

Assignments / Reading Quiz

- Any questions on the reading quiz?
 - These are some examples of (easier) questions that will appear on exams
 - I aim to do something similar each week
 - Anything didn't work? Anything you'd like me to change?
- Ping assignment posted to Laulima
 - Due next Wednesday (please submit on time, subsequent assignments will build on it)
 - Multiple parts:
 - Using ping to measure latencies
 - Write your own ping using python / scrapy
 - Bonus for your entertainment: include custom data in the pings

Protocols

What is a Protocol?

Human protocol:

- “Do you have the time?”

Network protocol:

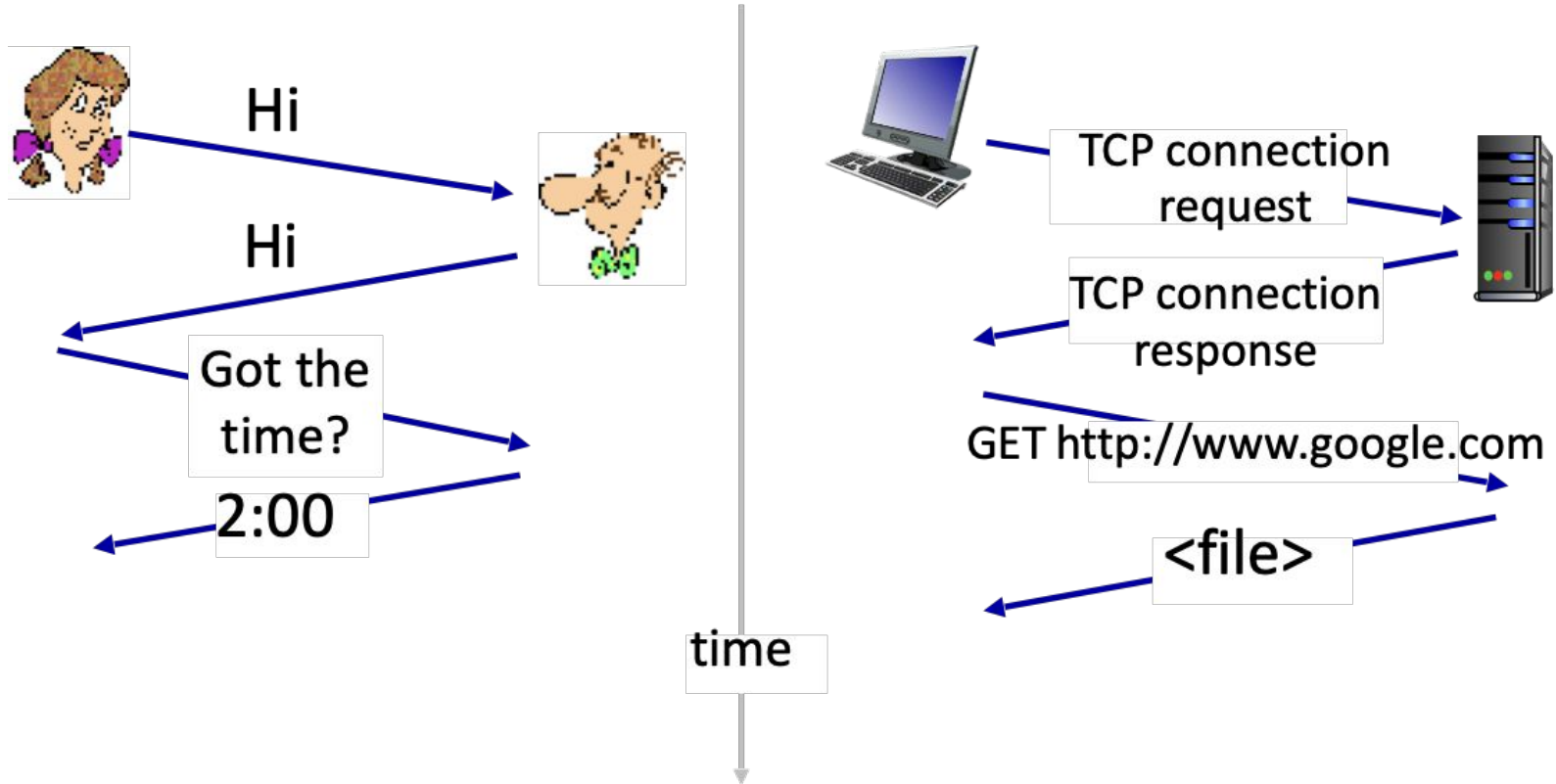
- Computers rather than humans
- All Internet communications governed by protocols (IETF RFCs)

Rules for:

- specific messages sent
- specific actions taken when message received, or other events

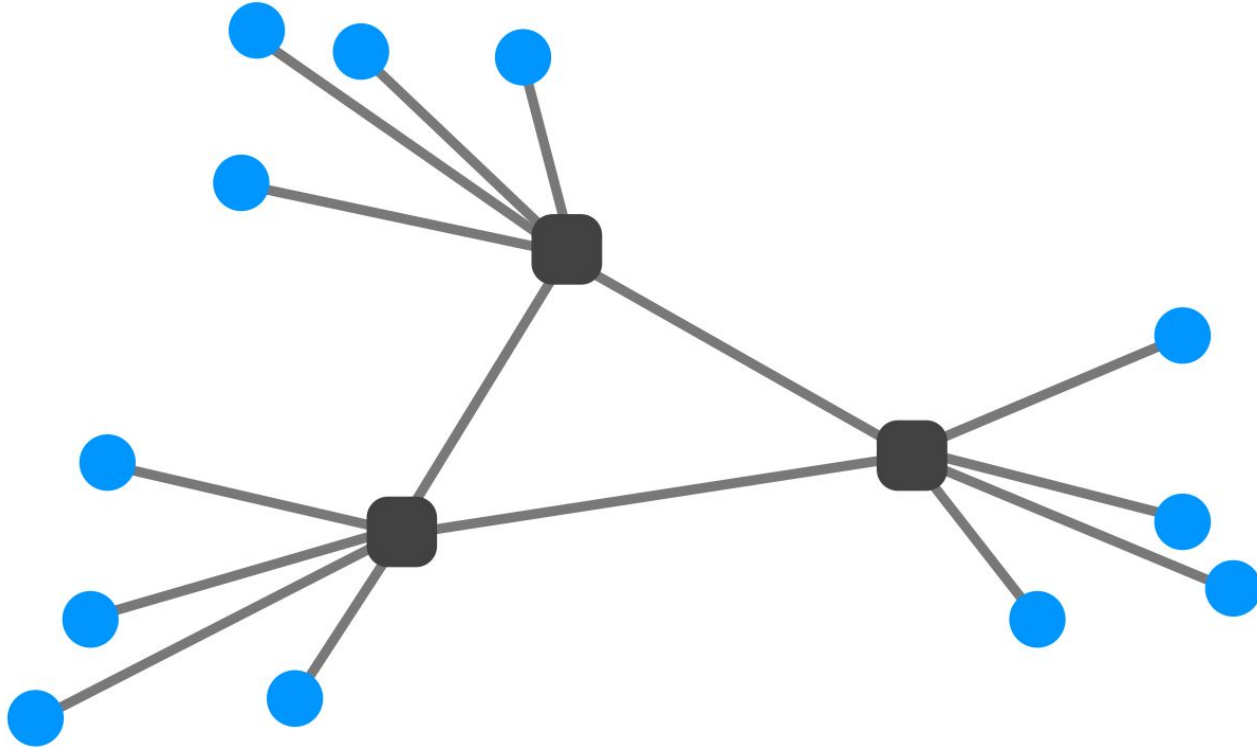
Protocols define the **format**, **order** of **messages sent and received** among network entities, and **actions taken** on message transmission, receipt

What is a Protocol?

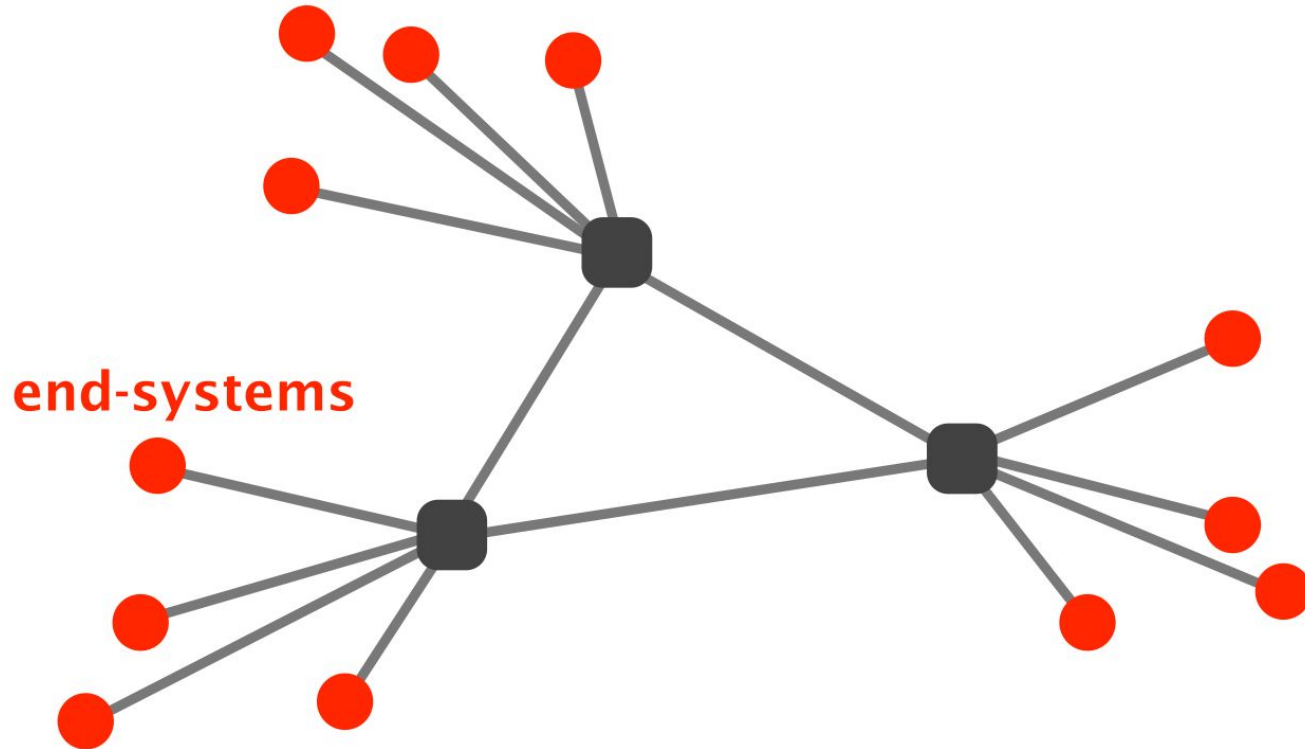


Network Components

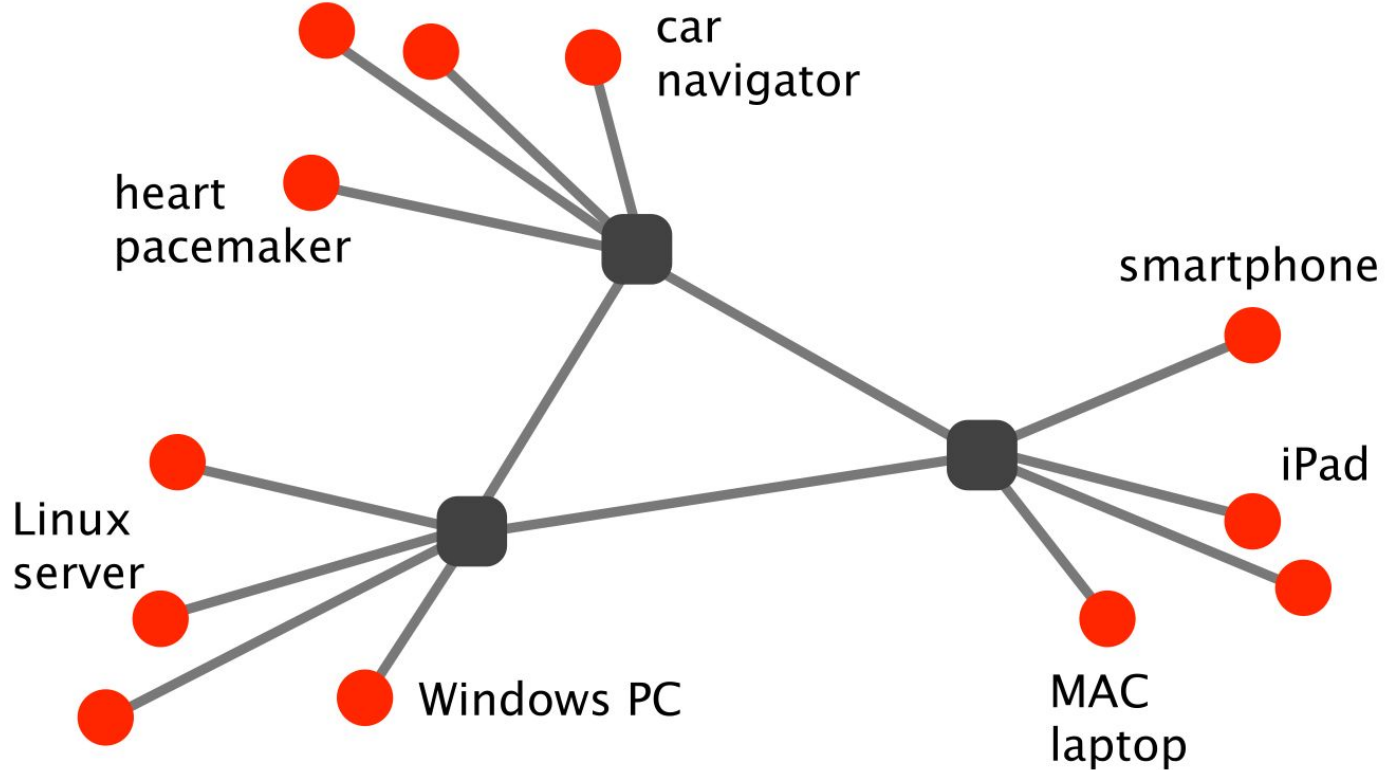
Networks are Composed of Three Basic Components



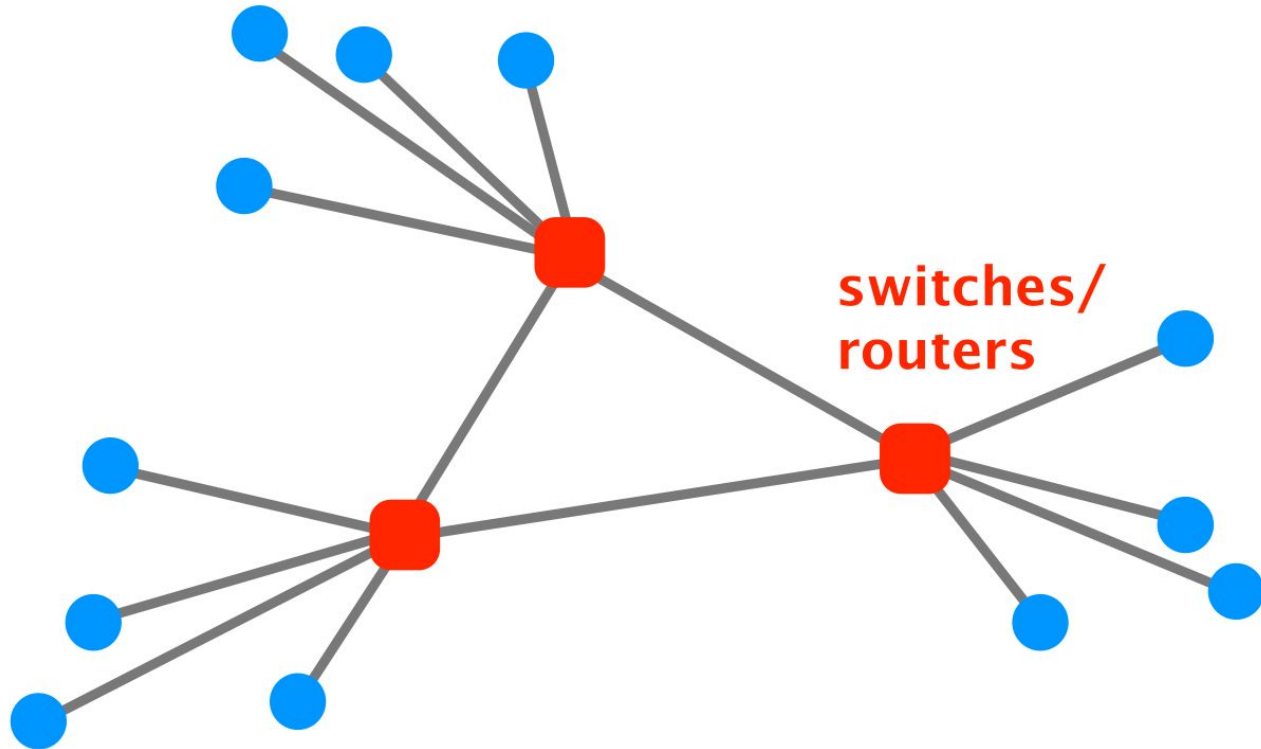
End Systems (Hosts) Send and Receive Data



End Systems (Hosts) Can be Many Things



Switches and Routers Forward Data Towards the Destination



Wide Variety of Switches/Routers

Home
router



~20 cm

0,5 kg

1 Gbps

Internet core
router

>200cm

700kg

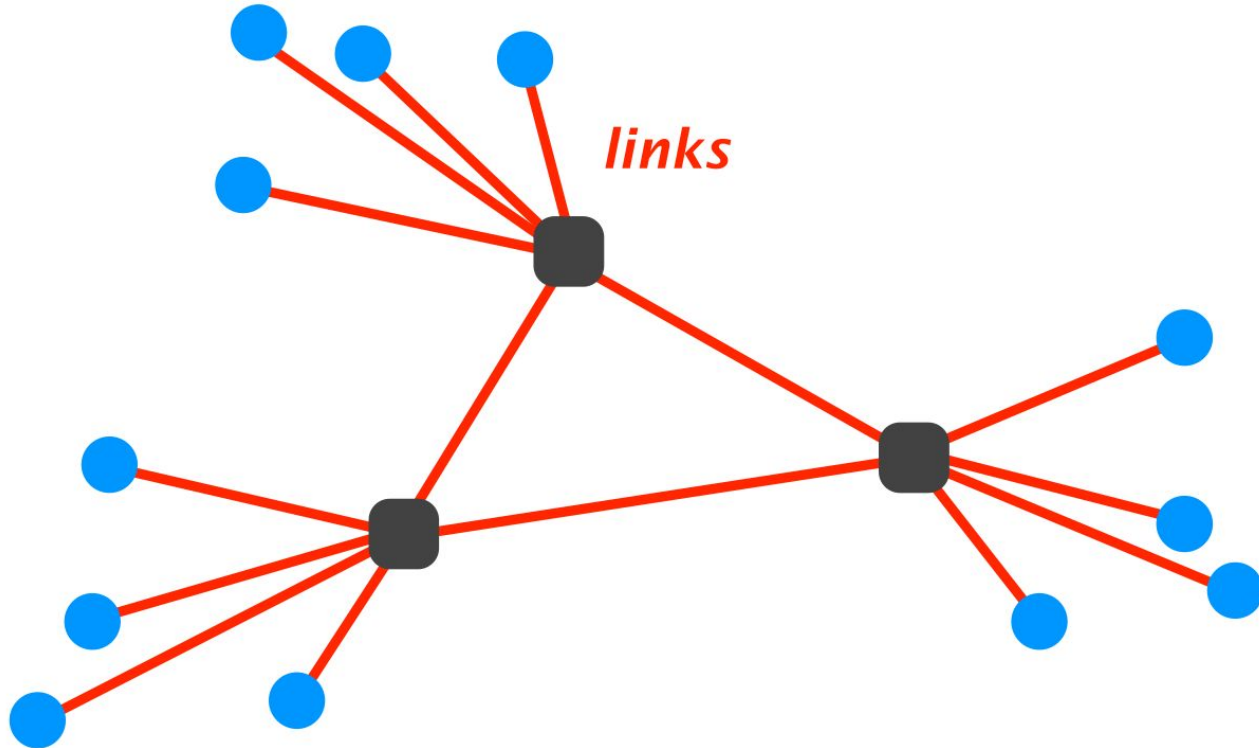
>12 Tbps

(>920 Tbps in
multi-chassis*)



*https://www.cisco.com/c/en/us/products/collateral/routers/carrier-routing-system/data_sheet_c78-726136.html

Links Connect Hosts to Switches and Switches to Each Other



Links Also Vary Greatly



Copper

ADSL, RJ-45,...



Optical fibers



Wireless link

Huge Number of **Access Technologies**

Ethernet	most common, symmetric
DSL	over phone lines, asymmetric
CATV	via cable TV, shared
Cellular	smart phones
Satellite	remote areas
FTTH	household
Fibers	Internet backbone
Infiniband	High performance computing