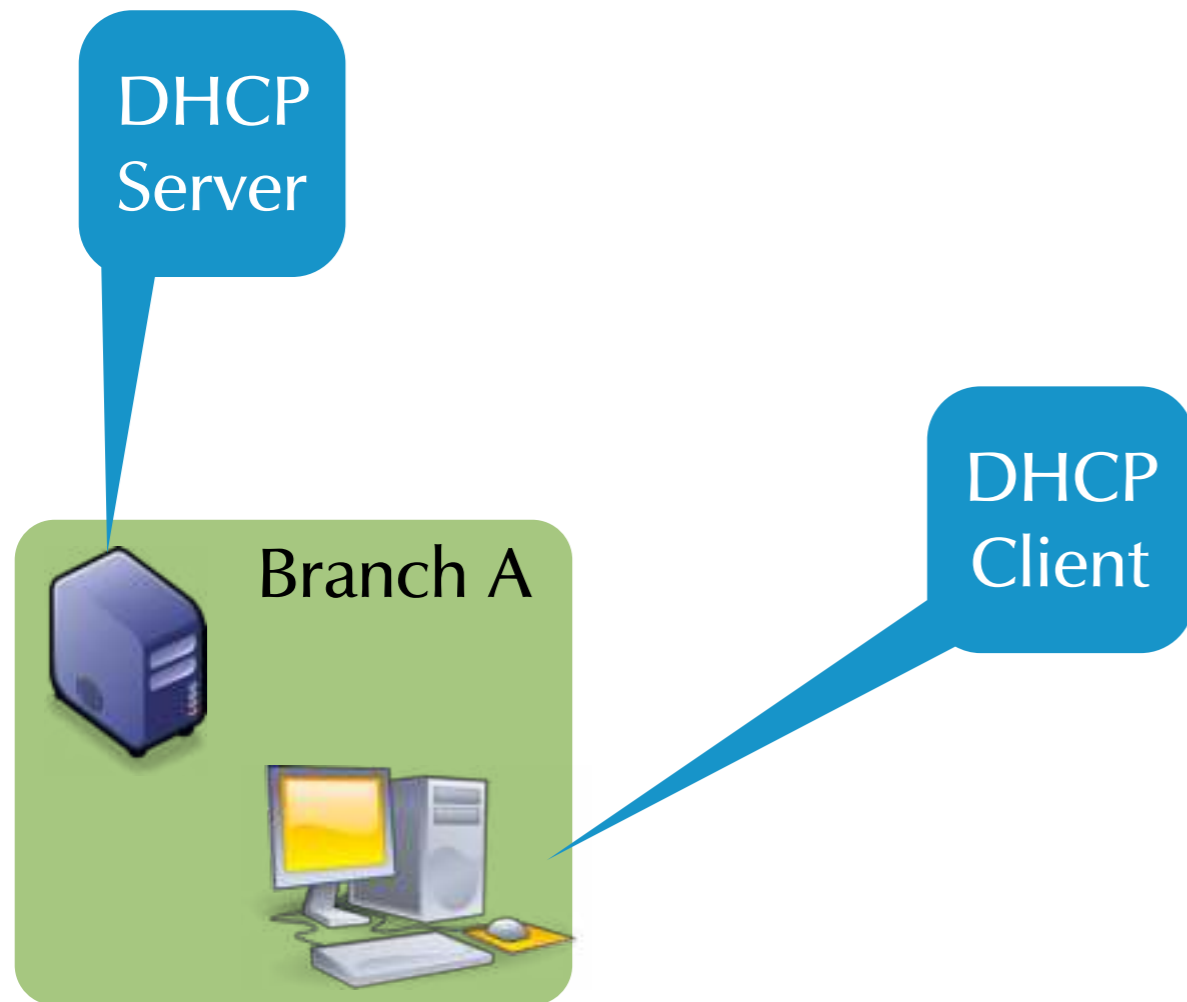
Agenda

- a reliable DHCP service
 - centralized vs. decentralized DHCP
- setting up a DHCP relay agent
- using static DHCP address allocation
- Split-Scopes
- Failover-Cluster with Windows 2012

The need for redundancy

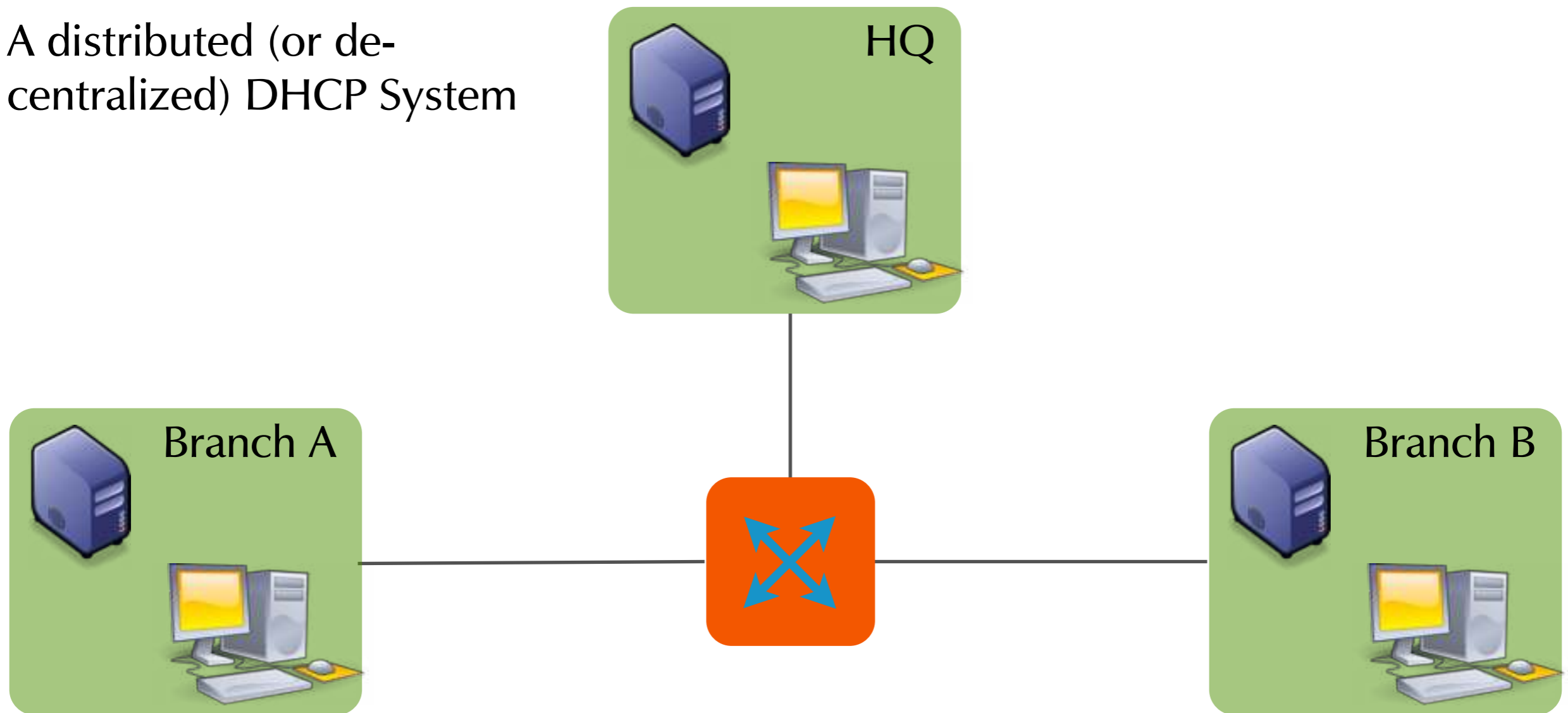
- A single DHCP Server is, well, a single point of failure
 - many devices might not get an IP Address and network configuration if the DHCP Server fails
- there are several ways to make a DHCP service redundant

Centralized vs. distributed DHCP



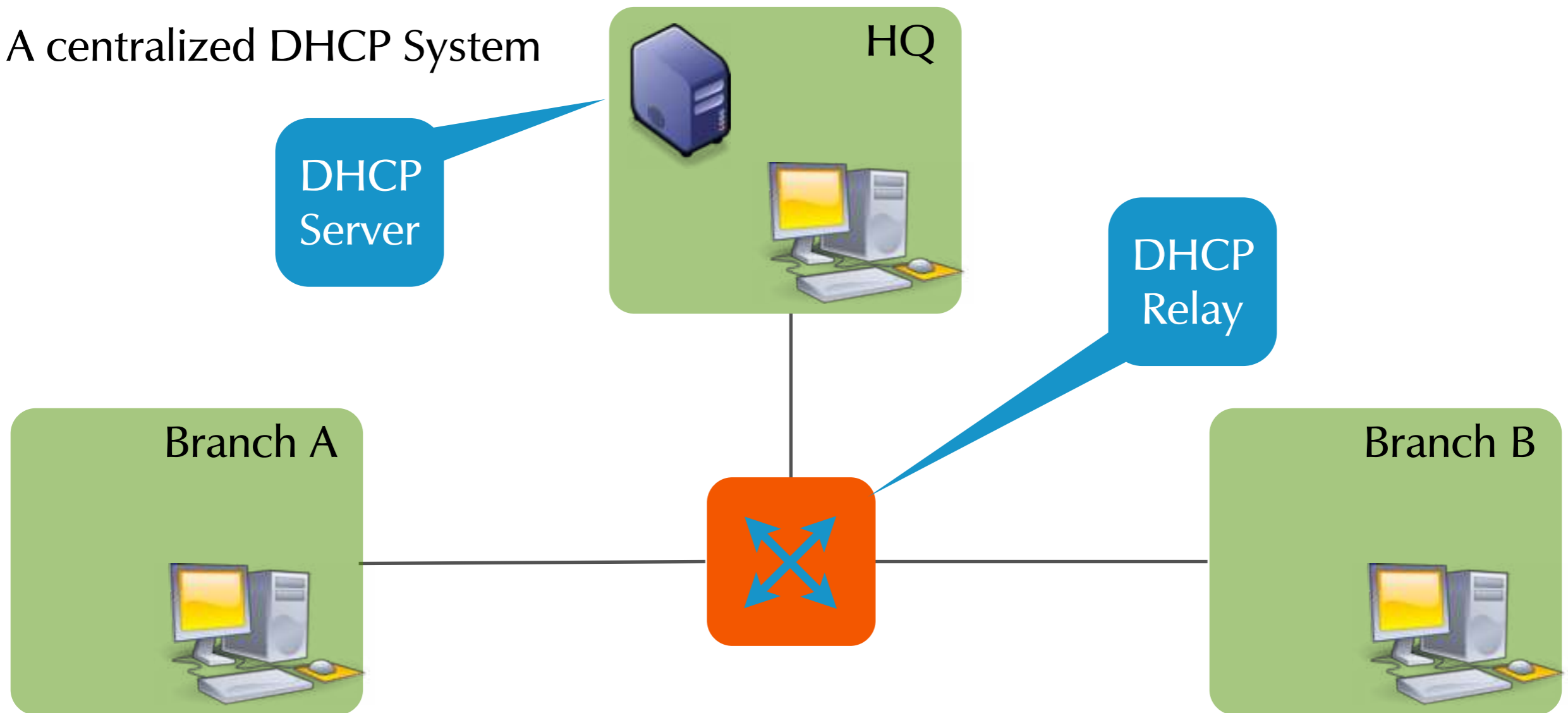
Centralized vs. distributed DHCP

A distributed (or de-centralized) DHCP System



Centralized vs. distributed DHCP

A centralized DHCP System

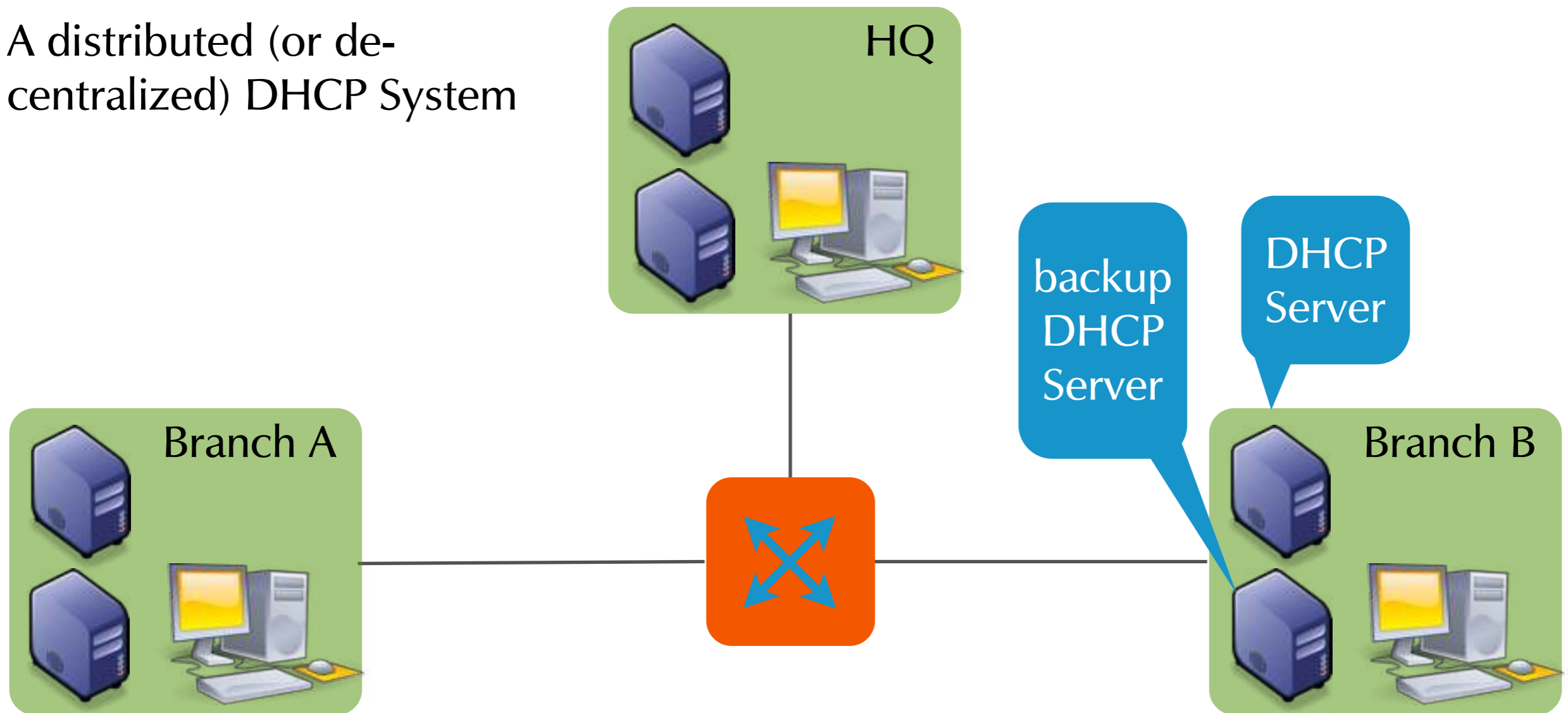


Centralized vs. de-centralized DHCP

- in the 1990ties, most DHCP deployments were de-centralized
- today, due to the increased reliability of network links, we see more centralized deployments
- but for certain businesses (retail stores), de-centralized deployments are still in use

Redundant DHCP Servers

A distributed (or de-centralized) DHCP System

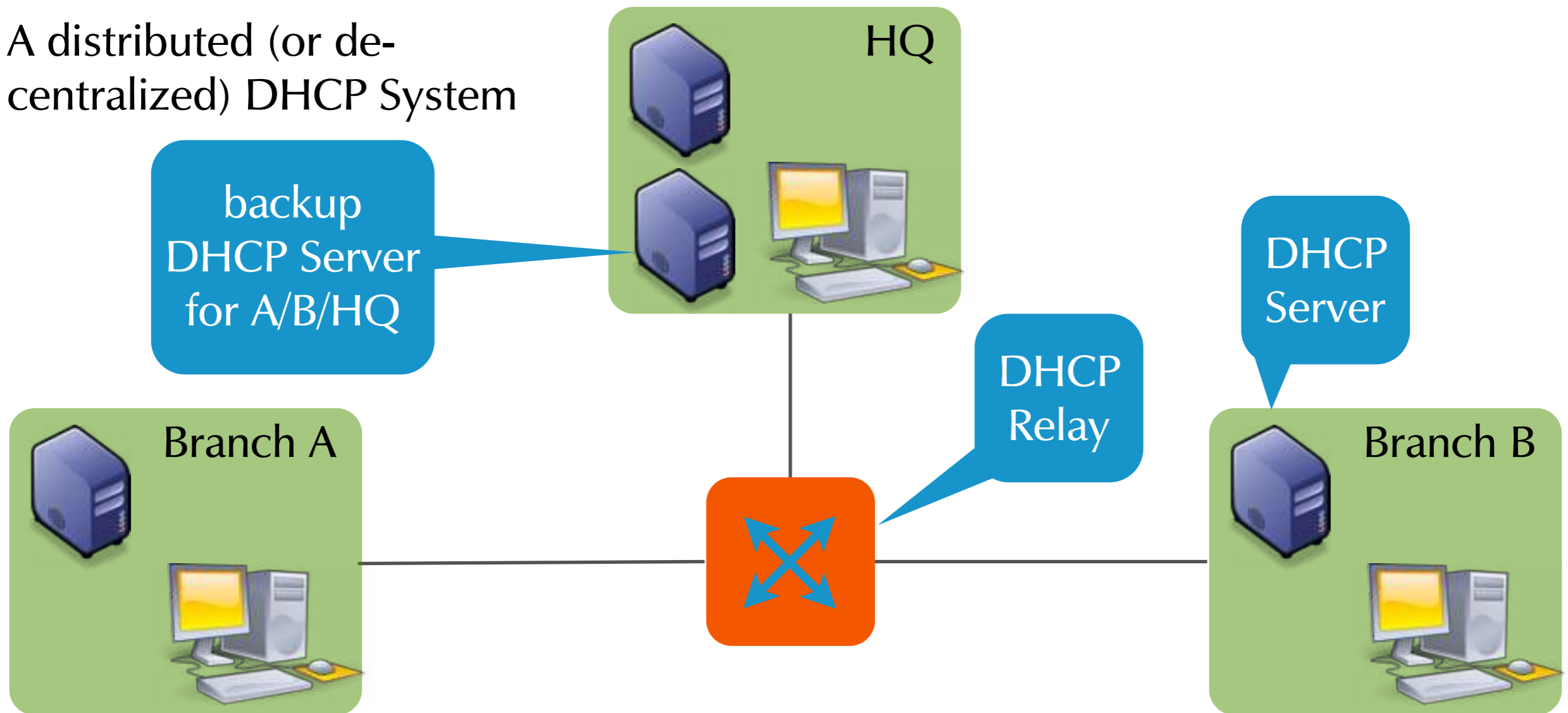


Redundant DHCP Servers

- having redundant DHCP Servers in every network is possible, but expensive in terms of hardware and maintenance
- backup DHCP Servers are therefore often shared across networks

Redundant DHCP Servers

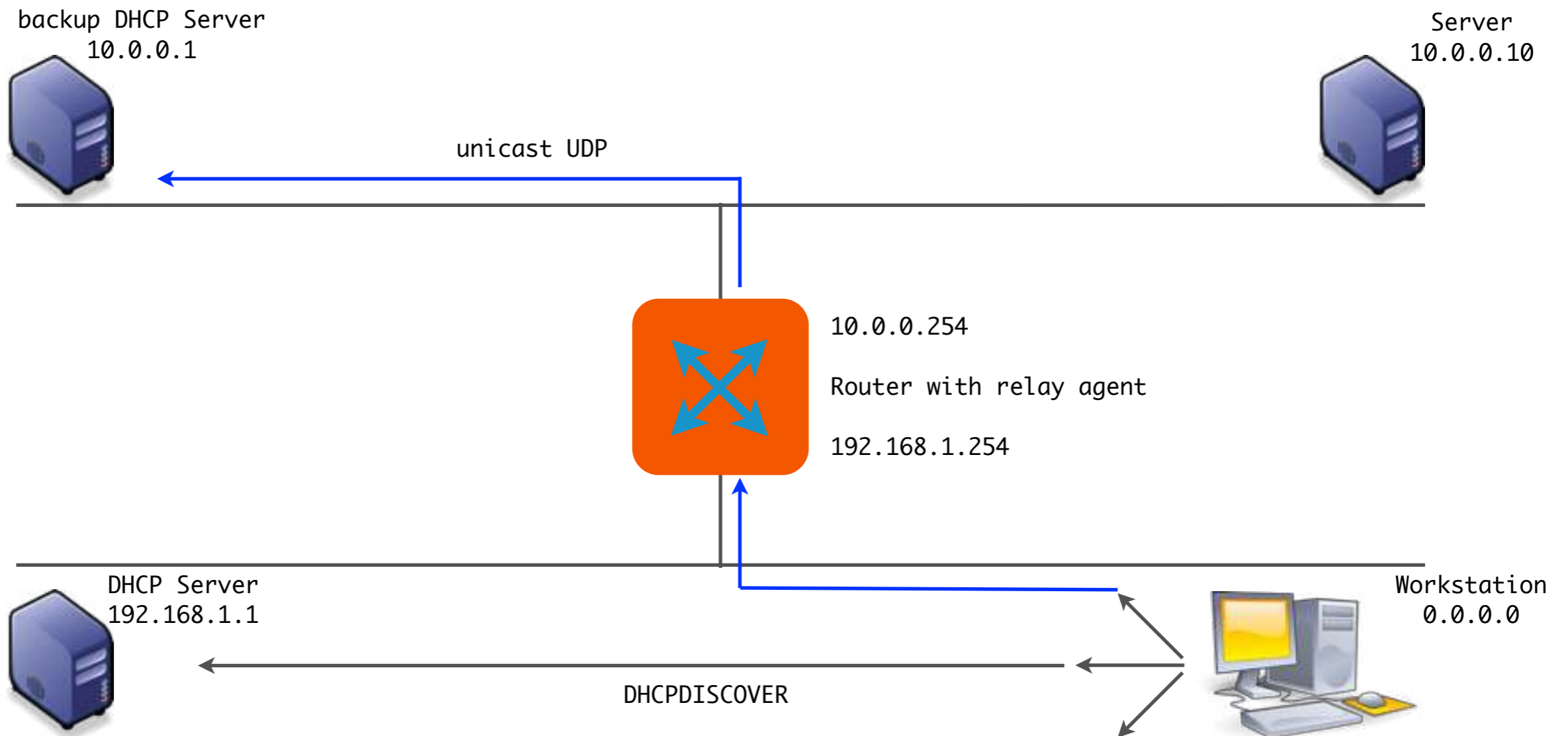
A distributed (or de-centralized) DHCP System



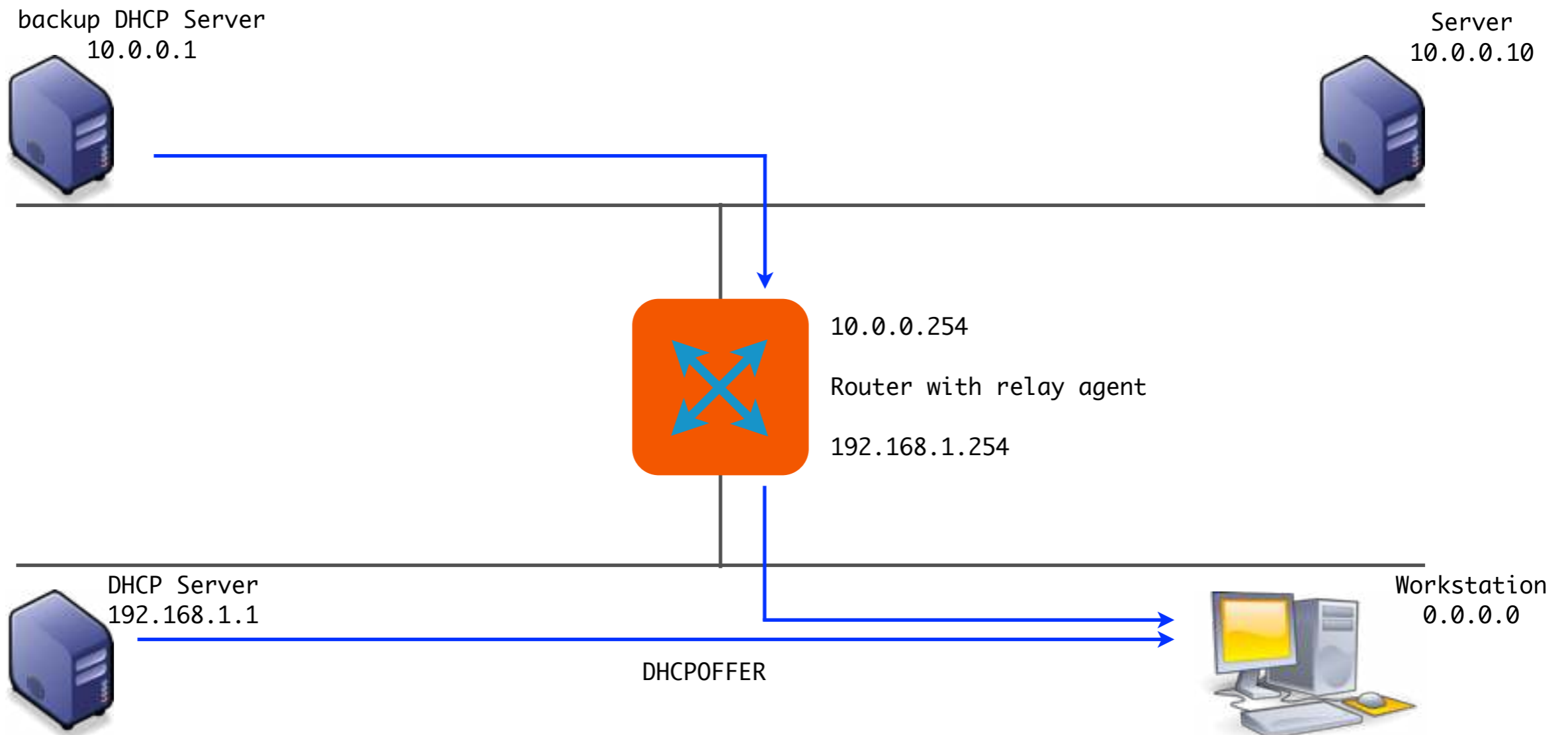
Redundant DHCP Servers

- the key to redundant DHCP server deployments are relay agents
 - software based relay agents (ISC DHCP relay agent)
 - router (Cisco, Juniper, HP, 3COM ...) based relay agents

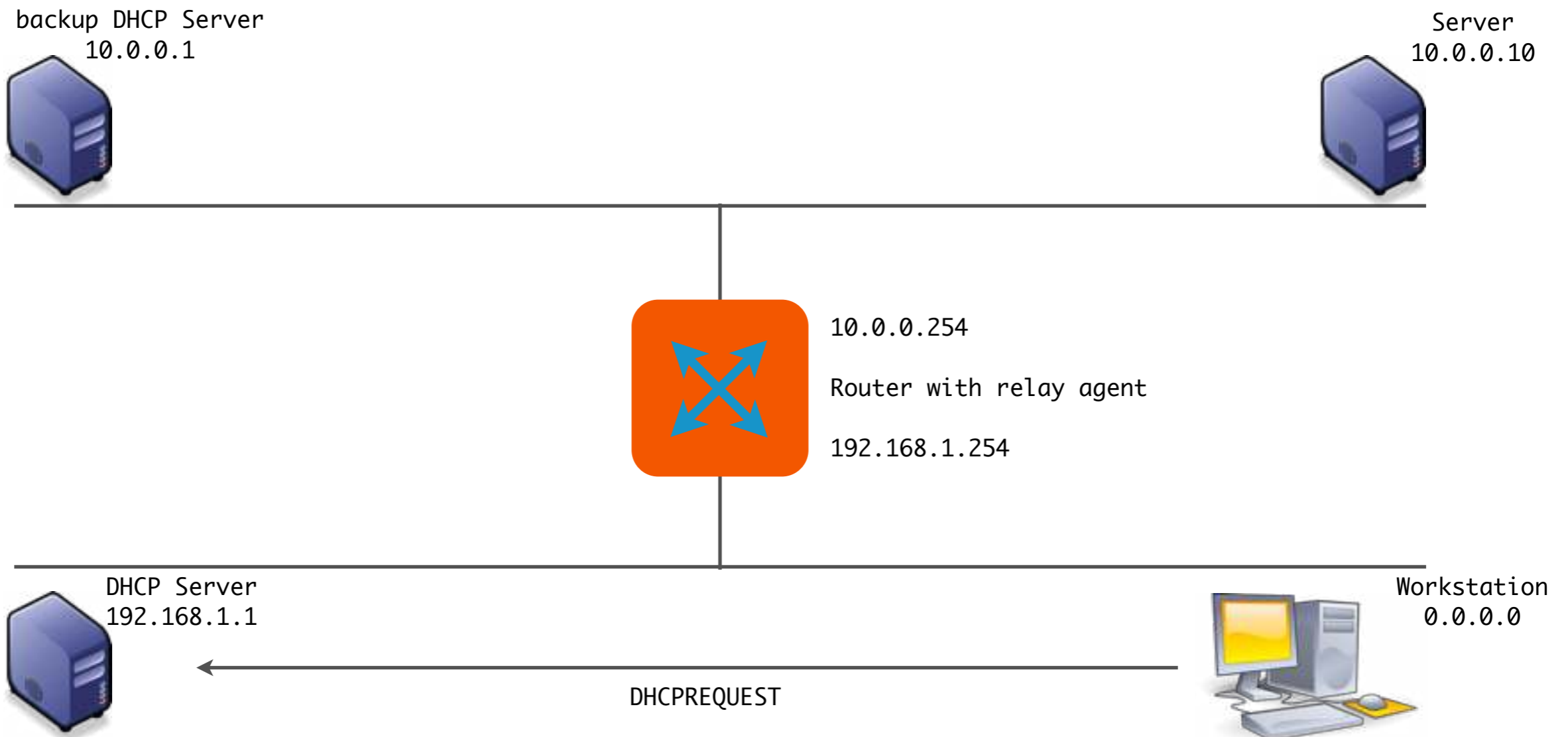
Redundant DHCP Servers



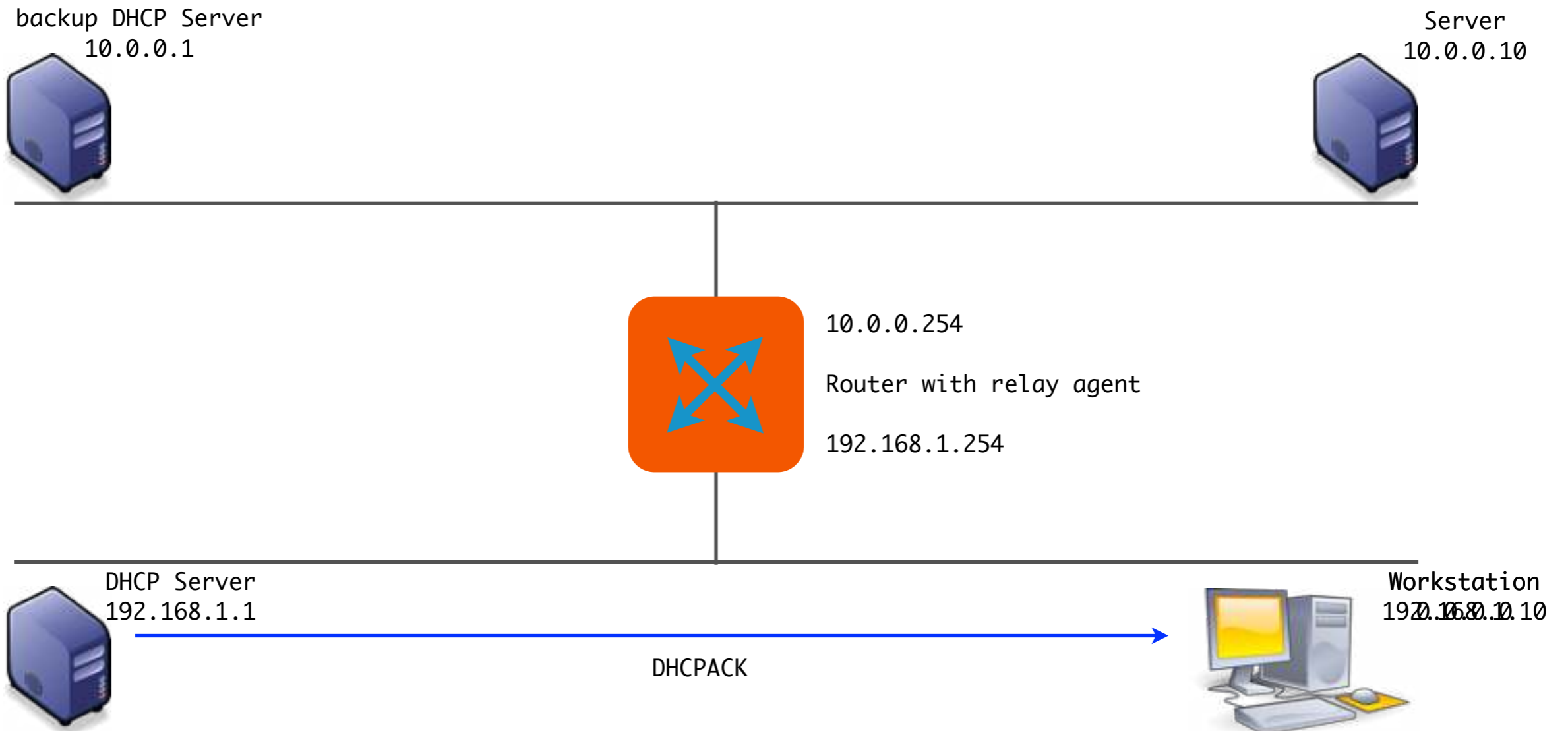
Redundant DHCP Servers



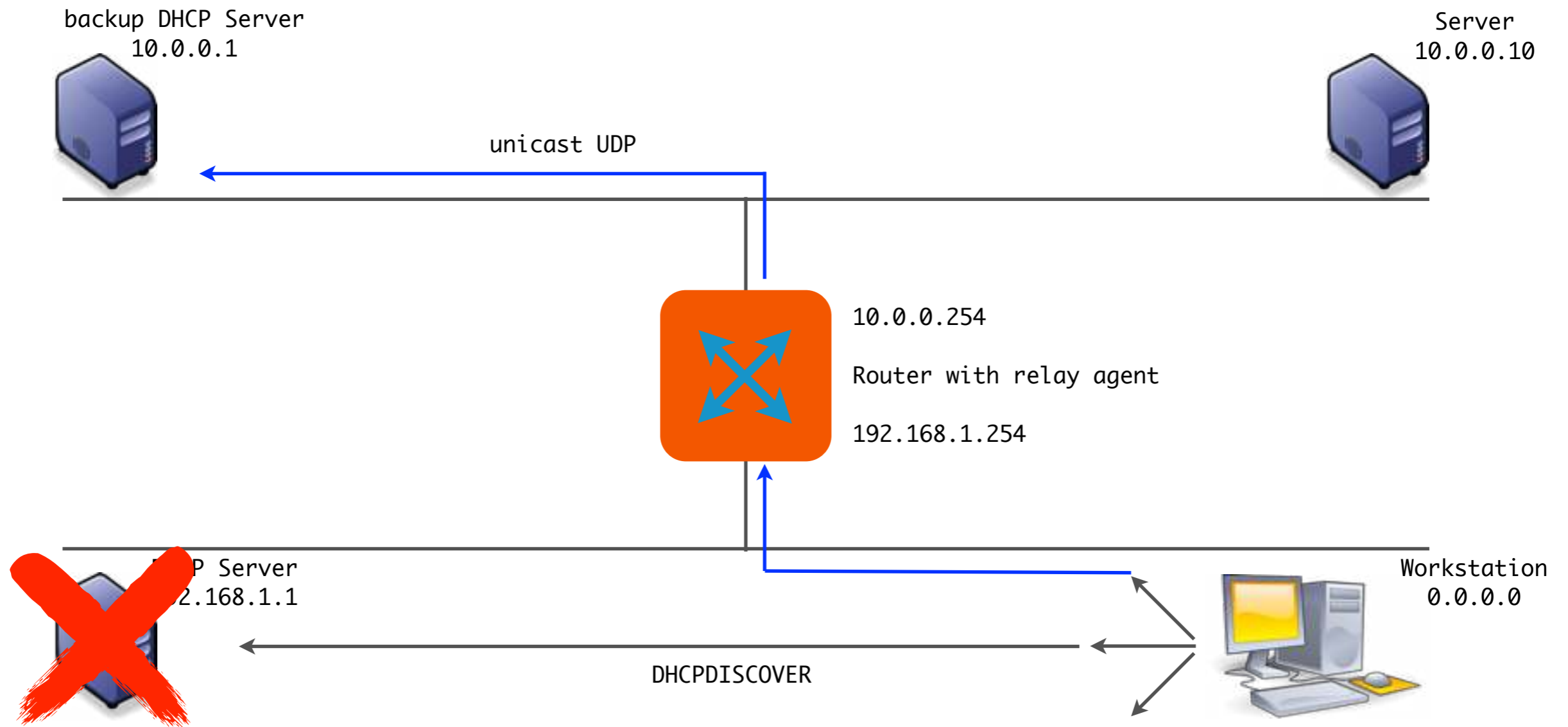
Redundant DHCP Servers



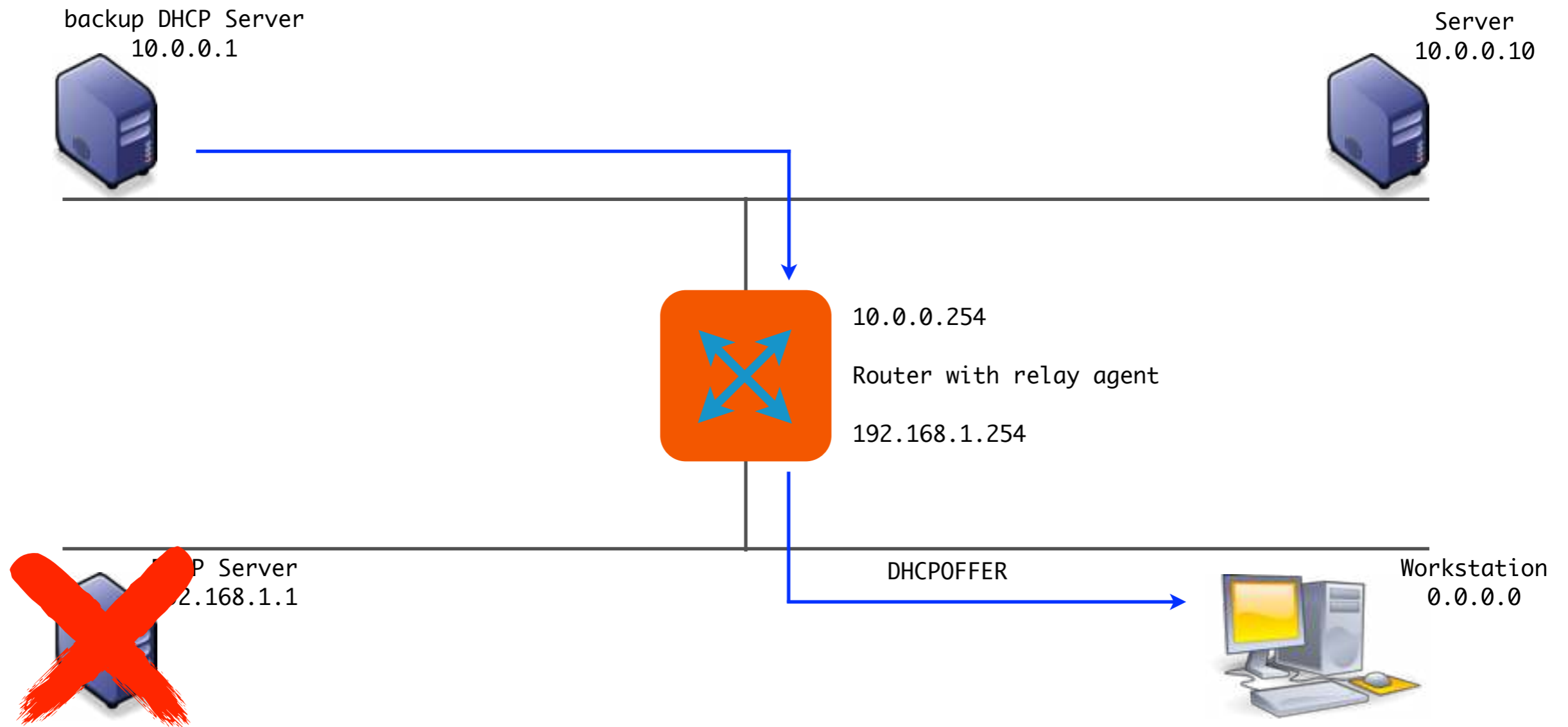
Redundant DHCP Servers



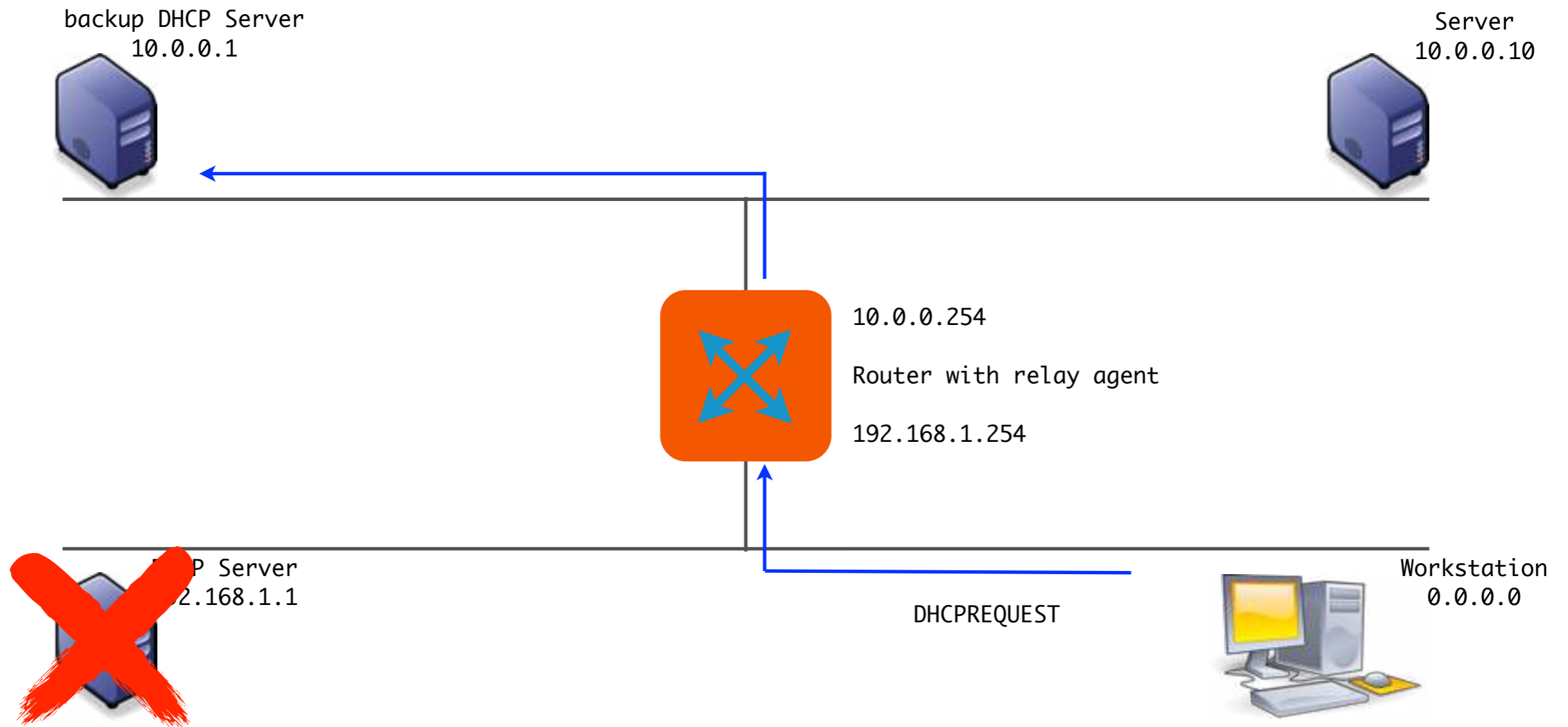
Redundant DHCP Servers



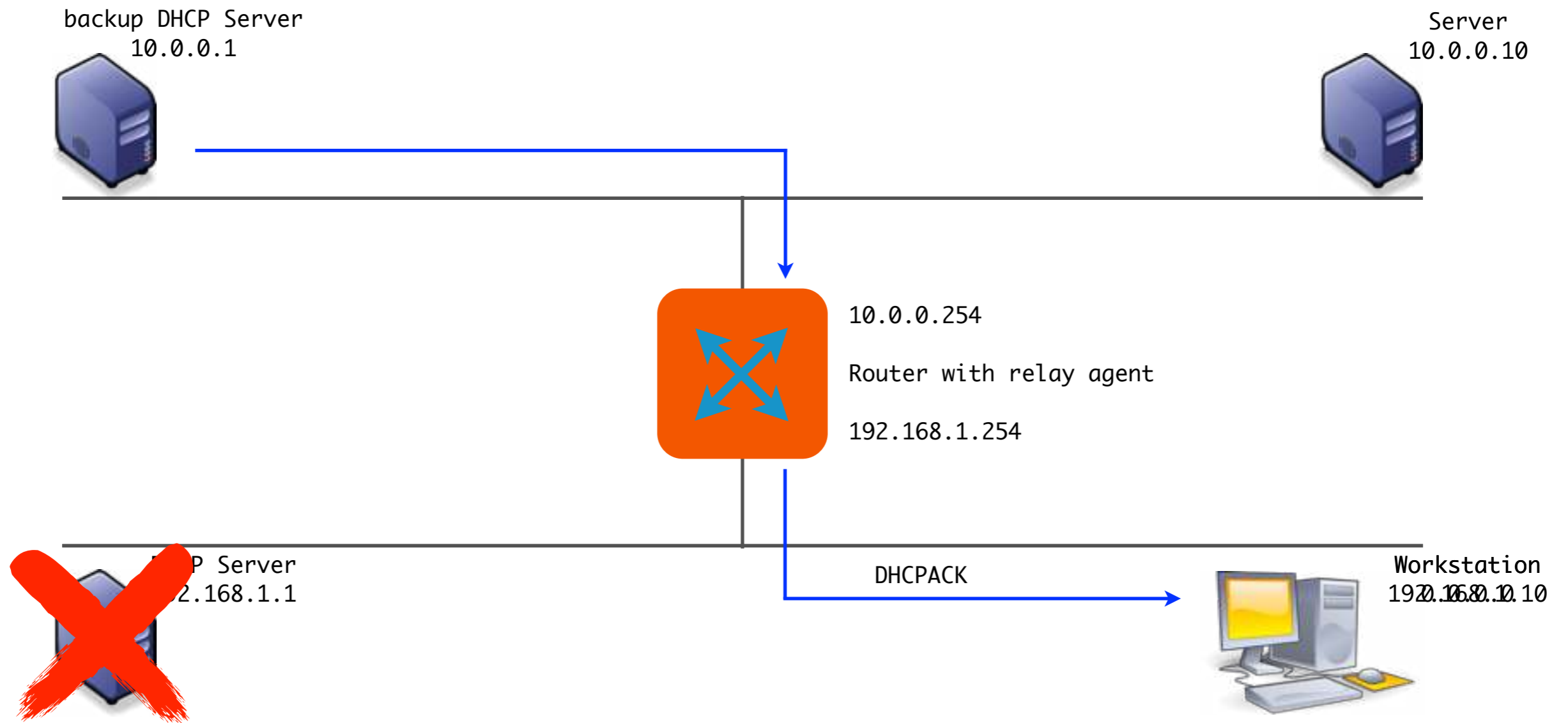
Redundant DHCP Servers



Redundant DHCP Servers



Redundant DHCP Servers



DHCP Server redundancy

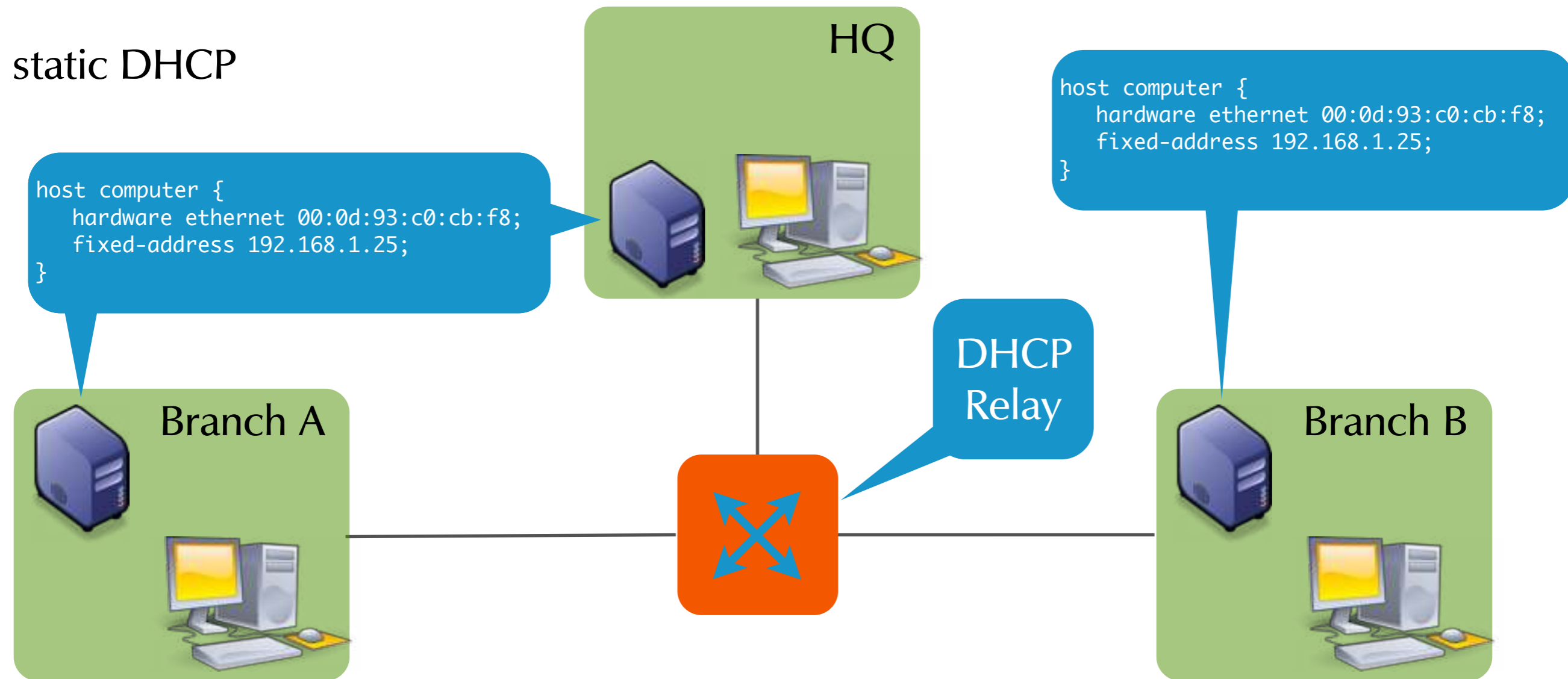
- the challenge when building redundant DHCP servers is the “lease state” held by the DHCP Servers
 - if more than one DHCP Server gives out IP Addresses for the same network, each server must “know” the leases the other servers have given out

DHCP Server redundancy

- Solution 1: using static DHCP
 - one possible solution is to use all static DHCP (no dynamic address pools)
 - every machine gets a host definition with a fixed-address statement (so called “reservation”)
 - the host definition is distributed to all DHCP Servers

Redundant DHCP Servers

static DHCP



DHCP Server redundancy

- Solution 1: using static DHCP
 - Pros:
 - works with any number of DHCP Servers, even with a mix of different products
 - simple
 - Cons
 - high management overhead
 - no dynamic address pools

DHCP Server redundancy

- Solution 2: split pools
 - the available addresses are split across DHCP Servers
 - no two DHCP Servers are authoritative for the same IP Addresses
 - the split depends on the lease times used and the time it takes to re-build a broken DHCP Server
 - a simple scheme is the 80/20 split

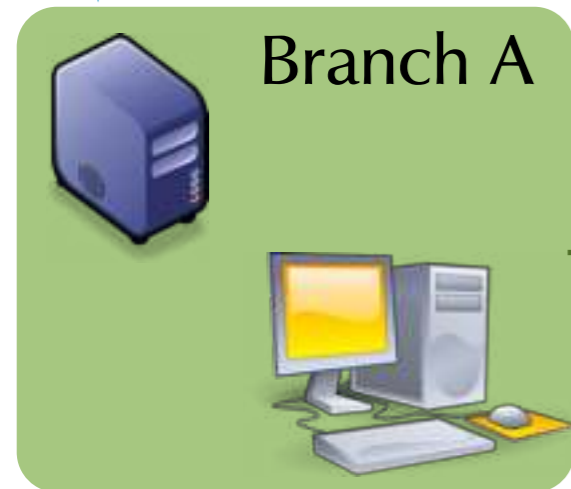
Redundant DHCP Servers

split pools with a 80/20 split

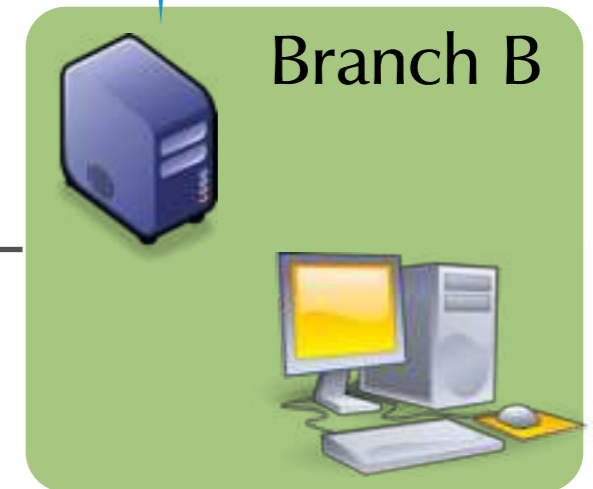
subnet 10.0.1.0/24
pool 10.0.1.1-10.0.1.200

subnet 10.0.1.0/24
pool 10.0.1.201-10.0.1.250
subnet 192.0.2.0/24
pool 192.0.2.201-192.0.2.250

subnet 192.0.2.0/24
pool 192.0.2.1-192.0.2.200



DHCP
Relay



DHCP Server redundancy

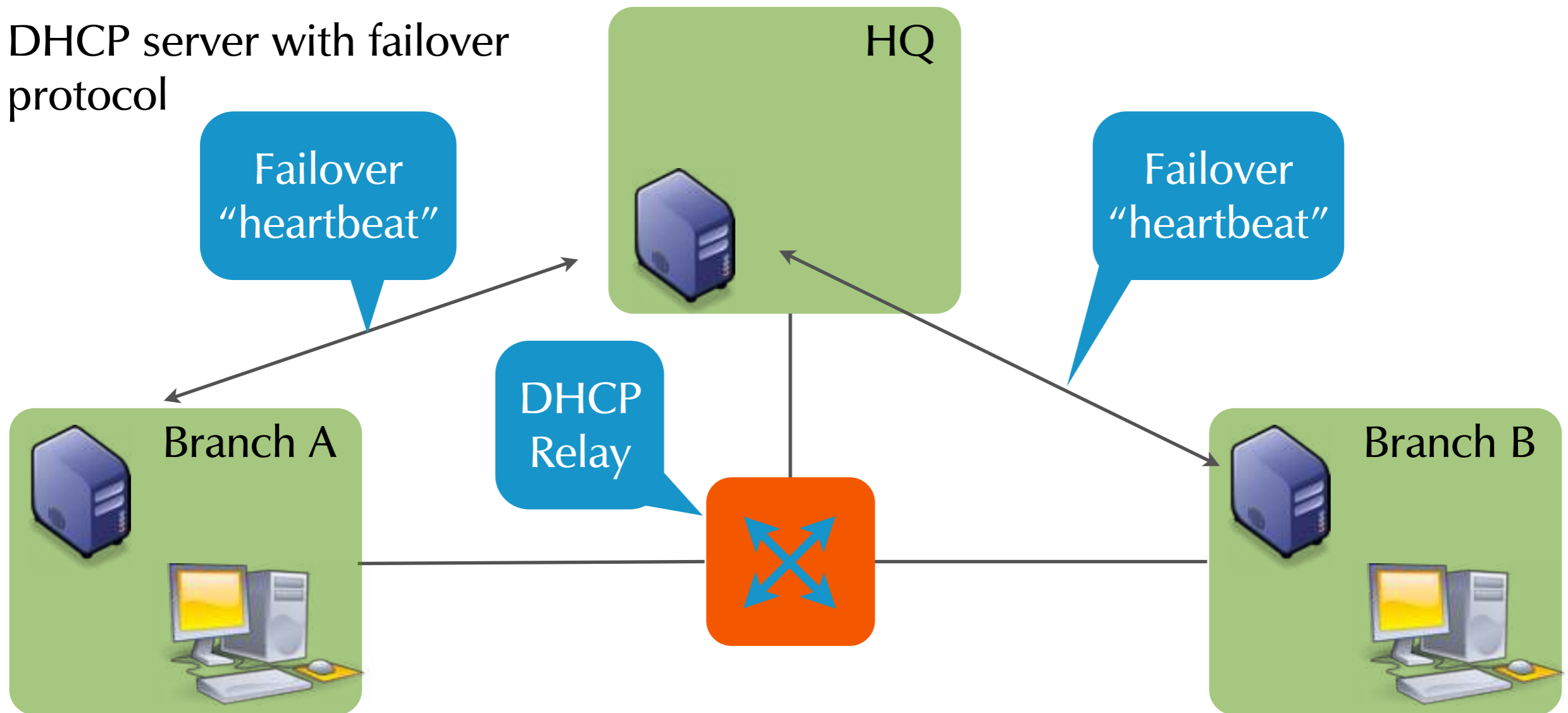
- Solution 2: using split pools
 - Pros:
 - works with any number of DHCP Servers, even with a mix of different products
 - allows dynamic address pools
 - Cons
 - high management overhead
 - IP space is not optimal utilized

DHCP Server redundancy

- Solution 3: DHCP cluster
 - some DHCP products can use a failover protocol to synchronize their state with a cluster peer
 - the Windows 2012 DHCP Server supports a failover protocol (RFC 3074)
 - the full number of available IP Addresses can be used for the dynamic address pools

Redundant DHCP Servers

DHCP server with failover protocol



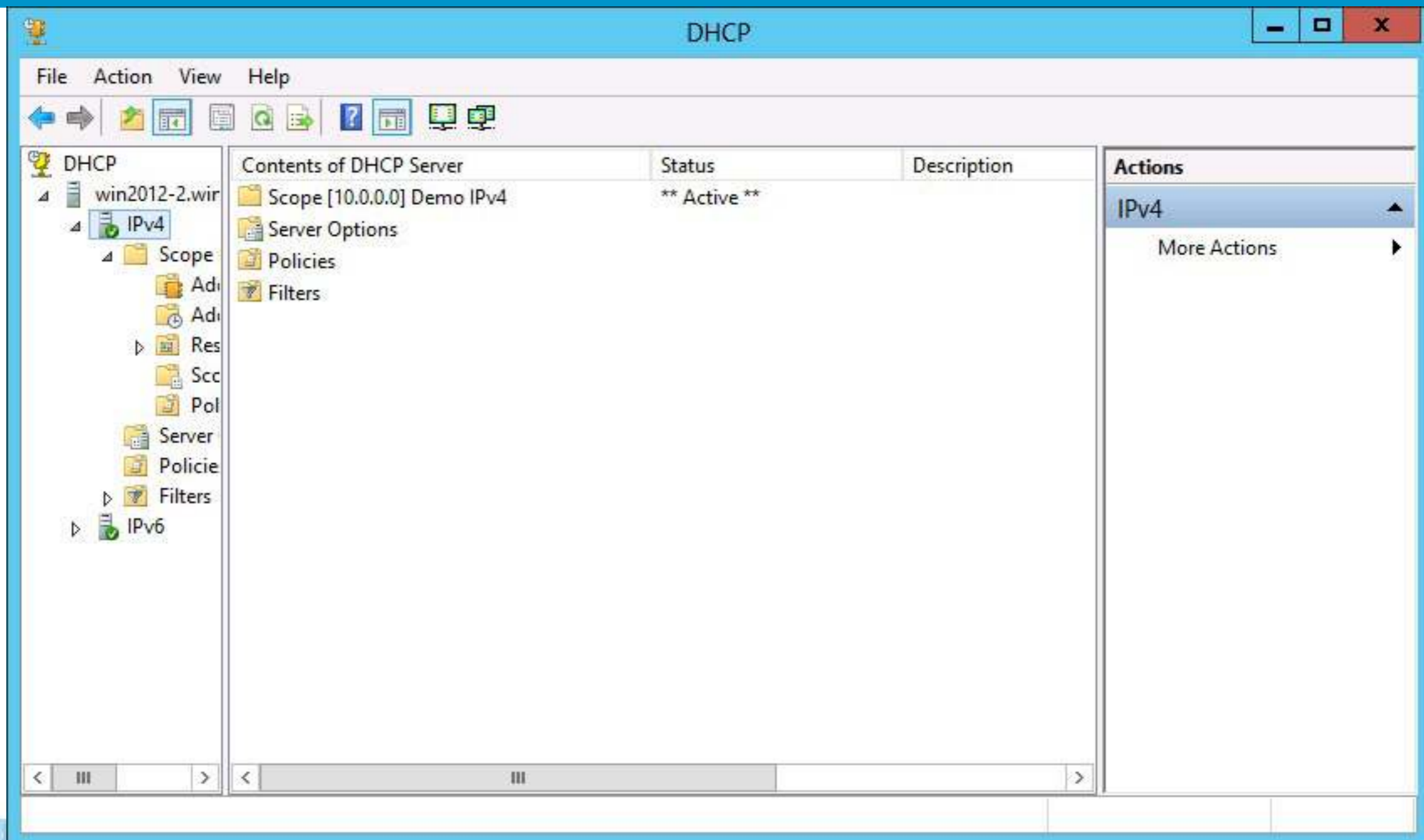
DHCP Server redundancy

- Solution 3: using a DHCP failover cluster
 - Pros:
 - optimal utilization of the IP address space
 - Cons
 - failover only available between compatible products
 - more complex

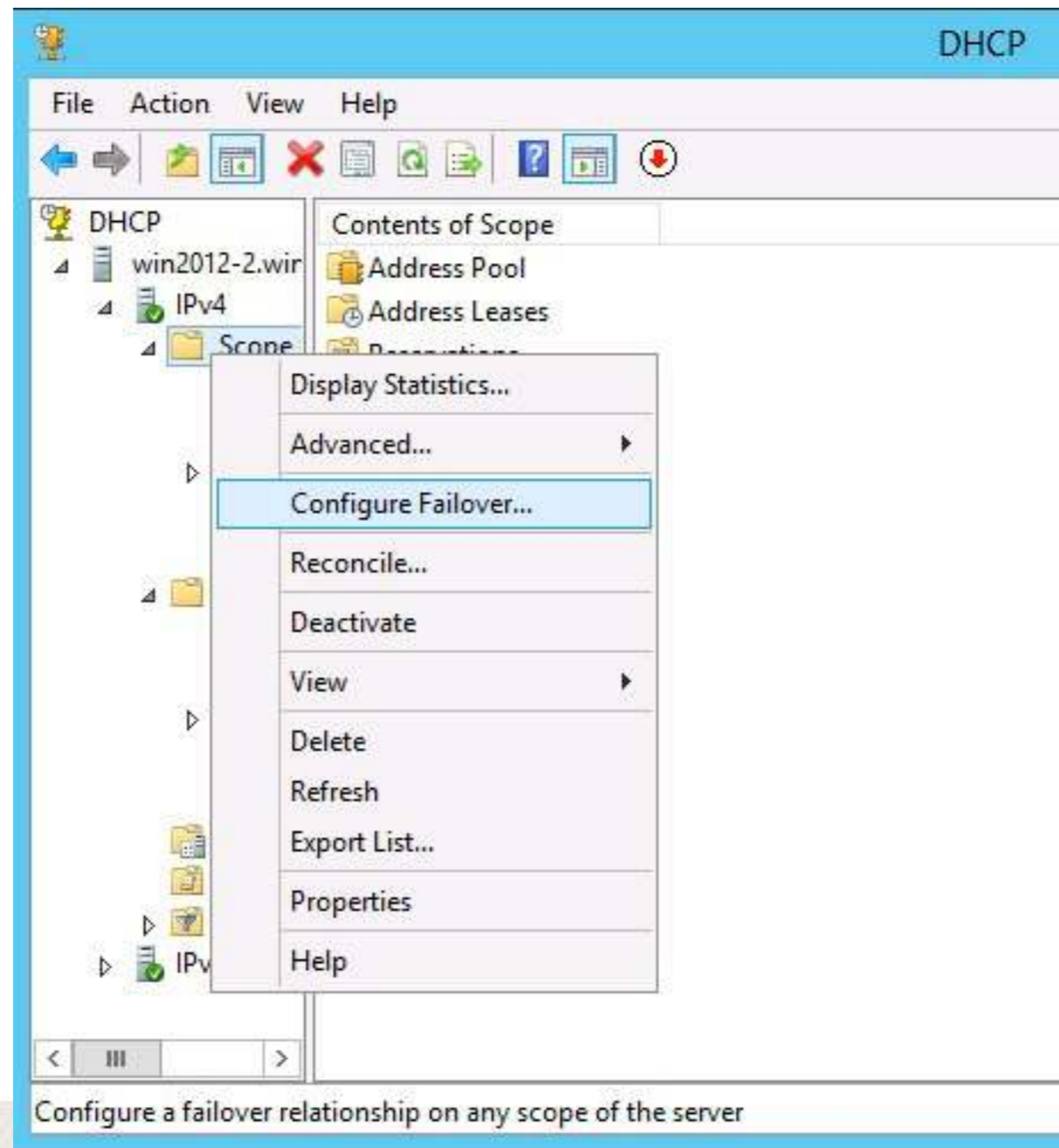
Configuring the Failover Protocol in Windows 2012

- the Failover protocol can be configured for every IPv4 scope between two DHCP server (DHCP Failover peers)
- there is no failover protocol for IPv6 (there is enough space per /64 for split scope configurations)
 - the IETF is working on a DHCPv6 failover protocol

Configuring the Failover Protocol in Windows 2012



Configuring the Failover Protocol in Windows 2012




Configuring the Failover Protocol in Windows 2012



Configuring the Failover Protocol in Windows 2012

Configure Failover

Specify the partner server to use for failover 

Provide the host name or IP address of the partner DHCP server with which failover should be configured.

You can select from the list of servers with an existing failover configuration or you can browse and select from the list of authorized DHCP servers.

Alternatively, you can type the host name or IP address of the partner server.

Partner Server:

Reuse existing failover relationships configured with this server (if any exist).

< Back Next > Cancel

Configuring the Failover Protocol in Windows 2012

Configure Failover

Create a new failover relationship

Create a new failover relationship with partner server1.win2012-domain.dnslab.org

Relationship Name: dnslab.org-server1.win2012-domain.dnslab.org

Maximum Client Lead Time: 1 hours 0 minutes

Mode: Load balance

Load Balance Percentage

Local Server: 50%

Partner Server: 50%

State Switchover Interval: 60 minutes

Enable Message Authentication

Shared Secret:

< Back Next > Cancel

- **Max client lead time:** the time a DHCP failover peer can extend a know lease to a client in case the partner is down
- a high value slows down recovery
- a low value causes more DHCP traffic on the remaining failover peer

Failover modes




- the Windows 2012 DHCP Server can be configured to run in two different failover modes
 - load-balance: both servers are active and are giving out leases
 - hot-standby: only the primary machine is active, the backup standby DHCP server is waiting to take over in the case of an failure on the primary DHCP server

Failover modes

Load Balance Percentage	
Local Server:	<input type="text" value="50"/> %
Partner Server:	<input type="text" value="50"/> %

- in a load balancing configuration, the split (number of IP address leases) can be configured between the failover peers

Failover modes



Hot Standby Configuration

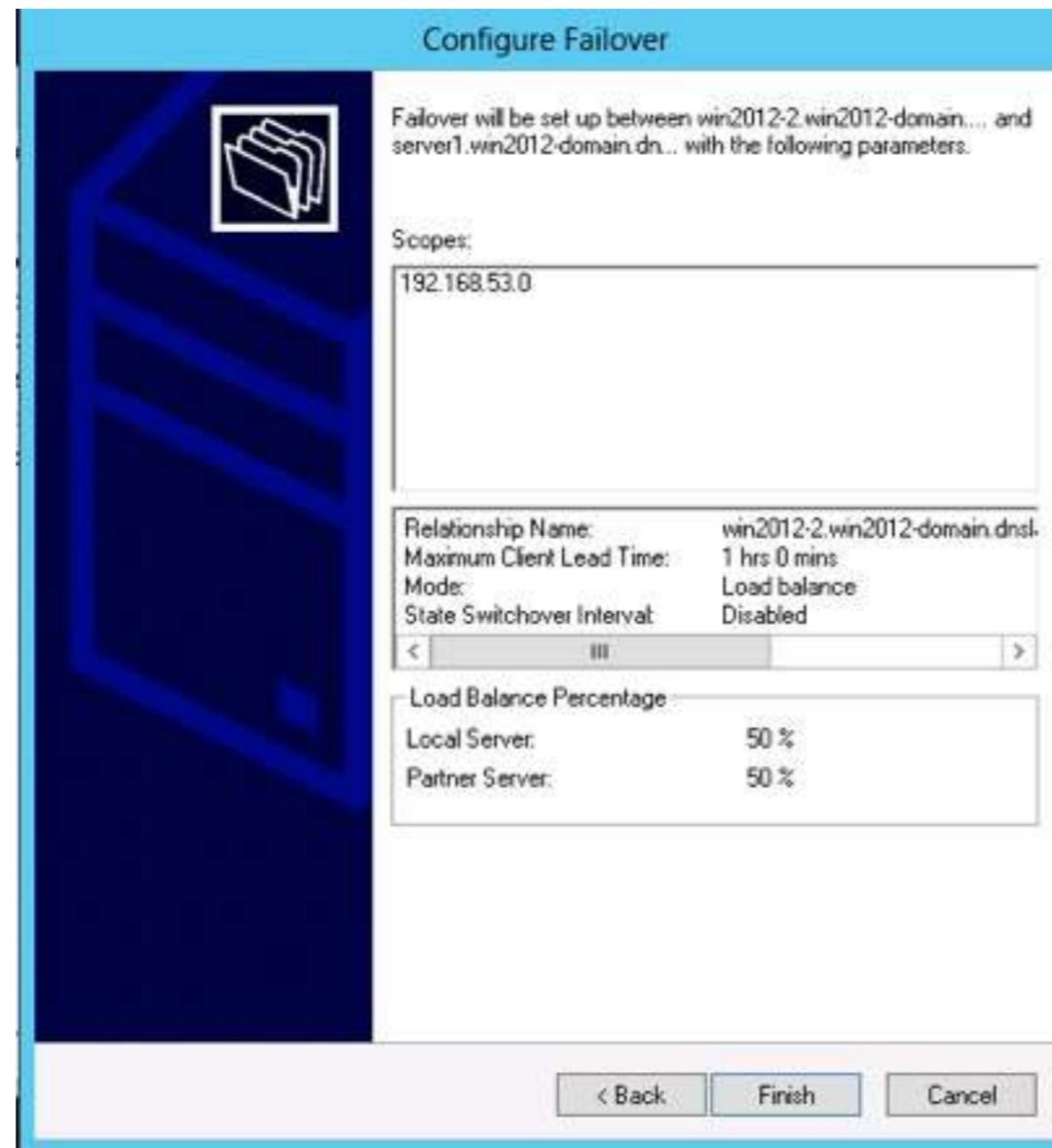
Role of Partner Server: Standby

Addresses reserved for standby server: 5 %

The image shows a screenshot of a 'Hot Standby Configuration' dialog box. It contains two main settings: 'Role of Partner Server' is set to 'Standby' in a dropdown menu, and 'Addresses reserved for standby server' is set to '5 %' in a numeric spinner control.

- in a hot-standby configuration most addresses are managed by the primary server
- the standby server holds a number of reserved addresses for new clients that appear in the failover case

Failover protocol



Configure Failover

Failover will be set up between win2012-2.win2012-domain... and server1.win2012-domain.dn... with the following parameters.

Scopes:

192.168.53.0

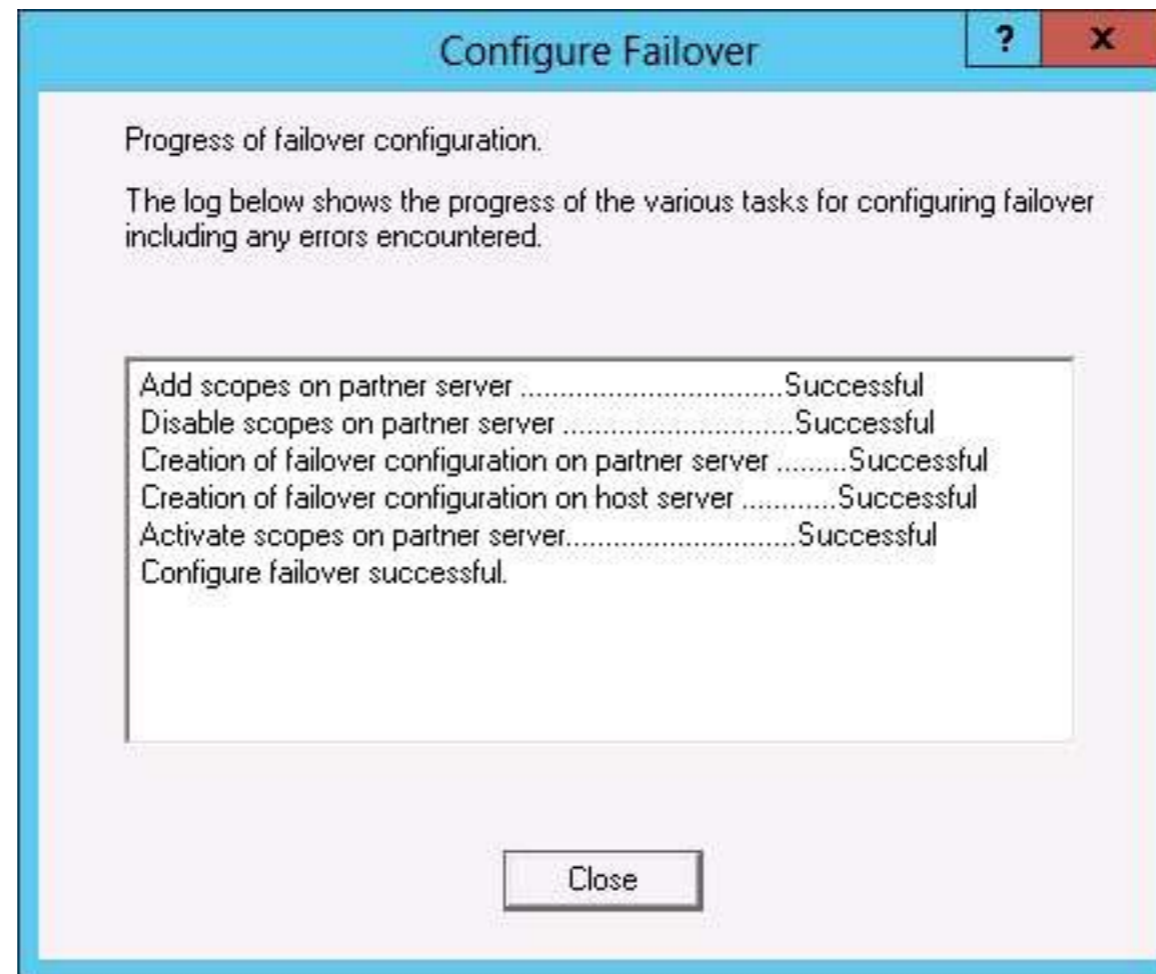
Relationship Name: win2012-2.win2012-domain.dnsl
Maximum Client Lead Time: 1 hrs 0 mins
Mode: Load balance
State Switchover Interval: Disabled

Load Balance Percentage

Local Server:	50 %
Partner Server:	50 %

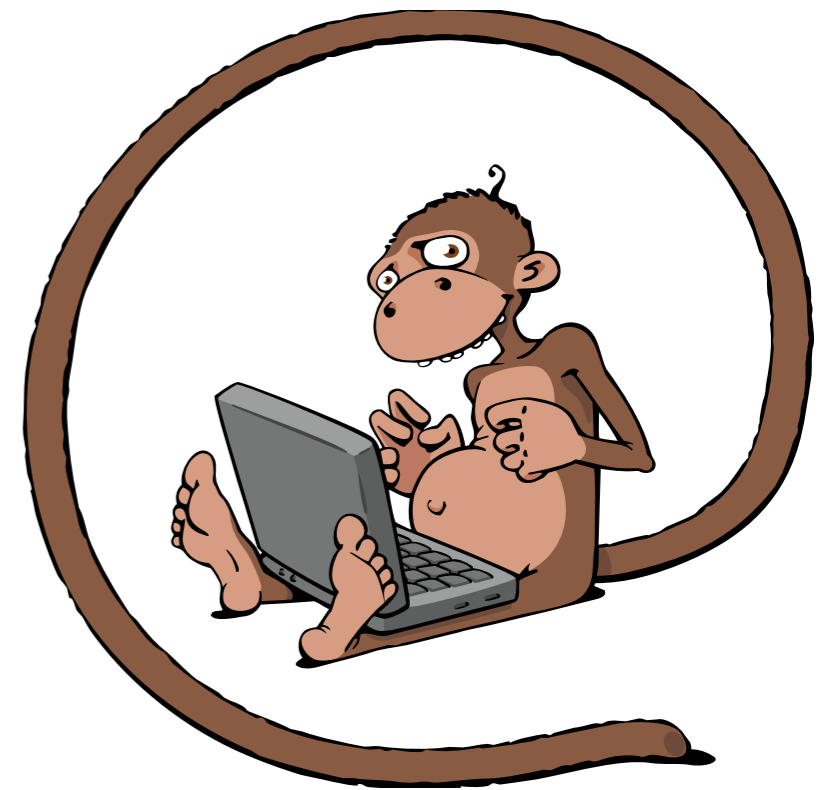
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Failover protocol



Men & Mice DHCP Workshop Training

- 3 day “hands-on” training including
 - a throughout introduction into DHCP
 - DHCP clients (Windows XP/Vista/7/8, Linux, MacOS X, Android, iPhone/iPad ...)
 - DHCP Server (ISC DHCP 3.x and 4.x, Microsoft DHCP 2008/2012, ISC BIND 10 DHCP, Cisco IOS DHCP)
 - DHCP and DNS interaction
 - DHCP and IPv6
 - DHCP operations (monitoring, troubleshooting, tools)
 - many “hands-on” labs
- For prices and dates
 - go to <http://menandmice.com/training/>



Questions?

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