

Computer Networks

Application Layer Overview



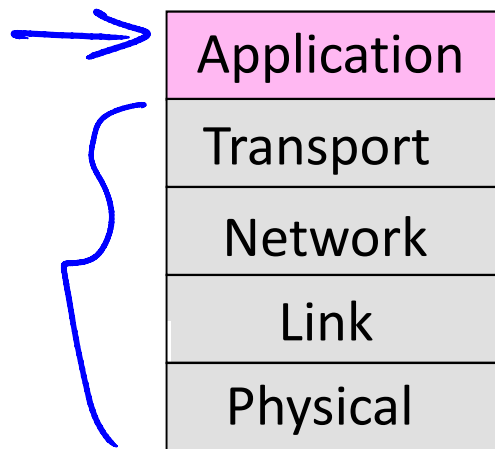
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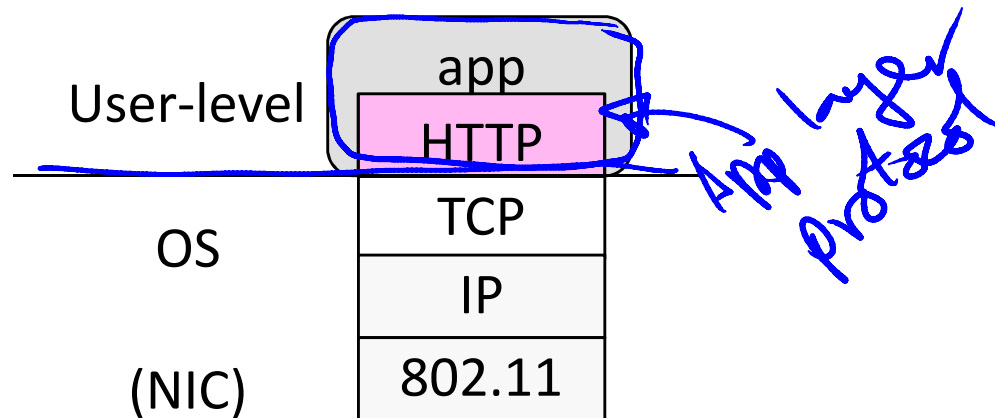
Where we are in the Course

- Starting the Application Layer!
 - Builds distributed “network services” (DNS, Web) on Transport services



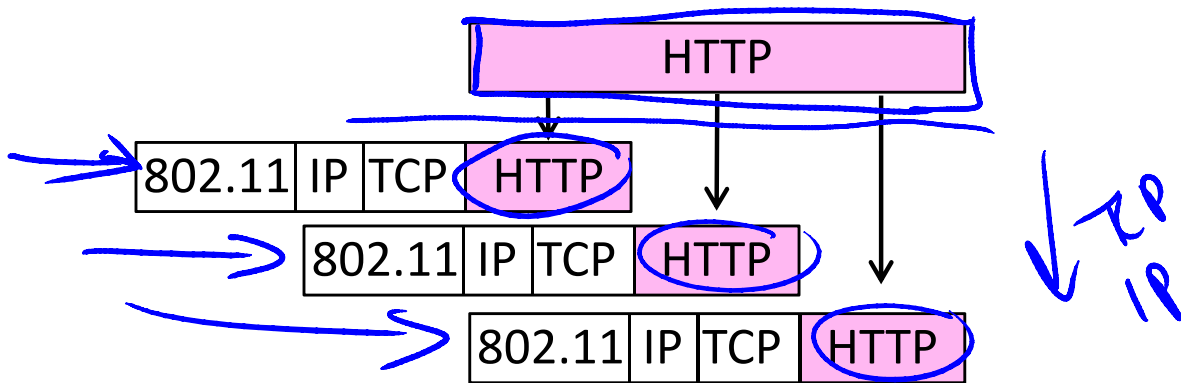
Recall

- Application layer protocols are often part of an “app”
 - But don’t need a GUI, e.g., DNS



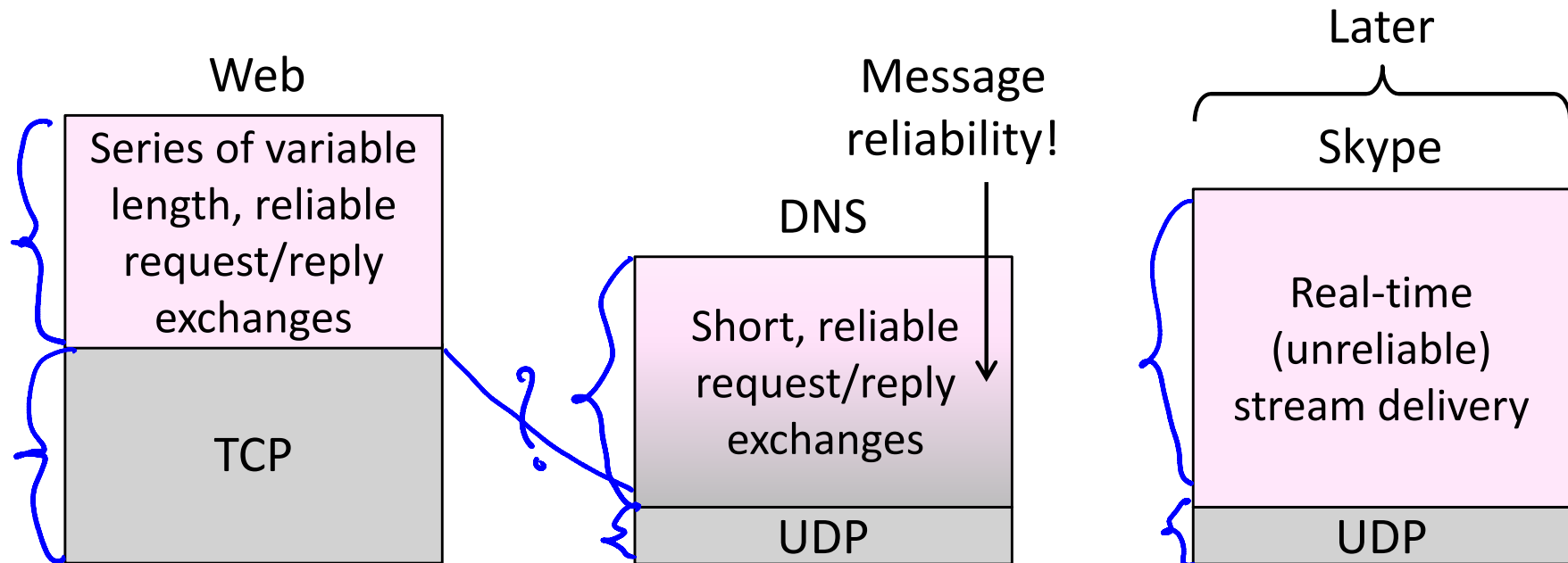
Recall (2)

- Application layer messages are often split over multiple packets
 - Or may be aggregated in a packet ...



Application Communication Needs

- Vary widely with app; must build on Transport services



OSI Session/Presentation Layers

- Remember this? Two relevant concepts ...

But consider
part of the
application,
not strictly
layered!

7	Application	– Provides functions needed by users
6	Presentation	– Converts different representations
5	Session	– Manages task dialogs
4	Transport	– Provides end-to-end delivery
3	Network	– Sends packets over multiple links
2	Data link	– Sends frames of information
1	Physical	– Sends bits as signals

Session Concept

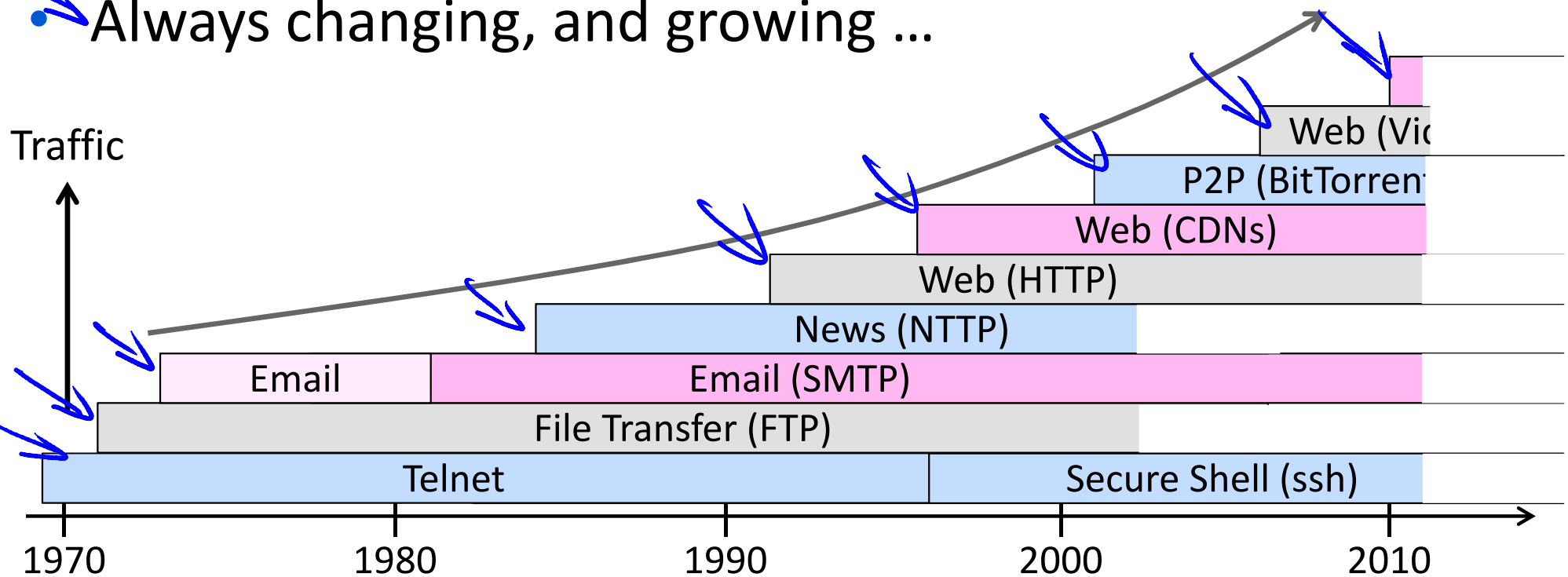
- A session is a series of related network interactions in support of an application task
 - Often informal, not explicit
- Examples:
 - ➡ Web page fetches multiple resources
 - ➡ Skype call involves audio, video, chat

Presentation Concept

- Apps need to identify the type of content, and encode it for transfer
 - These are Presentation functions
- Examples:
 - Media (MIME) types, e.g., image/jpeg, identify the type of content
 - Transfer encodings, e.g., gzip, identify the encoding of the content
 - Application headers are often simple and readable versus packed for efficiency

Evolution of Internet Applications

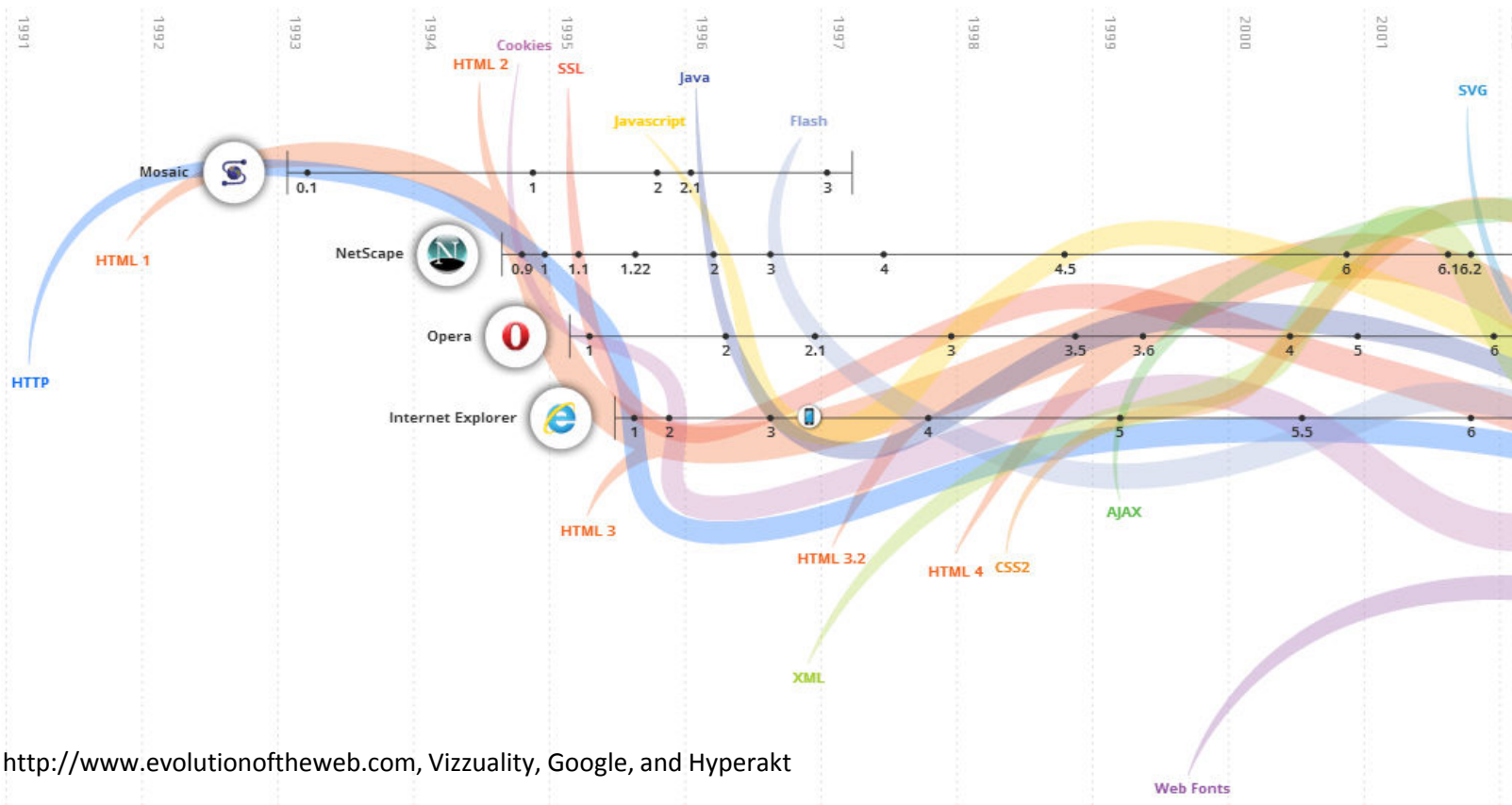
• Always changing, and growing ...



Evolution of Internet Applications (2)

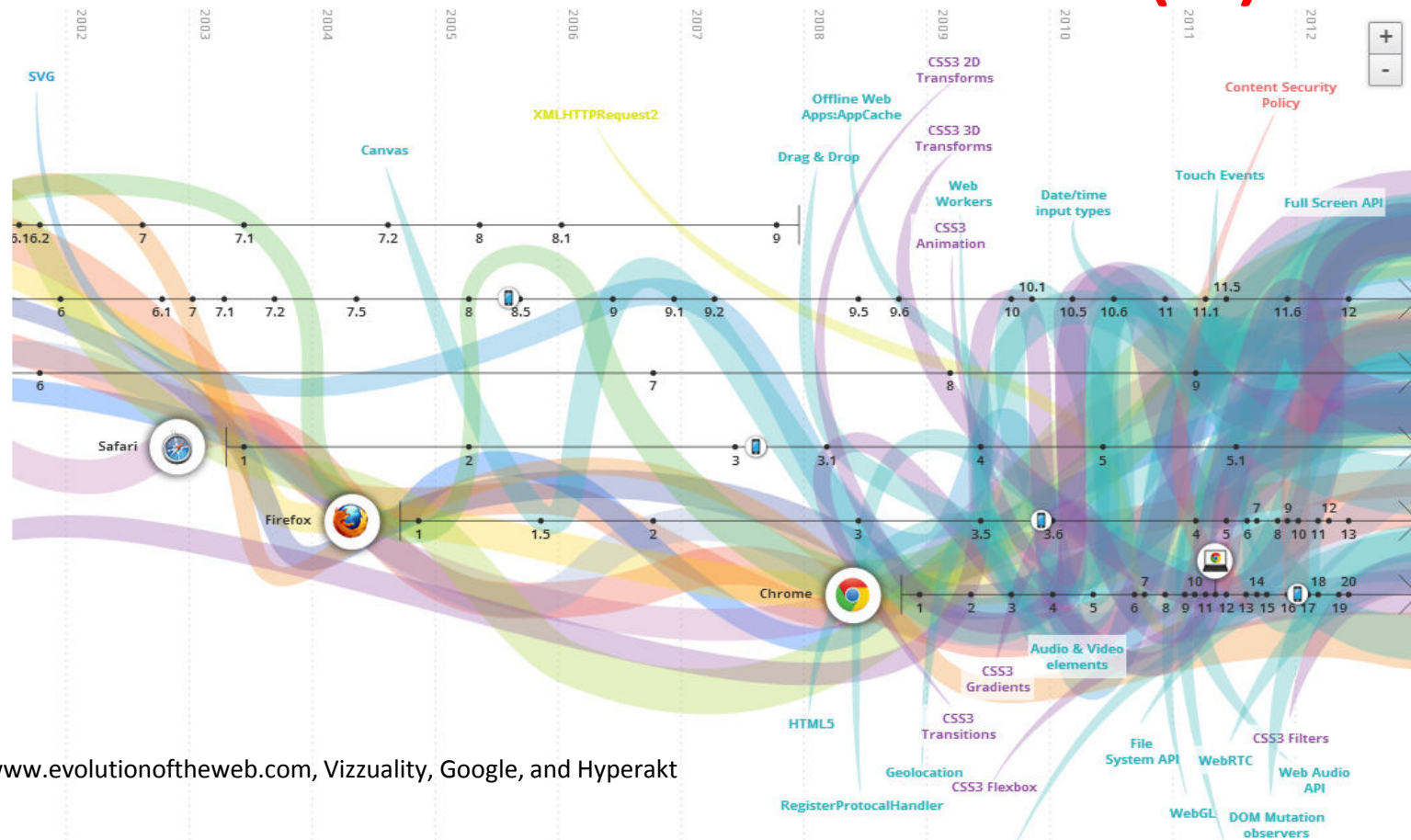
- For a peek at the state of the Internet:
 - ➔ Akamai's State of the Internet Report (quarterly)
 - ➔ Cisco's Visual Networking Index
 - ➔ Mary Meeker's Internet Report
- Robust Internet growth, esp. video, wireless and mobile
 - Most traffic is video, will be 90% of Internet in a few years
 - ➔ Wireless traffic will soon overtake wired traffic
 - ➔ Mobile traffic is still a small portion (15%) of overall
 - ➔ Growing attack traffic from China, also U.S. and Russia

Evolution of the Web










Source: <http://www.evolutionoftheweb.com>, Vizzuality, Google, and Hyperakt

Evolution of the Web (2)



Source: <http://www.evolutionoftheweb.com>, Vizzuality, Google, and Hyperakt

Topics

-  Evolving Internet applications
 -  DNS (Domain Name System)
 -  HTTP (HyperText Transfer Protocol)
 -  Web proxies and caching
 -  Content Distribution Networks
 -  Peer-to-peer (BitTorrent)
 -  Real-time applications (VoIP)
- This time
- Next time
- Later

END

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