# SW User Guide

1VV0301292, Rev. 04 – 2016-05-26

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# BlueMod+B20/BT2.1

User Guide

Release r04

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# 1 Introduction

This document describes the usage of the BlueMod+B20/BT2.1 Bluetooth module featuring software version V3.100 or later.

For a detailed description of the commands refer to the *BlueMod+B20/BT2.1 AT Command Reference*.

- **HID Profile**

HID profile is available in BlueMod+B20 firmware version V3.002 and later. This firmware implements the role device, device type combo device.

A combo device can be connected to the serial interface of the BlueMod+B20.

All Bluetooth HID specific information are described in chapter HID Profile.

- **SSP – Secure Simple Pairing**

The headline feature of Bluetooth 2.1 is the “Secure Simple Pairing” (SSP). The SSP is an improved experience of the pairing procedure.

For security reasons it is necessary to be able to recognize other Bluetooth devices and control the access to the local Bluetooth device.

This pairing process can be triggered from the user to create a bond (AT+BBND) or automatically when connecting to a service of another Bluetooth device (ATD…).

All security specific information are described in chapter Secure Simple Pairing.

- **Power Down Modes**

The BlueMod+B20 supports different power down modes to increase the electric power consumption.

All power down modes are described in chapter Power Down Modes.

- **Remote Configuration**

The BlueMod+B20 includes the functionality to configure the module from the Bluetooth interface.

More details about the required configuration and a connection example is described in the chapter Remote Configuration.

- **Out of Range Detach**

If enabled this feature detaches an active link if a given RSSI level is exceeded.

This function is described in chapter Out of Range Detach.

- **OBEX File Transfer**

The BlueMod+B20 includes the Object Push Profile (OBEX transfer) in firmware V3.100 or later. The firmware supports OPP Client functionality, so outgoing calls to an OBEX server can be made.

Detailed information about the OBEX file transfer and different connection examples are described in the chapter OBEX File Transfer.

- **Communication with Apple Devices**

The BlueMod+B20 supports connections to Apple devices using the SPP profile.

Detailed information about this feature are described in chapter Communication with Apple Devices.

- **Firmware Startup Timing**

This chapter describes the startup timing of the Bluemod+B20.

- **Firmware Upgrade**

The firmware of the BlueMod+B20 can be updated via RS232 or SPI interface.

These different upgrade procedures are described in chapter Firmware Upgrade.

# 2 HID Profile

This chapter describes the usage of the HID profile in the AT interface of the BlueMod+B20/SPP/HID.

## 2.1 Setup HID

This chapter describes the steps needed to setup a HID connection using BlueMod+B20/SPP/HID.

### 2.1.1 Set Own Service Profiles (S314)

The BlueMod+B20 firmware sets the own service profile to SPP (0x01) by default. To use HID the register S314 has to be set to 0x10. To set more than one profile at the same time, refer to the detailed description of S314 in the document *BlueMod+B20/BT2.1 AT Command Reference*.

| | |
|---|---|
| ATS314=0x10 | Set HID profile |

### 2.1.2 Class Of Device (S302)

The class of device has to be set in addition to S314. Some devices show only devices in their inquiry results that match a special major/minor class code.

For HID devices the major device class shall be set to “peripheral”, the minor device class shall be set to “combo”, “keyboard” or “pointing” device.

For detailed description of S302 please read the document *BlueMod+B20/BT2.1 AT Command Reference*.

### 2.1.3 I/O Capabilities (S406)

As a HID combo device implies keyboard functionality the I/O capabilities shall be set to keyboard.

| | |
|---|---|
| ATS406=2 | Set I/O capabilities to keyboard only |

### 2.1.4 Man In The Middle Protection (S407)

The HID device shall be set to the same man in the middle protection setting the HID host side uses. In principle a combo device shall support man in the middle protection because it is capable to enter a key and SSP using man in the middle protection is the most secure connection in Bluetooth 2.1.

| | |
|---|---|
| ATS407=1 | Set man in the middle protection on |

### 2.1.5 Initiate Bluetooth Link

To set up a connection from the BlueMod+B20 to a remote HID host, the ATD command is used with the profile identifier HID as described in the example below:

| | |
|---|---|
| ATD 0080371443AB,HID | Connect to Bluetooth device 0080371443AB using the remote service profile HID |

*Note: The firmware does not initiate an automatic reconnect, so reconnects have to be done manually by sending an "ATD" command triggered by the controller, or by the HID host application.*

### 2.1.6 Incoming HID Connection

If a HID host initiates a connection to the BlueMod+B20 a RING event is generated in the AT interface. If extended result codes are enabled (ATW1), the event gives information about Bluetooth address of the initiating device, UUID and profile.

```
RING·000461851832·1124·HID¶
```

### 2.1.7 HID Data Flow Control

During a HID connection the BlueMod+B20 supports the serial hardware flow control (RTS/CTS). Please note to control the serial status line "UART_RTS" (pin 24) of the BlueMod+B20 module in case of an active flow control situation.

## 2.2 HID Connection Examples

The following flow charts will give an example for the configuration and connection establishment using the BlueMod+B20 and an iPhone with and without SSP.

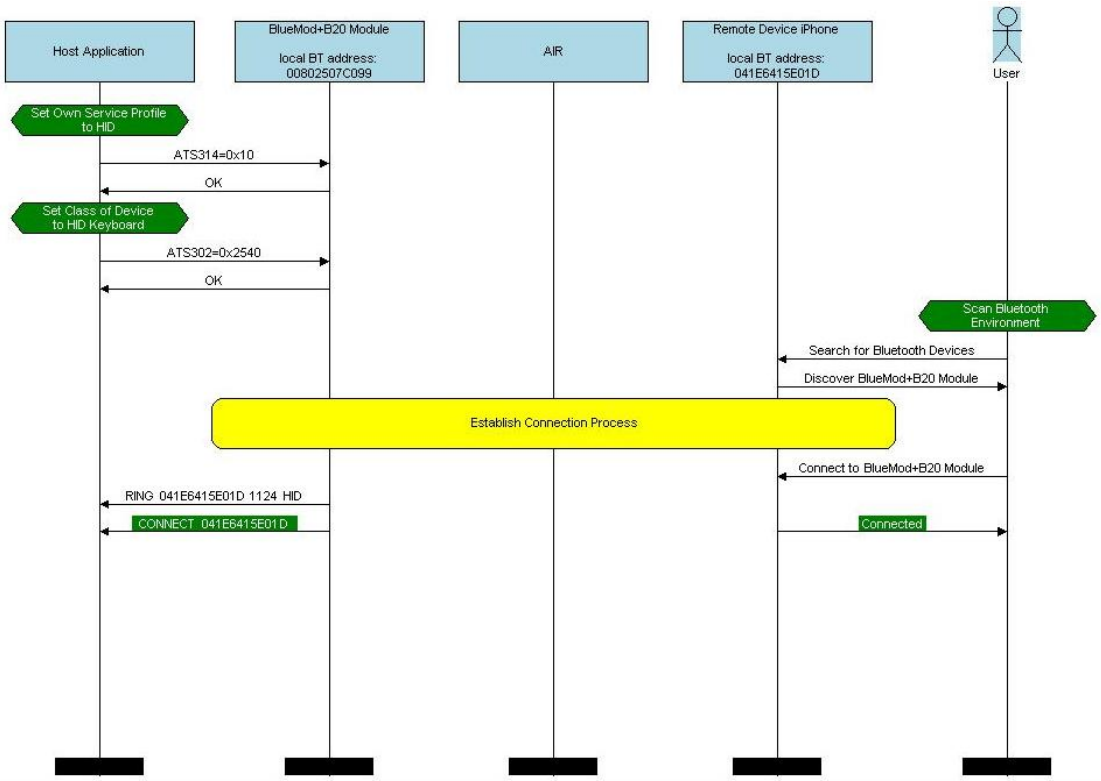
Onto these flow charts the local Bluetooth device (*BT device A*) is a BlueMod+B20. The destination is a iPhone with iOS 5.x.

The "*Application*" part will simulate the device at the end (DTE) which communicates to the local Bluetooth device with configuration commands.

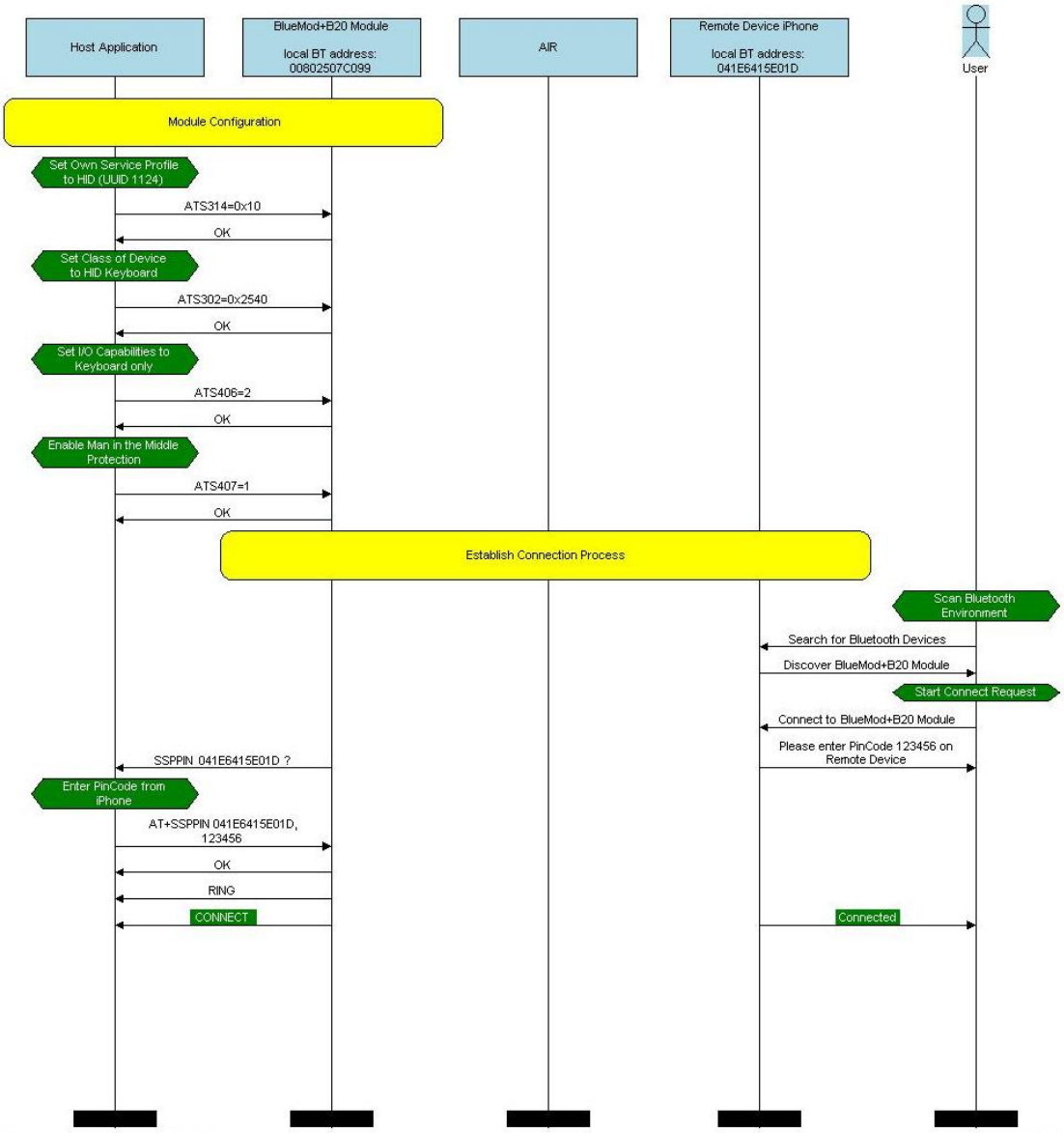
The box called "*AIR*" will signal which part of communication will be transmitted over Bluetooth to the destination side.

The configuration commands and responses within the flow charts are described in the *BlueMod+B20/BT2.1 AT Command Reference*.

### 2.2.1 Connection Example with iPhone (SSP "Just Works")



### 2.2.2 Connection Example with iPhone (SSP "Passkey Entry")



## 2.3 HID Usage

The firmware supports an US HID keyboard layout to send standard keys. To send special keys the raw mode is implemented.

### 2.3.1 US Key Codes

To send a key described in the table, the appropriate key code has to be sent to the host.

| Key code | Description |
|---|---|
| 0x00 | Left control + space |
| 0x01 | Left control + a |
| 0x02 | Left control + b |
| 0x03 | Left control + c |
| 0x04 | Left control + d |
| 0x05 | Left control + e |
| 0x06 | Left control + f |
| 0x07 | Left control + g |
| 0x08 | Backspace |
| 0x09 | Tab |
| 0x0A | Return |
| 0x0B | Left control + k |
| 0x0C | Left control + l |
| 0x0D | Return |
| 0x0E | Left control + n |
| 0x0F | Left control + o |
| 0x10 | Left control + p |
| 0x11 | Left control + q |
| 0x12 | Left control + r |
| 0x13 | Left control + s |
| 0x14 | Left control + t |
| 0x15 | Left control + u |
| 0x16 | Left control + v |
| 0x17 | Left control + w |
| 0x18 | Left control + x |
| 0x19 | Left control + y |
| 0x1A | Left control + z |
| 0x1B | ESC |
| 0x1C – 0x1F | Not used |
| 0x20 – 0x7E | Corresponding ASCII character |
| 0x7F | Backspace |
| 0x80 | Cursor up |
| 0x81 | Cursor right |

| Key code | Description |
|---|---|
| 0x82 | Cursor down |
| 0x83 | Cursor left |
| 0x84 | Insert |
| 0x85 | Delete |
| 0x86 | Home |
| 0x87 | End |
| 0x88 | Page up |
| 0x89 | Page down |
| 0x8A – 0x9E | Not used |
| 0x9F | Raw mode identifier |
| 0xA0 – 0xFE | Not used |

### 2.3.2 Raw Mode

To transmit special keys or mouse keys, the firmware supports sending HID reports in raw mode. The frame starts with 0x9f as identifier for raw mode. The following bytes select keyboard (0x01) or mouse report (0x02).

The full description of key codes can be found in the “USB HID Usage Tables” document: http://www.usb.org/developers/devclass_docs/Hut1_11.pdf

#### 2.3.2.1 Keyboard Report

| 0x9f | 0x01 | modifier | 0x00 | Code1 | Code2 | Code3 | Code4 | Code5 | Code6 |
|---|---|---|---|---|---|---|---|---|---|

Up to six key codes can be sent at a time.

Example (key “a” down):

```
0x9f 0x01 0x00 0x00 0x04 0x00 0x00 0x00 0x00 0x00
```

Example (key release):

```
0x9f 0x01 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
```

To release keys, a frame consisting a 0x00 instead of the corresponding code has to be sent.

#### 2.3.2.2 Mouse Report

| 0x9f | 0x02 | buttons | x-step | y-step | wheel |
|---|---|---|---|---|---|

Example (mouse 1 pressed):

```
0x9f 0x02 0x01 0x00 0x00 0x00
```

# 3 Secure Simple Pairing

For security reasons it is necessary to be able to recognize other Bluetooth devices and control the access to the local Bluetooth device.

The “Secure Simple Pairing” (SSP) is the headline feature of Bluetooth 2.1 and the improved experience of the pairing procedure.

SSP is mandatory for Bluetooth 2.1 devices and cannot be switched off.

A Bluetooth 2.1 device may only use “legacy pairing” to interoperate with a Bluetooth 2.0 or earlier device.

The pairing process can be triggered from the user to create a bond (AT+BBND) or automatically when connecting to a service of another Bluetooth device (ATD…).

SSP is configurable using the parameters for I/O capabilities (S406) and a man in the middle protection (S407).

S406 sets the input and output capabilities of the device used for SSP.

| Value | Description |
|---|---|
| 0 | Display only |
| 1 | Display Yes/No |
| 2 | Keyboard only |
| **3** | No input no output (default) |

S407 controls the man in the middle (MITM) protection of the device during SSP.

| Value | Description |
|---|---|
| **0** | Man in the middle protection disabled (default) |
| 1 | Man in the middle protection enabled |

In case the user choose a scenario where MITM protection is not allowed but one of the communication devices is configured to MITM protection, the pairing is refused.

SSP defines the following association models based on the Input/Output (I/O) capabilities of the two devices:

- **Just Works:**

This method is used when at least one of the devices does not have display capability of six digits and also is not capable of entering six decimal digits using a keyboard or any other means (no I/O).
This method does not provide MITM protection.
Compared to the legacy pairing with a fixed PIN, the security level provided by this method is much higher.

- **Numeric Comparison:**

If both devices have a display and both sides can accept a “Yes/No” user input, they may use Numeric Comparison. This method displays a six digit numeric code on each device. The user shall compare the numbers to ensure they are identical. If the comparison succeeds, the user(s) shall confirm pairing on the device(s) that can accept an input.
This method provides MITM protection, assuming the user confirms on both devices and actually performs the comparison properly.

- **Passkey Entry:**

This method may be used between a device with a display and a device with numeric keypad entry (such as a keyboard), or two devices with numeric keypad entry.
In the first case, the display is used to show a six digit numeric code to the user, who then enters the code on the keypad.
In the second case, the user of each device enters the same six digit numeric code.
Both cases provide MITM protection.

- **Legacy Pairing: (Bluetooth 2.0 compatible pairing mechanism)**

In this case both devices needs to enter the same PIN code of minimum four digits.
The BlueMod+B20 uses the PIN code saved in the local register S318
(compare: *BlueMod+B20/BT2.1 AT Command Reference*).

Possible combinations of I/O capabilities and the possibility of MITM protection are listed in the table below. For each case of the “MITM protection” an example of the serial messages between the BlueMod+B20 and the DTE are listed.

| B20 \ Remote device | Display only | Display Yes/No | Keyboard only | No input no output |
|---|---|---|---|---|
| **Display only**<br>ATS406=0 | Just Works<br>(numeric comparison, both automatic confirmation)<br>*No MITM protection* | Numeric comparison<br>(both displayed, one automatic confirm)<br>*No MITM protection* | Passkey entry<br>(one display, one input)<br>*MITM protection*<br>SSPPIN <BT addr> <passkey> | Just Works<br>(Numeric comparison, both automatic confirmation)<br>*No MITM protection* |
| **Display Yes/No**<br>ATS406=1 | Numeric comparison<br>(both displayed, one automatic confirm)<br>*No MITM protection* | Numeric comparison<br>(both displayed, both confirm)<br>*MITM protection*<br>SSPCONF <BT addr> <passkey> ?<br>AT+SSPCONF <BT addr>, 1 | Passkey entry<br>(one display, one input)<br>*MITM protection*<br>SSPPIN <BT addr> <passkey> | Just Works<br>(numeric comparison, both automatic confirmation)<br>*No MITM protection* |
| **Keyboard only**<br>ATS406=2 | Passkey entry<br>(one display, one input)<br>*MITM protection*<br>SSPPIN <BT addr> ?<br>AT+SSPPIN <BT addr>,<passkey> | Passkey entry<br>(one display, one input)<br>*MITM protection*<br>SSPPIN <BT addr> ?<br>AT+SSPPIN <BT addr>,<passkey> | Passkey entry (both input)<br>*MITM protection*<br>SSPPIN <BT addr> ?<br>AT+SSPPIN <BT addr>,<passkey> | Just Works<br>(numeric comparison, both automatic confirmation)<br>*No MITM protection* |
| **No input no output**<br>ATS406=3 | Just Works<br>(numeric comparison, both automatic confirmation)<br>*No MITM protection* | Just Works<br>(numeric comparison, both automatic confirmation)<br>*No MITM protection* | Just Works<br>(numeric comparison, both automatic confirmation)<br>*No MITM protection* | Just Works<br>(numeric comparison, both automatic confirmation)<br>*No MITM protection* |

Green color: B20 output message SSPPIN <BT addr> ? (example)

Blue color: B20 input request: AT+SSPPIN <BT addr> <passkey> (example)

## 3.1 SSP Connection Examples with BlueMod+B20

The following flow charts will give an example for the different SSP authentication methods “just works”, “numeric comparision” and “passkey entry” within an active outgoing call request from the BlueMod+B20.

Onto these flow charts the local Bluetooth device (*BT device A*) and the destination side (*BT device B*) are configured with a BlueMod+B20. The destination can be changed to each other Bluetooth 2.1 device.

The “*Application*” part will simulate the device at the end (DTE) which communicates to the local Bluetooth device with configuration commands.

The box called “*AIR*” will signal which part of communication will be transmitted over Bluetooth to the destination side.

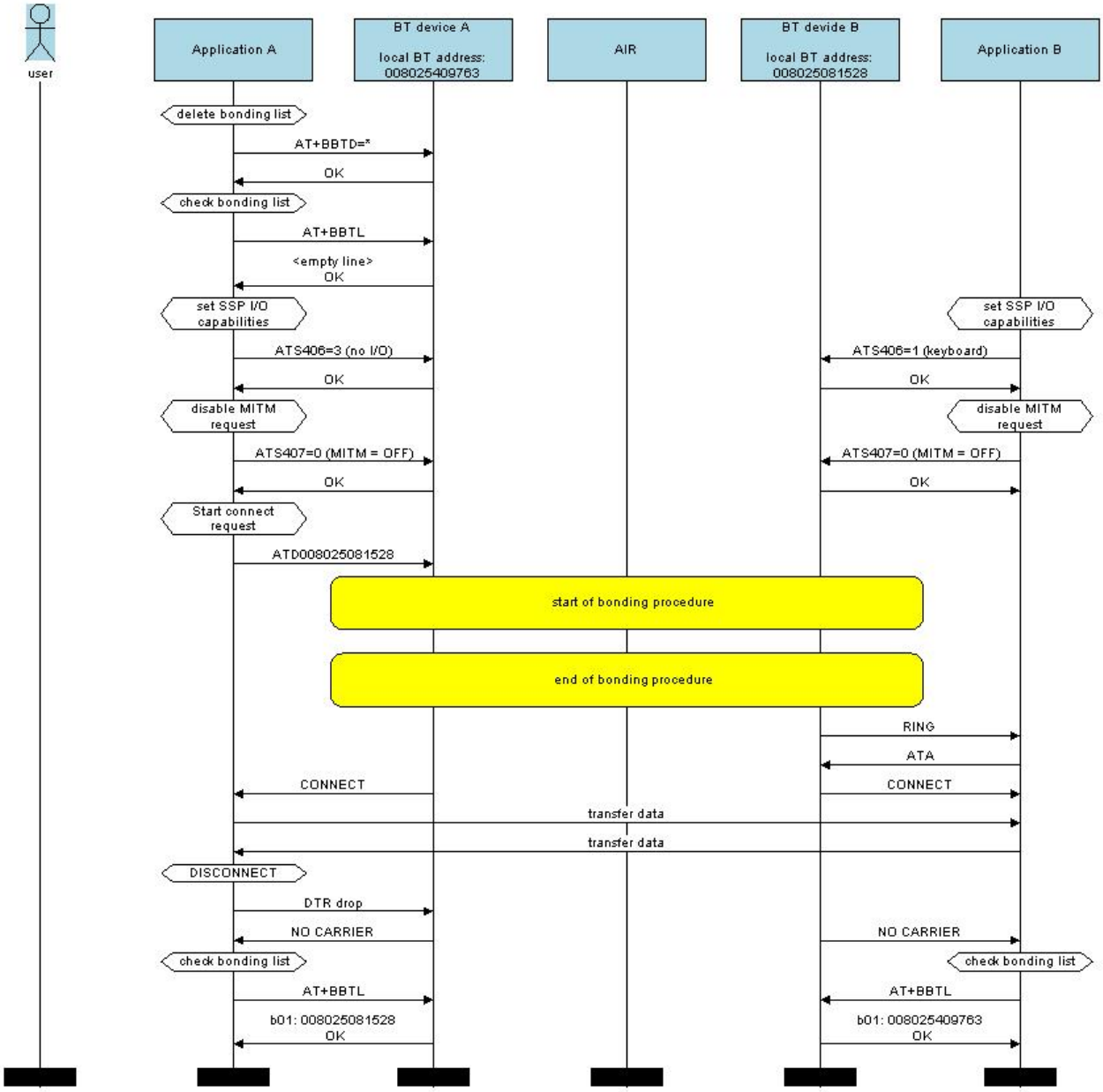
The interesting part of the bonding procedure is placed between the yellow boxes “*start of bonding procedure*” and “*end of bonding procedure*”.

All serial commands between the “*Application A/B*” and the “*BT device A/B*” out of the bonding procedure are used for further configuration of SSP.

The configuration commands and responses within the flow charts are described in the *BlueMod+B20/BT2.1 AT Command Reference*.

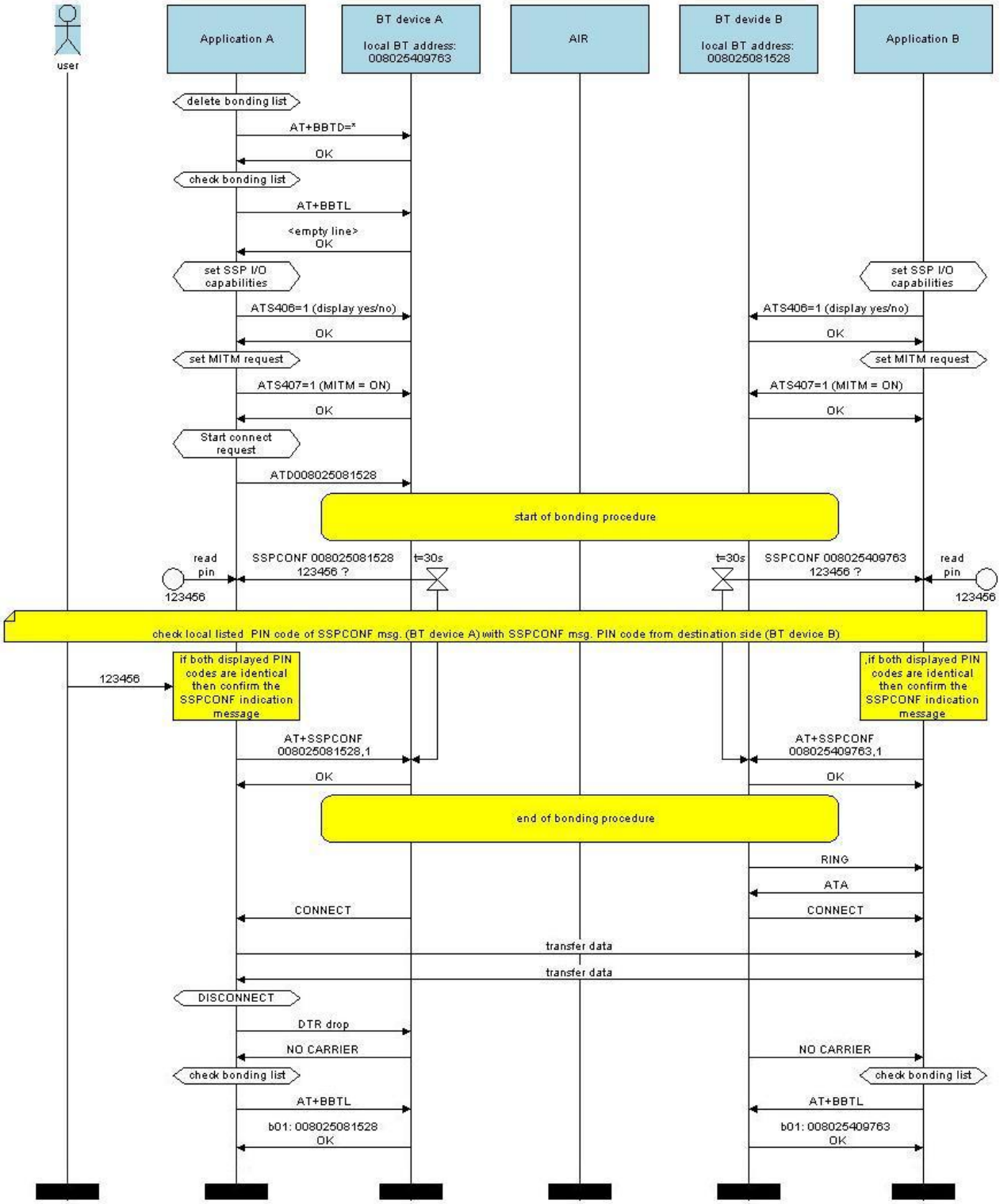
### 3.1.1 Connection Example “Just Works”

with I/O capabilities combination “no I/O” and “keyboard”



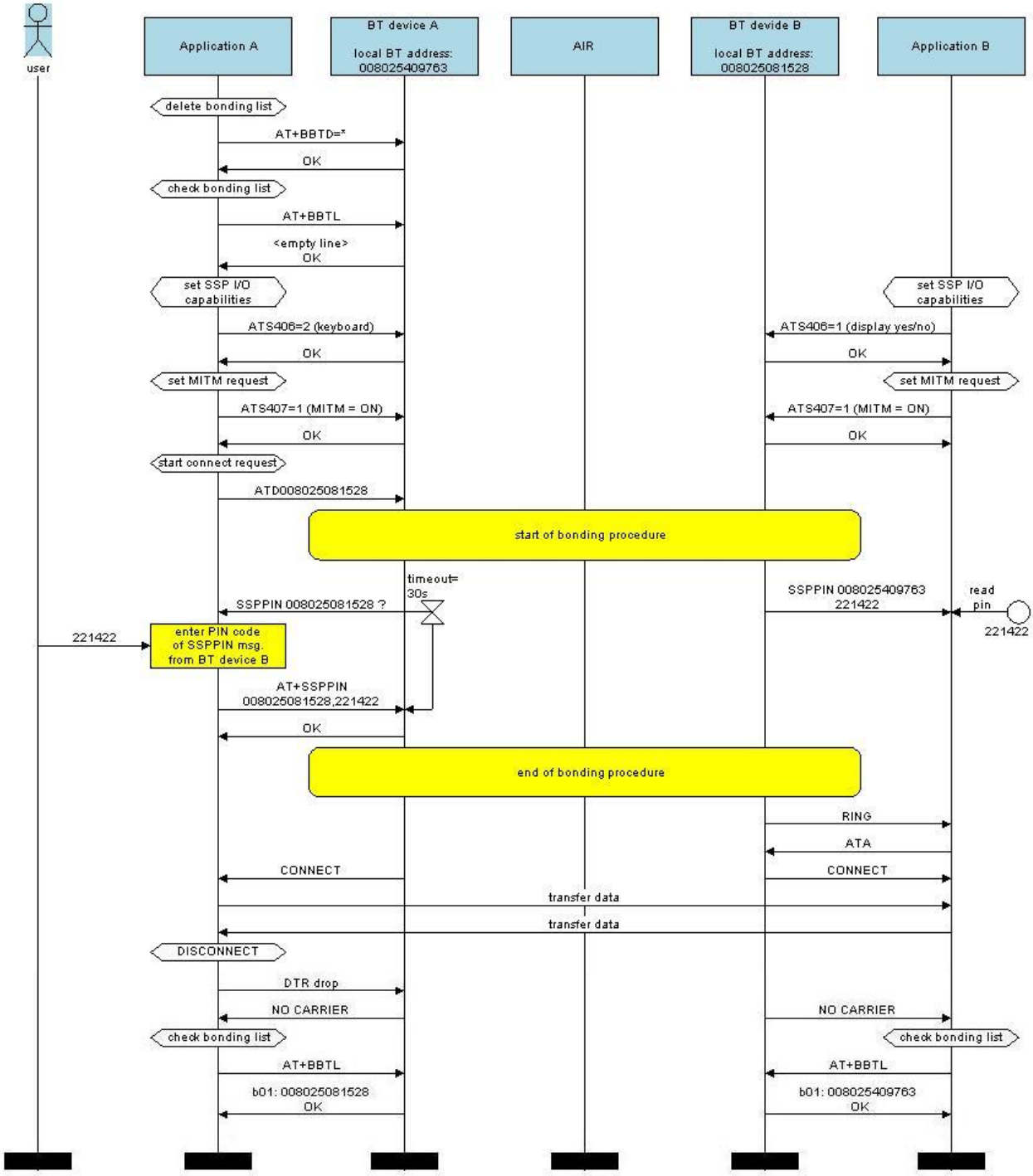
### 3.1.2 Connection Example “Numeric Comparison”

with I/O capabilities combination “display yes/no” on both sides



### 3.1.3 Connection Example “Passkey Entry”

with I/O capabilities combination “keyboard” and “display yes/no”



# 4 Power Down Modes

This chapter describes different power down modes and the prior conditions for these modes.

The power down mode is available on BlueMod+B20/SPP/HID in firmware V3.002 and later.

## 4.1 Power Down Usage (S409)

The power down functionality is disabled by default.

It can be enabled by setting the parameter S409 and additionally by controlling the serial input status line DTR (Pin no. 7, PIO4, 'RTC-IN').

| | |
|---|---|
| **ATS409=0** | Disable deep sleep (default) |
| ATS409=1 | Enable deep sleep |

## 4.2 Wake Up Events

If enabled, the device sleeps if no activity on the AT interface is detected for 250 ms. The device wakes up on the following events:

- An incoming connection
  *(only available if page scan is enabled, S316=2 or 3)*
- Activating serial status line DTR
  *(0V on LV-TTL level)*
- Activity on RX UART line, e.g. sending a character on the UART interface
  *(please note that the module will reach back to the power down mode after 250 ms of no activity on the RX UART)*

Waking up the device by activity on RX UART line is not recommenced because the first character is lost, so this method can result in loss of data.

Waking up by an incoming connection implies active page scans (S316). This leads to higher power consumption in the power down mode.

## 4.3 Avaialable Power Down Modes

| Power Down Mode | Conditions | Power Consumption |
|---|---|---|
| No Power Down<br>normal operation<br>(idle) | Power Down deactivated (S409=0)<br>Page/inquiry scan enabled (S316=3)<br>DTR active (0V on LV-TTL level) | 21pprox.. 2.5 mA |
| Power Down | Power Down active (S409=1)<br>Page scan enabled (S316=2)<br>Accept incoming call<br>when DTR is inactive (AT&D4)<br>DTR inactive (3.3V on LV-TTL level) | 21pprox.. 1.1 mA |
| Deep Sleep | Power Down active (S409=1)<br>No page/inquiry scan (S316=0)<br>DTR inactive (3.3V on LV-TTL level) | 21pprox.. 0.04 mA |
| RESET state | | 21pprox.. 2.3 mA |

# 5 Remote Configuration

The BlueMod+B20 can be configured via Bluetooth by using another Bluetooth device. Make sure the BlueMod+B20 is powered on and in range of the local Bluetooth device.

By default the configuration port of the BlueMod+B20 is not accessible and not visible. To make it visible and accessible for other Bluetooth devices the configuration port must be set to “accessible and visible” first (ATS403=2).

Initiate a new scan of the Bluetooth area. When the BlueMod+B20 is found perform a service discovery. In the result you will get 2 services (ports):

- “SPP” (UUID 0x1101, service channel 1)
- “Remote Config” (UUID 0x1101, service channel 2 or other)

Connect to the “Remote Config” and open the terminal program at the appropriate COM port.

Once the Bluetooth connection is established successfully (signaled with “RC ONLINE” response at the remote BlueMod+B20) the BlueMod+B20 answers the commands in the UART of the remote side. Now you can configure the remote BlueMod+B20 using the AT commands. You can close the connection by using the ATH command (signaled with “RC OFFLINE” response at the remote BlueMod+B20).

The configuration port of the BlueMod+B20 can be disabled using the ATS403=0 command.

The following flow chart will give an example of the remote configuration connection between two BlueMod+B20 modules (*BT device A + B*).

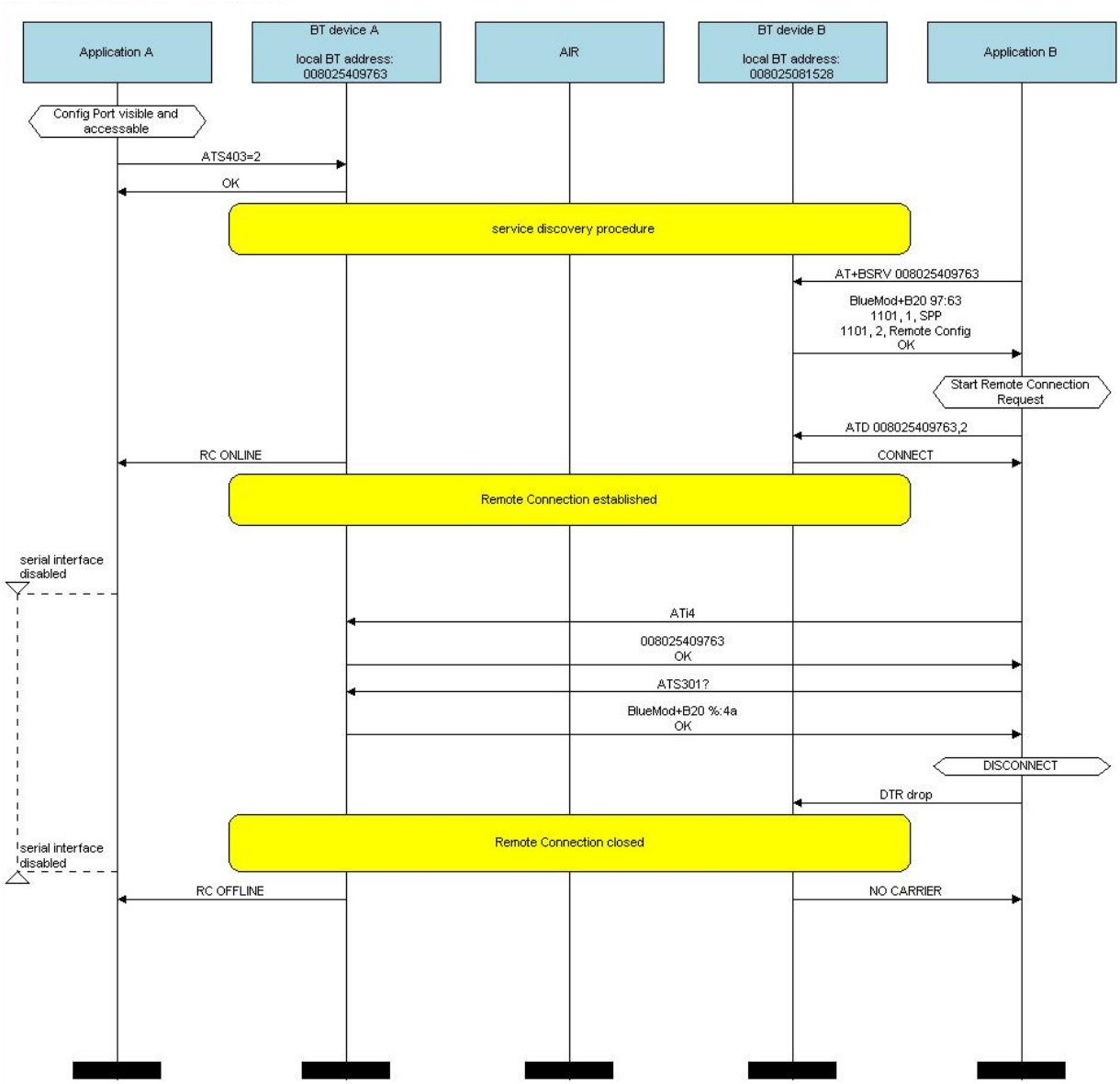
The Bluetooth device (*BT device A*) enables the visibility and the access of the “remote config port” first (ATS403=2). After that the *BT device B* starts a service discovery to *BT device A* followed by a remote connection.

During the remote connection *BT device B* reads out the BT address of *BT device A* (ATI4) and the local device name (ATS301?).

The remote connection is closed from the *BT device B* with a local DTR drop.

The “*Application*” part simulates the device at the end (DTE) which communicates to the local Bluetooth device with configuration commands.

The box called “*AIR*” signals which part of communication will be transmitted over Bluetooth to the destination side.


Application A
BT device A
local BT address:
008025409763
AIR
BT devide B
local BT address:
008025081528
Application B
Config Port visible and accessable
ATS403=2
OK
service discovery procedure
AT+BSRV 008025409763
BlueMod+B20 97:63
1101, 1, SPP
1101, 2, Remote Config
OK
Start Remote Connection Request
ATD 008025409763,2
RC ONLINE
CONNECT
Remote Connection established
serial interface disabled
ATi4
008025409763
OK
ATS301?
BlueMod+B20 %:4a
OK
DISCONNECT
DTR drop
Remote Connection closed
serial interface disabled
RC OFFLINE
NO CARRIER

# 6 Out Of Range Detach

If enabled this feature detaches an active link if a given RSSI value is exceeded.

It can be activated by setting the register S410 to 1, the default setting of S410 is 0.

| | |
|---|---|
| ATS410=1 | Enable out of range detach |

## 6.1 RSSI Value (S411)

The register S411 sets the RSSI value for the “out of range detach” feature. If set to -80 the link is detached if the measured RSSI exceeds this value. This value can be configured by the user according the existing scenario.

The application compares the mean value of the last 3 measured RSSI values to the value set in S411.

| | |
|---|---|
| ATS411=-80 | Set RSSI value to -80db |

## 6.2 RSSI Poll Time (S412)

The register S412 sets the poll time in milliseconds for measuring the RSSI value for the “out of range detach” feature. The default value is 3000, the maximum value is 10000. Changing this register affects the processing time of the “out of range detach” because the polling interval for RSSI is changed.

| | |
|---|---|
| ATS412=4000 | Set RSSI poll time to 4 seconds |

# 7 OBEX File Transfer

This chapter describes the Object Push Profile (OBEX transfer) implementation in the BlueMod+B20 firmware.

This Bluetooth module supports the Object Push Profile in client mode only (OPP client). Therefore the Bluetooth module initiates an outgoing call to the OBEX server side.

The OPP client call request, the OPP frame structure and different connection examples will be described below.

## 7.1 OPPC Call Request

To initiate a Bluetooth connection using the service profile “OPP” the dial command needs the additional identifier “OPPC” or the UUID “1105”.

Example:

**ATD<Bluetooth address>,OPPC**

**ATD<Bluetooth address>,1105**

After the destination device accepts the call request from the BlueMod+B20 module the message “CONNECT” is sent to the local serial interface.

## 7.2 OPP Frame Structure

After the connection is established the BlueMod+B20 can send the OPP frame as specified below:

| **Length** | **<sp>** | **Filename** | **<sp>** | **MIME Type** | **<sp>** | **Data** |
|---|---|---|---|---|---|---|

| | |
|---|---|
| Length | Length of the data field, 8 digits, ASCII decimal coded, filled with leading zero |
| Filename | File name of the transmitted data, i.e “test.vcf” |
| MIME Type | Type according RFC 2045, i.e. “image/jpeg” or “text/plain” |
| Data | Data (payload) of the transmitted object |
| <sp> | Field separator <SPACE> (0x0D) |

## 7.3 OPP Frame Transmission

The BlueMod+B20 is able to transmit data frames with different object types like:

- vCal
- vCard
- vMsg
- vNote
- files like text files, images, etc.

### 7.3.1 OPP Data Flow Control

During a OPP frame transmission the BlueMod+B20 supports the serial hardware flow control (RTS/CTS). Please note to control the serial status line “UART_RTS“ (pin 24) of the BlueMod+B20 module in case of an active flow control situation.

If the application does not react to the serial CTS status line of the BlueMod+B20 module some data of the OPP frame will get lost.

The following examples will give an overview about the object specific frame structure.

### 7.3.2 OPP Frame Structure Example for VCARD

| | |
|---|---|
| Length | 00000284 |
| Filename | vcard_Mustermann.vcf |
| MIME Type | text/x-vcard |
| Data | BEGIN:VCARD<br>VERSION:3.0<br>N:Mustermann;Max<br>FN:Max Mustermann<br>ORG:Wikipedia<br>URL:http://de.wikipedia.org/<br>EMAIL;TYPE=INTERNET:max.mustermann@example.org<br>TEL;TYPE=voice,work,pref:+49 1234 56788<br>ADR;TYPE=intl,work,postal,parcel:;;Musterstraße 1;Musterstadt;;12345;Germany<br>END:VCARD |

### 7.3.3 OPP Frame Structure Example for Text File

| | |
|---|---|
| Length | 00000099 |
| Filename | testfile.txt |
| MIME Type | text/plain |
| Data | 1234567890 1234567890 1234567890 1234567890 1234567890 1234567890 1234567890 1234567890 123456789 |

### 7.3.4 OPP Frame Structure Example for Image/jpg

| | |
|---|---|
| Length | 00194256 |
| Filename | Stollmann_Logo.jpg |
| MIME Type | image/jpg |
| Data |  |

## 7.4 OPP Status Messages

The BlueMod+B20 is transmitting the OPP frame to the destination side.

In case of a successful transmission the BlueMod+B20 module is reporting the following status message to the local serial interface: “**OPPC ACCEPT**”.

If the destination side (OPP server) rejects the received OPP frame the BlueMod+B20 reports a negative status message “**OPPC REJECT**”.

In case of a local procedure (syntax error) the BlueMod+B20 creates the following negative status message: “**OPPC ERROR**”.

| Text | Meaning |
|---|---|
| OPPC ACCEPT | Successful OPPC data transmission |
| OPPC REJECT | Failed OPPC data transmission |
| OPPC ERROR | Local OPPC frame error, OPPC syntax error |

These different status messages will be also listed in different OPPC transmission examples in the next chapter.

## 7.5 OPPC Transmission Examples with BlueMod+B20

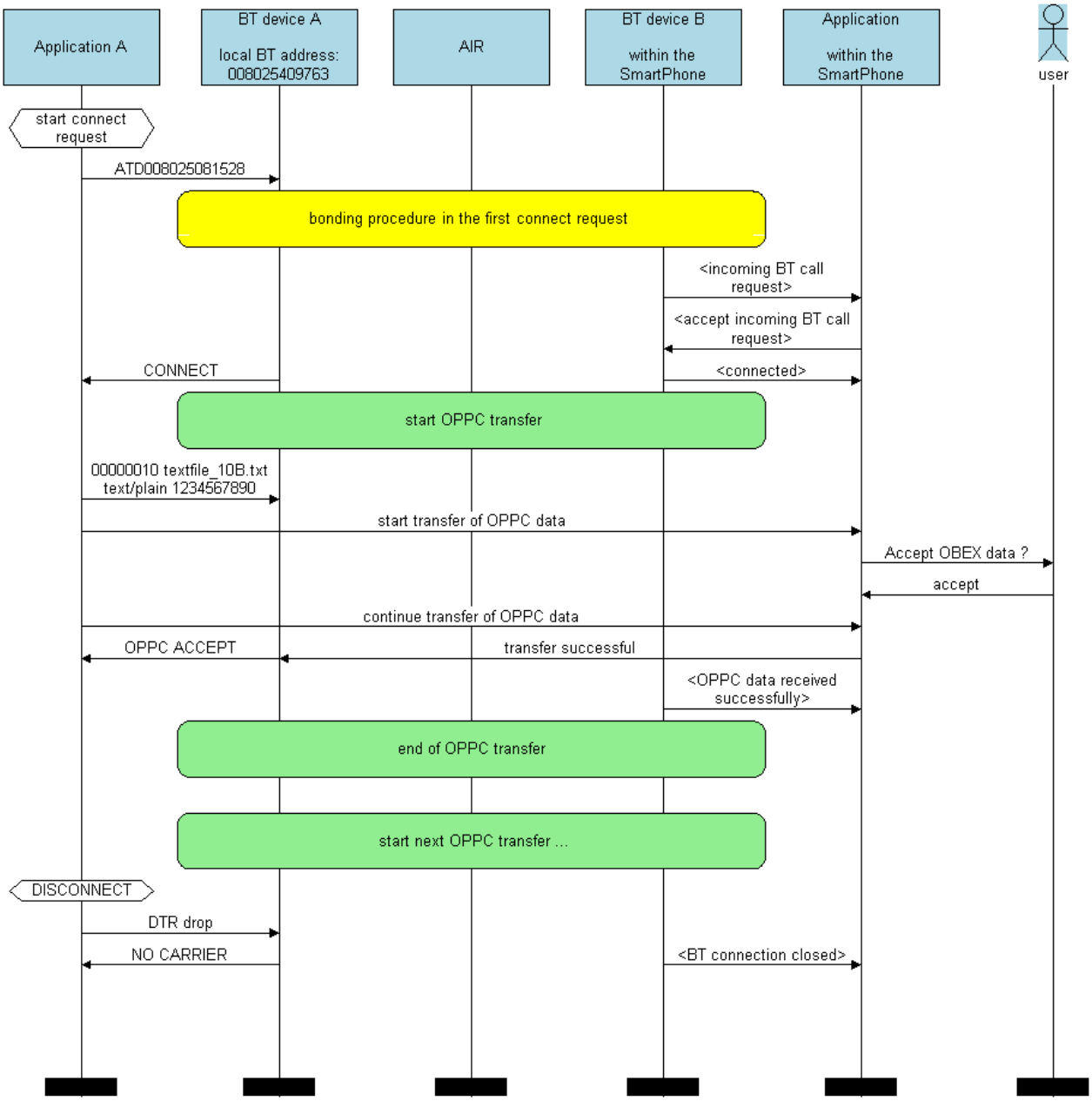
The following flow charts will give examples with different OPPC transmission results between the BlueMod+B20 and the reference device. In our situation the reference device is a smart phone.

The "*Application*" part will simulate the device at the end (DTE) which communicates to the local Bluetooth device or the application within the smart phone.

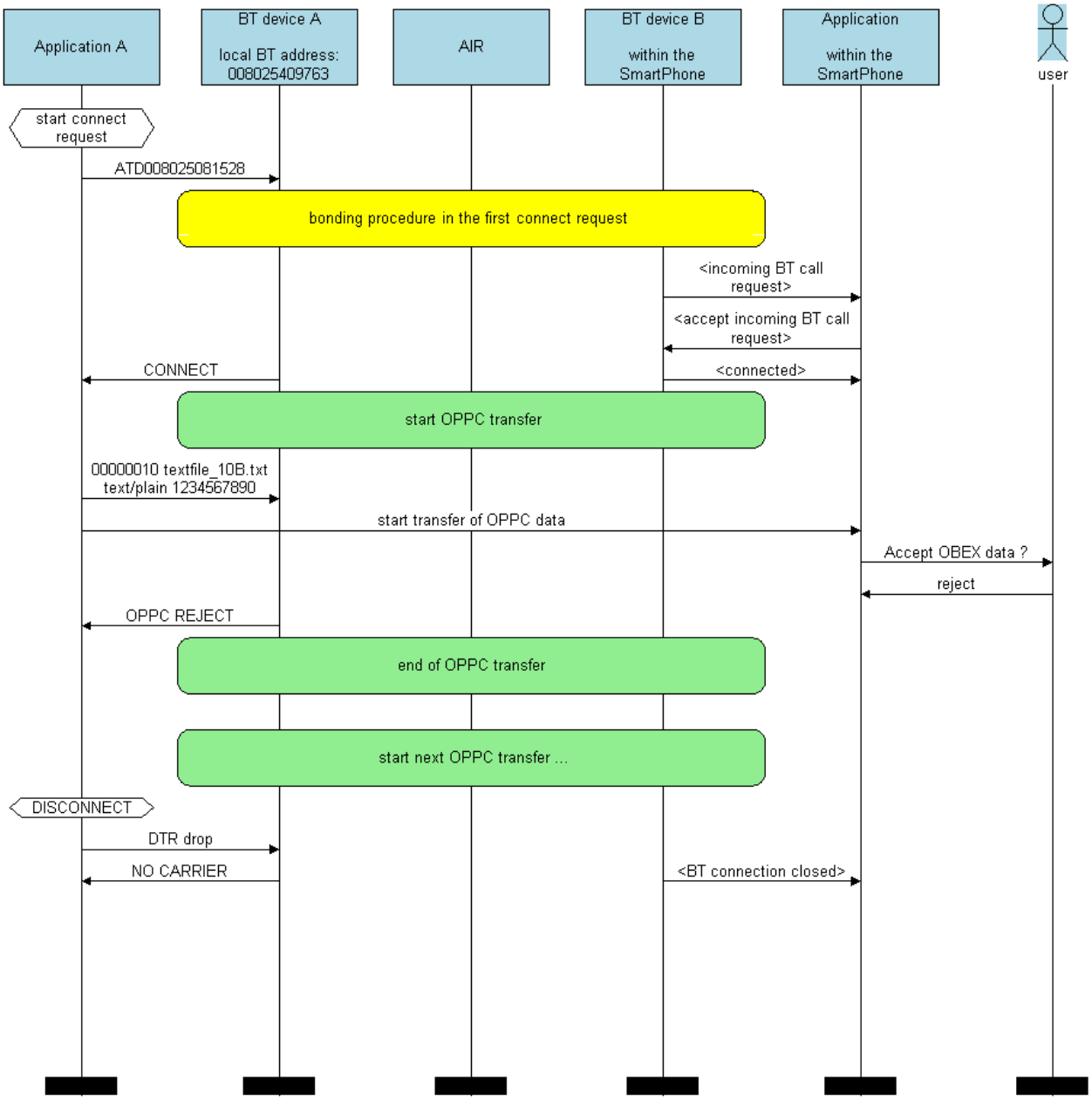
The box called "*AIR*" will signal which part of communication will be transmitted over Bluetooth to the destination side.

The configuration commands and responses within the flow charts are described in the *BlueMod+B20/BT2.1 AT Command Reference*.

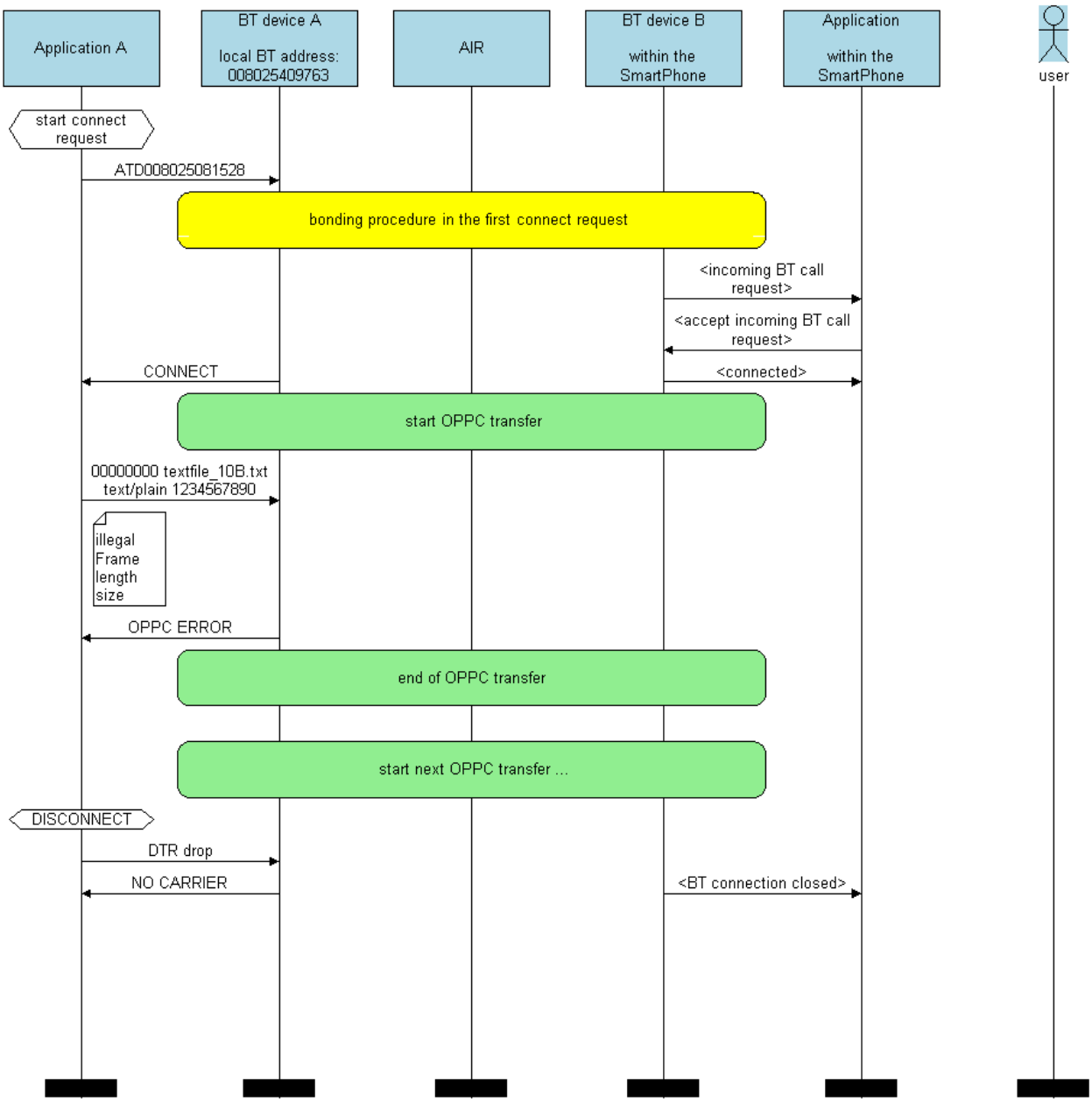
### 7.5.1 Successful OPPC Transfer



### 7.5.2 Failed OPPC Transfer



### 7.5.3 Local OPPC Communication Error



# 8 Communication with Apple Devices

To accept connections from Apple devices the service record of the BlueMod+B20 contains an Apple specific UUID. This UUID is implemented in the standard Serial Port Profile (1101) service record of the BlueMod+B20.

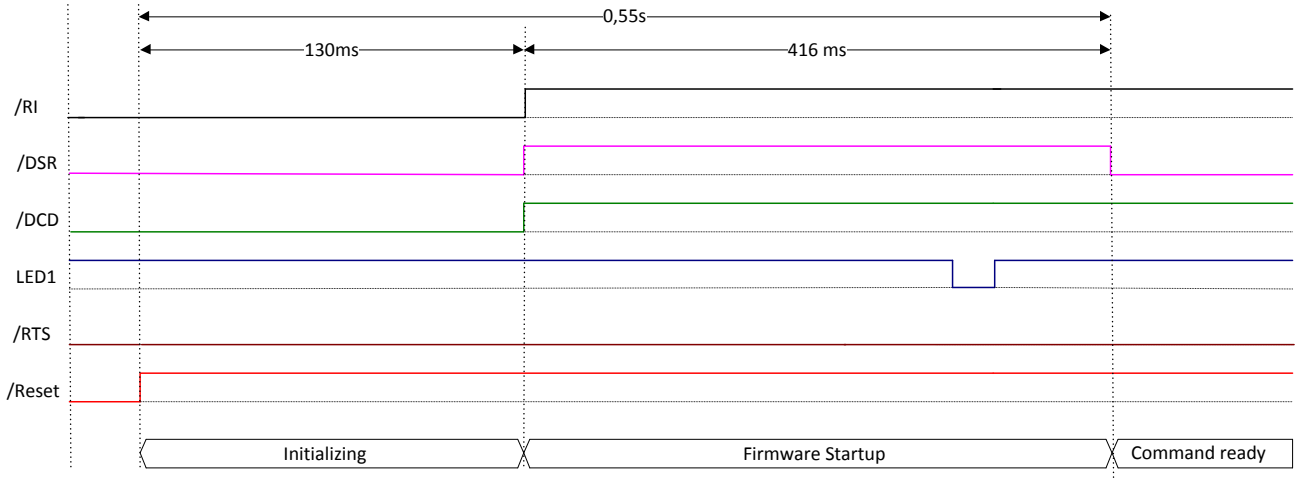
To connect to an Apple device, the user shall connect to the service named “Wireless iAP” of the Apple device. The **ATD** command has to be used with the corresponding service channel number. Use the **BSRV** command to find the channel number of the service named “Wireless iAP”.

To make the BlueMod+B20 visible to Apple devices the Class of Device (S302) has to be set to a value listed in the table below:

| Major Service Class | Major Device Class | Minor Device Class | S302 |
|---|---|---|---|
| Audio + Rendering | Audio / Video | Portable Audio | 0x24041C |
| | | Handsfree | 0x240408 |
| | | Headset | 0x240404 |
| | | Loadspeaker | 0x240414 |
| | | Headphones | 0x240418 |
| | | Hifi Audio | 0x240428 |
| | | Car Audio | 0x240420 |
| | Wearable | Watch | 0x240704 |
| | | Jacket | 0x24070C |
| | | Helmet | 0x240710 |
| | | Glasses | 0x240714 |

# 9 Startup Timing

The following diagram shows the startup timing of the BlueMod+B20 based on firmware version 3.100.




The firmware is command ready 0.55s after the reset has been released.

For further information regarding startup timing of other firmware versions please contact stollmann.

# 10 Firmware Upgrade

This chapter describes the firmware upgrade procedure for a BlueMod+B20 via RS232 or SPI.

The software used for the upgrade is able to run on the following Win32 platforms:

- Windows XP
- Windows Vista

*Note: Testing was only carried out on Vista Ultimate and XP Professional platforms; however experience suggests that the described software runs on all XP platforms and all Vista 32-bit platforms.*

## 10.1 Device Firmware Upgrade via Serial Interface

The DFU software package provides a tool for uploading firmware into a BlueMod+B20 via serial interface. The file name of the executable program consists of version and patch information.

For example a firmware version 1.025 patched to SPP will result in the executable file “fwb20sppav1025_dfu.exe”.

### 10.1.1 Prerequisites for Device Firmware Upgrade

- You need to have access to the UART interface of BlueMod+B20.
- DFU requires at least a 3-wire serial connection (UART_Rx, UART_Tx, GND) to the PC without flow control. In this scenario DSR and UART_CTS have to be connected to ground via 10k resistor.
- Before starting the DFU software the baud rate of the BlueMod+B20 has to be set to the default value (115,200 bps).
- You need to have a correct DFU file for your BlueMod+B20.
- If you want to upgrade your BlueMod+B20 with Stollmann BlueMod+B20 Updater, the old firmware version needs to be at least 1.024 or later.

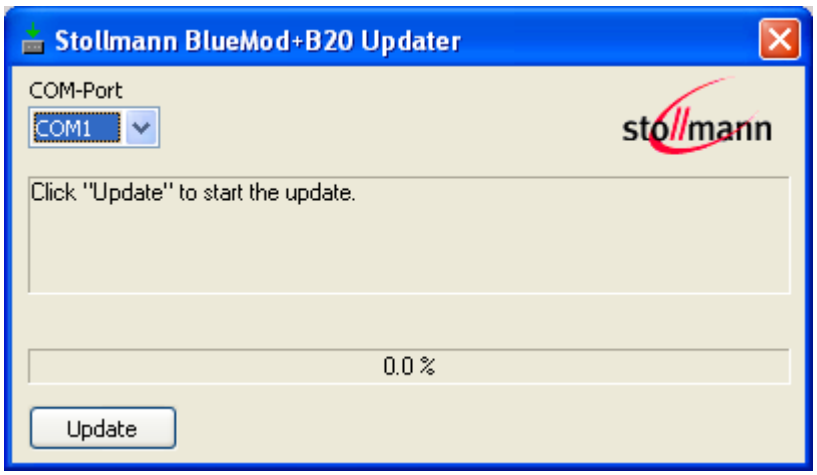
Firmware v1.023 or older cannot be updated to v1.024 or newer with DFU. The update is only possible via SPI.

### 10.1.2 Stollmann BlueMod+B20 Updater

Stollmann BlueMod+B20 Updater serves as a tool for uploading a firmware file (*.dfu) into a BlueMod+B20.

The program requires a PC with at least one free COM-Port and Windows XP or Windows Vista as operating system.

The upload is processed via the serial port the device is attached to.




- COM-Port
  The COM-Port the device is attached to
- Update
  Starts the update procedure

Several instances of Stollmann BlueMod+B20 Updater may be started concurrently on one PC in order to update several BlueMod+B20 in parallel.

After the successful update close the software and reset the BlueMod+B20.

*Note:*
*All stored settings in the S registers will be lost and set to default values after the firmware update.*
*Do not disconnect the device while the update is in progress, otherwise the update will fail and has to be repeated. In case it is not possible to update the BlueMod+B20 please contact the support.*

## 10.2 Firmware Upgrade via SPI

### 10.2.1 Installation

The software folder on the BlueEva+B20 CD-ROM or the provided package contains application programs for flashing new firmware and for setting specific configuration.

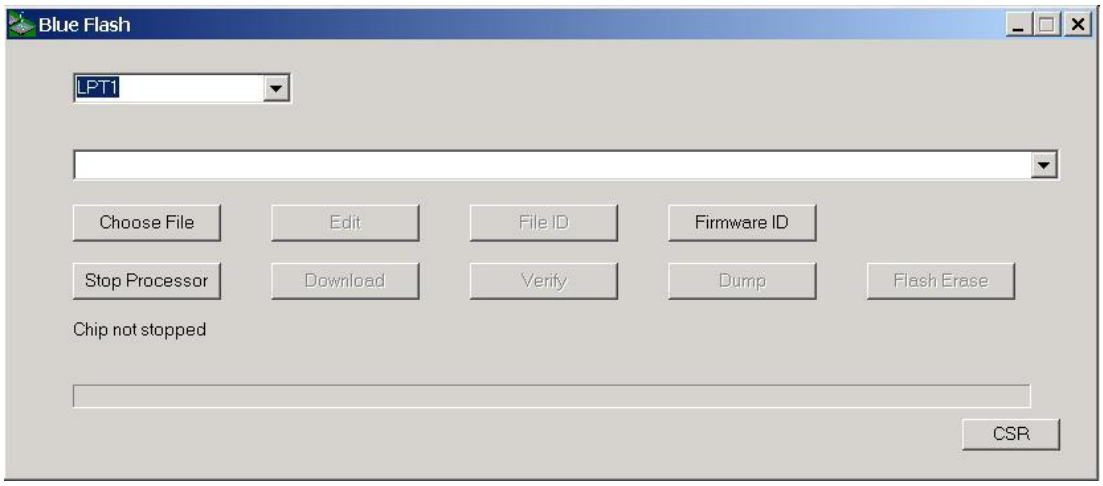
These application programs require a specific driver. Install the driver on your PC by doing the steps below:

- Copy all files from the “Software” folder to a directory on your hard disk
- Run “InstParSpi.bat”
- Run “RegPSToolocx.bat”
- Reboot your PC

### 10.2.2 Upgrade Procedure

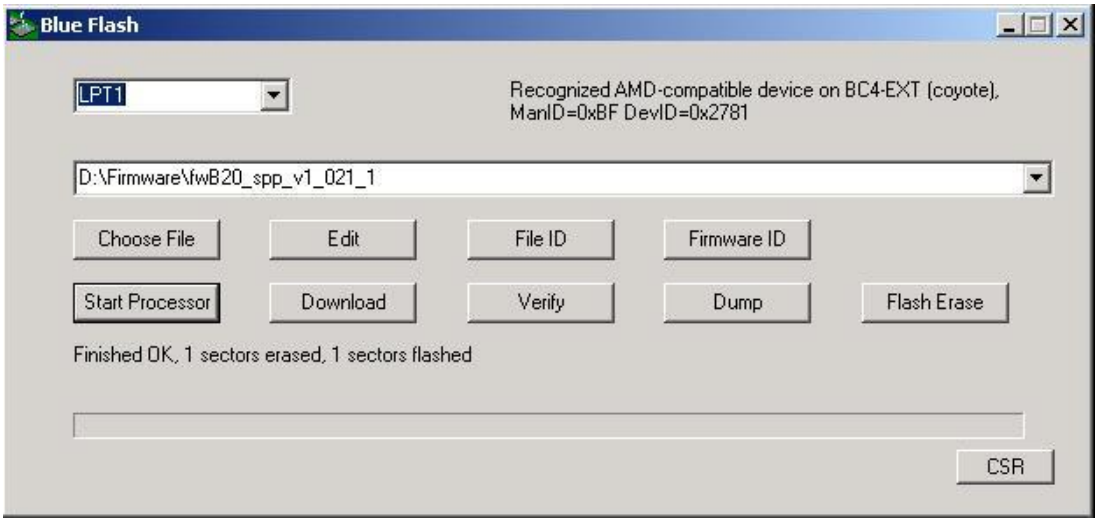
Connect the SPI interface of the BlueMod+B20 to the parallel port of your PC using a SPI cable.

For flashing new firmware, power-on the BlueMod+B20 and start the BlueFlash application (BlueFlash.exe).




BlueFlash application

Press the “Choose File” button and choose the firmware file you want to flash into the BlueMod+B20. Then press the “Stop Processor” button to halt the processor, followed by the “Download” button to start the flash procedure.




Flashing the firmware

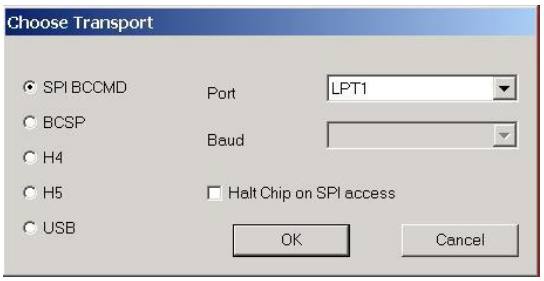
After the flash procedure ended successfully press the “Start Processor” button to run the new firmware.

The PS Tool application allows you to manipulate the configuration of the BlueMod+B20 via so-called PSKeys.

*Note: Change PSKeys only if you are certain of all side effects.*

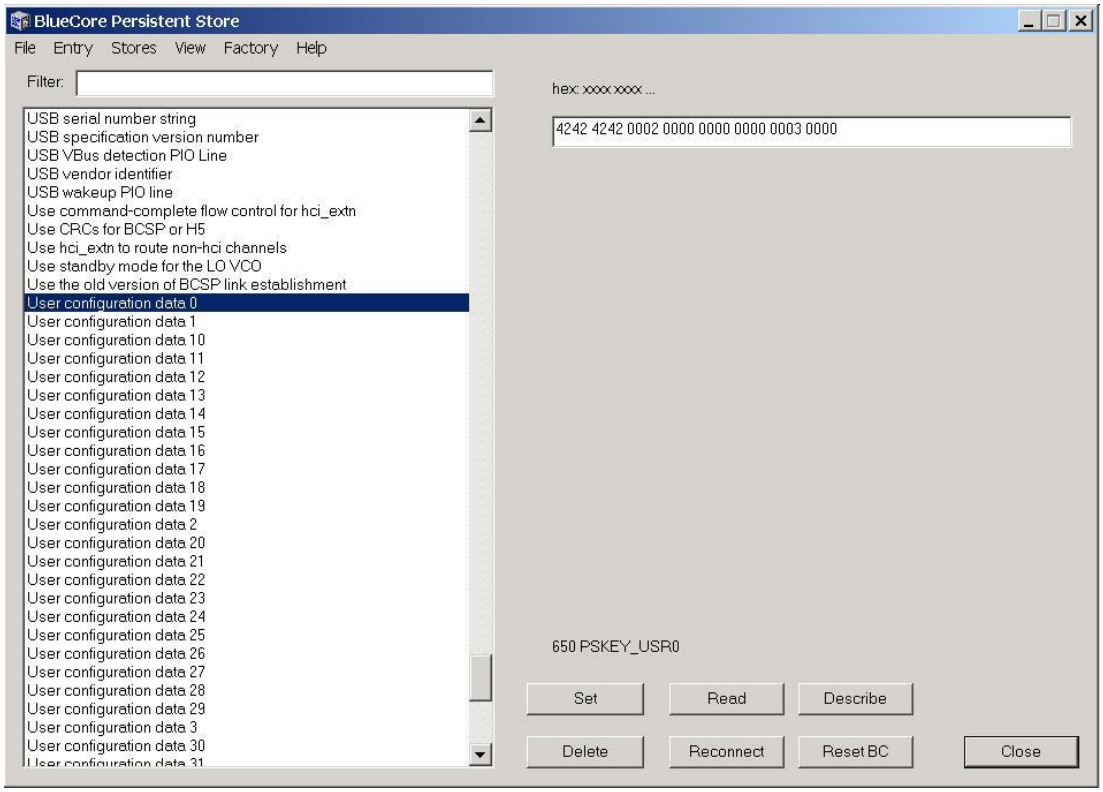
Normally, no changes in the PSKeys are needed to work with the BlueMod+B20. But if you configured the BlueMod+B20 such that it is not accessible anymore, e.g. you have configured the baud rate to 230,400 bps and the serial port of your PC only supports up to 115,200 bps, you can use the PS Tool application to restore the factory-default settings.

To restore the factory-default settings, power on the BlueMod+B20 and start the PS Tool application (PSTool.exe). Select the options shown below and click OK.




Restoring PSKeys with PS Tool Step 1

Select the PSKey “User configuration data 0” and press the “Delete” button.




Restoring PSKeys with PS Tool Step 2

After pressing the “Reset BC” button or power cycling the BlueMod+B20, it will operate on the factory-default settings.

## 10.3 Troubleshooting

- **Update won’t start when using Stollmann BlueMod+B20 Updater**

Check if the right COM-Port is selected and make sure the port is not used by other applications running. Set the communication settings of your BlueMod+B20 to 115,200 bps, 8 data bits, no parity, 1 stop bit. Retry the update.

- **Update process has been interrupted by power loss / Cable replacement on COM-Port**

Redo the update by restarting the Stollmann BlueMod+B20 Updater.

- **Firmware won’t start after serial update, no answer on AT**

Power cycle the BlueMod+B20, if the BlueMod+B20 is still not answering to AT commands, redo the update with the Stollmann BlueMod+B20 Updater.

# 11 History

| Version | Release Date | By | Change description |
|---|---|---|---|
| r01d01 | 27.02.2012 | hb | First release |
| r01 | 27.02.2012 | ta | Review, added some corrections |
| r02 | 20.04.2012 | hb,<br>bs,<br>ta | Added new chapters:<br>- “Out Of Range Detach”<br>- “Remote Configuration”<br>- “OBEX File Transfer”<br>- “Communication with Apple Devices”,<br>Added flow chart for “Remote Configuration”,<br>Added “Out Of Range Detach”, “Remote Configuration”, “OBEX” and “Communication with Apple Devices” in introduction |
| r03d01 | 20.06.2012 | bs<br><br>hb | Added OBEX status message, OBEX data transfer flow charts,<br>Added new chapter 2.1.7 HID Data Flow Control,<br>Added chapter 9 Startup Timing,<br>Added note for circuit of DSR and CTS in chapter 10.1.1 Prerequisites for Device Firmware Upgrade |
| r03 | 22.06.2012 | ta | Release r03 |
| r04 | 26.05.2016 | bg | Telit cover page added |

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# SUPPORT INQUIRIES

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[04.2016]