Introduction of Electronic Commerce

- **Class List:** enrolled students
- **Background** Nasdaq Bubble, Now, Over time
- **Course Overview:** [http://orfe.princeton.edu/courses/orf401/#Description/](http://orfe.princeton.edu/courses/orf401/#Description/)
- **Requirements**
  - 5 programming assignments focused on HandyRides
  - final projects:
    - enRouteCommerce*
    - Real-time Management & Control of Mobile Assets
    - Leveraging Google Maps *
    - Android and iPhone Apps
    - Augmented Reality
    - Beyond ‘Spectacles’ and ‘SmartWatches’
    - What to do with Drones? ???
- **Who’s involved**
  - TA: Mark Martinez, mam17@cs.princeton.edu
  - Office Hours: Monday & Friday 4:00-6:00pm or by appointment in Transportation Atelier (Basement ORFE)
What is eCommerce ? eBusiness?

- eCommerce: use of the internet to transact business; digitally enabled transactions among organizations and individuals
- eBusiness: refers primarily to the digital enabling of transactions and processes within a firm. (accounting and on-line inventory, optimal management and control of mobile assets.)
Elements of eCommerce & eBusiness

• eCommerce
  – Selling Buying
  – Customer support
  – Entertainment
  – Navigation-based Services
  – User generated content generation and distribution

• eBusiness
  – Back-office support (really eBusiness)
    • document/funds transfer, documentation, regulatory compliance
  – Distribution
  – Design & manufacture
  – Optimal Management and Control of Mobile Assets
Unique features of eCommerce Technology

- **Ubiquity**: available “everywhere”
- **Global reach**: knows no boundaries
- **Universal standards**: W3C
- **Richness**: video, audio, etc.
- **Interactivity**: user part off the loop
- **Information density**: scope, timeliness
- **Personalization/Customization**: targeted content
- **Social Technology**: Open to user content contribution
Internet Hierarchy

- (Inter)Network Topology [Reference](Alderson, CalTech)
- Phone - Circuit switched
  - Have a continuous connection
- Internet - Packet switched over a physical network
- Protocols govern how applications access the network
International Standards Organization

- created a 7 layer model defining the basic functions:
  - OSI Reference model
    - Open System: different network systems supporting the functions of a related layer can exchange data
    - Peer-to-Peer: Data created by one layer and transmitted to another device pertains only to that layer. Intervening layers do not alter data; they simply add data in order to perform their functions on the network.
## OSI Reference Model

<table>
<thead>
<tr>
<th>Layer</th>
<th>Function</th>
<th>Info transferred</th>
<th>TCP/IP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Application</td>
<td>Data to send?</td>
<td>Application Message</td>
<td>ftp, http, snmp, dns</td>
</tr>
<tr>
<td>2. Presentation</td>
<td>Data look like?</td>
<td>Encrypted/compressed data</td>
<td></td>
</tr>
<tr>
<td>3. Session</td>
<td>Who is the partner?</td>
<td>Session manager</td>
<td></td>
</tr>
<tr>
<td>4. Transport</td>
<td>Where is partner?</td>
<td>Multiple packets</td>
<td>TCP, UDP</td>
</tr>
<tr>
<td>5. Network</td>
<td>Route to follow?</td>
<td>Packets</td>
<td>IP, ARP</td>
</tr>
<tr>
<td>6. Data Link</td>
<td>Each step in route?</td>
<td>Frames</td>
<td>Ethernet, ppp</td>
</tr>
<tr>
<td>7. Physical</td>
<td>Use each step?</td>
<td>Bits</td>
<td>Physical wiring</td>
</tr>
</tbody>
</table>

Week 1
Physical Layer (network) hierarchy

- **Backbone**: high speed: ATT, MCI/WC
- **Network Access Points (NAP)**: Sprint, Pac Bell,
- **Regional networks**: CERFnet, Unet, PSInet
- **Internet Service Providers (ISP)**: AOL, ATT, Bell Atl. Mobile (BAM)
- **User Organizations**: Tigernet
- **User**
Network layer operations: several concepts

- **Dadagrams**: packets move freely
  - vs
- **Virtual Circuits**: force circuit-like behavior
- **Routing Method**: Varies w/level in Hierarchy
- **Packet contents**: Address (from, to), version, length, time-to-live, etc., data
- **Example**: Internet Protocol (IP)
What makes IP, IP?

- Fixed length addresses 192.21.33.17
  - must be unique since routing isn’t
  - Domain name system (DNS) converts quad to name
  - standard port numbering: :80 (http), :25 (mail)

- Allows intermediate networks to fragment datagrams
- It does NOT guarantee delivery
- It does NOT ensure integrity of the payload
- It does NOT guarantee order of receipt
Transport Layer (host-to-host)

• **Issues**
  – how & when to provide reliable comm. over unreliable channels
  – performance
  – fragmentation & re-assembly

• **Service Models:**
  – connectionless >>> circuit-like
  – issues error detection, timing, error recovery
  – examples:
    • TCP: reliable, bi-directional, byte string (returns what was received);
    • UDP: uses only “check sum” to determine if it got it all. (no confirmed receipt)