Data Communications

-Protocol, Layer, and TCP/IP Protocol Model-

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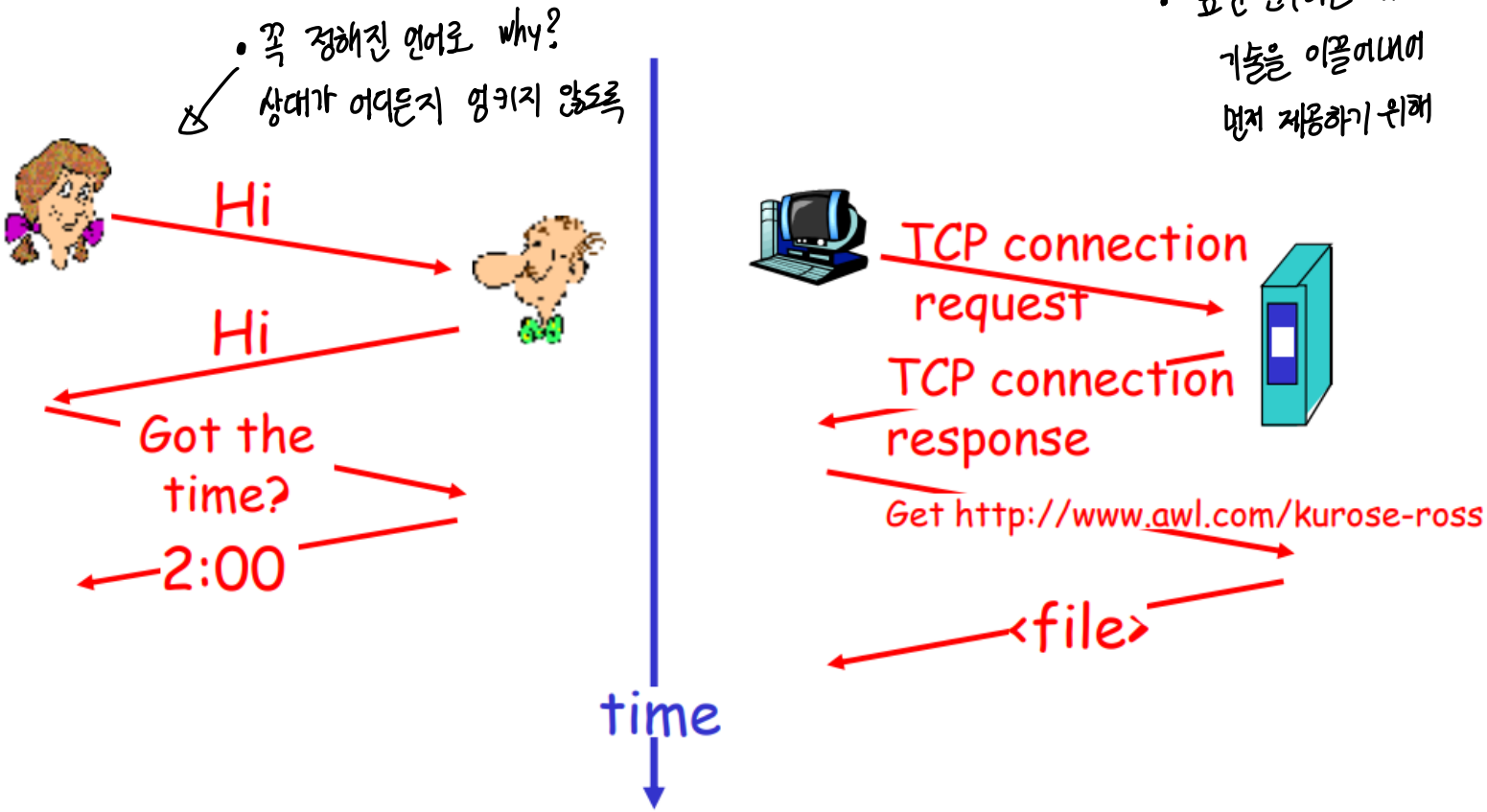
What is Protocol?

4G LTE → 3GPP 표준문서 배포
5G NR(New Rudio)

IEEE → wifi
- bluetooth
- Ethenet

통신 규약 → 통신 표준 (Standard)

- A human protocol vs computer network protocol

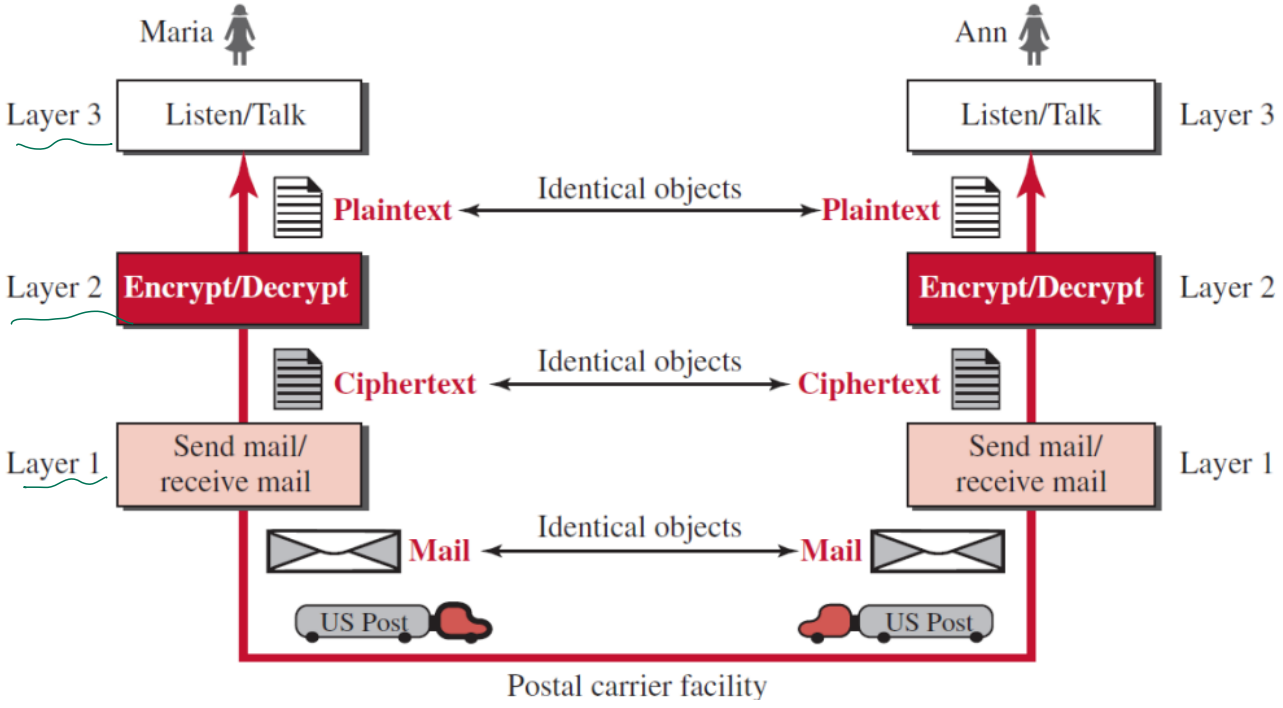


All communication in Internet is coordinated by protocols

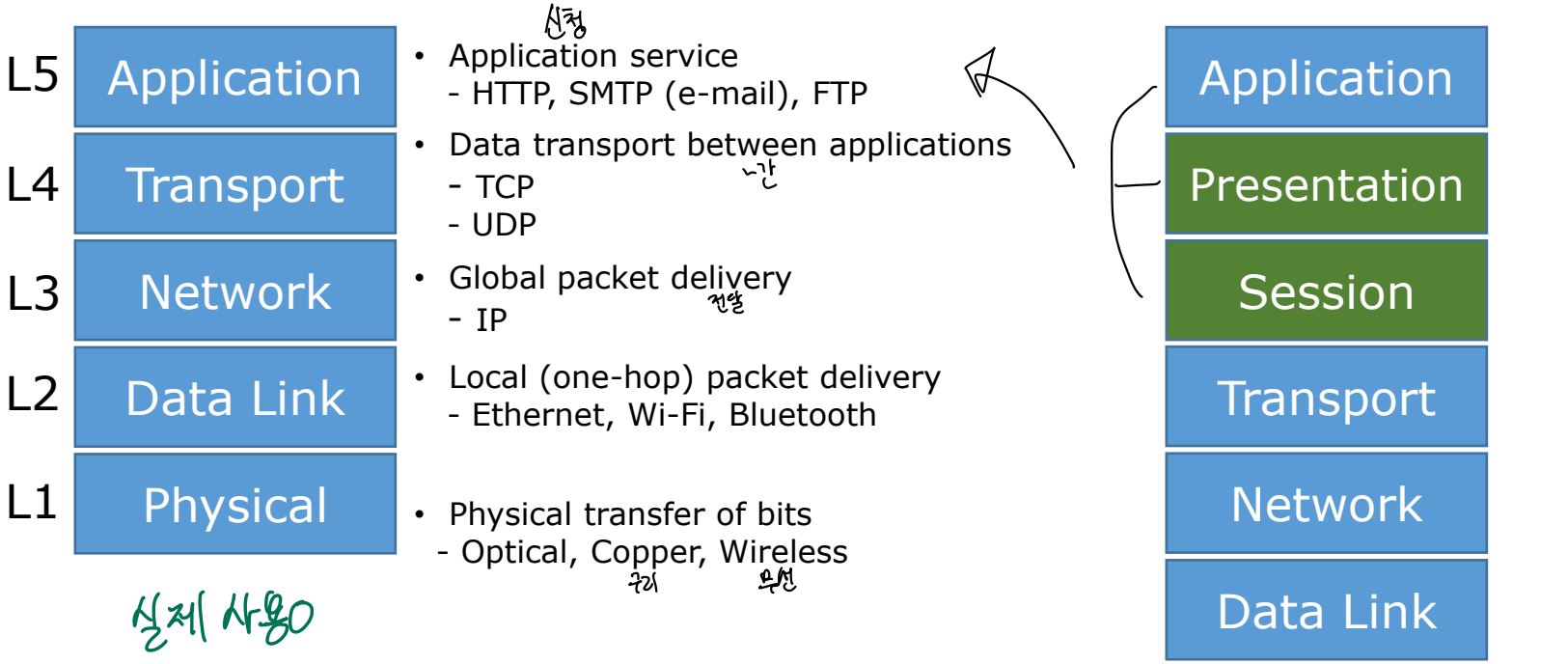
조정된

What is Layering?

- Example
  - Mail delivery task



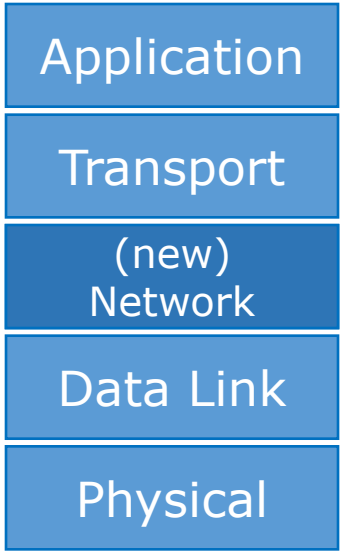
TCP/IP Protocol Model (Suite/Stack)



※ OSI 7-layer reference model

Why Layering?

- Reduce complexity 관리,보수,운영 편리 각자 역할
- Improve flexibility 다른 부분에 영향 없이 특정 부분만 수정 가능



장점 : 모듈화 (서로의 영향X)

유지보수 용이성 (특정 계층만 문제 해결)

문제 해결 용이성 (문제를 단계적 추적)

확장성 (새로운 계층 추가,수정)

유연성 (똑같은 계층사용하면 다른 기종과 통신O)

단점 : 계층 간 오버헤드 (독립적이기때문에 처리시간↑)

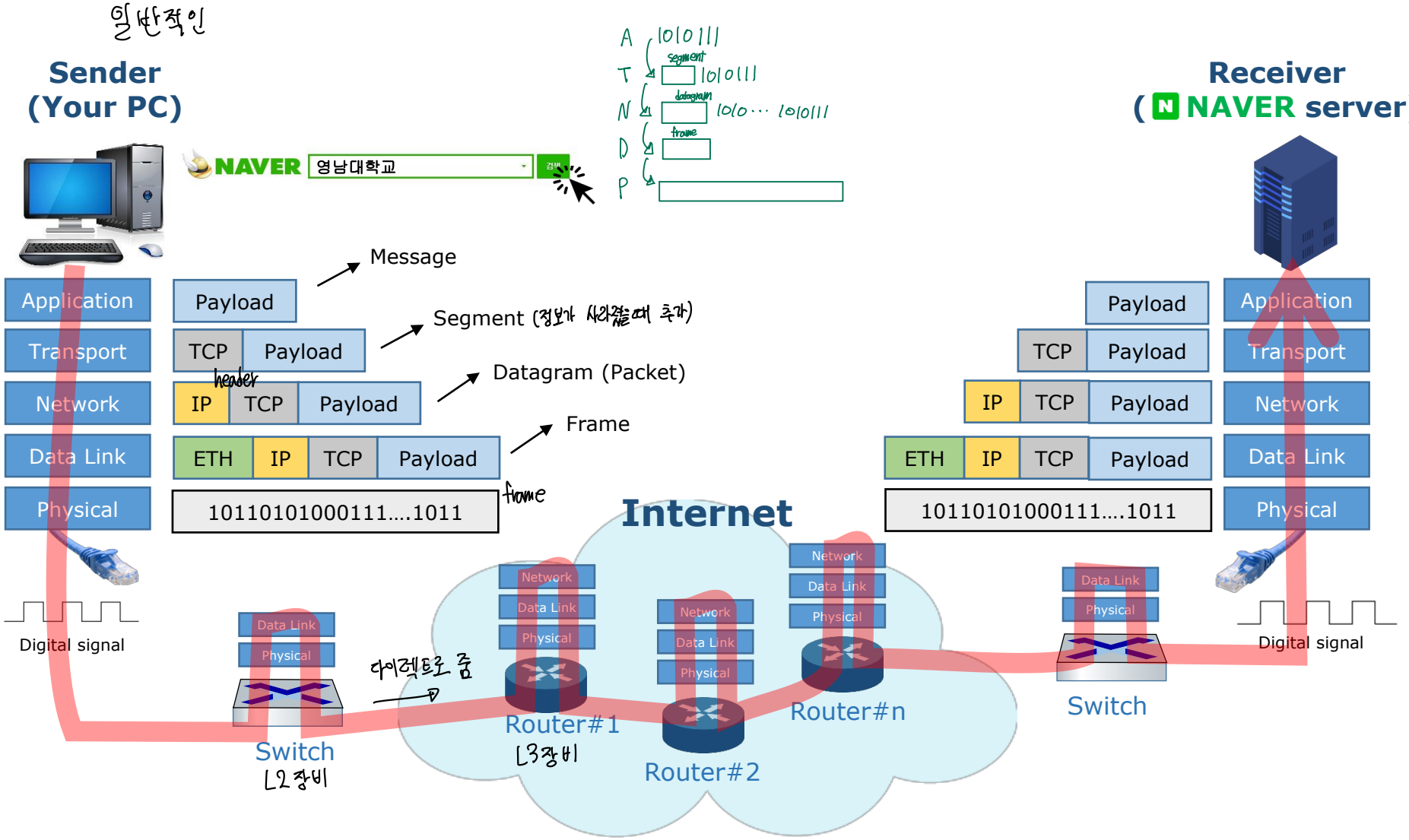
비효율성 (여러 계층에서 동일한 데이터 처리)

복잡성 증가 (구조 복잡, 추가적인 학습,관리 비용 필요)

계층 간 종속성 문제 (다른 계층에도 영향이 미칠수 있음)

성능 저하 (계층마다 데이터 변환, 재처리)

Typical Communication Path



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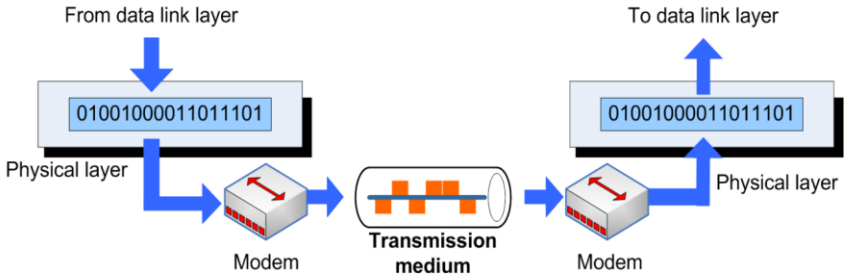
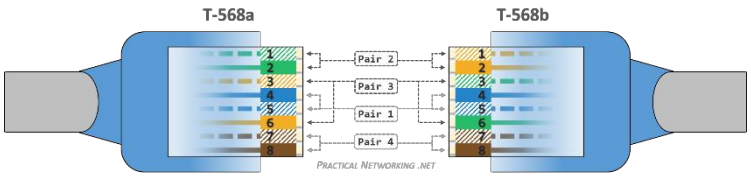
L1: Physical Layer (PHY)

- The lowest level in the TCP/IP protocol suite
- Responsible for carrying individual bits in a frame across the link
  - Defines encoding/decoding schemes, modulation/demodulation schemes, etc..



- Responsible for providing mechanical and electrical specifications



L2: Data Link Layer

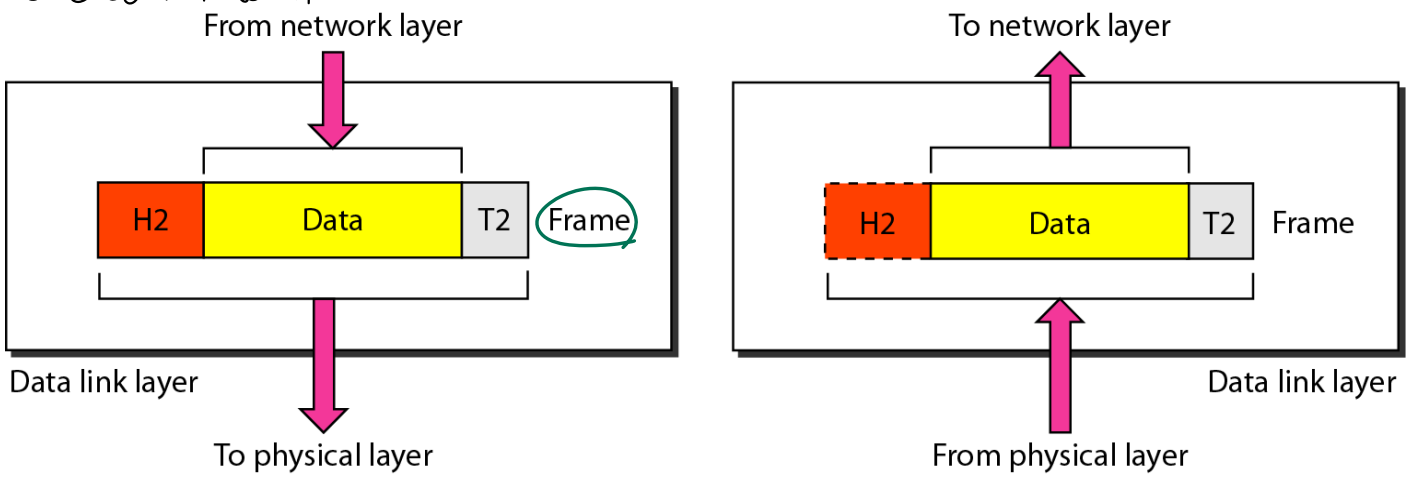
: 오류 검출 및 흐름 제어 담당

LLC
MAC Medium Access Control (대부분의 기능이 여기)

- Responsible for moving frames from one hop (node) to the next

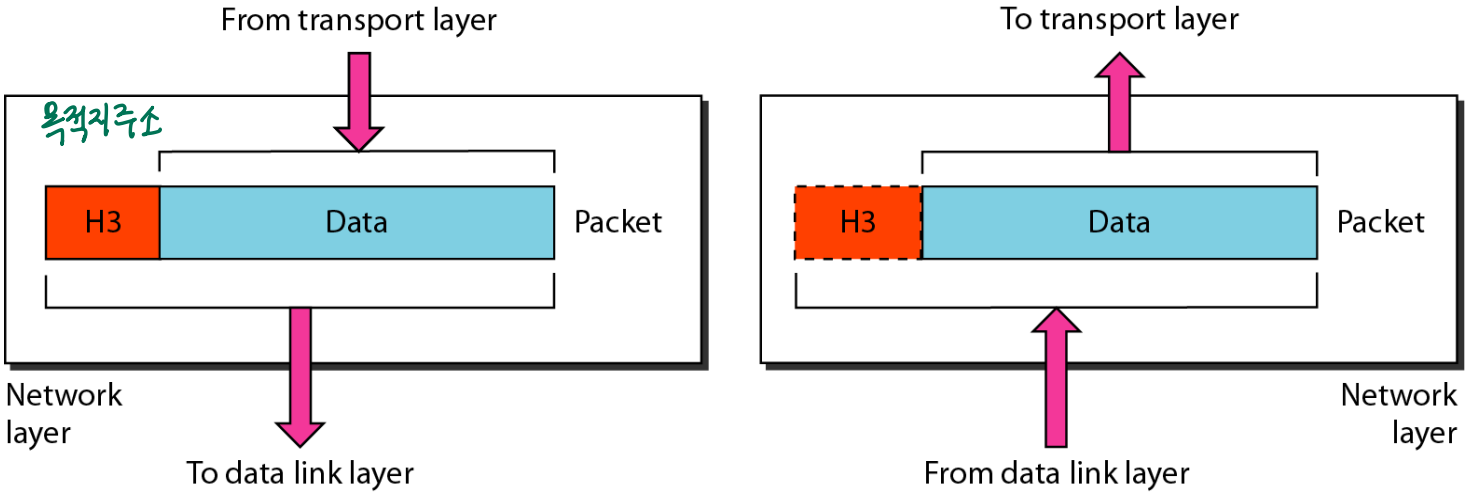
- Consists of two sub-layer
  - Medium Access Control (MAC) and Logical Link Control (LLC)

매체 접근 제어
: 공유된 통신 매체에 접근 제어



L3: Network Layer

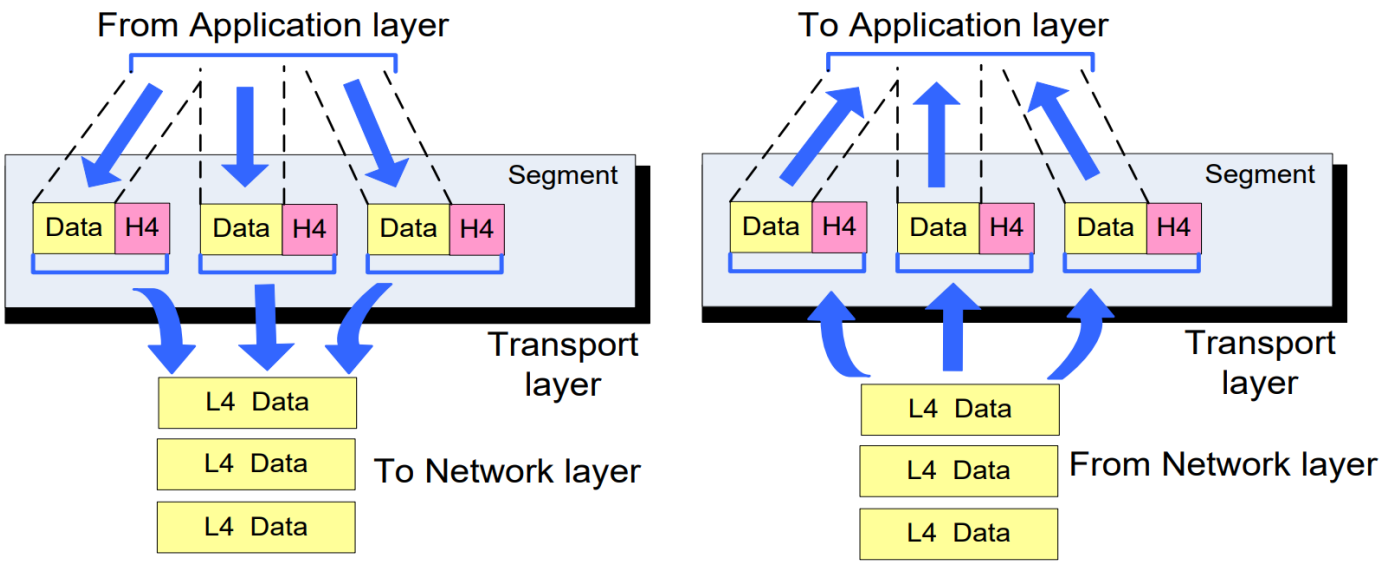
- Responsible for the delivery of individual packets from the source host to the destination host
  전달V 개별
- Routing, IP Addressing, etc..
  라우팅 : 최적의 경로



L4: Transport Layer

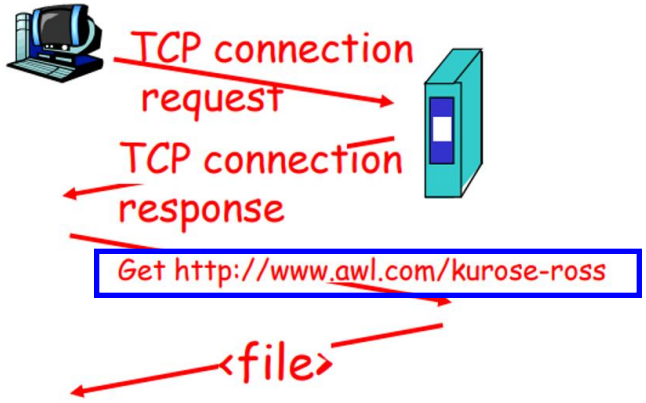
- Responsible for the delivery of a message from one process (application) to remote another process
  원격

- Reliable transmission, flow control, congestion control, etc..
  안정적인 전송 혼잡 제어



L5: Application Layer

- Responsible for providing services to the user
- Process-to-process communication
- HTTP, SMTP, FTP
  - Example
    - Web-browser generates message using HTTP (protocol) to get articles in news-web site



(Again) Typical Communication Path