Networking & Communications

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Internet use continues to grow

• Half the world population is online
• One third of the world population uses Facebook
• # of cell phone users exceeds # of toothbrush users
Internet traffic is exploding

- Unparalleled growth in devices, data rates, and traffic
- 1 billion hours of YouTube streamed every day
- Services evolving from high-speed data and video towards Augmented Reality, Virtual Reality, and Internet of Things
Wireless and Wireline Networks

- LTE
- ZigBee: SHORT RANGE, LOW DATA RATE
- Bluetooth: SHORT RANGE, HIGH DATA RATE
- Body/Personal Area Networks
- Local Area Networks: Wi-Fi a, g, n, ac, …
- Cellular Networks: LTE, LTE Advanced, Het-nets, 5G

- Internet of Things
- Data center networks, cloud computing
- Optical networks
- Content distribution networks

- Edge
- Access/Aggregation
- Core
Networks - Challenges

- Available anytime and anywhere, from any device
- Incorporate **new technologies**, support/enable **new classes of applications** and services, and meet new requirements
- Scale and adapt to types of applications, topology, mobility patterns, and heterogeneity of devices
- Easily controllable and **manageable**
- Resource and energy **efficient**
- Secure and robust to failures and attacks
Enabled by: Networking and Communications
Classes

Policy, Security

Transport
Network
MAC
PHY

Networking
Communications

Analytical tools
ELEN E6770 TPC: Network Virtualization & Cloud Computing
ELEN E6776 TPC: Content Storage & Distribution
EECS 6897: TPC: Cloud Data Infrastructure
ELEN 9701: Seminar in Wireless and Edge Networking
ELEN E6713 Topic: mmWave & Applications for 5G
EECS E6896 Topic: Quantum Computing & Comm
### Additional Classes

- **Networking (CS)**
  - COMS E6156: Cloud Computing
  - COMS 6998 Topics: Cloud Computing & Big Data
  - COMS 6998 Topics: Datacenter Networking
  - COMS W4419: Internet Technology, Economics, and Policy

- **Related**
  - COMS 4995 Topics: Intro to Networks and Crowds
    - COMS E6998 Topics: Blockchain Apps
    - COMS 4181: Security

- **Analytical Tools (CS, IEOR)**
  - CSOR 4231: Analysis of Algorithms
  - CSOR W4246: Algorithms for Data Science: EE students can usually get into
  - IEOR - Stochastic Models, Optimization, etc.
General Advice

• It’s a short program – plan ahead
• Don’t repeat undergraduate classes…
• Sample several classes
• Consider classes beyond the EE dept.
  – e.g., Networking classes – in EE and CS
• Participate in a research project/s (spring or summer)
• Look for a summer internship (winter)