

# CSE 550: *Systems for all*

Au 2021

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# Building a global network to rule them all

1. Accommodate all applications
2. Accommodate all networking technologies

# What should networks do for apps?

- Make and break connections
- Find a path through the network
- Transfers information reliably
- Transfers arbitrary length information
- Send as fast as the network allows
- Shares bandwidth among users
- Secures information in transit
- Lets many new hosts be added
- ...

# Example networking technologies

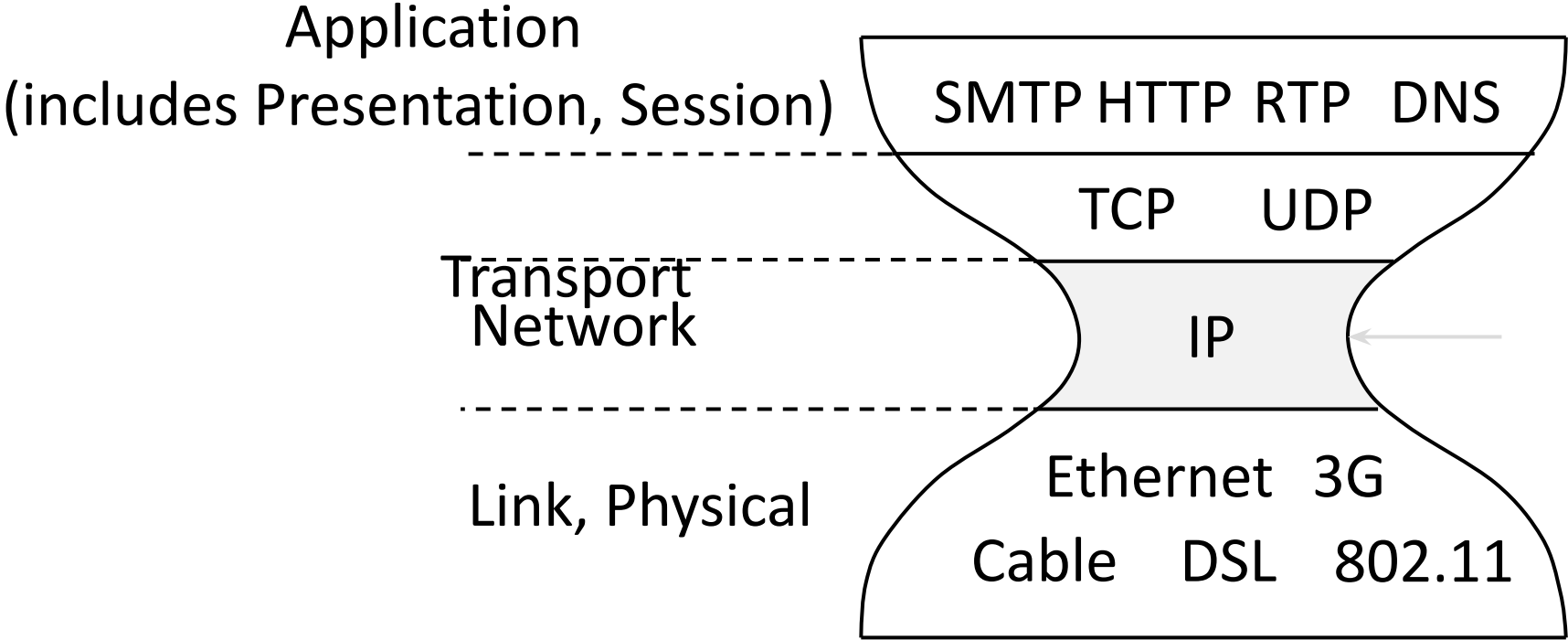
- WiFi (802.11) – few rooms
- Ethernet – building
- Optical fibers – continents and oceans
- Coaxial cables – metro area
- Cellular (2G, 3G, 4G, 5G) – few KMs
- Bluetooth – personal space
- Twisted pair – metro area
- Satellite – space
- ...

Need modularity to help manage complexity and support reuse

# Networking layers

Layer	Function	Example
<b>Application (7)</b>	Services that are used with end user applications	SMTP,
<b>Presentation (6)</b>	Formats the data so that it can be viewed by the user  Encrypt and decrypt	JPG, GIF, HTTPS, SSL, TLS
<b>Session (5)</b>	Establishes/ends connections between two hosts	NetBIOS, PPTP
<b>Transport (4)</b>	Responsible for the transport protocol and error handling	TCP, UDP
<b>Network (3)</b>	Reads the IP address from the packet.	Routers, Layer 3 Switches
<b>Data Link (2)</b>	Reads the MAC address from the data packet	Switches
<b>Physical (1)</b>	Send data on to the physical wire.	Hubs, NICs, Cable

# The narrow waist



Over to Jonathan and Kaiming