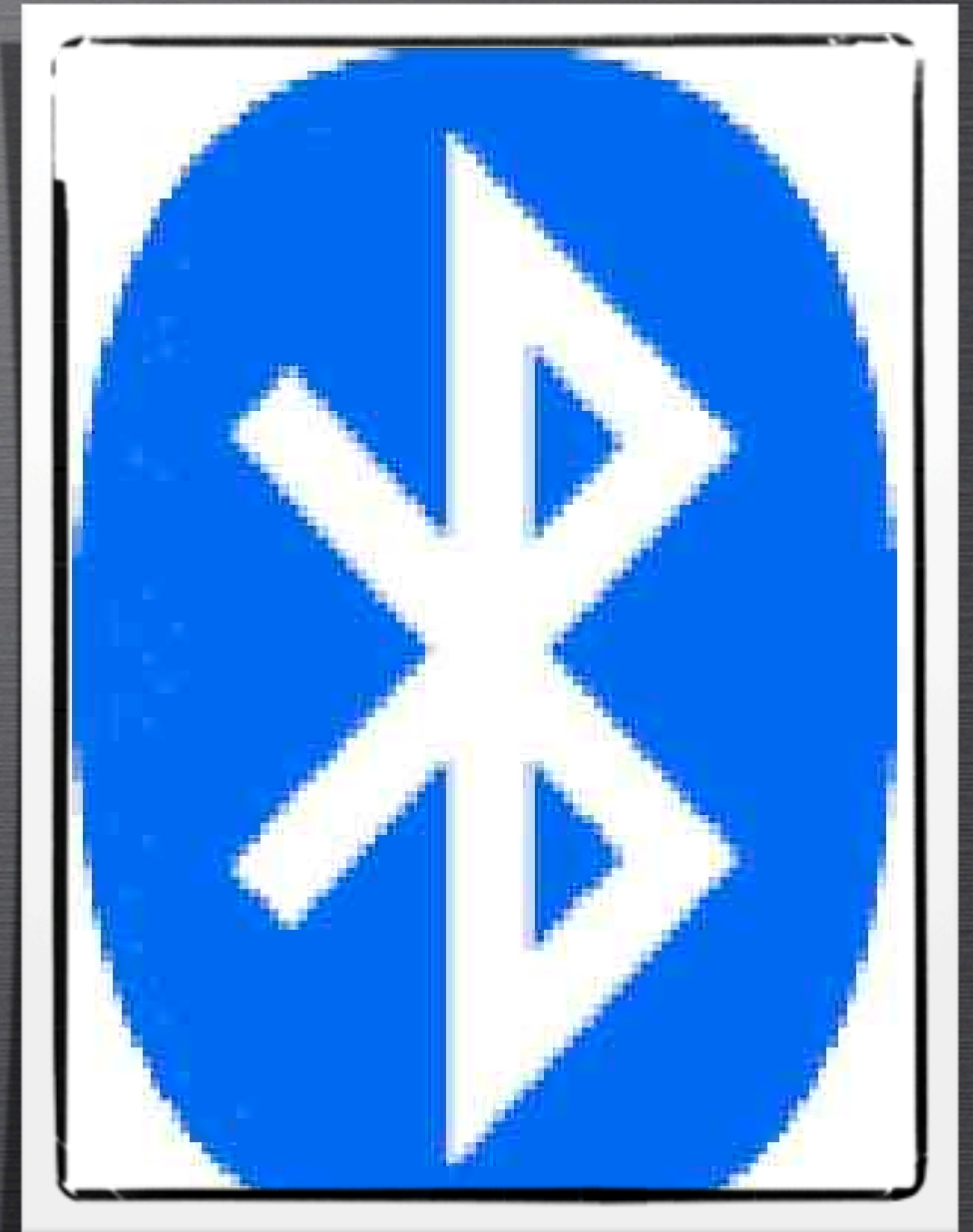# Bluetooth

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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 (acompanied by telephone, pc, etc)

Of Interest

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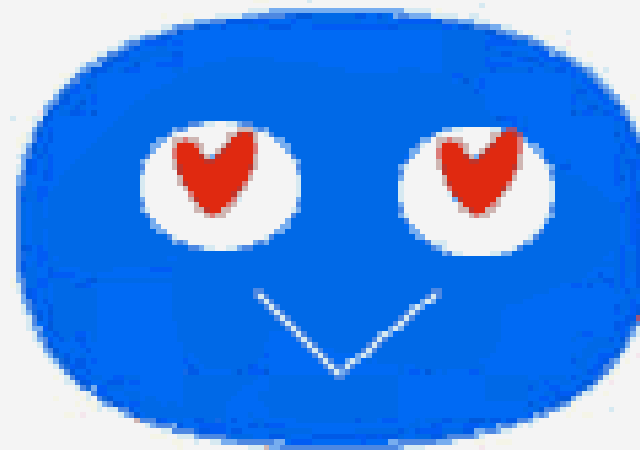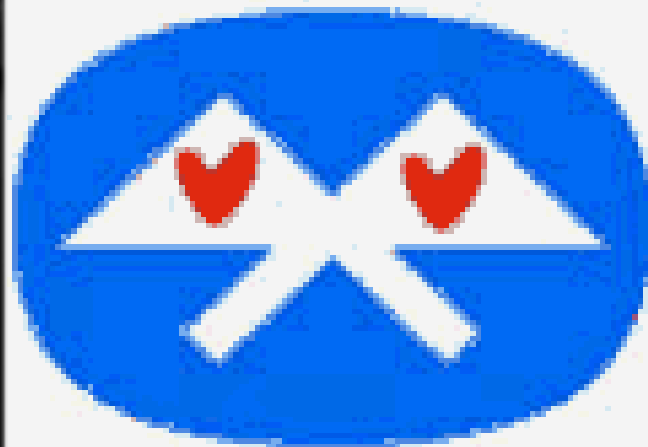- Car Whisperer (eavesdropping)
- See **http://trifinite.org/**

BlueSniper

Long range bluetooth communication

Existing Projects

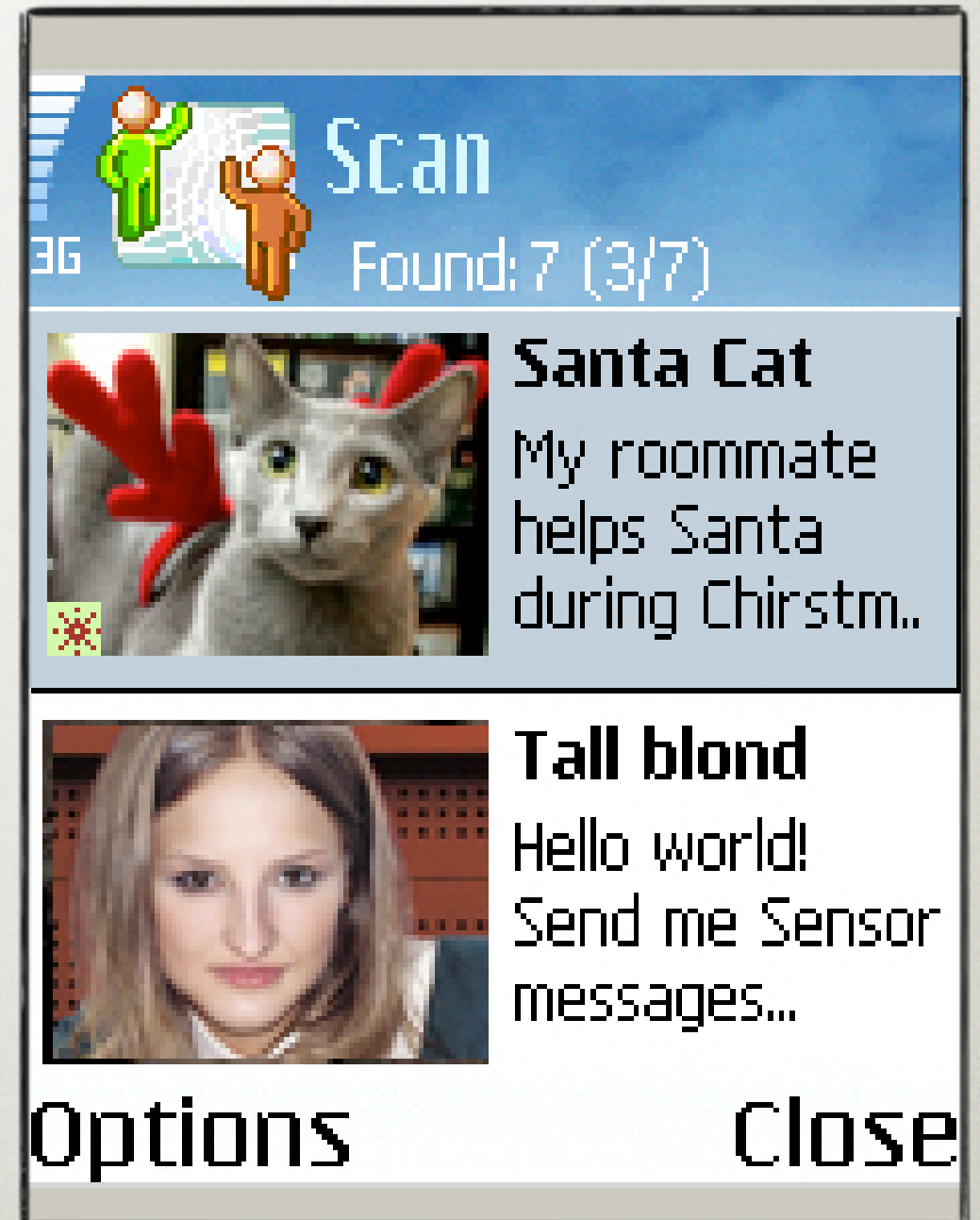- Good source: IEEE Pervasive Computing April-June 2005 4(2)
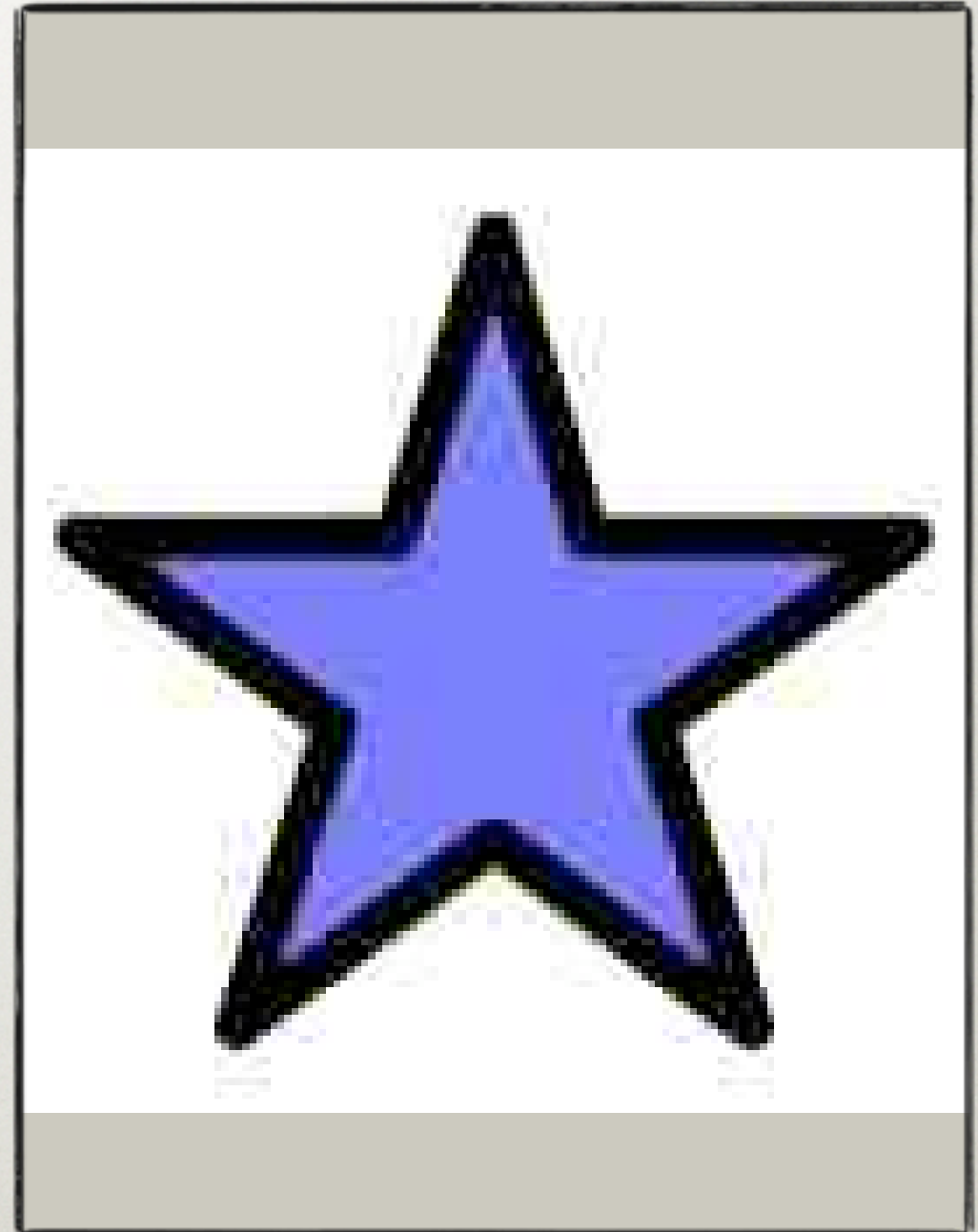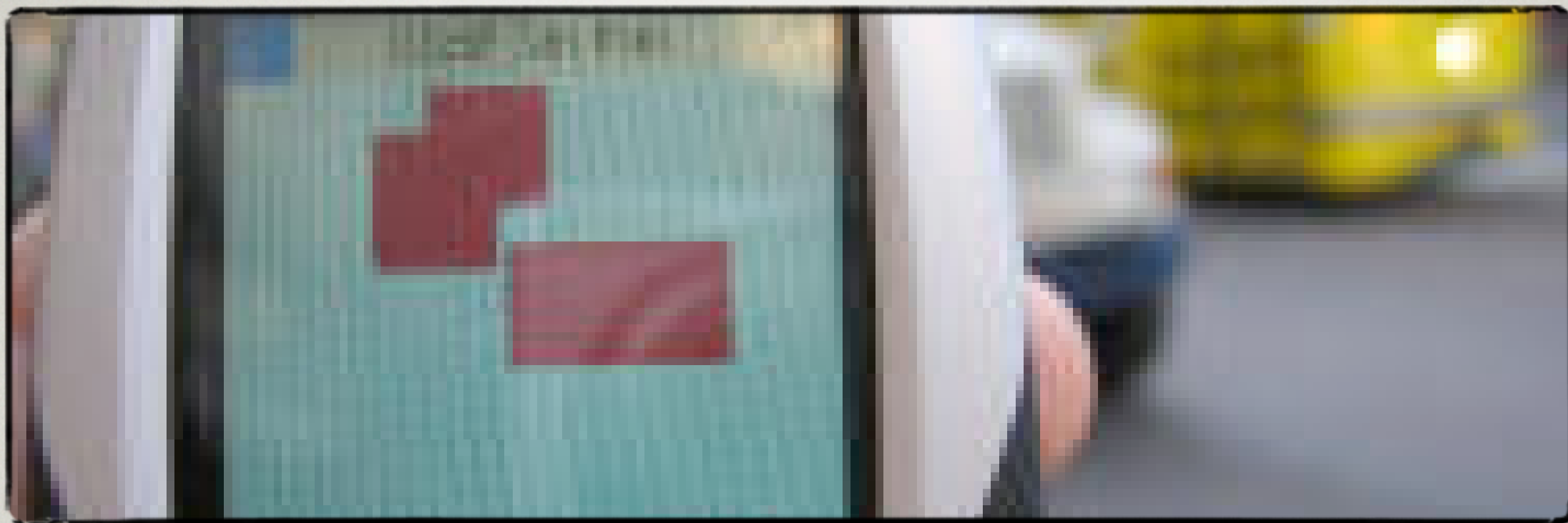
Bluedating

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

Presence info for Kari Laa...

Current location	Kumpula, HKI for the last 0:30
Current Profile:	Meeting
🔇	Speaker off
📳	Vibrator on

People close-by:

🟢 1 friend(s)
🟡 6 other person(s)

✊ Last phone use: 0:02 ago

▲   Close

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