Ch.6 Link Layer

application
transport) OS에 구현
network
link — network interface card

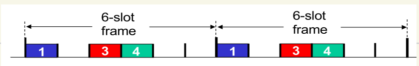
MAC
Multiple Access link Protocols (Medium Access Control Protocol)

(desiderata) 바라는 것

- 1 node : can send at rate R.
- M nodes : can send at rate $\frac{R}{M}$
- fully decentralized (완전히 분산) - 사회자가 없어야함
- simple (동작이 단순해야함)

[MAC Protocols]

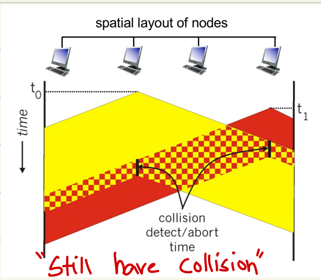
- channel partitioning (낭비가 심함)
  - : TDMA (Time Division Multiple Access) : 시간 분할 배정



  - : FDMA (Frequency Division Multiple Access) : 주파수 분할 배정

(TDMA, FDMA) user가 많을수록 이득

- random access
  - : CSMA (Carrier Sense Multiple Access)



⟹

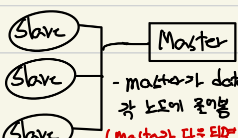
CSMA/CD (Collision Detection)

① collision detection되면 모든 host는 frame 전송 stop

② 초기 대기 random time은 짧게 설정

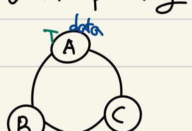
- 또 collision되면 random time을 2배씩 늘림 binary exponential backoff
- host가 많을수록 backoff interval은 증가

- Taking turns (잘 안 쓰임)
  - : polling



- master가 data 있는지 각 노드에 물어봄 (master가 다운되면 전체 동작X)

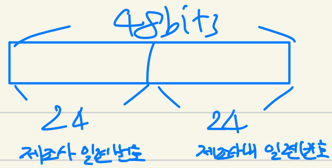
  - : token passing



token을 가진 기기만 데이터 전송 (token이 loss되면 문제)

MAC Addresses (48bit)

Application	hostname
Transport	port#
Network	IP Addr
Link	MAC Addr (수정X)



ARP (Address Resolution Protocol)

- IP를 가지고 MAC Addr를 구하는 방법

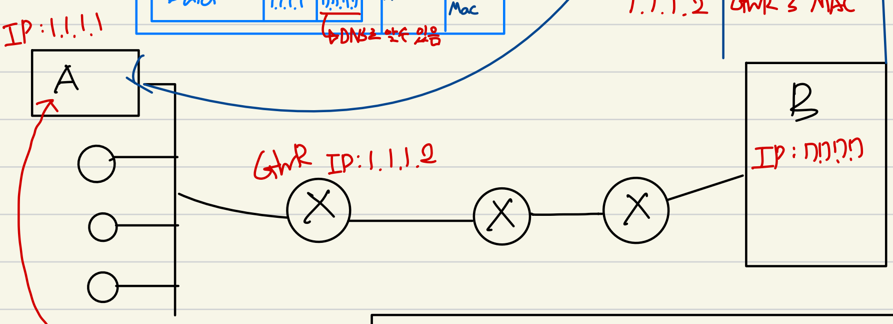
Frame

IP PKT			SRC	DST
Data	SRC 1.1.1.1	DST ?.?.?.?	A's Mac	GWR's Mac

↳ DNS로 알 수 있음

⟨ARP Table⟩

IP Addr	MAC Addr	TTL
1.1.1.2	GWR's MAC	...



(Forwarding Table)

DST	Next-Hop
*	1.1.1.2 (GWR)

- 초기에 MAC 주소를 알기위해 BroadCast 함

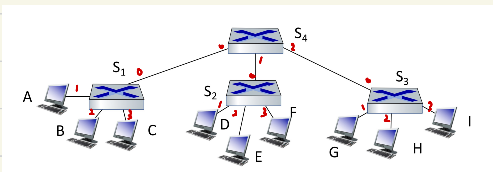
Data	SRC	DST
ARP Query	A's Mac	FF-FF-FF-FF-FF-FF

Frame

[type 필드로 Data에 뭐가 담겨 있는지 판단]

Switch ☒

- Switch Table (Self-Learning)



- Table에 없는 경우 : flooding

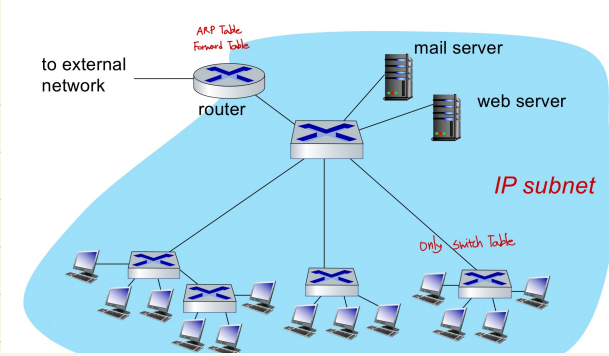
C → I

I → C

S1 MAC	S1 Interface#	S2 MAC	S2 Interface#	S3 MAC	S3 Interface#	S4 MAC	S4 Interface#
C	3	C	0	C	0	C	0
I	0			I	3	I	2

router : ARP Table (Network layer)
forward Table

Switch : only switch Table (link layer)
(MAC Addr X)


ARP Table
Forward Table
to external
network
router
mail server
web server
IP subnet
Only Switch Table