Introduction to Computer Networks

Application Layer Overview

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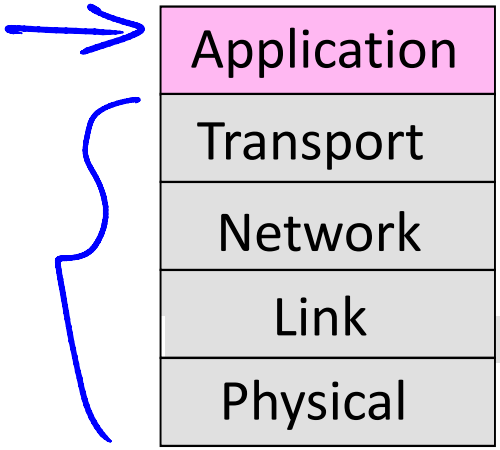
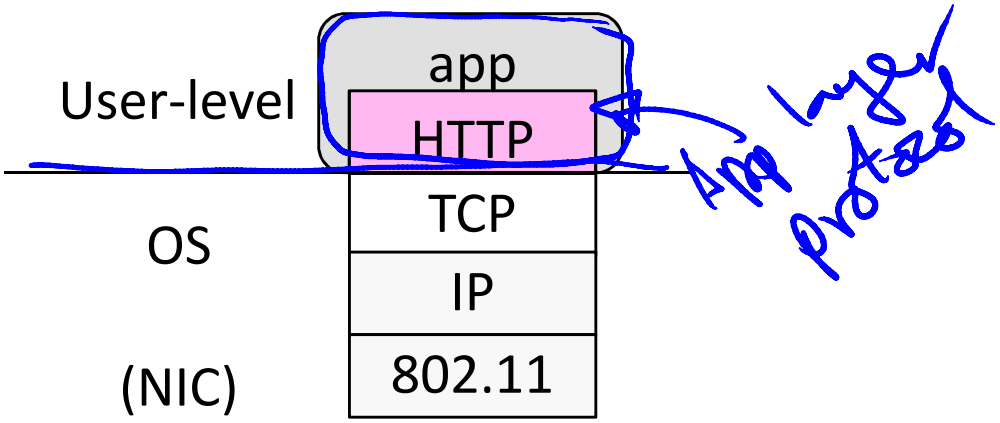
Where we are in the Course

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



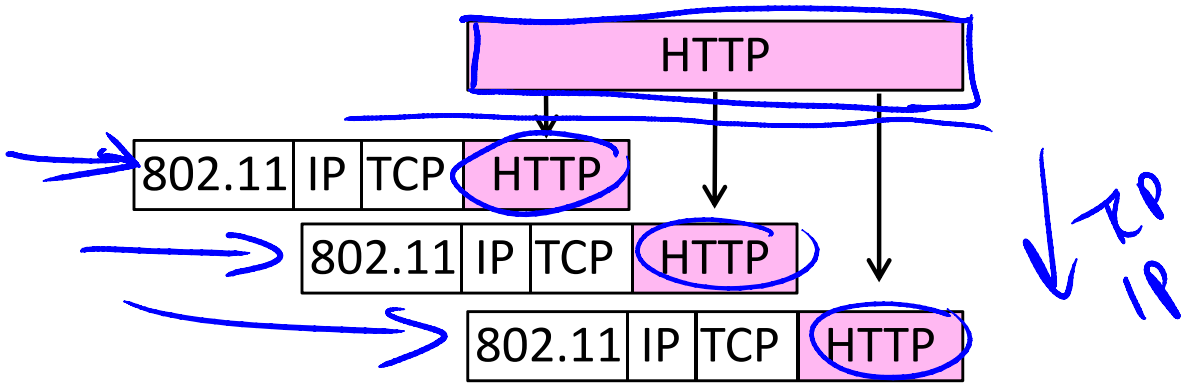
Recall

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



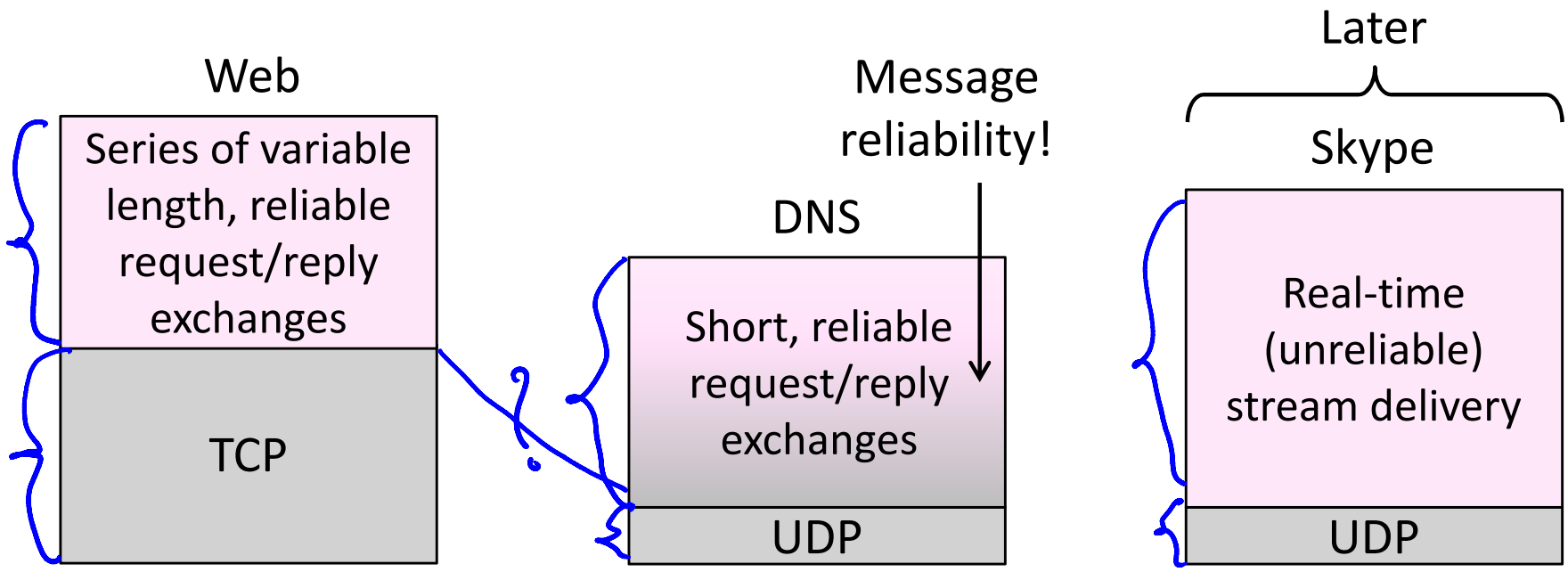
Recall (2)

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



Application Communication Needs

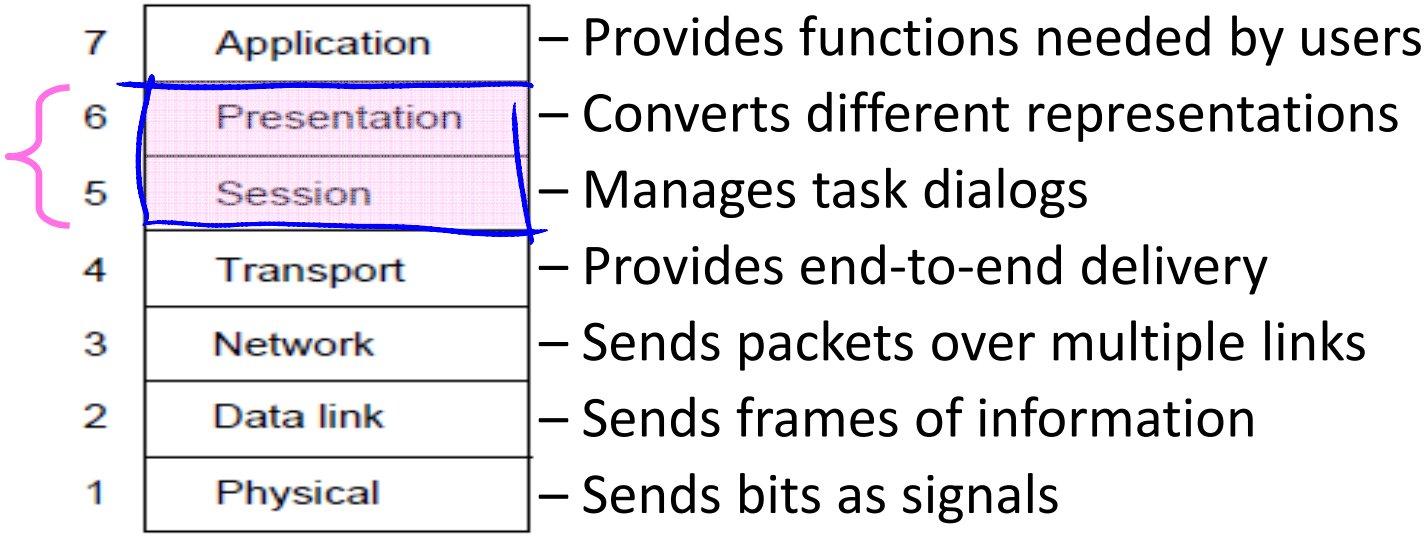
- Vary widely with app; must build on Transport services



OSI Session/Presentation Layers

- Remember this? Two relevant concepts …

But consider part of the application, not strictly layered!



Session Concept

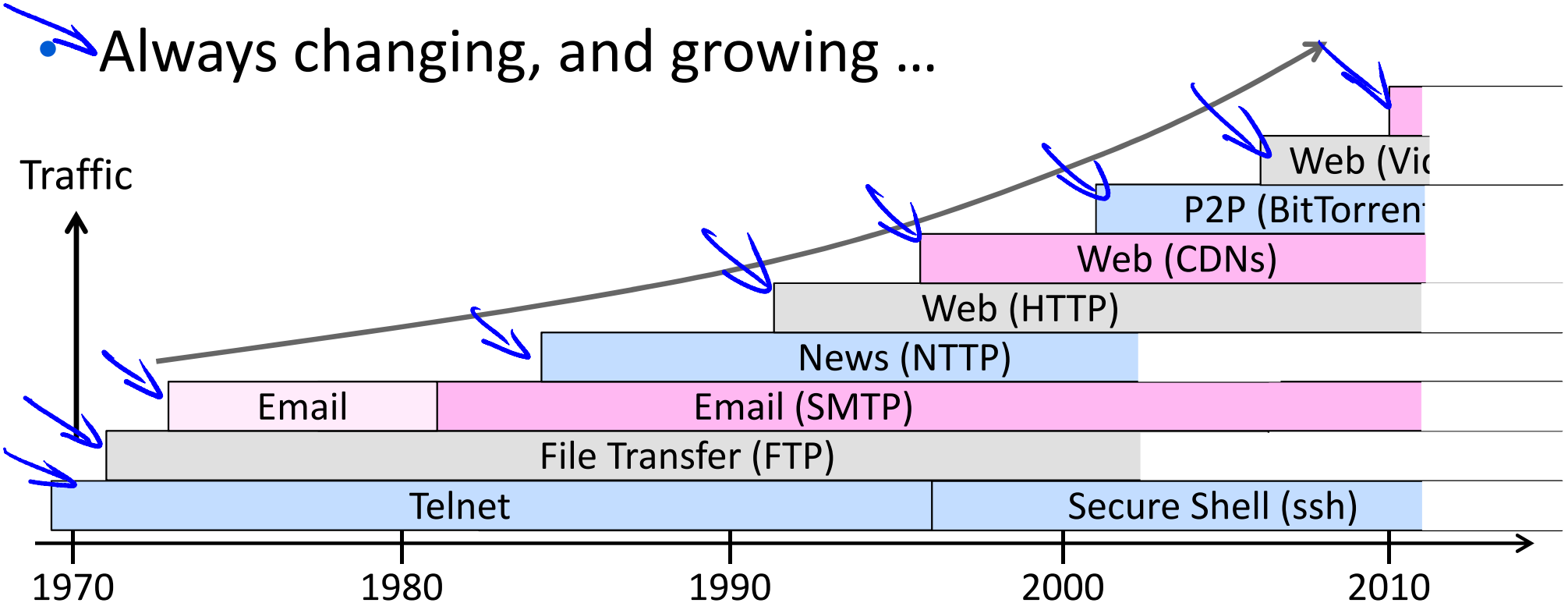
- A session is a series of related network interactions in support of an application task
  - Often informal, not explicit
- Examples:
  - Web page fetches multiple resources
  - Skype call involves audio, video, chat

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 …

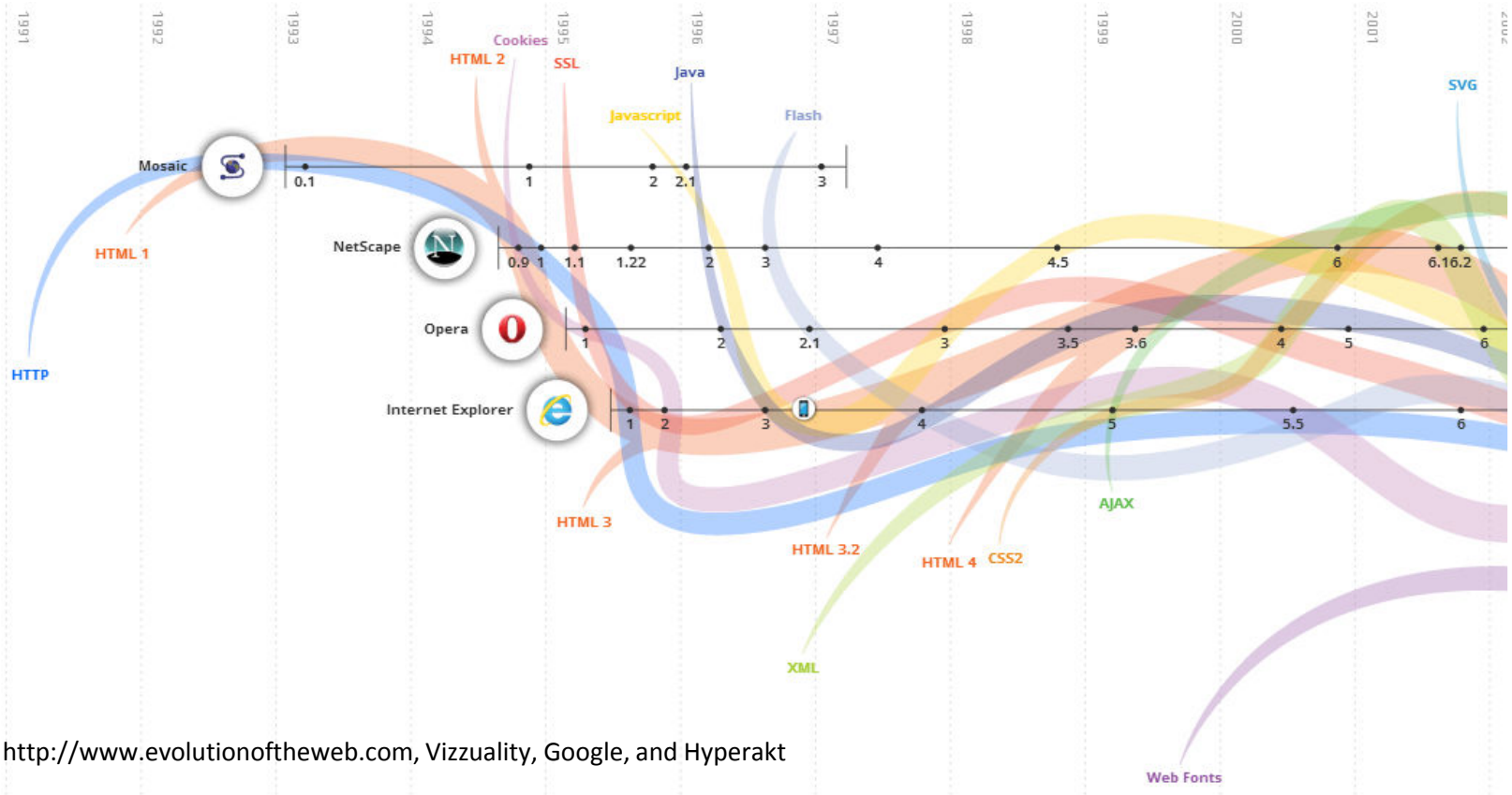


Evolution of Internet Applications (2)

- 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

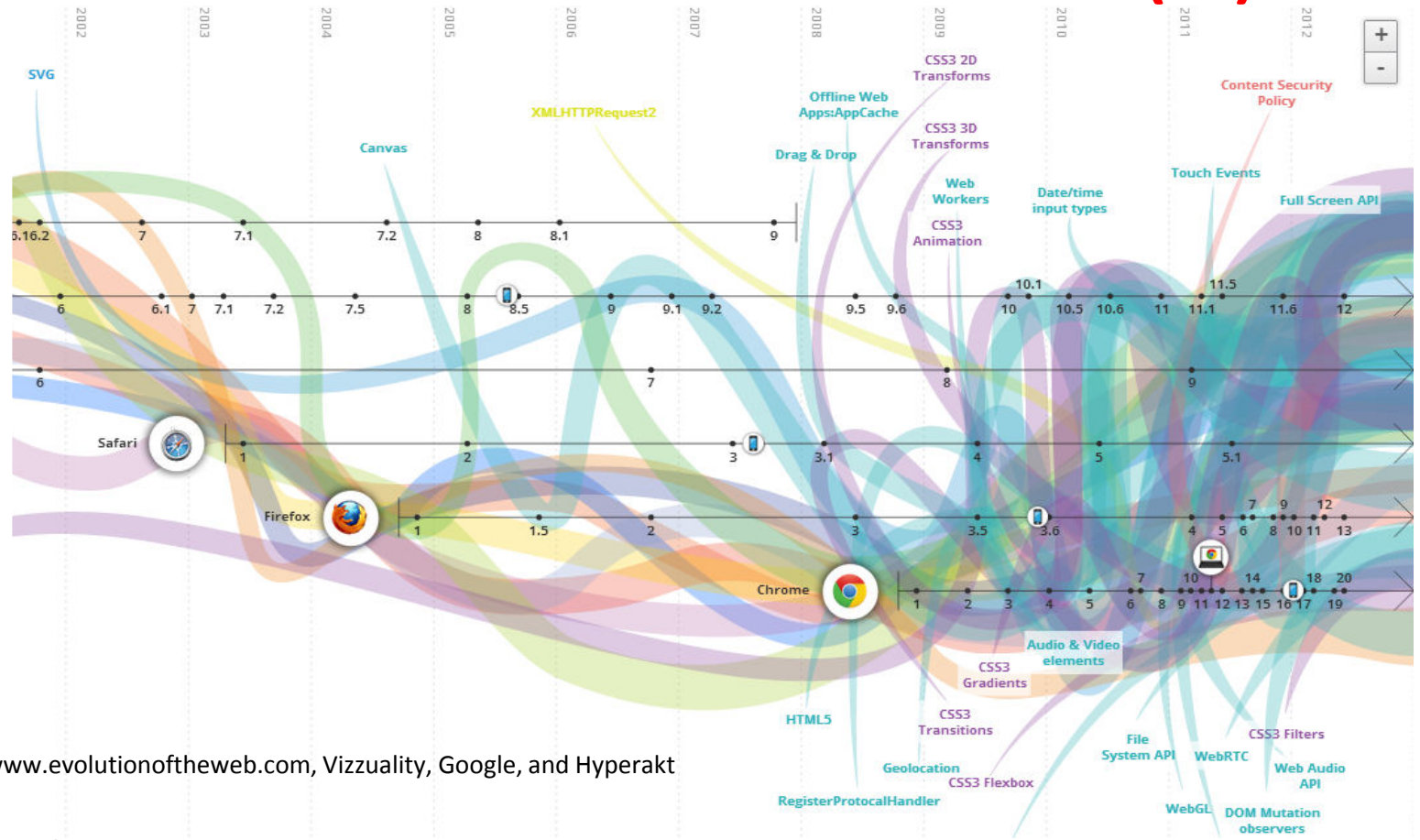
- Robust Internet growth, esp. video, wireless and mobile
  - Most traffic is video, will be 90% of Internet in a few years
  - Wireless traffic will soon overtake wired traffic
  - Mobile traffic is still a small portion (15%) of overall
  - Growing attack traffic from China, also U.S. and Russia

Evolution of the Web



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

Evolution of the Web (2)



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Topics

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

END