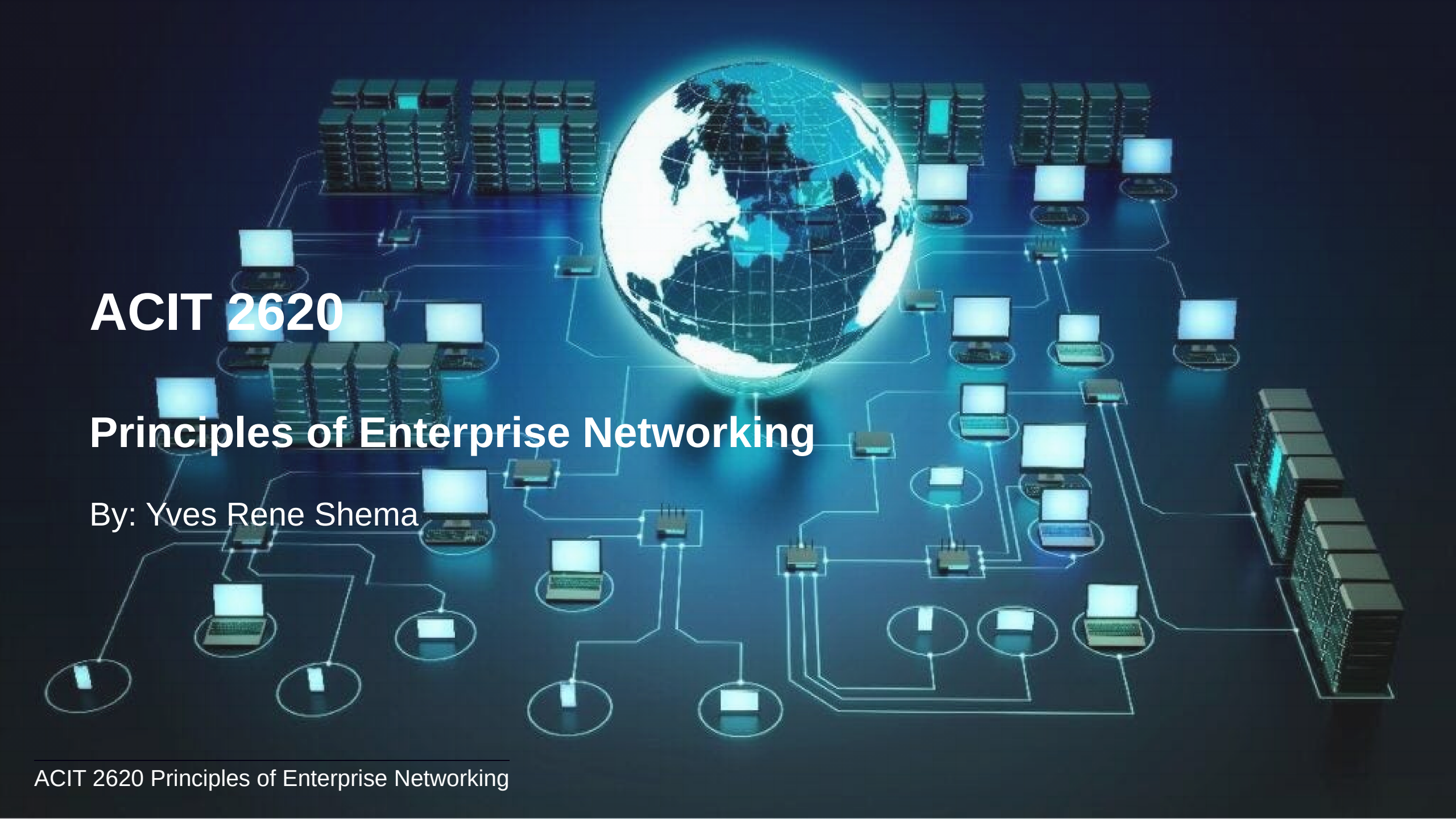


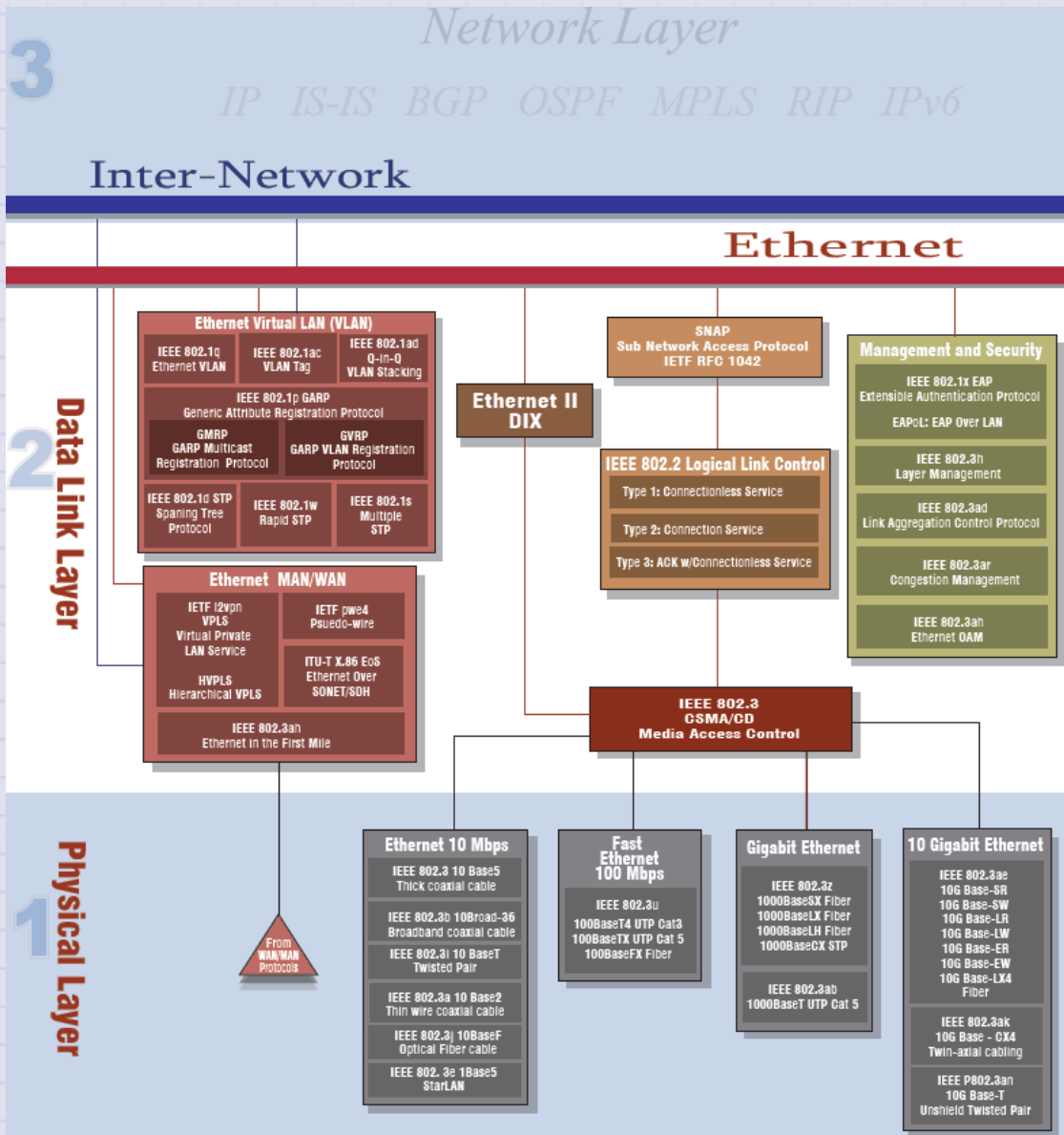


ACIT 2620

Principles of Enterprise Networking

By: Yves Rene Shema

Ethernet



Data Link Layer Sublayers

Logical Link Control (LLC)

Used to facilitate multiple upper layer (i.e. network) protocols

Provides common interface to upper layers

Supplies multiplexing and flow control services

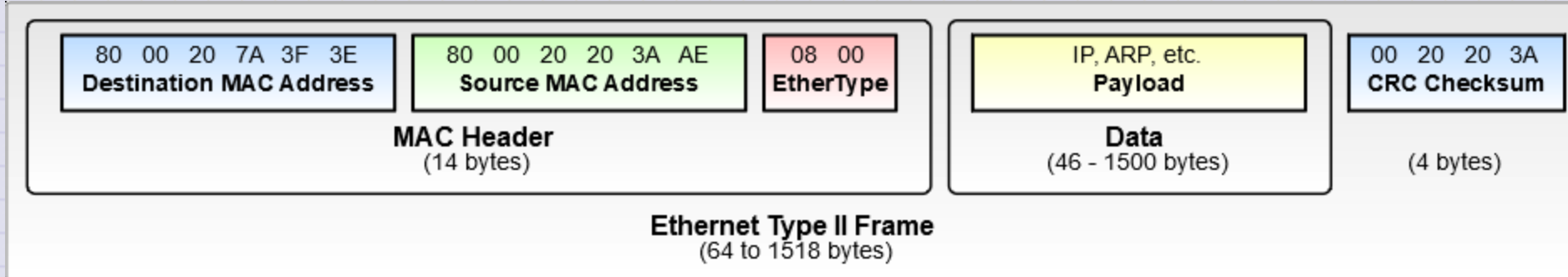
Provides error checking

Media Access Control (MAC)

Provides addressing and channel access control mechanisms (i.e. CSMA CD, CSMA CA)

Appends physical address of destination computer onto the frame

Frames



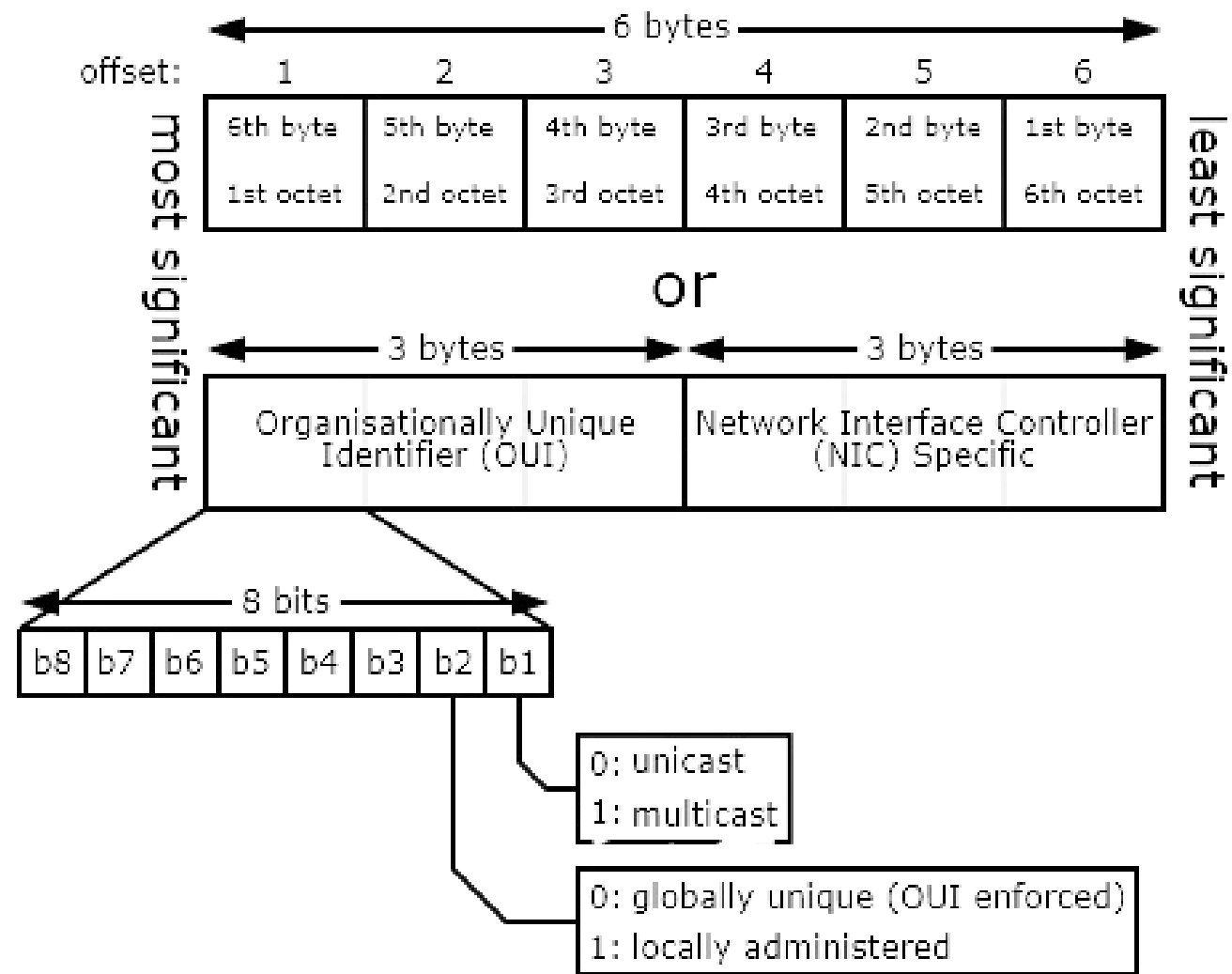
- Preamble
 - Marks beginning of entire frame
- Start of Frame Delimiter (SFD)
 - Indicates beginning of addressing fields
- Destination Address
 - Contains destination node address

- Source Address
 - contains address of sender node
- Length (LEN)
 - indicates length of data/payload
- Data (payload)
 - contains data, or segmented part of data, transmitted from originating node

- Pad
 - Used to increase size of the frame to its minimum size requirement of 46 bytes
- Frame Check Sequence
 - provides algorithm to determine whether data were correctly received
 - most commonly used algorithm is Cyclic Redundancy Check (CRC)

Ethernet Addressing

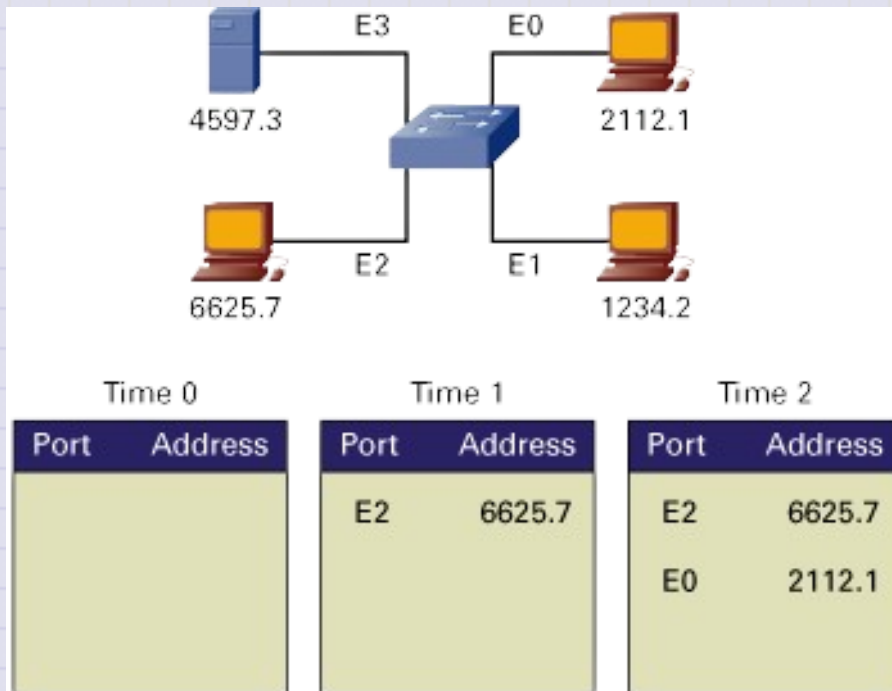
- MAC address: Media Access Control (MAC) sub-layer
- 48 Bits
- Number uniquely defining a network node
- Generally rendered as Hex: **00:1e:33:ba:87:c1**
- Doesn't contain any data regarding network location –just an ID



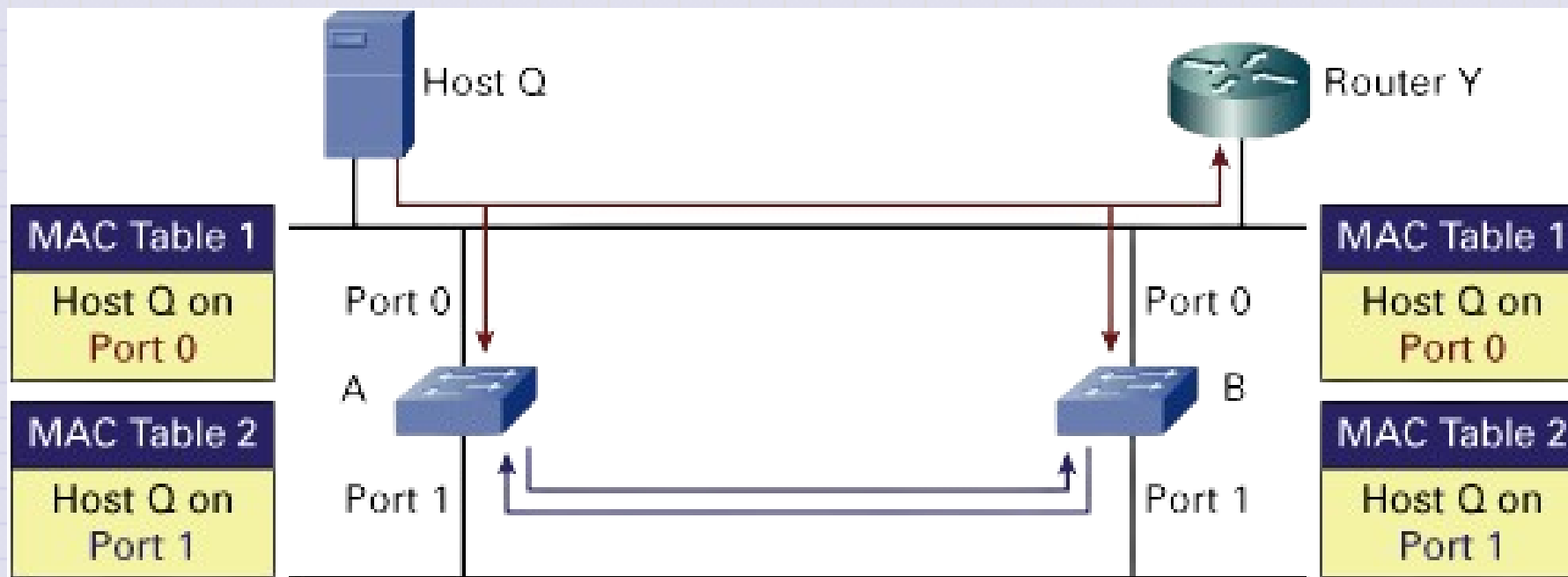
- first three bytes
 - Either Manufacturer hard coded
 - Or Reserved Addresses (common ones)
 - Broadcast Address **FF:FF:FF:FF:FF:FF**
 - Spanning Tree Multicast: **01:80:C2:00:00:00**
 - IANA reserves all address starting with **00:00:5E** see Ethernet Numbers(this includes IPv4 multicast -and inserts the low 23 Bits of the multicast IPv4 Address into the Ethernet Address)
 - **33:33:XX** is reserved for IPv6 Multicast

Switching

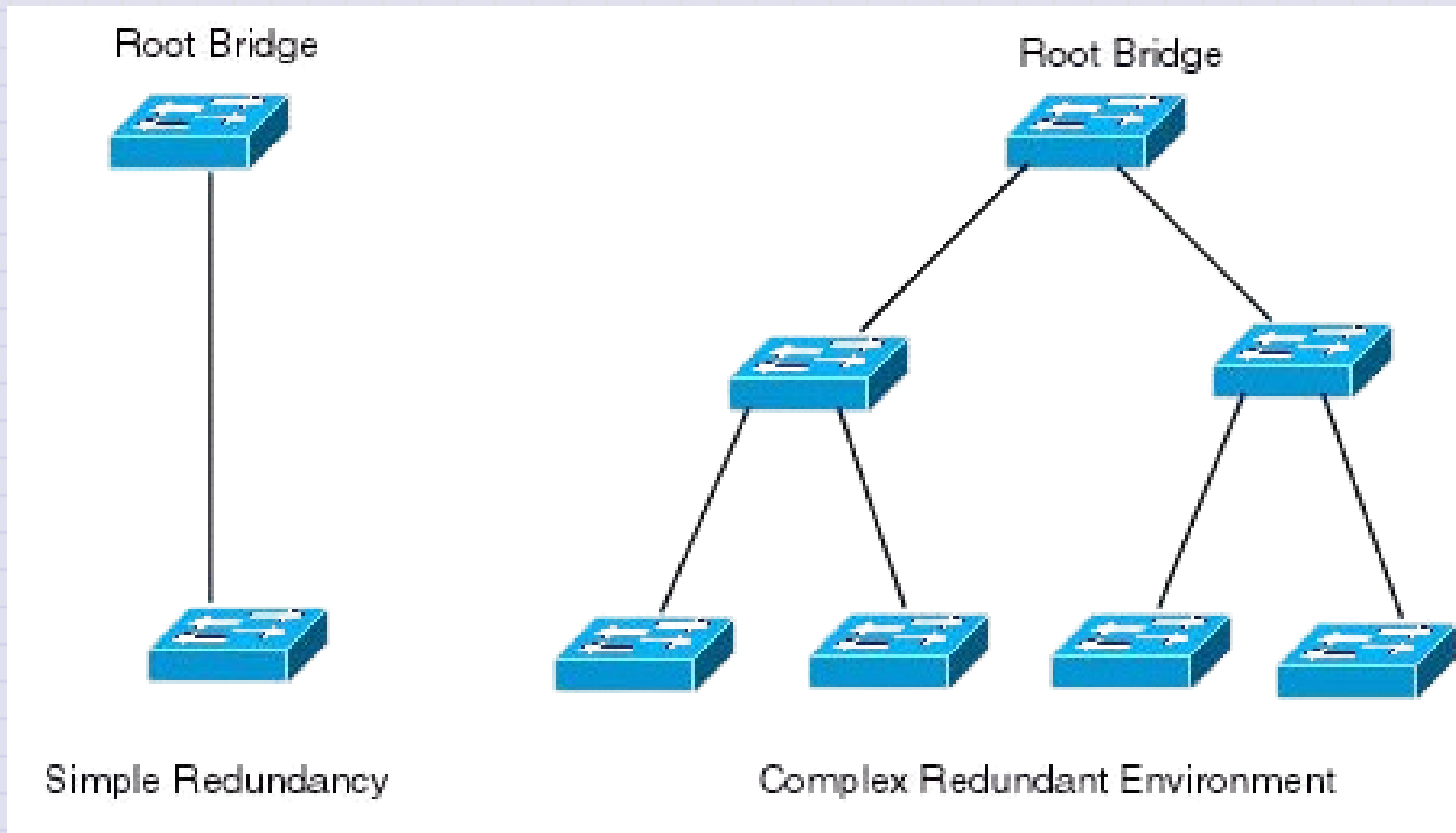
- Making Forwarding decisions
 - Transparent bridging



Broadcast Loop and STP

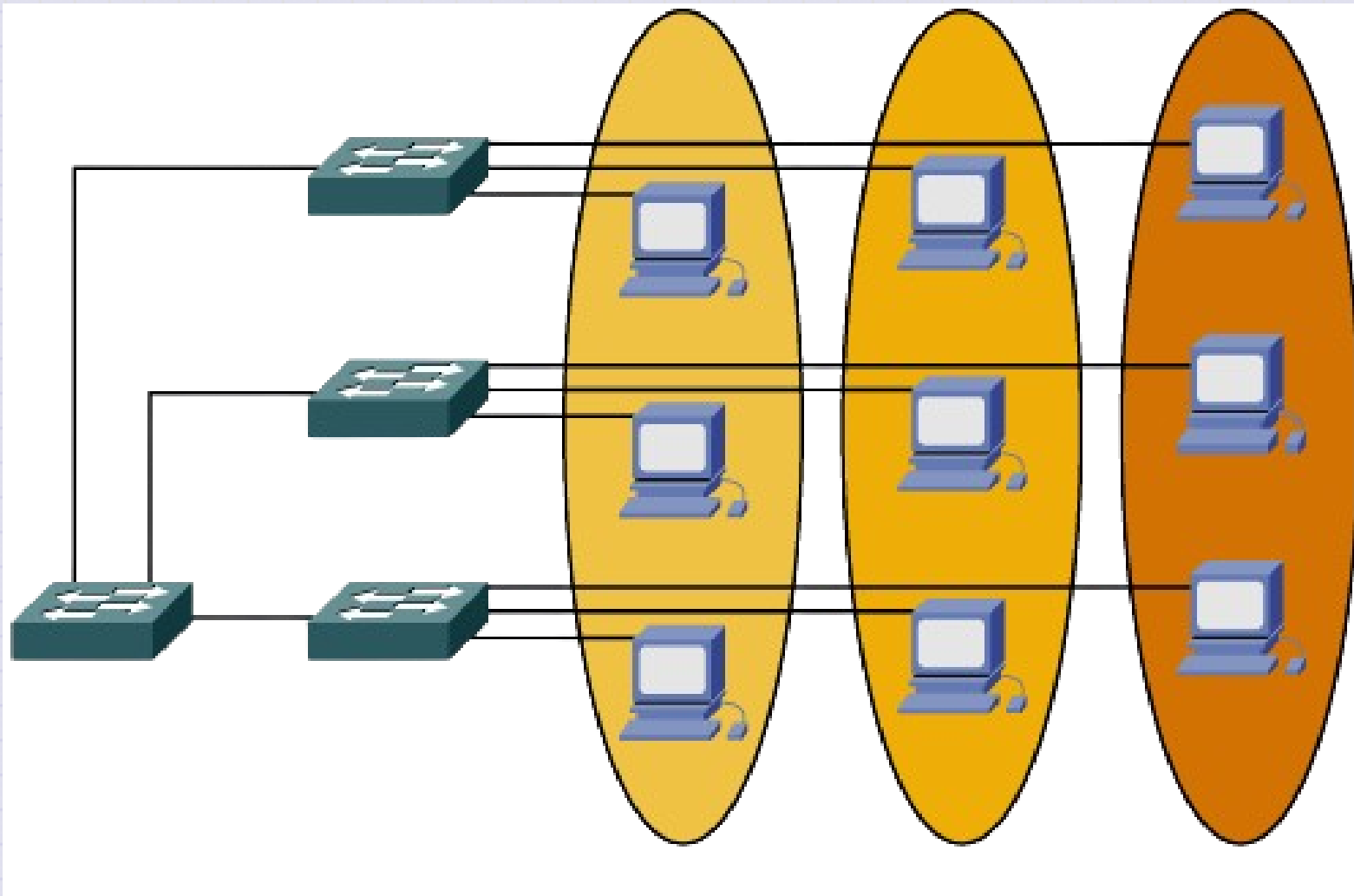


Spanning Tree Protocol



VLANs

- Virtual Local Area Networks
- A logical network within a physical network
- Achieved by grouping some of the switch ethernet ports into a logical broadcast domain
- Can span multiple switches

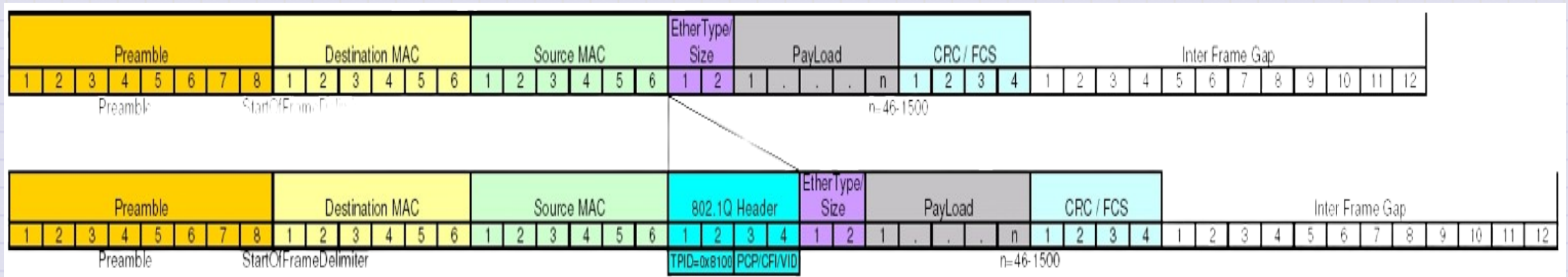


VLAN port types

- Access ports
 - assigned VLAN ID
 - for connecting end hosts/nodes
 - nodes connected to ports with same VLAN ID are in the same broadcast domain

- Trunk ports
 - typically for switch to switch or switch to router connection
 - carry "tagged" frames, i.e modified ethernet frames with VLAN markers

Tagged frames



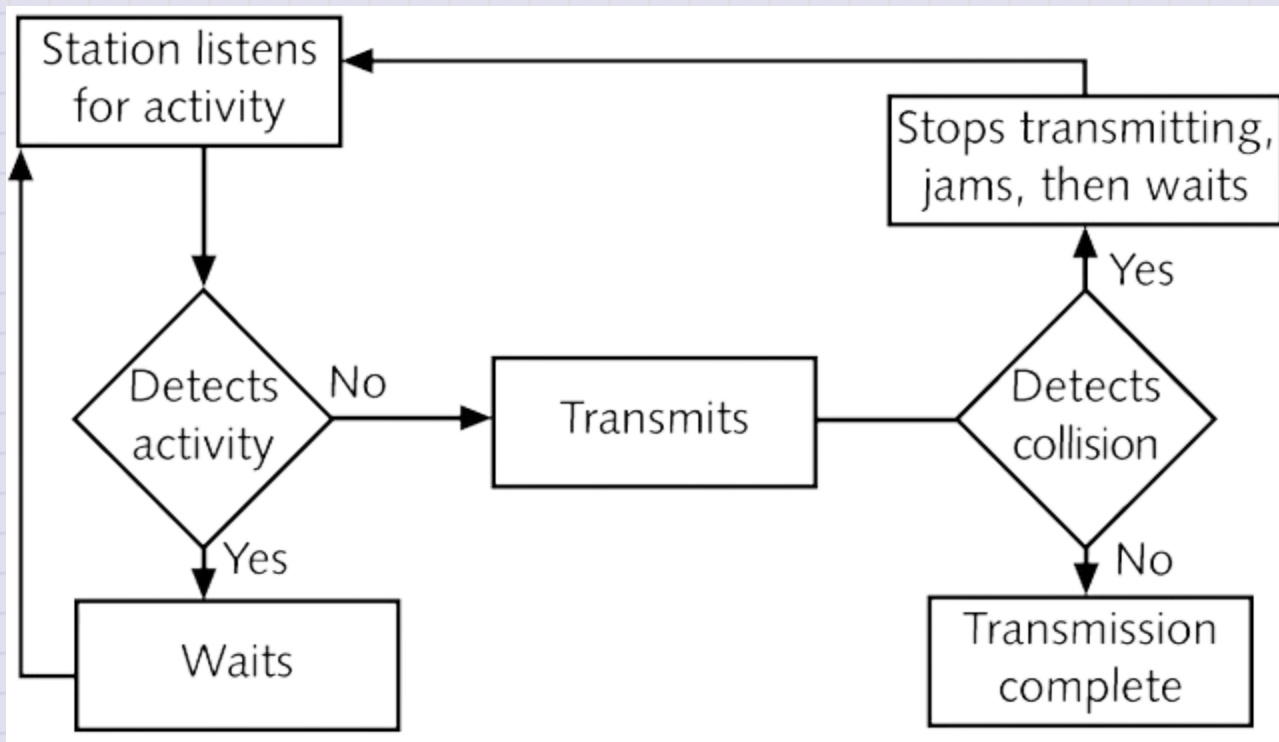
- 4-byte tag header inserted between Source MAC and EtherType fields
 - 2-byte tag protocol identifier (TPID)
 - a fixed value of 0x8100 that indicates the frame carries tag information.

- 2-byte tag control information (TCI)
 - Three-bit user priority (used to prioritize traffic)
 - Drop Eligible Indicator (DEI) (in congestion is frame “dropable”)
 - Twelve-bit VLAN identifier (VID)-Uniquely identifies the VLAN to which the frame belongs

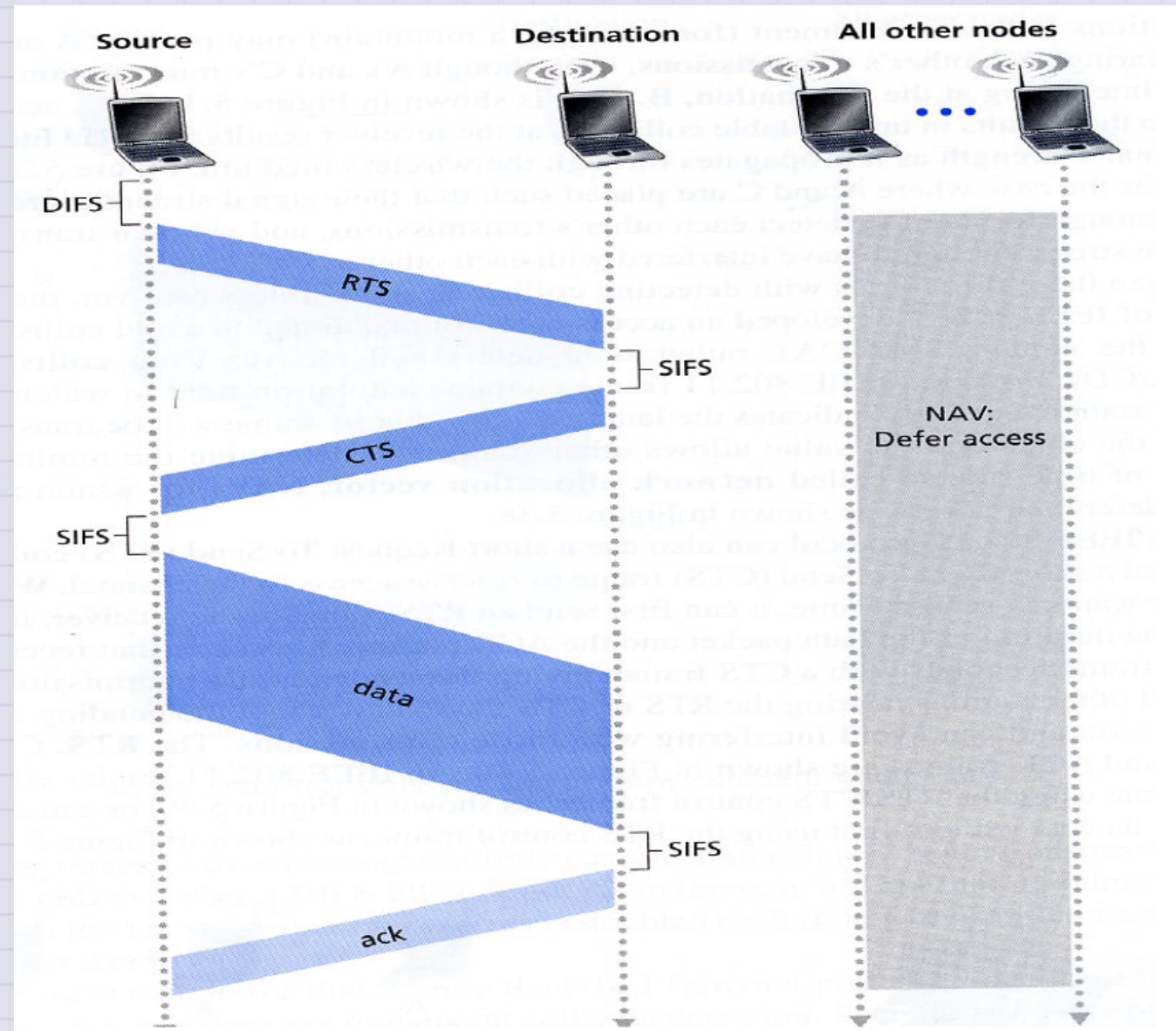
Link Access Methods

- Manage shared medium access contention (collision)
- Two methods:
 - CSMA/CD: for wired Ethernet
 - CSMA/CA: for wireless Ethernet

CSMA/CD



CSMA/CA



Reading List

- [IPv4 Addressing \(video\)](#)
- [Internet Protocol Version 4](#)