

B345 Internet Science and Technology

Week 2 lecture 2

Prelude

- Lecture handouts
- Tutorial exercises and assessments

This lecture's Learning Objectives

- Understand what is the Architecture of the Internet.
- Current issues about the future of the Internet Architecture.

What is "Architecture"?

- A reminder from the last lecture.

Topologies

- LAN, MAN, WAN interconnections
- ISP, PoP and customers
- NSP and NAPs
- Direct-interconnections
- Peering

TCP/IP Protocol Suite

- Network access
- IPv4 and IPv6
- ICMP, ARP, RARP
- TCP and UDP
- Application protocols
- DNS

Routing

- Internet as a collection of autonomous systems.
- Internal routing (IGPs)
 - RIP, EIGRP, OSPF, IS-IS
- Exterior routing (EGP)
 - BGP-4

Design Goals Again

- Design to Implementation, or the other way around?
- Design goals of the Internet Architecture
 - internetworking
 - robustness
 - heterogeneity
 - distributed management
 - cost effective
 - ease of attachment
 - accountability

Achieving the design goals

- Some features of the Internet Architecture to achieve the design goals
 - Datagrams and connectionless service.
 - State information and where to store them - Transport vs Network layers.
 - Need for unreliable service - TCP vs UDP.
 - Hierarchical scaling - DNS, subnets, CIDR, AS.

Failing the design goals

- Some features of the Internet Architecture that fails the design goals
 - Lack of ways to do distributed resource management.
 - Packet sizes.
 - Retransmission of lost packets.
 - Performance specifications.

Architectural Failings

- Clash between principles and actual operations.
 - IPSEC
 - NAT
 - Firewalls
 - MPLS

New Requirements

- Some examples for a new Internet Architecture.
 - Mobility
 - Policy-driven auto-configuration
 - Highly time-variable resources
 - Allocation of capacity and RT traffic control
 - Multi-protocol support
 - Security