

# Exercise 2

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# CRC checksums

Please calculate the CRC  $R$  of

$$D = 0101\ 1100\ 1010\ 0111\ 1110\ 1111.$$

Use the 4 bit generator

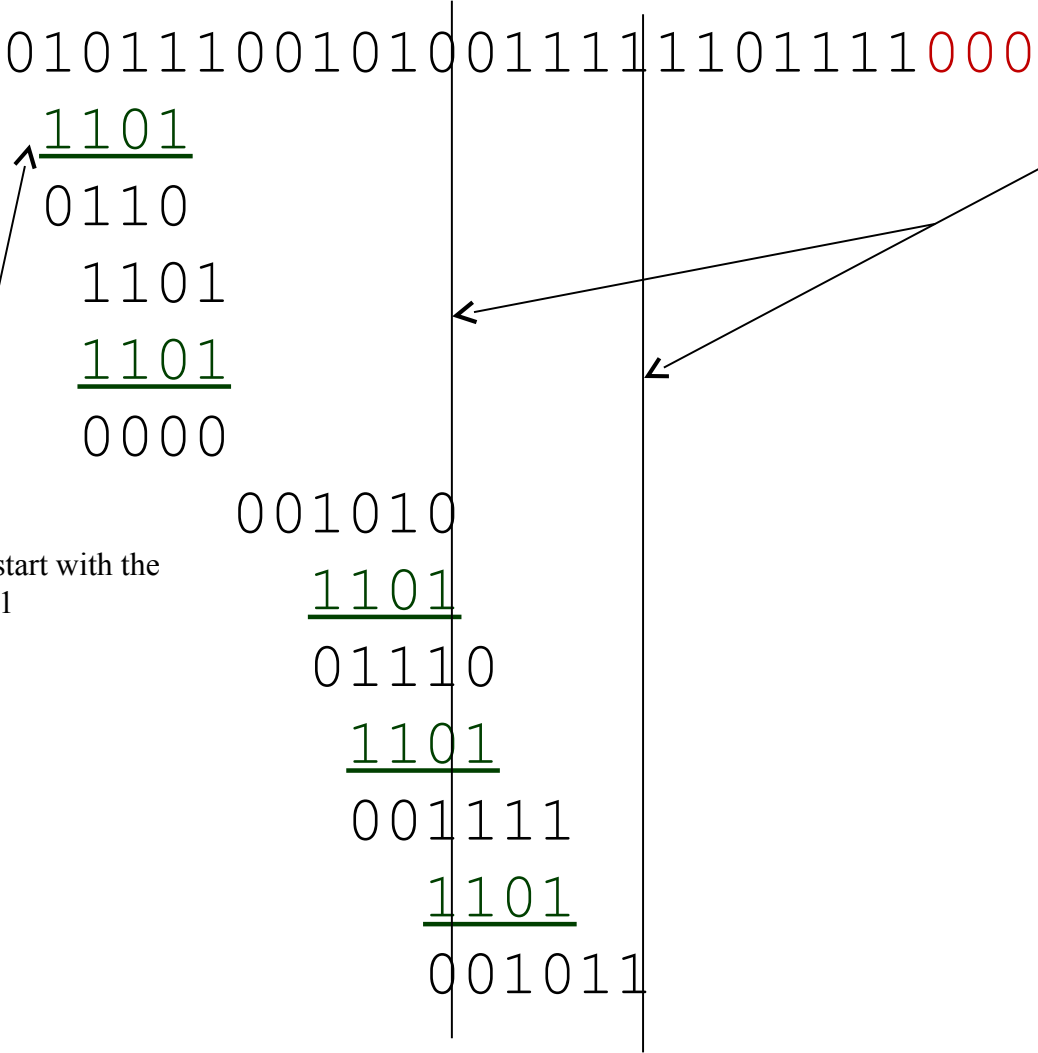
$$G = 1101.$$

*Note:*

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

# CRC Checksums

just lines to help:  
do not lose the  
correct column!



always start with the  
leading 1

# CRC Checksums

```
0101110010100111111101111000
      1011
      1101
      01101
        1101
        0000
          1011
          1101
          01101
            1101
            00001000
              1101
              0101
```

Remainder = CRC = 101

only 3 bits!

# 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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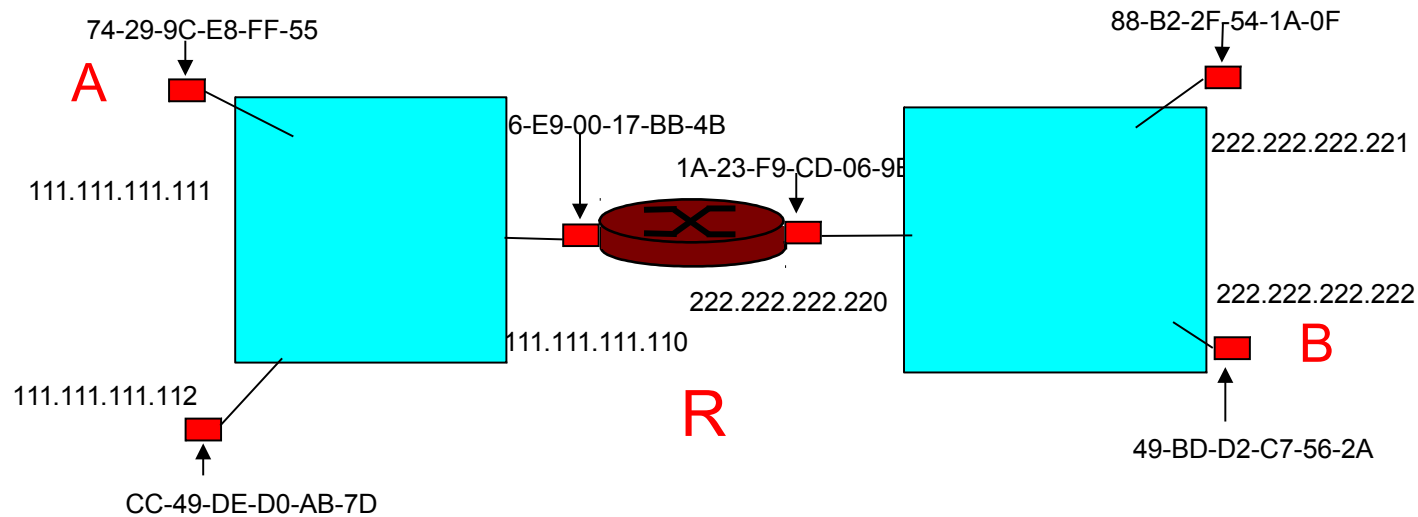
Answer:

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

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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.