Windows 2012 DHCP Failover

© Men & Mice http://menandmice.com

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

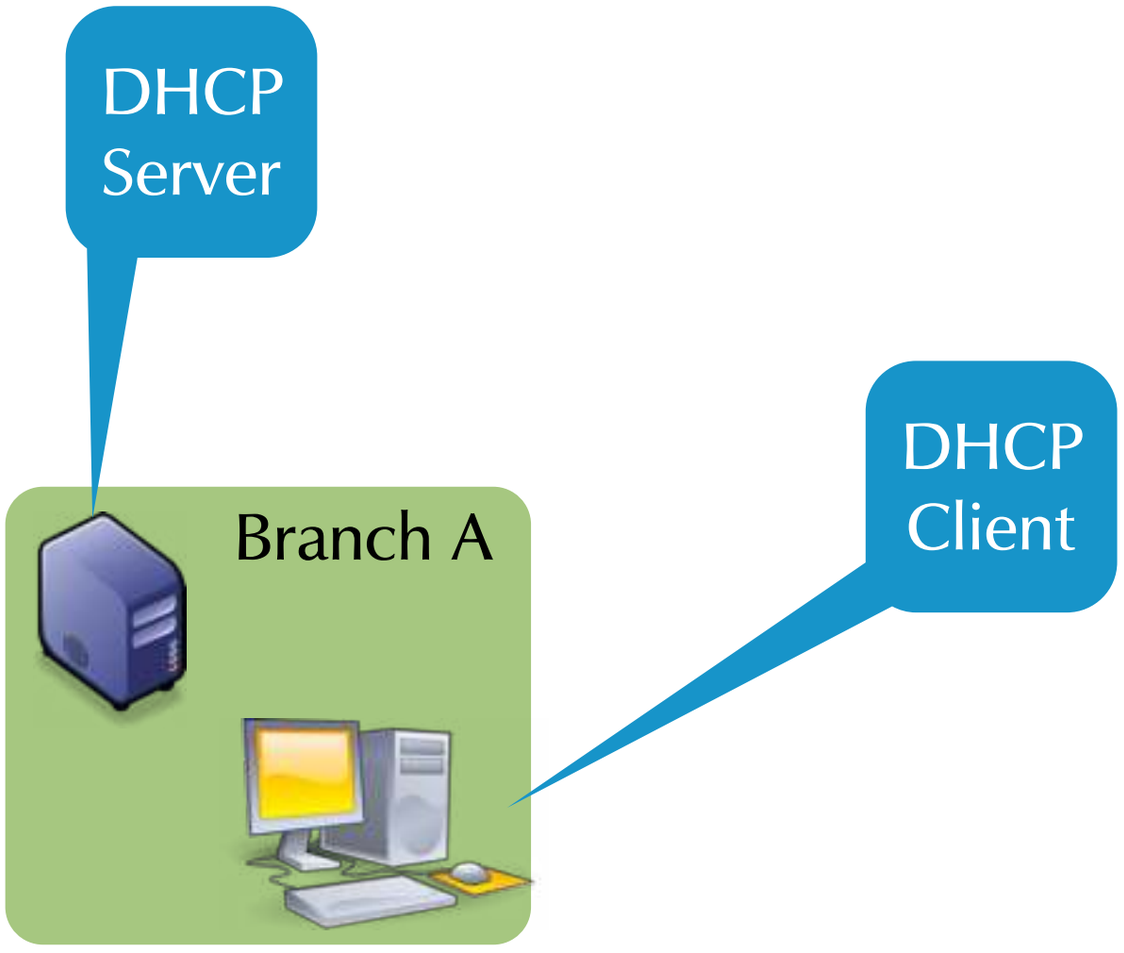
© Men & Mice http://menandmice.com

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

© Men & Mice http://menandmice.com

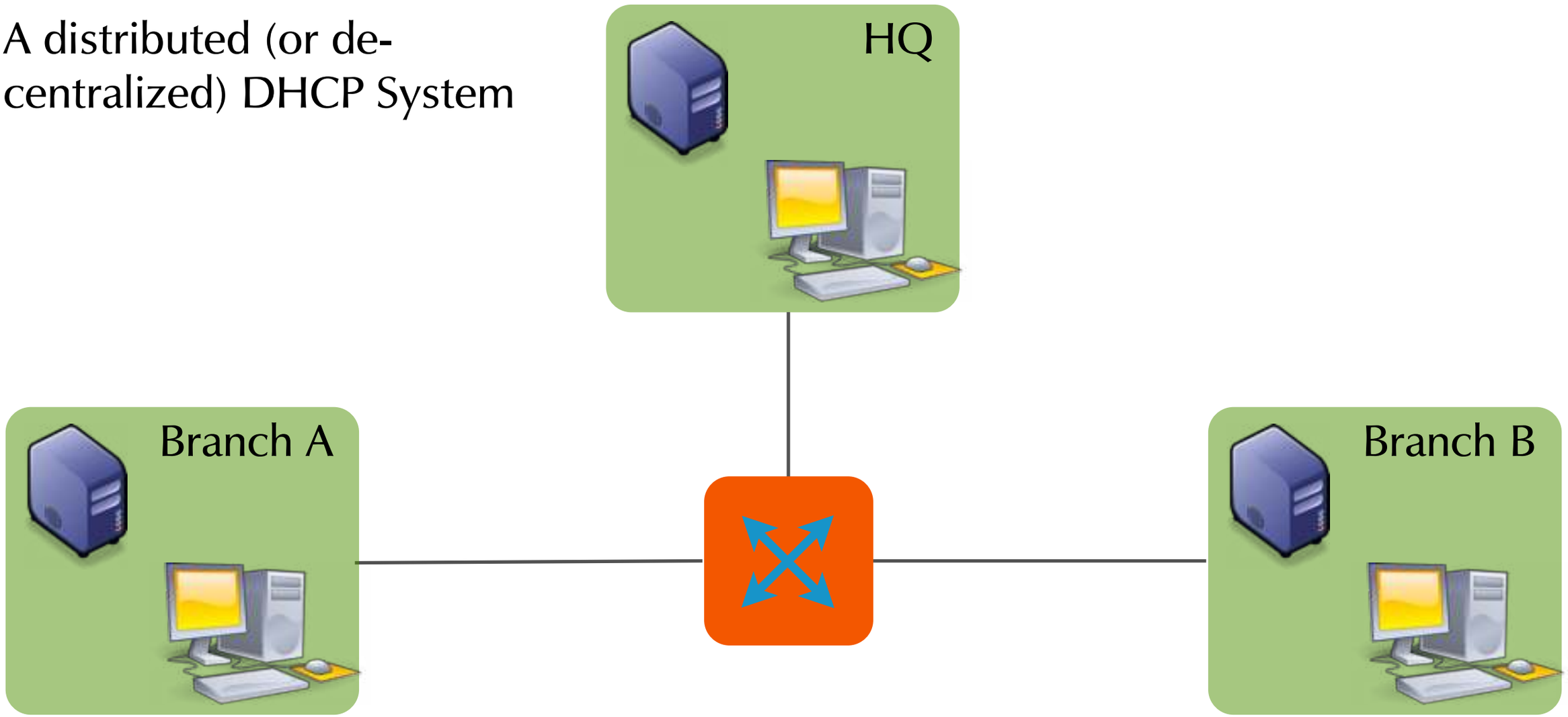
Centralized vs. distributed DHCP



© Men & Mice http://menandmice.com

Centralized vs. distributed DHCP

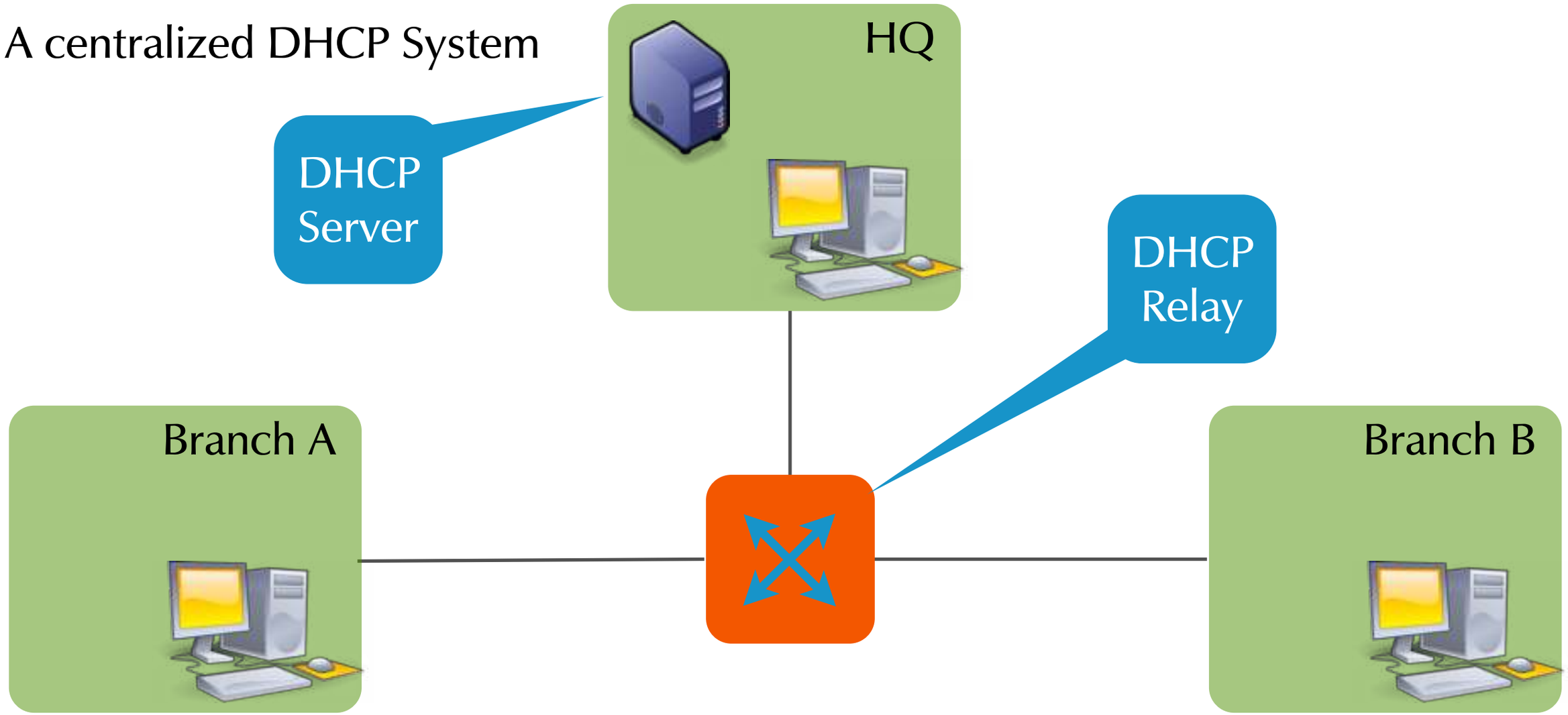
A distributed (or de-centralized) DHCP System



© Men & Mice http://menandmice.com

Centralized vs. distributed DHCP

A centralized DHCP System



© Men & Mice http://menandmice.com

Centralized vs. de-centralized DHCP

- in the 1990ties, most DHCP deployments were de-centralized

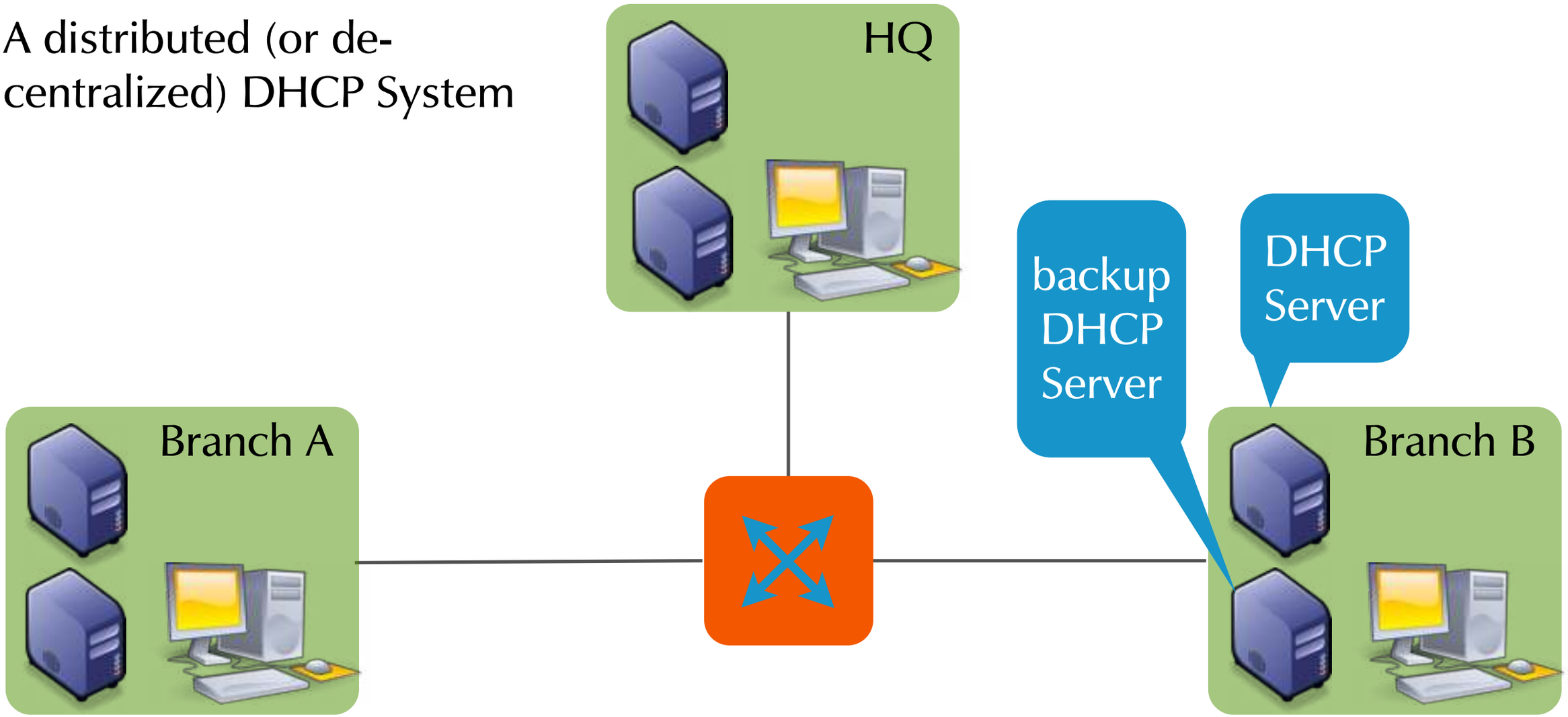
- today, due to the increased reliability of network links, we see more centralized deployments

- but for certain businesses (retail stores), de-centralized deployments are still in use

© Men & Mice http://menandmice.com

Redundant DHCP Servers

A distributed (or de-centralized) DHCP System



© Men & Mice http://menandmice.com

Redundant DHCP Servers

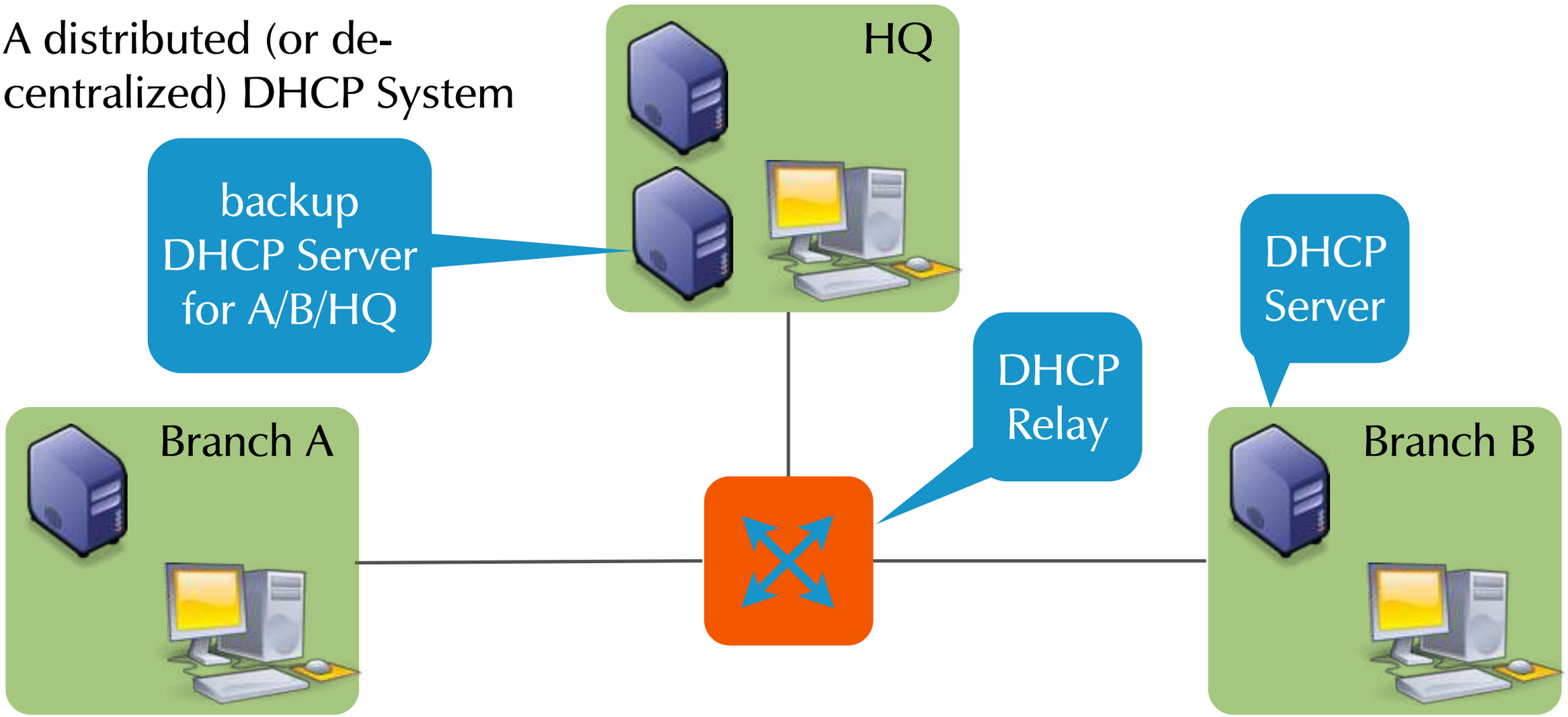
- having redundant DHCP Servers in every network is possible, but expensive it terms of hardware and maintenance

- backup DHCP Servers are therefore often shared across networks

© Men & Mice http://menandmice.com

Redundant DHCP Servers

A distributed (or de-centralized) DHCP System



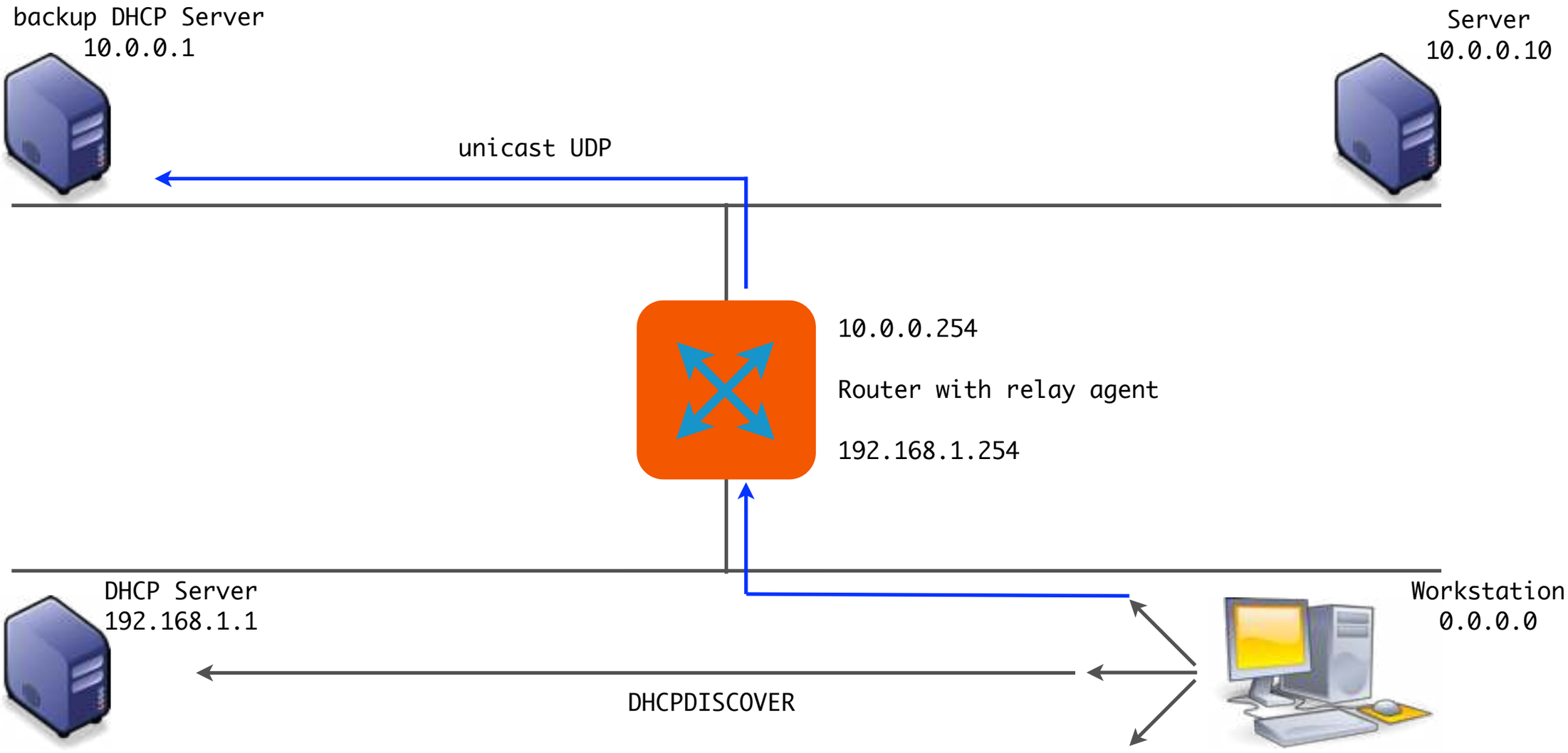
© Men & Mice http://menandmice.com

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

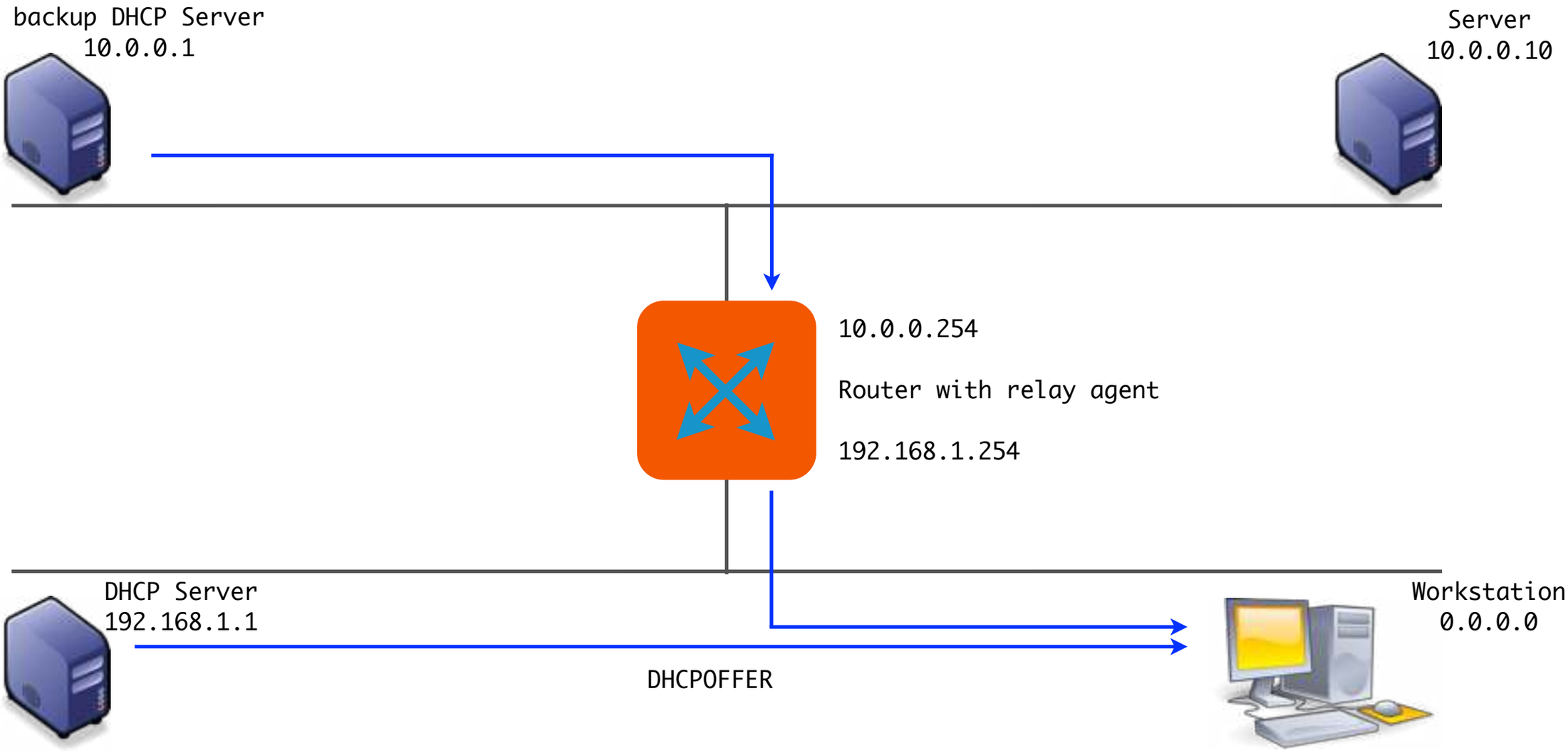
© Men & Mice http://menandmice.com

Redundant DHCP Servers



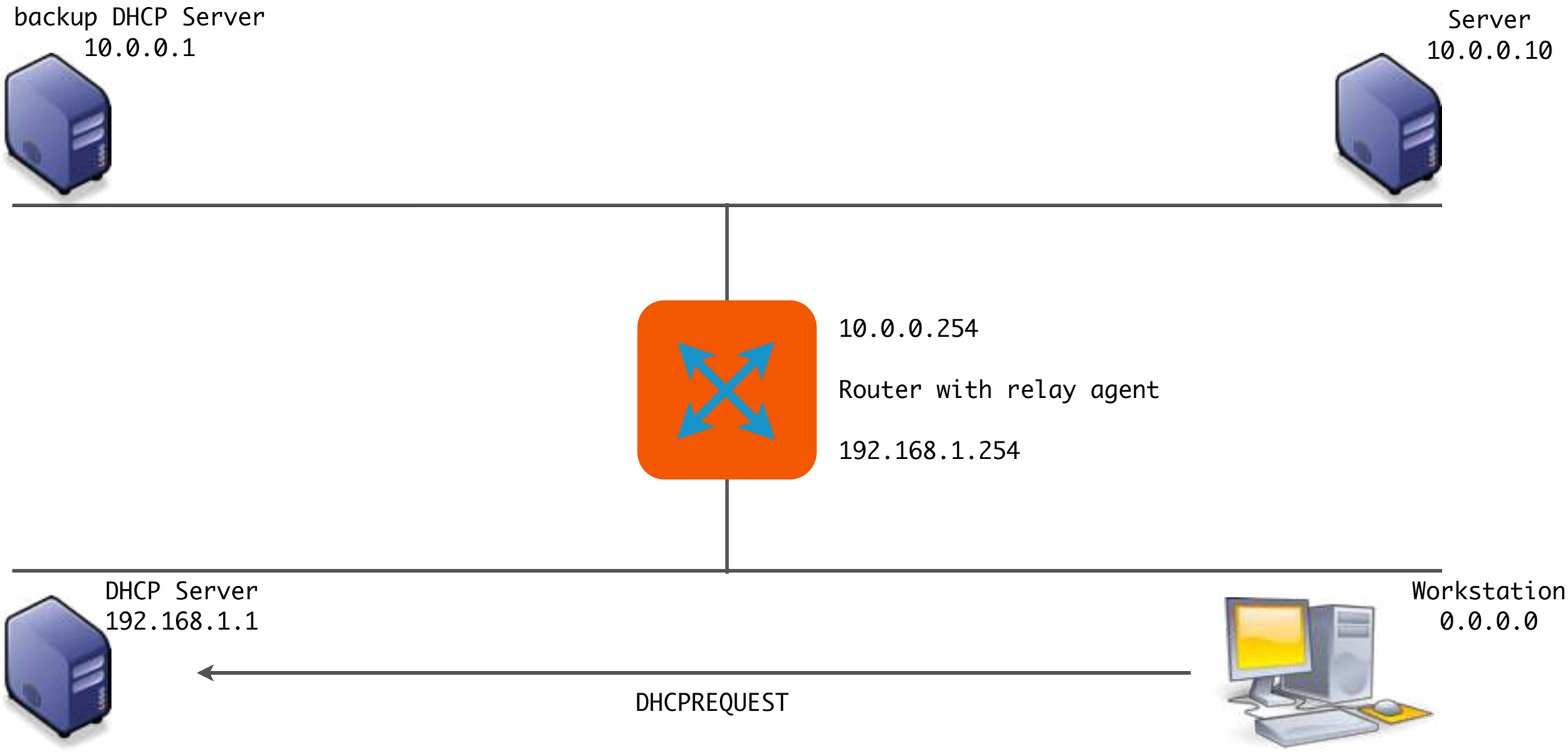
© Men & Mice http://menandmice.com

Redundant DHCP Servers



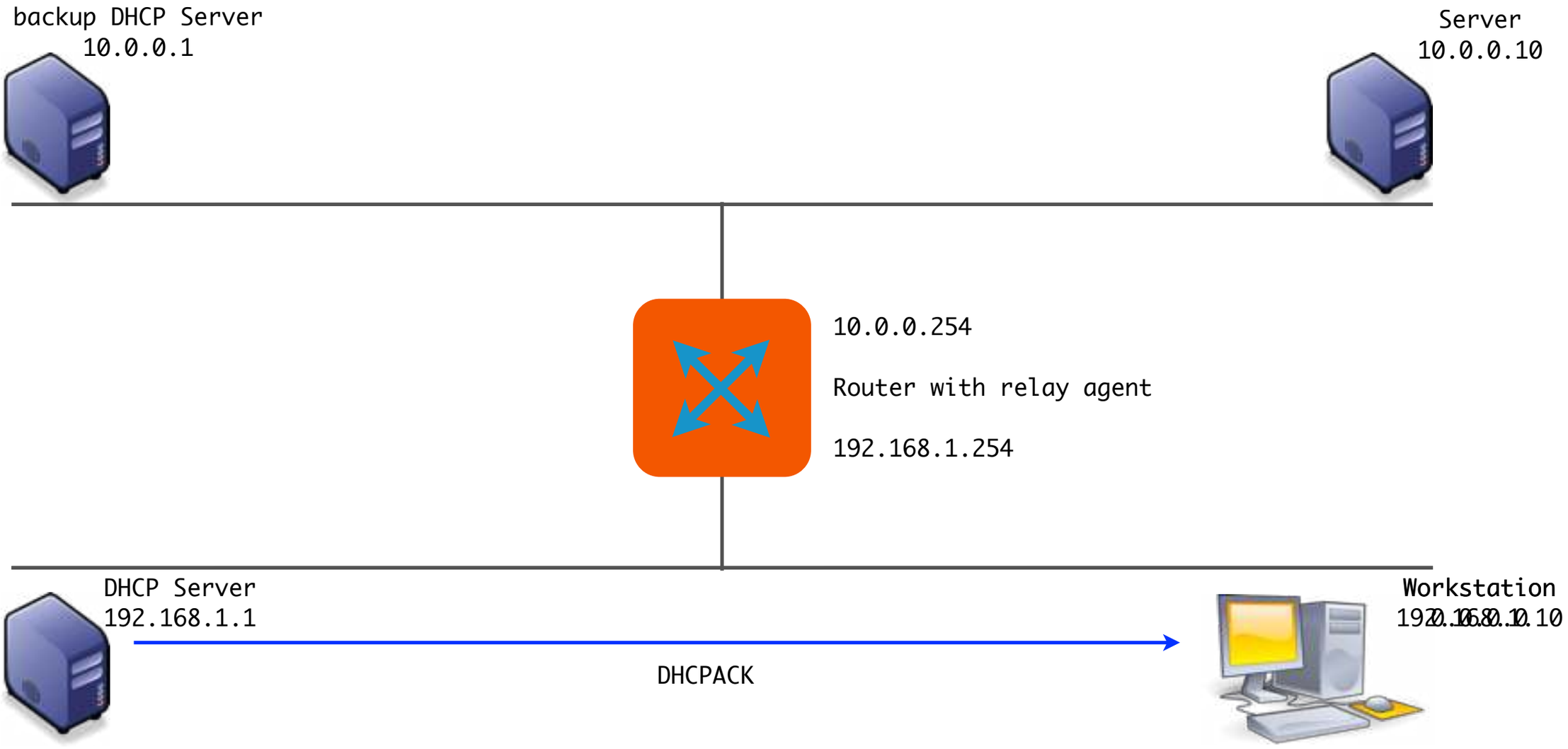
© Men & Mice http://menandmice.com

Redundant DHCP Servers



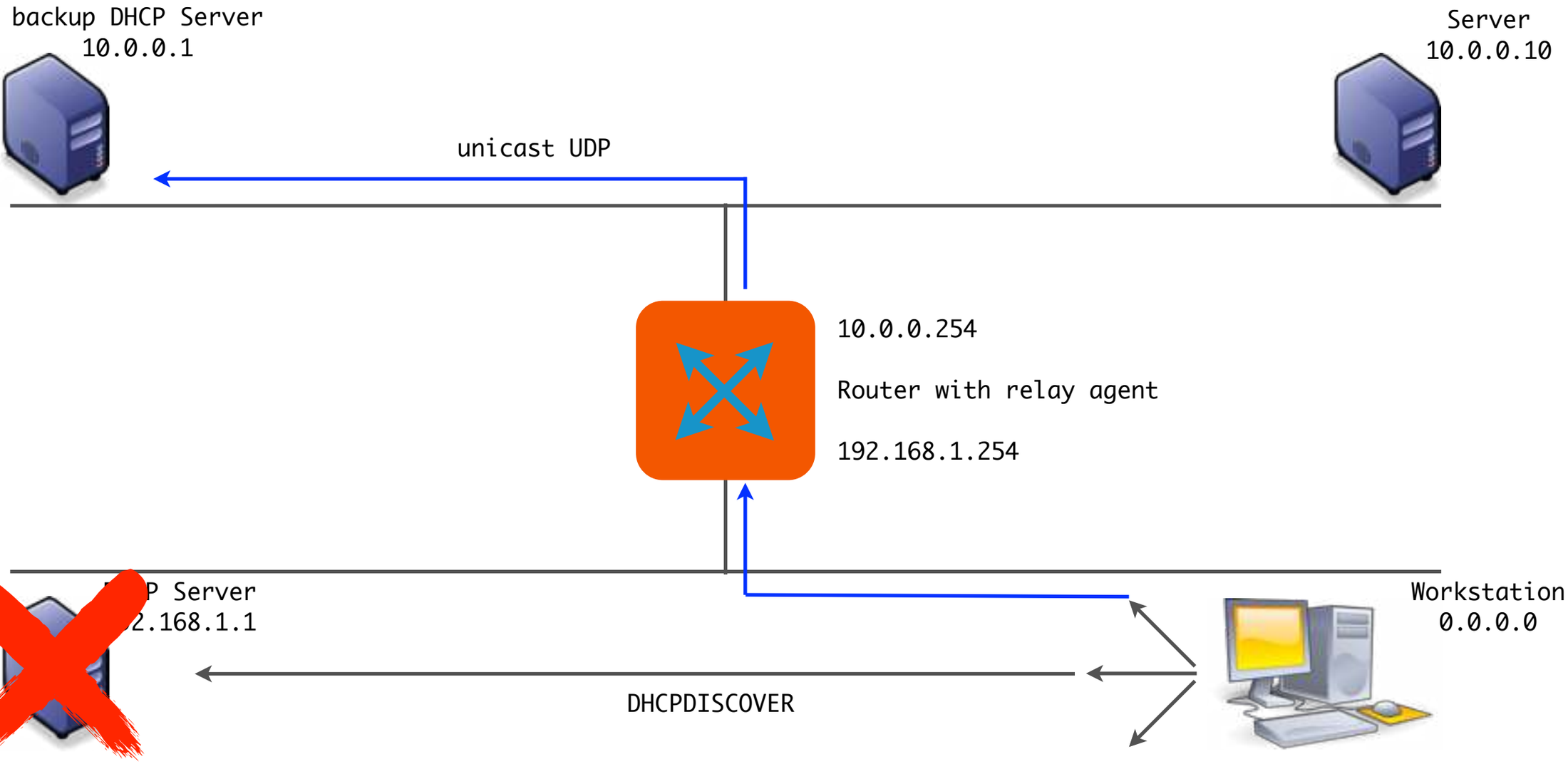
© Men & Mice http://menandmice.com

Redundant DHCP Servers



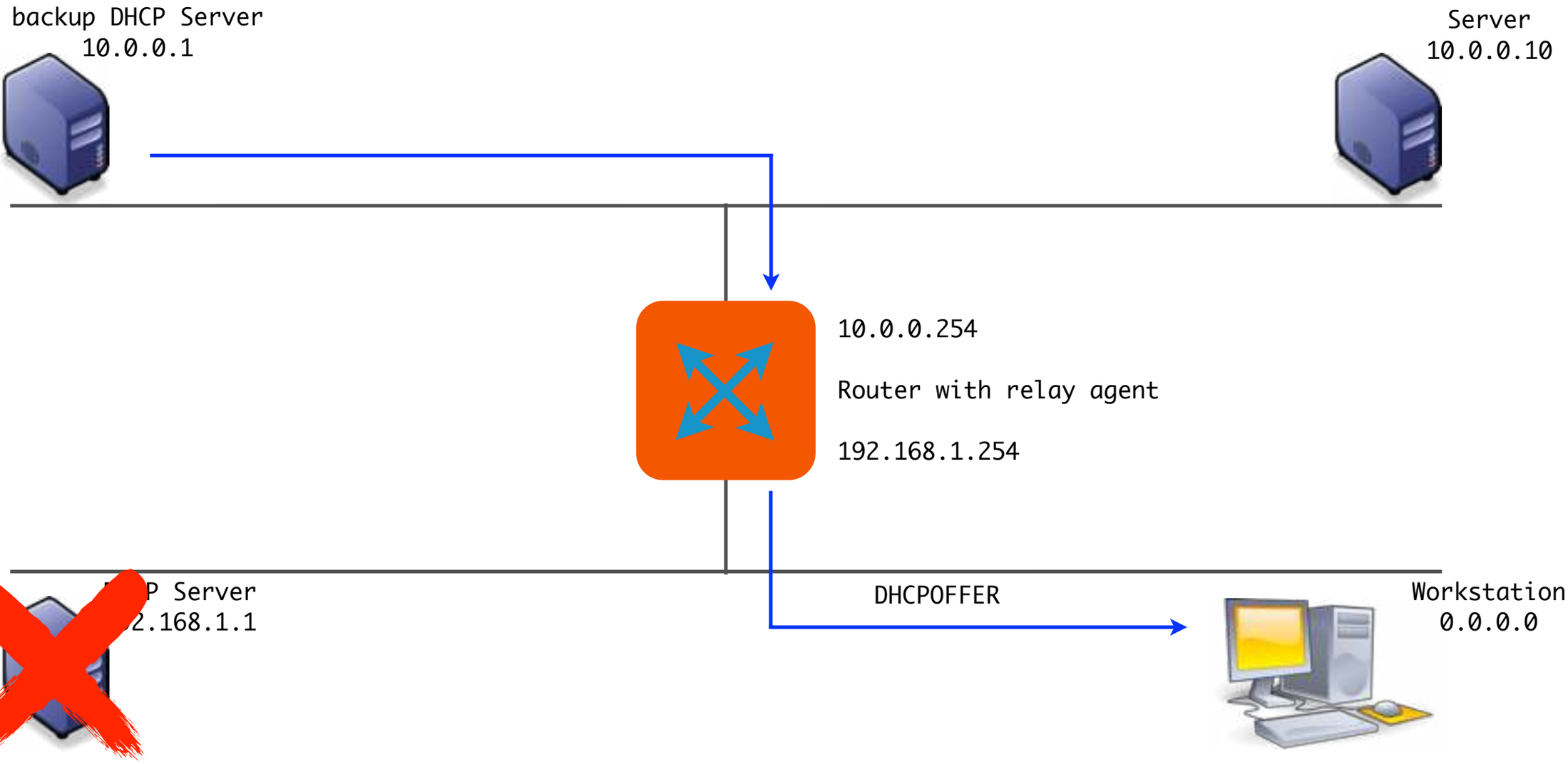
© Men & Mice http://menandmice.com

Redundant DHCP Servers



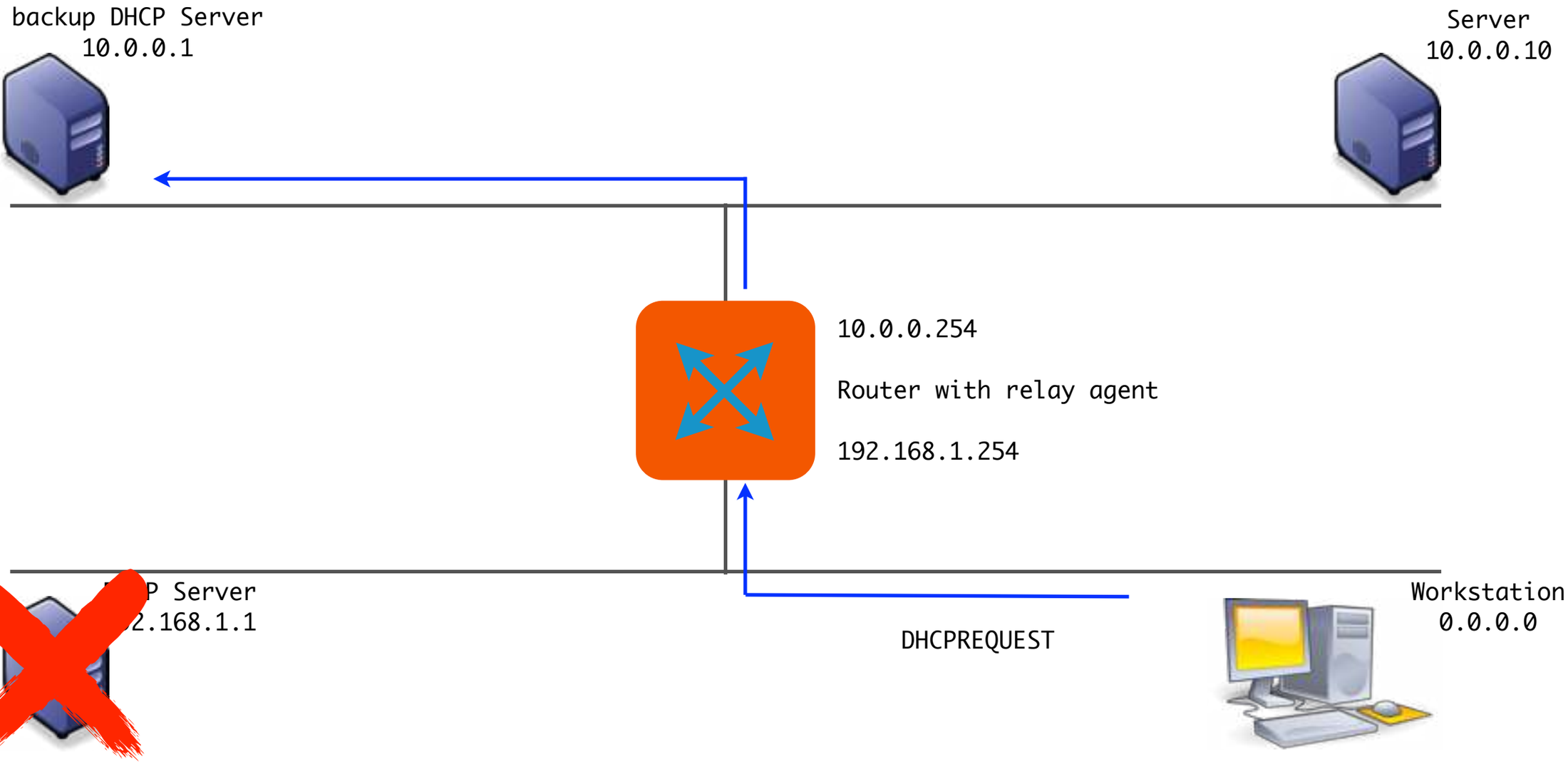
© Men & Mice http://menandmice.com

Redundant DHCP Servers



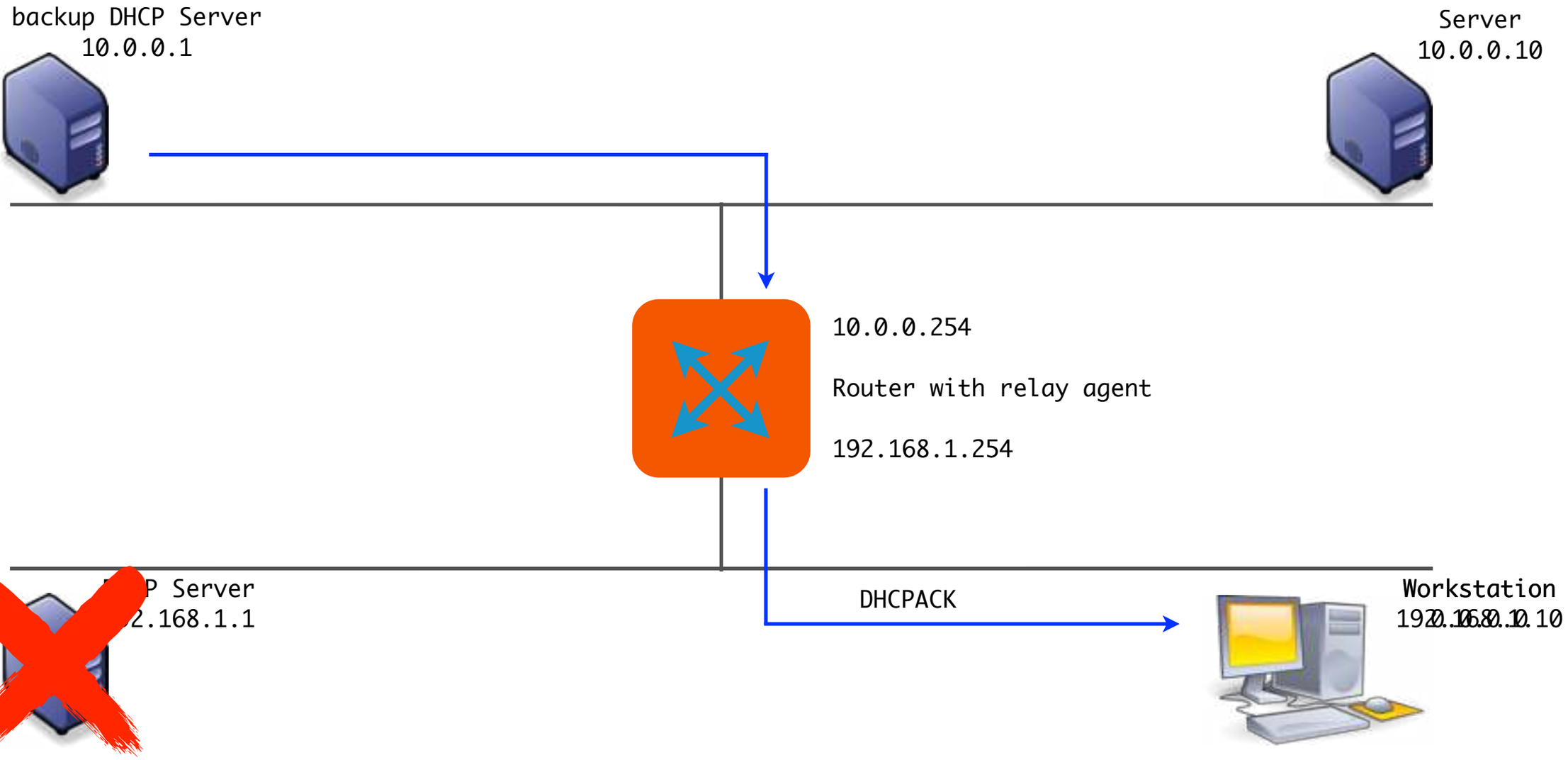
© Men & Mice http://menandmice.com

Redundant DHCP Servers



© Men & Mice http://menandmice.com

Redundant DHCP Servers



© Men & Mice http://menandmice.com

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 most “know” the leases the other servers have given out

© Men & Mice http://menandmice.com

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

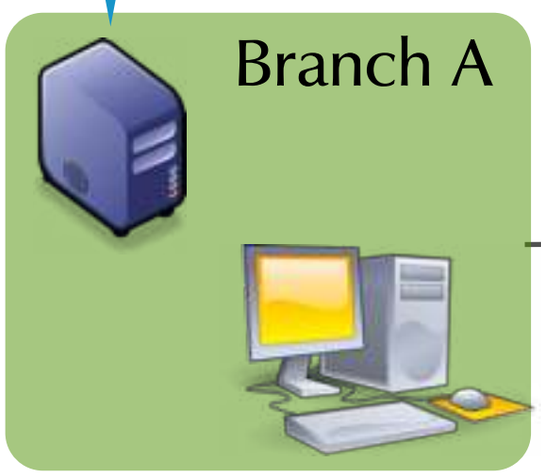
© Men & Mice http://menandmice.com

Redundant DHCP Servers

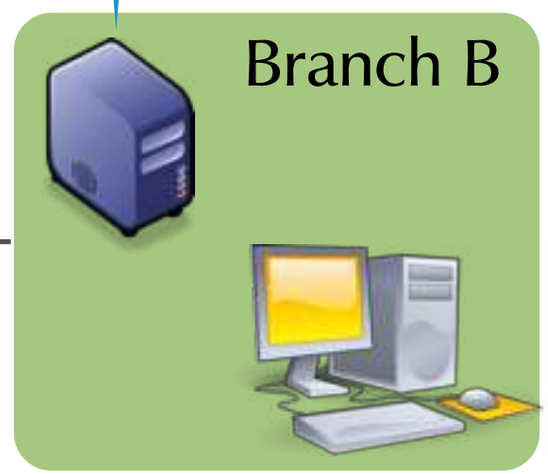
static DHCP

```
host computer {
   hardware ethernet 00:0d:93:c0:cb:f8;
   fixed-address 192.168.1.25;
}
```

```
host computer {
   hardware ethernet 00:0d:93:c0:cb:f8;
   fixed-address 192.168.1.25;
}
```



DHCP Relay



© Men & Mice http://menandmice.com

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

© Men & Mice http://menandmice.com

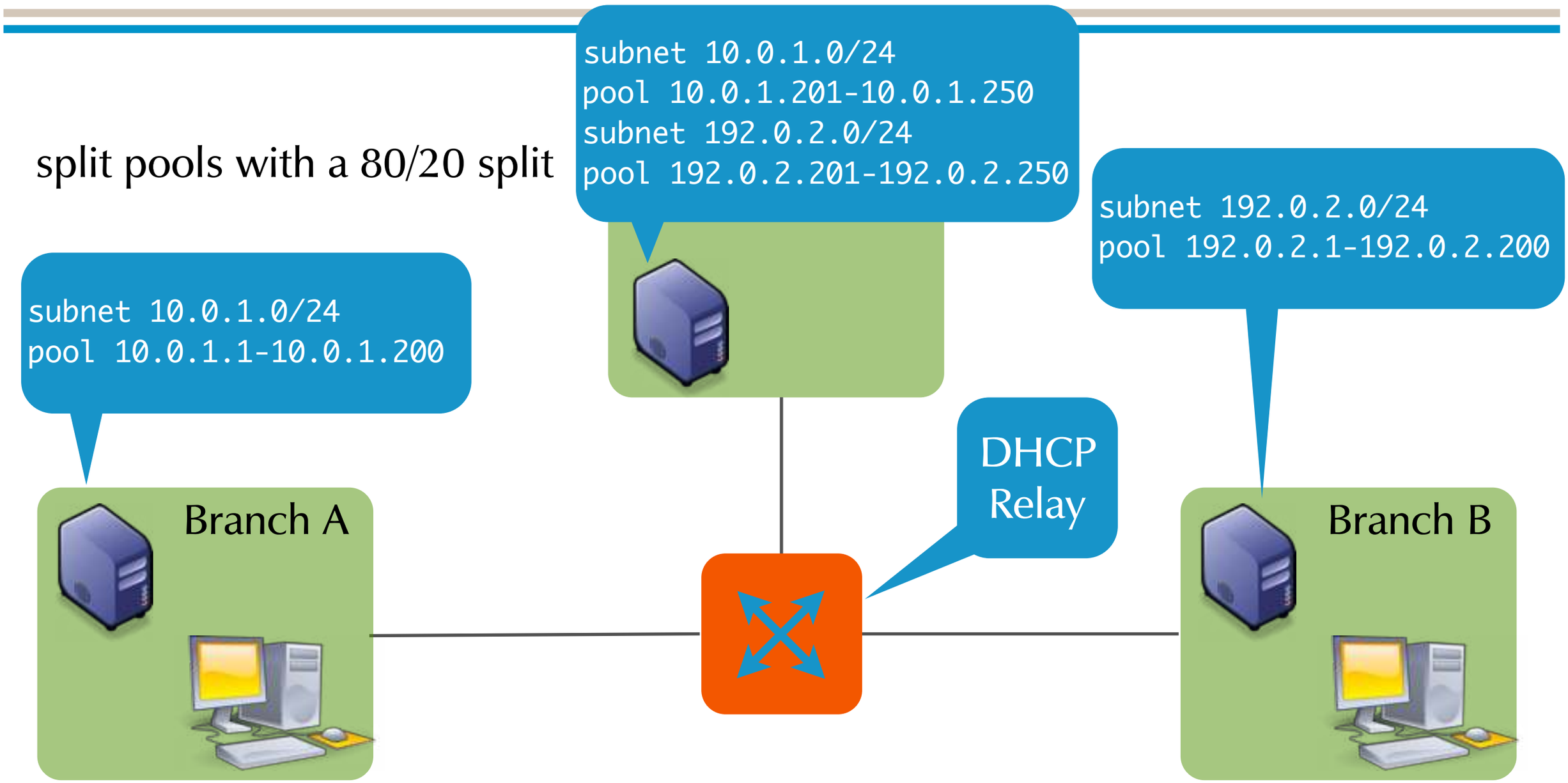
DHCP Server redundancy

- 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

© Men & Mice http://menandmice.com

Redundant DHCP Servers

split pools with a 80/20 split



© Men & Mice http://menandmice.com

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

© Men & Mice http://menandmice.com

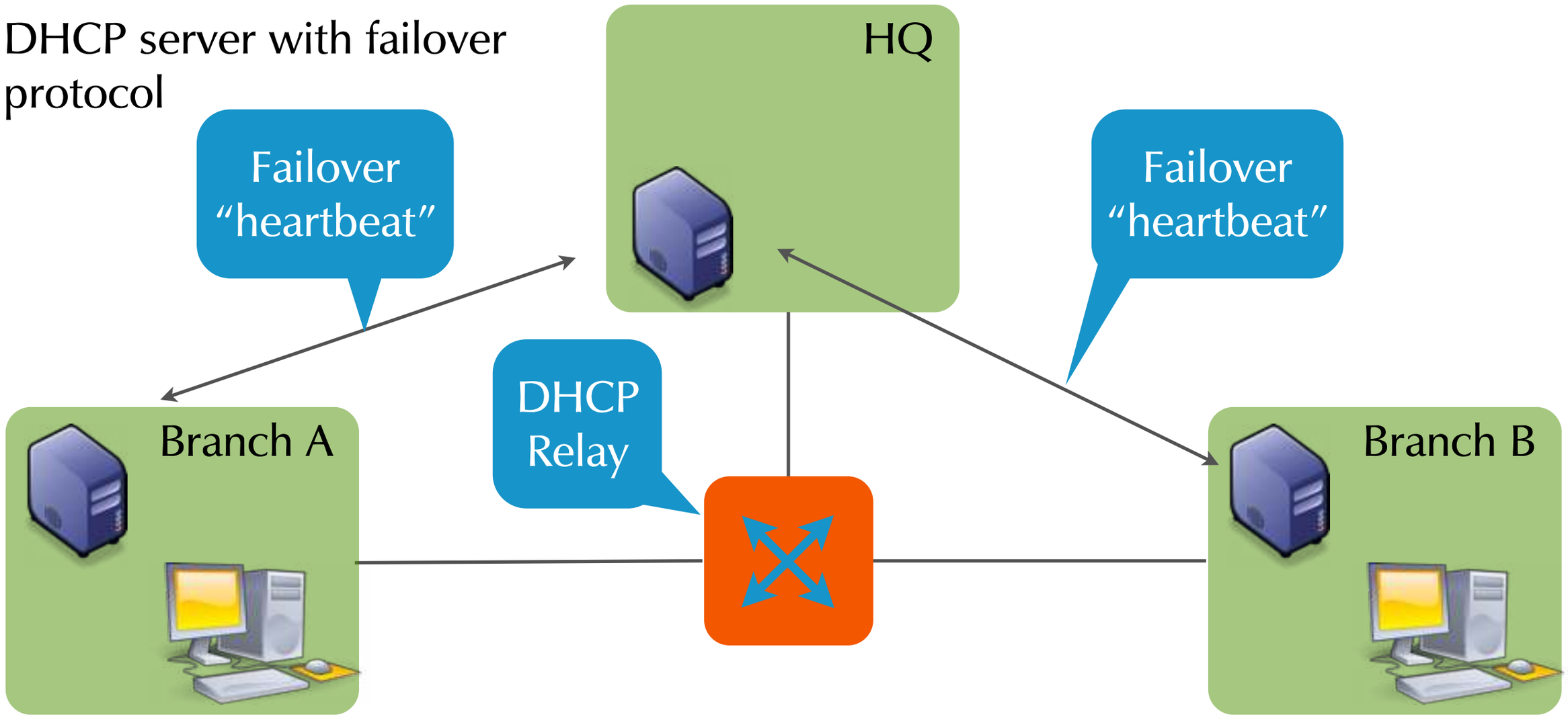
DHCP Server redundancy

- 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

© Men & Mice http://menandmice.com

Redundant DHCP Servers

DHCP server with failover protocol



© Men & Mice http://menandmice.com

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

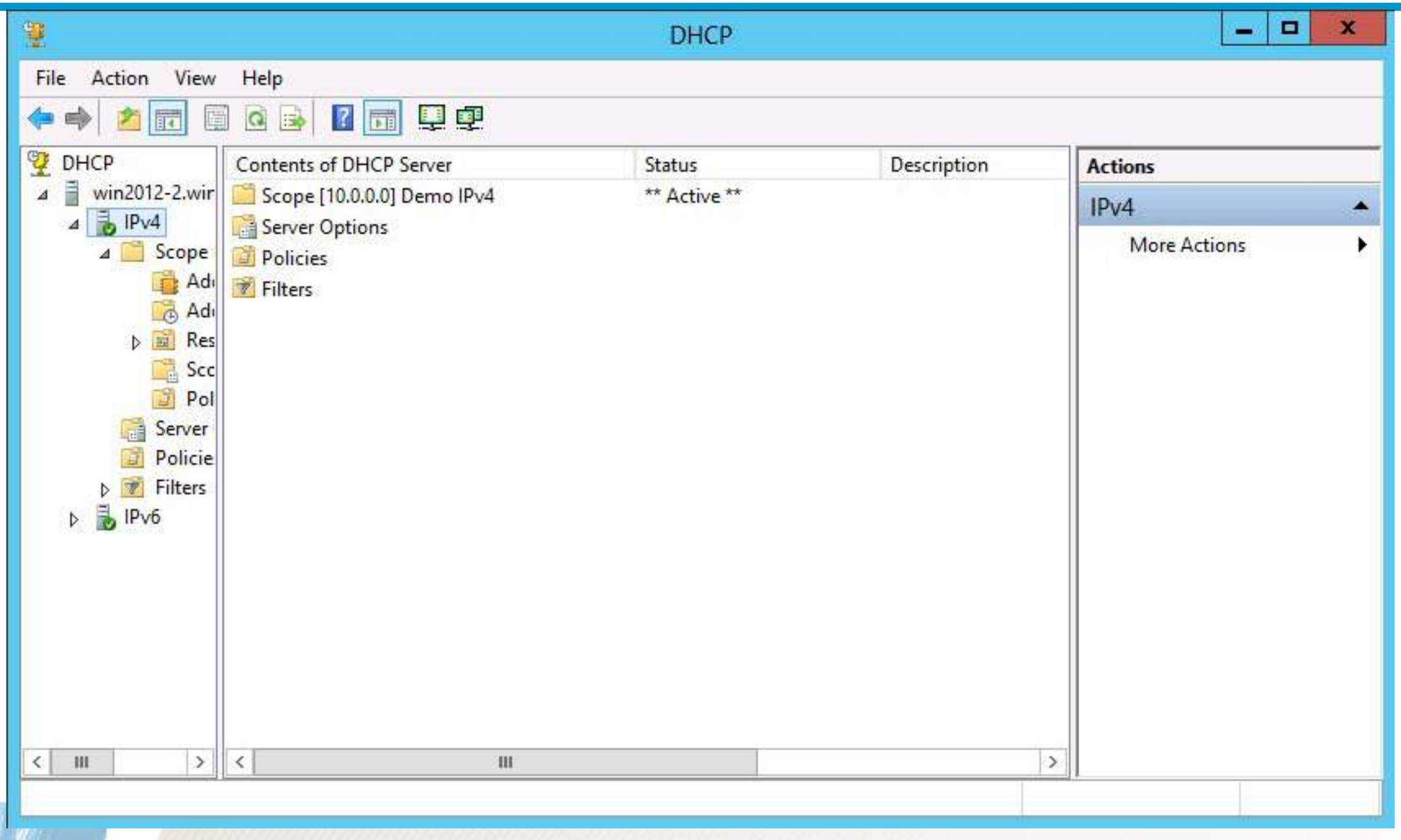
© Men & Mice http://menandmice.com

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

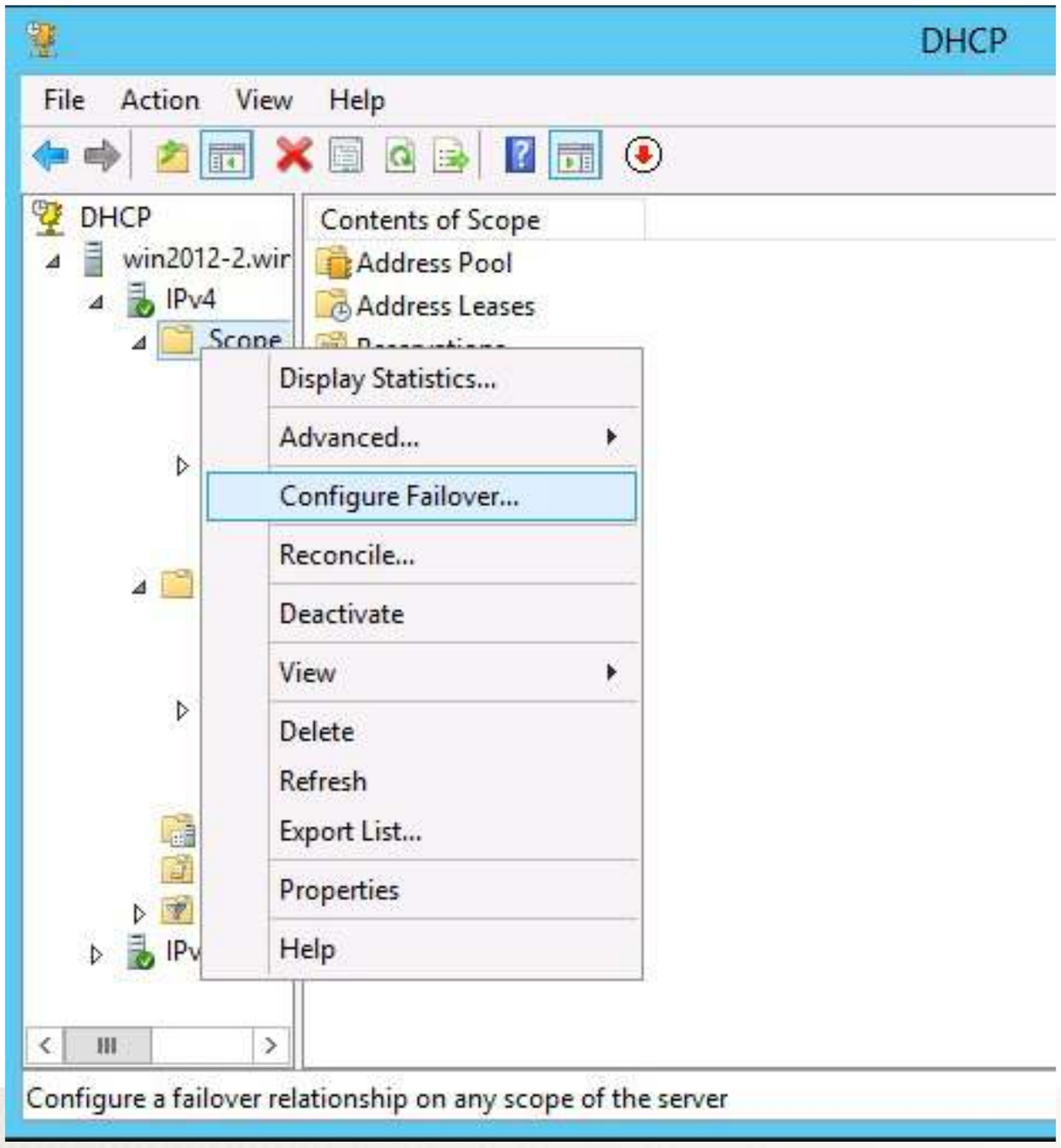
© Men & Mice http://menandmice.com

Configuring the Failover Protocol in Windows 2012



© Men & Mice http://menandmice.com

Configuring the Failover Protocol in Windows 2012

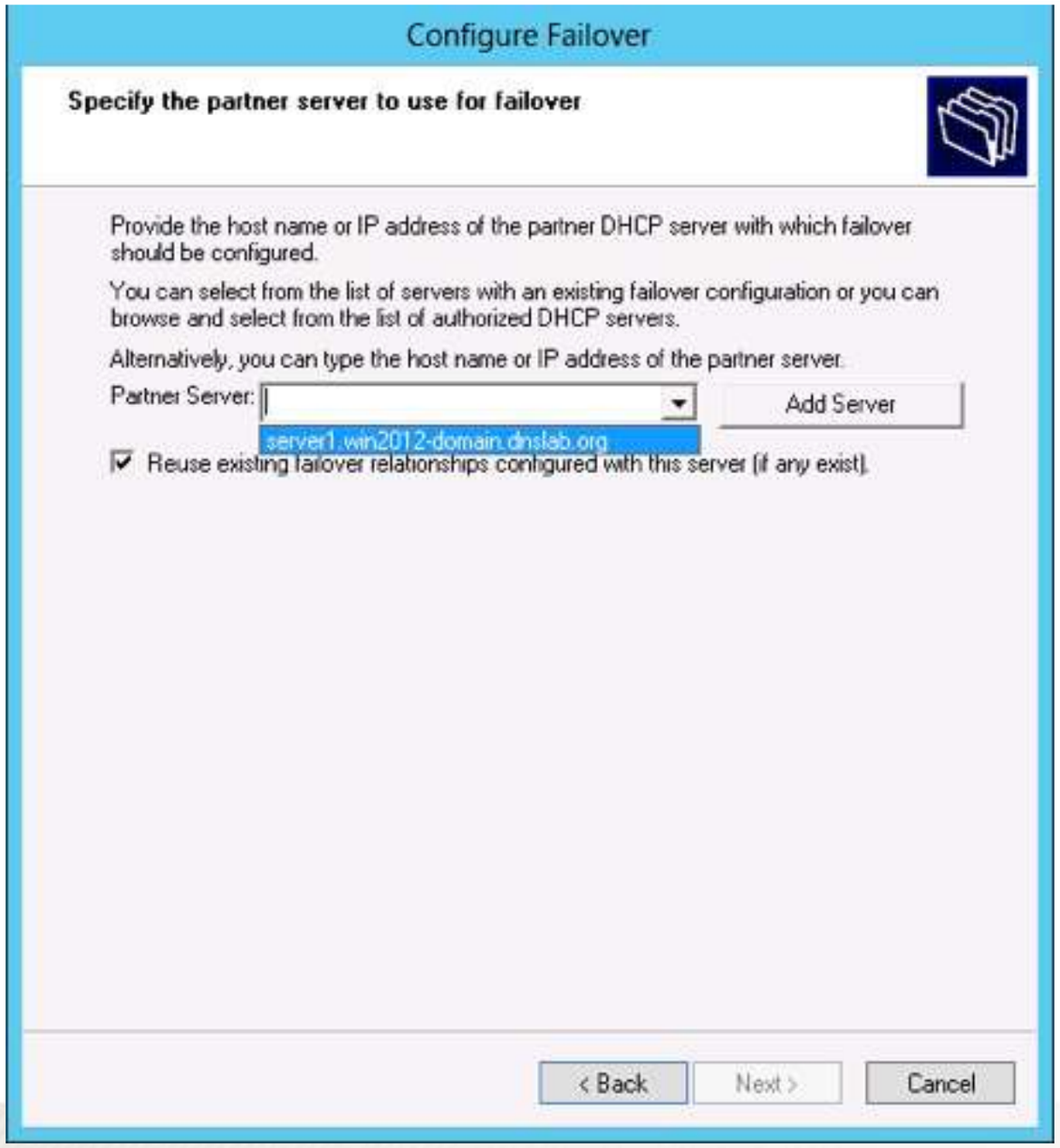


© Men & Mice http://menandmice.com

Configuring the Failover Protocol in Windows 2012

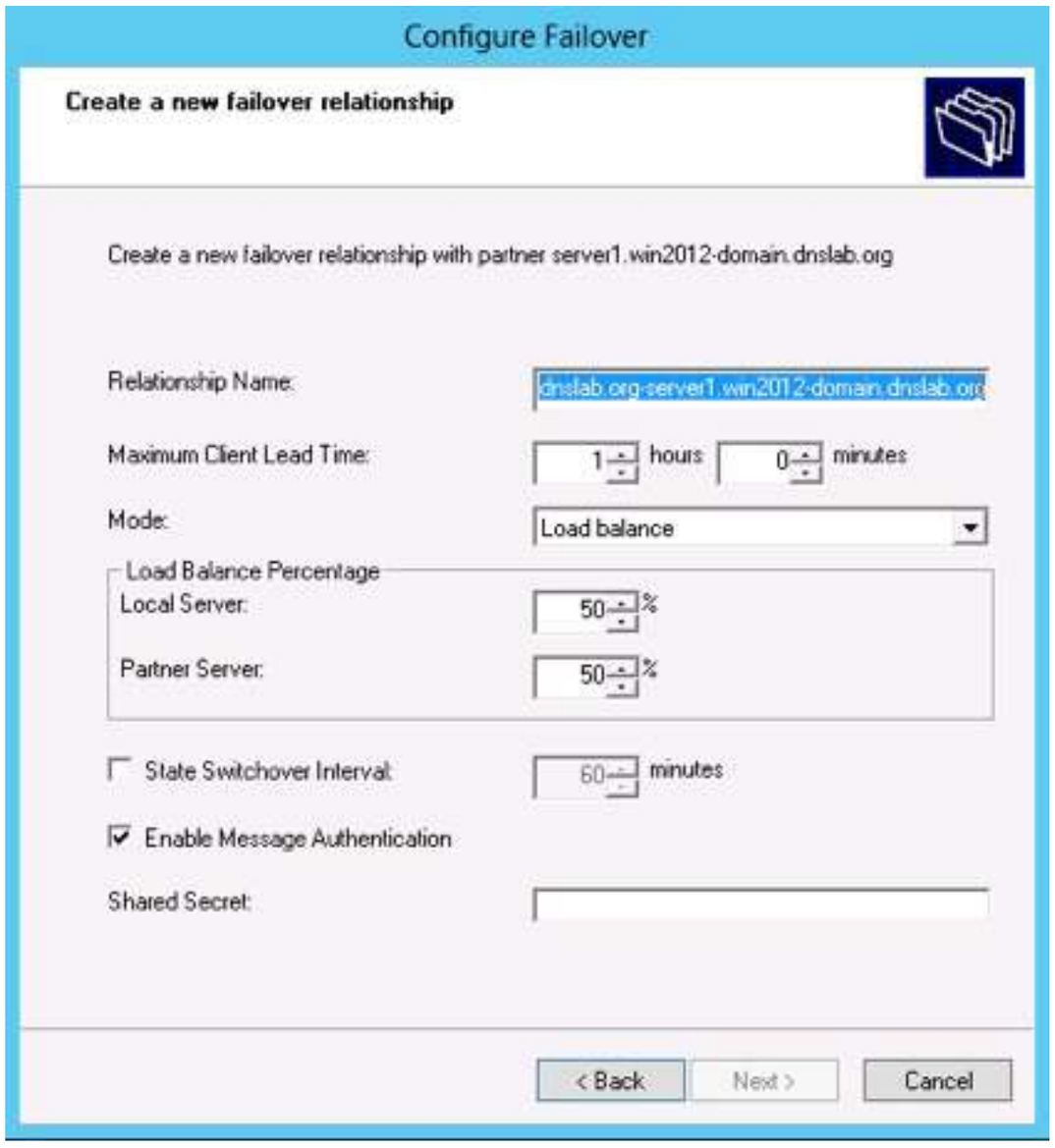
© Men & Mice http://menandmice.com

Configuring the Failover Protocol in Windows 2012



© Men & Mice http://menandmice.com

Configuring the Failover Protocol in Windows 2012



- **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

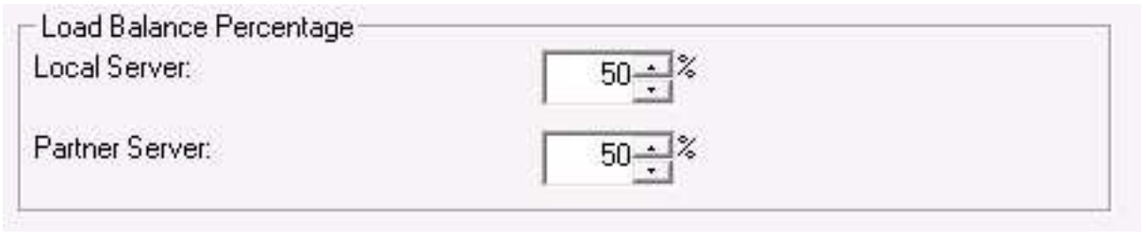
© Men & Mice http://menandmice.com

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

© Men & Mice http://menandmice.com

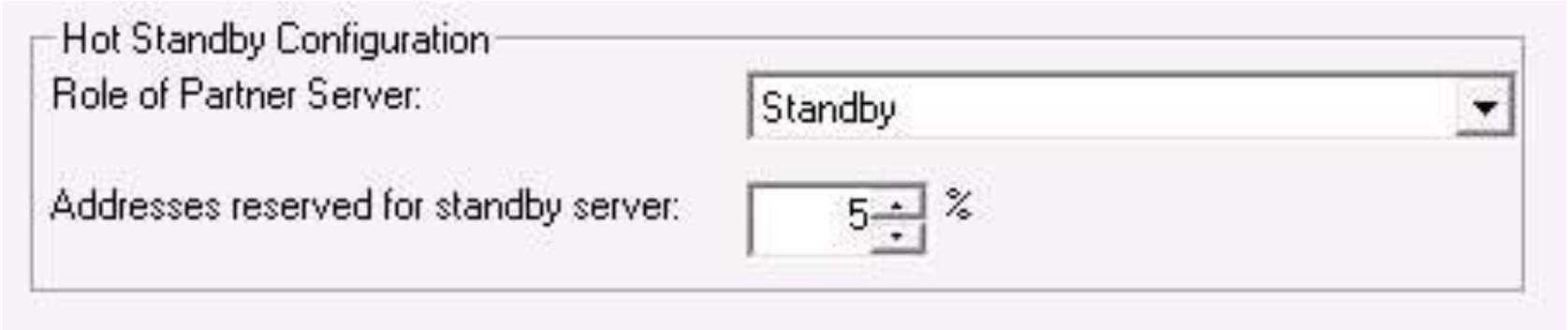
Failover modes



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

© Men & Mice http://menandmice.com

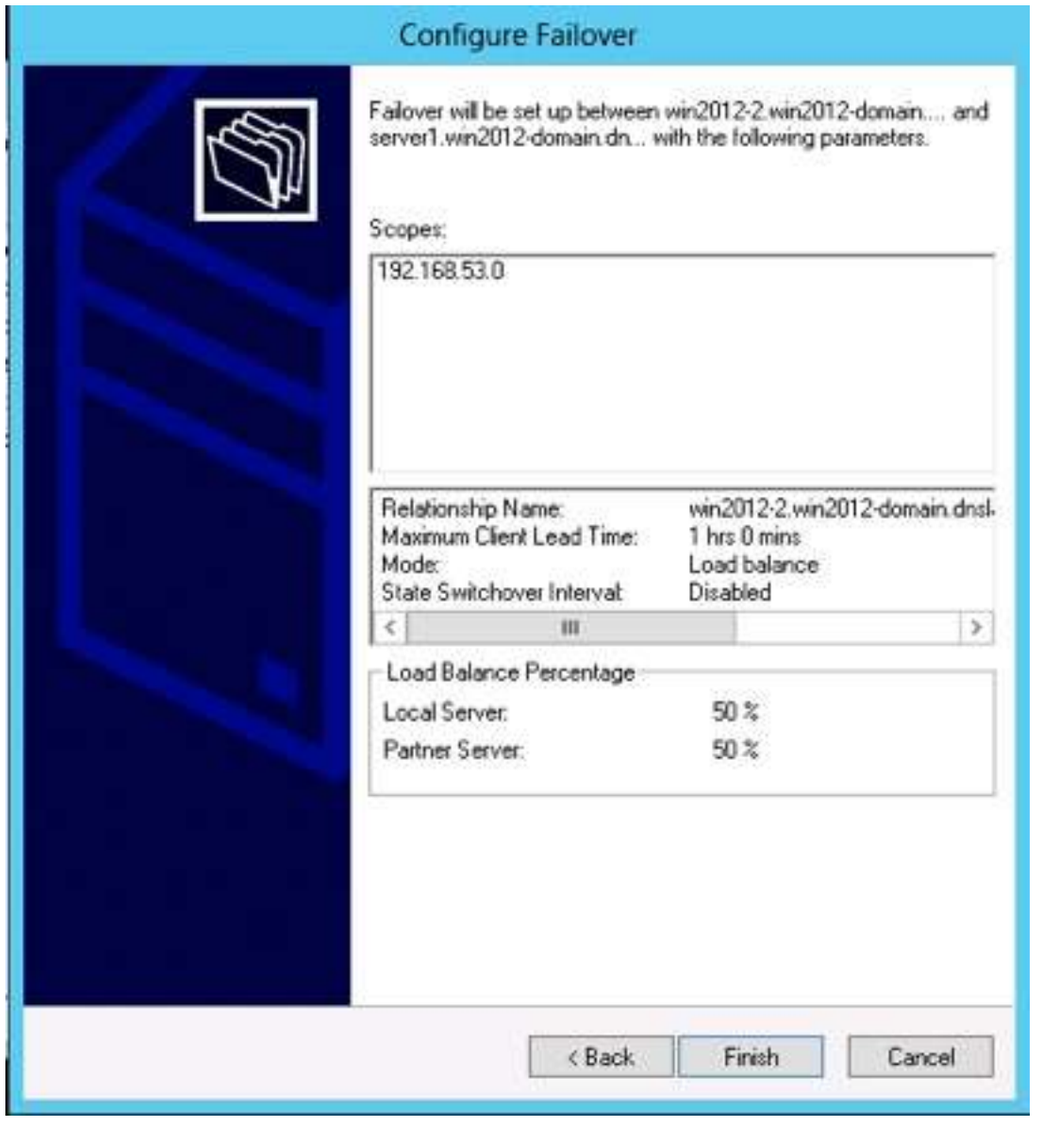
Failover modes



- 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

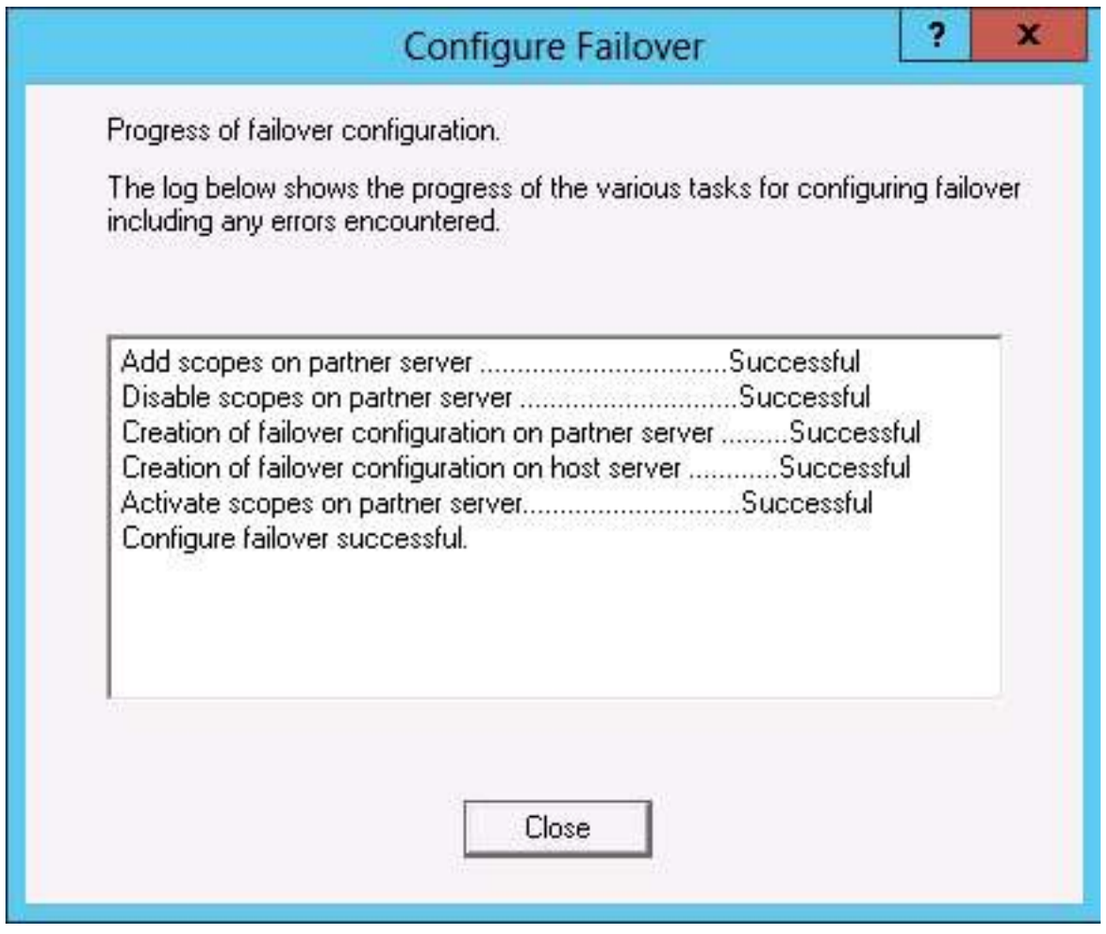
© Men & Mice http://menandmice.com

Failover protocol



© Men & Mice http://menandmice.com

Failover protocol

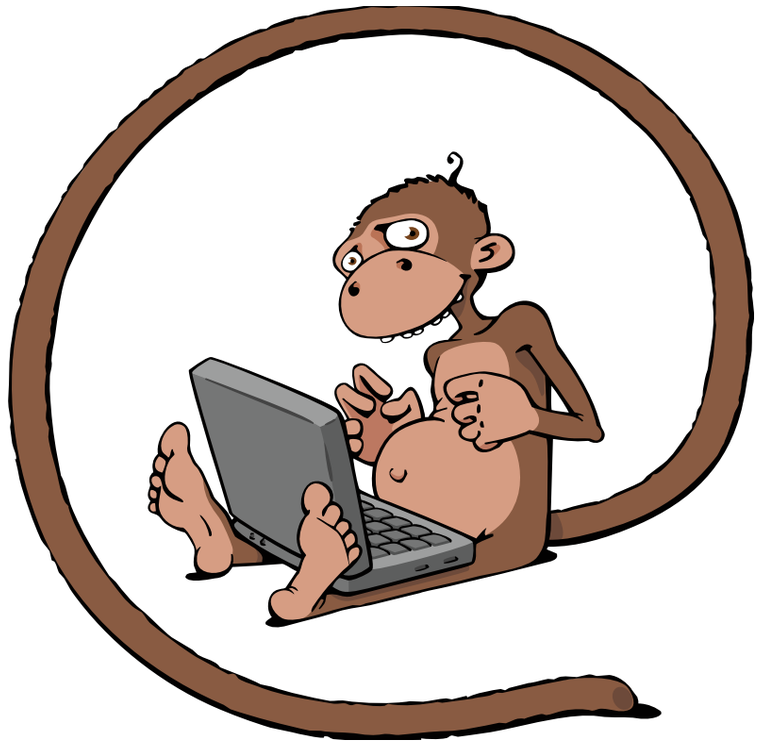


© Men & Mice http://menandmice.com

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/

© Men & Mice http://menandmice.com



Questions?

E-Mail:
carsten@menandmice.com

MEN&MICE

© Men & Mice http://menandmice.com