

# How the Internet Works

INTRODUCTION TO THE OSI MODEL

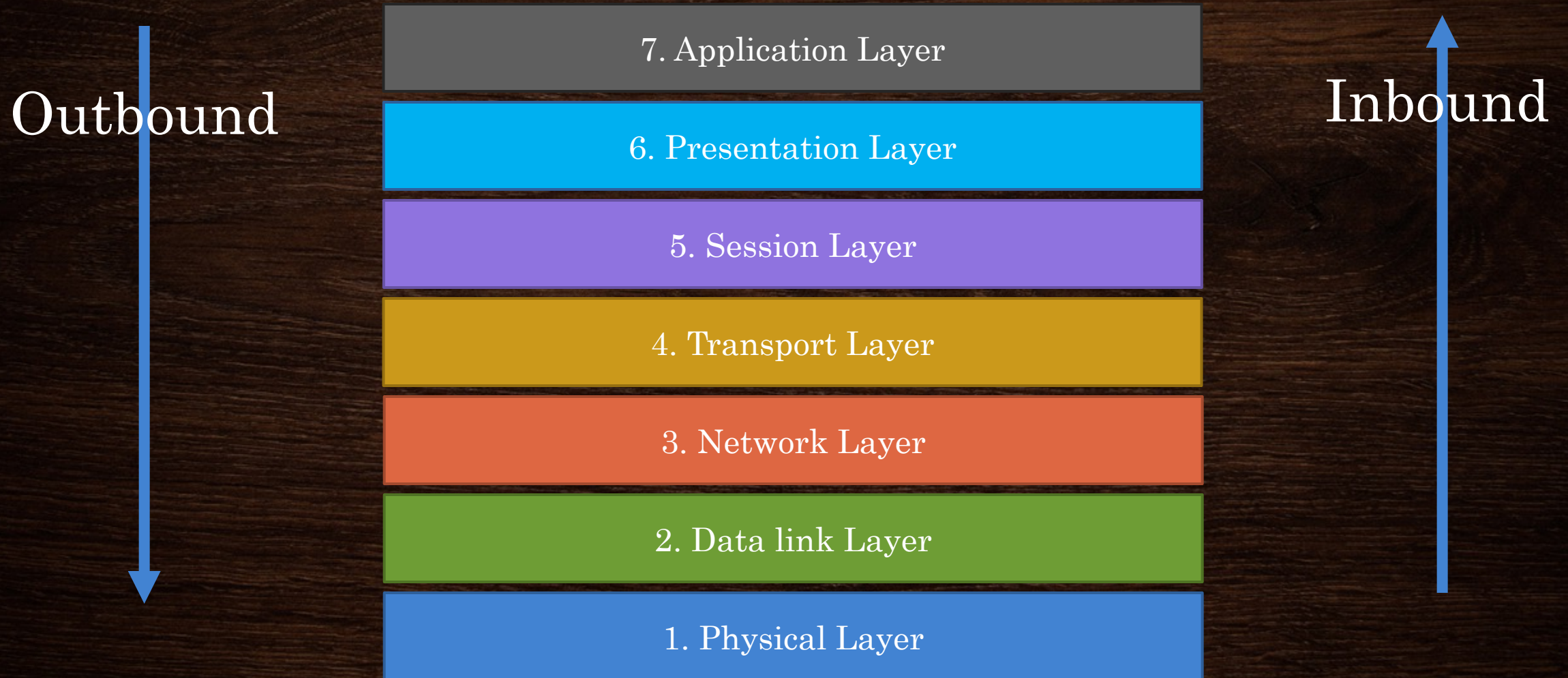


# Open Systems Interconnection

- Conceptual Model
- Standard for the Internet
- 7 Layers

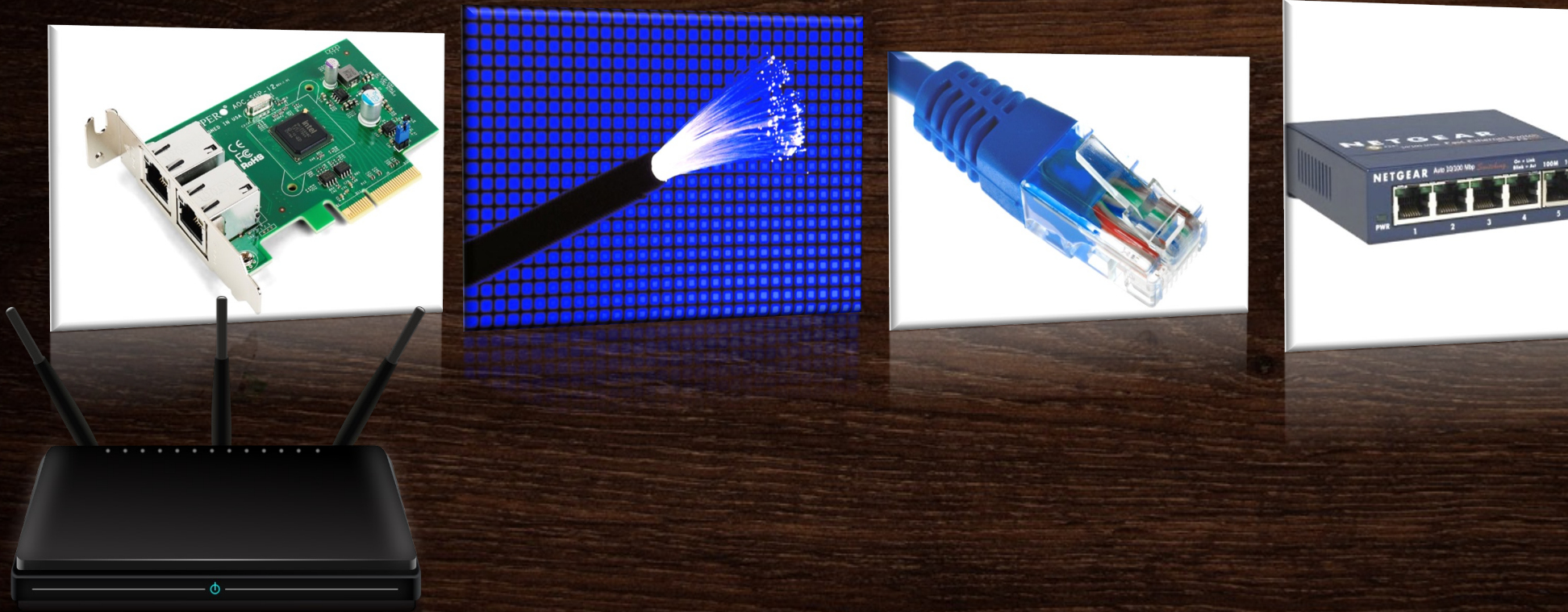


# Seven Layers





# Seven Layers



1. Physical Layer

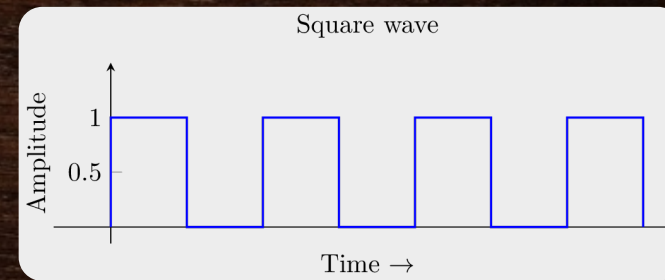


# Seven Layers

101110101001010101010101010101010101



Signals: Digital, Light, Analog



2. Data link Layer

1. Physical Layer



# Seven Layers



Internet Protocol Addresses  
build network of all computers.

3. Network Layer

2. Data link Layer

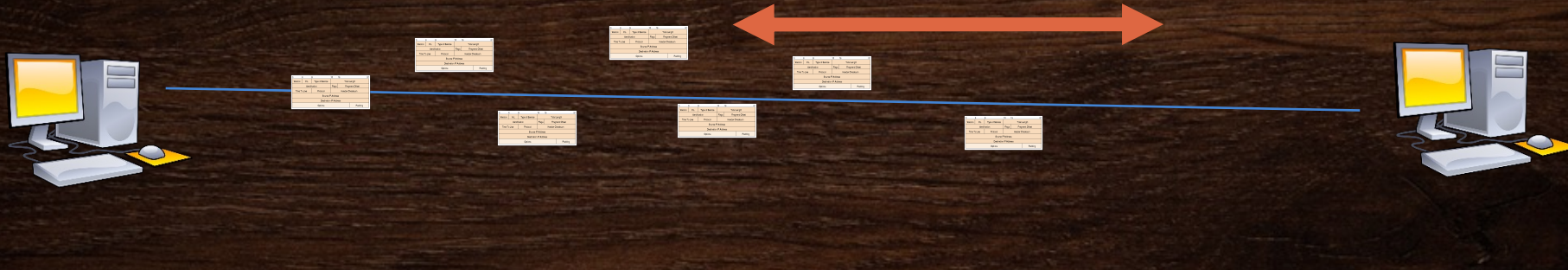
1. Physical Layer



# Seven Layers

IP Packets

0	4	8	16	19	31
Version	IHL	Type of Service	Total Length		
Identification			Flags	Fragment Offset	
Time To Live	Protocol		Header Checksum		
Source IP Address					
Destination IP Address					
Options				Padding	



## TCP Packets

- All Packets arrive, or are resent.
- Packets may not take same route
- Packets may not arrive in order
- TCP has overhead latency to manage packages arrival

4. Transport Layer

3. Network Layer

2. Data link Layer

1. Physical Layer

## UDP Packets

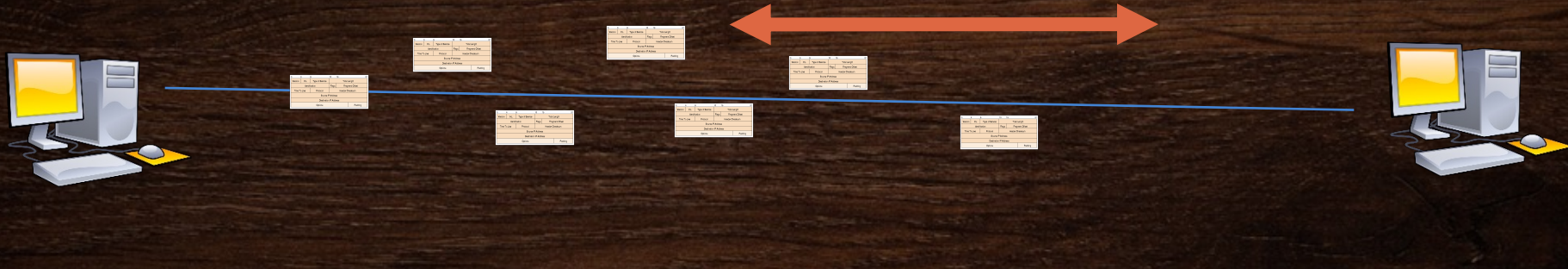
- Used for live broadcasting.
- Not all packets may arrive
- Faster transit than TCP
- Squares missing on TV are lost UDP packets



# Seven Layers

IP Packets

0	4	8	16	19	31
Version	4	Type of Service	Total Length		
Identification			Flags	Fragment Offset	
Time To Live		Protocol	Header Checksum		
Source IP Address					
Destination IP Address					
Options				Padding	



**TCP**

4. Transport Layer

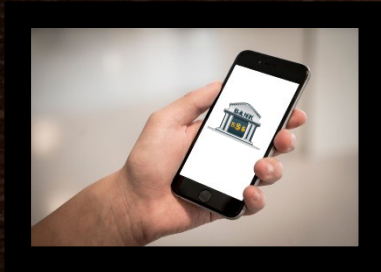
**IP**

3. Network Layer

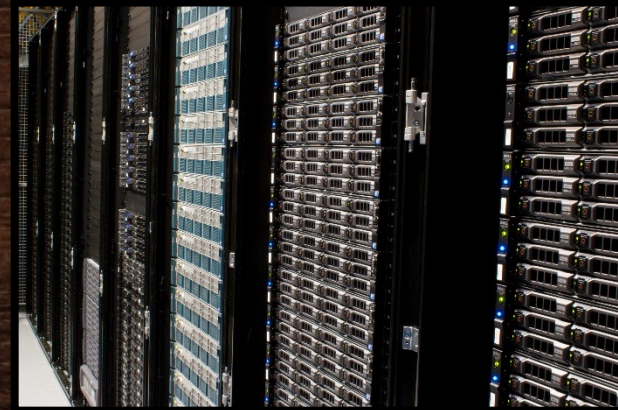
TCP/IP is often called “The Language of the Internet”



# Seven Layers



MANAGED SESSION



5. Session Layer

4. Transport Layer

3. Network Layer

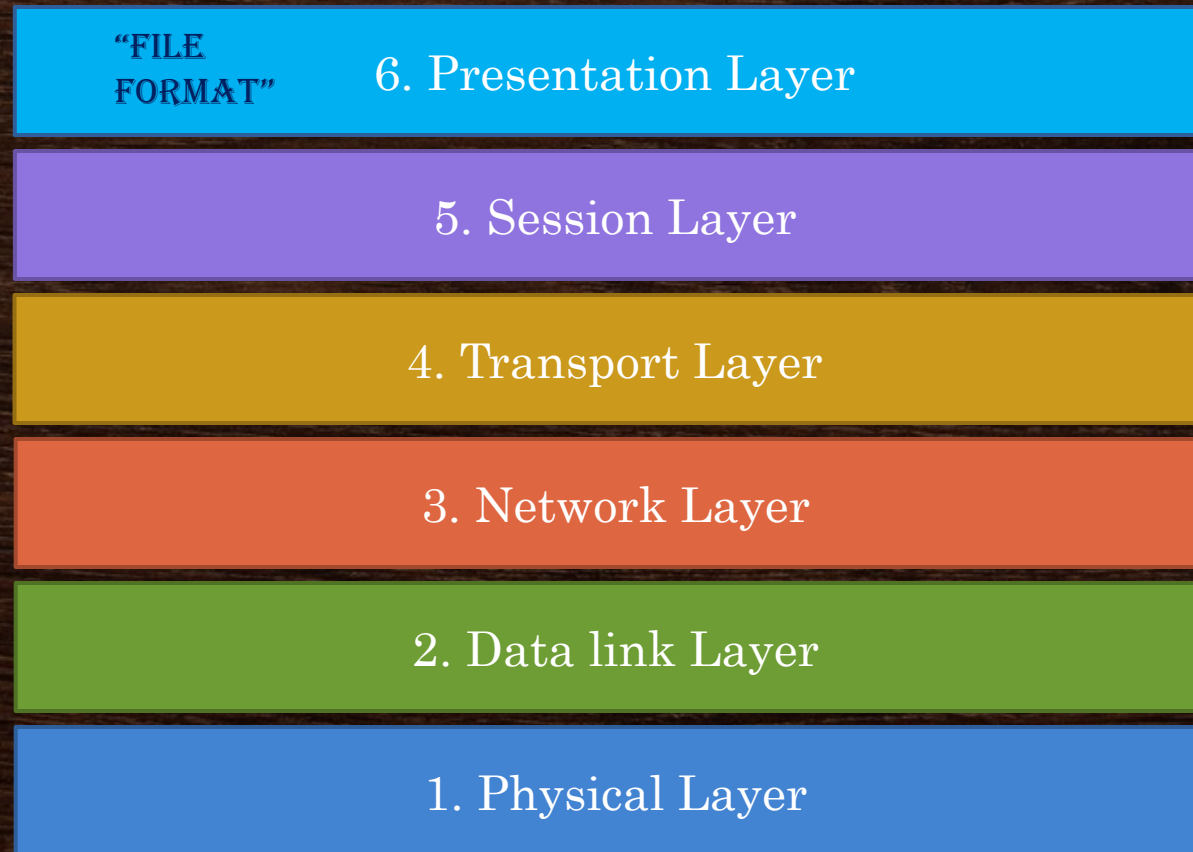
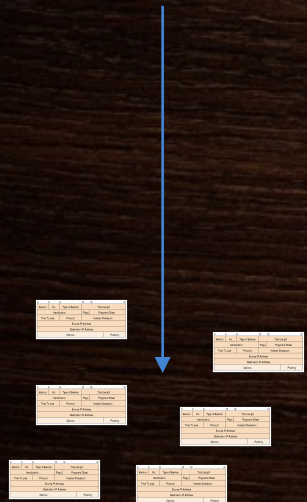
2. Data link Layer

1. Physical Layer

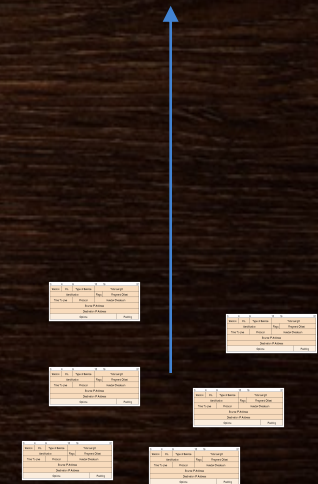


# Seven Layers

Outbound files  
are broken down  
into packets



Inbound files are  
reassembled into  
files





# Seven Layers

7. Application Layer

6. Presentation Layer

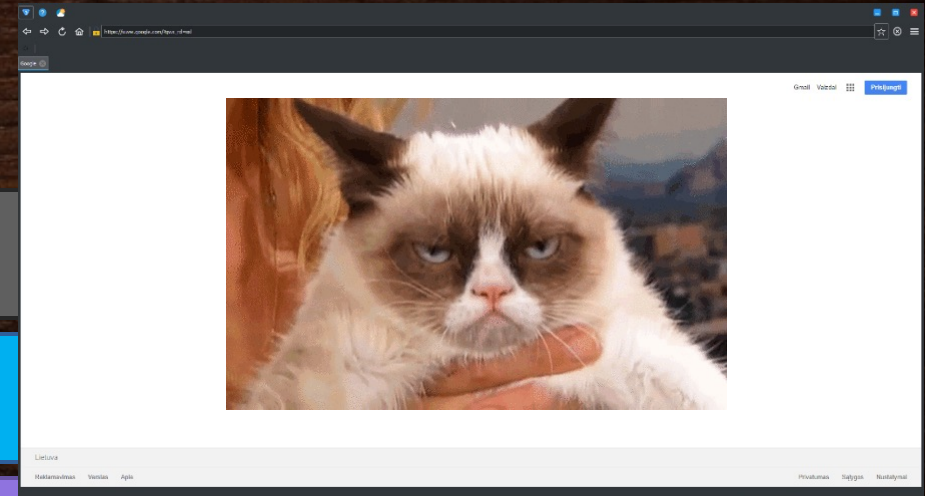
5. Session Layer

4. Transport Layer

3. Network Layer

2. Data link Layer

1. Physical Layer





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## Essential Question:

“How is information shared across the Internet?”

## Applicable Georgia Standards for reference

### Introduction to Digital Technology

- IT-IDT-4** Identify, describe, select and use appropriate technology  
**IT-IDT-5** Understand, communicate, and adapt to a digital world  
**IT-IDT-6** Explore and explain the basic components of computer networks

### Computer Science Principles

**T-CSP-7** Gain insight into the operation of the Internet, study characteristics of the Internet and systems built upon it, and analyze important concerns, such as cybersecurity.

### AP Computer Science Principles

- EU 6.1 LO 6.1.1** Explain the abstractions in the Internet and how the Internet functions.  
**EU 6.2 LO 6.2.1** Explain the characteristics of the Internet and the systems built on it.



# Pedagogy Ideas

- Timing

- This lesson can be given in a single period for advanced classes or if a significant base of knowledge of networks is already established
- This lesson can also be spread over several days to allow activities or deeper research into each layer if desired

- Activity Ideas

- Find images applicable to each layer and build an OSI “model.”
- Explain the OSI layers to each other in small groups
- Write/Create presentations that dive deeper into each layer