BLUEWAY PROJECT

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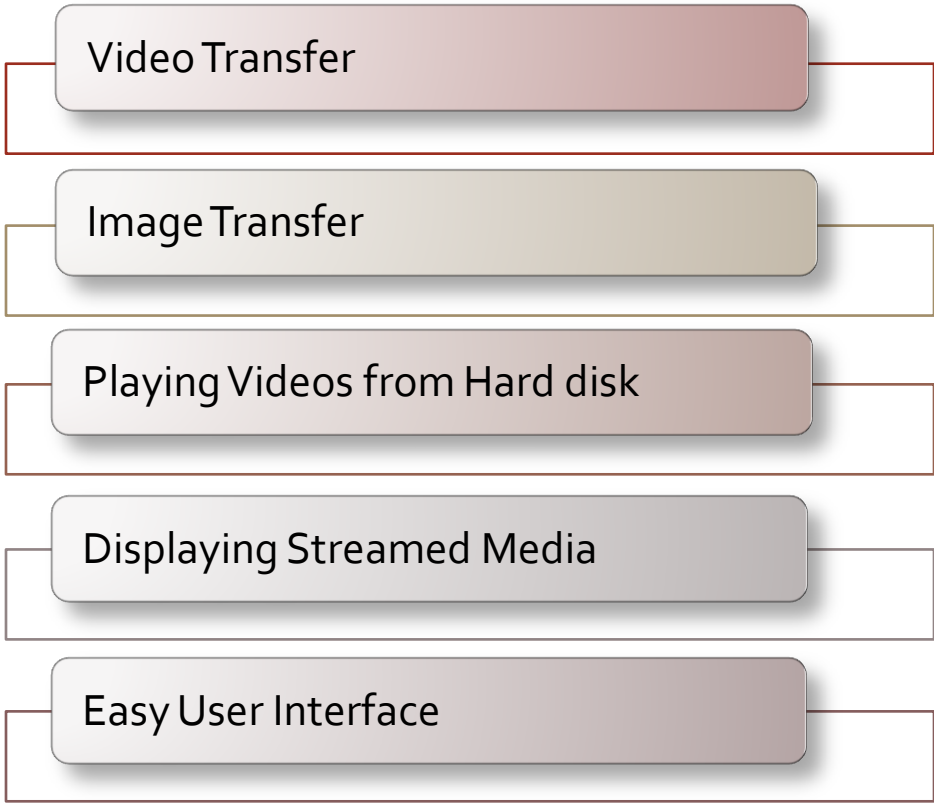
Blueway

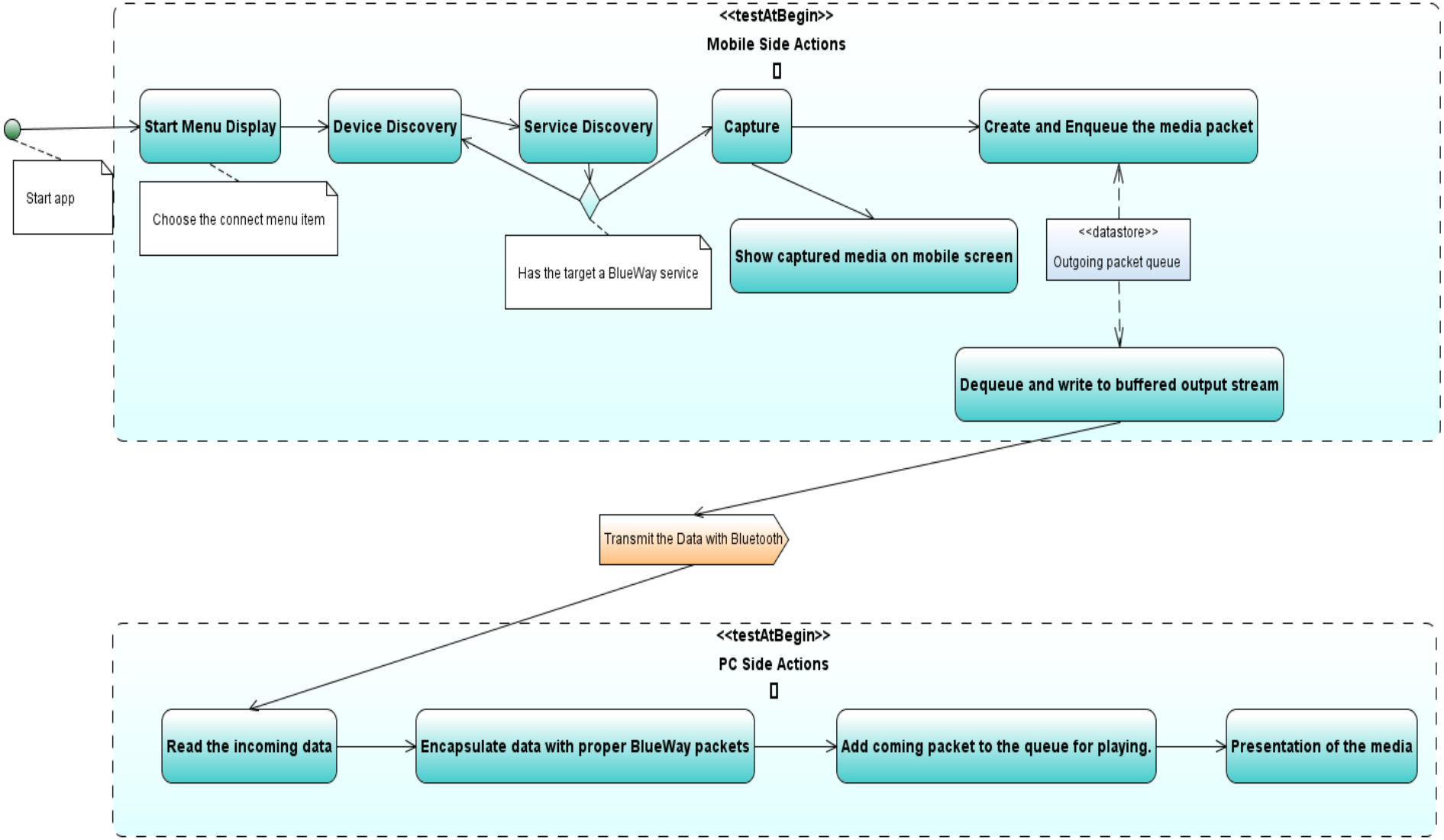
Blueway is providing a communication system with Bluetooth between a Smartphone/PDA and a Java Runtime enabled computer which is used to send image and video. It also presents the received media at the computer side.



Blueway

- This project consists of two parts on two different platforms.
- They interact over bluetooth connection and provide the desired functionality.
- The components of the project are BluewayMobile and BluewayPC.

Blueway: Activities



BluewayMobile

What it does:

This part of the project takes the image and video data from the camera of the mobile device and sends it over bluetooth to a PC.

BluewayMobile

How to do it?

Establishing Connection

Handshaking& Authentication

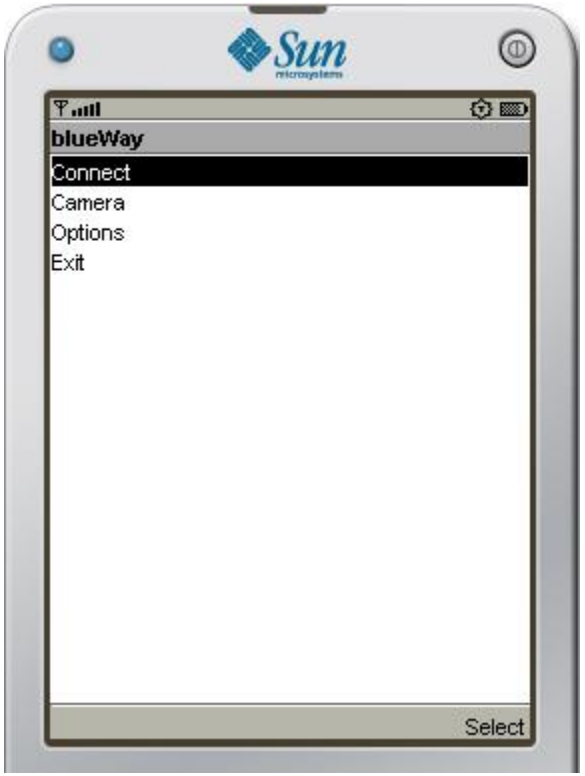
Media Capturing

Sending Captured Media

Establishing Connection

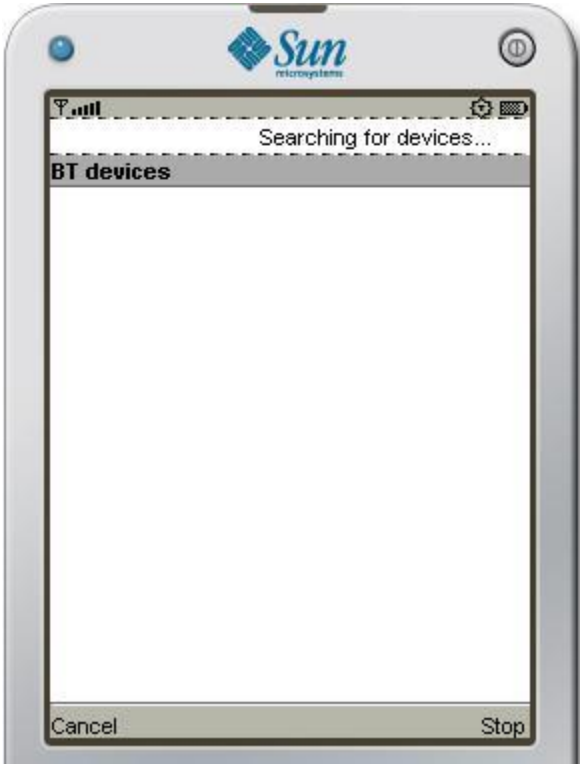
The following activities are going to be done during the establishing the connection.

•Activating the bluetooth function on smartphone.



Establishing Connection

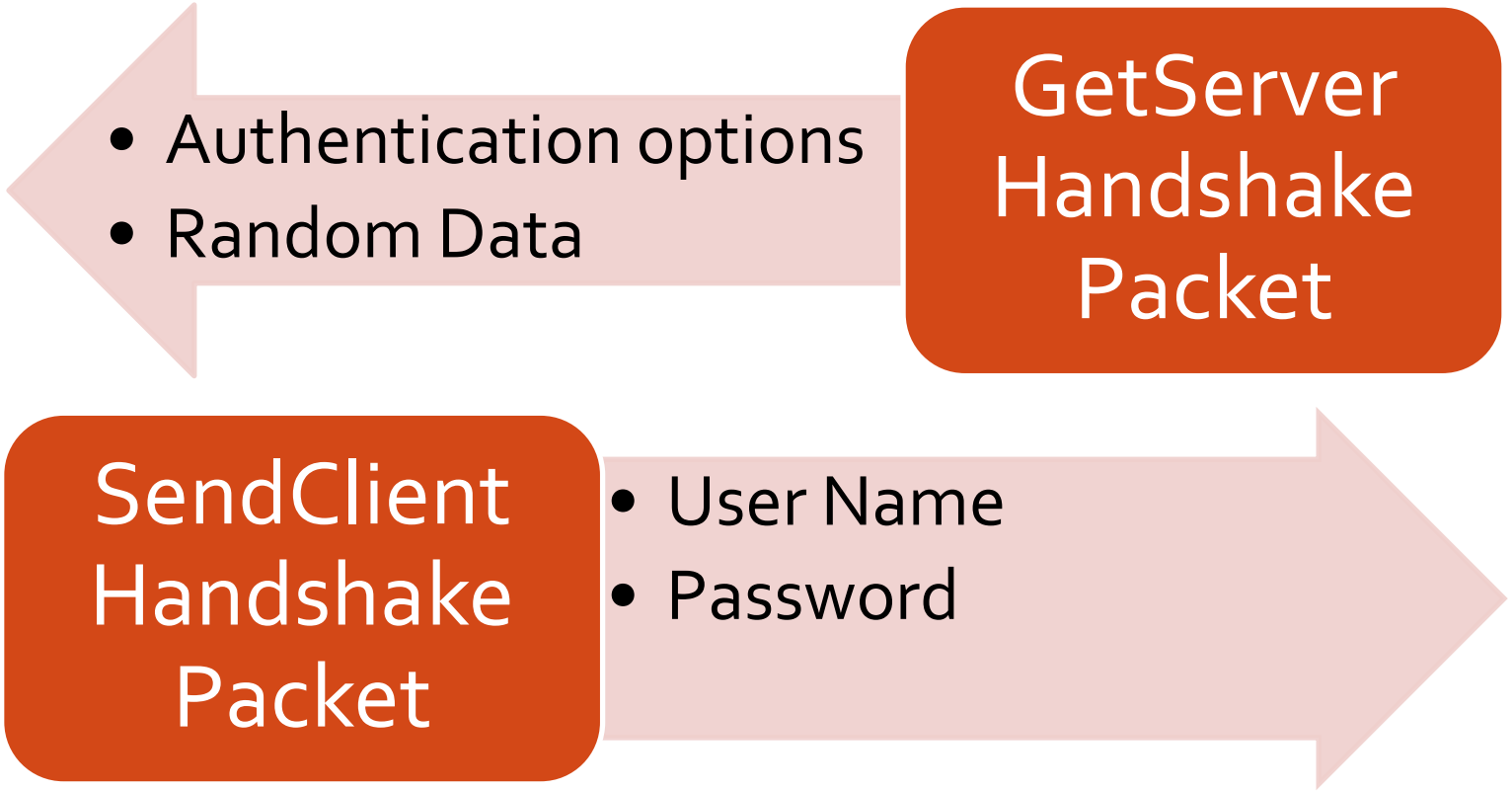
- Dicovering the nearby bluetooth devices to connect.
- And realize the connection on RFCOMM(Serial).



Handshaking & Authentication

- If a client explores a server, handshaking begins.
- First a handshake packet is received.
- Then the client sends its handshake packet and fills it with username and password if it is required by the server.
- The handshaking process keeps on untill the validation is done or one of the sides give up.

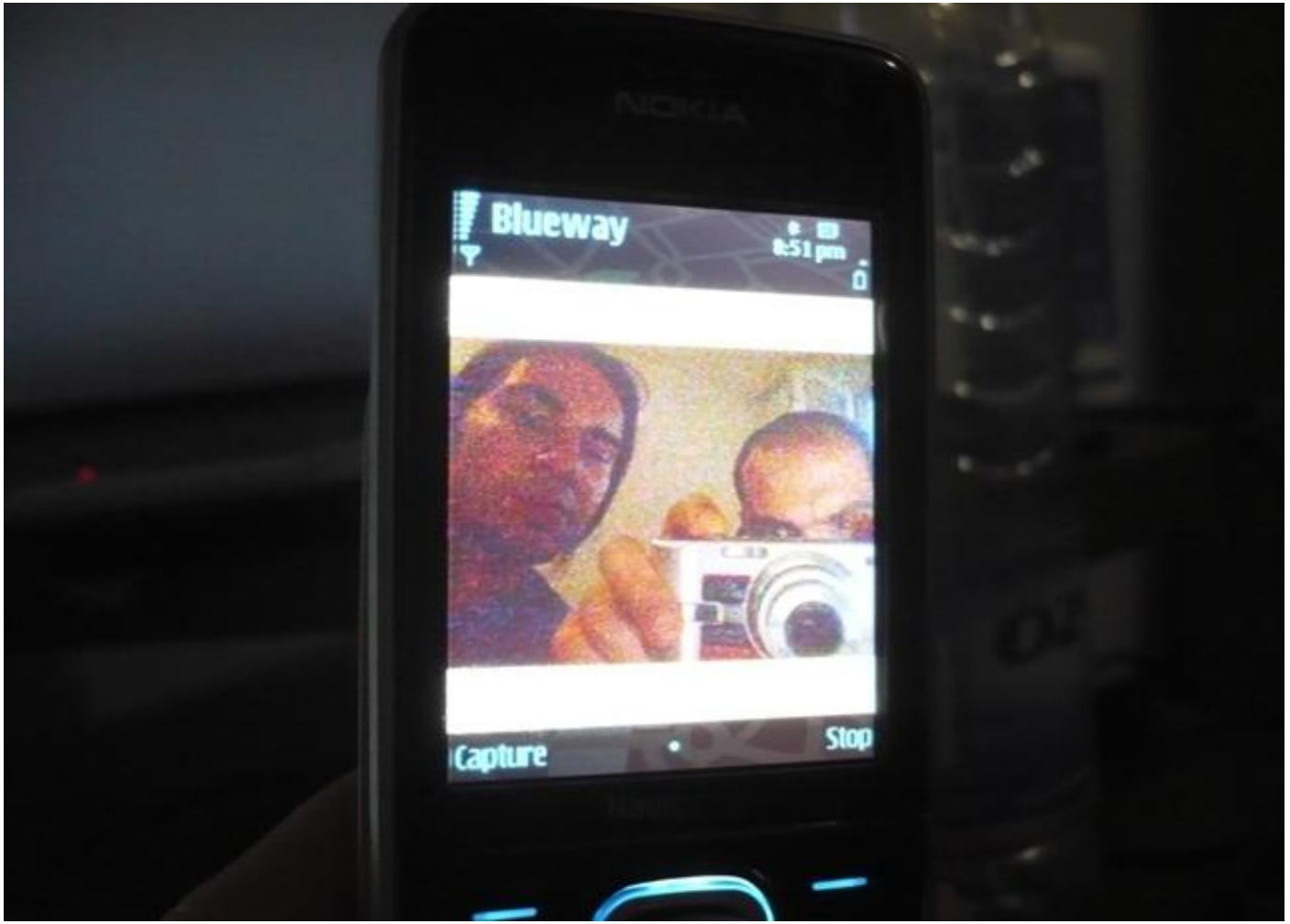
Handshaking & Authentication on Mobile



Media Capturing

- After establishing the connection we are ready to capture the image or video.
- The cam devices may be more than one and they are choosen by the user or defined as default cam of the mobile device.
- Capturing is done by using the API's provided by the manufacturer of the device for the Java Specification Request which is JSR-135.

Media Capturing



Sending Captured Media

- When the media is captured it is ready to send to the PC.
- There exists the proper functions to send the media packets with Bluetooth.
- The captured packets are sent one by one to the server with a FIFO approach.

Requirements of BluewayMobile

- Smartphones with the following requirements:
- Camera
  - Video capturing and snapshot property.
  - 3gpp or mpeg4 encoding format support.
- Bluetooth 2.0 +
- Supporting Java API's for Bluetooth and media.
- MIDP 2.0 +
- CLDC 1.1

Constraints of BluewayMobile

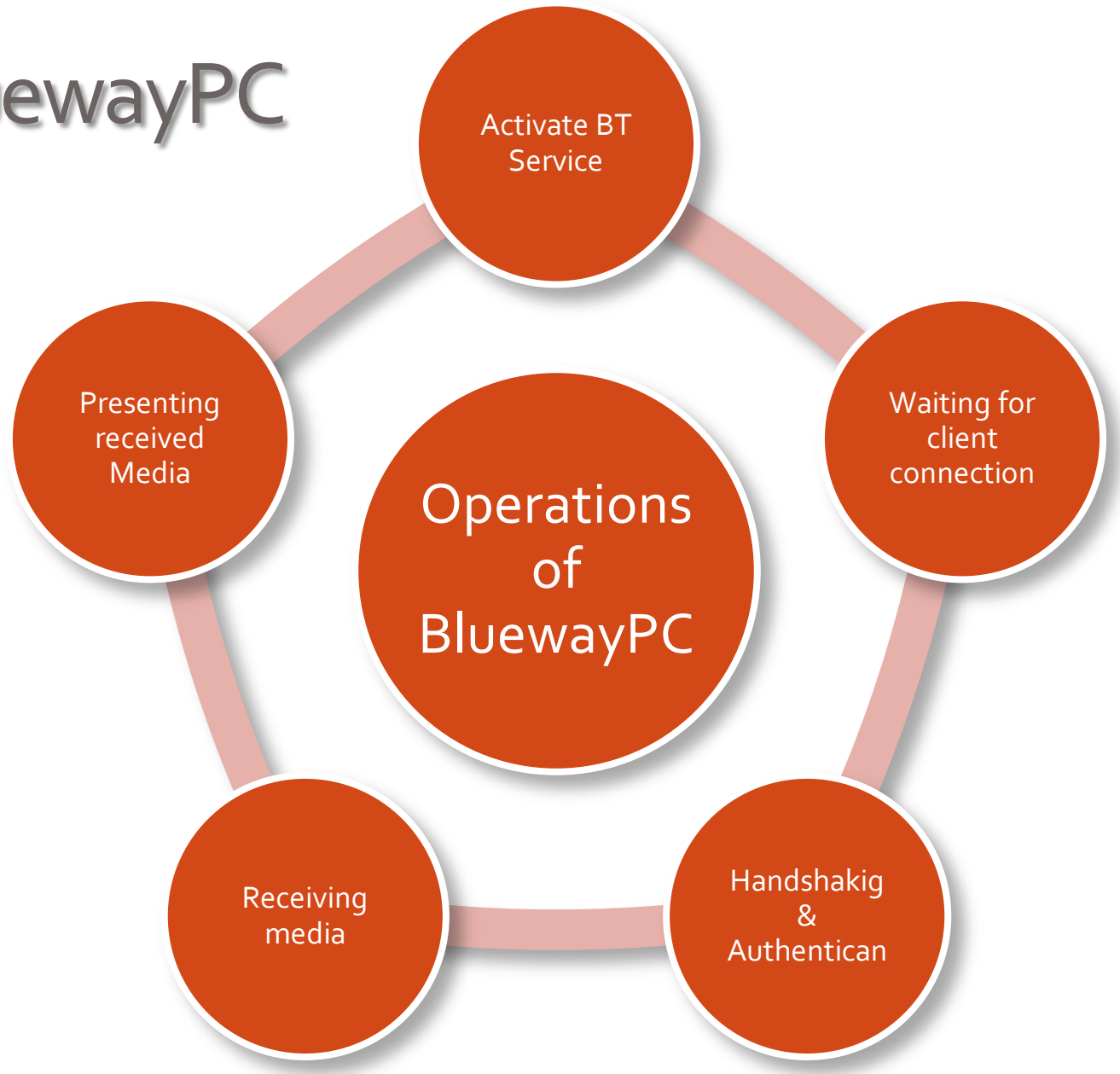
- The limited JVM for J2ME
- Limited Threading and Data Structures
- A challenging task: Real time media Transfer over Bluetooth
- Limited support for Bluetooth protocols
- Lack of concurrency in capturing and recording

BluewayPC

•This the part of the project providing Bluetooth service . It receives the media (images and videos) which are sent from mobile side , and presents them on computer screen.

• It's a Java Desktop Application and has GUI which is implemented with Swing library.

BluewayPC

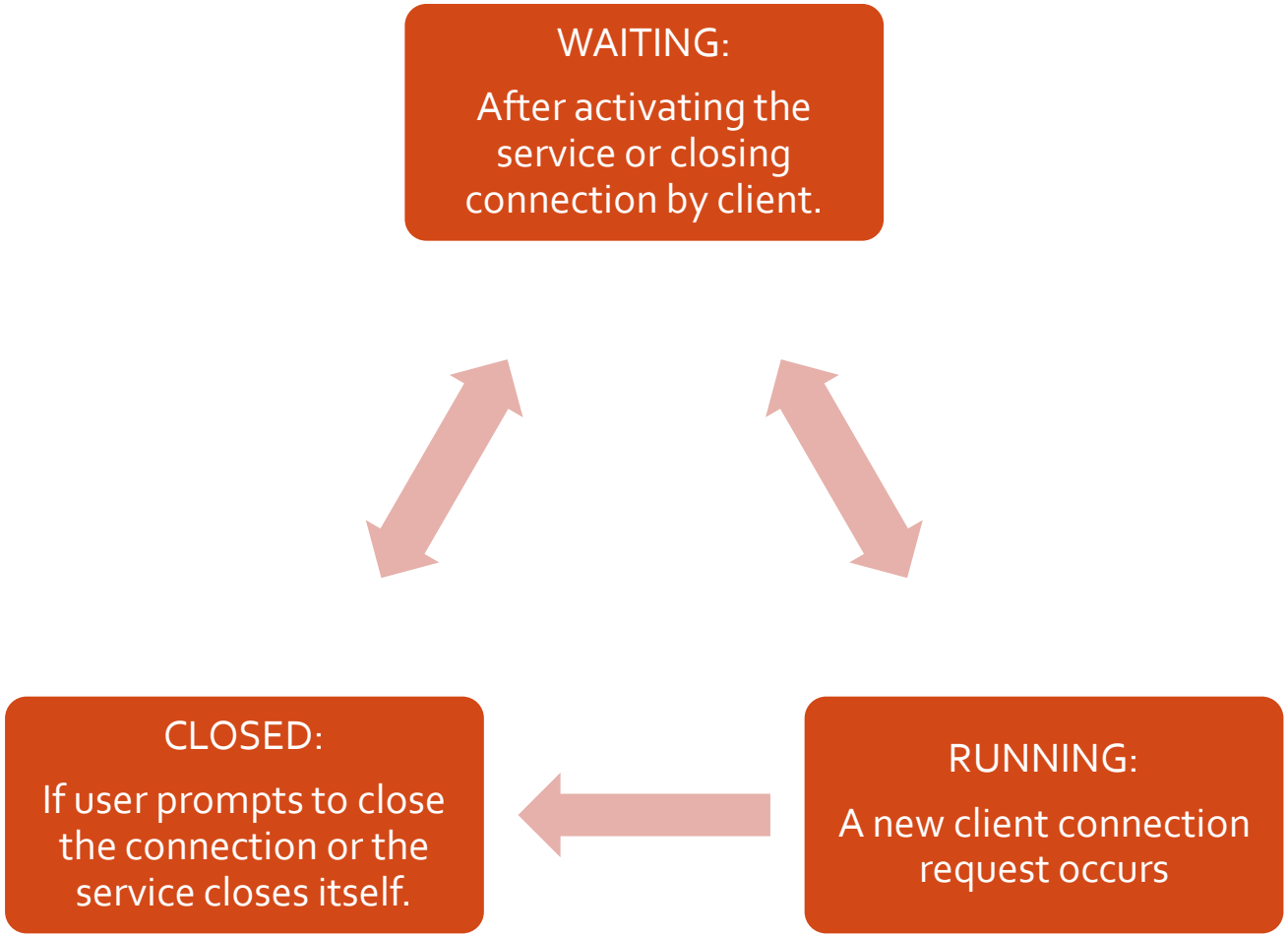

Activate BT Service
Waiting for client connection
Handshakig & Authentican
Receiving media
Presenting received Media
Operations of BluewayPC

Activating BT Service

•For establishing a connection to a client (mobile phone) the service function of **BluewayPC** must be activated.

•After activation BluewayPC is ready to receive and present media.

Waiting for Connection



Handshaking & Authentication on PC

- If a client sends connection request to the server, handshaking begins.
- After accepting the connection request, a handshake packet is sent to the client.
- Then the client setups its handshake packet with filling username and password if it is required by the server.
- The handshaking process keeps on until the validation is done or one of the sides give up.

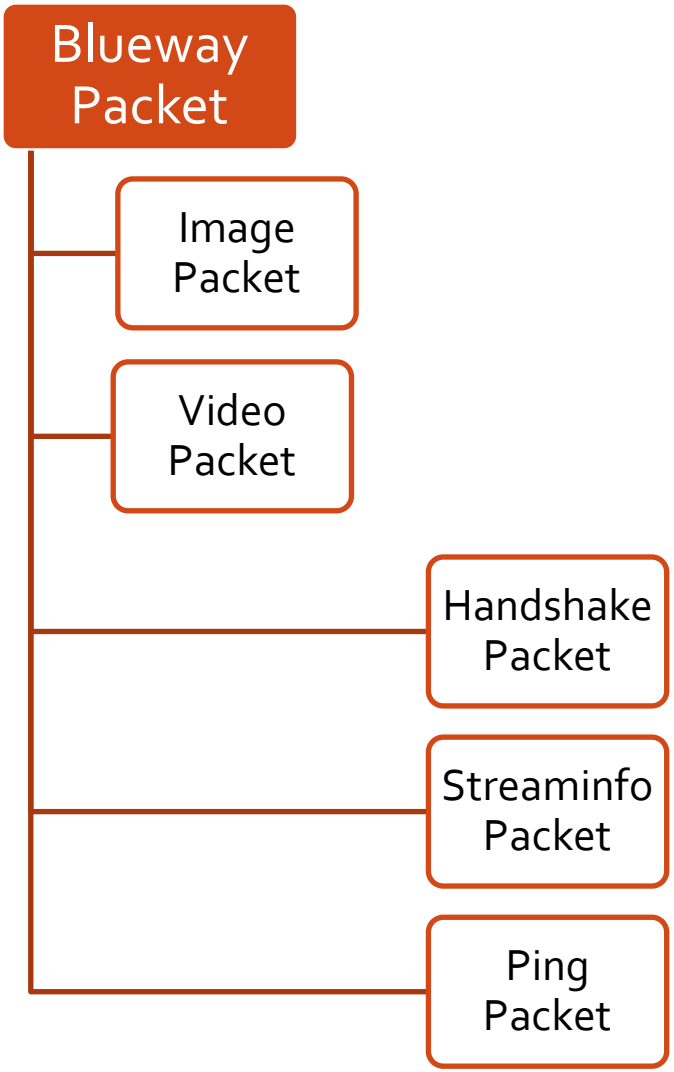
Receiving Media and Messages

•After the connection is properly established ,the PC side is able to receive media and message packets from mobile.

•Received packets are recognized and classified.

•PC side acts according to the type and content of the incoming packet.

Receiving Media and Messages

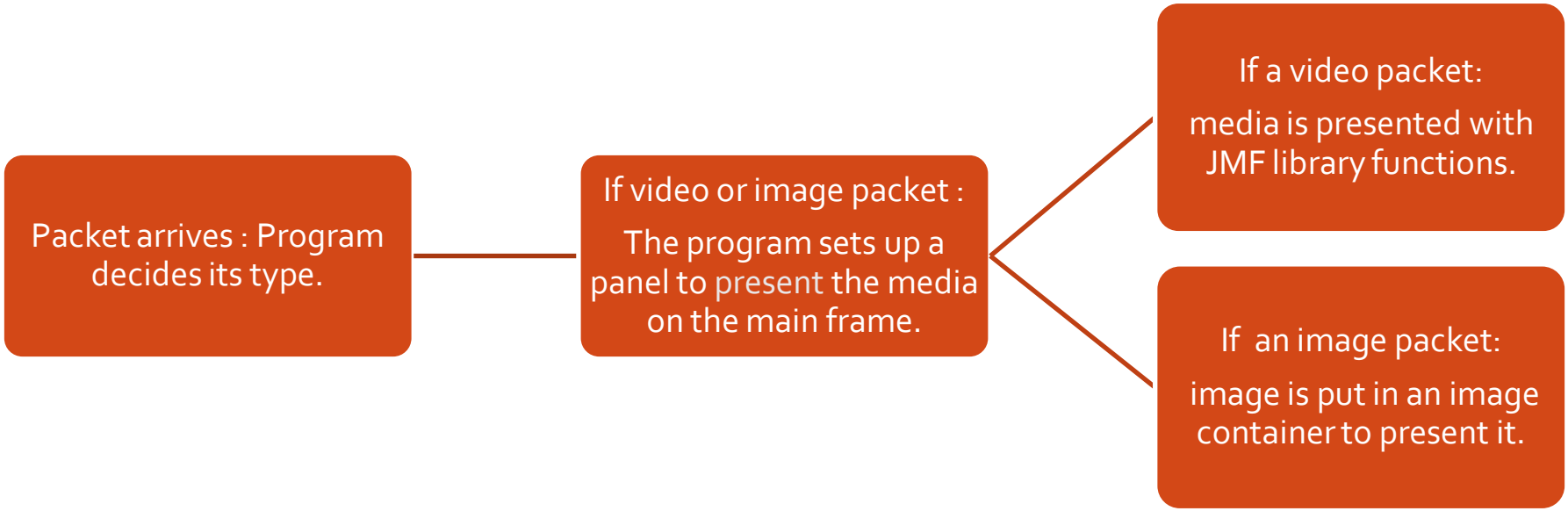


- Blueway Packet is the main type in the packet hierarchy.
- Video Packet carries video data inside it. It is inherited from the Blueway Packet.
- Stream-info Packet is used to get the information about the media like resolution, author, title and the media type.
- It is used a type attribute for identifying each type inherited from the Blueway Packet.

Sample Console Log

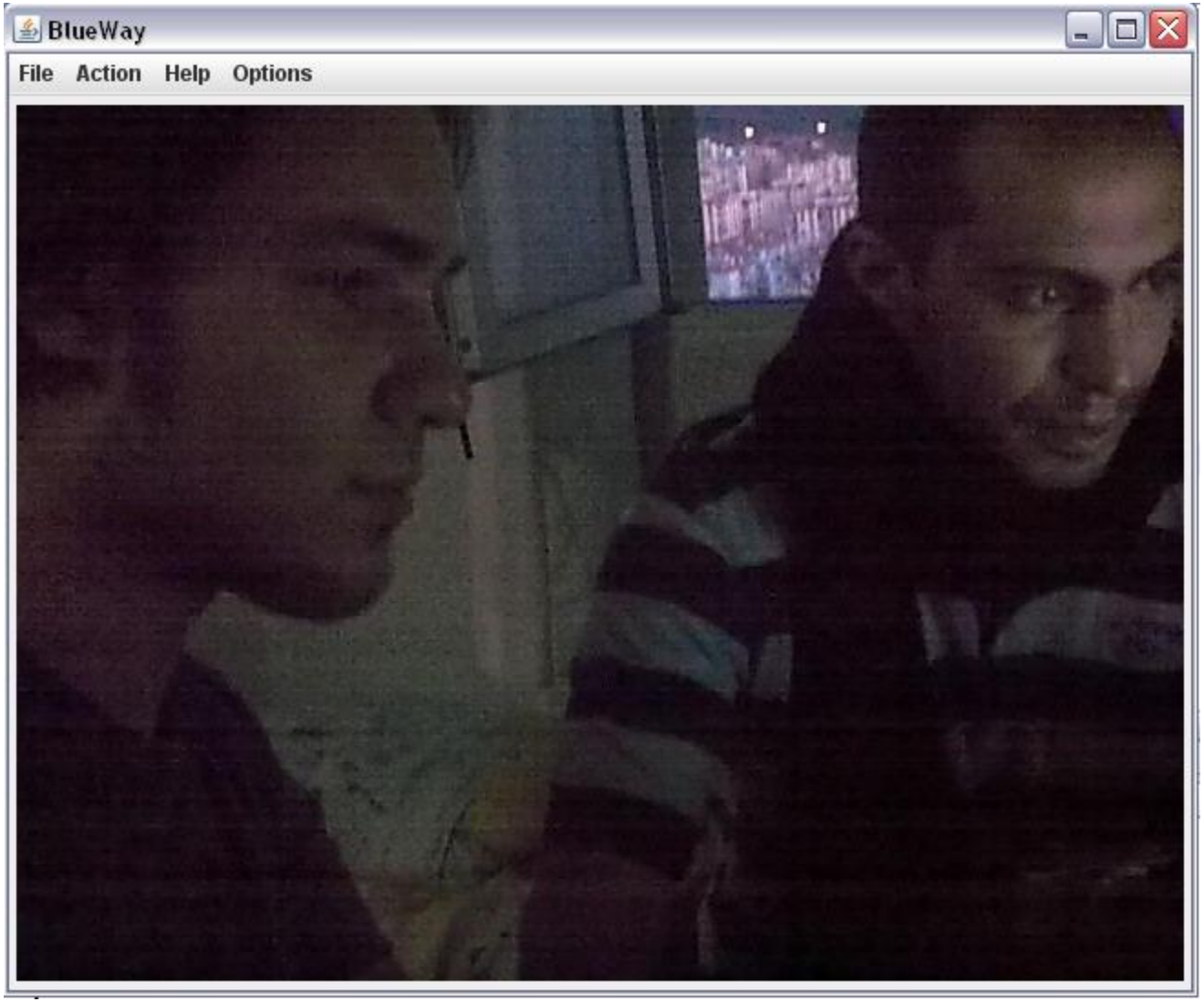
```
run:
BlueCove version 2.1.0 on widcomm

Blueway Service is ready
Server handshake packet is sent
Client handshake packet is received
Stream info packet is received...
It's connected now...
The time passed for one packet exchange: 16
New Stream packet is received width:160 height:120 camMode:false
image data received
image data received
Stream closed packet received closing the connection
BlueWay Connection closed

Blueway Service is ready
```

Presenting Received Media



The incoming media packets will be handled sequentially .

Presenting Received Media



Requirements of BluewayPC

- A Bluetooth adapter is required.
- JSR-82 implementation must be provided for developing Java Bluetooth application. We used **Bluecove** library for this need.
- Java Virtual Machine must be installed on the PC.
- It is recommended using WIDCOMM Bluetooth stack instead of WINSOCK of Microsoft because of unhandled bugs in Bluecove interaction with WINSOCK.

Constraints of BluewayPC

- It is used an additional Java library for playing encoded video data:
- FOBS4JMF
- It has no audio support for our media formats.

Used Technologies in Development Phase

- NetBeans IDE and UML plug-in
- Sun Java Wireless Toolkit
- Bluecove
- Java Media Framework (JMF) extended with Fobs4Jmf
- S60 3rd edition feature pack 2 SDK
- Nokia 6210 Navigator Smartphone

Use Blueway for

- Web cam applications
- Wireless communication in short distance
- In a disaster area on a remote controlled explorer robot
- Wireless security cam …

And so on…

Thanks for listening to us.