How Is Wireless & Mobile Different From Traditional Networking?

1. Transmission media is air
   - Higher error rates
   - Mitigated by physical level work (coding)
2. Not everyone can hear each other
3. Limited spectrum
4. Slower speed than traditional (limited spectrum)
5. Security
   - Network may not trust users
   - Users may not trust network
6. Location change
   - Routing needs to change
   - Ex: It may be easier to share files with floppies
7. Energy constraints
   - One-hop to base-station vs. ad hoc/multi-hop
   - Ex: it may be easier to forward your data to someone in your close vicinity
8. Trust
   - You don’t trust others to forward your data
   - Do you trust others to overhear your packets, even if you have connectivity, what can you do?

Approach For This Class

- Look at small sample link-layer: MACAW
- Application (CS555)
- Sensor networks: Diffusion
- Transport-layer: SNOOP
- Routing: Mobile IP and DSR
- Look at small sample

(dimensions of wireless/mobile)

- Server
  - Use may not trust network
  - Networks may not trust users
- Security
  - everyone can hear each other
  - Higher error rates
  - Different views
  - More lossensitive
  - More interference from other radios and obstacles
- Wireless vs. mobile
  - Cellular vs. ad hoc
- Traditional Networking?
  - How is Wireless & Mobile Different From Traditional Networking? (Cont...)

- Mobile IP

[Johnson96b]

Bill Cheng

http://merlot.usc.edu/cs551-f12
how do people find you if you move around?

Mobile IP:

Key Ideas

Computer Communications - CSCI 551

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specifically: how do you keep your IP address anywhere you go

Impact on IP addressing

How do we deliver IP packets when endpoints move?

Impact on routing

Scale

Key design considerations

Incremental deployment

Internet standard for support for mobility in IP

Result: Mobile IP

[RFC 2290]

doesn't scale to millions of hosts

Why not just announce a route to your host?

Possible Approaches

Why not re-address your host?

but this is what 95% of people do today, because they

only run clients, not servers

too many protocols use IP addresses instead of hostnames,

especially for open connections

Why not separate naming and addressing?

breaks hierarchical addressing!

then people can't find out

Q:

Discovering Agents

How do laptops usually figure things out? Why not use that?

A: DHCP... because it didn't exist when Mobile IP started.

Routers periodically beacon ICMP router advertisements

Discovering Agents

Mobile IP Terminology

HA
FA
CH
MH
HN
Q:

Q:

The IETF Mobile IP Approach

tunnels packets to you

good scalability (many users)

Pros:

good security (many users)

Cons:

incremental deployment easy

Inter-Agent Key setup and authentication

must be careful about security

only many protocols use the address instead of hostnames,

Why not separate naming and addressing?

Why not re-address your host?

Why not just announce a route to your host?

Possible Approaches

Key Ideas

Mobile IP

Internet standard for support for mobility in IP

Result: Mobile IP

Incremental deployment

Key security considerations

Impact on routing

Impact on addressing

How do we deliver IP packets when endpoints move?
MH moves to foreign network

MH registers with FA and gets temp local IP address

FA registers with HA and gets tunneled

FA gets tunneled pkt, decapsulates it, sends it to MH's temp-local address.

CH sends pkt to MH's IP address like normal

HA intercepts pkt (uses same IP network as MH) and tunnels pkt to FA.

MH's reply can then go straight back to the CH.

CH does not have to be Mobile IP-aware.
resulting paths are not optimal, they all go through the HA

smart senders keep cache of FA & MH

one more thing to keep updated

can be improved with route optimization

Other Mobile IP Issues

FA may modify messages

local-temp

route optimality

FA may be listening and recording

FA may make false claim that MH is in its network

Authentication

FA may be listening and recording

don't want to drop pkts when changing FAs

Smooth handoffs

need optimal routes

Security Issues

don't want others to claim to be MH

FA may make false claim that MH is in its network

Confidentiality

don't want others to claim to be MH

FA may be listening and recording

FA may modify messages