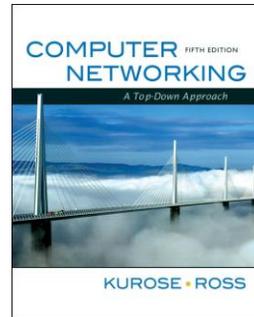


RSC

Part I: Introduction



Redes y Servicios de Comunicaciones Universidad Carlos III de Madrid

These slides are, mainly, part of the companion slides to the book "Computer Networking: A Top Down Approach" generously made available by their authors (see copyright below). The slides have been adapted, where required, to the teaching needs of the subject above.

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*Computer Networking:
A Top Down Approach
5th edition.*

Jim Kurose, Keith Ross
Addison-Wesley, April
2009.

RSC Part I: Introduction

- ❑ Circuit switching vs packet switching
- ❑ Protocols and protocols stacks
- ❑ **What is the Internet**
- ❑ **Network structure**
- ❑ **ISPs and Internet**

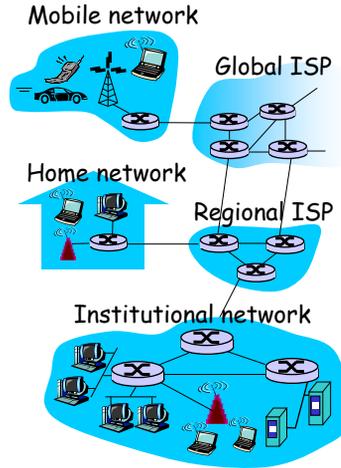
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What's the Internet: "nuts and bolts" view

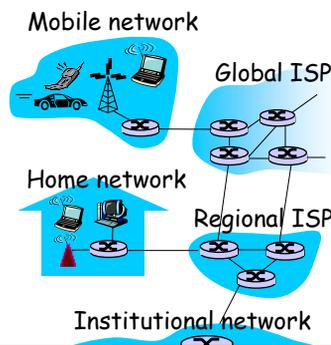
-  PC
 -  server
 -  wireless laptop
 -  cellular handheld
 -  access points
 -  wired links
 -  router
- millions of connected computing devices: *hosts = end systems*
 - ❖ running *network apps*
 - *communication links*
 - ❖ fiber, copper, radio, satellite
 - ❖ transmission rate = *bandwidth*
 - *routers*: forward packets (chunks of data)



Introduction 1-3

What's the Internet: "nuts and bolts" view

- *protocols* control sending, receiving of msgs
 - ❖ e.g., TCP, IP, HTTP, Skype, Ethernet
- *Internet: "network of networks"*
 - ❖ loosely hierarchical
 - ❖ public Internet versus private intranet



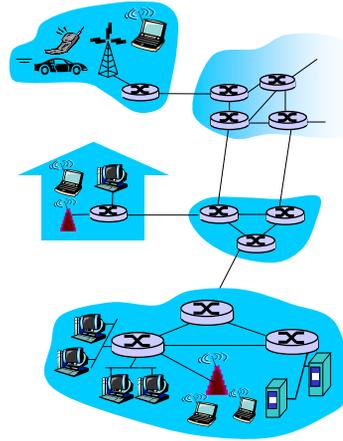
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What's the Internet: a service view

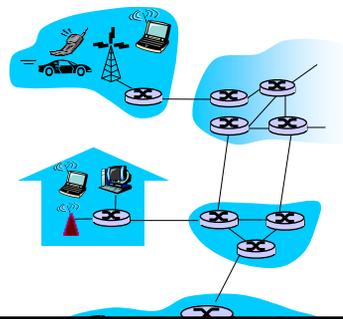
- **communication infrastructure** enables distributed applications:
 - ❖ Web, VoIP, email, games, e-commerce, file sharing
- **communication services provided to apps:**
 - ❖ reliable data delivery from source to destination
 - ❖ "best effort" (unreliable) data delivery



Introduction 1-5

A closer look at network structure:

- **network edge:** applications and hosts
- **access networks, physical media:** wired, wireless communication links



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The network edge:

□ end systems (hosts):

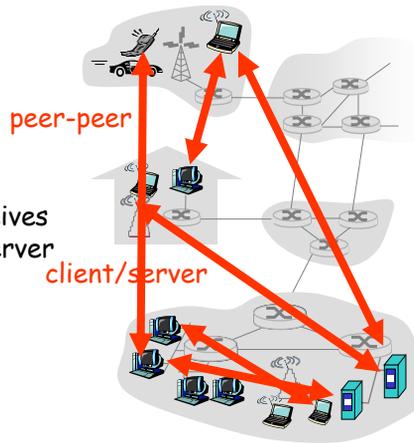
- ❖ run application programs
- ❖ e.g. Web, email
- ❖ at "edge of network"

□ client/server model

- ❖ client host requests, receives service from always-on server
- ❖ e.g. Web browser/server; email client/server

□ peer-peer model:

- ❖ minimal (or no) use of dedicated servers
- ❖ e.g. Skype, BitTorrent



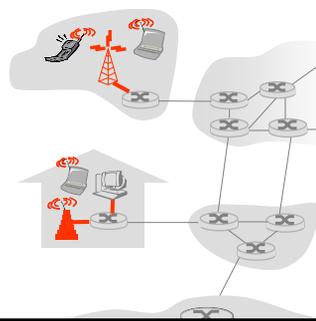
Introduction 1-7

Access networks and physical media

Q: How to connect end systems to edge router?

- residential access nets
- institutional access networks (school, company)
- mobile access networks

Keep in mind:



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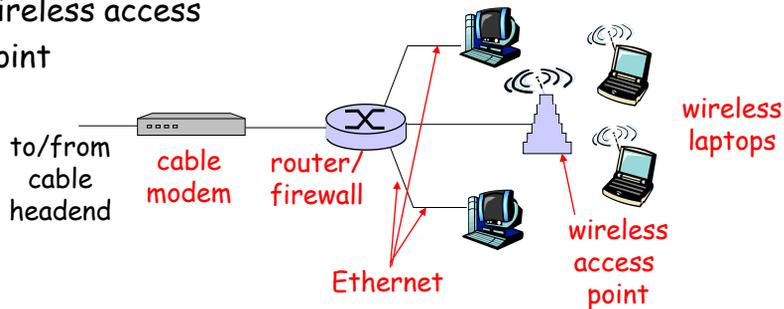
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Home networks

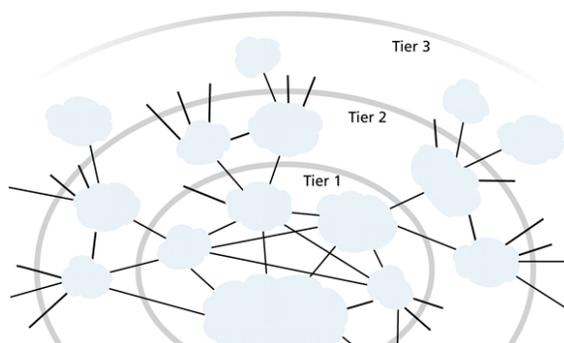
Typical home network components:

- DSL or cable modem
- router/firewall/NAT
- Ethernet
- wireless access point



Introduction 1-9

Internet structure: network of networks



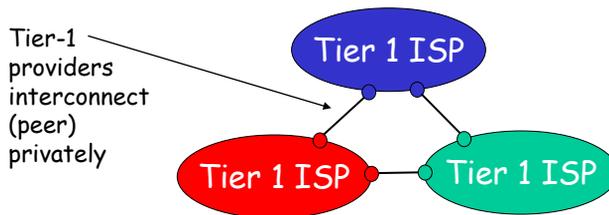
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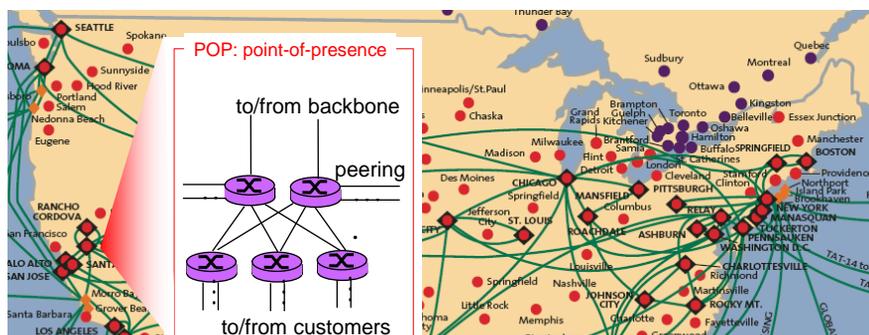
Internet structure: network of networks

- roughly hierarchical
- **at center: "tier-1" ISPs** (e.g., Verizon, Sprint, AT&T, Cable and Wireless), national/international coverage
 - ❖ treat each other as equals



Introduction 1-11

Tier-1 ISP: e.g., Sprint



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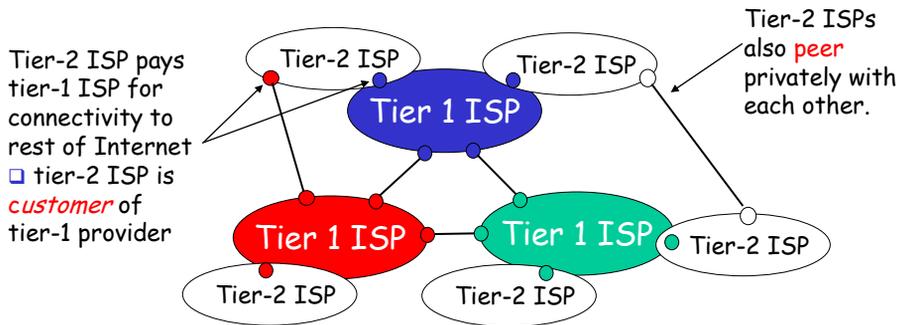
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Internet structure: network of networks

□ "Tier-2" ISPs: smaller (often regional) ISPs

- ❖ Connect to one or more tier-1 ISPs, possibly other tier-2 ISPs

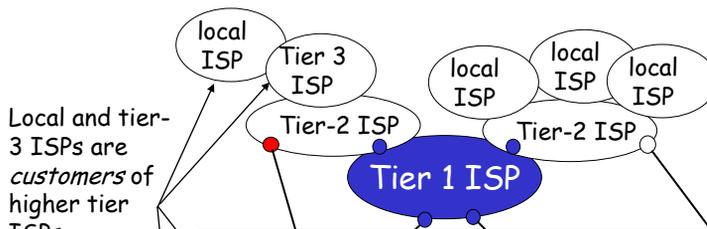


Introduction 1-13

Internet structure: network of networks

□ "Tier-3" ISPs and local ISPs

- ❖ last hop ("access") network (closest to end systems)



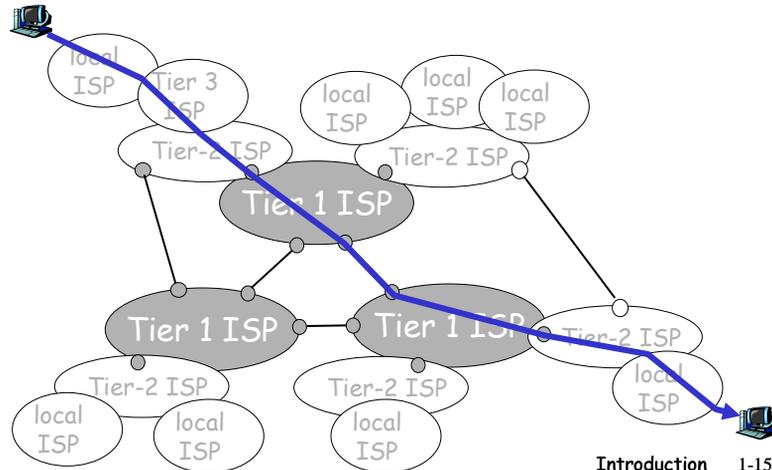
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Internet structure: network of networks

- a packet passes through many networks!



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