Wireless Internet Routing

Introduction
Wireless Internet Routing

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Disclaimer and Acknowledgements

Lots of content borrowed from/inspired by:

- Computer Networks, EPFL-IC, Fall 2008, Jean-Pierre Hubaux and Mohammad Hossein Manshaei (http://compnet.epfl.ch)
- Mobile Networks, EPFL-IC, Spring 2009, Jean-Pierre Hubaux (http://mobnet.epfl.ch/)
- CS691aa, 2007, Deepak Ganesan (http://www.cs.umass.edu/~dganesan/courses/fall07/)
- Optimized Link State Routing, Andreas Tønnesen (http://www.olsr.org/?q=links)
- Wikipedia (but be cautious...)

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Motivation: IP on Everything and Wireless Everywhere

- Wireless connectivity is cheap and easy
  - Wi-Fi, GSM, 3G, Bluetooth on the same device (or even chip)
- We want more connectivity
- Everything becomes connected

The Internet is becoming wireless
Motivation: Wireless Communication Networks are Everywhere

- Cellular networks: GSM, 3G
- Wi-Fi networks: Wireless LAN, Hotspots, Fon, Freifunk, ...
- Personal and body area networks: Bluetooth, Wireless USB
- Vehicular networks
- Sensor networks and RFID
- Underwater networks, inter-planetary networks...

In this course: routing in radio communication networks for wireless Internet access
Wireless is Everywhere

- **Indoor**: 10-30m
- **Outdoor**: 50-200m
- **Mid-range outdoor**: 200m – 4 Km
- **Long-range outdoor**: 5Km – 20 Km

**Data rate (Mbps)**

- **802.15**: 1 Mbps
- **802.11b**: 5-11 Mbps
- **802.11a,g**: 54 Mbps
- **802.11n**: 200 Mbps
- **802.16 (WiMAX)**: 200 Mbps

**3G cellular enhanced**

- **UMTS/WCDMA-HSPDA, CDMA2000-1xEVDO**: 802.11a,g point-to-point
- **UMTS/WCDMA, CDMA2000**: .384 Mbps
- **IS-95, CDMA, GSM**: .056 Mbps

**2G**

- **802.15**: 1 Mbps
- **802.11b**: 5-11 Mbps
- **802.11a,g**: 54 Mbps
- **802.11n**: 200 Mbps
- **802.16 (WiMAX)**: 200 Mbps

**3G**

- **UMTS/WCDMA-HSPDA, CDMA2000-1xEVDO**: 802.11a,g point-to-point
- **UMTS/WCDMA, CDMA2000**: .384 Mbps
- **IS-95, CDMA, GSM**: .056 Mbps

**4G**

- **UMTS/WCDMA-HSPDA, CDMA2000-1xEVDO**: 802.11a,g point-to-point
- **UMTS/WCDMA, CDMA2000**: .384 Mbps
- **IS-95, CDMA, GSM**: .056 Mbps
Community Networks/Mesh Network

- Freifunk (map.berlin.freifunk.net)
- Seattle Wireless (since 2000)
Sensor Networks for Environmental Monitoring

- Permasense: deployement on the Matterhorn
- Sensorscope
- Zebranet
Overview

- Introduction to wireless routing
- Review: architecture of wireless networks, wireless PHY, wireless MAC, 802.11
- Wireless: what does it change?
- Specifics of routing in wireless networks
- In the beginning: routing for wireless ad hoc networks and MANET
- Becoming standard: wireless Internet routing
- Selected topic(s): taking advantage of the wireless medium