

# J2ME Bluetooth Programming

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# Outline

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

# Bluetooth

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- 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)

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

Applications	
Profile (MIDP)	
Configuration (CLDC)	Libraries
	JVM
Host Operating System	



# MIDP

(Mobile Information Device Profile)

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- 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)

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- 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

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- 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

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- 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

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## Nokia 6600

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

# Smartphones

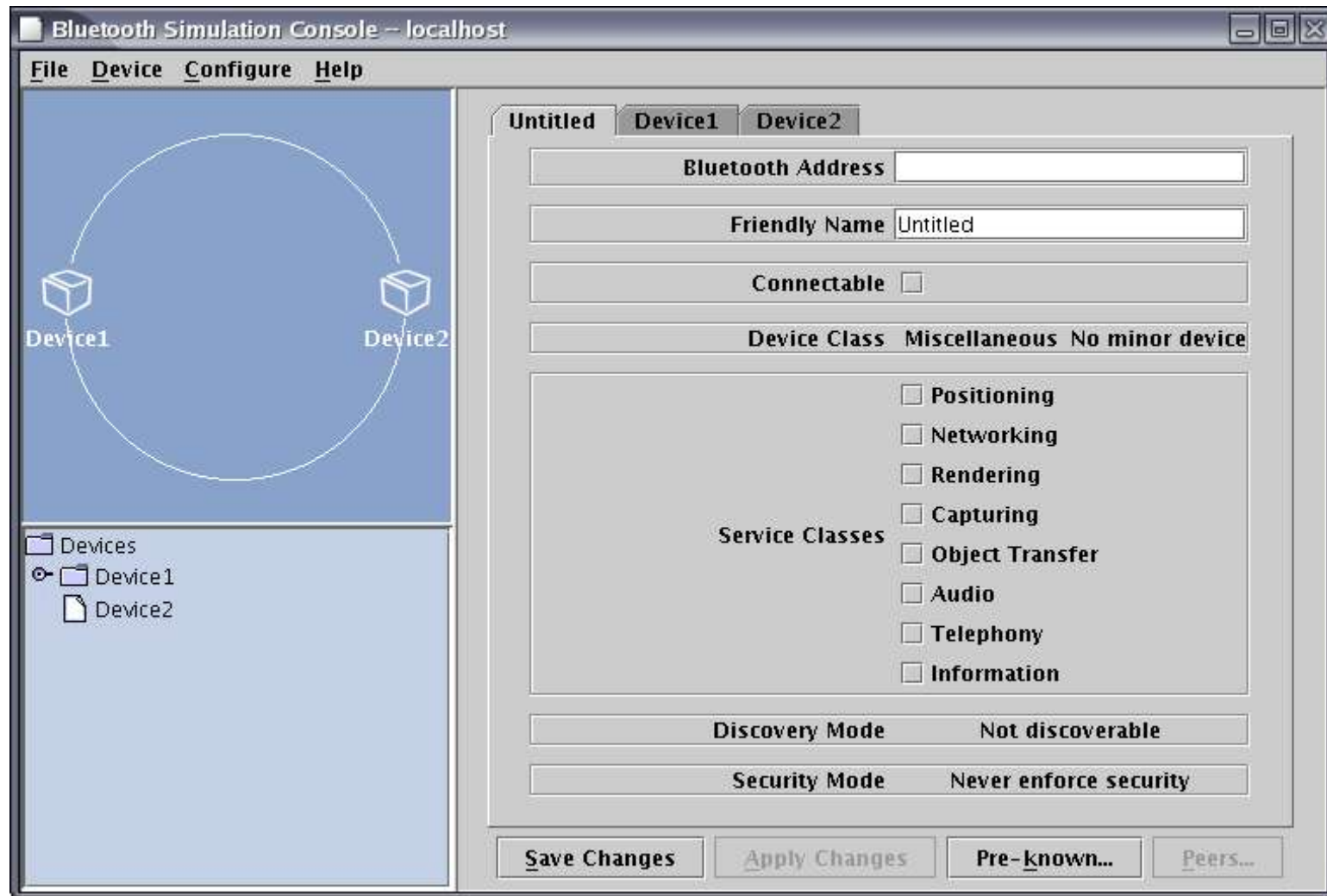
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## Sony Ericsson P900



- 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)

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

# BTBrowser Installation

1.



Welcome to the wap section of klings.org

There are two Java programs available for download at this time. Check out the links for details.

Phoneinfo  
Valg ▼ Lukk

2.



The Bluetooth Browser can show you nearby discoverable Bluetooth devices, their services and information about each service. It has been tested on a Nokia 6600 and works fine.

Valg ▼ Tilbake

3.



show you nearby discoverable Bluetooth devices, their services and information about each service. It has been tested on a Nokia 6600 and works fine.

[Download BTBrowser](#)

Valg ▲ Tilbake

4.



show you nearby discoverable Bluetooth devices, their services and information about each service. It has been

Installere BTBrowser? ?

Ja Nei

5.

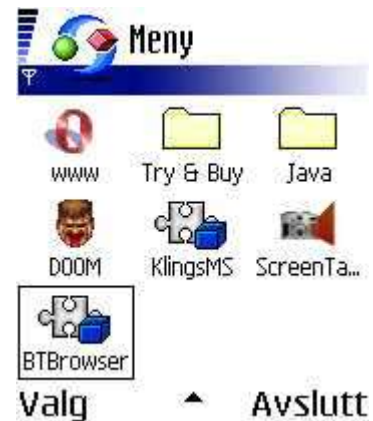


show you nearby discoverable Bluetooth devices, their services and information about each service. It has been

Installing

Avbryt

6.



Meny

www Try & Buy Java

DOOM KlingsMS ScreenTa...

BTBrowser

Valg ▲ Avslutt

# Running BTBrowser

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

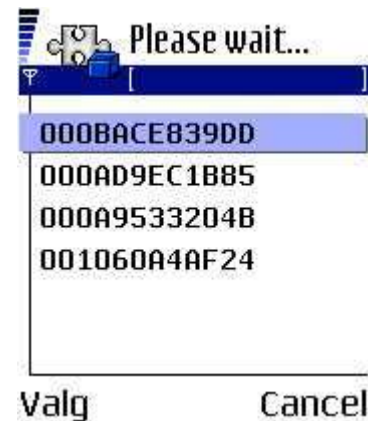
1.



2.



3.



4.



# Running BTBrowser

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- Service discovery



# Running BTBrowser

- Detailed information about services

1.  BTBrowser  
 Service name:  
 Voice gateway  
 Service description:  
 Voice gateway  
 Provider name:  
 Sony Ericsson  
 ServiceRecordHandle:  
 0x100  
 ServiceId:  
 Valg Back

2.  BTBrowser  
 ServiceClassIdList:  
 0x1112, HeadsetAudioGateway  
 0x1203, GenericAudio  
 ProtocolDescriptorList:  
 0x0100, L2CAP  
 0x0003, RFCOMM  
 Channel: 8  
 ProfileDescriptorList:  
 0x1108, Headset  
 Valg Back

1.  BTBrowser  
 Service name:  
 Bluetooth Serial Port  
 Service description:  
 Bluetooth Serial Port  
 Provider name:  
 Symbian Ltd.  
 ServiceRecordHandle:  
 0x3000100  
 ServiceId:  
 Valg Back

2.  BTBrowser  
 ServiceClassIdList:  
 0x1101, SerialPort  
 ProtocolDescriptorList:  
 0x0100, L2CAP  
 0x0003, RFCOMM  
 Channel: 3  
 ProfileDescriptorList:  
 Unknown  
 Valg Back





# BTBench

(My second sample application)

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- 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



Valg

Avslutt



Valg

Avslutt



OK

# BTBench client

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



# Benchmark results

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<b>Devices</b>	<b>Results</b>
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

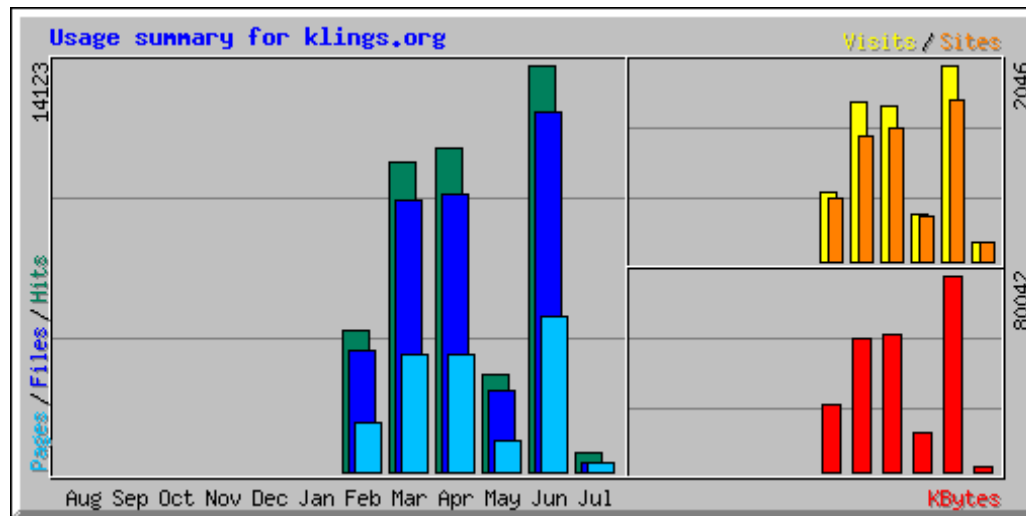
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- Students
- Developers

# Website traffic

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





# JABWT problems

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



# Summary

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



# Conclusions

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



# More information

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<http://wireless.klings.org>

<http://www.nowires.org>