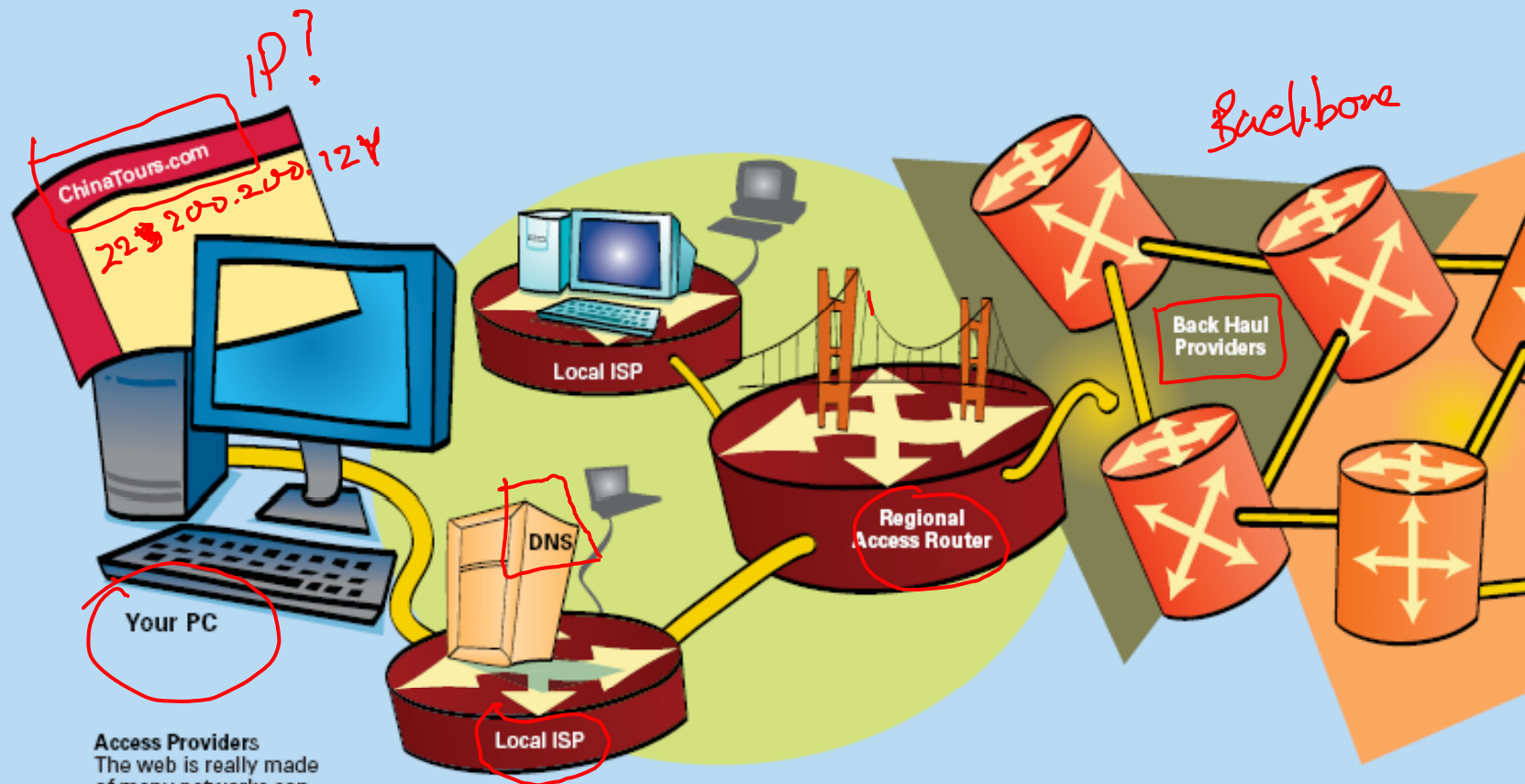


Komunikasi Melalui Jaringan

Jarkom – Nugroho Agus H., M.Si.

Internet Infrastructure: How It All Connects



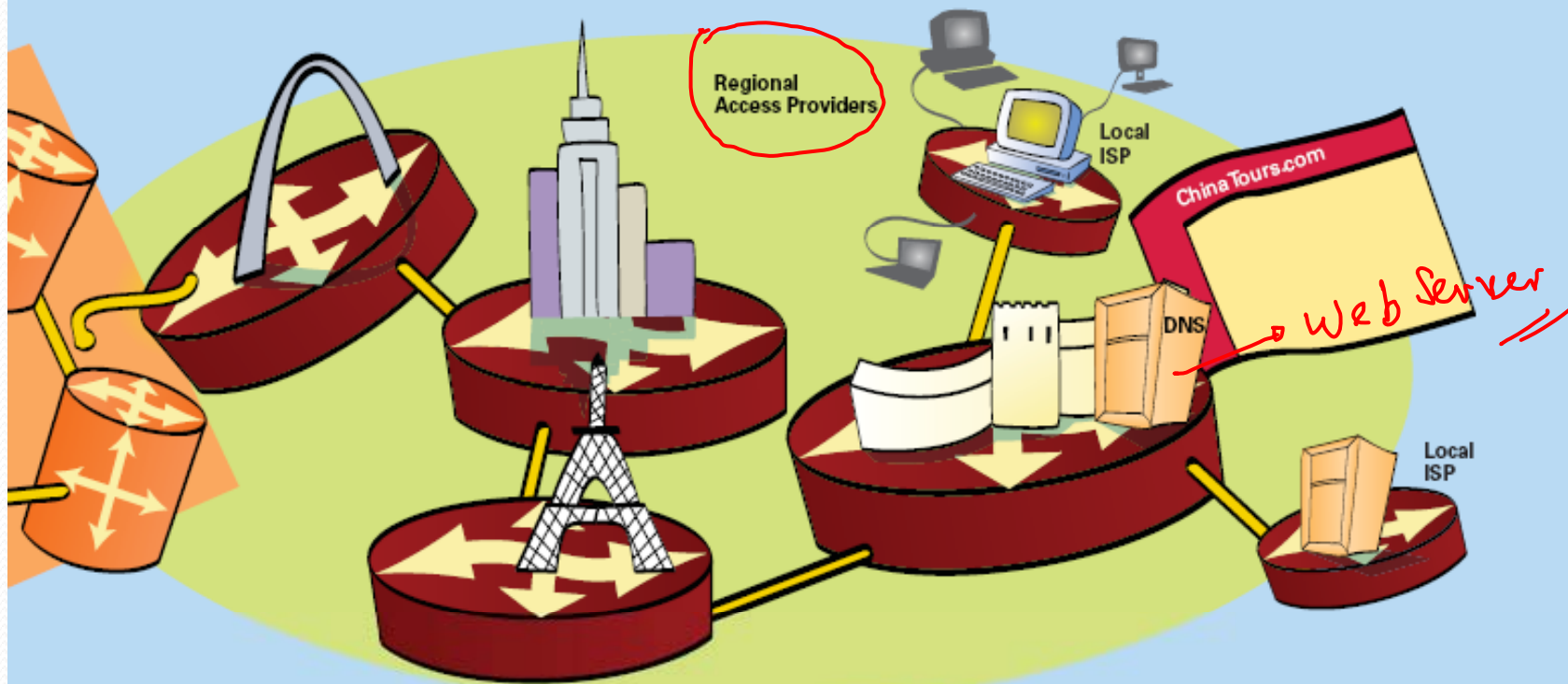
Access Providers

The web is really made of many networks connected in a hierarchy. Local Internet service providers (ISPs) typically give residential and small business access to the Internet. Regional providers typically connect several local ISPs to each other and to back haul providers that connect with other regional providers.

Domain Name Server (DNS)

This server maps domain names to their IP addresses. One of the reasons that the Internet has taken off in use and popularity is because `www.cisco.com` is much easier to remember than `25.156.10.4`.

Internet Infrastructure: How It All Connects



Web Servers

All web pages are stored on computers called web servers. Thousands of these servers can be dedicated servers for companies, hosting servers that house many personal pages, or even single computers housing individual pages.

Back Haul Providers

A few back haul providers comprise the high-speed backbone of the Internet. Only a handful of these providers are capable of handling the massive amounts of Internet traffic that continues to grow. Many parts of the back haul providers overlap with each other, which improves both the speed and reliability of the network.

Elemen-elemen Komunikasi

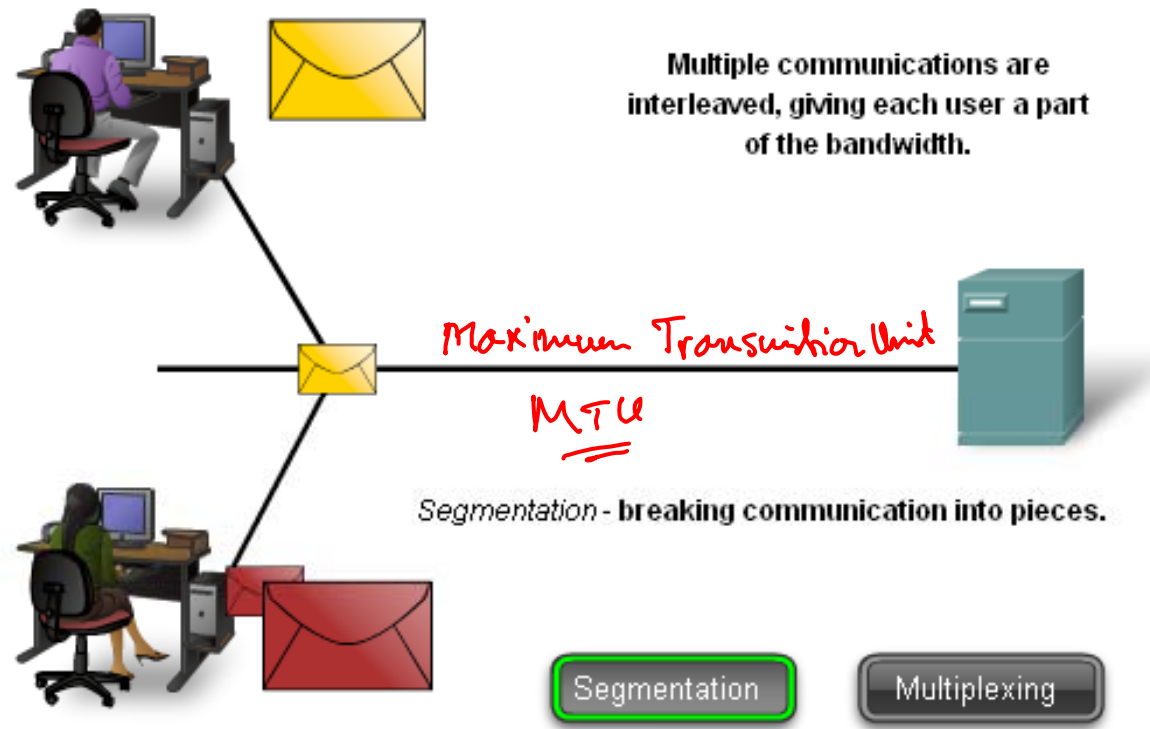
- Pesan/informasi (message) → *Voice, Video, Text, .jpg*
 - Yang harus dikirim dari satu piranti ke piranti yang lain.
- Sumber pesan (source)/~~pengirim~~ (sender) → *address*
 - Piranti elektronik yang mengirim pesan ke piranti yang lain.
- Tujuan (destination) /penerima (receiver) → *address*
 - Menerima pesan dan menterjemahkan.
- Kanal (Channel) → *saluran*
 - Terdiri dari media yang menyediakan jalan untuk message dari source ke destination.

Segmentation *→ Pemotongan*

- Data is sent across a network in small “chunks” called segments

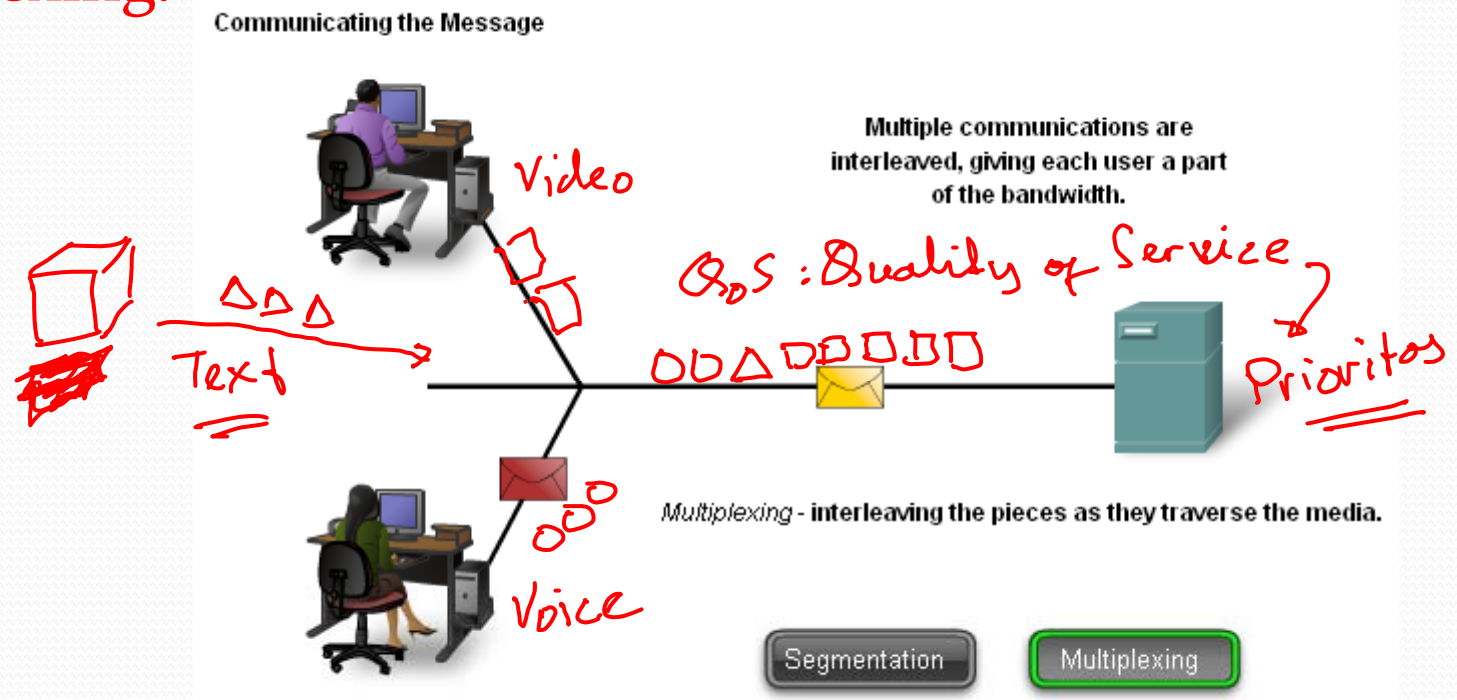


Communicating the Message

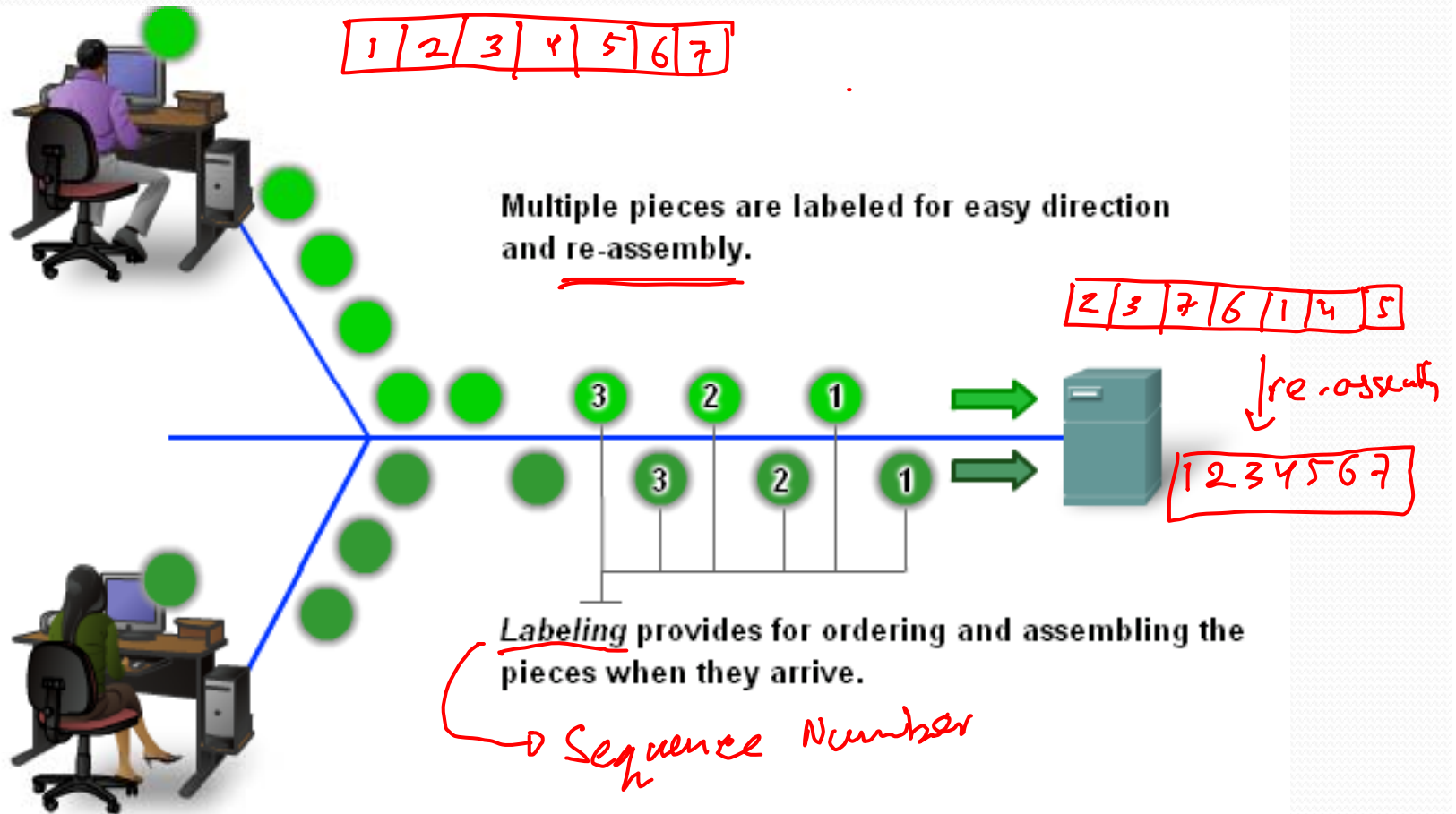


Multiplexing

- The process used to interleave the pieces of separate conversations together on the network is called **multiplexing**.



Communicating the Message





Komponen-komponen Jaringan

- Piranti (device) dan media
 - Elemen fisik atau hardware jaringan
- Layanan (service) dan Proses (process)
 - program-program komunikasi (software) yang berjalan di piranti jaringan.
 - Sebuah service jaringan menyediakan informasi untuk merespon sebuah permintaan (request)
 - Contoh service: layanan e-mail hosting, web hosting,
 - Sebuah Proses jaringan menyediakan fungsionalitas (aturan-aturan) yang mengarahkan dan menggerakkan message melalui jaringan.

Piranti Jaringan

- Piranti akhir (end device): berhubungan langsung dengan user.

- Contoh:

- Computers (work station, laptop, server)
- Printer jaringan
- Telepon IP (VoIP phone)
- Kamera keamanan (security camera)
- PDA, barcode scanner, dan lain-lain.

- Piranti antara (intermediate): menyediakan koneksi jaringan

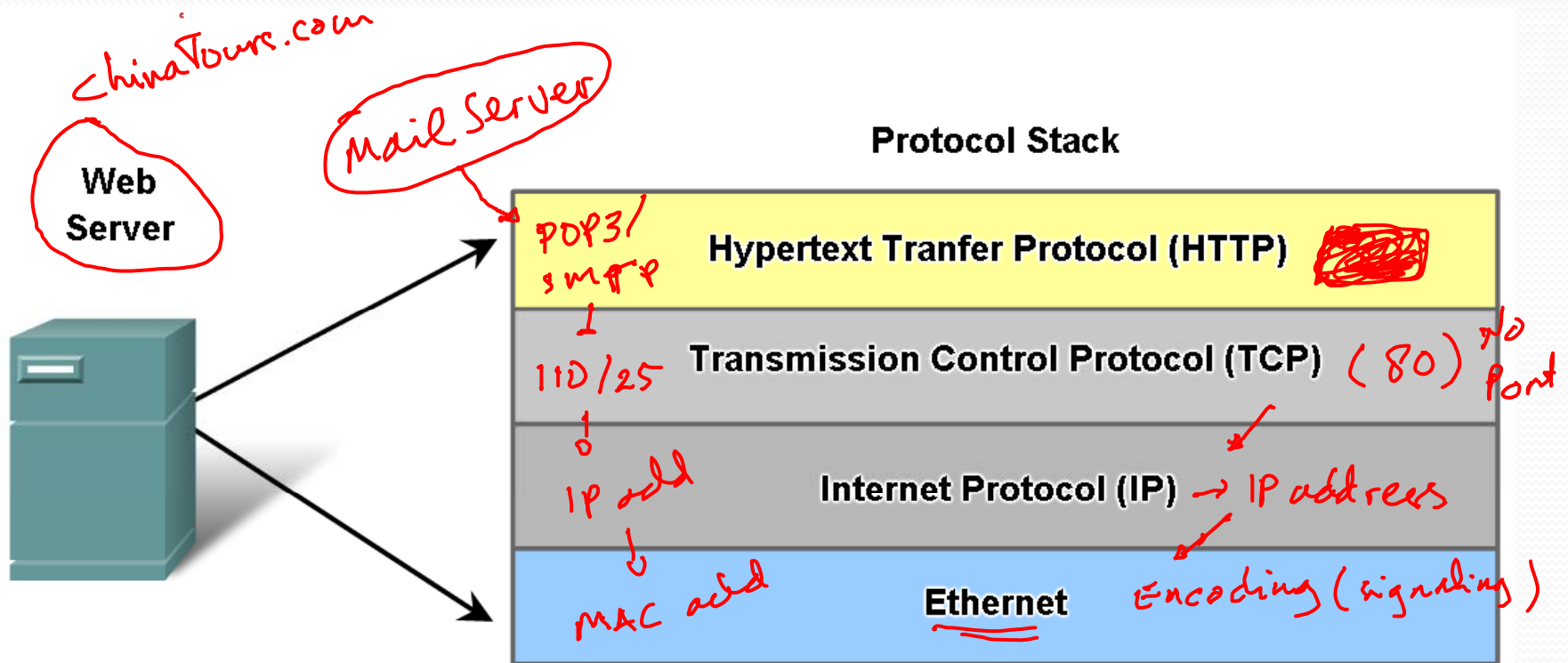
- Network Access Devices (Hubs, switches, and wireless access points)
- Internetworking Devices (routers)
- Communication Servers and Modems
- Security Devices (firewalls)

→ intra-networking
(di dalam satu network)
inter-networking
(antar network)

Fungsi Protokol dalam Jaringan (1)

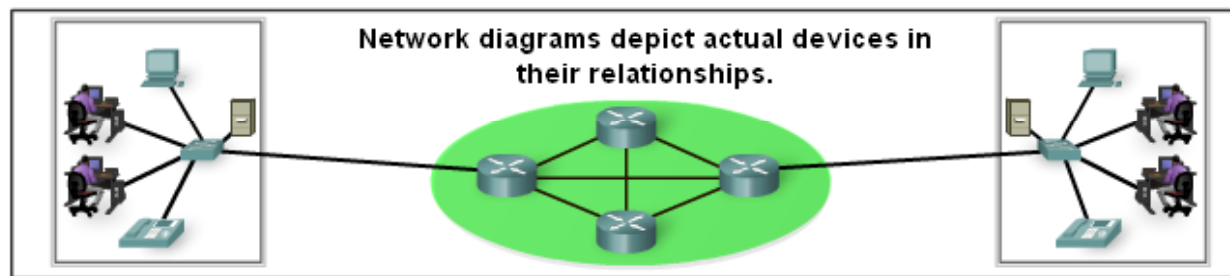
- Protokol jaringan menyediakan:
 - Format atau struktur message → *Frame Struktur*
 - Proses yang dikerjakan piranti jaringan untuk berbagi informasi tentang jalur jaringan. → *Routing Protocol dll.*
 - Kapan message dilewatkan piranti jaringan dan bagaimana cara mengatasi error pada proses pengiriman. → *retransmission process*
 - Pengaturan dan penentuan sesi (session) pengiriman data. → *aplikasi yg sesuai ...*

Fungsi Protokol dalam Jaringan (2)

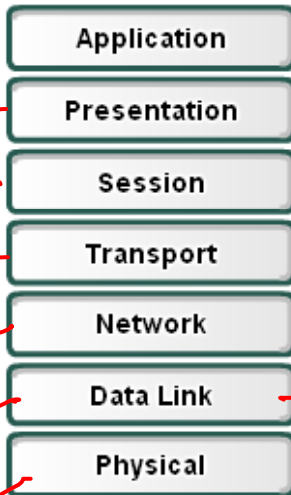


Protokol dan Layer Model

Models Provide Guidance



OSI Model



ChinaTours.com
Web Browser
HTML
80
220.200.1.70
MAC Gateway
Wired

LLC
MAC

A networking model is only a representation of network operation. The model is not the actual network.

TCP/IP Model

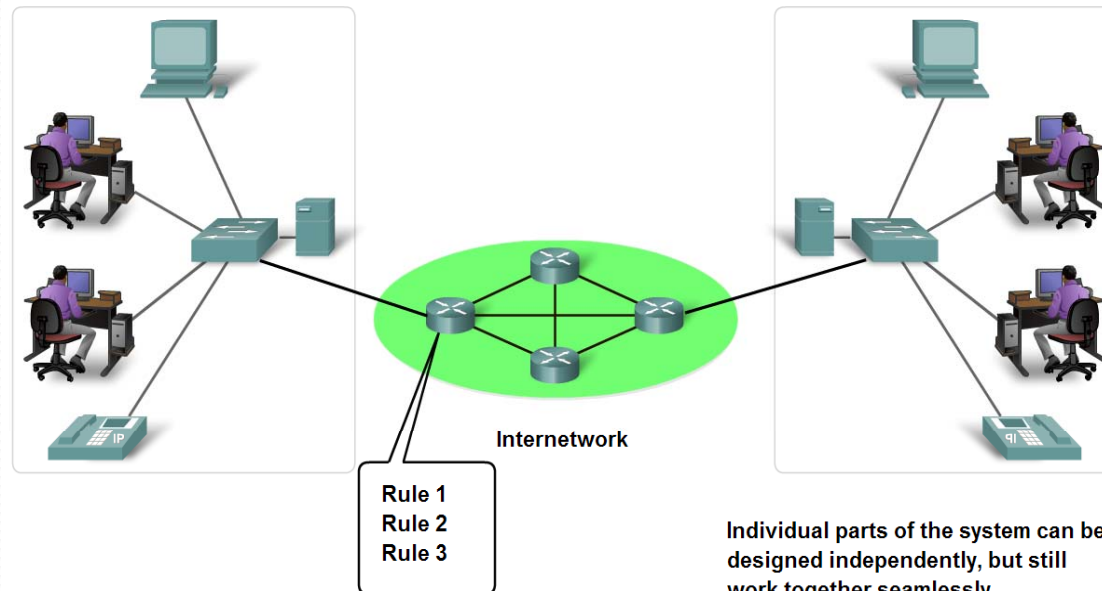


web browser
80
220.200.1.7
MAC add
Wired

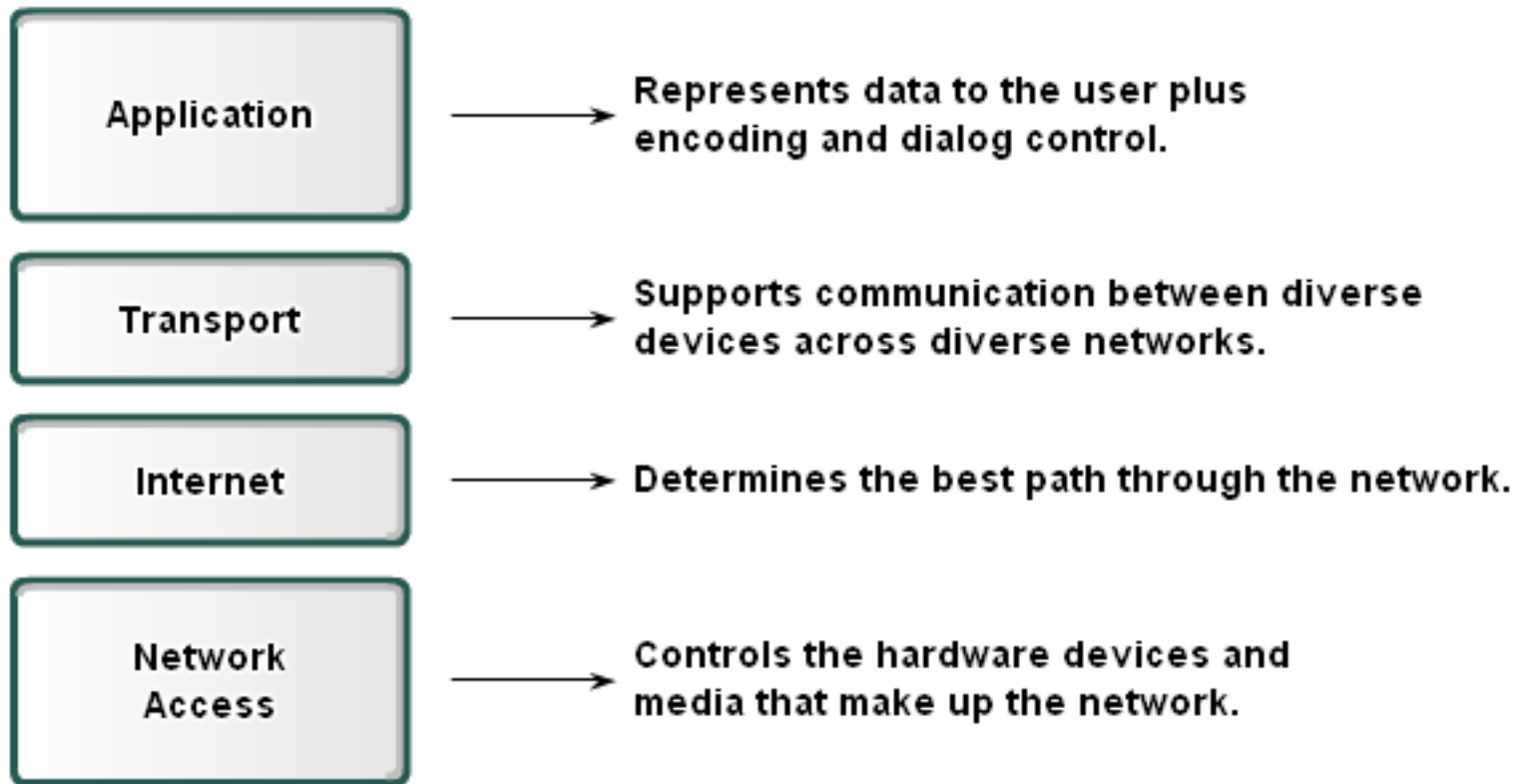
Keuntungan Model Layer

- Assists in protocol design
- Fosters competition
- Changes in one layer do not affect other layers
- Provides a common language

Using a layered model helps in the design of complex, multi-use, multi-vendor networks.



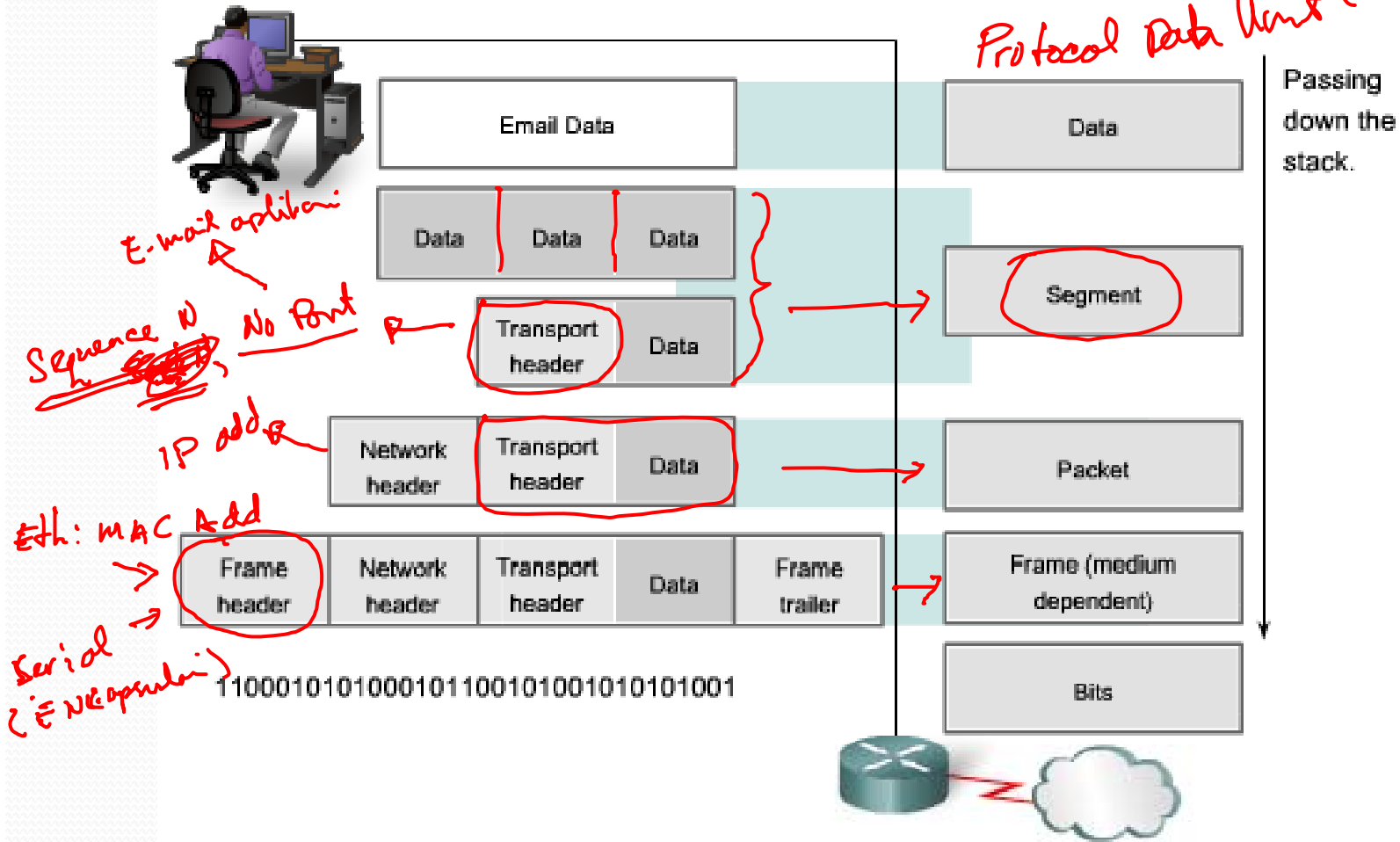
Model TCP/IP



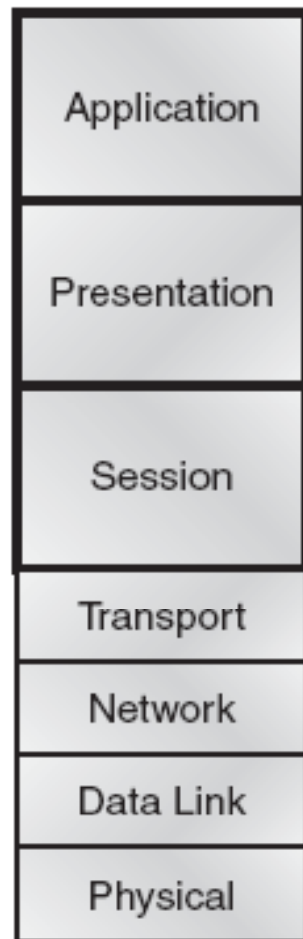
At a Glance - TCP IP Model

Encapsulation

Protocol Data Unit (PDU)



OSI Model – the upper layer



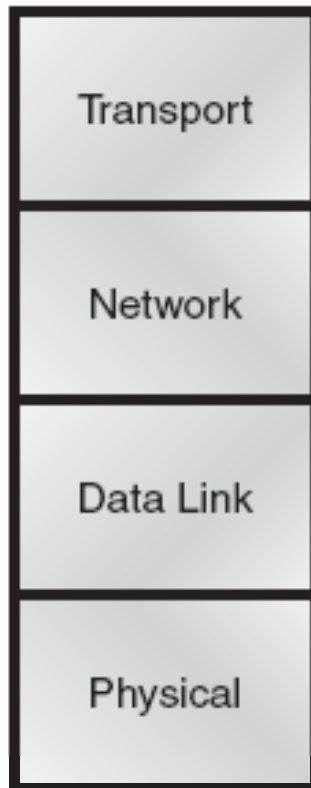
- Provides a user interface

- Presents data
- Handles processing such as encryption

compression

- Keeps different applications' data separate

OSI Model – the lower layer



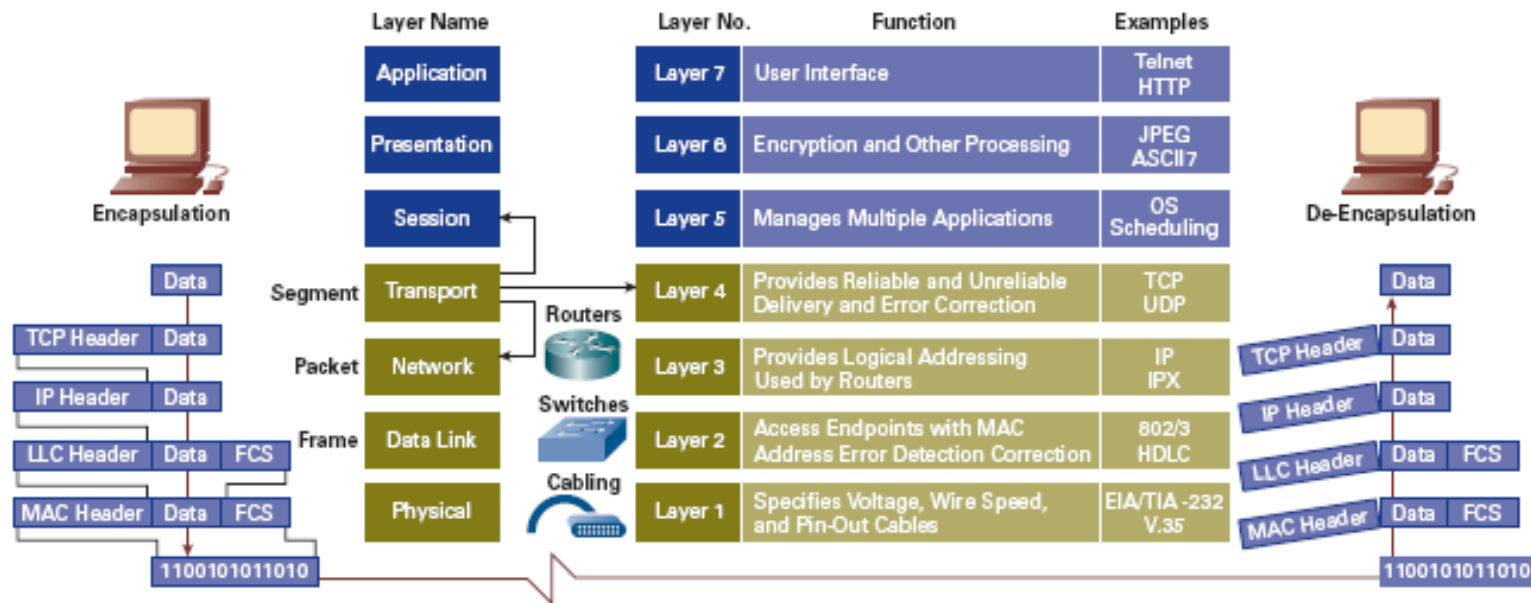
- Provides reliable or unreliable delivery
- Performs error correction before retransmit

- Provides logical addressing, which routers use for path determination

- Combines packets into bytes and bytes into frames
- Provides access to media using MAC address
- Performs error detection not correction

- Moves bits between devices
- Specifies voltage, wire speed, and pin-out of cables

At-a-Glance: OSI Model



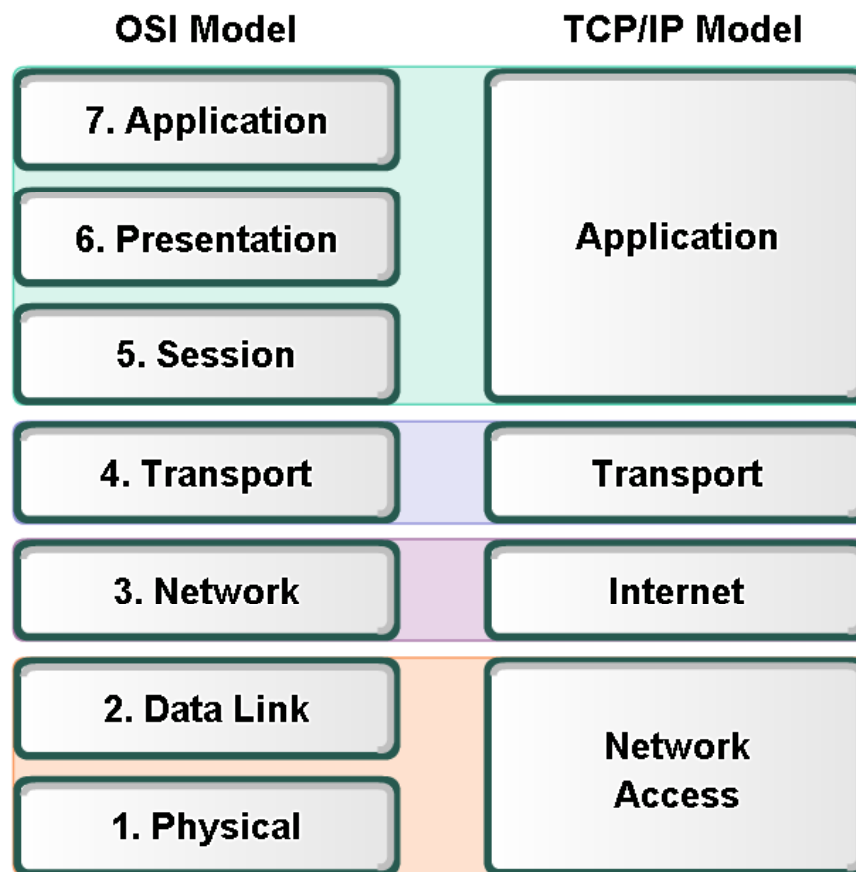
Communicating Between Layers

Each layer of the OSI model uses its own protocol to communicate with its peer layer in the destination device. The OSI model specifies how each layer communicates with the layers above and below it, allowing vendors to focus on specific layers that will work with any other vendor's adjacent layers.

Information is exchanged between layers using protocol data units (PDU). PDUs include control information (in the form of headers and trailers) and user data. PDUs include different types of information as they go up or down the layers (called "the stack"). To clarify where the PDU is on the stack, it is given a distinct name at each of the lower levels.

In other words, a PDU that is a segment (Layer 4) includes all the application layer's information. A packet (Layer 3) includes network layer control information in addition to the data and control information contained at the transport layer. Similarly, a frame (Layer 2) is a PDU that includes data link layer control information in addition to the upper layer control information and data. Finally, PDUs at the physical layer (Layer 1) are called bits.

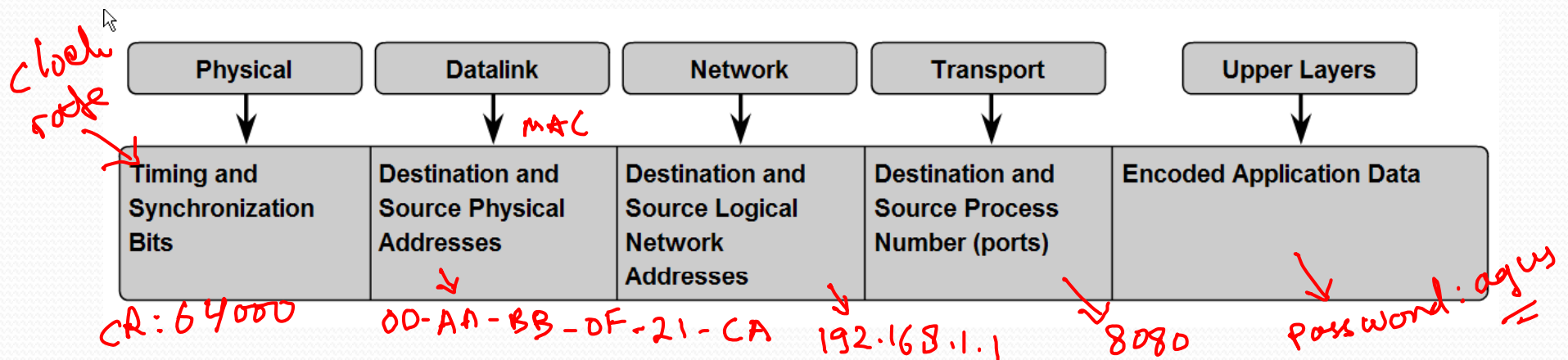
Compare OSI and TCP/IP model



The key parallels are in the Transport and Network layers.

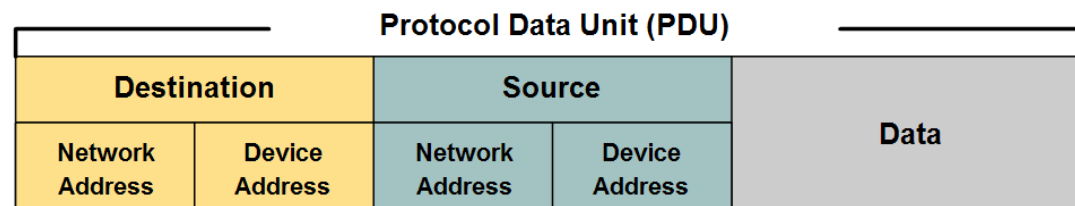
Addressing and Naming Schemes

- Explain how labels in encapsulation headers are used to manage communication in data networks
 - MAC Address → Layer 2 (data link) → Switches → Tabel ^{MAC}
 - IP Address → Layer 3 (network) → Routers → Tabel Routing
 - Port Number → Layer 4 (Transport) → PC / and device

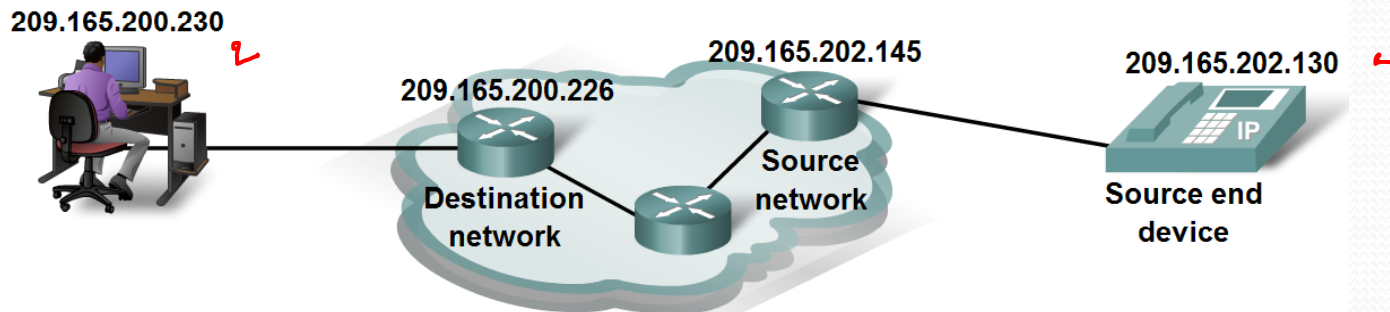


Addressing and Naming Schemes

- Explain how labels in encapsulation headers are used to manage communication in data networks



The Protocol Data Unit header also contains the network address.



Addressing and Naming Schemes

- Describe how information in the encapsulation header is used to identify the source and destination processes for data communication

At the end device, the service port number directs the data to the correct conversation.

