

The OSI Model

Why do we need the OSI Model?

- ❑ To address the problem of networks increasing in size and in number, the International Organization for Standardization (ISO) researched many network schemes and recognized that there was a need to create a network model
- ❑ This would help network builders implement networks that could communicate and work together
- ❑ ISO therefore, released the OSI reference model in 1984.

Don't Get Confused.

ISO - International Organization for Standardization

OSI - Open System Interconnection

IOS - Internetwork Operating System

To avoid confusion, some people say “International Standard Organization.”

The OSI Reference Model

7 Application

6 Presentation

5 Session

4 Transport

3 Network

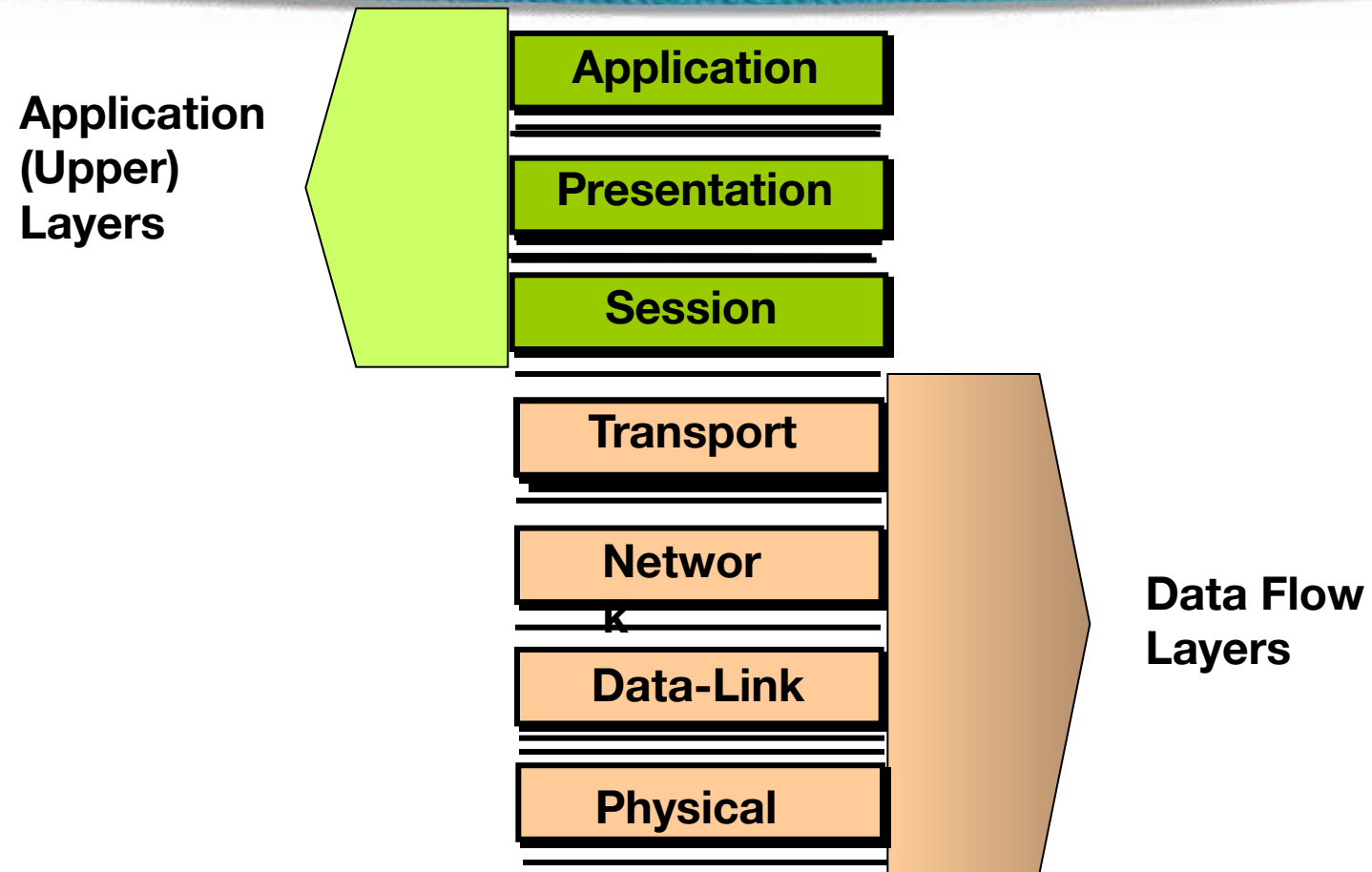
2 Data Link

1 Physical

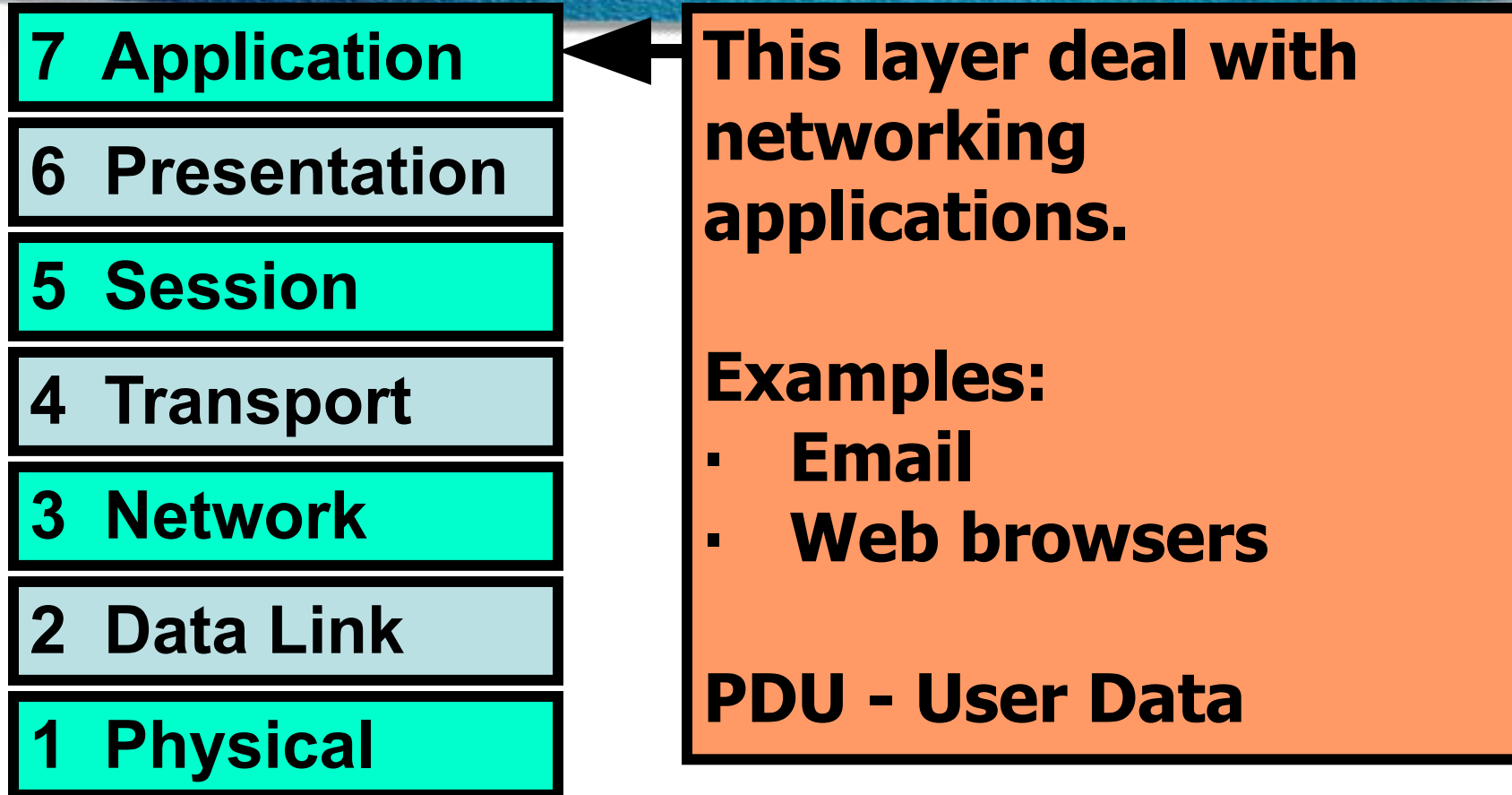
The OSI Model will be used throughout your entire networking career!

Memorize it!

OSI Model

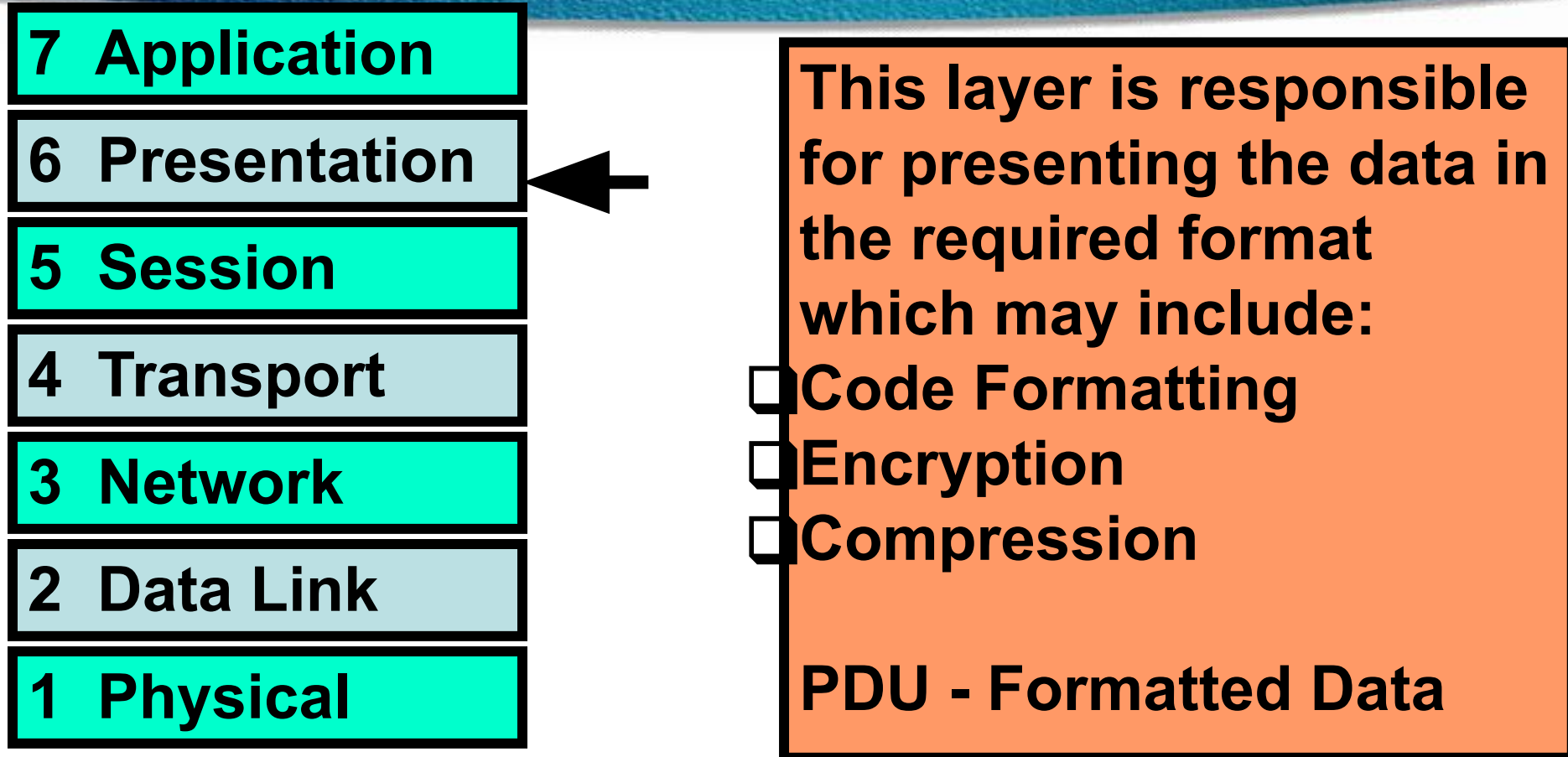


Layer 7 - The Application Layer

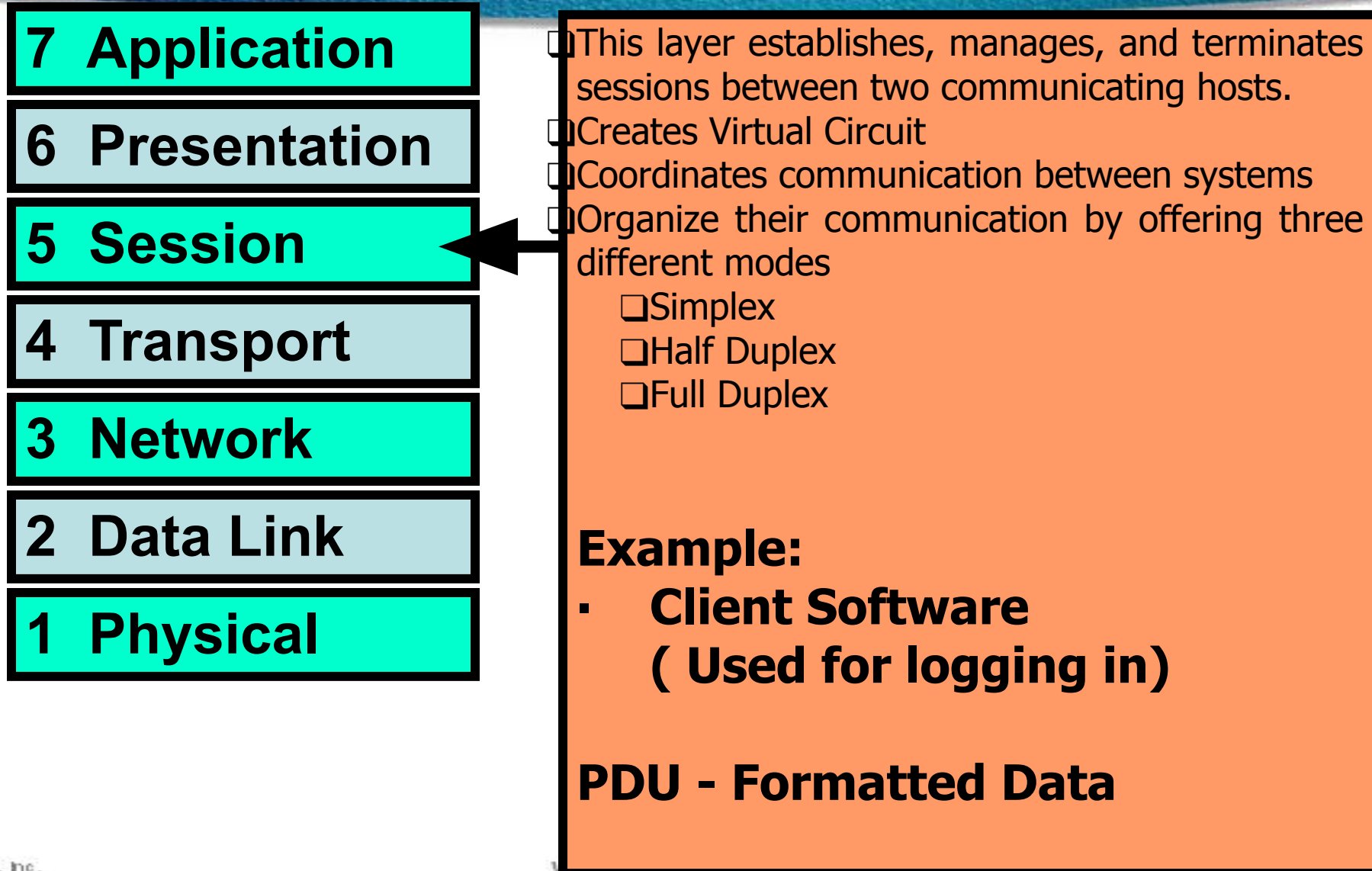


Each of the layers have Protocol Data Unit (PDU)

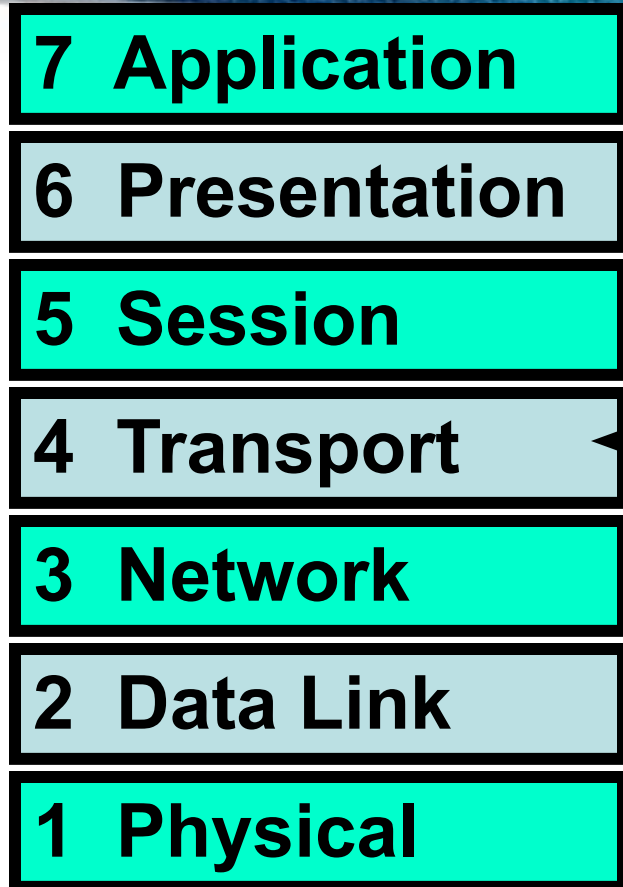
Layer 6 - The Presentation Layer



Layer 5 - The Session Layer



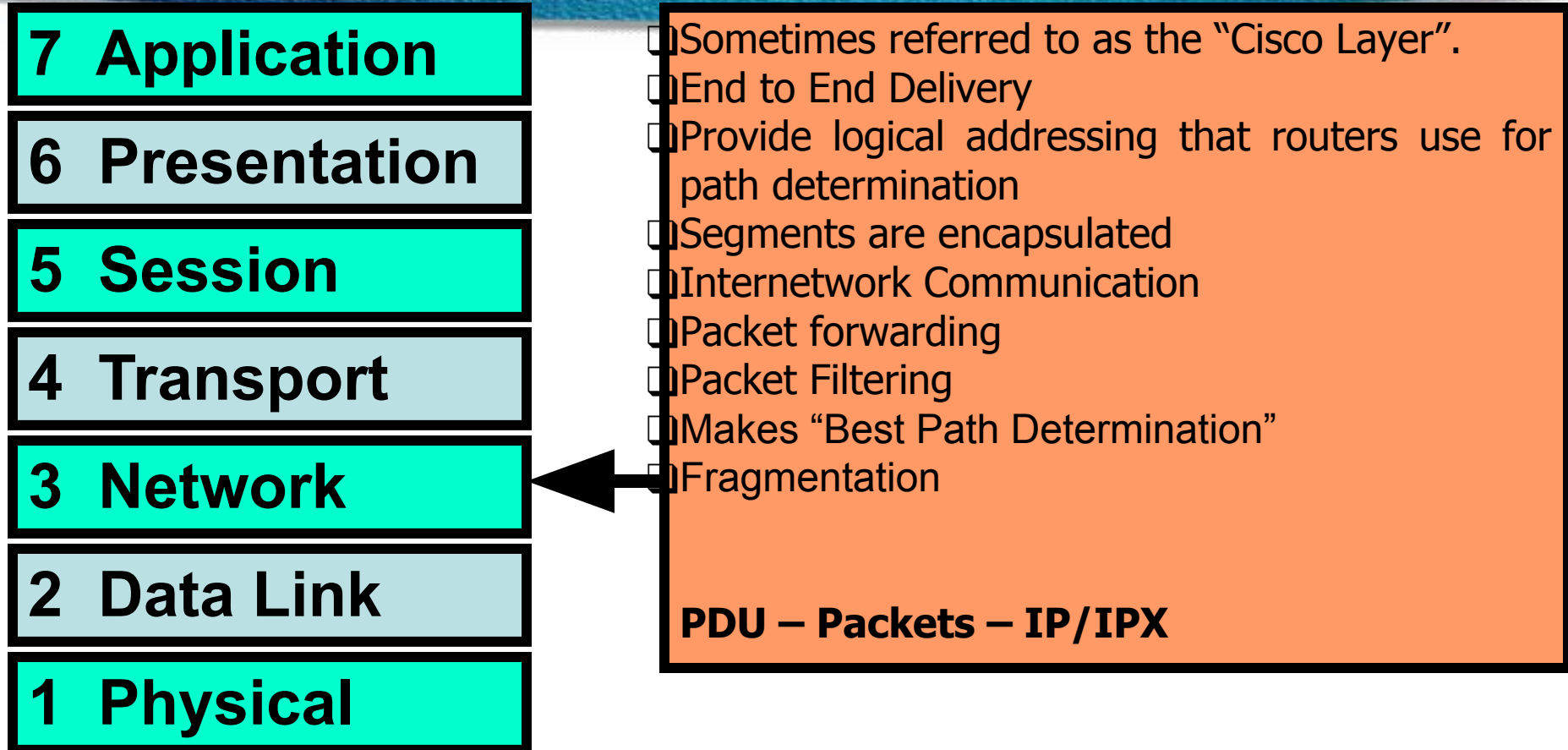
Layer 4 - The Transport Layer



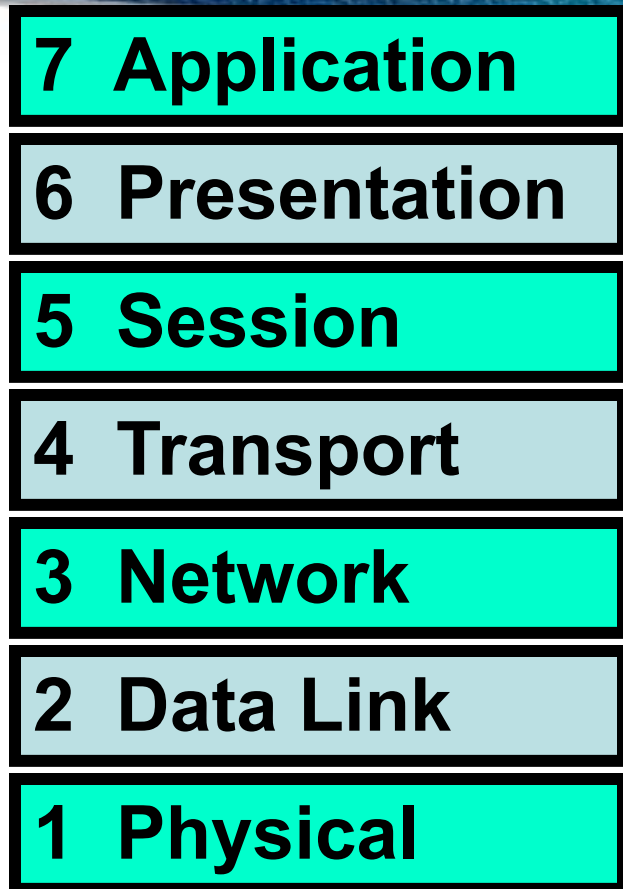
- ❑ This layer breaks up the data from the sending host and then reassembles it in the receiver.
- ❑ It also is used to insure reliable data transport across the network.
- ❑ Can be reliable or unreliable
- ❑ Sequencing
- ❑ Acknowledgment
- ❑ Retransmission
- ❑ Flow Control

PDU - Segments

Layer 3 - The Network Layer



Layer 2 - The Data Link Layer



- ❑ Performs Physical Addressing
- ❑ This layer provides reliable transit of data across a physical link.
- ❑ Combines bits into bytes and bytes into frames
- ❑ Access to media using MAC address
- ❑ Error detection, not correction
- ❑ LLC and MAC
- ❑ Logical Link Control performs Link establishment
- ❑ MAC Performs Access method

PDU - Frames



Layer 1 - The Physical Layer

7 Application

6 Presentation

5 Session

4 Transport

3 Network

2 Data Link

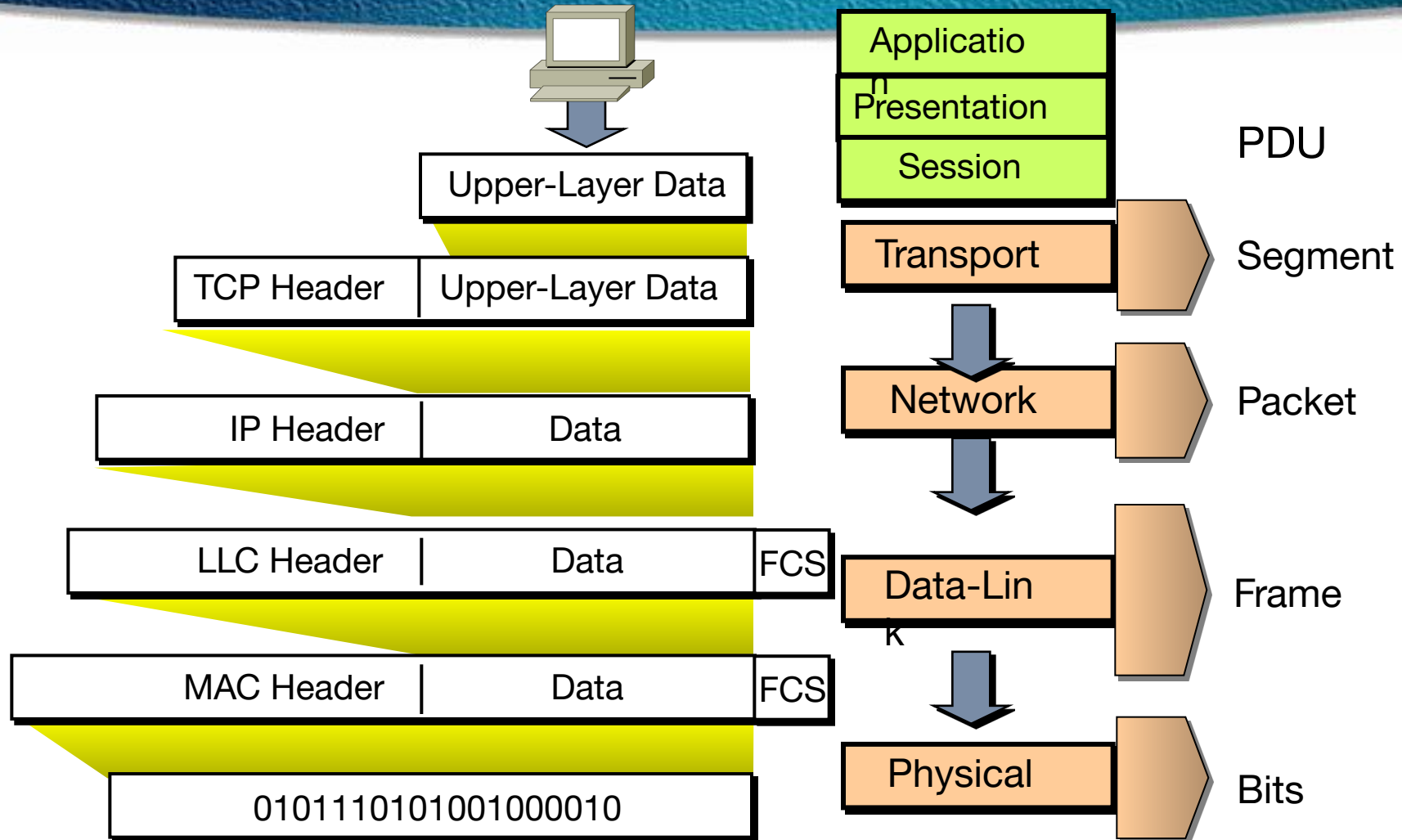
1 Physical

- This is the physical media through which the data, represented as electronic signals, is sent from the source host to the destination host.

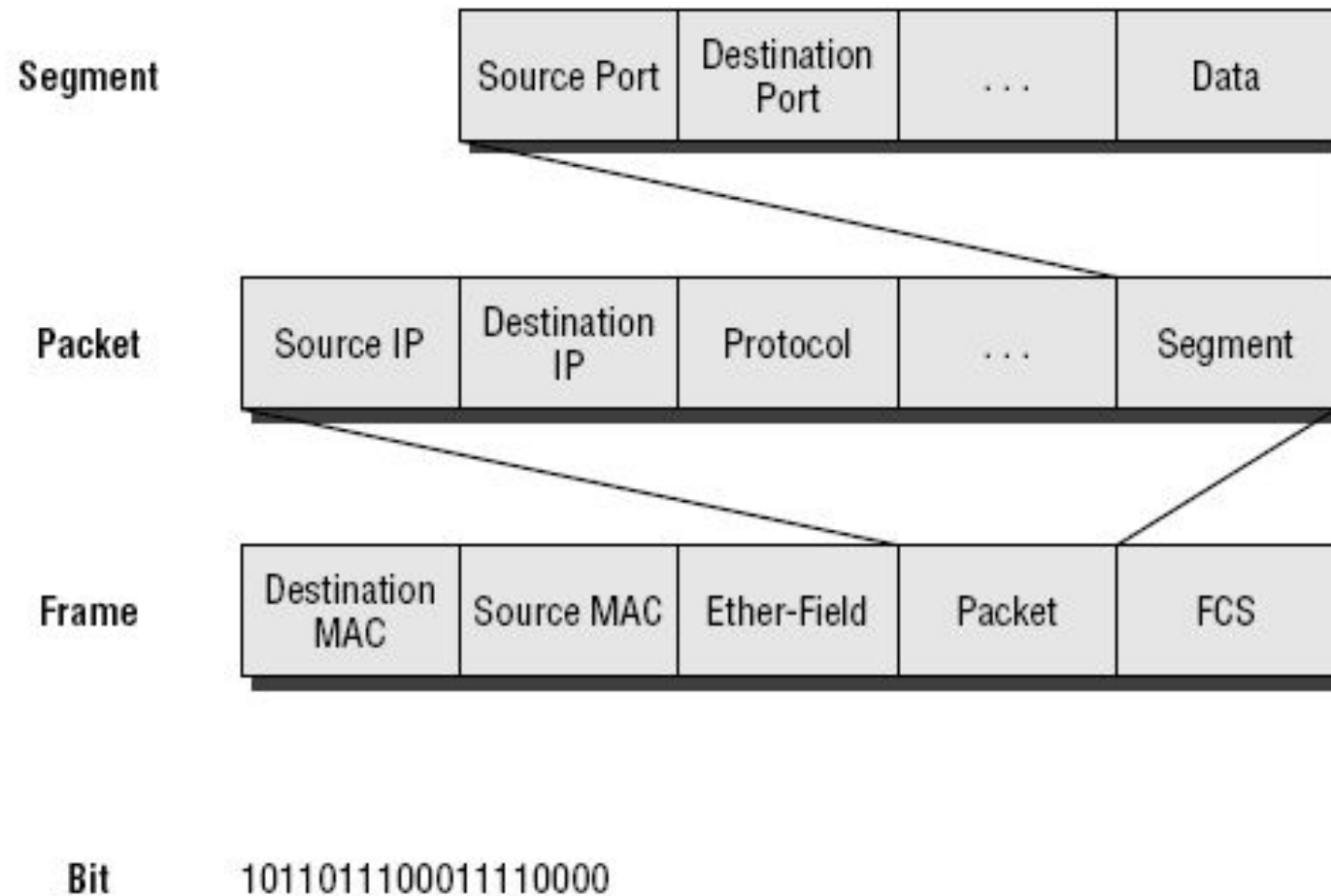
- Move bits between devices
- Encoding

PDU - Bits

Data Encapsulation



Data Encapsulation



OSI Model Analogy

Application Layer - Source Host



After riding your new bicycle a few times in Bangalore, you decide that you want to give it to a friend who lives in DADAR, Mumbai.

OSI Model Analogy

Presentation Layer - Source Host



Make sure you have the proper directions to disassemble and reassemble the bicycle.

OSI Model Analogy

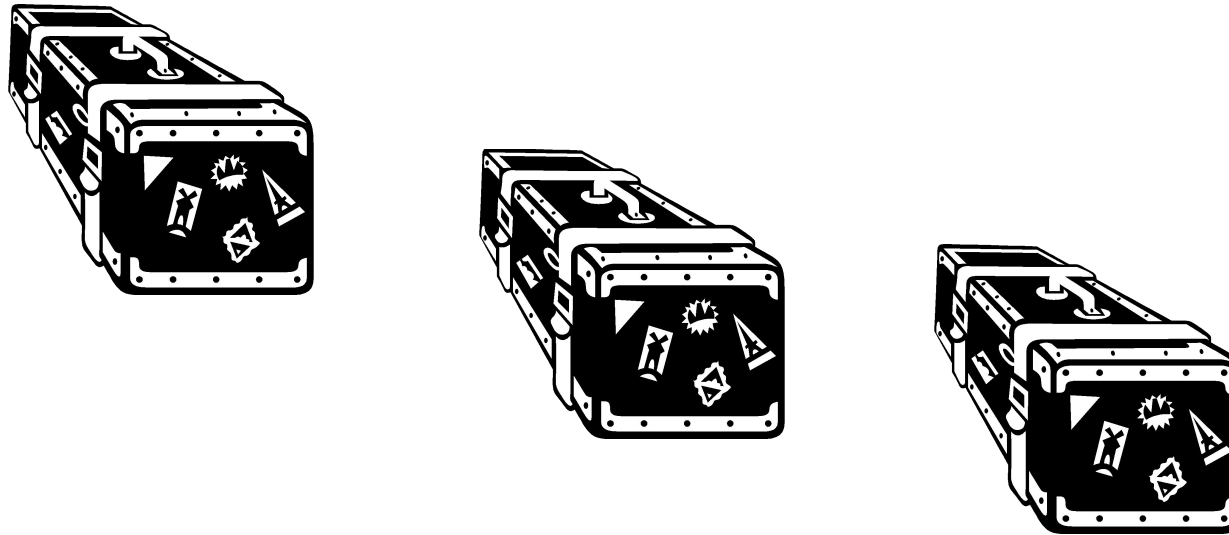
Session Layer - Source Host



Call your friend and make sure you have his correct address.

OSI Model Analogy

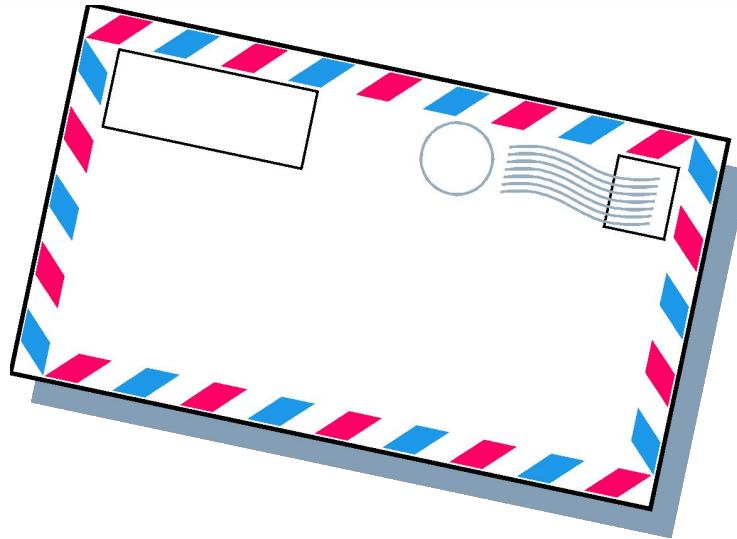
Transport Layer - Source Host



Disassemble the bicycle and put different pieces in different boxes. The boxes are labeled “1 of 3”, “2 of 3”, and “3 of 3”.

OSI Model Analogy

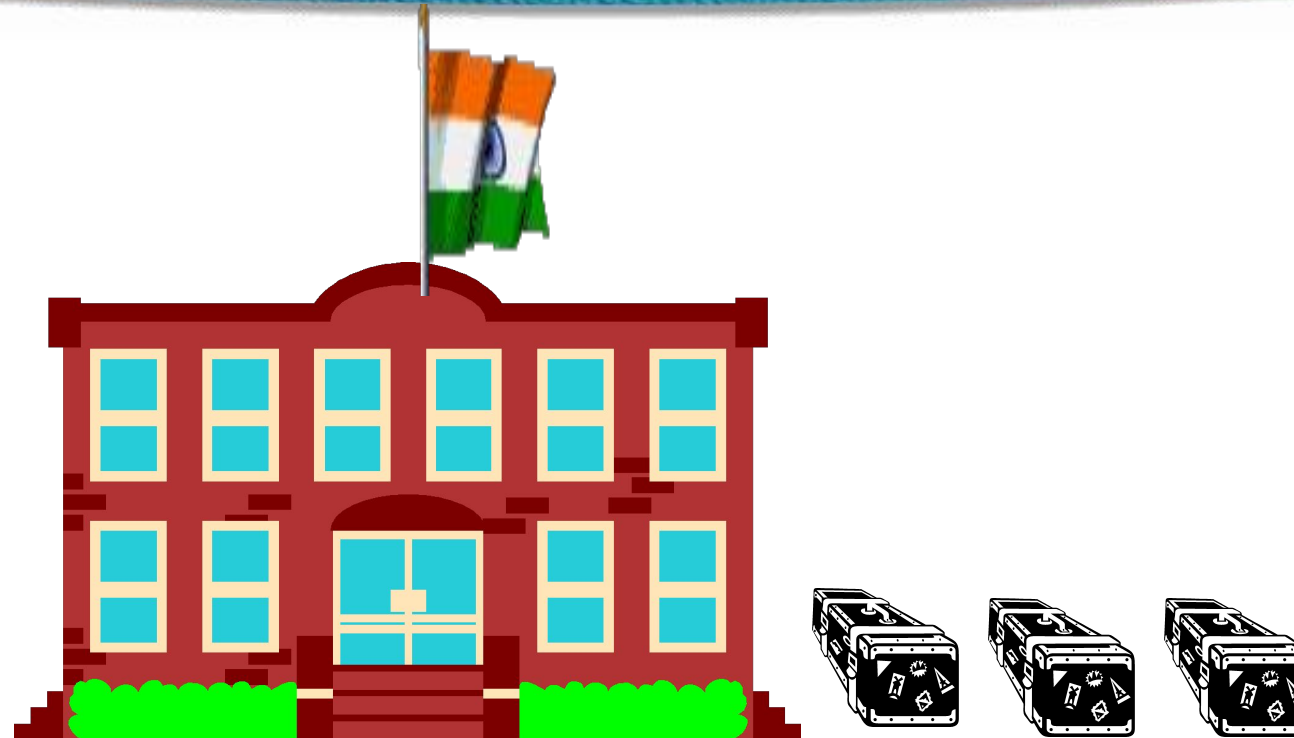
Network Layer - Source Host



Put your friend's complete mailing address (and yours) on each box. Since the packages are too big for your mailbox (and since you don't have enough stamps) you determine that you need to go to the post office.

OSI Model Analogy

Data Link Layer – Source Host



Bangalore post office takes possession of the boxes.

OSI Model Analogy

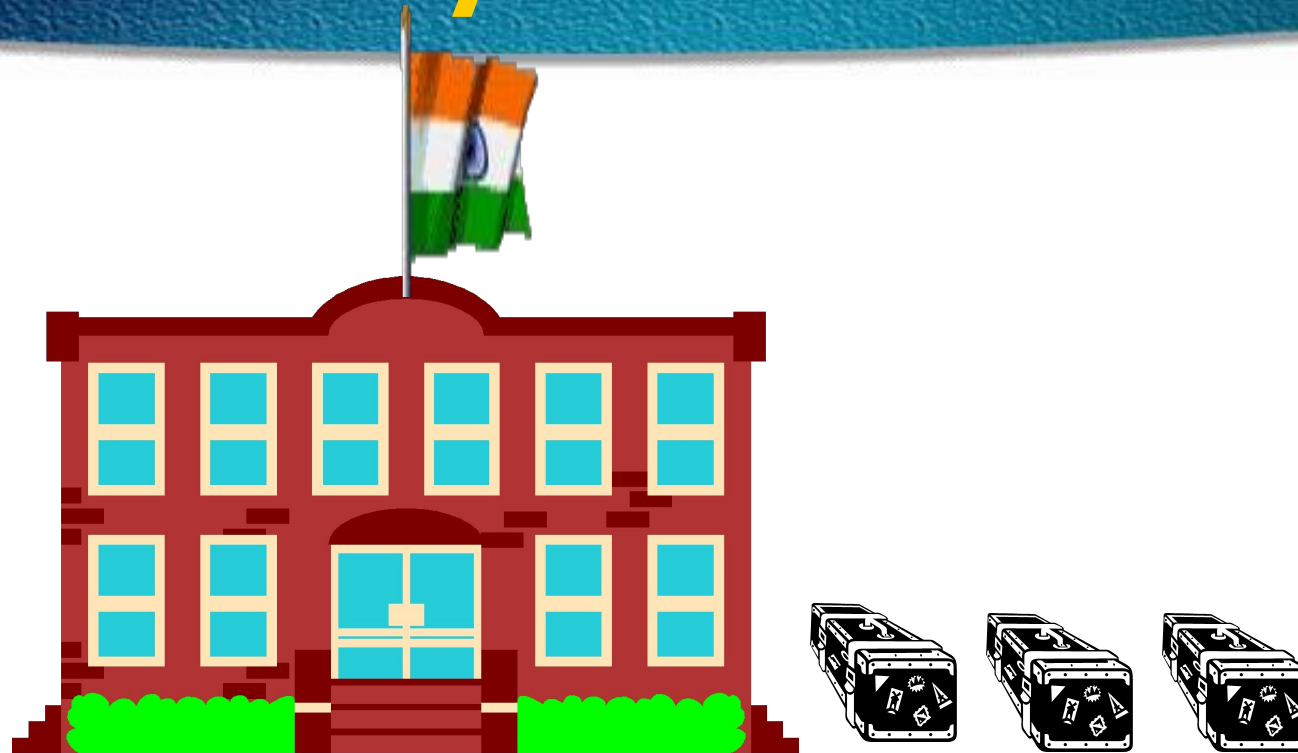
Physical Layer - Media



The boxes are flown from Bangalore to Mumbai.

OSI Model Analogy

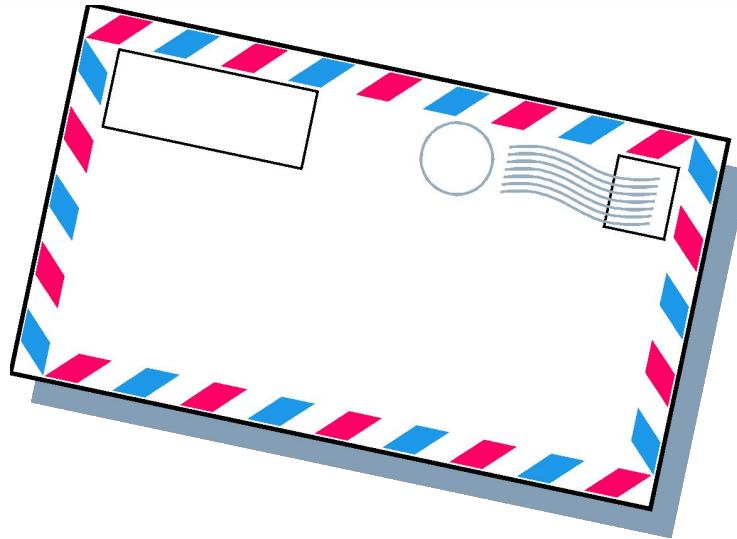
Data Link Layer - Destination



Dadar post office receives your boxes.

OSI Model Analogy

Network Layer - Destination



Upon examining the destination address, Dadar post office determines that your boxes should be delivered to your written home address.

OSI Model Analogy

Transport Layer - Destination



Your friend calls you and tells you he got all 3 boxes and he is having another friend named BOB reassemble the bicycle.

OSI Model Analogy

Session Layer - Destination



Your friend hangs up because he is done talking to you.

OSI Model Analogy

Presentation Layer - Destination



BOB is finished and “presents” the bicycle to your friend. Another way to say it is that your friend is finally getting him “present”.

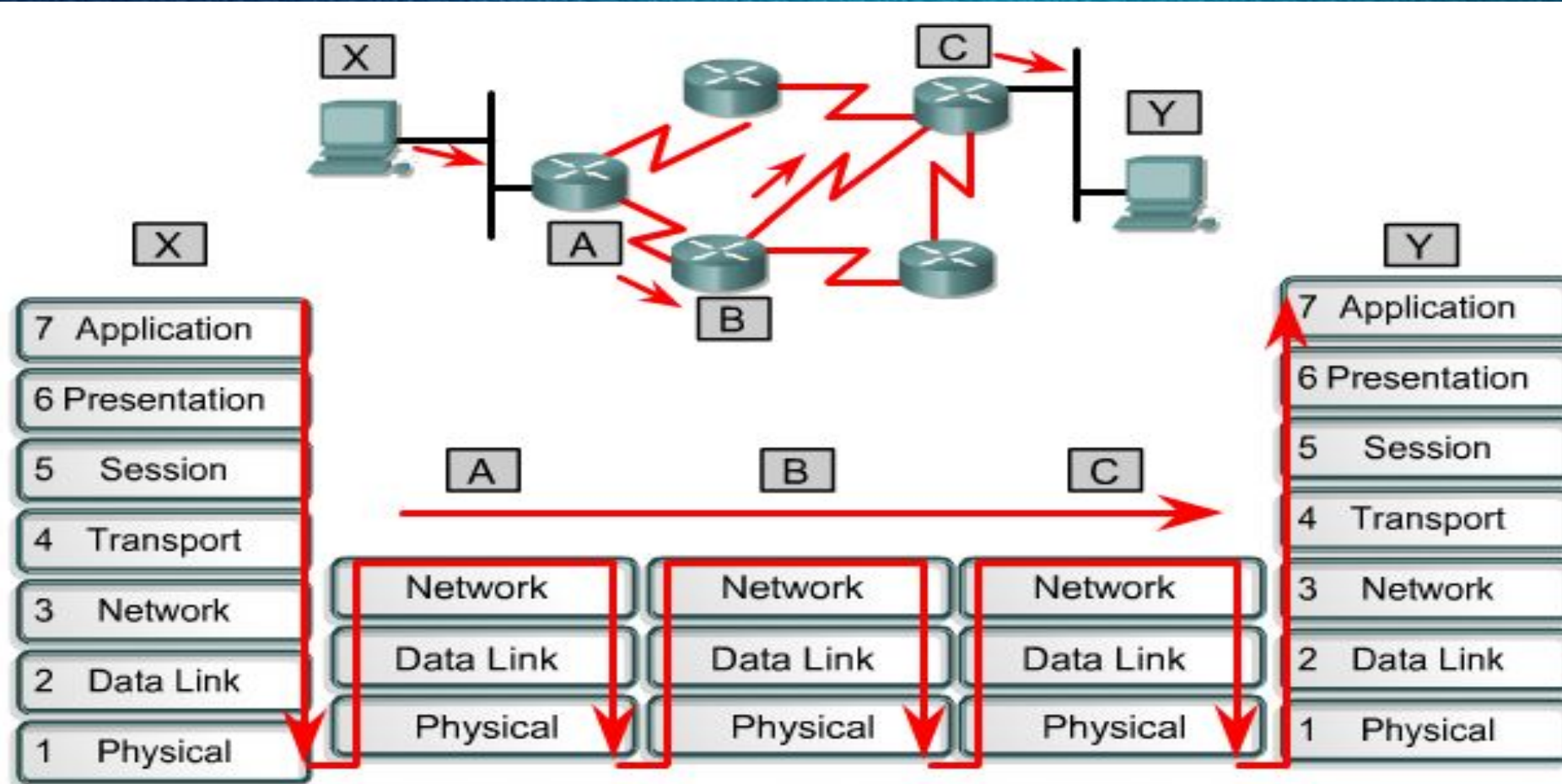
OSI Model Analogy

Application Layer - Destination



Your friend enjoys riding his new bicycle in Dadar.

Data Flow Through a Network



Data flow in a network focuses on layers one, two and three of the OSI model. This is after being transmitted by the sending host and before arriving at the receiving host.

TCP/IP MODEL

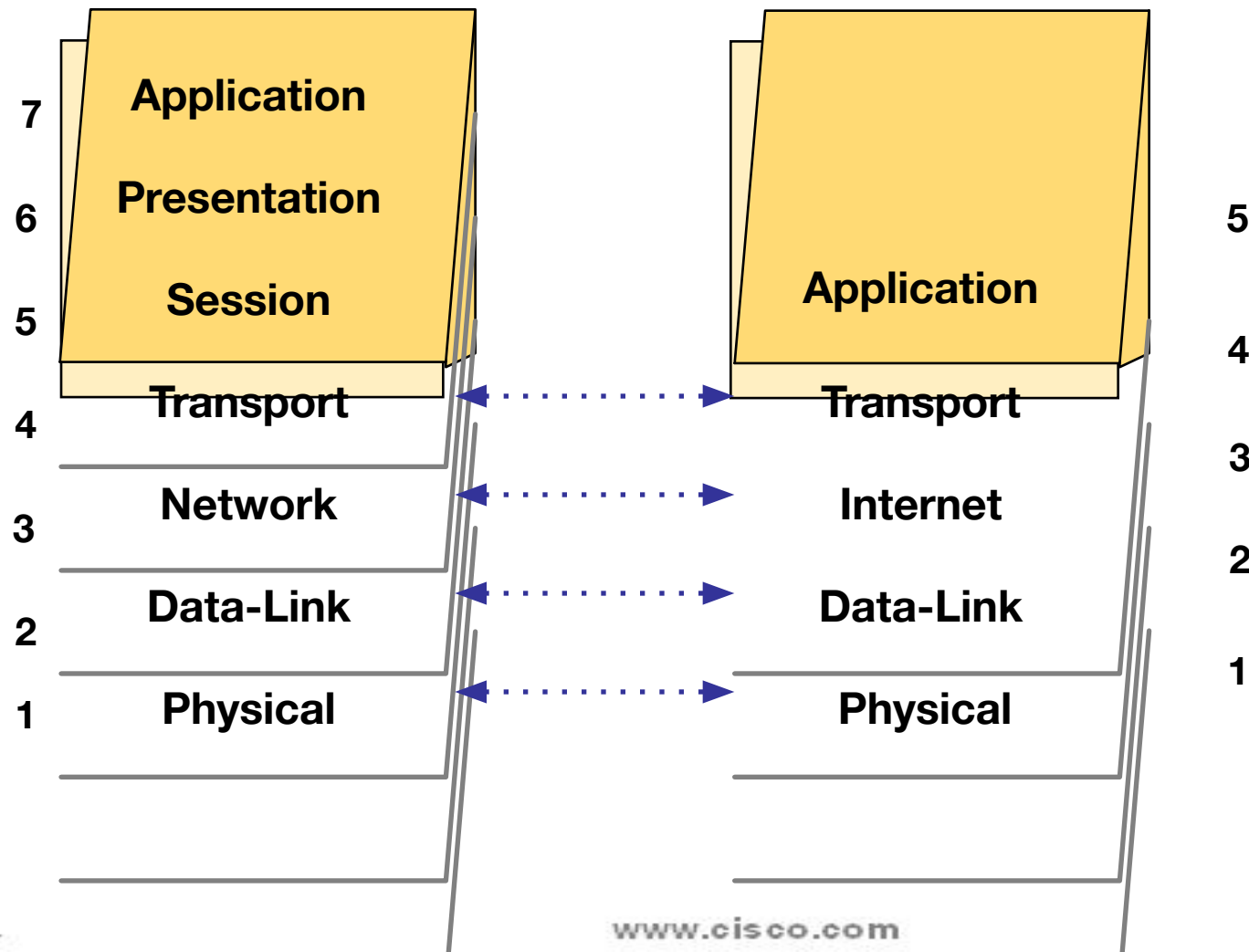
Why Another Model?

Although the OSI reference model is universally recognized, the historical and technical open standard of the Internet is Transmission Control Protocol / Internet Protocol (TCP/IP).

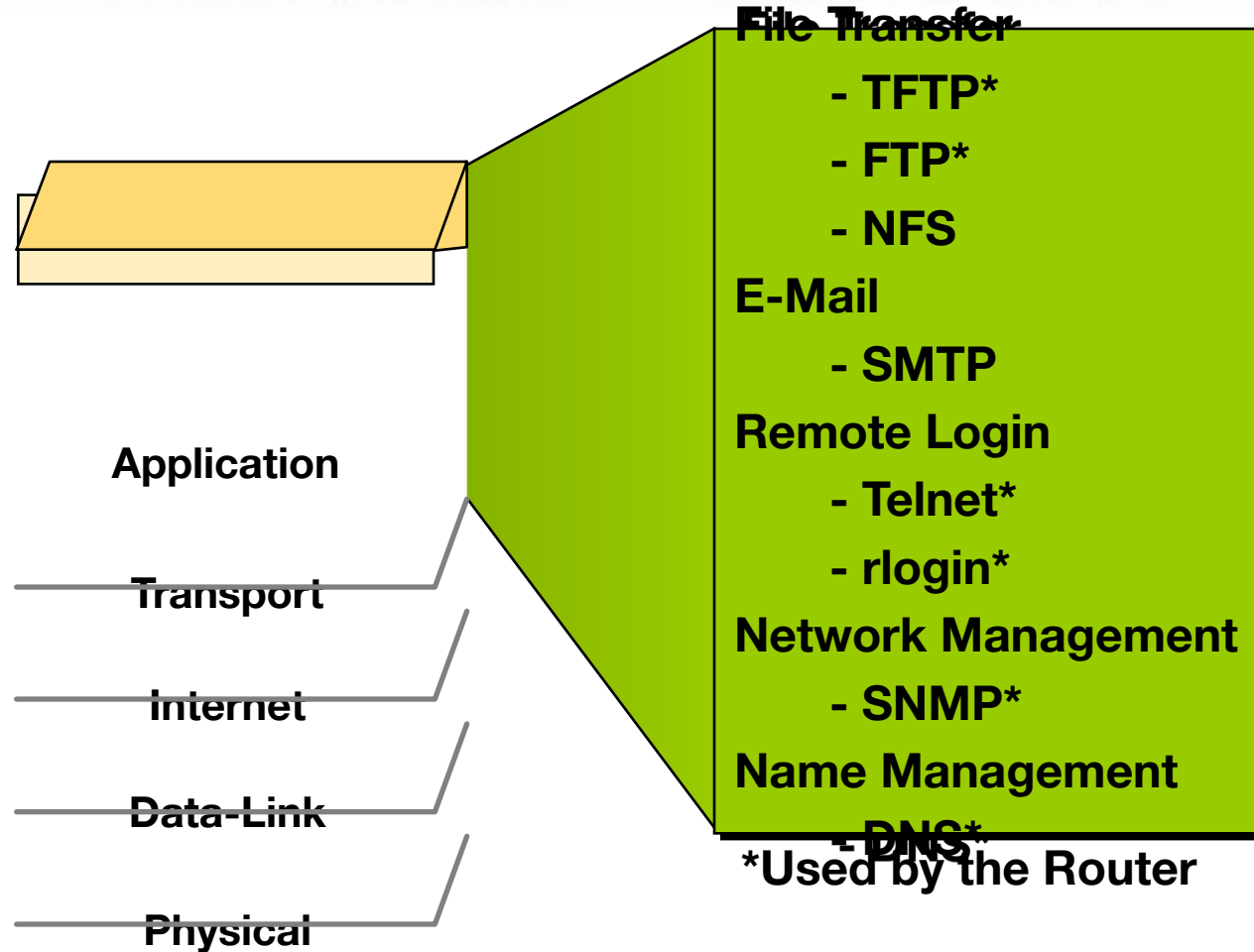
The TCP/IP reference model and the TCP/IP protocol stack make data communication possible between any two computers, anywhere in the world, at nearly the speed of light.

The U.S. Department of Defense (DoD) created the TCP/IP reference model because it wanted a network that could survive any conditions, even a nuclear war.

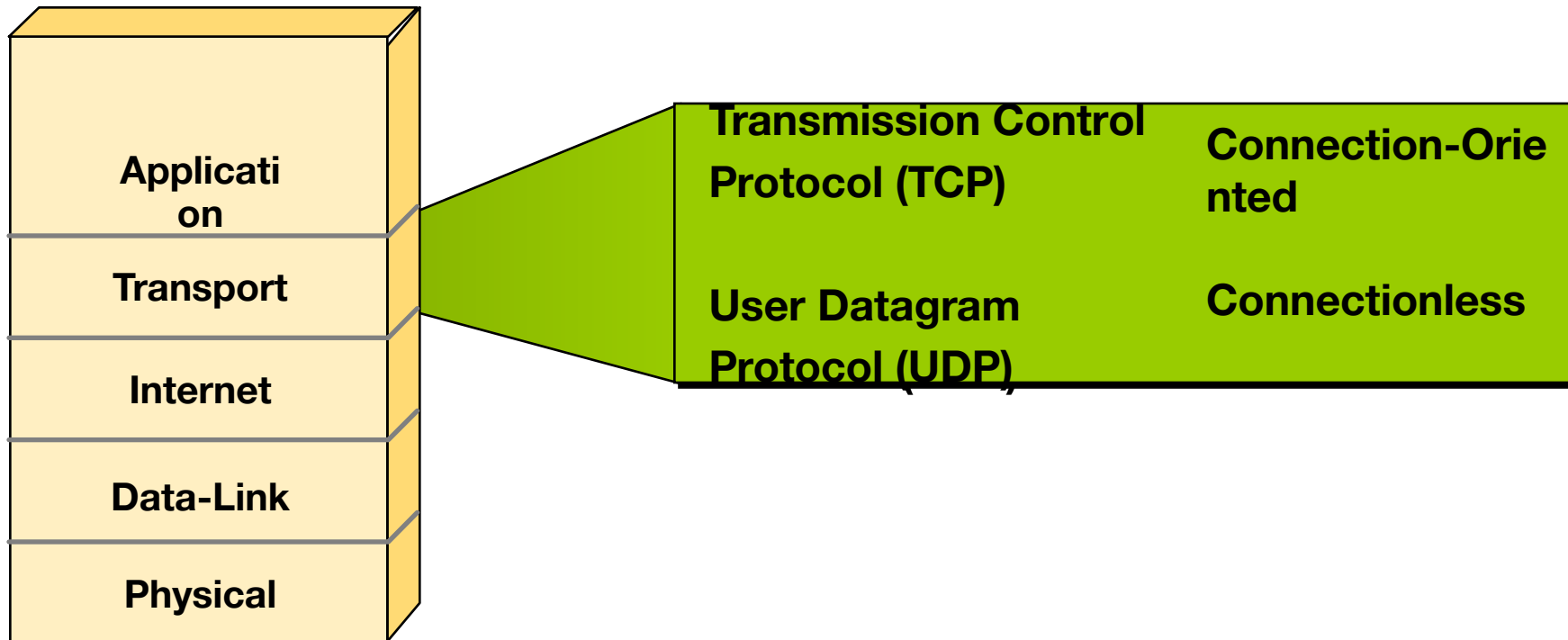
TCP/IP Protocol Stack



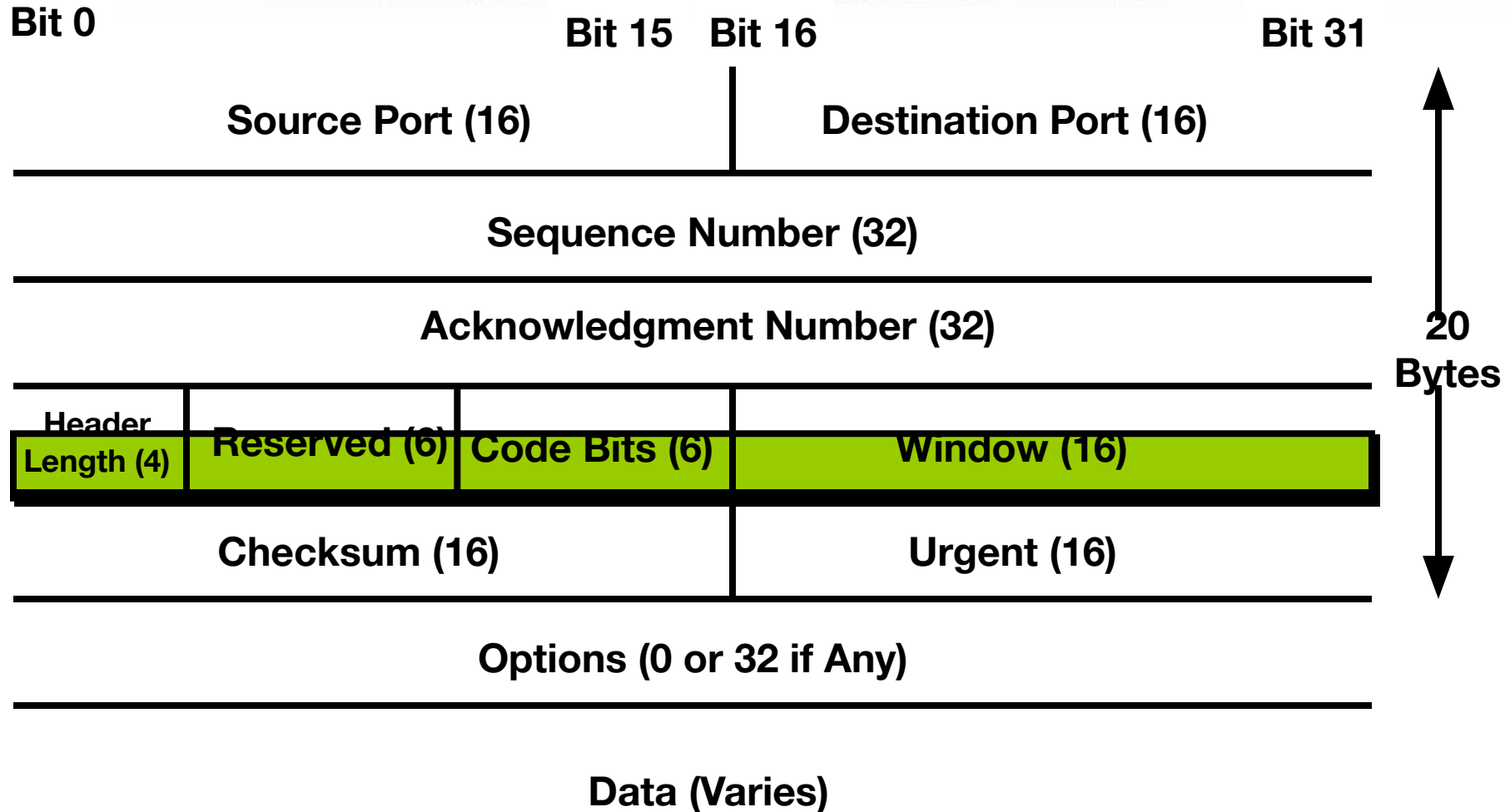
Application Layer Overview



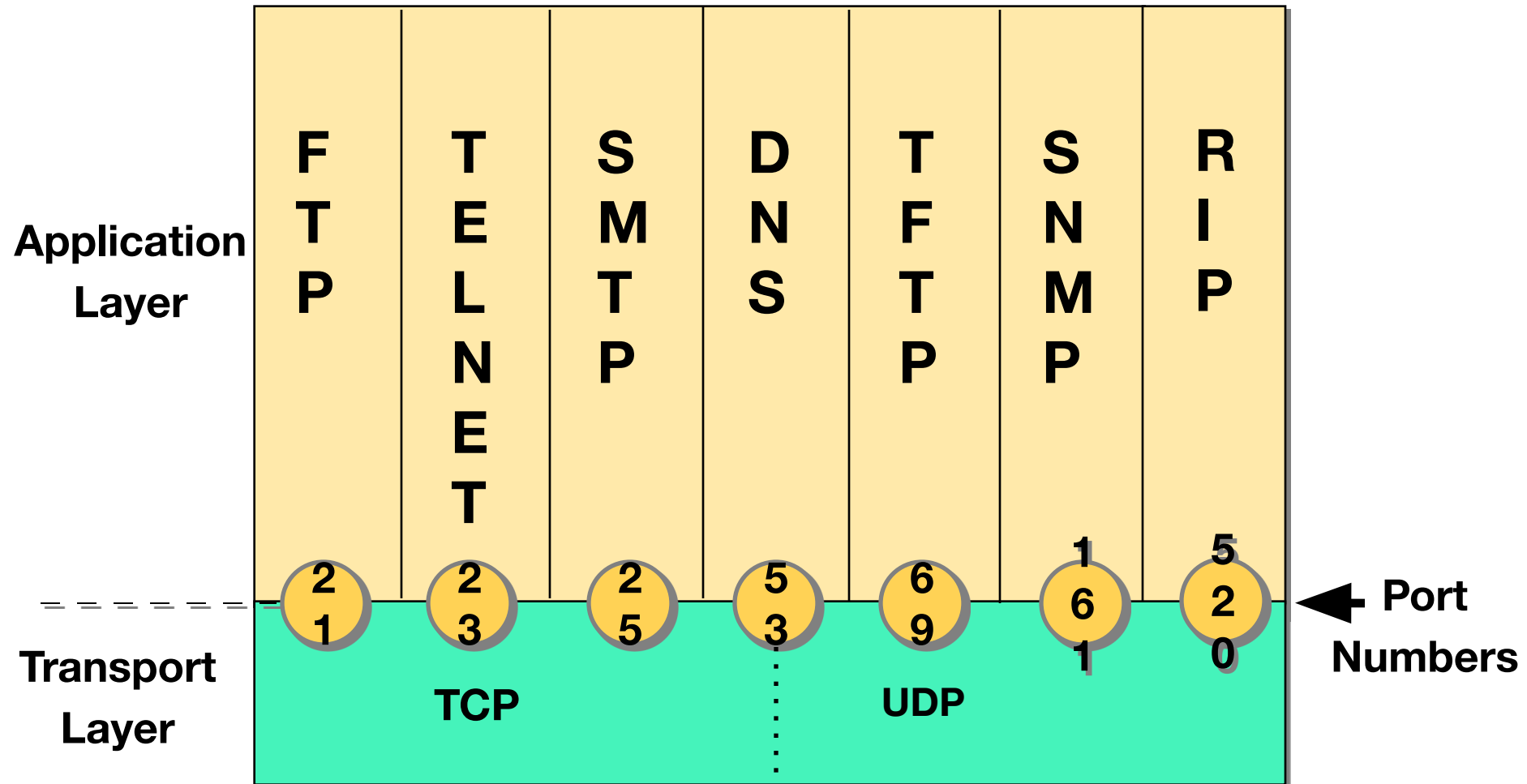
Transport Layer Overview



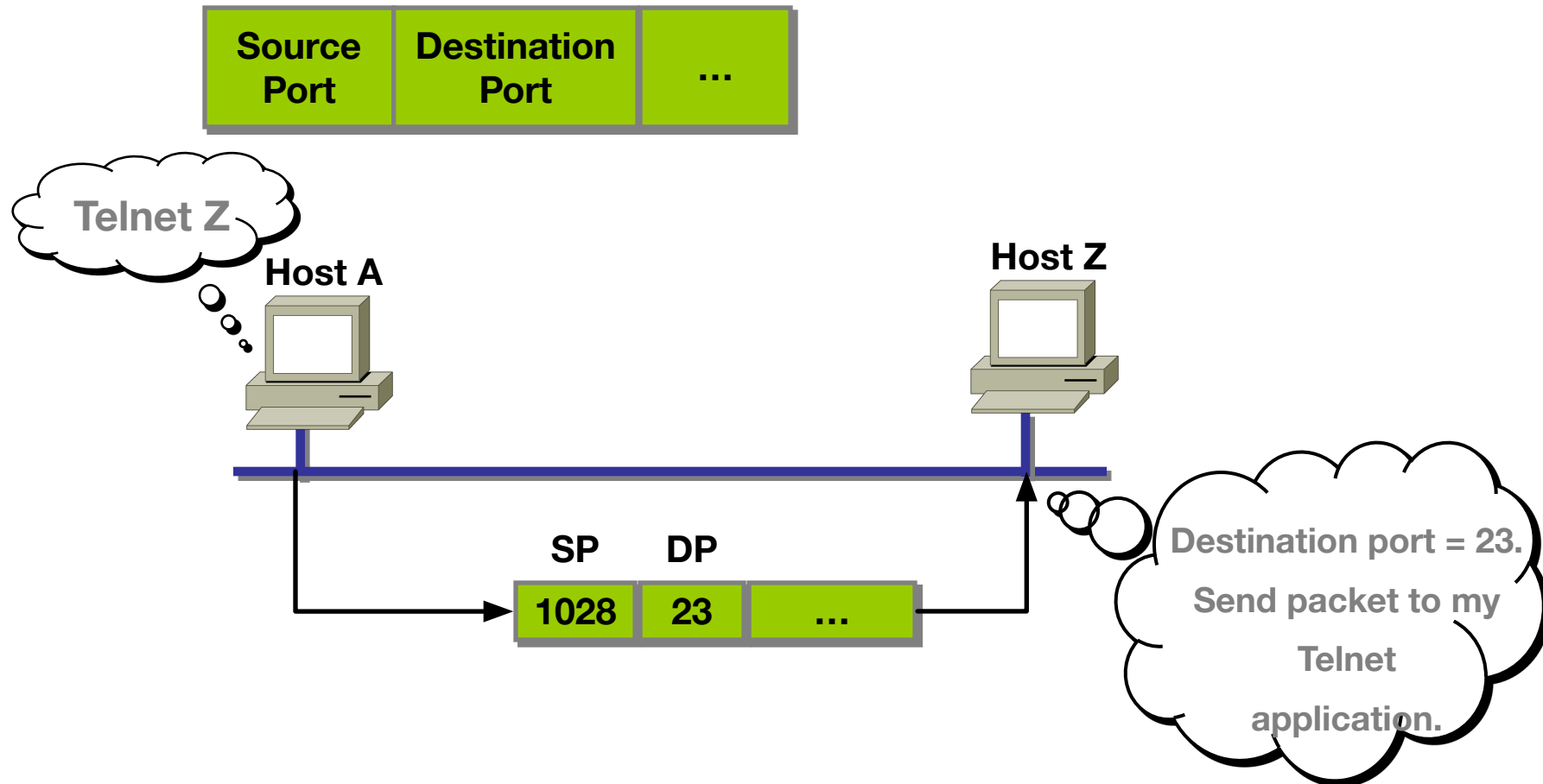
TCP Segment Format



Port Numbers



TCP Port Numbers



TCP Port Numbers

