

# Exercise 2

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# CRC checksums

Please calculate the CRC  $R$  of

$$D = 0101\ 1101\ 1010\ 0101\ 1110\ 0000.$$

Use the 4 bit generator

$$G = 1101.$$

*Note:*

*$R$  is always of length  $|G|-1$*

# CRC (Done by Vivien & Fabiola) tries by Linux, Jonathon and Helen

Handwritten binary long division on a chalkboard:

Top row:  $01101100110101110000000000000000$

Left side division:

$$\begin{array}{r} 1101 \\ 01101 \\ \underline{1101} \\ 000001101 \\ \underline{1101} \\ 00011011 \\ \underline{1101} \\ 1101 \\ \underline{1101} \\ 0 \end{array}$$

Right side division:

$$\begin{array}{r} 1100 \\ 1101 \\ \underline{1101} \\ 010 \\ \underline{1000} \\ 1101 \\ \underline{1010} \\ 1101 \\ \underline{1110} \\ 1101 \\ \underline{1101} \\ 110 \end{array}$$

Remainder:  $R = 110$

# Purpose of the link layer

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Answer:

Hop-to-hop connection in one network  
(NOT between networks)

# ARP and inter-networking

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# ARP and inter-networking

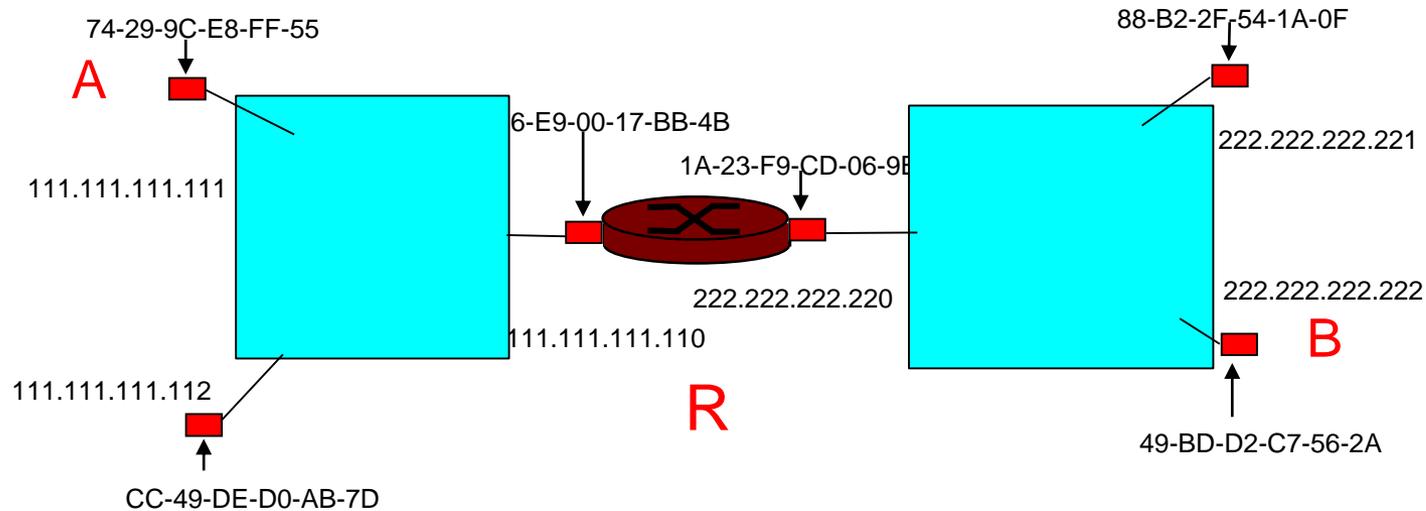
What happens, if you want to connect to a host that is not in your local area network?

Answer:

Remember: ARP is layer 2, routers are layer 3.  
Inter-networking is the job of the network layer.

ARP is serving in looking up the MAC of the router that connects to the network of the destination node.

- 1.A creates IP datagram with source A, destination B
- 2.A uses ARP to get R's MAC address for 111.111.111.110
- 3.A creates link-layer frame with R's MAC address as dest, frame contains A-to-B IP datagram
- 4.A's NIC sends frame
- 5.R's NIC receives frame
- 6.R removes IP datagram from Ethernet frame, sees destination B
- 7.R uses ARP to get B's MAC address
- 8.R creates frame containing A-to-B IP datagram sends to B



# MAC and IP addresses

Please name a conceptual difference between MAC and IP addresses

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Answer:

MAC addresses are unique identifiers for a specific device.

IP addresses for devices may change frequently

# Exponential backoff

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Answer:

Exponential backoff is a simple way to quickly resolve a collision and to adapt to varying congestion states.

It does not require additional signalling among nodes.