Layer 2 Interconnection

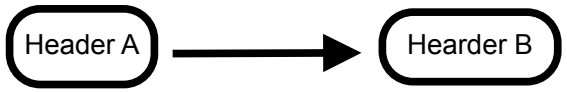
The IEEE 802 (Ethernet – 802.3 – WiFi) case

Encapsulation vs. Translation

- What is encapsulation?
- What is translations?
- What are their advantages and weaknesses?

ajouter une entête au passage d'une techno à une autre -> pb: augmente la taille / avnt : plus simple

plus lourd et plus complexe -> prends plus de temps



What is the difference between Ethernet and IEEE 802.3?

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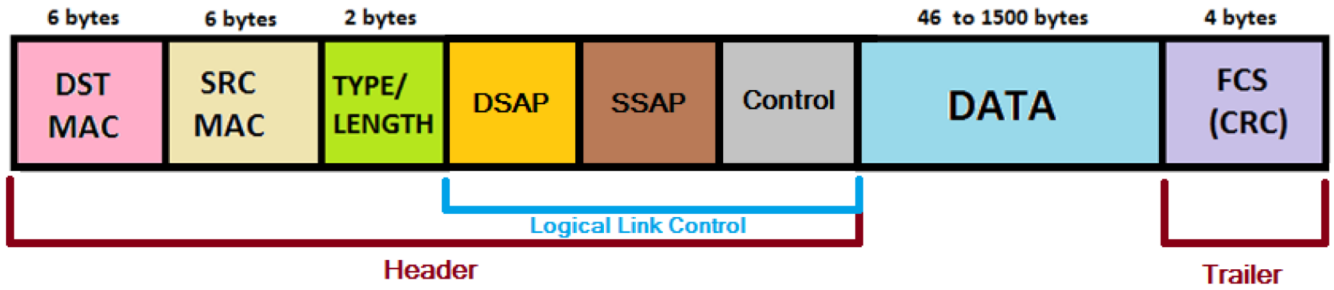
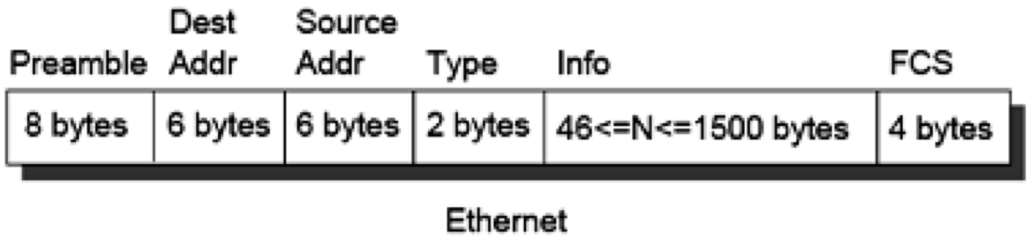
différence dans l'entête



IEEE 802.3



Ethernet

Interconnecting Ethernet and IEEE 802.3

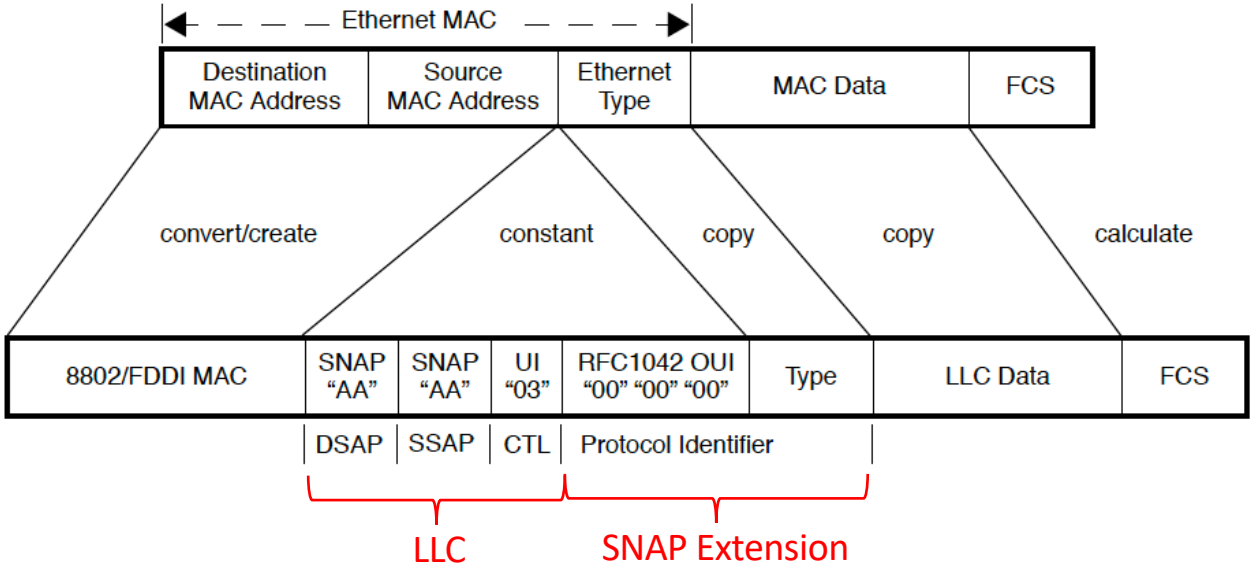
- What happens if a bridge connects an Ethernet LAN with one using IEEE 802.3?

LLC and SNAP

- Both for multiplexing protocols
- LLC
  - 1 byte DSAP, 1 byte SSAP (influenced by ethernet)
  - Soon ran out of values
- SNAP extension – 5 bytes
  - OUI: 3 bytes
  - Protocol ID: 2 bytes

RFC1042

Dans l'@ MAC RFC à 0 -> trame ethernet (mais Apple a commencé à l'utiliser pour leur adresse MAC) du coup quand on traduit pour faire de l'ethernet on a juste à mettre le RFC à 0.



But…

- Apple Computer and Novell Inc. released protocol implementations using RFC1042-style SNAP headers
  - AppleTalk Phase 2 Address Resolution Protocol (AARP)
  - Novell Internetwork Packet eXchange (IPX) protocol

802.11h

Protocol	Ethertype
AppleTalk ARP	0x80F3
Novell IPX	0x8137

Ethernet/802.3 LAN to non-Ethernet LAN(WiFi) Encapsulation

- If Type/Length field has a value between 0x0000 and 0x05DC (0 to 1500)
  - It's length => interpreted as 802.3, no changes since WiFi uses LLC
- Else if Type field contains 0x80F3 or 0x8137
  - BTEP header of the form 0xAA-AA-03-00-00-F8-nn-mm where nn-mm is the value from the Ethernet frame's Type field
- Else
  - Encapsulated using RFC1042 SNAP header of the form 0xAA-AA-03-00-00-00-nn-mm, where "nn-mm" is the Ethernet Type field contents.

Non-Ethernet (WiFi) LAN to Ethernet/802.3 LAN Decapsulation Rules

- IF SNAP header is a BTEP header (i.e. it begins with 0xAA-AA-03-00-00-F8)
  - Decapsulate into an Ethernet frame whose Type field is taken from the last two octets of the BTEP header.
- A frame whose SNAP header is an RFC1042 header (i.e. it begins with 0xAA-AA-03-00-00-00) and last two octets are not in the STT (i.e. any value other than 0x80F3 or 0x8137)
  - Decapsulate into an Ethernet frame whose Type field is taken from the last two octets of the RFC1042 header.
- All other frames are passed intact as 802.3 frames

Some examples

Ethernet/802.3 LAN to 802.11 LAN Encapsulation

Protocol	Type/Length	LLC Header		802.11 LLC Header
IP	08-00	--		AA-AA-03-00-00-00-08-00
IP 802.3	length	AA-AA-03-00-00-00-08-00		AA-AA-03-00-00-00-08-00
IP ARP	08-06	--		AA-AA-03-00-00-00-08-06
AppleTalk (1)	80-9B	--		AA-AA-03-00-00-00-80-9B
AppleTalk (2)	length	AA-AA-03-08-00-07-80-9B		AA-AA-03-08-00-07-80-9B
AppleTalk AARP (1)	80-F3	--		AA-AA-03-00-00-F8-80-F3
AppleTalk AARP (2)	length	AA-AA-03-00-00-00-80-F3		AA-AA-03-00-00-00-80-F3
IPX Ethernet II	81-37	--		AA-AA-03-00-00-F8-81-37
IPX SNAP	length	AA-AA-03-00-00-00-81-37		AA-AA-03-00-00-00-81-37
IPX 802.2	length	E0-E0-03		E0-E0-03
IPX 802.3	length	FF-FF		FF-FF

802.11 LAN to Ethernet/802.3 LAN Decapsulation

Protocol	802.11 LLC Header		Type/Length	802.3 LLC Header
IP	AA-AA-03-00-00-00-08-00		08-00	--
IP 802.3	AA-AA-03-00-00-00-08-00		08-00	--
IP ARP	AA-AA-03-00-00-00-08-06		08-06	--
AppleTalk (1)	AA-AA-03-00-00-00-80-9B		80-9B	--
AppleTalk (2)	AA-AA-03-08-00-07-80-9B		length	AA-AA-03-08-00-07-80-9B
AppleTalk AARP (1)	AA-AA-03-00-00-F8-80-F3		80-F3	--
AppleTalk AARP (2)	AA-AA-03-00-00-00-80-F3		length	AA-AA-03-00-00-00-80-F3
IPX Ethernet II	AA-AA-03-00-00-F8-81-37		81-37	--
IPX SNAP	AA-AA-03-00-00-00-81-37		length	AA-AA-03-00-00-00-81-37
IPX 802.2	E0-E0-03		length	E0-E0-03
IPX 802.3	FF-FF		length	FF-FF