Mobile and Ubiquitous Computing
Revision Part I

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Elements of Mobile Computing

- Wireless communication
  - Disconnection
  - Low bandwidth
  - High bandwidth variability
  - Heterogeneous networks
  - Security
- Mobility
  - Addressing and routing
  - Location based information
  - Migration
- Portability
  - Low power
  - Small interface
  - Restricted storage
  - Security

Example: Wireless Characteristics

- Implication: signal interacts with the environment
  - noise, echoes (multi-path, timing), blocking
  - objects, walls, other sources, weather
- Implication: network topology very dynamic
  - hosts come and go, loss of connectivity, variable density
- Result: degradation/variability of capability to communicate, errors
- Networks and applications must deal with this
Research Papers

- Mobile IP
  - Main points about its operation
- Service discovery
  - Principles and techniques
  - E.g. registration
- Placelab
  - Main principle

Location sensing

- Location sensing techniques
  - Triangulation
  - Proximity
  - Scene analysis
- Location sensing systems
  - Properties
  - Examples
  - Challenges

RFID Operating Principle

- Tag components
  - Microcontroller
  - Antenna (wire/conductive carbon ink)
  - Polymer enclosure
  - Battery (optional)
- Reader detected by voltage difference at the antenna endpoints caused by inductive or capacitive coupling
  - Magnetic (near) field (LF or HF)
  - Electric (UHF)
Object Naming Service

Bit Format:
[10 000000000000001000000000000000000000111000000000000000000001]
Decimal Format: [2.44.15.65]

Step 1: EPC event manager receives the ID 2.44.15.65
Step 2: EPC EM creates URI:
epc://2.44.15.65
Step 3: URI is sent to local ONS resolver
Step 4: ONS resolver converts the URI to the equivalent DNS NAPTR query
15.44.2.epcinc.org
Step 5: DNS returns result set

Tiny OS basics

• Main characteristics
  – Memory, power consumption, modularity
  – Programming with
• System model
  – Concurrency
  – Modules and configs