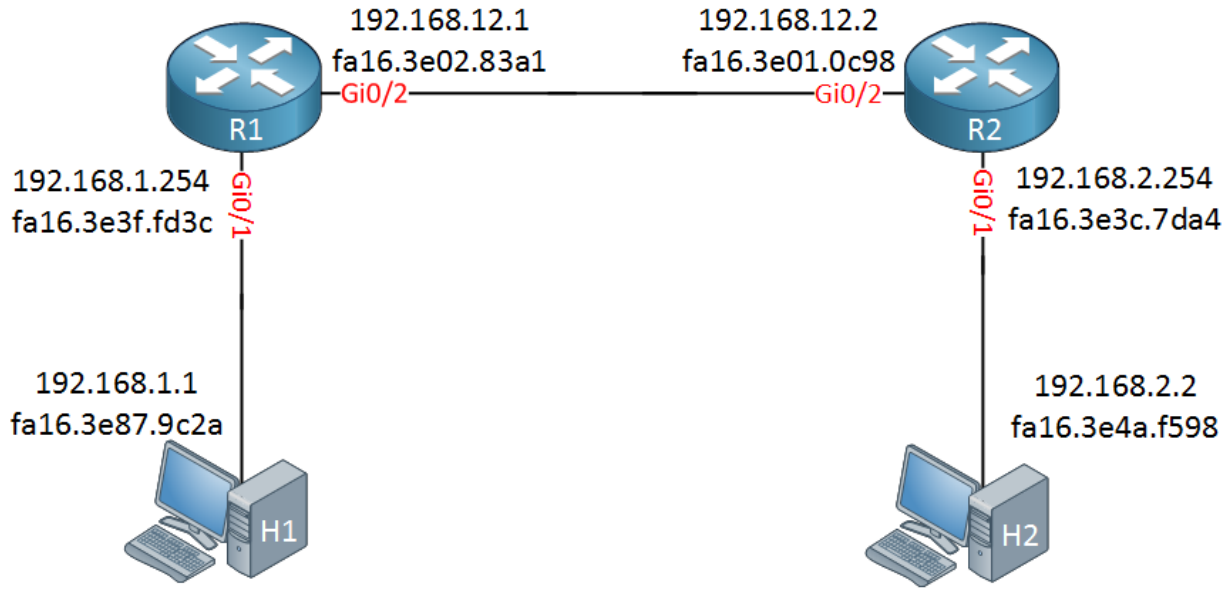
IP Routing

The actual forwarding of IP packets by routers is called *IP routing*. This has nothing to do with the “learning” of network routes through static or dynamic routing protocols. but has everything to do with the steps that routers have to take when they forward an IP packet from one interface to another.

In this lesson, I will walk you through an example and show you all steps that occur.

To do this, I will use the following topology:



Let’s summarize this process.

The host has a simple decision to make:

- Is the destination on the local subnet?
  - Check ARP table for destination IP address, if empty, send an ARP request.
- Is the destination on a remote subnet?
  - Check ARP table for default gateway IP address, if empty, send an ARP request.

The router has to perform a number of tasks:

- When it receives an Ethernet frame, check if the FCS (Frame Check Sequence) is correct. If not, drop the frame.

- Check if the destination address of the frame is:
    - destined to our MAC address
    - destined to a broadcast address of the subnet our interface is in.
    - destined to a multicast address that we listen to.
- De-encapsulate the IP packet from the frame, discard the Ethernet frame.
- Look for a match in the routing table for the destination IP address, figure out what the outgoing interface and optionally, the next hop IP address is.
- Decrease the TTL (Time to Live) field in the IP header, recalculate the header checksum.
- Encapsulate the IP packet in a new Ethernet frame.
- Check the ARP table for the destination IP address or next hop IP address.
- Transmit the frame.