Bluetooth

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Overview

- History of Bluetooth
- Facts about Bluetooth
  - Standards, capabilities, limitations
- Bluetooth operation
  - pairing, services, etc...
- Ideas & applications with Bluetooth
Origin of name

- Named after a Danish king Harald Blåtand (Harold I of Denmark in English), known for his unification of previously warring tribes from Denmark and Norway.
- Bluetooth likewise was intended to unify different technologies like computers and mobile phones.
HISTORY

• First developed by Ericsson
• later formalized by the Bluetooth Special Interest Group (SIG). The SIG was formally announced on May 20, 1999
• Sony Ericsson, IBM, Intel, Toshiba and Nokia, and later joined by many other companies as Associate or Adopter
History

• Bluetooth versions so far
  • Bluetooth 1.0 and 1.0B
  • Bluetooth 1.1 (700Kbit/sec)
  • Bluetooth 1.2
  • Bluetooth 2.0 (2.1 Mbit/sec)
Piconets

- Devices connect and communicate wirelessly through short-range, ad hoc networks known as piconets
- Each device can simultaneously communicate with up to seven other devices within a single piconet
- Each device can also belong to several piconets simultaneously
Radio class

- Class 3 radios – have a range of up to 1 meter or 3 feet
- Class 2 radios – most commonly found in mobile devices – have a range of 10 meters or 30 feet
- Class 1 radios – used primarily in industrial use cases – have a range of 100 meters or 300 feet
Radio Frequency

- Bluetooth operates in the industrial, scientific and medical (ISM) band at 2.4 to 2.485 GHz
- using a spread spectrum, frequency hopping
- full-duplex
- ability to simultaneously handle both data and voice transmissions
Operation

- Any Bluetooth device will transmit the following sets of information on demand
  - Device Name, Class, Unique ID
  - List of services
  - device features, manufacturer, etc...
Security mode

- Security Mode 1: non-secure
- Security Mode 2: service level enforced security
- Security Mode 3: link level enforced security
- Additionally, a device may be trusted or untrusted
Pairing

• Security Modes 2 & 3 require pairing
• To communicate / access a service, a device requests a PIN (0000)
• Once the PIN is verified, it is used to create and exchange security keys
• A trusted device does not require pairing every time (it already has the key)
Services

• Devices cannot just “send data”. They need to make use of available services in order to communicate.

• Typical services: voice, fax, modem, print...

• Your application will need to either
  • use an existing service, or
  • “publish” its own service
Typical Bluetooth communication
Hints

• A lot of people don’t know that:
  • Their phone has Bluetooth abilities
  • Their phone’s Bluetooth is turned on
  • People nearby have Bluetooth
  • Usually no security needed to share photos / text / files
Hints

• Fast enough to transmit an MP3 in a few seconds
• A lot can be inferred by “reading” someone’s phone over Bluetooth
• Limited range can be an advantage
• Bluetooth is never on its own (accompanied by telephone, pc, etc)
Of Interest

• Bluejacking (send text)
• Bluebugging (remote control)
• Bluesnarfing (remotely reading data)
• Bluesmack (denial of service)
• Car Whisperer (eavesdropping)
• See http://trifinite.org/
BlueSniper

Long range bluetooth communication
Existing Projects

- Good source: IEEE Pervasive Computing April-June 2005 4(2)
MOBILEDATINGSOFTWARE.COM
& www.bluedating.info
Nokia Sensor

- “See and be seen”
- Local peer-to-peer profile searching
Bluetella

- Peer to peer file sharing
- File forwarding over clients
Jabberwocky

Meet familiar strangers
“Urban atmospheres” project
Telelogs

Listen to familiar strangers’ audio blogs
**ContextPhone**

- Context aware
- Instant messenger
- Communicates over network / bluetooth
Decoy

An invisible poster, graffiti or a direction sign which gets alive by the mobile in the pocket
**MobiTip**

Location-based tips about restaurants, shops, etc.
You-Who

Question-and-answer game to meet strangers
New Ideas ???

• Bluetooth implies nearby
• Bluetooth runs on phones & laptops
• Static / mobile Bluetooth
• User interaction sequence is a “mess” - pushing data publicly becomes tricky
• Bluetooth is more than an invisible cable; but what?
Your ideas?

THE END