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.
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
Switch

forward/filter based on MAC address
MAC Address

e.g., FF:CA:43:09:23:13
MAC Address

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

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?
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
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.
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

<table>
<thead>
<tr>
<th>MAC address</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>FA:CE:B0:0C:12:45</td>
<td>1</td>
</tr>
<tr>
<td>13:00:17:77:AA:AA</td>
<td>3</td>
</tr>
</tbody>
</table>
self-learning

A
S
S
S
B
C
D
E
F
IEEE 802.11 Wireless LAN (or WiFi)
IEEE 802.11 Wireless LAN
(or WiFi)

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