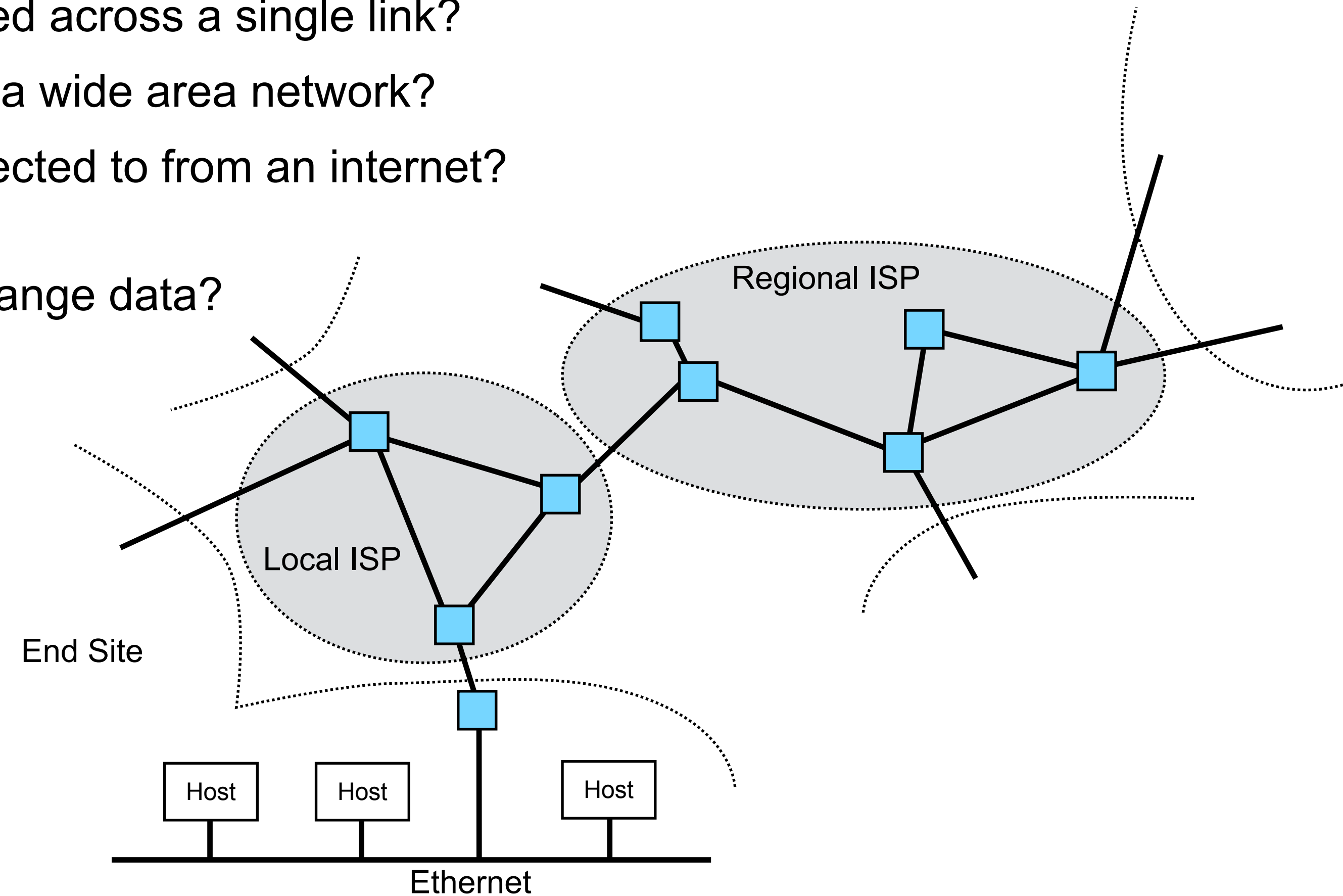


# Protocols and Layers

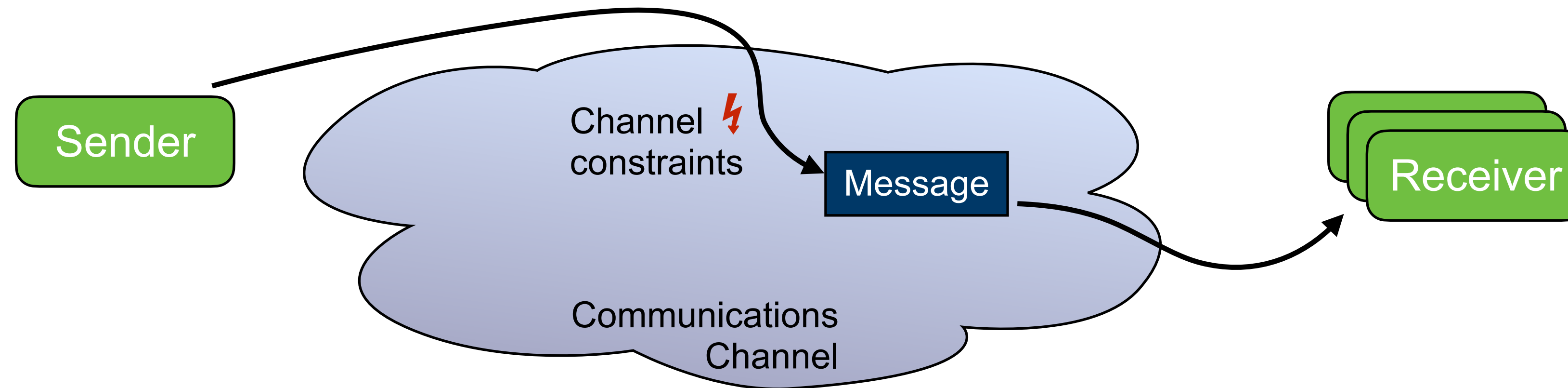
- What is a networked system?
- Protocols and Layering

# What is a Networked System?

- A cooperating set of autonomous computing devices that exchange data to perform some application goal
- Communication – how is information exchanged across a single link?
- Networking – how are links connected to form a wide area network?
- Internetworking – how are networks interconnected to form an internet? How is data routed across that network?
- Transport – how do end-systems reliably exchange data?

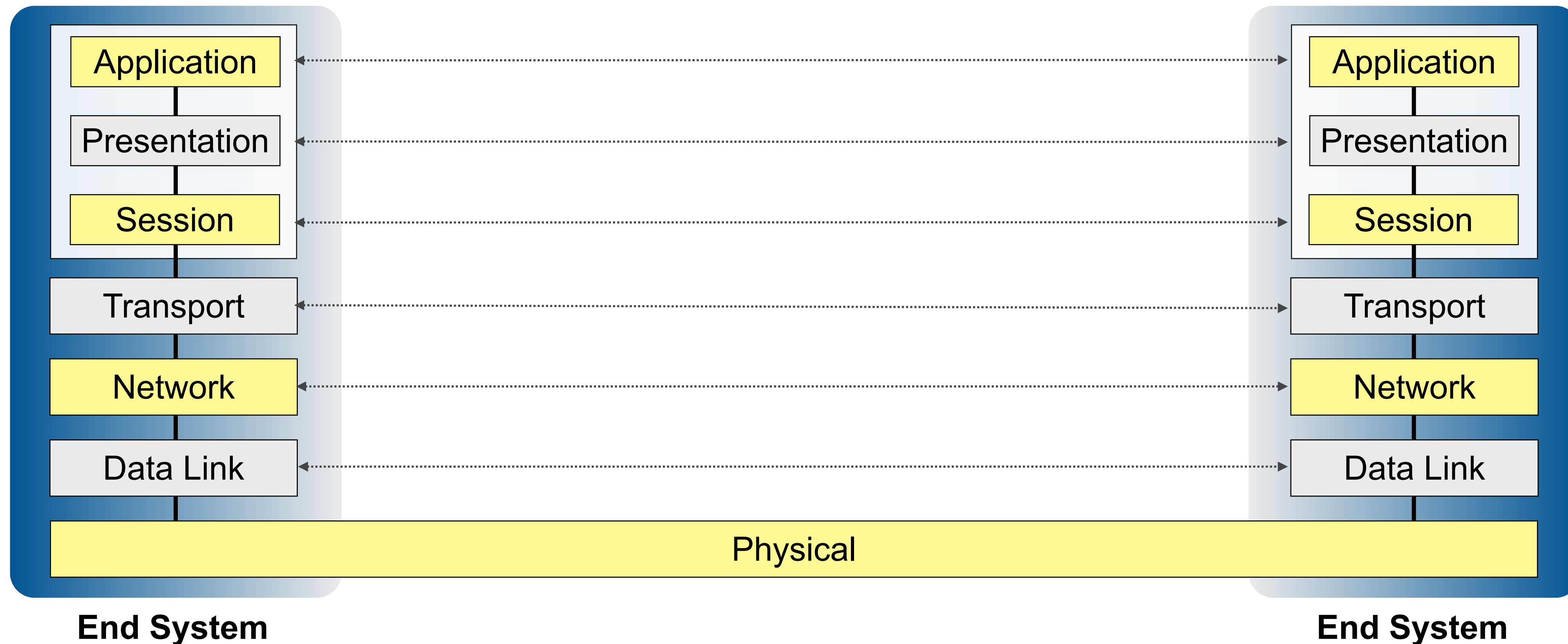


# Communication Protocols



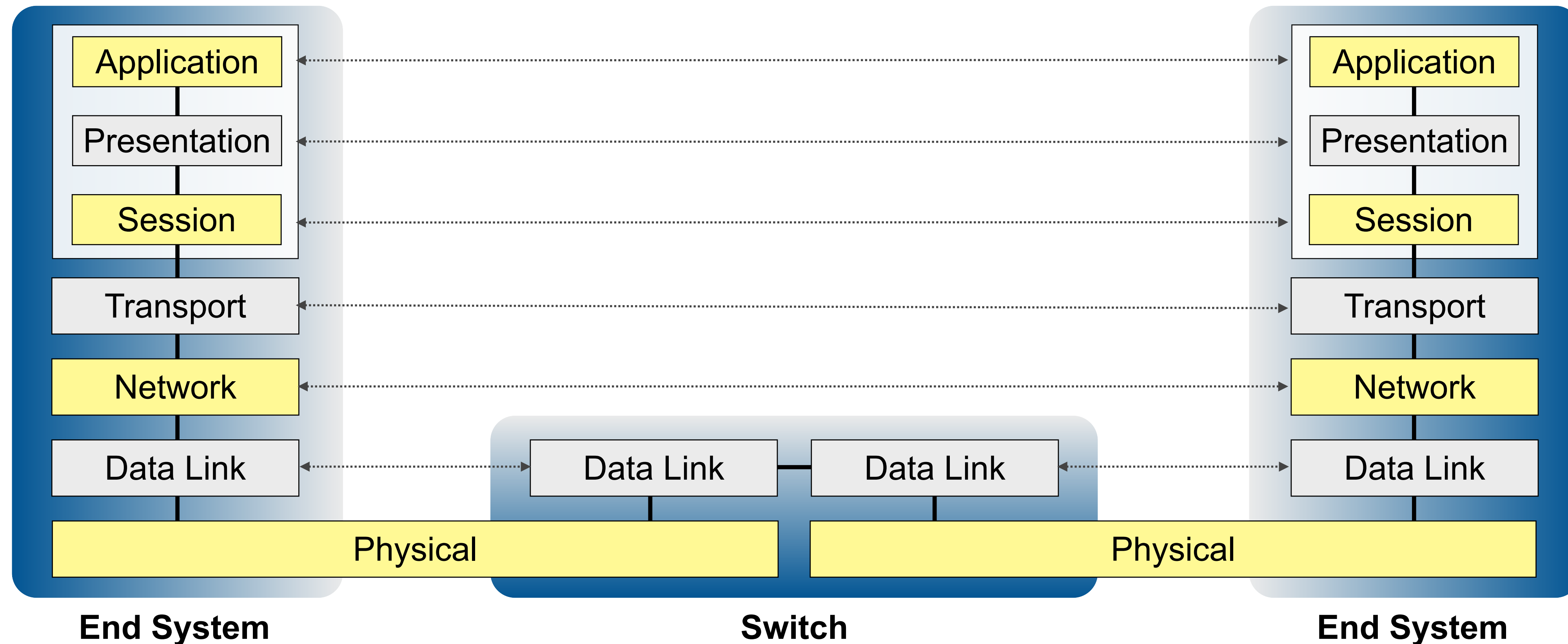
- Channel constraints bound communications speed and reliability
- The message syntax, semantics, and communication patterns form a **network protocol** – HTTP, TCP, IP, etc.
- Protocols can be composed and layered to raise level of abstraction

# Protocol Layering: The OSI Reference Model

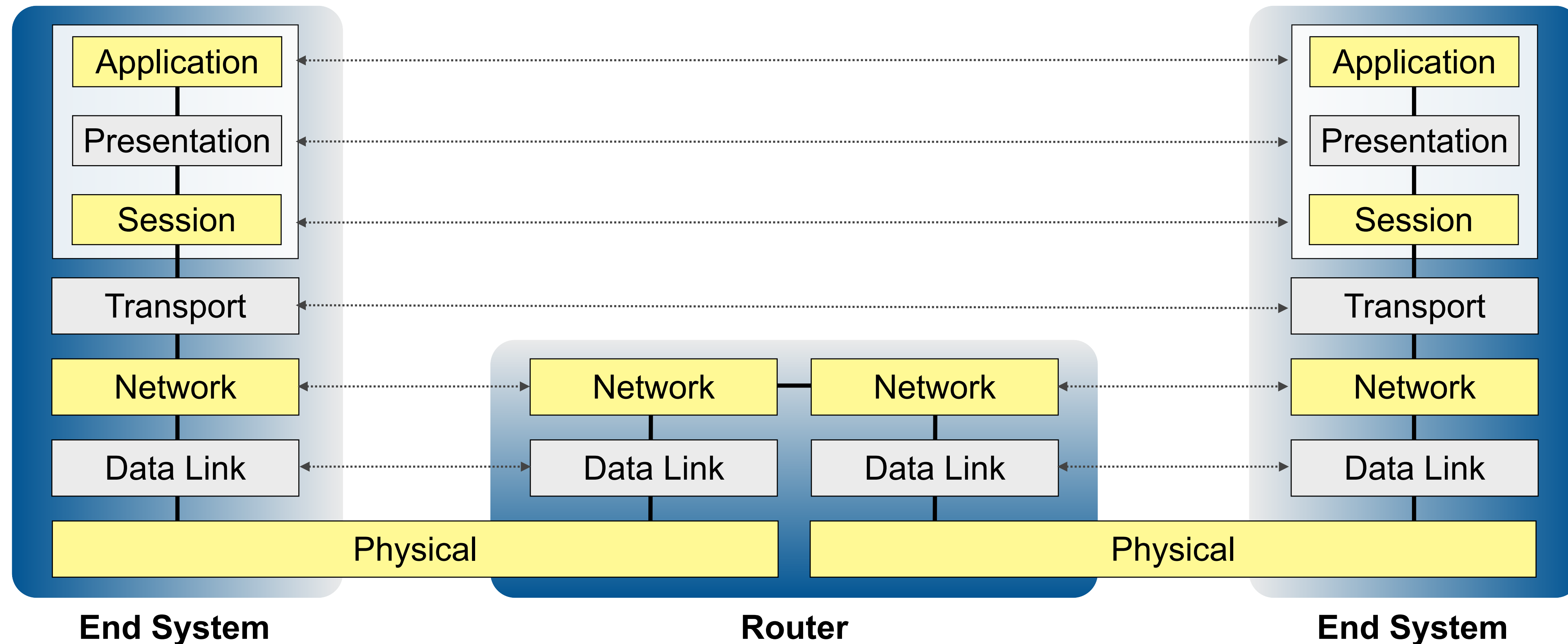


ISO/IEC 7498-1(1994) "Information technology — Open Systems Interconnection — Basic Reference Model: The Basic Model"

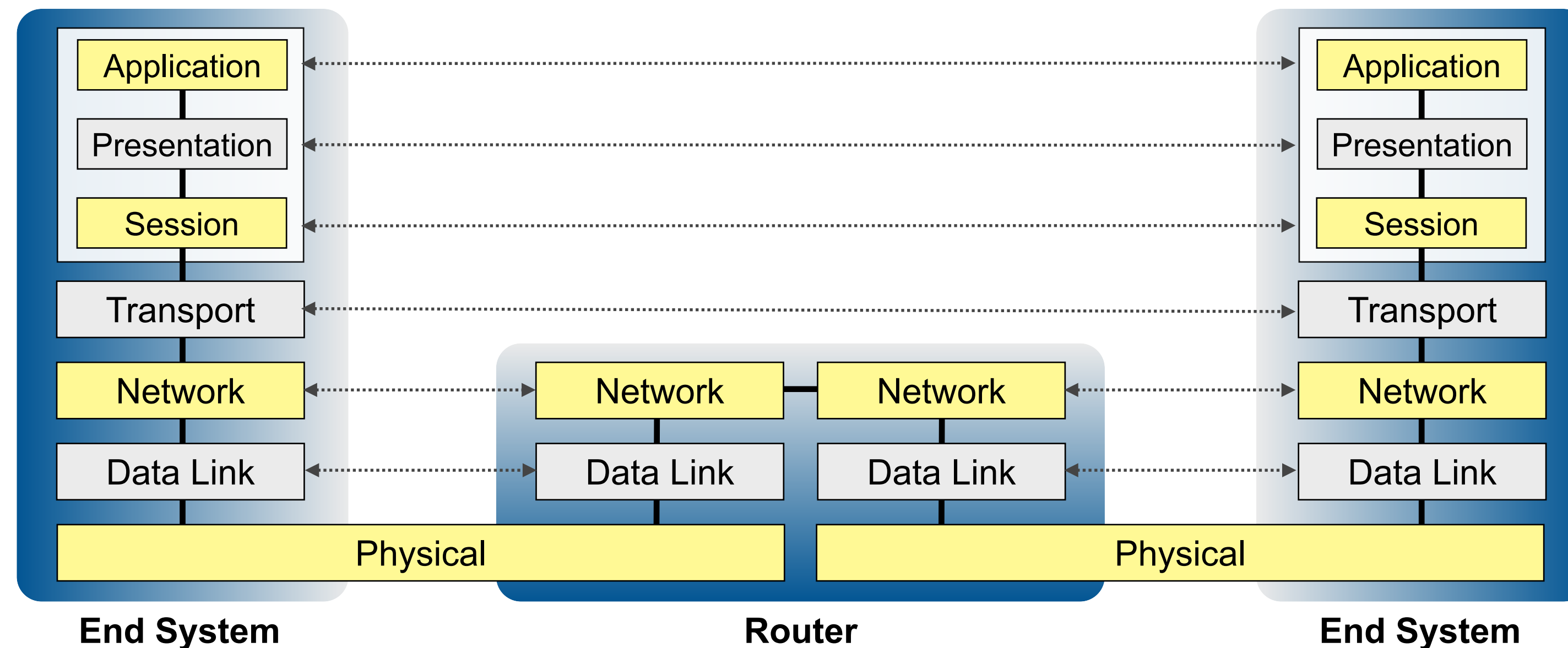
# Protocol Layering: The OSI Reference Model



# Protocol Layering: The OSI Reference Model



# Protocol Layering: The OSI Reference Model



- A standard model of layered protocol design – **real networks don't follow this model** – they're more complex, and layer violations, sublayers, and tunnels are commonplace
- A layered model is extremely useful for helping structure discussions about networks

# Protocols and Layers

- What is a networked system?
- Protocols and Layering