J2ME Bluetooth Programming

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Outline

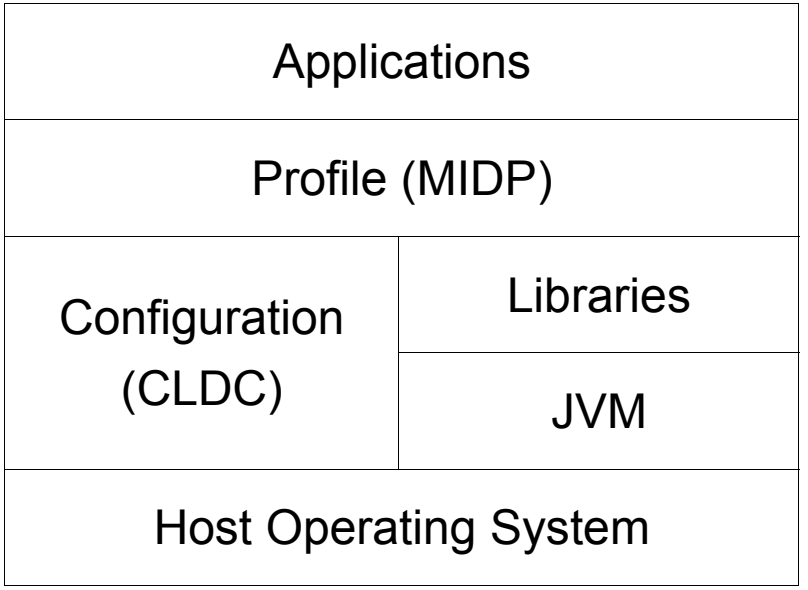
- Bluetooth
- J2ME
- JABWT
- MIDlet Suites
- Infrastructure
- Smartphones
- BTBrowser
- BTBench
- Website statistics
- Summary and conclusions

Bluetooth

- Short range, low power, low cost radio communication
- Replaces cables
- Developed by Bluetooth SIG (Special Interest Group)
- Available in the majority of new handheld devices and laptop computers

J2ME
(Java 2 Micro Edition)

- Subset of Java 2 Standard Edition
- Highly optimized runtime environment
- Configurations and profiles define available functionality



MIDP

(Mobile Information Device Profile)

- Defines mobile device specific functionality
- Needs 128 KB (v1) or 256 KB (v2) memory for installation
- Needs 32 KB (v1) or 128 KB (v2) for runtime
- Provides APIs for user interface, http connectivity, data storage and the MIDlet framework
- Core java functionality and simple connectivity are provided by the CLDC (Connected Limited Device Configuration)

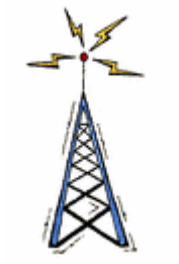
JABWT

(Java APIs for Bluetooth Wireless Technology)

- Encapsulates complex Bluetooth operations in an easy-to-use *standard* Java API
- Provides functionality such as inquiry, service discovery, communication through Bluetooth links and creation of Bluetooth services
- Few devices have JABWT at this time
- Expected to be available in most up-coming smartphones

MIDlet Suites

- Ready-to-install MIDP applications
- Usually published on a webserver, accessible via http connections over WAP or IP
- Can also be deployed over Bluetooth links or cable connections



Infrastructure

- Linux powered workstation for application development
- Bluetooth USB device
- Java/Bluetooth enabled smartphones, Nokia 6600 and Sony Ericsson P900
- Linux powered web-server
- Rococo Bluetooth simulator
- Eclipse IDE (Integrated Developer Environment)

Smartphones

Nokia 6600

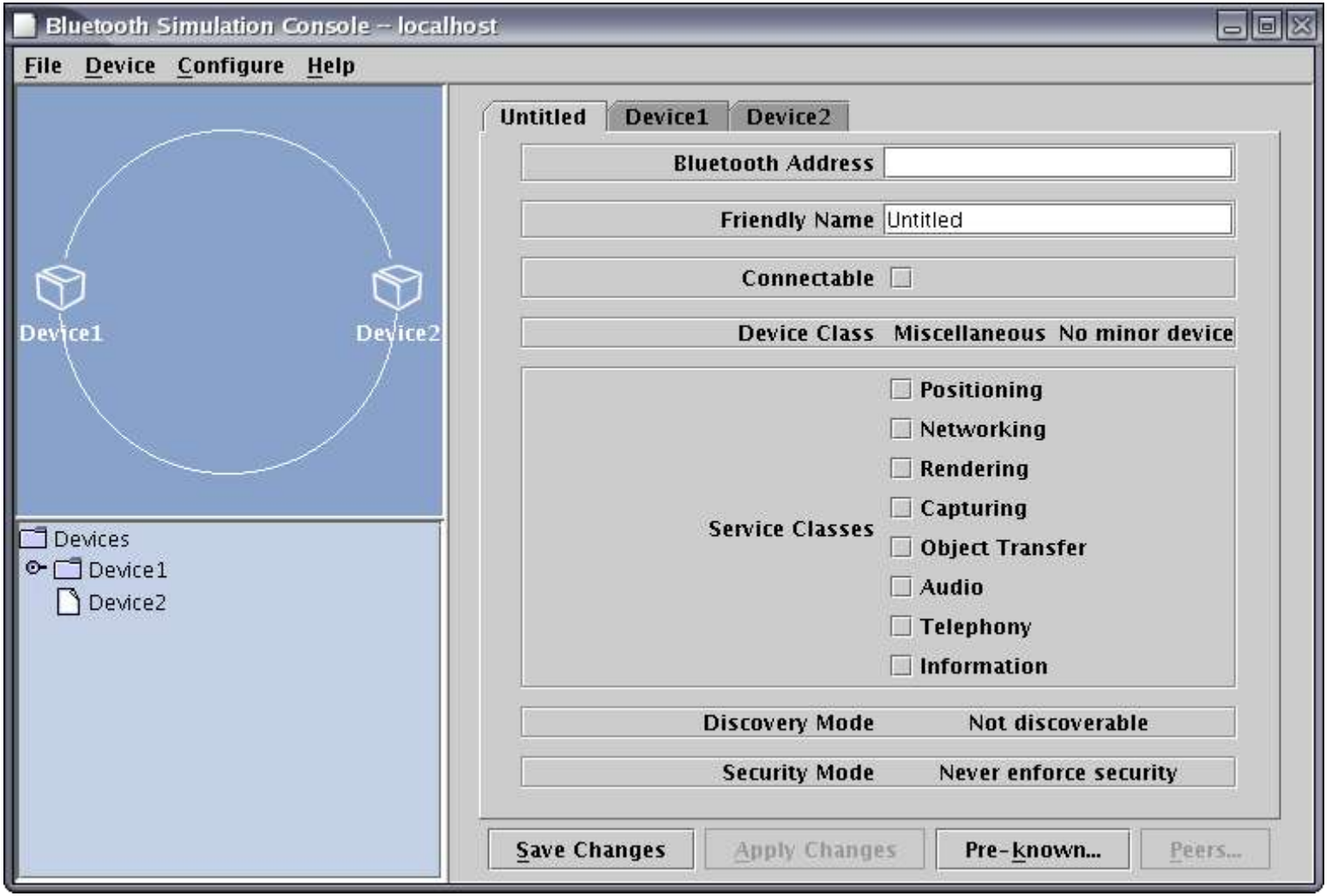
- 104 Mhz processor
- 6 MB internal memory
- 32 MB MMC (MultiMedia Card) memory
- JABWT
- MIDP 2.0
- Opera browser

Smartphones

Sony Ericsson P900

- 156 Mhz processor
- 16 MB internal memory
- 32 MB Memory Stick Duo memory
- JABWT
- MIDP 2.0
- Web browser

Rococo Bluetooth simulator



BTBrowser

(My first sample application)

- Lets you browse nearby, discoverable Bluetooth devices
- Device discovery, service search, service records
- Available through http://wap.klings.org

BTBrowser Installation

1.

2.

3.

4.

5.

6.

Running BTBrowser

- Shows cached and known devices
- Device discovery (Inquiry)

1.

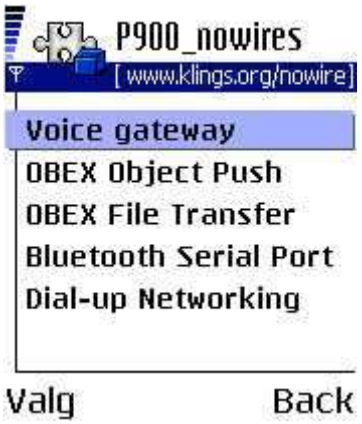
2.

3.

4.

Running BTBrowser

- Service discovery



Running BTBrowser

- Detailed information about services

1. 

2. 

1. 

2. 

BTBench

(My second sample application)

- Benchmark program for Bluetooth links
- Application level throughput
- Available through http://wap.klings.org

BTBench server

- Configure security settings
- Create Bluetooth service
- Wait for client connection
- Receive data

BTBench client

- Configure security settings
- Search for service
- Connect to service
- Send data

Benchmark results

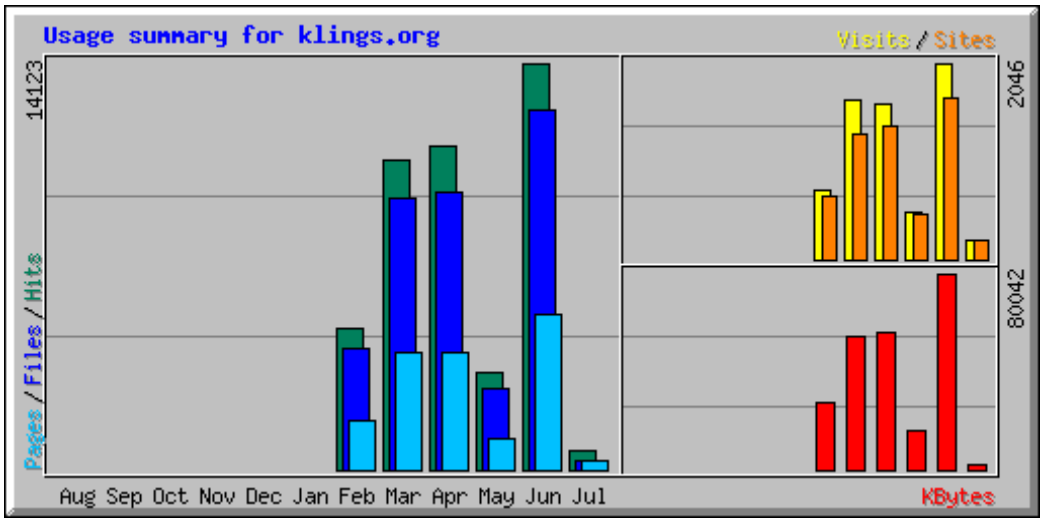
Devices	Results
Nokia 6600 to Nokia 6600	10-11 KB/s
Nokia 6600 to Sony Ericsson P900	10-11 KB/s
PC to Nokia 6600	25 KB/s

Java Bluetooth interest

- Students
- Developers

Website traffic

- Increasing traffic
- How-To's and BTBrowser most popular
- Internet search and developer forums



JABWT problems

- Implementations differ from specification
- Different devices have different errors
- Security issues

Summary

- Introduced Bluetooth, J2ME, JABWT
- Described the infrastructure for development and deployment of applications
- Described our smartphones
- BTBrowser
- BTBench
- Website statistics

Conclusions

- Growing interest in Java Bluetooth
- Growing availability of Java Bluetooth
- Irregularities in JABWT implementations
- Promising technology, not “production ready” yet

More information

http://wireless.klings.org

http://www.nowires.org