

# ECE 671 – Lecture 1

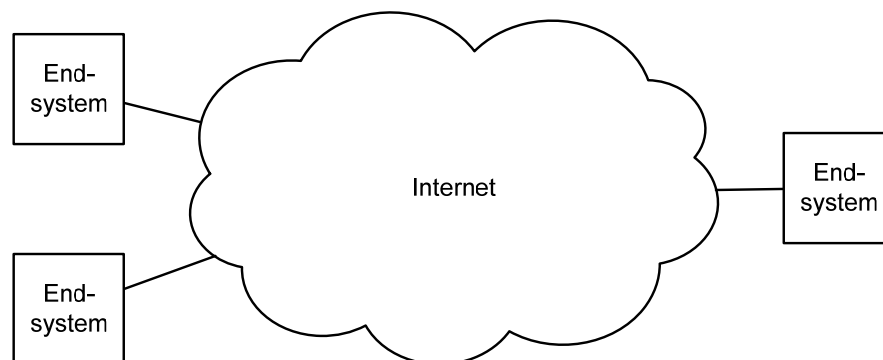
Introduction

What is a computer network?

# Why study computer networks?

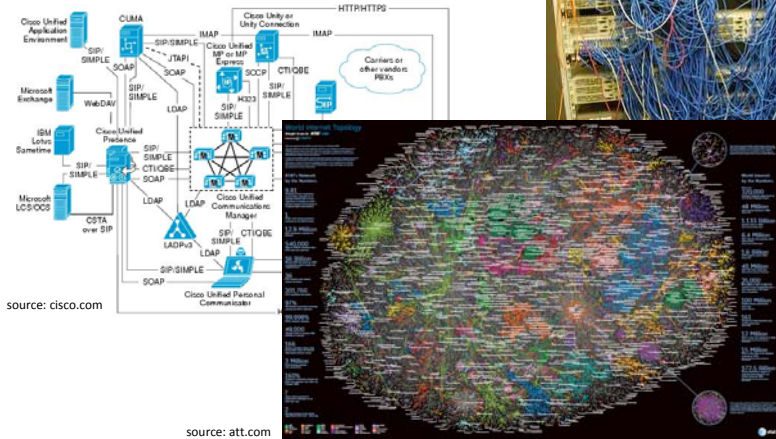
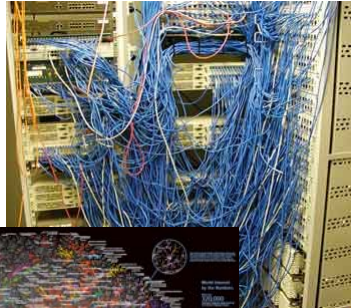
## The “pretty” picture

- Conceptual view of Internet:



# The "ugly" picture

- There are lots of details...



source: aatechnet.com

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source: att.com

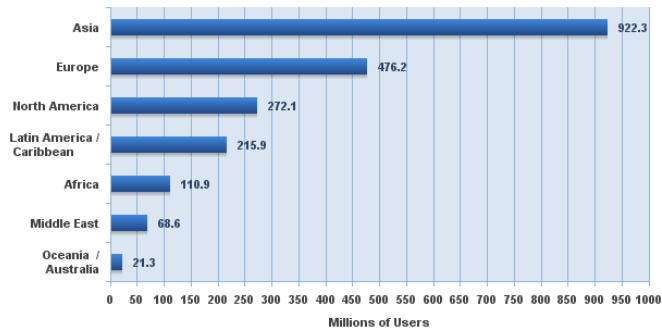
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# Scale of Internet

- Number of users:

**Internet Users in the World by Geographic Regions - 2011**



Source: Internet World Stats - [www.internetworldstats.com/stats.htm](http://www.internetworldstats.com/stats.htm)  
 Estimated Internet users are 2,095,006,005 on March 31, 2011  
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# Scale of Internet

- Number of domains:

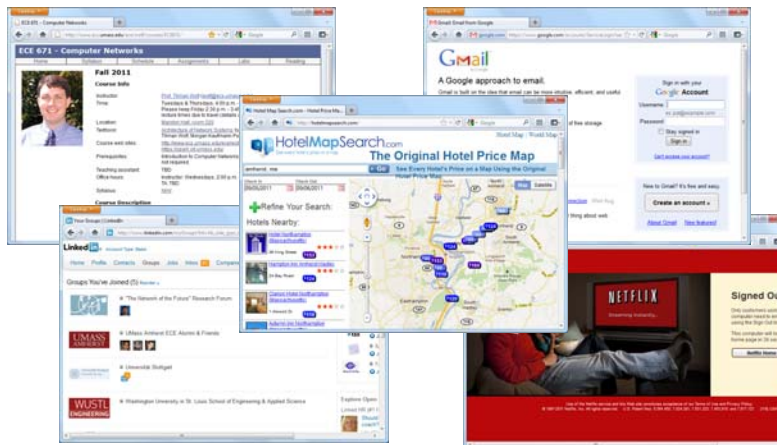
## TLD Overview for September 05, 2011

All	New	Deleted	Transferred	TLD
132,314,738	85,990	87,126	105,174	All TLDs
96,943,156	54,972	62,510	81,324	.COM
14,124,430	7,840	8,070	9,048	.NET
9,398,579	5,520	4,846	5,630	.ORG
7,998,344	15,091	8,834	7,514	.INFO
2,129,553	1,139	1,336	796	.BIZ
1,720,676	1,428	1,530	862	.US

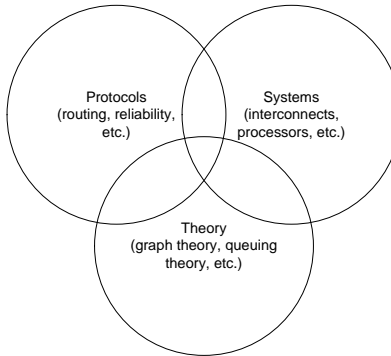
More information about these numbers, including breakdown by Name Server, can be found at [DailyChanges.com](http://DailyChanges.com).

# Uses of Internet

- Web site access, mash-ups, social networking, etc.



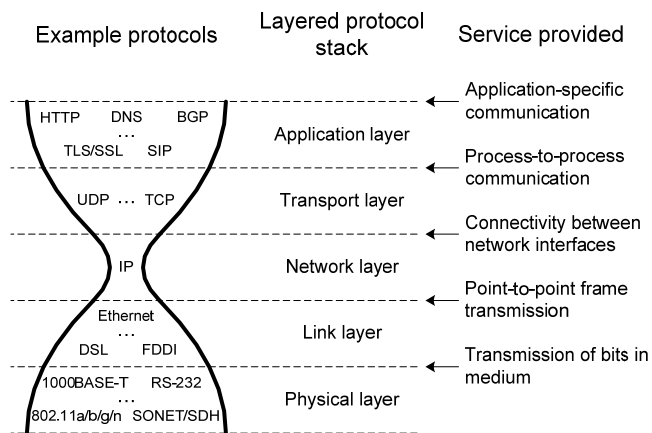
# Networking has many facets



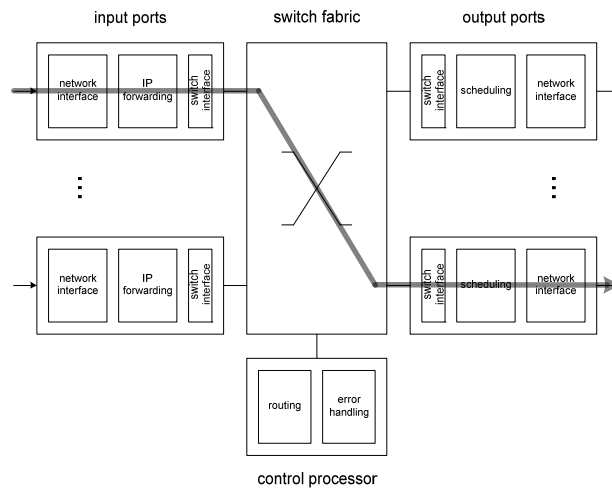
- Goals: functionality, scalability, throughput performance, security, power efficiency, manageability, etc.

# Protocols: Internet architecture

- Hourglass architecture of protocol stack



## Systems: generic router



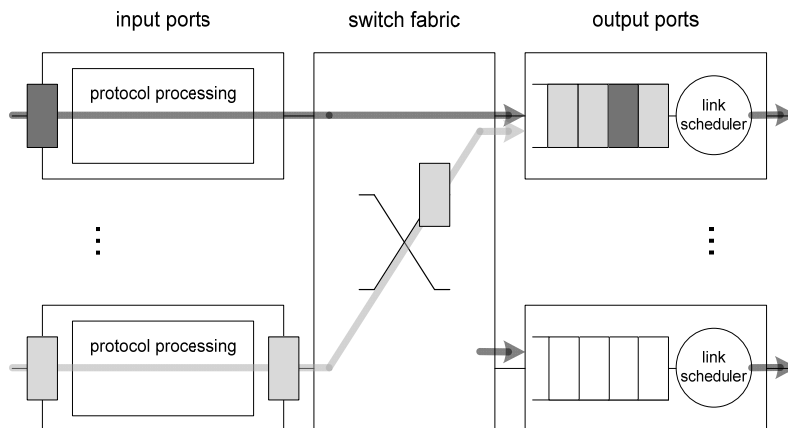
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## Theory: statistical multiplexing

- Operation of network without guarantees



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## What are interesting new problems?

- Many interesting research problems in networking
  - Billions of users, machine-to-machine communication, applications (e.g., health-care), etc.
- Examples:
  - Protocols
    - Defining exchanges for new communication paradigms (e.g., peer-to-peer, content-centric networking, sensor networks, etc.)
  - Systems
    - Design of high-performance routers that can process packets in software
  - Theory
    - Network science and overlap with other “networks”
  - Many more...

## Structure of this course

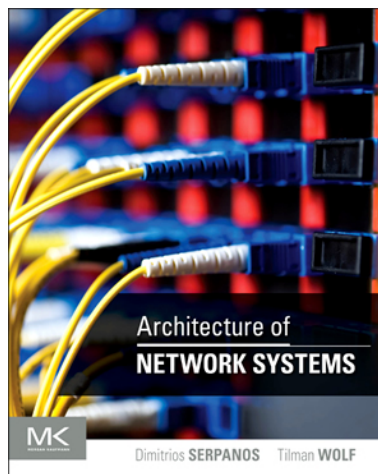
- Introduction (4 lectures)
  - Review of Internet protocols
- Basic systems (6 lectures):
  - Interconnects, NICs, bridges, routers
- Specialized systems (3 lectures):
  - Transport and application layer
- Theory (5 lectures):
  - Queuing theory, quality of service, security
- Special topics (5 lectures):
  - Specialized hardware, future Internet, open topics

## Course information

- Read the syllabus
- Up-to-date information on course web site:
  - <http://www.ecs.umass.edu/ece/wolf/courses/ECE671/>
  - Schedule, slides, etc.
- Course components:
  - Exam I 20%
  - Exam II 20%
  - Exam III 20%
  - Online quizzes 10%
  - Lab assignments 20%
  - Final project 10%
- Final grades will be norm-referenced (“curved”)

## Textbook

- “[Architecture of Network Systems](#)” by Dimitrios N. Serpanos and Tilman Wolf, Morgan Kaufmann Publishers, 2011.
- One copy available outside my office (do not remove)
- Does not have question sets
  - You can help...





## Labs and assignments

- Labs
  - Four lab assignments
  - Details later in the semester
- Assignments
  - Online quiz before every lecture
  - Check web site for reading assignments
    - Multiple lectures may cover single chapter