Networks Research at IAT

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A View of Networks

Web

Multimedia   Messaging

Computing   Data storage

Services/
Applications

Optics

Switches

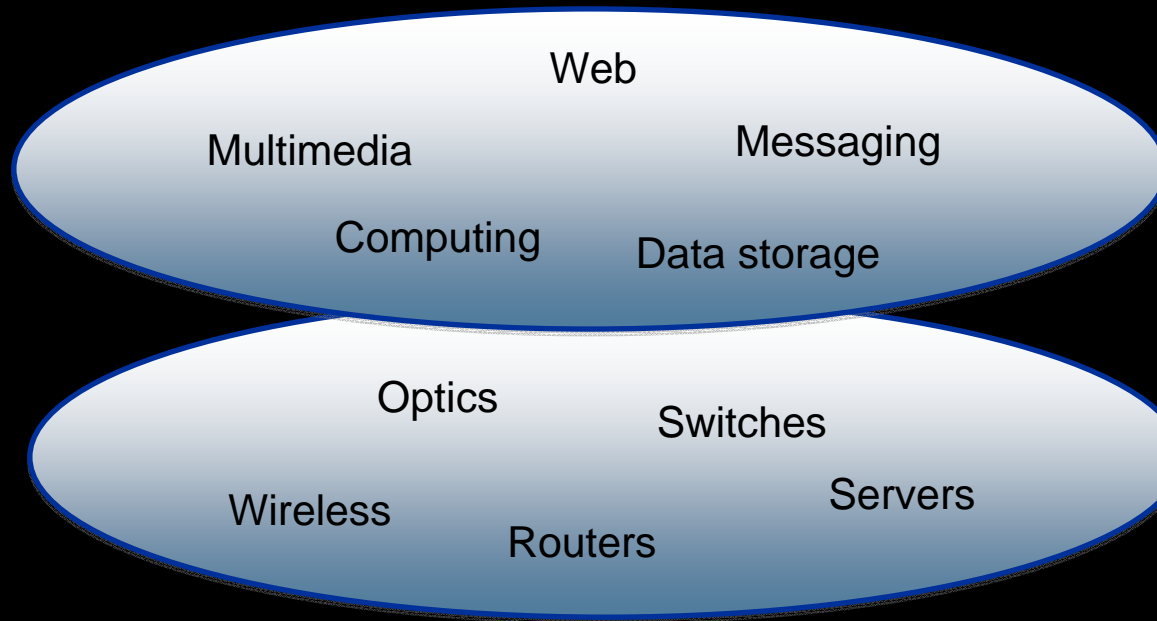Wireless   Servers

Routers

Transport/
Infrastructure

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Digital Futures 16th September 2008

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A View Backward

Services

WWW ●

Google ●

Transport

Ethernet ●

1G cellular ●

TCP/IP ●

802.11 ●

Key networking technologies up to today

1970   1980   1990   2000
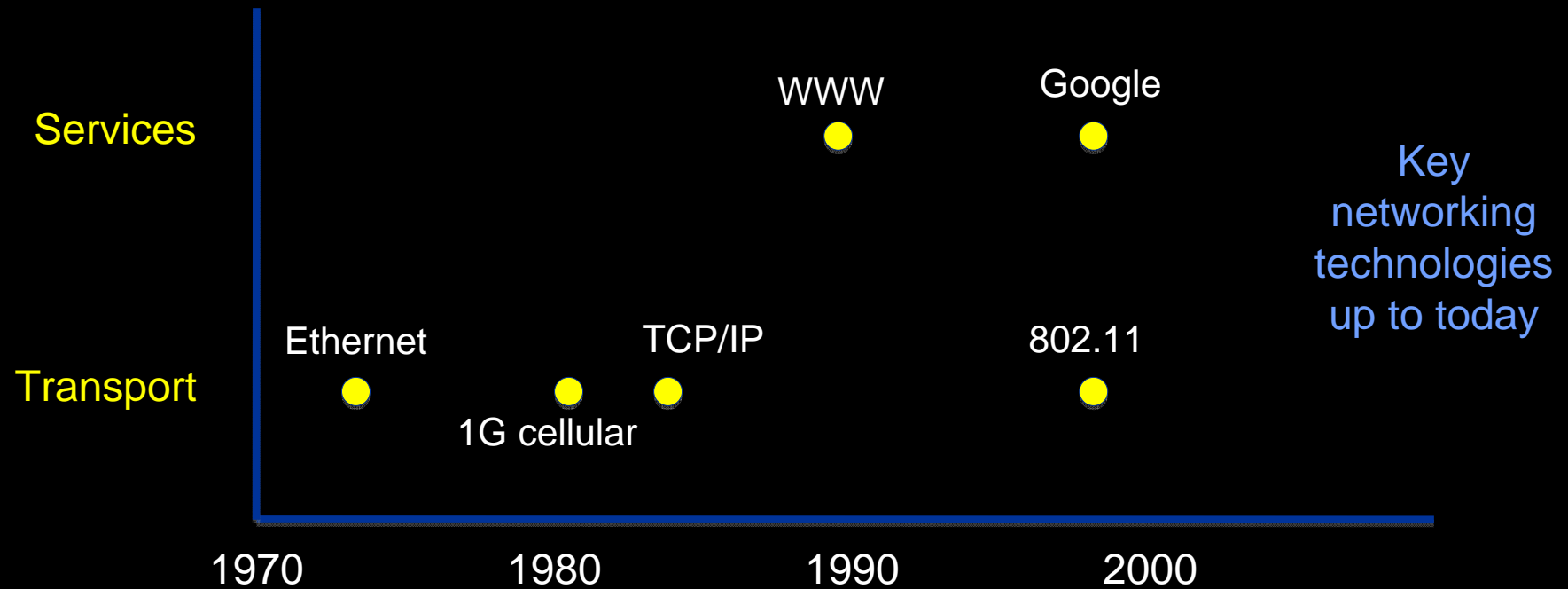
Future Transport

- Ubiquitous broadband
  - What's needed:
  - High broadband penetration to homes (cable, fiber)
  - Broadband wireless access (WiMax, 3G)
  - Broadband networks extended to vehicles, airplanes, trains

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Future Transport (cont)

- Internet (designed for stationary PCs) will be accessed by predominantly mobile devices
  - 2 billion cell phones vs. 1 billion PCs
  - Most cell phones will become data-centric smartphones, e.g., Apple's iPhone
  - Need broadband wireless (3G, WiMax)

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Future Transport (cont)

- IP (Internet protocol) everywhere – Internet extends to cell phones, TVs, cameras, home appliances,...
  - What's needed:
  - IP-addressed "smart" consumer devices
  - More home networks
  - IMS (IP to mobile devices)

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Future Services

- Data storage shift from PCs to the cloud
  - User's data (documents, mail, photos, video,…) will reside mostly online and distributed among different servers vs. centrally stored in PCs
  - Current trend, e.g., Google docs, webmail

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Future Services (cont)

- Computing shift from desktop applications to the cloud
  - Applications for collaborative content creation, e.g., Web 2.0 applications
  - "Smart" cloud services, e.g., Google Translate, Apple's MobileMe
  - Need web services and applications offering desktop-like experiences

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Future Services (cont)

- Web browser disappears -- web and desktop merge
  - Web applications run directly on operating systems
    - Operating systems understand web technologies (HTML, XML, Javascript, Flash), e.g., Windows Vista Sidebar and Gadgets
  - Web extends to "smart" consumer devices and appliances

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Networks Research Group Activities

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Privacy
Security

Services/
Applications

Network Evolution
Network Performance
Traffic Control
Wireless Networks

Transport/
Infrastructure

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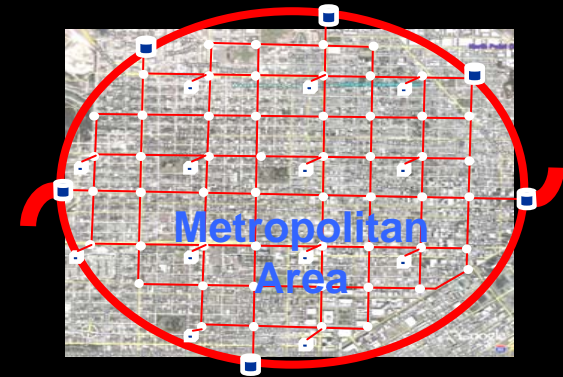
Networks Group (cont)

- Network security and privacy
  - Malicious software filtering (viruses, spyware)
  - Malicious web site detection (drive-by downloads)
  - Identity theft (phishing)
  - Online behavior tracking
  - Network intrusion detection
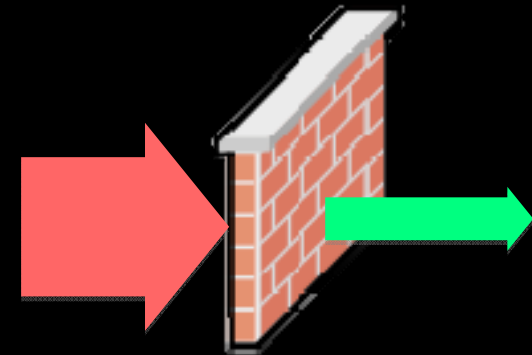
Networks Group (cont)

- Network evolution
  - Migration to all-optical networks
  - Migration to wireless broadband (mesh networks, WiMax)
  - Wireless networking for fast moving users (trains)

Metropolitan Area

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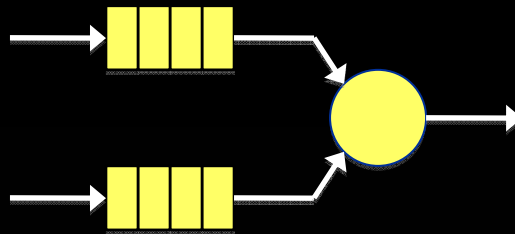
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Networks Group (cont)

- Network performance
  - Modeling of 3G/4G networks
  - Modeling of WiMax
  - Modeling and analysis of large-scale distributed systems

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Networks Group (cont)

- Traffic control
  - Traffic classification by deep packet inspection
  - Scheduling algorithms for optical networks and WiMax networks

Networks Group (cont)

- Wireless networks
  - New routing protocols for wireless mesh networks and wireless sensor networks
  - Dynamic spectrum access for cognitive radio
  - Medium access control protocols
  - Resource management for WiMax and wireless mesh networks

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