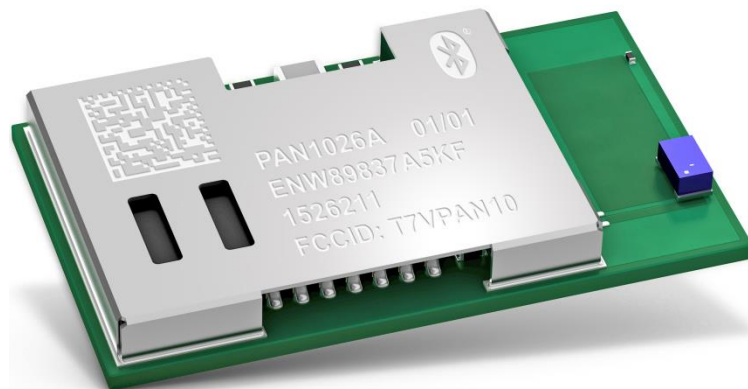


# PAN1026A

PAN1322 to PAN1026A

## Migration Guide

Rev. 1.0



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# 1 About This Document

## 1.1 Purpose and Audience

This Migration Guide describes the migration process from the discontinued PAN1322 Bluetooth module to the PAN1026A Bluetooth module. Necessary hardware as well as software changes are described with the intention of quick and easy migration.



The products are referred to as “the PAN1322” respectively “the PAN1026A” or “the modules” within this document.

The document is intended for hardware as well as software engineers.

## 1.2 Revision History

Revision	Date	Modifications/Remarks
0.1	12.07.2017	Initial draft
1.0	16.08.2017	Editorial review

## 1.3 Use of Symbols

Symbol	Description
	<b>Note</b> Indicates important information for the proper use of the product. Non-observance can lead to errors.
	<b>Attention</b> Indicates important notes that, if not observed, can put the product’s functionality at risk.
⇒ [chapter number] [chapter title]	<b>Cross reference</b> Indicates cross references within the document. <b>Example:</b> Description of the symbols used in this document ⇒ 1.3 Use of Symbols.

## 1.4 Related Documents

- [1] Panasonic. eUniStone PAN1322 Design Guide Rev.1.2
- [2] Intel. eUniStone SPP-AT Application SW 3.1 Rev.0.2
- [3] Panasonic. PAN1026A Product Specification Rev.1.0
- [4] Toshiba. TC35661-ROM551 Extended HCI Command Interface Document
- [5] Toshiba. TC35661-ROM551 Bluetooth Basic Management Command Interface Document
- [6] Toshiba. TC35661-ROM551 SPP Command Interface Document

Please refer to the Panasonic website for more information as well as related documents  
⇒ 5.1.2 Product Information.

## 2 Overview

### PAN1322

- Overall size of 15.6 mm x 8.7 mm x 2.8 mm
- Industrial temperature range of -40 °C to + 85 °C
- Operational voltage range of 2.9 V to 4.1 V
- Output power of +4 dBm
- Receiver sensitivity of -86 dBm
- Integrated 32 kB EEPROM for device configuration data and application
- GPIOs with interrupt and wake-up capabilities
- AT command set
- Follows EMC, Safety, EN300328, FCC and IC regulations

### PAN1026A

- Overall size of 15.6 mm x 8.7 mm x 1.9 mm
- Industrial temperature range of -40 °C to + 85 °C
- Operational voltage range of 2.7 V to 3.6 V
- Output power of +4 dBm
- Receiver sensitivity of -88 dBm
- Integrated 32 kB EEPROM for device configuration data and application
- GPIOs and wake-up control pins
- High-level API commands
- Follows EMC, Safety, EN300328, FCC, MIC and IC regulations

## 2.1 Bluetooth Features

### PAN1322

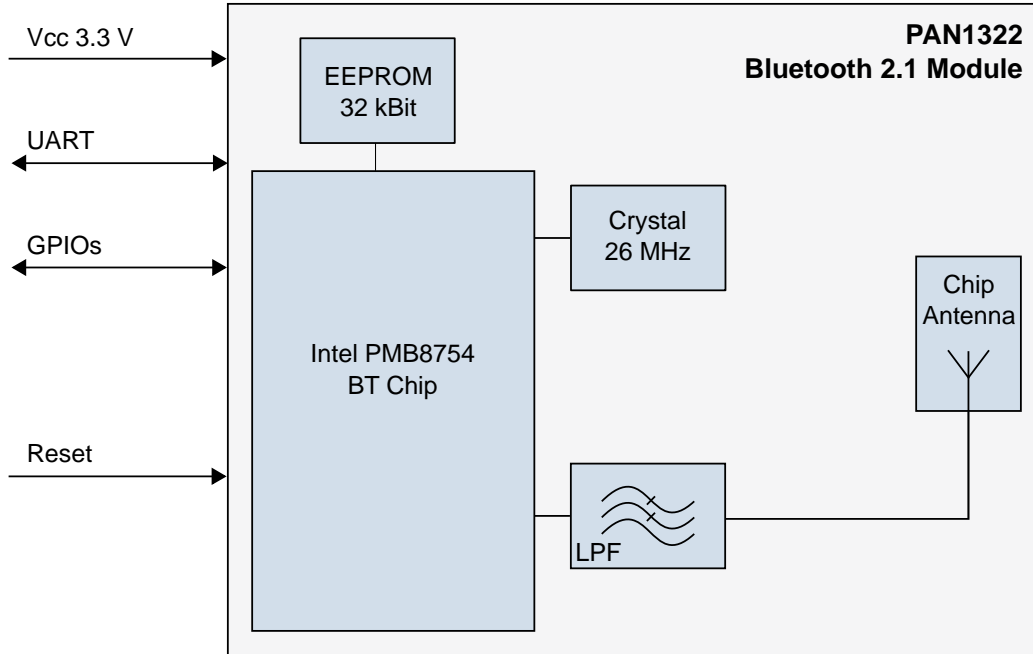
- Bluetooth 2.1 compliant
- Bluetooth class 2 device
- SPP profile support
- Single active connection

### PAN1026A

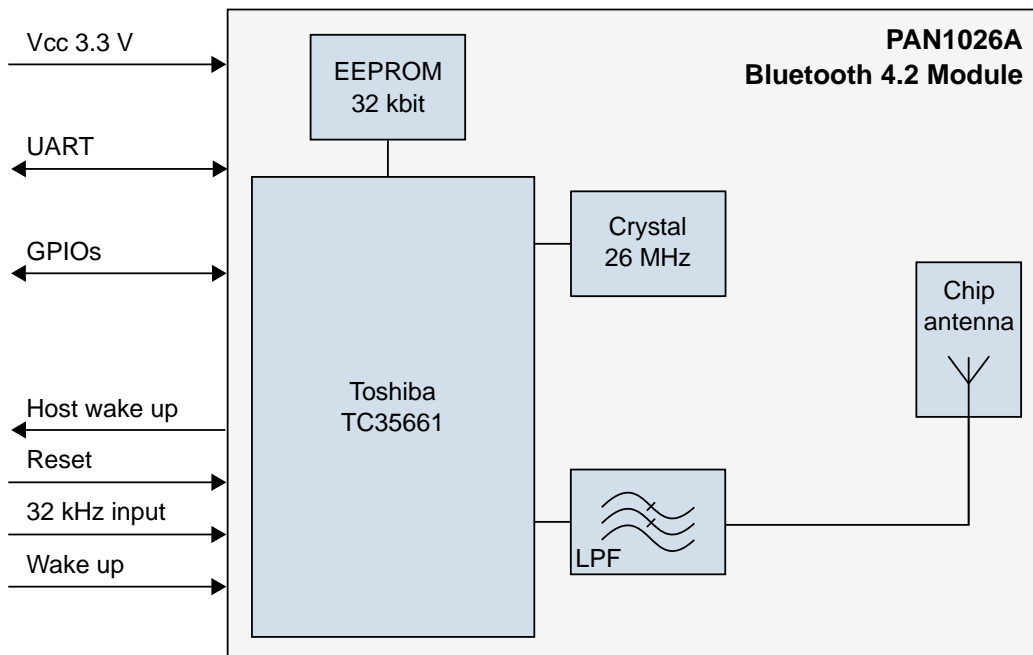
- Bluetooth 2.1 and 4.2 standard compliant
- Bluetooth class 2 device
- Bluetooth Basic Rate SPP profile support
- Bluetooth Low Energy GATT profile support for server and client mode
- Single active connection for Bluetooth Classic and Low Energy

## 2.2 Block Diagram

### PAN1322



### PAN1026A

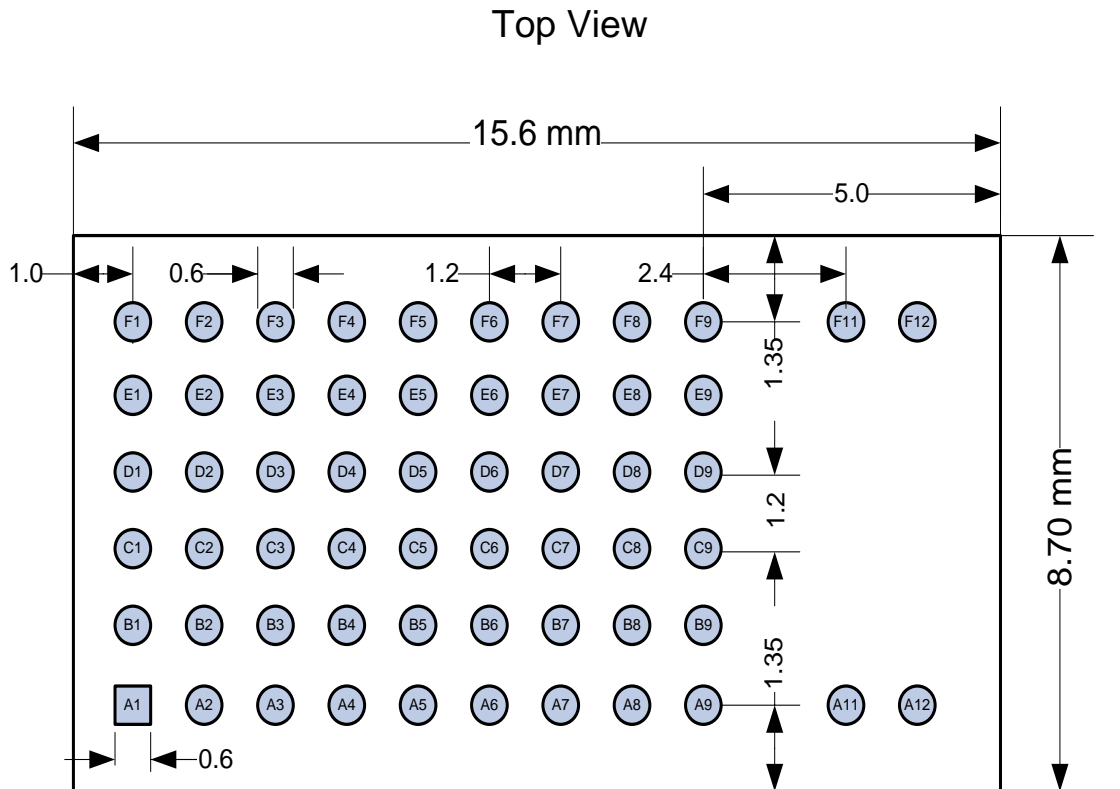


### 3 Hardware

#### 3.1 Pin Configuration

##### Pin Layout

The pin layout of the PAN1322 and the PAN1026A are based on the same module footprint, which is depicted below.



##### Pin Assignment Comparison

Although the footprint of the modules is identical, not all of the pins have the same assignment. Thus, the following table compares both pin assignments and notes the changes to be made.

No	Pin Name PAN1026A	Pin Name PAN1322	Change notice
A1	GND	GND	
A2	NC	P1.6	Check if this port is used
A3	Reset	RESET	
A4	VCC	VCC	
A5	VCC	VCC	
A6	VCC	VCC	
A7	GND	GND	

No	Pin Name PAN1026A	Pin Name PAN1322	Change notice
A8	NC	P1.5	Check if this port is used
A9	GND	GND	
A11	GND	X	Connect to GND
A12	GND	X	Connect to GND
B1	NC	P1.7	Check if this port is used
B2	BTS	P1.8	Check if this port is used
B3	BTA	P1.0	Check if this port is used
B4	NC	P1.4	Check if this port is used
B5	NC	ONOFF	Check if this port is used
B6	NC	NC	
B7	NC	NC	
B8	NC	NC	
B9	NC	SLEEPX	Host sleep mode is implemented via UART
C1	CS0X	VREG	Check if this port is used
C2	BTI	P0.9	Check if this port is used
C3	WIA	JTAG#	
C4	NC	TRST#	
C5	NC	VDD1	
C6	PCMCLK	NC	
C7	FSYNC	NC	
C8	GND	GND	
C9	GND	GND	
D1	CS1X	P0.10	
D2	DIN	P0.8	
D3	GPIO1	P1.1	Check if this port is used
D4	GPIO0	P0.3	Check if this port is used
D5	NC	P0.2	Check if this port is used
D6	PCMIN	NC	
D7	GND	GND	
D8	GND	GND	
D9	ANT	ANT	



No	Pin Name PAN1026A	Pin Name PAN1322	Change notice
E1	SDA	SDA0	
E2	SCL	SCL0	
E3	GND	P1.3	Check if this port is used
E4	USB	P0.0	Check if this port is used
E5	CLKREQ	P0.1	Check if this port is used
E6	UARTRXD	UARTRXD	
E7	PCMOUT	NC	
E8	GND	GND	
E9	GND	GND	
F1	GND	GND	
F2	EEPROM_WP	P1.2	Check if this port is used
F3	GND	P0.11	Check if this port is used
F4	GND	P0.14	Check if this port is used
F5	UART CTS	UARTCTS	HW flow control is mandatory
F6	SLEEPCLK	VDDUART	When not used, pull down with 100 k $\Omega$
F7	UARTTXD	UARTTXD	
F8	UARTRTS	UARTRTS	HW flow control is mandatory
F9	GND	GND	
F11	GND	X	Connect to GND
F12	GND	X	Connect to GND

## 3.2 UART Interface

As the pin comparison table in section [⇒ 3.1 Pin Configuration](#) shows, the UART interfaces of the PAN1322 and the PAN1026A are identical. Both modules require a 4 wire UART interface featuring hardware flow control pins.

## 4 Software Migration

### 4.1 Introduction

In order to migrate the software from the PAN1322 to the PAN1026A, it is important to understand the different command interfaces of the modules. The PAN1322 uses human-readable AT commands for module interaction, while the PAN1026A uses binary commands for module interaction. This binary-based interaction is separated into Host Controller Interface (HCI) commands for low level configuration commands and Toshiba Control Unit (TCU) commands for high level abstraction commands similar to the AT abstraction level.

The following sections will describe the PAN1322 commands and the associated PAN1026A Bluetooth Classic binary commands only. The Bluetooth Low Energy commands for the PAN1026A will not be described within this document.

A set of example command sequences for initialization, device discovery, service discovery, connection handling and data exchange can be found in the last section.

### 4.2 General Device Configuration

#### 4.2.1 UART Configuration

The following table lists both default UART configurations.

Module	Baudrate	Data Bits	Parity	Stop Bits	Flow Control
PAN1322	115200 bps	8	None	1	Hardware (RTS/CTS)
PAN1026A	115200 bps	8	None	1	Hardware (RTS/CTS)

#### 4.2.2 End-Of-Line Markers

The PAN1322 and PAN1026A modules use different end-of-line-markers.

While the PAN1322 ends all commands, responses and events with carriage return (CR) and line feed (LF), the PAN1026A uses a different approach.

For HCI commands, the length of a command, request or event cannot be fully determined without parsing. However, HCI commands will only be used for low level configuration after the startup of the module.

After that, the command mode will be changed to TCU mode, in which commands, responses and events use the first three bytes to determine the length of the message.

#### 4.2.3 Device Initialization

The PAN1026A is using an internal EEPROM, which contains pre-programmed information such as the Bluetooth Device (BD) address. During the initialization of the module this address needs to be read from the EEPROM and has to be stored in RAM. In order to do that, the I<sup>2</sup>C interface of the chip has to be enabled. For the PAN1322 such an initialization was not required. The commands needed for the PAN1026A initialization are listed and described below. The usage of these commands can be found in an example sequence in chapter [⇒ 4.7.1 Initialization](#).

### 4.2.3.1 Resetting the device

#### PAN1322

<b>Command</b>	<b>AT+JRES</b>
<b>Description</b>	Software reset of the PAN1322.
<b>Response</b>	<b>ROK</b>
<b>Description</b>	Startup response.

#### PAN1026A

<b>Command</b>	HCI_RESET_REQ <b>01 03 0C 00</b>
<b>Description</b>	Software reset of the PAN1026A.
<b>Response</b>	HCI_RESET_RESP <b>04 0E 04 04 03 0C 00</b>
<b>Description</b>	Software reset response of the PAN1026A.

### 4.2.3.2 Enabling the I<sup>2</sup>C Interface

#### PAN1026A

<b>Command</b>	HCI_M2_BTL_SET_I2C_ENABLE_REQ <b>01 08 FC 0B 00 A0 00 00 00 14 5B FF 02 03 01</b>
<b>Description</b>	Enable I <sup>2</sup> C of the PAN1026A.
<b>Response</b>	HCI_M2_BTL_SET_I2C_ENABLE_RESP <b>04 FF 0A 08 00 A0 00 00 00 14 5B 00 00</b>
<b>Description</b>	Enable I <sup>2</sup> C response of the PAN1026A.

### 4.2.3.3 Reading the BD Address from EEPROM

#### PAN1026A

<b>Command</b>	HCI_M2_GENERAL_READ_EEPROM_REQ <b>01 08 FC 10 00 A1 00 00 00 14 88 FF 10 06 A0 01 01 06 02 00</b>
<b>Description</b>	Reads the BD address from EEPROM of the PAN1026A.
<b>Response</b>	HCI_M2_GENERAL_READ_EEPROM_RESP <b>04 FF 11 08 00 A1 00 00 00 14 88 00 10 06 BD BD BD BD BD BD</b> BD: Local Device Address (6 bytes): The local Bluetooth device address. Note: The BD address is passed MSB first!
<b>Description</b>	Reads the BD address from EEPROM response of the PAN1026A.

#### 4.2.3.4 Writing the BD Address to RAM

##### PAN1026A

<b>Command</b>	HCI_WRITE_BD_ADDR_REQ <b>01 13 10 06 BD BD BD BD BD</b> BD: Local Device Address (6 bytes): The local Bluetooth device address. Note: The BD address has to be passed LSB first!
<b>Description</b>	Writes the BD address previously read from EEPROM to RAM of the PAN1026A.
<b>Response</b>	HCI_WRITE_BD_ADDR_RESP <b>04 0E 04 04 13 10 ST</b> ST: Status (1 byte): The status of the write process. Successful 0x00 Failure 0xFF (anything > 0x00)
<b>Description</b>	Write BD address to RAM response of the PAN1026A.

#### 4.2.3.5 Switching the API Mode

As initially mentioned, the PAN1026A uses HCI and TCU modes to interact with the host controller. To change from HCI to TCU mode, the following command has to be used.

##### PAN1026A

<b>Command</b>	HCI_SET_MODE_REQ <b>01 08 FC 03 00 99 01</b>
<b>Description</b>	Request to switch from HCI to TCU mode.
<b>Response</b>	HCI_SET_MODE_RESP <b>04 FF 05 08 00 99 ST 01</b> ST: Status (1 byte): Successful 0x00 Failure 0xFF (anything > 0x00)
<b>Description</b>	Response to the request to switch from HCI to TCU mode.



Once in the TCU mode, the HCI mode is no longer available for configuration. The module has to be reset in order to perform another configuration in the HCI mode.

Please note that HCI and TCU commands can only be sent in the appropriate command mode. Sending HCI commands in TCU mode and vice versa will not work.

### 4.2.3.6 Initializing the Firmware

In order to initialize the PAN1026A firmware and to set the device name the following command has to be used.

#### PAN1026A

<b>Command</b>	TCU_MNG_INIT_REQ <b>RL 00 00 E1 01 PL 00 04 00 LD DN ...</b> RL: Request length (1 byte): The length of the total request. PL: Parameter length (1 byte): The length of the following parameters -1. LD: Device name length (1 byte): The length of the device name (0x00-0x80). DN: Device name (LD bytes): The UTF-8 encoded device name (max. 128 bytes).
<b>Description</b>	TCU_MNG_INIT_REQ initializes the PAN1026A firmware and sets the device name.
<b>Response</b>	TCU_MNG_INIT_RESP <b>0E 00 00 E1 01 07 00 ST BD BD BD BD BD BD</b> ST: Status (1 byte): Successful 0x00 Parameter failure 0x01 Device Initialization finished 0x02  BD: Local Device Address (6 bytes): The local Bluetooth device address. If status is failed, it will be 0xFFFFFFFFFFFF.
<b>Description</b>	TCU_MNG_INIT_RESP is the acknowledging response for TCU_MNG_INIT_REQ.



Please note that the use of the command TCU\_MNG\_INIT\_REQ is mandatory and that it can only be executed once per runtime.

### 4.2.3.7 Setting Up the SPP Device

#### PAN1026A

<b>Command</b>	TCU_SPP_SETUP_REQ <b>07 00 00 E5 01 00 00</b>
<b>Description</b>	TCU_SPP_SETUP_REQ sets up the SPP device. TCU_SPP_SETUP_RESP is generated, when this command is completed.
<b>Response</b>	TCU_SPP_SETUP_RESP <b>08 00 00 E5 81 01 00 ST</b> ST: Status (1 byte): Successful 0x00 Parameter Failure 0x01 No Device Initialization 0x03 Setup SPP 0x40
<b>Description</b>	The response for TCU_SPP_SETUP_REQ.

### 4.2.4 Setting the Device Name

PAN1322

<b>Command</b>	<p><b>AT+JSLN= &lt;length_friendly_name&gt;, &lt;friendly_name&gt;</b></p> <p>&lt;length_friendly_name&gt; (2 characters (DEC)): The length of the friendly name (max. 18).</p> <p>&lt;friendly_name&gt; (&lt;length_friendly_name&gt; characters): The friendly name used for EIR and RNR. It should be written at start-up or reset. The default name after reset is “eUniStone SPP BT2.1 features”.</p>								
<b>Description</b>	Sets the local device name.								
<b>Response</b>	<p><b>&lt;general_response&gt;</b></p> <p>&lt;general_response&gt; (2 or 6 characters (DEC)): The general response of the module for requests indicating that the executing went OK or that an error occurred.</p> <table border="0"> <tr> <td>OK</td> <td>Syntax correct, execution allowed and successful</td> </tr> <tr> <td>ERR=-1</td> <td>Syntax error</td> </tr> <tr> <td>ERR=-2</td> <td>Command not allowed at present execution status</td> </tr> <tr> <td>ERR=-3</td> <td>Internal unknown protocol stack error</td> </tr> </table>	OK	Syntax correct, execution allowed and successful	ERR=-1	Syntax error	ERR=-2	Command not allowed at present execution status	ERR=-3	Internal unknown protocol stack error
OK	Syntax correct, execution allowed and successful								
ERR=-1	Syntax error								
ERR=-2	Command not allowed at present execution status								
ERR=-3	Internal unknown protocol stack error								
<b>Description</b>	The general response to requests.								

Setting the device name on the PAN1026A can only be achieved once during the initialization phase using the command TCU\_MNG\_INIT\_REQ.

### 4.2.5 Enabling Security

PAN1322

<b>Command</b>	<p><b>AT+JSEC= &lt;security_mode&gt;,&lt;PIN_type&gt;, &lt;length_PIN_code&gt;, &lt;PIN_code&gt;, &lt;Input_capability&gt;,&lt;Output_capability&gt;</b></p> <p>&lt;security_mode&gt; (1 char (DEC)): The security mode.</p> <table border="0"> <tr> <td>N/A</td> <td>1</td> </tr> <tr> <td>N/A</td> <td>2</td> </tr> <tr> <td>N/A</td> <td>3</td> </tr> <tr> <td>Security Mode 4</td> <td>4</td> </tr> </table> <p>&lt;PIN_type&gt; (1 char (DEC)): The PIN code type.</p> <table border="0"> <tr> <td>Variable PIN (default)</td> <td>1</td> </tr> <tr> <td>Fixed PIN</td> <td>2</td> </tr> </table> <p>&lt;length_PIN_code&gt; (2 chars (DEC)): The length of the PIN code. The maximum PIN length value is 16.</p> <p>&lt;PIN_code&gt; (&lt;length_PIN_code&gt; chars): Normal user PIN, for example “0000”. This parameter is taken into account if the Pin type is fixed.</p> <p>&lt;Input_capability&gt; (1 char (DEC)):</p>	N/A	1	N/A	2	N/A	3	Security Mode 4	4	Variable PIN (default)	1	Fixed PIN	2
N/A	1												
N/A	2												
N/A	3												
Security Mode 4	4												
Variable PIN (default)	1												
Fixed PIN	2												

	Input None                    0 Input Yes/No                 1 Input Keyboard                2 <Output_capability> (1 char (DEC)): Output None                    0 Output Yes/No                 1
<b>Description</b>	AT+JSEC sets the security mode of the device. The command shall be the first command that is sent after a SW reset.
<b>Response</b>	<general_response> <general_response> (2 or 6 characters (DEC)): The general response of the module for requests indicating that the executing went OK or that an error occurred. OK                                Syntax correct, execution allowed and successful ERR=-1                         Syntax error ERR=-2                         Command not allowed at present execution status ERR=-3                         Internal unknown protocol stack error
<b>Description</b>	The general response to requests.

The PAN1026A does not provide a single command to set the desired security measures as the PAN1322. The security measures used for a connection depend on the input and output capabilities of a device and these will be requested during the pairing process ⇒ [4.5.5 Security Handling](#).

### 4.2.6 Registering local services

#### PAN1322

<b>Command</b>	AT+JRLS=<length_uuid>,<length_service_name>, <uuid>,<service_name>,<service_channel>, <CoD> <length_uuid> (2 chars (DEC)): The length of the UUID (4 or 32). <length_service_name> (2 chars (DEC)): The length of the service name (01 to 16). <uuid> (4 or 32 chars (HEX)): The UUID for supported profile. <service_name> (<length_service_name> chars (DEC)): The name of the service. <service_channel> (2 chars (DEC)): The service channel number (01 to 30). <CoD> (6 chars (HEX)): The Class of Device (default 000000).
<b>Description</b>	Request to register up to three local services. Once the command is issued, the service is registered even though an identical service has already been registered. <b>Note:</b> There is no default service configuration. Services need to be re-registered after a SW or HW reset.
<b>Response</b>	<general_response> <general_response> (2 or 6 characters (DEC)): The general response of the module for requests indicating that the executing went OK or that an error occurred.

	OK	Syntax correct, execution allowed and successful
	ERR=-1	Syntax error
	ERR=-2	Command not allowed at present execution status
	ERR=-3	Internal unknown protocol stack error
<b>Description</b>	The general response to requests.	

**PAN1026A**

<b>Command</b>	<p>TCU_MNG_STANDARD_HCI_SET_REQ_WriteClassOfDeviceCommand</p> <p><b>0D 00 00 E1 3D 06 00 24 0C 03 CD CD CD</b></p> <p>CD: Class of Device (3 bytes): The class of the device (LSB, LSB+1, MSB).</p> <p>TCU_SPP_UUID_ASSIGN_REQ</p> <p><b>RL 00 00 E5 20 PL 00 IT IV ... AT AV ...</b></p> <p>RL: Request Length (1 byte): The length of the total request.</p> <p>PL: Parameter Length (1 byte): The length of the following fields -1.</p> <p>IT: Initiate UUID Data Type (1 byte): The UUID data type for initiation.</p> <table border="0"> <tr> <td>UUID16</td> <td>0x19</td> </tr> <tr> <td>UUID32</td> <td>0x1A</td> </tr> <tr> <td>UUID128</td> <td>0x1C</td> </tr> </table> <p>IV: Initiate UUID Value (2 / 4 /16 bytes): The UUID value for initiate connection.</p> <p>AT: Accept UUID Data Type (1 byte): The UUID data type for initiation.</p> <table border="0"> <tr> <td>UUID16</td> <td>0x19</td> </tr> <tr> <td>UUID32</td> <td>0x1A</td> </tr> <tr> <td>UUID128</td> <td>0x1C</td> </tr> </table> <p>AV: Accept UUID Value (2 / 4 /16 bytes): The UUID value for accept connection.</p>	UUID16	0x19	UUID32	0x1A	UUID128	0x1C	UUID16	0x19	UUID32	0x1A	UUID128	0x1C
UUID16	0x19												
UUID32	0x1A												
UUID128	0x1C												
UUID16	0x19												
UUID32	0x1A												
UUID128	0x1C												
<b>Description</b>	<p>The command TCU_MNG_STANDARD_HCI_SET_REQ_WriteClassOfDeviceCommand requests to write the class of device to the module.</p> <p>The command TCU_SPP_UUID_ASSIGN_REQ requests to set the service class ID for SPP. It is used to connect to the service with UUID the Bluetooth SIG does not specify. The command sets the UUID for both initiator and acceptor. TCU_SPP_UUID_ASSIGN_RESP is generated, when this command is completed.</p> <p><b>Note:</b> There is a default service configuration that uses the well-known SPP service UUID and the service channel “5”.</p> <p>Thus, this command does only have to be used when the desired SPP service UUID deviates from the default. However, the service channel cannot be changed.</p>												
<b>Response</b>	<p>TCU_MNG_STANDARD_HCI_SET_RESP_WriteClassOfDeviceResponse</p> <p><b>RL 00 00 E1 BD PL 00 ST PE 0E 04 01 24 0C SA</b></p> <p>RL: Response Length (1 byte): The length of the total response.</p> <table border="0"> <tr> <td>No Error occurred</td> <td>0x0F</td> </tr> <tr> <td>Error occurred</td> <td>0x09</td> </tr> </table> <p>PL: Parameter Length (1 byte): The length of TCU_MNG_STANDARD_HCI_SET_RESP.</p>	No Error occurred	0x0F	Error occurred	0x09								
No Error occurred	0x0F												
Error occurred	0x09												



	<p>No Error occurred 0x06</p> <p>Error occurred 0x02</p> <p>ST: Status (1 byte): The status of the TCU_MNG_STANDARD_HCI_SET_RESP.</p> <p>Successful 0x00</p> <p>Parameter Failure 0x01</p> <p>No Device Initialization 0x03</p> <p>PE: Parameter Length (1 byte): The length of WriteClassOfDeviceResponse.</p> <p>No Error occurred 0x06</p> <p>Error occurred 0x02</p> <p>SA: Status parameter (1 byte): The status of WriteClassOfDeviceResponse.</p> <p>TCU_SPP_UUID_ASSIGN_RESP</p> <p><b>08 00 00 E5 A0 01 00 ST</b></p> <p>ST: Status (1 byte):</p> <p>Successful 0x00</p> <p>Parameter failure 0x01</p> <p>No Device Initialization 0x03</p> <p>Setup SPP 0x40</p>
<b>Description</b>	<p>TCU_MNG_STANDARD_HCI_SET_RESP_WriteClassOfDeviceResponse is the response to TCU_MNG_STANDARD_HCI_SET_REQ_WriteClassOfDeviceCommand indicating the status of the class of device writing request.</p> <p>TCU_SPP_UUID_ASSIGN_RESP is the response to TCU_SPP_UUID_ASSIGN_REQ indicating the status of the UUID setting request.</p>

### 4.3 Device Discovery

#### 4.3.1 Making the device discoverable

PAN1322

<b>Command</b>	<p><b>AT+JDIS=&lt;discoverable&gt;</b></p> <p>&lt;discoverable&gt; (1 character (DEC)):</p> <p>No scans enabled 0</p> <p>Inquiry Scan enabled (visible) 1</p> <p>Page Scan enabled (connectable) 2</p> <p>Inquiry &amp; Page Scan enabled (visible &amp; connectable) 3</p>
<b>Description</b>	<p>Forces PAN1322 into Page Scan / Inquiry Scan.</p> <p>Scan is automatically disabled when connected and at disconnection they are automatically enabled. Default configuration after a HW or SW reset is no scans enabled. A device with no service registered and discoverable, will not accept any incoming SPP connection request.</p>
<b>Response</b>	<p><b>&lt;general_response&gt;</b></p> <p>&lt;general_response&gt; (2 or 6 characters (DEC)):</p> <p>The general response of the module for requests indicating that the executing</p>

	<p>went OK or that an error occurred.</p> <p>OK                      Syntax correct, execution allowed and successful</p> <p>ERR=-1                Syntax error</p> <p>ERR=-2                Command not allowed at present execution status</p> <p>ERR=-3                Internal unknown protocol stack error</p>
<b>Description</b>	The general response to requests.

**PAN1026A**

<b>Command</b>	<p>TCU_MNG_SET_SCAN_REQ</p> <p><b>08 00 00 E1 0C 01 00 SM</b></p> <p>SM: Scan Mode (1 byte):</p> <p>Inquiry Scan OFF, Page Scan OFF            0x00</p> <p>Inquiry Scan ON, Page Scan OFF            0x01</p> <p>Inquiry Scan OFF, Page Scan ON            0x02</p> <p>Inquiry Scan ON, Page Scan ON            0x03</p>
<b>Description</b>	<p>Set Inquiry Scan and/or Page Scan.</p> <p>When this command is completed, TCU_MNG_SET_SCAN_RESP is generated.</p>
<b>Response</b>	<p>TCU_MNG_SET_SCAN_RESP</p> <p><b>08 00 00 E1 8C 01 00 ST</b></p> <p>Status (ST) (1 byte):</p> <p>Successful                                    0x00</p> <p>Parameter failure                            0x01</p> <p>No device initialization                    0x03</p> <p>No setup profile                             0x08</p>
<b>Description</b>	This response is generated, when Inquiry Scan and Page Scan setting is completed.

**4.3.2 Starting the device discovery**

**PAN1322**

<b>Command</b>	<p><b>AT+JDDS=&lt;Extended_Inquiry&gt;</b></p> <p>&lt;Extended Inquiry&gt; (1 character (DEC)):</p> <p>No remote name needed: Only information from EIR (Extended Inquiry Response) is used no RNR (Remote Name Request) is performed, all found addresses and the CoD are presented.            0</p> <p>Shortened name requested: Shortened name is used if it is available. If it is not available RNR is performed.            1</p> <p>Full name requested: RNR is performed for devices that do not respond with full name in EIR.            2</p>
<b>Description</b>	Causes PAN1322 to start a Device Discovery (Inquiry and Remote Name Request).
<b>Responses</b>	<p><b>&lt;general_response&gt;</b></p> <p>&lt;general_response&gt; (2 or 6 chars (DEC)):</p>

	<p>The general response of the module for requests indicating that the executing went OK or that an error occurred.</p> <table border="0"> <tr> <td>OK</td> <td>Syntax correct, execution allowed and successful</td> </tr> <tr> <td>ERR=-1</td> <td>Syntax error</td> </tr> <tr> <td>ERR=-2</td> <td>Command not allowed at present execution status</td> </tr> <tr> <td>ERR=-3</td> <td>Internal unknown protocol stack error</td> </tr> </table> <p>Then, if responses are returned:</p> <p><b>+RDDSRES=&lt;bd_addr&gt;,&lt;remote_name&gt;,&lt;COD&gt;</b></p> <p>&lt;bd_addr&gt; (12 chars (HEX)): The BD address of the remote device</p> <p>&lt;remote_name&gt; (variable length): The name of the remote device.</p> <p>If Extended Inquiry = 0, then remote name will be empty if no name is available.</p> <p>If Extended Inquiry = 1 or 2, remote_name will be page timeout if the RNR does not find any devices answering.</p> <p>&lt;COD&gt; (6 chars (HEX)): The class of the remote device.</p> <p>Completed by:</p> <p><b>+RDDSCNF=&lt;status&gt;</b></p> <p>&lt;status&gt; (1 char (DEC)): The status of the device discovery process.</p> <table border="0"> <tr> <td>Success</td> <td>0</td> </tr> <tr> <td>Failure</td> <td>Anything &gt; 0</td> </tr> </table>	OK	Syntax correct, execution allowed and successful	ERR=-1	Syntax error	ERR=-2	Command not allowed at present execution status	ERR=-3	Internal unknown protocol stack error	Success	0	Failure	Anything > 0
OK	Syntax correct, execution allowed and successful												
ERR=-1	Syntax error												
ERR=-2	Command not allowed at present execution status												
ERR=-3	Internal unknown protocol stack error												
Success	0												
Failure	Anything > 0												
<b>Description</b>	Returns the discovered devices.												

**PAN1026A**

<b>Command</b>	<p>TCU_MNG_DISCOVER_REMOTE_DEVICE_REQ</p> <p><b>08 00 00 E1 03 01 00 NR</b></p> <p>NR: Number of Reports (1 byte):</p> <table border="0"> <tr> <td>Number of searched devices</td> <td>0x01 – 0x10</td> </tr> </table>	Number of searched devices	0x01 – 0x10
Number of searched devices	0x01 – 0x10		
<b>Description</b>	<p>Set remote device discovery.</p> <p>When the PAN1026A starts the device discovery, TCU_ACCEPT is generated.</p> <p>In case remote devices were found, TCU_MNG_DISCOVER_REMOTE_DEVICE_RESULT_EVENT is generated.</p> <p>When this command is completed, TCU_MNG_DISCOVER_REMOTE_DEVICE_COMPLETE_EVENT is generated.</p> <p>When the PAN1026A finds the remote devices and the number of searched devices reaches the setting number, the PAN1026A continues to get the names of the discovered remote devices and transfers the remote device information to the Host CPU.</p> <p>If the number of discovered devices does not reach the setting number, the PAN1026A continues to get the device names 10.24 s later.</p> <p>After PAN1026A created a result event for all searched devices, the complete event is generated to Host CPU.</p>		
<b>Responses</b>	<p>TCU_ACCEPT</p> <p><b>0A 00 00 E1 F1 03 00 ST E1 03</b></p>		

	<p>ST Status (1 byte):</p> <table border="0"> <tr> <td>Successful</td> <td>0x00</td> </tr> <tr> <td>Parameter failure</td> <td>0x01</td> </tr> <tr> <td>No device initialization</td> <td>0x03</td> </tr> <tr> <td>On searching device</td> <td>0x04</td> </tr> <tr> <td>On searching device service</td> <td>0x05</td> </tr> <tr> <td>On progress of other profile connection</td> <td>0x0E</td> </tr> <tr> <td>On releasing SPP connection</td> <td>0x43</td> </tr> </table> <p>TCU_MNG_DISCOVER_REMOTE_DEVICE_RESULT_EVENT</p> <p><b>RL 00 00 E1 44 PL 00 BD BD BD BD BD BD CD CD CD LD DN ...</b></p> <p>RL: Response length (1 byte): The total length of the response (0x11 – 0x8F).</p> <p>PL: Parameter length (1 byte): The length of the following parameters -1 (0x0A – 0x8A).</p> <p>BD: BD address (6 bytes): The BD address of the remote device.</p> <p>CD: Class of Device (3 bytes): The device class of the remote device.</p> <p>LD: Length of Device Name (1 byte): The length of the user-friendly name (0x00 – 0x80).</p> <p>DN: Device Name (max. 128 bytes): The UTF-8 encoded User-friendly name.</p> <p>TCU_MNG_DISCOVER_REMOTE_DEVICE_COMPLETE_EVENT</p> <p><b>07 00 00 E1 43 00 00</b></p>	Successful	0x00	Parameter failure	0x01	No device initialization	0x03	On searching device	0x04	On searching device service	0x05	On progress of other profile connection	0x0E	On releasing SPP connection	0x43
Successful	0x00														
Parameter failure	0x01														
No device initialization	0x03														
On searching device	0x04														
On searching device service	0x05														
On progress of other profile connection	0x0E														
On releasing SPP connection	0x43														
<b>Description</b>	<p>The TCU_ACCEPT event is used to notify that the module has received the command from the host controller. After this event has been received, the host can send the next command to the module.</p> <p>The TCU_MNG_DISCOVER_REMOTE_DEVICE_RESULT_EVENT is generated, when remote devices were found.</p> <p>When device discovery is complete, the TCU_MNG_DISCOVER_REMOTE_DEVICE_COMPLETE_EVENT is generated.</p>														

## 4.4 Service Discovery

### PAN1322

<b>Command</b>	<p><b>AT+JSDS= &lt;bd_addr&gt;,&lt;length_uuid&gt;, &lt;uuid&gt;</b></p> <p>&lt;bd_addr&gt; (12 chars (HEX)): The BD address of the remote device.</p> <p>&lt;length_uuid&gt; (2 chars (DEC)): The length of the UUID (04 or 32).</p> <p>&lt;uuid&gt; (4/32 chars (HEX)): The service UUID to search for eg. 1101 or 0000110100001000800000805F9B34FB for Serial Port Profile.</p>
<b>Description</b>	<p>AT+JSDS causes the PAN1322 to start a specified service discovery of a specified remote device with the given BD address and UUID.</p>
<b>Response</b>	<p><b>&lt;general_response&gt;</b></p> <p>&lt;general_response&gt; (2 or 6 chars (DEC)):</p>

	<p>The general response of the module for requests indicating that the executing went OK or that an error occurred.</p> <table border="0"> <tr> <td>OK</td> <td>Syntax correct, execution allowed and successful</td> </tr> <tr> <td>ERR=-1</td> <td>Syntax error</td> </tr> <tr> <td>ERR=-2</td> <td>Command not allowed at present execution status</td> </tr> <tr> <td>ERR=-3</td> <td>Internal unknown protocol stack error</td> </tr> </table> <p>Then, if responses are returned:</p> <p><b>+RSDSRES=&lt;remote_service_name&gt;,&lt;remote_service_channel&gt;</b></p> <p>&lt;remote_service_name&gt; (variable length): The name of the remote service.          &lt;remote_service_channel&gt; (2 chars (DEC)): The channel of the service.</p> <p>Completed by:</p> <p><b>+RSDSCNF=&lt;status&gt;</b></p> <p>&lt;status&gt; (1 char (DEC)): The status of the service discovery process.</p> <table border="0"> <tr> <td>Success</td> <td>0</td> </tr> <tr> <td>Failure</td> <td>Anything &gt; 0</td> </tr> </table>	OK	Syntax correct, execution allowed and successful	ERR=-1	Syntax error	ERR=-2	Command not allowed at present execution status	ERR=-3	Internal unknown protocol stack error	Success	0	Failure	Anything > 0
OK	Syntax correct, execution allowed and successful												
ERR=-1	Syntax error												
ERR=-2	Command not allowed at present execution status												
ERR=-3	Internal unknown protocol stack error												
Success	0												
Failure	Anything > 0												
<b>Description</b>	Returns the discovered services.												

**PAN1026A**

<b>Command</b>	<p>TCU_MNG_DISCOVER_REMOTE_SERVICE_REQ</p> <p><b>RL 00 00 E1 05 PL 00 SM BD BD BD BD BD BD UL LK ...</b></p> <p>RL: Request length (1 byte): The total length of the request (0x0F or 0x1F).          PL: Parameter length (1 byte):              The length of the following parameters -1 (0x08 or 0x18).          SM: Security Mode (1 byte): Set of Bluetooth security modes.</p> <table border="0"> <tr> <td>Mode 3</td> <td>0x00</td> </tr> <tr> <td>Mode 2</td> <td>0x01</td> </tr> </table> <p>BD: BD Address (6 bytes): The BD address of the remote device.          UL: Use of link key (1 byte): Set link key for Bluetooth connection.</p> <table border="0"> <tr> <td>No</td> <td>0x00</td> </tr> <tr> <td>Yes</td> <td>0x01</td> </tr> </table> <p>LK: Link key (16 bytes):              The link key of the connection. This field can be omitted when UL is 0x00.</p> <p><b>Note:</b> PAN1026A link keys have to be handled and stored by the host controller.</p>	Mode 3	0x00	Mode 2	0x01	No	0x00	Yes	0x01
Mode 3	0x00								
Mode 2	0x01								
No	0x00								
Yes	0x01								
<b>Description</b>	<p>TCU_MNG_DISCOVER_REMOTE_SERVICE_REQ causes the PAN1026A to search the remote device for services. TCU_ACCEPT is generated to notify to Host CPU, when this command operation is started.          TCU_MNG_DISCOVER_REMOTE_SERVICE_EVENT is generated, when this command is completed.</p>								
<b>Response</b>	<p>TCU_ACCEPT</p> <p><b>0A 00 00 E1 F1 03 00 ST E1 05</b></p>								

<p><b>ST Status (1 byte):</b></p> <table border="0"> <tr><td>Successful</td><td>0x00</td></tr> <tr><td>Parameter failure</td><td>0x01</td></tr> <tr><td>No device initialization</td><td>0x03</td></tr> <tr><td>On searching device</td><td>0x04</td></tr> <tr><td>On searching device service</td><td>0x05</td></tr> <tr><td>On progress of other profile connection</td><td>0x0E</td></tr> <tr><td>On progress of SPP connection or establishing SPP</td><td>0x42</td></tr> <tr><td>On releasing SPP connection</td><td>0x43</td></tr> </table> <p><b>TCU_MNG_DISCOVER_REMOTE_SERVICE_EVENT</b></p> <p><b>RL RL 00 E1 45 PL 00 ST BD BD BD BD BD BD SC SE ... IP IL EI</b></p> <p>RL: Response length (2 bytes): The total length of the response (0xXX – 0xXX).</p> <p>PL: Parameter length (1 byte): The length of the following parameters -1 (0x08 – 0xFF).</p> <p>ST: Status (1 byte): The operation result status.</p> <table border="0"> <tr><td>Successful</td><td>0x00</td></tr> <tr><td>SDP connection failure</td><td>0x8C</td></tr> <tr><td>No supported SDP</td><td>0x8D</td></tr> </table> <p>BD: BD address (6 bytes): The BD address of the remote device.</p> <p>SC: Service count (1 byte): The number of services on the remote device.</p> <p>SE: Service type (1 byte): The profile indicator for each supported profile.</p> <table border="0"> <tr><td>SPP (B-Party)</td><td>0x03</td></tr> <tr><td>Device ID (DI)</td><td>0x0E</td></tr> </table> <p>IP: Extension info profile (1 byte): The profile that has additional information.</p> <table border="0"> <tr><td>SPP</td><td>0x02</td></tr> <tr><td>Device ID</td><td>0x03</td></tr> </table> <p>IL: Extension info length (1 byte): The length of the additional information.</p> <p>EI: Extension info (186 bytes): The additional information.</p> <p><b>Example: Device ID and SPP</b></p> <table border="0"> <tr><td>Parameter length:</td><td>0x1D</td></tr> <tr><td>Status:</td><td>0x00</td></tr> <tr><td>BD Address:</td><td>0x001343XXXXXX</td></tr> <tr><td>Service count:</td><td>0x02</td></tr> <tr><td>Service type:</td><td>0x03 (SPP)</td></tr> <tr><td>Service type:</td><td>0x0B (Device ID)</td></tr> <tr><td>Extension info profile:</td><td>0x02 (SPP)</td></tr> <tr><td>Extension info length:</td><td>0x03</td></tr> <tr><td>Extension info:</td><td>0x02 (Number of server channels)</td></tr> <tr><td>Extension info:</td><td>0x01 (Server channel 1)</td></tr> <tr><td>Extension info:</td><td>0x02 (Server channel 2)</td></tr> </table>	Successful	0x00	Parameter failure	0x01	No device initialization	0x03	On searching device	0x04	On searching device service	0x05	On progress of other profile connection	0x0E	On progress of SPP connection or establishing SPP	0x42	On releasing SPP connection	0x43	Successful	0x00	SDP connection failure	0x8C	No supported SDP	0x8D	SPP (B-Party)	0x03	Device ID (DI)	0x0E	SPP	0x02	Device ID	0x03	Parameter length:	0x1D	Status:	0x00	BD Address:	0x001343XXXXXX	Service count:	0x02	Service type:	0x03 (SPP)	Service type:	0x0B (Device ID)	Extension info profile:	0x02 (SPP)	Extension info length:	0x03	Extension info:	0x02 (Number of server channels)	Extension info:	0x01 (Server channel 1)	Extension info:	0x02 (Server channel 2)
Successful	0x00																																																			
Parameter failure	0x01																																																			
No device initialization	0x03																																																			
On searching device	0x04																																																			
On searching device service	0x05																																																			
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SPP (B-Party)	0x03																																																			
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Parameter length:	0x1D																																																			
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	Extension info profile: 0x03 (Device ID) Extension info length: 0x0B (Device ID description length) Extension info: 0XXXXX (Specification ID) Extension info: 0XXXXX (Vendor ID) Extension info: 0XXXXX (Product ID) Extension info: 0XXXXX (Version) Extension info: 0XXX (Primary record) Extension info: 0XXXXX (Vendor ID source)
<b>Description</b>	TCU_MNG_DISCOVER_REMOTE_SERVICE_EVENT is generated, when the service information of a remote device was found. With this event, the BD_ADDR and service information of a remote device is transferred to the host CPU.

In addition to the mentioned commands above, the PAN1026A provides a function to cancel an ongoing service discovery. This command and its response are described in the following table.

**PAN1026A**

<b>Command</b>	TCU_MNG_DISCOVER_REMOTE_SERVICE_CANCEL_REQ <b>0D 00 00 E1 12 06 00 BD BD BD BD BD BD</b> BD: BD address (6 bytes): The BD address of the remote device.
<b>Description</b>	TCU_MNG_DISCOVER_REMOTE_SERVICE_CANCEL_REQ causes the PAN1026A to cancel the service discovery. TCU_ACCEPT is generated to notify the host controller, when this command operation is started.
<b>Response</b>	TCU_ACCEPT <b>0A 00 00 E1 F1 03 00 ST E1 12</b> ST Status (1 byte): Successful 0x00 Parameter failure 0x01 No device initialization 0x03  TCU_MNG_DISCOVER_REMOTE_SERVICE_CANCEL_EVENT <b>0D 00 00 E1 52 06 00 BD BD BD BD BD BD</b> BD: BD address (6 bytes): The BD address of the remote device.
<b>Description</b>	TCU_MNG_DISCOVER_REMOTE_SERVICE_CANCEL_REQ is the acknowledging response for the TCU_MNG_DISCOVER_REMOTE_SERVICE_CANCEL_REQ.

## 4.5 Device Connection

### 4.5.1 Connecting an SPP Link

#### PAN1322

<b>Command</b>	<p><b>AT+JCCR=&lt;bd_addr&gt;, &lt;service channel&gt;</b></p> <p>&lt;bd_addr&gt; (12 chars (HEX)): The bluetooth address of the remote device.</p> <p>&lt;service_channel&gt; (2 chars (DEC)):</p> <p>The service channel to connect to (01 - 30). It can be received from a service discovery AT+JSDS.</p>								
<b>Description</b>	Instructs the PAN1322 to connect to a remote Bluetooth device.								
<b>Response</b>	<p><b>&lt;general_response&gt;</b></p> <p>&lt;general_response&gt; (2 or 6 chars (DEC)):</p> <p>The general response of the module for requests indicating that the executing went OK or that an error occurred.</p> <table border="0"> <tr> <td>OK</td> <td>Syntax correct, execution allowed and successful</td> </tr> <tr> <td>ERR=-1</td> <td>Syntax error</td> </tr> <tr> <td>ERR=-2</td> <td>Command not allowed at present execution status</td> </tr> <tr> <td>ERR=-3</td> <td>Internal unknown protocol stack error</td> </tr> </table> <p>Followed by:</p> <p><b>+RCCRCNF = &lt;MTU_size&gt;, &lt;service&gt;, &lt;status&gt;</b></p> <p>&lt;MTU_size&gt; (3 chars (DEC)): The maximum transmission unit (01 to 500).</p> <p>&lt;service&gt; (4 or 32 chars (DEC)):</p> <p>The service the remote device is connected to. The host of the initializing device specifies which service it connects to in AT+JCCR.</p> <p>&lt;status&gt; (1 char (DEC)):</p> <p>The status of the request. If maximum number of allowed connections already exists: ERR=-2.</p>	OK	Syntax correct, execution allowed and successful	ERR=-1	Syntax error	ERR=-2	Command not allowed at present execution status	ERR=-3	Internal unknown protocol stack error
OK	Syntax correct, execution allowed and successful								
ERR=-1	Syntax error								
ERR=-2	Command not allowed at present execution status								
ERR=-3	Internal unknown protocol stack error								
<b>Description</b>	Indicates the status of the connection process.								

#### PAN1026A

<b>Command</b>	<p>TCU_SPP_CONNECT_REQ</p> <p><b>RL 00 00 E5 03 PL 00 BD BD BD BD BD BD 07 03 00 00 00 00 00 00 UL LK ...</b></p> <p>RL: Request length (1 byte): The total length of the request (0x16 or 0x26).</p> <p>PL: Parameter length (1 byte): The length of the following parameters (0x0F or 0x1F).</p> <p>BD: BD Address (6 bytes): The Bluetooth device address of the remote device.</p> <p>UL: Use of Link Key (1 byte): The link key usage setting.</p> <table border="0"> <tr> <td>Don't use link key. Pairing will be performed again.</td> <td>0x00</td> </tr> <tr> <td>Use a link key, if it is available from a previous pairing process</td> <td>0x01</td> </tr> </table> <p>LK: Link Key (16 bytes): The link key of a previous pairing process.</p> <p><b>Note:</b> PAN1026A link keys have to be handled and stored by the host controller.</p>	Don't use link key. Pairing will be performed again.	0x00	Use a link key, if it is available from a previous pairing process	0x01
Don't use link key. Pairing will be performed again.	0x00				
Use a link key, if it is available from a previous pairing process	0x01				



<b>Description</b>	To establish an SPP connection with a specific remote device. TCU_ACCEPT is generated to notify the command operation started on host controller. When the service level connection is established, TCU_SPP_CONNECT_EVENT is generated.																										
<b>Response</b>	<p>TCU_ACCEPT</p> <p><b>0A 00 00 E1 F1 03 00 ST E5 03</b></p> <p>ST: Status (1 byte):</p> <table border="0"> <tr><td>Successful</td><td>0x00</td></tr> <tr><td>Parameter failure</td><td>0x01</td></tr> <tr><td>No device initialization</td><td>0x03</td></tr> <tr><td>On Searching device</td><td>0x04</td></tr> <tr><td>On searching device service</td><td>0x05</td></tr> <tr><td>Under connection setup of other profile</td><td>0x0E</td></tr> <tr><td>No setup SPP</td><td>0x41</td></tr> <tr><td>On progress SPP connection or Establish SPP</td><td>0x42</td></tr> <tr><td>Releasing SPP</td><td>0x43</td></tr> </table> <p>TCU_SPP_CONNECT_EVENT</p> <p><b>EL 00 00 E5 43 PL 00 ST BD BD BD BD BD BD NF NF LN DN ...</b></p> <p>EL: Event length (2 bytes): The total length of the event (0x11 – 0x29).</p> <p>PL: Parameter length (1 byte): The length of the following parameters -1 (0xA – 0x22).</p> <p>ST: Status (1 byte): The status of the connection establishment.</p> <table border="0"> <tr><td>Successful</td><td>0x00</td></tr> <tr><td>No Simple Device Pairing (SDP) service supported</td><td>0x8D</td></tr> <tr><td>SPP connection timeout</td><td>0xD0</td></tr> <tr><td>SPP connection failure</td><td>0xD3</td></tr> </table> <p>BD: BD Address (6 bytes): The Bluetooth device address of the remote device.</p> <p>NF: Negotiated Frame Size (NF) (2 bytes):</p> <p>The maximum frame size of an SPP frame. This value has to be used in the Length of Data field of the TCU_SPP_DATA_TRANSFER_REQ request.</p> <p>LN: Length of device name (1 byte):</p> <p>The length of the remote device name. When no name is set the value is 0x00.</p> <p>DN: Device Name (max. 24 bytes):</p> <p>The UTF-8 encoded remote device name. Not present if the length is 0x00.</p>	Successful	0x00	Parameter failure	0x01	No device initialization	0x03	On Searching device	0x04	On searching device service	0x05	Under connection setup of other profile	0x0E	No setup SPP	0x41	On progress SPP connection or Establish SPP	0x42	Releasing SPP	0x43	Successful	0x00	No Simple Device Pairing (SDP) service supported	0x8D	SPP connection timeout	0xD0	SPP connection failure	0xD3
Successful	0x00																										
Parameter failure	0x01																										
No device initialization	0x03																										
On Searching device	0x04																										
On searching device service	0x05																										
Under connection setup of other profile	0x0E																										
No setup SPP	0x41																										
On progress SPP connection or Establish SPP	0x42																										
Releasing SPP	0x43																										
Successful	0x00																										
No Simple Device Pairing (SDP) service supported	0x8D																										
SPP connection timeout	0xD0																										
SPP connection failure	0xD3																										
<b>Description</b>	<p>The TCU_ACCEPT event is used to notify that the module has received the command from the host controller. After this event has been received, the host can send the next command to the module.</p> <p>TCU_SPP_CONNECT_EVENT is generated, when SPP connection is established.</p>																										

### 4.5.2 Incoming Connection Request Events

#### PAN1322

<b>Response</b>	<b>+RCOI=&lt;bd_addr&gt;</b>  <bd_addr> (12 chars (HEX)): The Bluetooth device address of the remote device.
<b>Description</b>	Indicates a remote connection request. This request can be answered with the command AT+JACR= <accept>.

#### PAN1026A

<b>Event</b>	TCU_MNG_CONNECTION_REQUEST_EVENT  <b>10 00 00 E1 55 07 00 BD BD BD BD BD BD CD CD CD</b>  BD: BD address (6 bytes): BD address of the remote device. CD: Class of device (3 bytes): The class of the remote device.
<b>Description</b>	TCU_MNG_CONNECTION_REQUEST_EVENT is generated when a remote device requests to connect to the PAN1026A. If the host controller does not execute TCU_MNG_CONNECTION_ACCEPT_REQ within 5 seconds, the PAN1026A will automatically cancel the request and generate TCU_MNG_CONNECTION_STATUS_EVENT.

### 4.5.3 Accepting Connection Requests

#### PAN1322

<b>Command</b>	<b>AT+JACR=&lt;accept&gt;</b>  <accept> (1 char (DEC)): The parameter to control connection acceptance.  Do not accept                    0 Accept                                1
<b>Description</b>	AT+JACR=<accept> is used to answer to a connection indication (+RCOI).
<b>Response</b>	<b>&lt;general_response&gt;</b>  <general_response> (2 or 6 chars (DEC)):  The general response of the module for requests indicating that the executing went OK or that an error occurred.  OK                                    Syntax correct, execution allowed and successful ERR=-1                                Syntax error ERR=-2                                Command not allowed at present execution status ERR=-3                                Internal unknown protocol stack error
<b>Description</b>	The different responses possible to the request.

#### PAN1026A

<b>Command</b>	TCU_MNG_CONNECTION_ACCEPT_REQ  <b>RL 00 00 E1 13 PL 00 RT BD BD BD BD BD BD UL LK ...</b>  RL: Request length (1 byte): The total length of the request. PL: Parameter length (1 byte): The length of the parameters. RT: Response Type (1 byte): The response type of the request.
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	<p>Accept                    0x00</p> <p>Reject                    0x01</p> <p>BD: BD address (6 bytes): The BD address of the remote device.</p> <p>UL: Use of link key (1 byte): Indicator for the use of a link key.</p> <p>LK: Link key (16 bytes): The link key of the connection.</p> <p><b>Note:</b> PAN1026A link keys have to be handled and stored by the host controller.</p>								
<b>Description</b>	TCU_MNG_CONNECTION_ACCEPT_REQ is used to accept or reject a received connection request from a remote device. When this command is completed, TCU_MNG_CONNECTION_ACCEPT_RESP is generated.								
<b>Response</b>	<p>TCU_MNG_CONNECTION_ACCEPT_RESP</p> <p><b>08 00 00 E1 93 01 00 ST</b></p> <p>ST: Status (1 byte):</p> <table border="0"> <tr> <td>Successful</td> <td>0x00</td> </tr> <tr> <td>Parameter failure</td> <td>0x01</td> </tr> <tr> <td>No device initialization</td> <td>0x03</td> </tr> <tr> <td>No connection</td> <td>0x06</td> </tr> </table>	Successful	0x00	Parameter failure	0x01	No device initialization	0x03	No connection	0x06
Successful	0x00								
Parameter failure	0x01								
No device initialization	0x03								
No connection	0x06								
<b>Description</b>	When TCU_MNG_CONNECTION_ACCEPT_REQ is completed, this response is generated.								

#### 4.5.4 Accepting Connection Requests Automatically

##### PAN1322

<b>Command</b>	<p><b>AT+JAAC=&lt;auto_accept&gt;</b></p> <p>&lt;auto_accept&gt; (1 char (DEC)): The parameter to control auto connection acceptance.</p> <table border="0"> <tr> <td>Host will be notified with incoming connection indication (+RCOI) – (no auto accept). This is the default configuration.</td> <td>0</td> </tr> <tr> <td>PAN1322 will automatically accept incoming connection requests. Host will be notified.</td> <td>1</td> </tr> </table>	Host will be notified with incoming connection indication (+RCOI) – (no auto accept). This is the default configuration.	0	PAN1322 will automatically accept incoming connection requests. Host will be notified.	1				
Host will be notified with incoming connection indication (+RCOI) – (no auto accept). This is the default configuration.	0								
PAN1322 will automatically accept incoming connection requests. Host will be notified.	1								
<b>Description</b>	Forces the PAN1322 to automatically accept connection requests.								
<b>Response</b>	<p><b>&lt;general_response&gt;</b></p> <p>&lt;general_response&gt; (2 or 6 chars (DEC)):</p> <p>The general response of the module for requests indicating that the executing went OK or that an error occurred.</p> <table border="0"> <tr> <td>OK</td> <td>Syntax correct, execution allowed and successful</td> </tr> <tr> <td>ERR=-1</td> <td>Syntax error</td> </tr> <tr> <td>ERR=-2</td> <td>Command not allowed at present execution status</td> </tr> <tr> <td>ERR=-3</td> <td>Internal unknown protocol stack error</td> </tr> </table>	OK	Syntax correct, execution allowed and successful	ERR=-1	Syntax error	ERR=-2	Command not allowed at present execution status	ERR=-3	Internal unknown protocol stack error
OK	Syntax correct, execution allowed and successful								
ERR=-1	Syntax error								
ERR=-2	Command not allowed at present execution status								
ERR=-3	Internal unknown protocol stack error								
<b>Description</b>	The general response to a request.								

In order to connect to the PAN1026A automatically (Just works scenario) the input and output capabilities have to be set, when the module requests these from the host. To do that, please refer to the PAN1026A commands listed in section [4.5.5 Security Handling](#) as well as the PAN1026A example sequences for connection establishment ([4.7.4 Connection Establishment](#)).

## 4.5.5 Security Handling

Due to the different command interfaces of the PAN1322 and the PAN1026A, the security handling differs. The PAN1322's AT commands can be used to predefine the capabilities of the device, which are automatically used by the module when necessary. The PAN1026A's command interface does not provide this feature. Device capabilities are actively requested when necessary, leading to a different handling for the host controller.

Unlike before and due to the mentioned reasons, in this section the PAN1322 and PAN1026A security handling will be listed separately.

### PAN1322

<b>Response</b>	<b>+RPCI=&lt;bd_addr&gt;, &lt;simple_pairing&gt;</b>  <bd_addr> (12 chars (HEX)): The BD address of the remote device.  <simple_pairing> (1 char (DEC)): The pairing setting.  Legacy pairing                             0 Secure simple pairing                    1
<b>Description</b>	The PIN code request from a remote Bluetooth device. This event has to be answered with the AT+JPCR command.

<b>Command</b>	<b>AT+JPCR=&lt;length_PIN_code&gt;, &lt;PIN_code&gt;</b>  <length_PIN_code> (2 chars (DEC)): The length of the PIN code (01 - 16). <PIN_code> (<length_PIN_code> chars (DEC)): The PIN code for the pairing.
<b>Description</b>	The PIN code reply in response to a PIN code request from a remote Bluetooth device.
<b>Response</b>	<b>&lt;general_response&gt;</b>  <general_response> (2 or 6 chars (DEC)):  The general response of the module for requests indicating that the executing went OK or that an error occurred.  OK   Syntax correct, execution allowed and successful ERR=-1                                 Syntax error ERR=-2                                 Command not allowed at present execution status ERR=-3                                 Internal unknown protocol stack error  <b>+RSLE</b>
<b>Description</b>	The general response to a request and an indication that a secure link has been established.

<b>Response</b>	<b>+RPNE= &lt;Numerical_Value&gt;</b>  <Numerical_Value> (6 chars (DEC)): The numerical value to be display.
<b>Description</b>	The passkey notification event. This event will only be generated, when the device has output capabilities.

<b>Response</b>	<b>+RUCE= &lt;Numerical_Value&gt;</b>  <Numerical_Value> (6 chars (DEC)): The numerical value to be display.
<b>Description</b>	The user confirmation event. This event has to be answered with the AT+JUCR command.

<b>Command</b>	<b>AT+JUCR=&lt;Status&gt;</b>  <Status> (1 char (DEC)): The status of the response.  Not accepted                      0 Accepted                            1
<b>Description</b>	The user confirmation reply command to confirm or reject a numerical value.
<b>Response</b>	<b>&lt;general_response&gt;</b>  <general_response> (2 or 6 chars (DEC)):  The general response of the module for requests indicating that the executing went OK or that an error occurred.  OK                                      Syntax correct, execution allowed and successful ERR=-1                                Syntax error ERR=-2                                Command not allowed at present execution status ERR=-3                                Internal unknown protocol stack error
<b>Description</b>	The general response to a request.

## PAN1026A

In order to fully understand the usage of the commands listed below, please refer to the PAN1026A example sequences for connection establishment ⇒ [4.7.4 Connection Establishment](#).

<b>Event</b>	TCU_MNG_SSP_INFO_EVENT_HCI_IO_Capability_Request_Event <b>0F 00 00 E1 7D 08 00 31 06 BD BD BD BD BD BD</b>  BD: BD address (6 bytes): The BD address of the remote device (LSB first).
<b>Description</b>	Indicates that the IO capabilities of the host controller are required for a simple pairing process. The host shall respond with a TCU_MNG_SSP_SET_REQ_HCI_IO_Capability_Request_Reply or TCU_MNG_SSP_SET_REQ_HCI_IO_Capability_Request_Negative_Reply.

<b>Command</b>	TCU_MNG_SSP_SET_REQ_HCI_IO_Capability_Request_Reply <b>13 00 00 E1 3D 0C 00 2B 04 09 BD BD BD BD BD BD IO OB AR</b>  BD: BD address (6 bytes): The BD address of the remote device (LSB first).  IO: IO capability (1 byte): The IO capability of the remote device.
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	<p>DisplayOnly 0x00</p> <p>DisplayYesNo 0x01</p> <p>KeyboardOnly 0x02</p> <p>NoInputNoOutput 0x03</p> <p>Reserved for future use 0x04 – 0xFF</p> <p>OB: OOB data present (1 byte):</p> <p>The indication whether OOB authentication data is present or not.</p> <p>OOB authentication data not present 0x00</p> <p>OOB authentication data from remote device present 0x01</p> <p>Reserved for future use 0x02 – 0xFF</p> <p>AR: Authentication requirement (1 byte):</p> <p>MITM and general/dedicated bonding.</p> <p>MITM protection not required – No bonding. 0x00 Numeric comparison with automatic accept allowed.</p> <p>MITM protection required – No bonding. 0x01 Use IO capabilities to determine authentication procedure.</p> <p>MITM protection required – Dedicated bonding. 0x02 Numeric comparison with automatic accept allowed.</p> <p>MITM Protection Required – Dedicated Bonding. 0x03 Use IO Capabilities to determine authentication procedure.</p> <p>MITM Protection Not Required – General Bonding. 0x04 Numeric Comparison with automatic accept allowed.</p> <p>MITM Protection Required – General Bonding. 0x05 Use IO capabilities to determine authentication procedure.</p> <p>Reserved for future use. 0x06 – 0xFF</p>
<b>Description</b>	TCU_MNG_SSP_SET_REQ_HCI_IO_Capability_Request_Reply is used to reply to a TCU_MNG_SSP_INFO_EVENT_HCI_IO_Capability_Request_Event and specifies the current I/O capabilities of the host. This includes the host input, output and out-of-band (OOB) capabilities.
<b>Response</b>	<p>TCU_MNG_SSP_SET_RESP_HCI_IO_Capability_Request_Reply_Response</p> <p><b>15 00 00 E1 BD 0E 00 00 0C 0E 0A 01 2B 04 ST BD BD BD BD BD BD</b></p> <p>ST: Status (1 byte):</p> <p>Command success 0x00</p> <p>Command failure 0xFF (anything &gt; 0x00)</p> <p>BD: BD address (6 bytes): The BD address of the remote device (LSB first).</p>
<b>Description</b>	TCU_MNG_SSP_SET_RESP_HCI_IO_Capability_Request_Reply_Response is the response to the TCU_MNG_SSP_SET_REQ_HCI_IO_Capability_Request_Reply.
<b>Command</b>	<p>TCU_MNG_SSP_SET_REQ_HCI_IO_Capability_Request_Negative_Reply</p> <p><b>11 00 00 E1 3D 0C 00 34 04 07 BD BD BD BD BD BD 38</b></p> <p>BD: BD address (6 bytes): The BD address of the remote device (LSB first).</p>
<b>Description</b>	TCU_MNG_SSP_SET_REQ_HCI_IO_Capability_Request_Negative_Reply is used to reject a pairing attempt after a TCU_MNG_SSP_INFO_EVENT_HCI_IO_Capability_Request_Event has been received by the host.

<b>Response</b>	<p>TCU_MNG_SSP_SET_RESP_HCI_IO_Capability_Request_Negative_Reply_Response  <b>15 00 00 E1 BD 0E 00 00 0C 0E 0A 01 34 04 ST BD BD BD BD BD BD</b></p> <p>ST: Status (1 byte):</p> <table> <tr> <td>Command success</td> <td>0x00</td> </tr> <tr> <td>Command failure</td> <td>0xXX (anything &gt; 0x00)</td> </tr> </table> <p>BD: BD address (6 bytes): The BD address of the remote device (LSB first).</p>	Command success	0x00	Command failure	0xXX (anything > 0x00)
Command success	0x00				
Command failure	0xXX (anything > 0x00)				
<b>Description</b>	<p>TCU_MNG_SSP_SET_RESP_HCI_IO_Capability_Request_Negative_Reply_Response is the response to the TCU_MNG_SSP_SET_REQ_HCI_IO_Capability_Request_Negative_Reply.</p>				

<b>Event</b>	<p>TCU_MNG_SSP_INFO_EVENT_HCI_IO_Capability_Response_Event  <b>12 00 00 E1 7D 0B 00 32 09 BD BD BD BD BD BD IO OB AR</b></p> <p>BD: BD address (6 bytes): The BD address of the remote device (LSB first).</p> <p>IO: IO capability (1 byte): The IO capability of the remote device.</p> <table> <tr> <td>DisplayOnly</td> <td>0x00</td> </tr> <tr> <td>DisplayYesNo</td> <td>0x01</td> </tr> <tr> <td>KeyboardOnly</td> <td>0x02</td> </tr> <tr> <td>NoInputNoOutput</td> <td>0x03</td> </tr> <tr> <td>Reserved for future use</td> <td>0x04 – 0xFF</td> </tr> </table> <p>OB: OOB data present (1 byte):</p> <p>The indication whether OOB authentication data is present or not.</p> <table> <tr> <td>OOB authentication data not present</td> <td>0x00</td> </tr> <tr> <td>OOB authentication data from remote device present</td> <td>0x01</td> </tr> <tr> <td>Reserved for future use</td> <td>0x02 – 0xFF</td> </tr> </table> <p>AR: Authentication requirement (1 byte):</p> <p>Man in the middle (MITM) and general/dedicated bonding.</p> <table> <tr> <td>MITM protection not required – No bonding. Numeric comparison with automatic accept allowed.</td> <td>0x00</td> </tr> <tr> <td>MITM protection required – No bonding. Use IO capabilities to determine authentication procedure.</td> <td>0x01</td> </tr> <tr> <td>MITM protection required – Dedicated bonding. Numeric comparison with automatic accept allowed.</td> <td>0x02</td> </tr> <tr> <td>MITM Protection Required – Dedicated Bonding. Use IO Capabilities to determine authentication procedure.</td> <td>0x03</td> </tr> <tr> <td>MITM Protection Not Required – General Bonding. Numeric Comparison with automatic accept allowed.</td> <td>0x04</td> </tr> <tr> <td>MITM Protection Required – General Bonding. Use IO capabilities to determine authentication procedure.</td> <td>0x05</td> </tr> <tr> <td>Reserved for future use.</td> <td>0x06 – 0xFF</td> </tr> </table>	DisplayOnly	0x00	DisplayYesNo	0x01	KeyboardOnly	0x02	NoInputNoOutput	0x03	Reserved for future use	0x04 – 0xFF	OOB authentication data not present	0x00	OOB authentication data from remote device present	0x01	Reserved for future use	0x02 – 0xFF	MITM protection not required – No bonding. Numeric comparison with automatic accept allowed.	0x00	MITM protection required – No bonding. Use IO capabilities to determine authentication procedure.	0x01	MITM protection required – Dedicated bonding. Numeric comparison with automatic accept allowed.	0x02	MITM Protection Required – Dedicated Bonding. Use IO Capabilities to determine authentication procedure.	0x03	MITM Protection Not Required – General Bonding. Numeric Comparison with automatic accept allowed.	0x04	MITM Protection Required – General Bonding. Use IO capabilities to determine authentication procedure.	0x05	Reserved for future use.	0x06 – 0xFF
DisplayOnly	0x00																														
DisplayYesNo	0x01																														
KeyboardOnly	0x02																														
NoInputNoOutput	0x03																														
Reserved for future use	0x04 – 0xFF																														
OOB authentication data not present	0x00																														
OOB authentication data from remote device present	0x01																														
Reserved for future use	0x02 – 0xFF																														
MITM protection not required – No bonding. Numeric comparison with automatic accept allowed.	0x00																														
MITM protection required – No bonding. Use IO capabilities to determine authentication procedure.	0x01																														
MITM protection required – Dedicated bonding. Numeric comparison with automatic accept allowed.	0x02																														
MITM Protection Required – Dedicated Bonding. Use IO Capabilities to determine authentication procedure.	0x03																														
MITM Protection Not Required – General Bonding. Numeric Comparison with automatic accept allowed.	0x04																														
MITM Protection Required – General Bonding. Use IO capabilities to determine authentication procedure.	0x05																														
Reserved for future use.	0x06 – 0xFF																														
<b>Description</b>	<p>Indicates to the host that IO capabilities from a remote device specified by BD address have been received during a simple pairing process.</p>																														





<b>Description</b>	The response to TCU_MNG_SSP_SET_REQ_HCI_User_Confirmation_Request_Negative_Reply.
<b>Event</b>	TCU_MNG_SSP_INFO_EVENT_HCI_Simple_Pairing_Complete_Event <b>10 00 00 E1 7D 09 00 36 07 ST BD BD BD BD BD BD</b> ST: Status (1 byte): The status of the event. Command success 0x00 Command failure 0xFF (anything > 0x00) BD: BD address (6 bytes): The BD address of the remote device (LSB first).
<b>Description</b>	Indicates that the simple pairing process has completed. A host that is displaying a numeric value can use this event to change its UI.

### 4.5.6 Disconnecting SPP Link

#### PAN1322

<b>Command</b>	<b>AT+JSDR</b>
<b>Description</b>	Forces an SPP disconnection.
<b>Response</b>	<b>OK</b>
<b>Description</b>	Disconnection Response.

#### PAN1026A

<b>Command</b>	TCU_SPP_DISCONNECT_REQ <b>07 00 00 E5 04 00 00</b>
<b>Description</b>	TCU_SPP_DISCONNECT_REQ requests to disconnect an SPP connection. TCU_ACCEPT is generated to notify the start of this command operation. When the connection is disconnected, TCU_SPP_DISCONNECT_EVENT is generated.
<b>Response</b>	TCU_ACCEPT <b>0A 00 00 E1 F1 03 00 ST E5 04</b> ST: Status (1 byte): Success 0x00 Parameter failure 0x01 No device initialization 0x03 Under Connection setup of other profile 0x0E No setup SPP 0x41  TCU_SPP_DISCONNECT_EVENT <b>0F 00 00 E5 44 08 00 ST BD BD BD BD BD BD RE</b> ST: Status (1 byte): The status of the disconnection. Successful 0x00 SPP release timeout 0xD2 BD: BD Address (6 bytes): The BD address of the remote device. RE: Reason (1 byte): The reason for the disconnection.

	Releasing required from local host	0x01
	Releasing required from remote device	0x02
	Disconnection error	0x03
	Link loss	0x04
<b>Description</b>	TCU_ACCEPT is generated to notify the start of the TCU_SPP_DISCONNECT command execution. TCU_SPP_DISCONNECT_EVENT is generated, when the SPP disconnection is completed.	

### 4.5.7 Connection Status Events

To provide a connection status feedback to the host controller, the PAN1322 uses multiple events, which are listed below.

#### PAN1322

<b>Event</b>	<b>+RSLE</b>
<b>Description</b>	Indicates that a secure link has been established.

#### PAN1322

<b>Event</b>	<b>+RDII</b>
<b>Description</b>	Indicates the disconnection.

The PAN1026A combines its connection status information in the following event.

#### PAN1026A

<b>Event</b>	TCU_MNG_CONNECTION_STATUS_EVENT EL 00 00 E1 47 PL 00 ST BD ... CS LK ... LT SI ..
	EL: Event length (1 byte): The length of the event.
	PL: Parameter length (1 byte): The length of the following parameters -1.
	ST: Status (1 byte): The status of the process.
	Successful 0x00
	Page timeout 0x80
	Local device connection reject 0x81
	Link loss 0x82
	Pin code input timeout 0x83
	Pin code failure 0x84
	Local device pin code input reject 0x85
	Remote device pin code input reject 0x86
	Link key failure 0x87
	BD: BD Address (6 bytes): The BD address of the remote device.
	CS: Connection status (1 byte): The status of the connection process.
	Connected 0x00
	Disconnected 0x01
	Connection failure 0x02

	<p>Link key 0x03</p> <p>Mode change active 0x04</p> <p>Mode change hold 0x05</p> <p>Mode change sniff 0x06</p> <p>Mode change park 0x07</p> <p>LK: Link key (16 bytes): The link key of the pairing process.</p> <p>If the connection status is 0x00 – 0x02, this parameter is omitted.</p> <p>LT: Link key type (1 byte): The type of the link key.</p> <p>Combination key 0x00</p> <p>Local unit key 0x01</p> <p>Remote unit key 0x02</p> <p>Debug combination key 0x03</p> <p>Unauthenticated combination key 0x04</p> <p>Authenticated combination key 0x05</p> <p>Changed combination key 0x06</p> <p>Reserved 0x07 – 0xFF</p> <p>SI: Sniff Interval (2 bytes): The sniff interval to set sniff subrating.</p> <p>When sniff subrating on TCU_MNG_INIT_REQ is selected, and the connection status on this event is “Mode Change Sniff”, this parameter is generated.</p> <p><b>Note:</b> PAN1026A link keys have to be handled and stored by the host controller.</p>
<b>Description</b>	<p>TCU_MNG_CONNECTION_STATUS_EVENT is generated for the following situations:</p> <ul style="list-style-type: none"> <li>• Establish ACL connection</li> <li>• Disconnect ACL connection</li> <li>• Pairing is successful and link key is generated</li> <li>• Pairing or authentication is failed</li> </ul>

## 4.6 Data Transmission

### 4.6.1 Transferring Data

#### PAN1322

<b>Command</b>	<p><b>AT+JSDA=&lt;length&gt;, &lt;data&gt;</b></p> <p>&lt;length&gt; (3 chars (DEC)): The amount of bytes to be sent. Can be 001 to max MTU size.</p> <p>&lt;data&gt; (001 – max MTU size): The data to be sent.</p>
<b>Description</b>	<p>Sends a specified amount of data. The maximum number of bytes for each packet is reported at connection confirmation (MTU size). The value for this parameter is negotiated by the two devices during the connection setup.</p>
<b>Response</b>	<p><b>&lt;general_response&gt;</b></p> <p>&lt;general_response&gt; (2 or 6 chars (DEC)): The general response of the module for requests indicating that the executing went OK or that an error occurred.</p> <p>OK Syntax correct, execution allowed and successful</p> <p>ERR=-1 Syntax error</p>

	ERR=-2	Command not allowed at present execution status
	ERR=-3	Internal unknown protocol stack error
<b>Description</b>	The general responses to a request.	

**PAN1026A**

<b>Command</b>	<p>TCU_SPP_DATA_TRANSFER_REQ</p> <p><b>RL RL 00 E5 08 PL PL LD LD DA ...</b></p> <p>RL: Request length (2 bytes): The total length of the request.</p> <p>PL: Parameter length (2 bytes): The length of the following parameters.</p> <p>LD: Length of data (2 bytes): The length of the data to be sent.</p> <p>This can be 0x01 to max MTU size. The actual MTU size has to be taken from the TCU_SPP_CONNECT_EVENT parameter "Negotiated frame size".</p> <p>DA: Data (1 byte to LD bytes – max MTU size bytes): The data to be sent.</p>														
<b>Description</b>	<p>TCU_SPP_DATA_TRANSFER_REQ is used to send SPP data to a remote device.</p> <p>TCU_ACCEPT is generated to notify the execution of this command. Afterwards, TCU_SPP_DATA_SEND_EVENT is generated, when this command is completed.</p>														
<b>Response</b>	<p>TCU_ACCEPT</p> <p><b>0A 00 00 E1 F1 03 00 ST E5 08</b></p> <p>ST: Status (1 byte):</p> <table border="0"> <tr> <td>Success</td> <td>0x00</td> </tr> <tr> <td>Parameter failure</td> <td>0x01</td> </tr> <tr> <td>No device initialization</td> <td>0x03</td> </tr> <tr> <td>No setup SPP</td> <td>0x41</td> </tr> <tr> <td>Releasing SPP</td> <td>0x43</td> </tr> <tr> <td>No SPP connection</td> <td>0x44</td> </tr> <tr> <td>On transferring SPP data</td> <td>0x46</td> </tr> </table> <p>TCU_SPP_DATA_SEND_EVENT</p> <p><b>07 00 00 E5 F1 00 00</b></p>	Success	0x00	Parameter failure	0x01	No device initialization	0x03	No setup SPP	0x41	Releasing SPP	0x43	No SPP connection	0x44	On transferring SPP data	0x46
Success	0x00														
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On transferring SPP data	0x46														
<b>Description</b>	<p>TCU_ACCEPT is generated to notify the start of the TCU_SPP_DATA_TRANSFER_REQ command execution.</p> <p>TCU_SPP_DATA_SEND_EVENT is generated when the PAN1026A has completed sending data to the remote device.</p>														

### 4.6.2 Receiving Data

#### PAN1322

<b>Response</b>	<b>+RDAI=&lt;length&gt;, &lt;data&gt;</b>  <length> (3 chars (DEC)): The amount of bytes received. <data> (<length> chars): The received data.
<b>Description</b>	Indicate that data has been received. This response is not available during stream mode.

#### PAN1026A

<b>Event</b>	TCU_SPP_DATA_RECEIVE_EVENT <b>EL EL 00 E5 48 PL PL LD LD DA ...</b>  EL: Event length (2 bytes): The total length of the event. PL: Parameter length (2 bytes): The length of the following parameters. LD: Length of data (2 bytes): The length of the received SPP data. DA: Data (1 byte to LD bytes – max. 543 bytes): The received SPP data.
<b>Description</b>	TCU_SPP_DATA_RECEIVE_EVENT notifies the host that data has been received from the remote device.

### 4.6.3 Switching Transmission Modes

The PAN1322 can use two operation modes: Command Mode and Stream Mode.

In Command Mode, the module will execute the AT commands sent from the host controller via UART. The mode is used to control the module behavior as well as to transmit data bursts and packetized data to a remote device that has a Bluetooth connection on SPP level with the PAN1322.

In Stream Mode, the host controller can send un-packetized data to the PAN1322, which will transfer this data to the remote device. This mode is used when transmitting a small amount of data in a random way and for serial cable replacement applications.



The Command Mode yields higher throughput than Stream Mode, because the filling of Bluetooth packets can be optimized.

The following commands are used to switch back and forth between the modes.

#### PAN1322

<b>Command</b>	<b>AT+JSCR</b>
<b>Description</b>	The stream connection request, requests the PAN1322 to switch from Command Mode and to Stream Mode.
<b>Response</b>	<b>OK</b>
<b>Description</b>	Response that indicates a successful command execution.

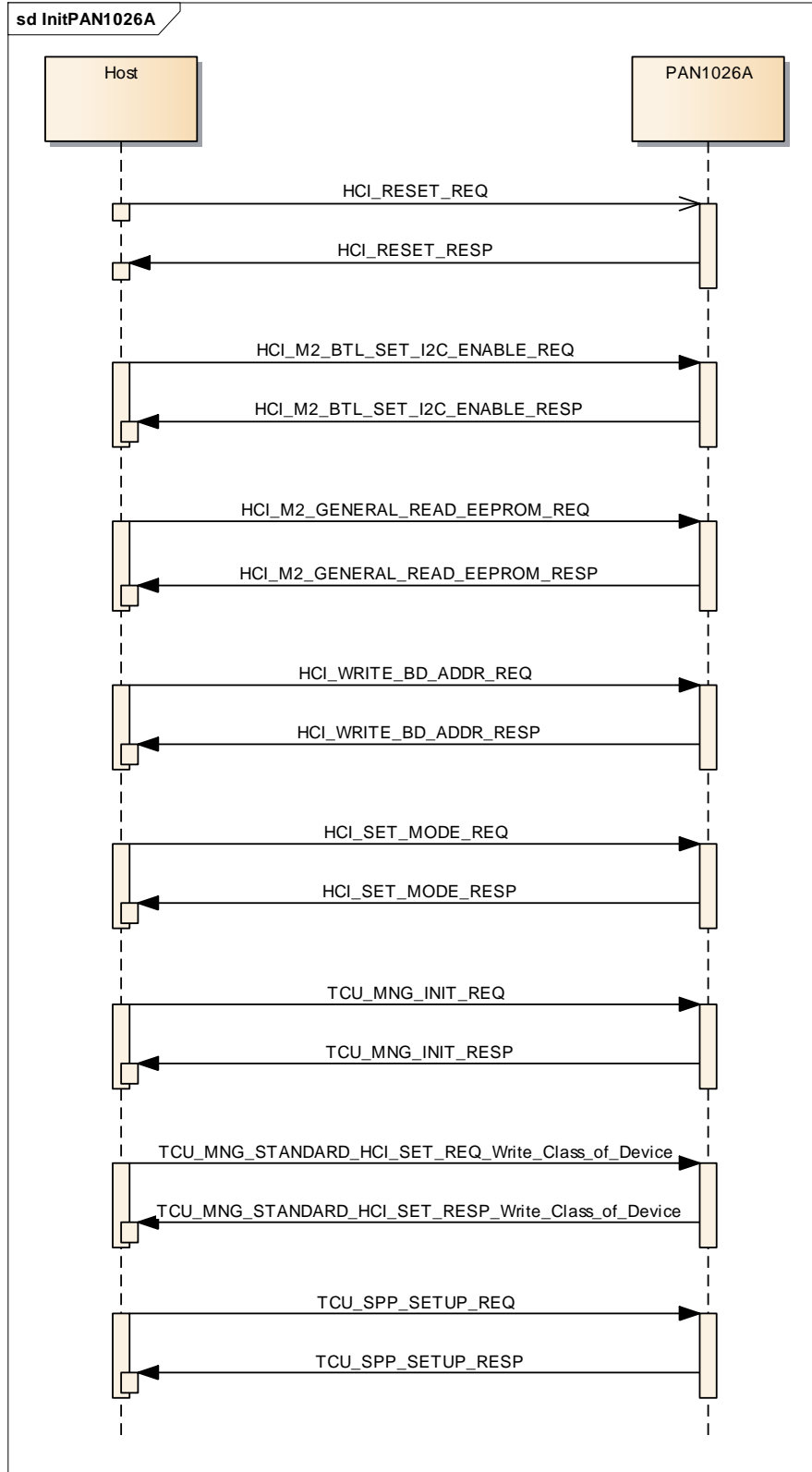
**PAN1322**

<b>Command</b>	^^^
<b>Description</b>	Escape character sequence, that causes the PAN1322 to switch from Stream Mode to Command Mode. A wait time greater than 100 ms after the last byte transmission is mandatory. This sequence is not terminated with <CR><LF>.
<b>Response</b>	OK
<b>Description</b>	Response that indicates a successful command execution.

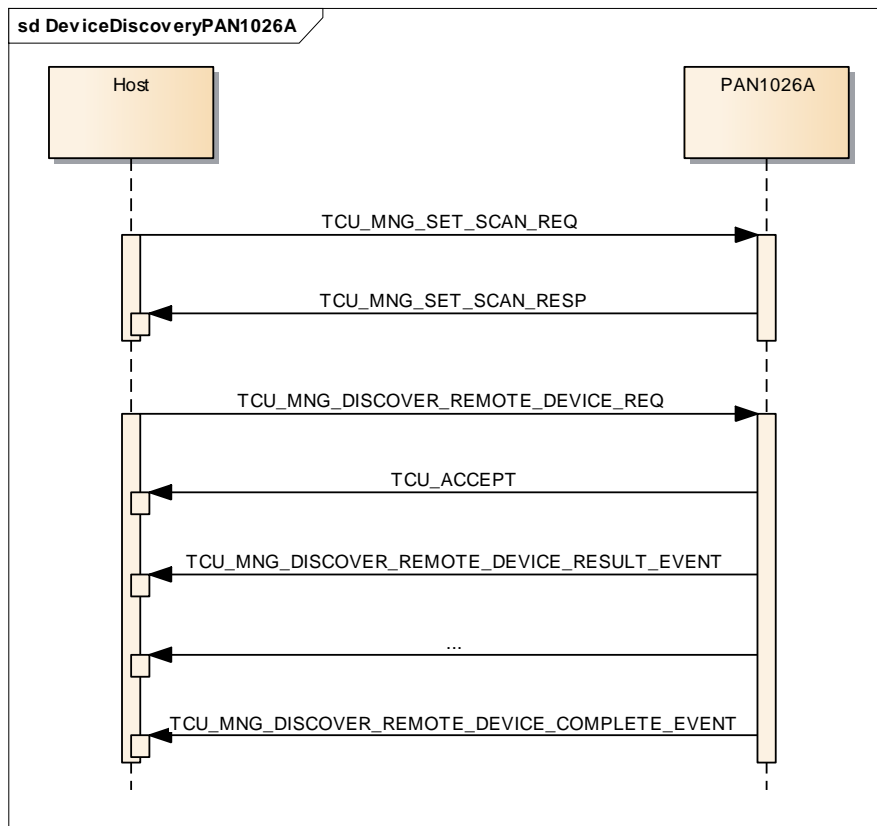
The PAN1026A does not provide a Stream Mode. Data has to be sent using the appropriate command similar to the Command Mode of the PAN1322.


## 4.7 PAN1026A Example Sequences

### 4.7.1 Initialization



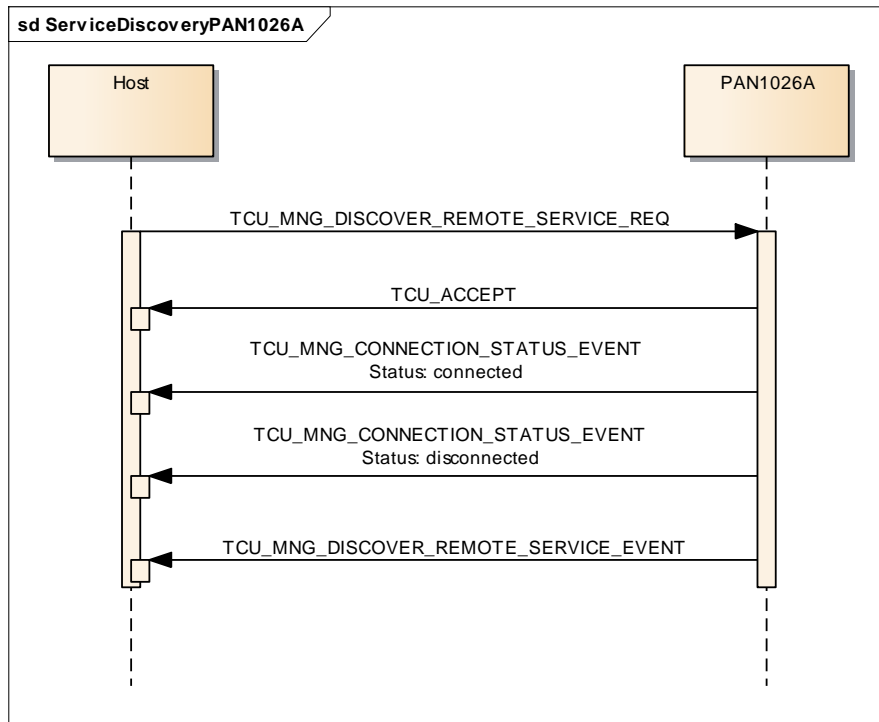
### 4.7.2 Device Discovery



 Please note that the device discovery can only be performed after the initialization has been successful.



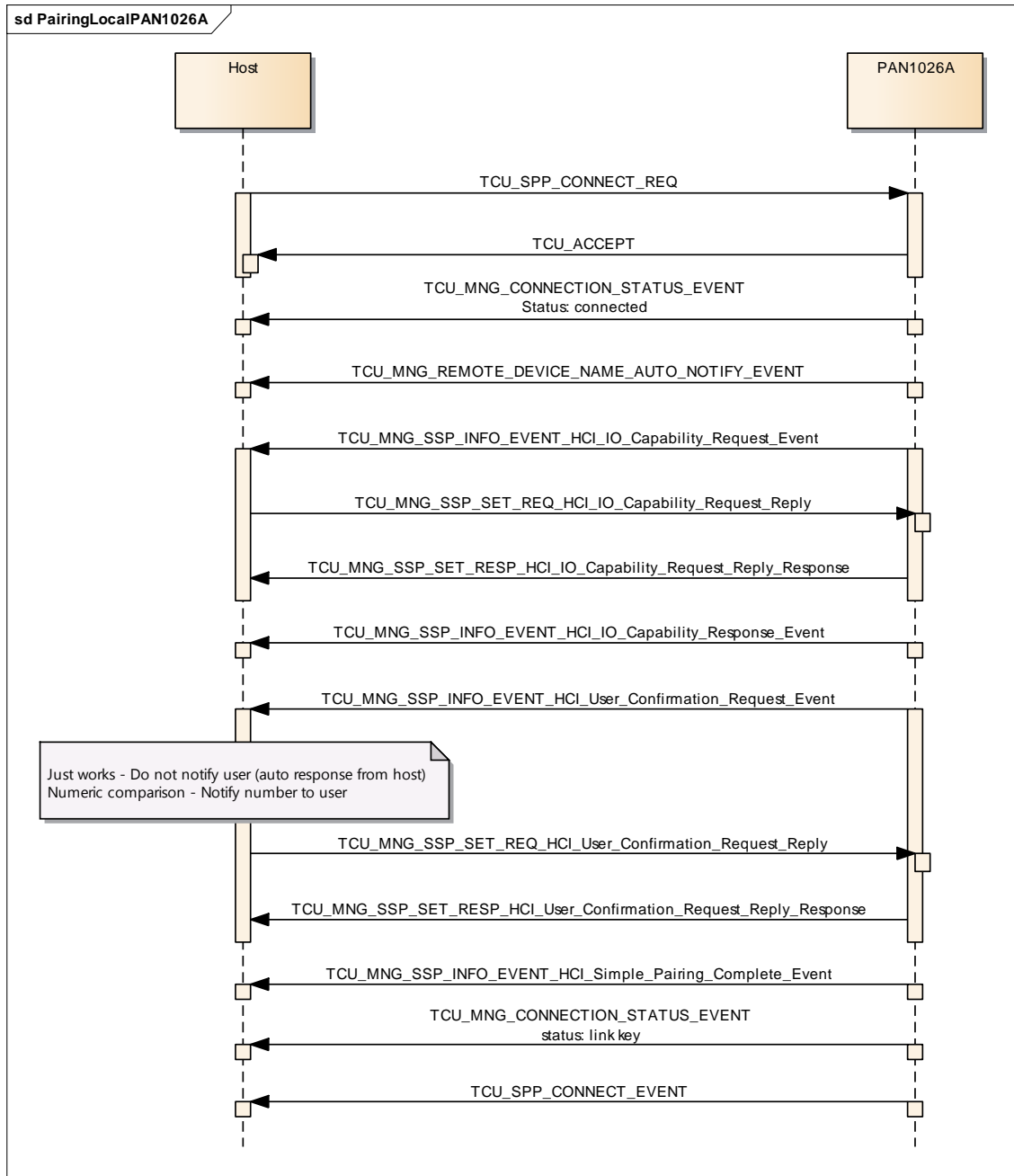
### 4.7.3 Service Discovery




Please note that the service discovery can only be performed after the initialization has been successful.

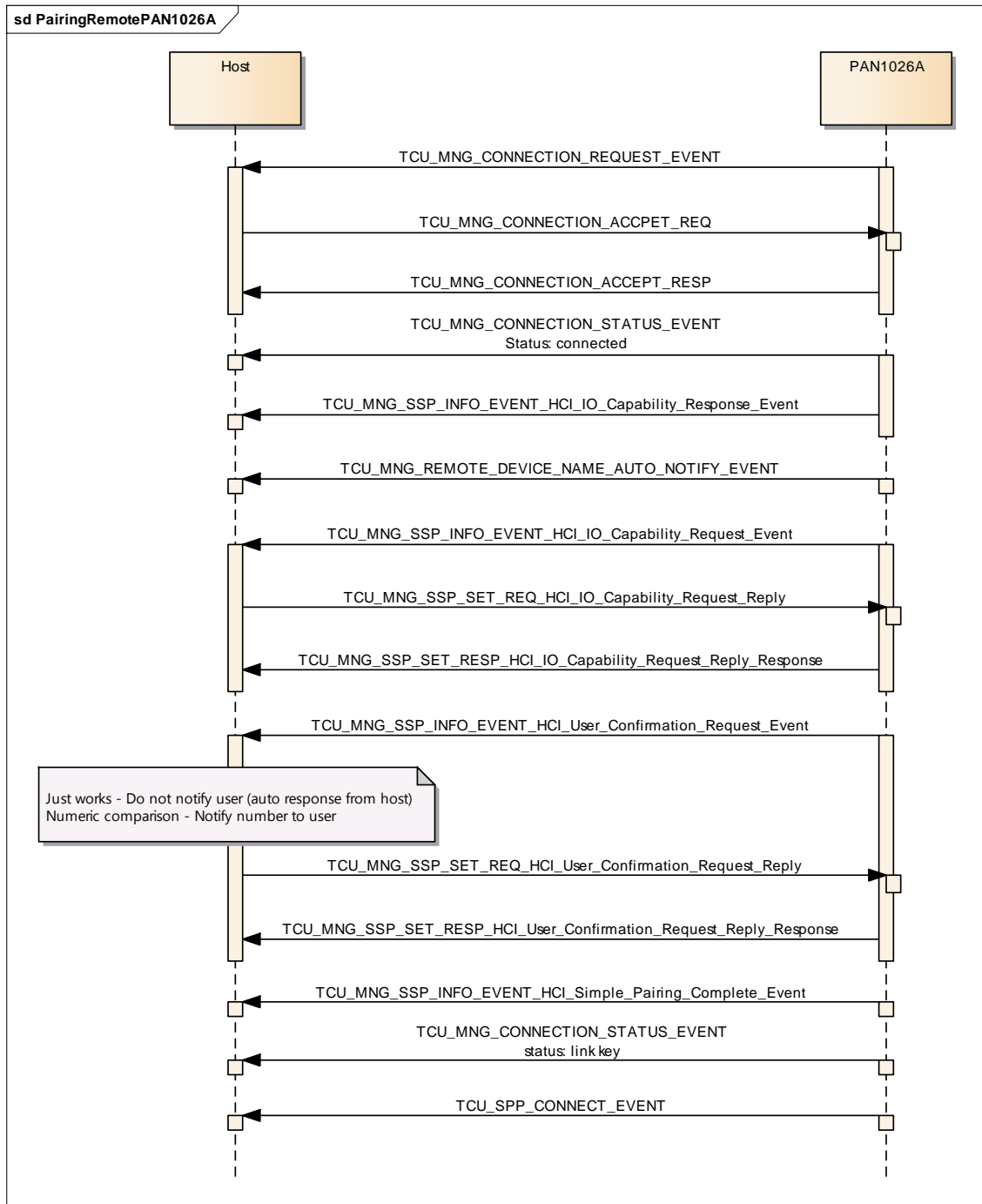
### 4.7.4 Connection Establishment


#### 4.7.4.1 Pairing from Local Device



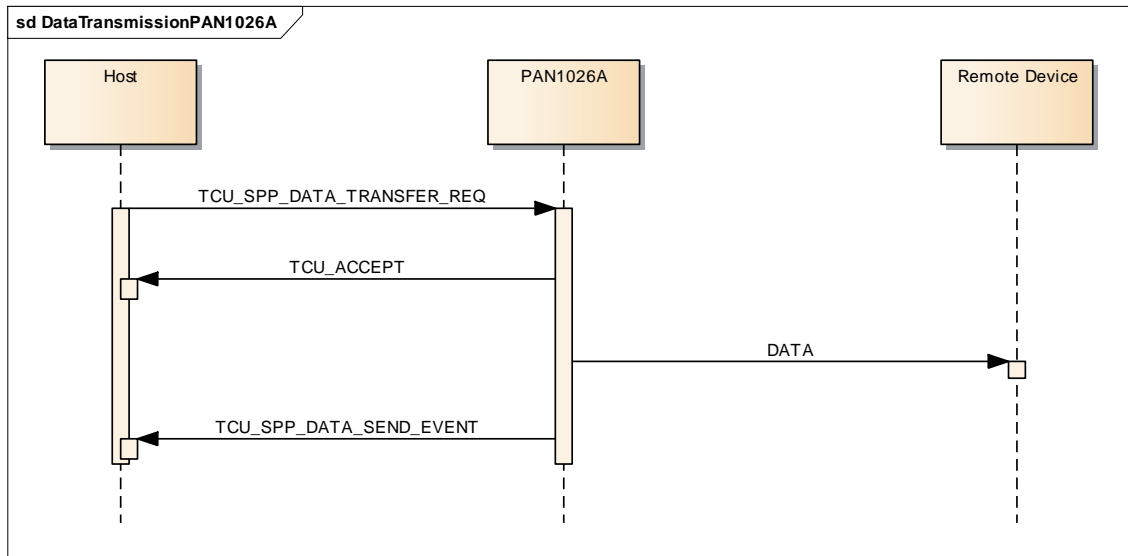
 Please note that the connection establishment can only be performed after the initialization has been successful.


### 4.7.4.2 Pairing from Remote Device



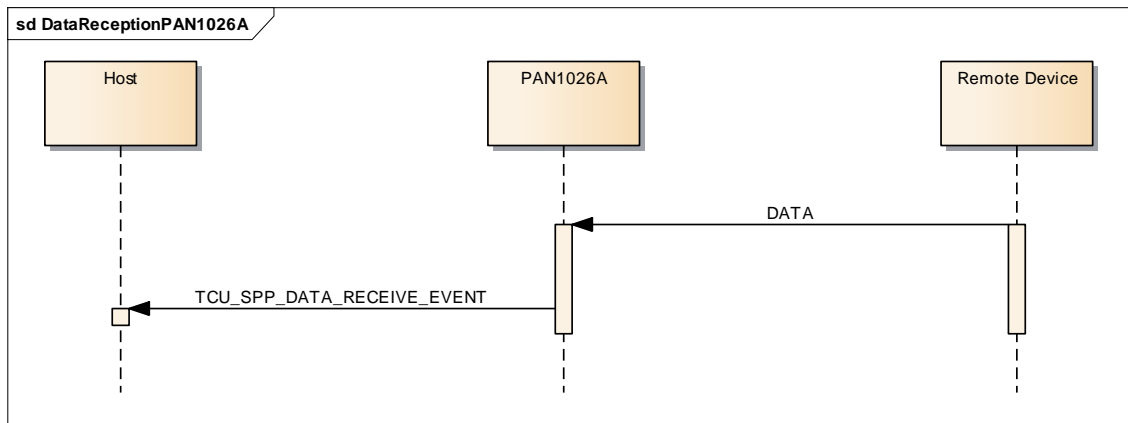
 Please note that the connection establishment can only be performed after the initialization has been successful.


### 4.7.5 Data Transmission



 Please note that the data transmission can only be performed after the initialization and connection establishment has been successful.

### 4.7.6 Data Reception



 Please note that the data transmission can only be performed after the initialization and connection establishment has been successful.

# 5 Appendix

## 5.1 Contact Details

### 5.1.1 Contact Us

Please contact your local Panasonic Sales office for details on additional product options and services:

For Panasonic Sales assistance in the **EU**, visit

<https://eu.industrial.panasonic.com/about-us/contact-us>

Email: [wireless@eu.panasonic.com](mailto:wireless@eu.panasonic.com)

For Panasonic Sales assistance in **North America**, visit the Panasonic Sales & Support Tool to find assistance near you at

<https://na.industrial.panasonic.com/distributors>

Please visit the **Panasonic Wireless Technical Forum** to submit a question at

<https://forum.na.industrial.panasonic.com>

### 5.1.2 Product Information

Please refer to the Panasonic Wireless Connectivity website for further information on our products and related documents:

For complete Panasonic product details in the **EU**, visit

<http://pideu.panasonic.de/products/wireless-modules.html>

For complete Panasonic product details in **North America**, visit

<http://www.panasonic.com/rfmodules>