CS2105 Lecture 10
Local Area Network

30 March, 2014

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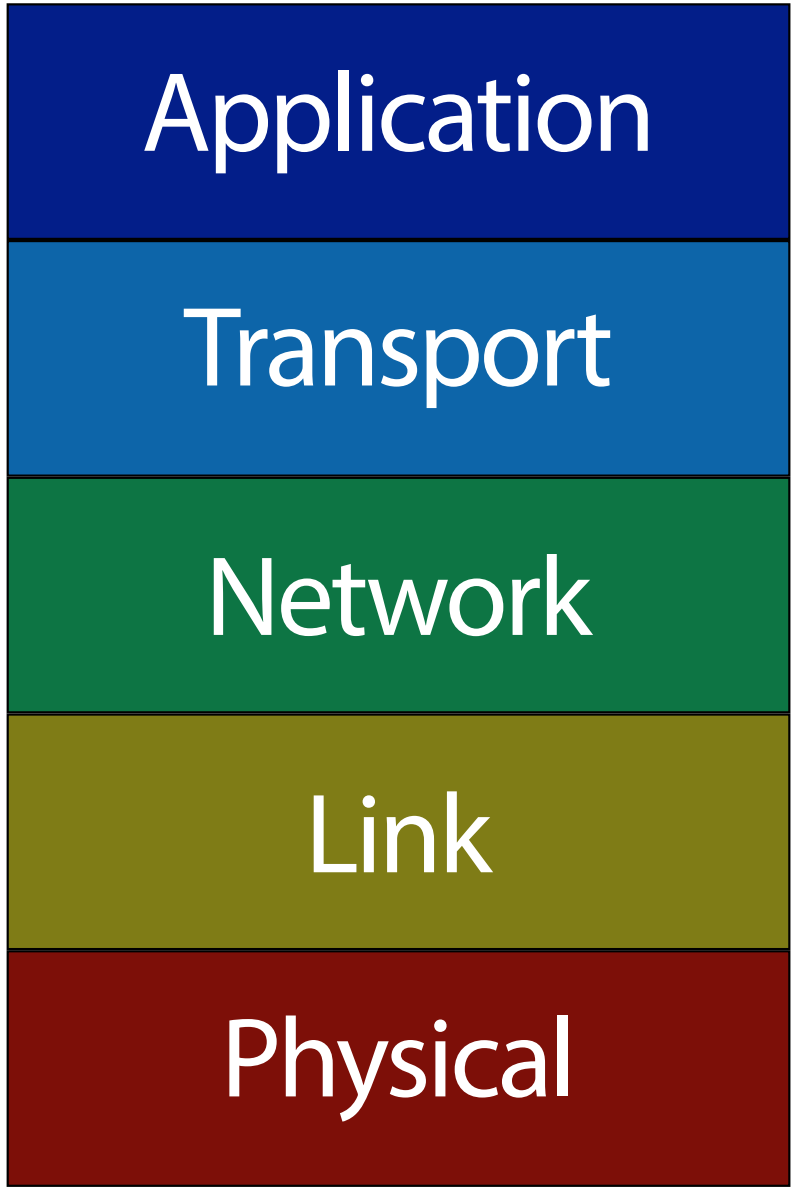
After this class, you are expected to be able to understand:

- the role of MAC address.
- the role of a hub and a switch in interconnecting subnets in a LAN.
- how switching table is built and how it is used to filter/forward link-layer frames.
- how ARP allows a host to discover the MAC addresses of other nodes.
- the link properties of a wireless link.
- how CSMA/CA works and how it addresses the hidden node problem.

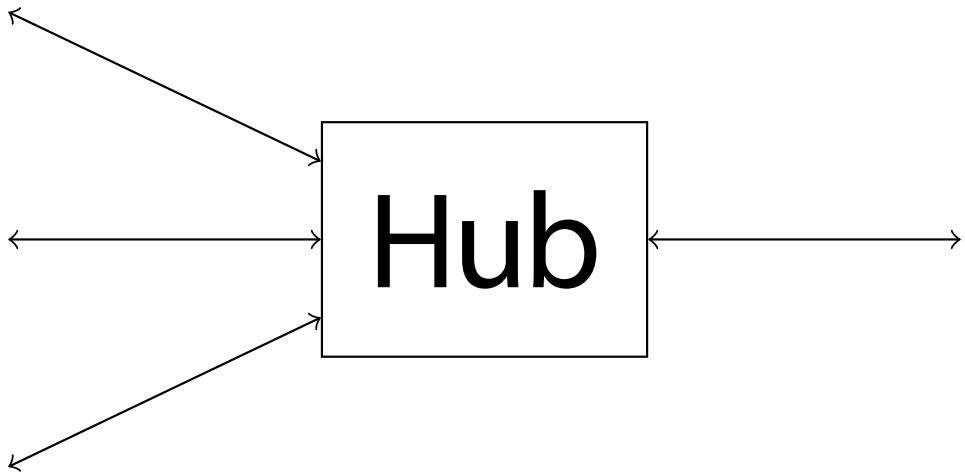

Application
Transport
Network
Link
Physical

How to inter-connect large number of hosts in a subnet?

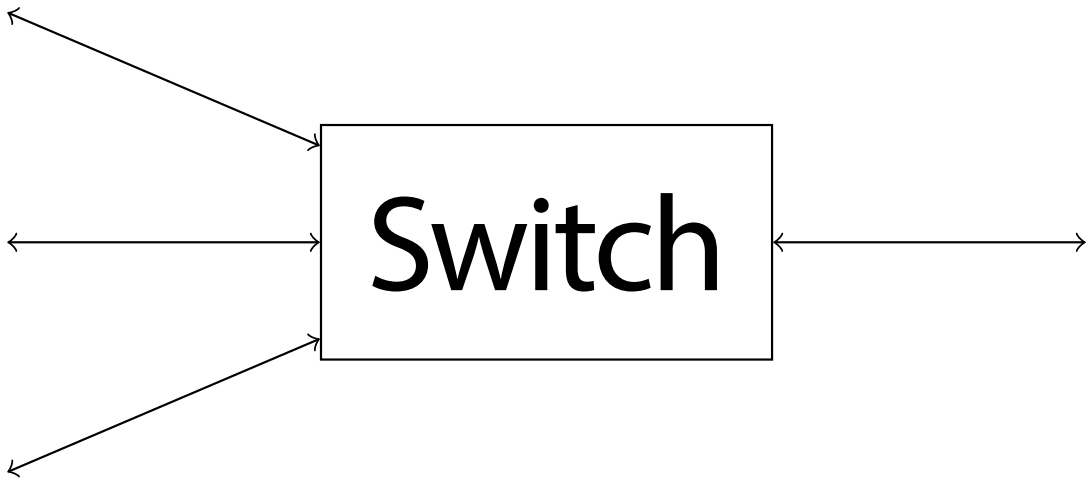
Router: Network layer

Switch: Link layer

Hub: Physical layer



simply forward signals to all outgoing links



forward/filter based on MAC address

MAC Address

e.g., `FF:CA:43:09:23:13`

MAC Address

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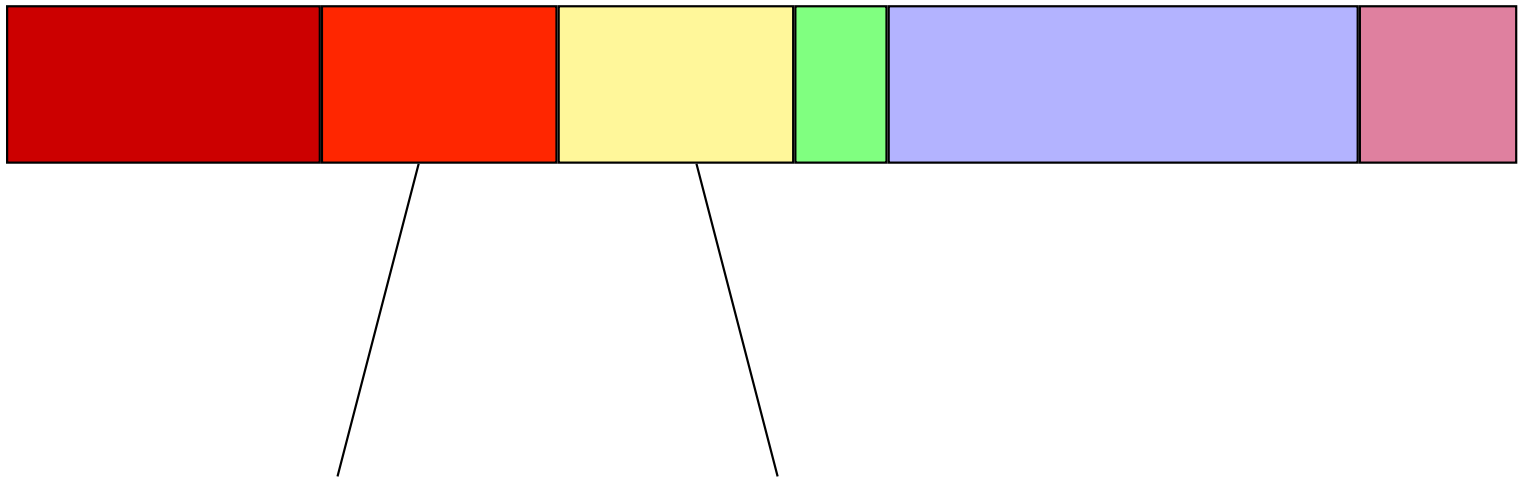
The first three byte identifies the vendor of the hardware. Several sites, such as `http://www.coffer.com/mac_find/` allows us to lookup the vendor given the 3-byte prefix of a MAC address

MAC address vs. IP address

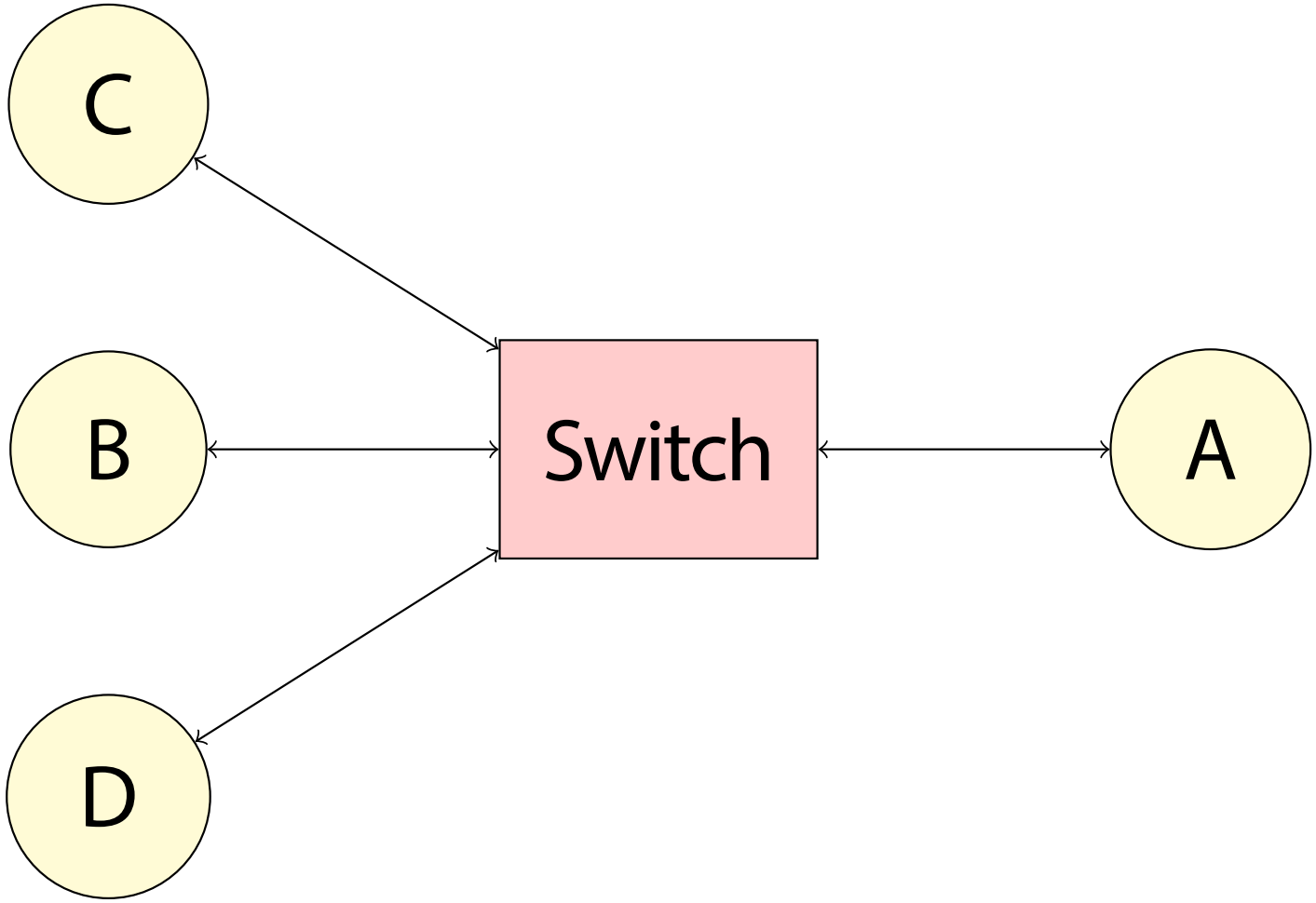

Src MAC
Address
(6 bytes)
Dest MAC
Address
(6 bytes)

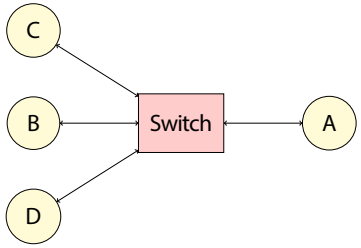
How to find the destination's MAC address?

How to find the destination's MAC address?

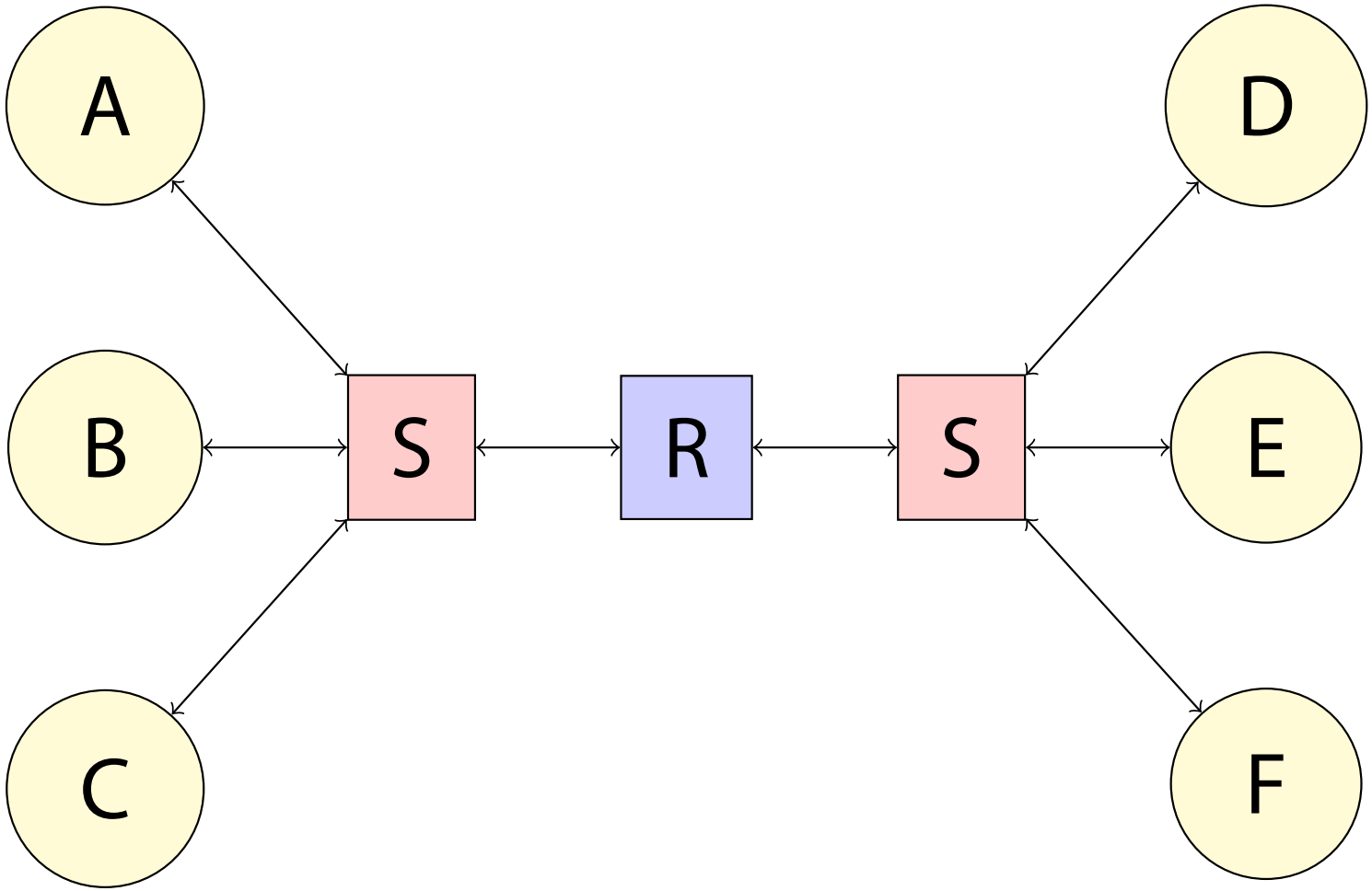
We previously asked a similar question: how to find the destination's IP address? You should know the answer to this question.

ARP:
Address Resolution Protocol


C
B
D
Switch
A



You can inspect your own ARP table with the command `arp -na` (on Mac OS X). Your operating systems may have a different syntax. Check your documentation for the `arp` command for details.


A
B
C
S
R
S
D
E
F

How does a switch know which is the right interface to forward a frame to?

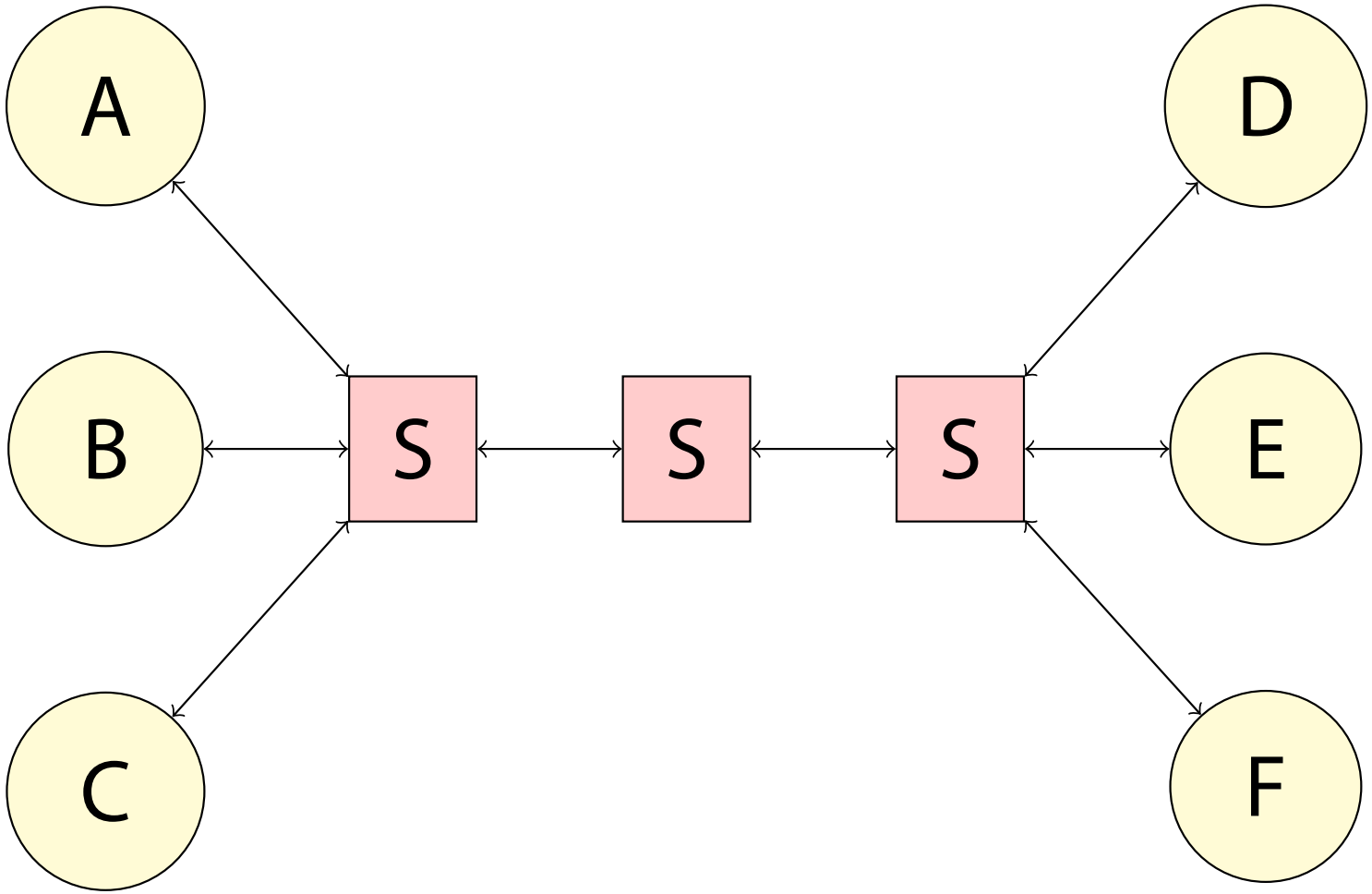
How does a switch know which is the right interface to forward a frame to?

We previously asked a similar question: how does a router know which is the right interface to forward a datagram to? You should know the answer to this question.

Switching Table

MAC address	Interface
FA:CE:B0:0C:12:45	1
66:75:23:78:BE:EF	2
13:00:17:77:AA:AA	3

self-learning



IEEE 802.11 Wireless LAN (or **WiFi**)

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(or **WiFi**)

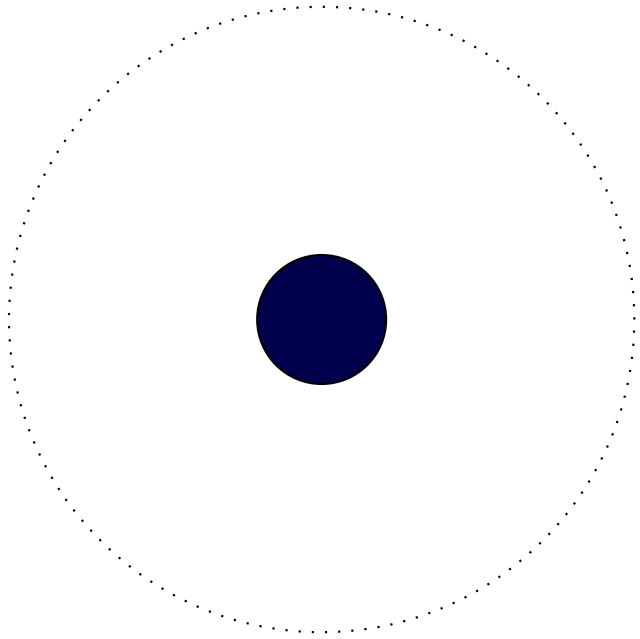
We will only touch this topic briefly in CS2105. Interested students can consider taking CS4222, which covers wireless networking in depth.

BSS

AP

SSID

RSSI



CSMA/CA

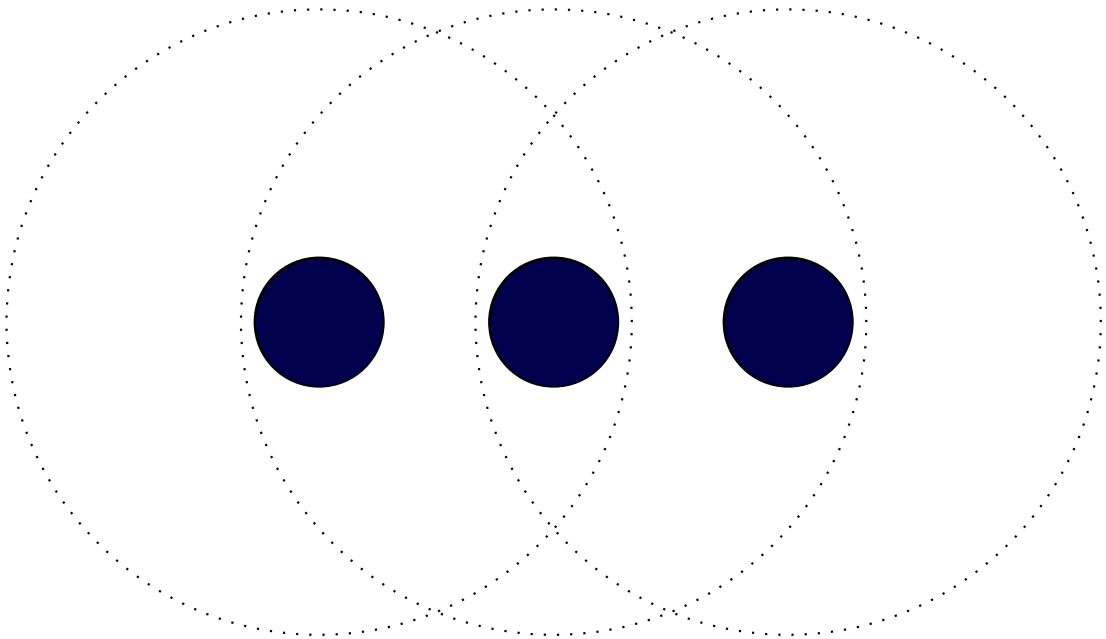
CA = collision avoidance

1. No collision detection
2. Link-layer ACK

Why no collision detection?

1. $RSSI_{recv} < RSSI_{send}$
2. Cannot detect all collision

Hidden Node Problem



Why need link-layer ACK?
Cannot detect all collision!