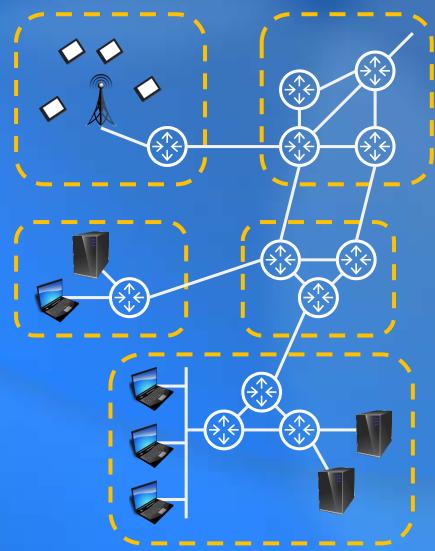
Layering

Networks are complex!



Networks consist of many parts

- hosts
- applications
- routers
- links of various media
- protocols
- hardware
- software

How can we organize the network?

By layering!

Example: Air Travel

Ticketing

Baggage Check/Claim

Gate (load/unload)

Takeoff/Landing

Airplane Routing

- To get from one city to another, passengers must travel down and up through layers.
- Each layer implements a service.
- Higher layers rely on services provided by lower layers
 - Do not need to know implementation details.

Transferring Passengers

Each layer adds information to the passengers with the information needed to do its job.

			passenger
		claim tag	passenger
	seat no.	claim tag	passenger
flight no.	seat no.	claim tag	message

Ticketing

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Why layering?

When dealing with a complex system, layering

- Enables identification of different parts and their relationship
- Eases maintenance and updating of the system
 - Changes in the implementation of one layer's services does not affect the rest of the system.
 - Limits the amount of information each layer needs to know about the other.

Internet protocol stack

Application

Transport

Network

Link

Physical

- Application layer runs applications,
 e.g. email, web browser, messaging
- Transport layer provides for logical communication between applications
- Network layer delivers packets from source to destination over a network
- Link layer handles data transfer from between adjacent nodes
- Physical layer deals with properties of medium (e.g. wired/wireless)

Transferring Data

Each layer adds header information to the data from upper layers with the information needed to do its job.

	message			
	se	transport header	message	
datagram network header		network header	transport header	message
frame	link header	network header	transport header	message

Application
Transport
Network
Link
Physical