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CANblue II Extended User Manual

USER MANUAL

4.01.0126.20000 EN 3.1 ENGLISH



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1 User Guide

Please read the manual carefully. Make sure you fully understand the manual before using the product.

1.1 Target Audience

This manual addresses trained personnel who are familiar with CAN technology, Bluetooth® wireless technology and the applicable national standards. The contents of the manual must be made available to any person authorized to use or operate the product.

1.2 Related Documents

Document	Author
Installation Guide <i>VCI Driver</i>	HMS
User Manual of bus monitor in use	HMS
VCI Software Design Guides (.NET, C, C++)	HMS

1.3 Document History

Version	Date	Description
3.0	March 2017	Edited and revised in new design.
3.1	September 2018	Removed instructions for Windows XP, added bus off information, structural changes in configuration chapters, added target audience and intended use

1.4 Conventions

Instructions and results are structured as follows:

- ▶ instruction 1
- ▶ instruction 2
 - ➔ result 1
 - ➔ result 2

Lists are structured as follows:

- item 1
- item 2


Bold typeface indicates interactive parts such as connectors and switches on the hardware, or menus and buttons in a graphical user interface.

```
This font is used to indicate program code and other
kinds of data input/output such as configuration scripts.
```


This is a cross-reference within this document: [Conventions, p. 6](#)


This is an external link (URL): www.hms-networks.com


Safety advice is structured as follows:


	<p>Cause of the hazard!</p> <p>Consequences of not taking remediate action.</p> <p>How to avoid the hazard.</p>
---	---

Safety signs and signalwords are used dependent on the level of the hazard.

 *This is additional information which may facilitate installation and/or operation.*

	<p>This instruction must be followed to avoid a risk of reduced functionality and/or damage to the equipment, or to avoid a network security risk.</p>
---	--

	<p>Caution</p> <p>This instruction must be followed to avoid a risk of personal injury.</p>
---	--

	<p>WARNING</p> <p>This instruction must be followed to avoid a risk of death or serious injury.</p>
---	--

2 Safety Instructions



Risk of disturbances and interferences if used with WLAN at the same time!
Bluetooth® wireless technology and WLAN both work with the frequency of 2.4 GHz.



Caution

This equipment emits RF energy in the ISM (Industrial, Scientific, Medical) band. Make sure that all medical devices used in proximity to this device meet appropriate susceptibility specifications for this type of RF energy.

The CANblue II contains a small radio transmitter and receiver. During communication with other Bluetooth products the CANblue II receives and transmits electromagnetic fields (microwaves) in the frequency range 2.4 to 2.5 GHz. The output power of the radio transmitter is very low. The exposure to transmitted RF energy while using the device is well below the prescribed limits in all national and international RF safety standards and regulations.

2.1 Information on EMC



Risk of interference to radio and television if used in office or home environment!
Use exclusively included accessories. Use exclusively shielded cables.
Make sure that the shield of the interface is connected with the device plug and the plug on the other side.

2.2 General Safety Instructions

- ▶ Protect product from moisture and humidity.
- ▶ Protect product from too high or too low temperature (see [Technical Data, p. 53](#)).
- ▶ Protect product from fire.
- ▶ Do not paint the product.
- ▶ Do not modify or disassemble the product. Service must be carried out by HMS Industrial Networks.
- ▶ Store products in dry and dust-free place.

2.3 Bluetooth® Connection

Make sure that the following conditions are met:

- preferably unobstructed line of sight between the antennas of the devices
- minimum distance of 50 cm between the devices (to avoid interference)
- minimum distance of 10 m to WLAN recommended

Data transmission rate depends on:

- distance between the communicating devices
- obstacles between the devices
- environment (texture of walls etc.)
- device configuration
- signal conditions

2.4 Intended Use

The CANblue II is used to connect computer systems (like PC, notebook, tablet or smartphone) to CAN networks via Bluetooth® wireless technology.

3 Scope of Delivery

Included in the scope of delivery:

- CANblue II
- CANanalyser Mini
- Installation Guide *VCI Driver*
- User Manual *CANblue II*
- CD with VCI driver and extended User Manual

4 Product Description

With the CANblue II multiple CAN networks can be connected wireless via **Bluetooth®** wireless technology. The CANblue II forwards from the CAN network received messages to the Bluetooth connection. The messages that are received via a Bluetooth connection are transmitted to the CAN network and other existing Bluetooth connections.

The CANblue II provides an additional server. This connection can be used to configure the CANblue II. Various operation modes are supported.

4.1 Operation Modes

PC interface

- **VCI driver for Windows**
 - supported by the VCI driver
 - operation with all IXXAT tools possible
 - operation with other VCI-based application programs and tools possible
- **Generic mode (ASCII/binary protocol)**
 - communication based on ASCII commands and optimized binary data transfer
 - usable in all systems, for example embedded computer systems
 - low latency

Bridge mode

- several CANblue II can be connected
- CANblue II can serve as Master and Slave
- transparent message exchange on layer 2
- can be used in DeviceNet, CANopen, J1939 and customer specific protocols
- use of CAN ID filters possible

4.2 Features

- Bluetooth® specification Bluetooth v4.0
- power supply 9 to 30 V DC
- ISO 11898-2 CAN bus coupling (9 pin D-Sub 9)
- available with internal or external antenna
- different external antennas available
- CAN controller initialization with automatic baud rate detection
- CAN message filtering

5 Installation



Connection issues if the computer turns into sleep mode!

Deactivate the sleep mode of the computer the CANblue II is connected to. In case of reconnecting problems see [Errors and Troubleshooting, p. 27](#).

5.1 Installing the Software

5.1.1 Installing the Driver

For the operation of the CANblue II as VCI PC interface for Windows the VCI driver is needed.

- ▶ Install the VCI driver (see Installation Guide *VCI Driver*).

5.1.2 Installing the CANblue II Software Package

- ▶ Close all open applications.
- ▶ Make sure that all prior versions of the CANblue II software package are uninstalled.
- ▶ Insert the CD-ROM in the CD drive.
- ▶ Run *CANblue_II_Generic_Setup.exe*.
- ▶ Follow the instructions in the installation program.

5.2 Connectors

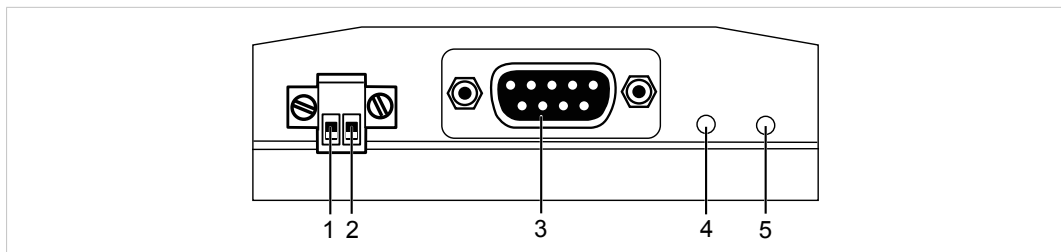


Fig. 1 Connectors

1	Power connector +
2	Power connector -
3	CAN connector
4	No function
5	Button Reset to factory settings

5.2.1 Power Connector

The device is protected against polarity reversal.

Pin Allocation

Number	Pin designation	Signal
1	+	9 to 30 V DC
2	-	GND

5.2.2 External Antenna

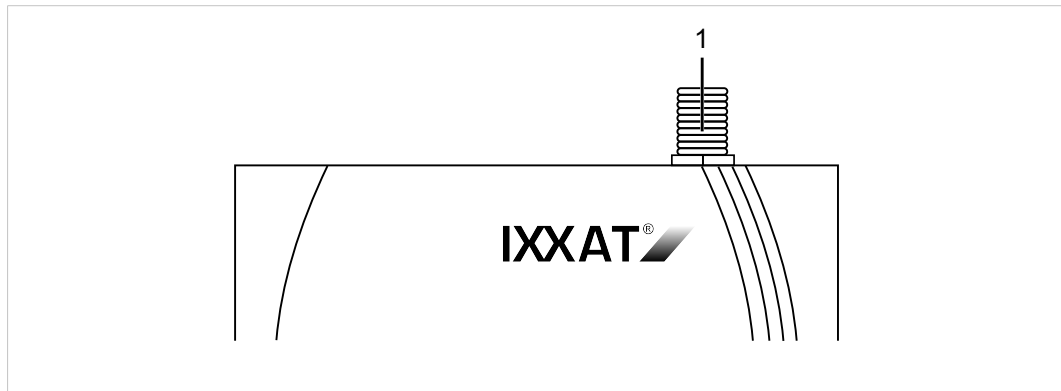


Fig. 2 Connector for external antenna

- ▶ Screw the external antenna on connector (1).
- ▶ Use exclusively antennas that are approved by HMS Industrial Networks (by reason of radio certification).
- ▶ For further information about different antennas see www.ixxat.com.

5.2.3 CAN Connector

Pin Allocation of D-Sub 9 Connector

Pin no.	Signal
1	–
2	CAN low
3	GND
4	–
5	–
6	–
7	CAN high
8	–
9	–

5.3 Installing the Virtual COM Port

The CANblue II provides two virtual servers: Config and SPP. For the configuration of the CANblue II a Bluetooth-capable device that supports the serial port profile (SPP) must be connected to the Config server via a virtual COM port.

The COM port must have the following properties:

- baud rate: 921600
- data bits: 8
- parity bit: none
- stop bits: 1
- flow control: hardware

Windows 7, 8 and 10

- ▶ In Windows task bar right-click on the Bluetooth icon and select **Add a device**.
 - ➔ All available devices are displayed.
 - ➔ CANblue II devices are named *IXXAT CANblue II ([MAC address])*.

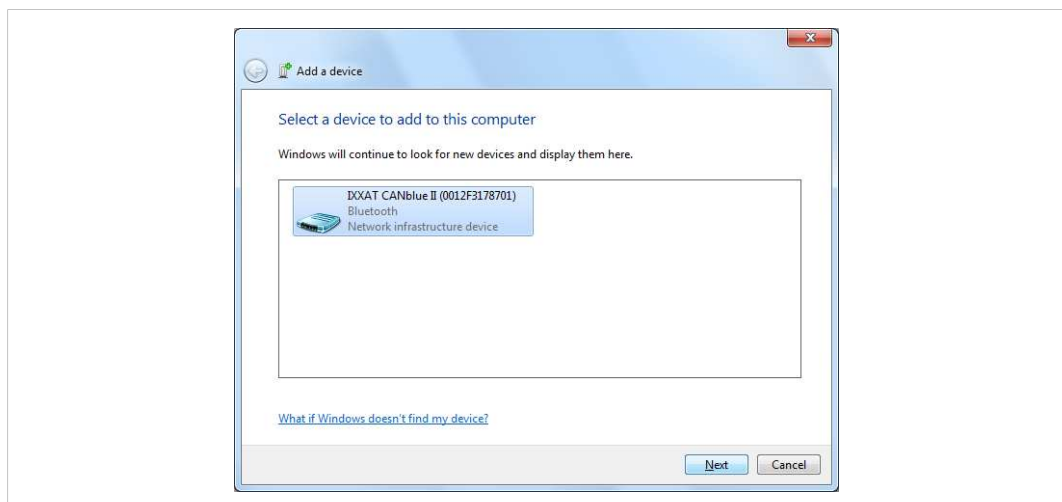


Fig. 3 Add a device

- ▶ Check the MAC address of the CANblue II that is printed on the back of the device.

- ▶ Select the device to connect and click button **Next**.

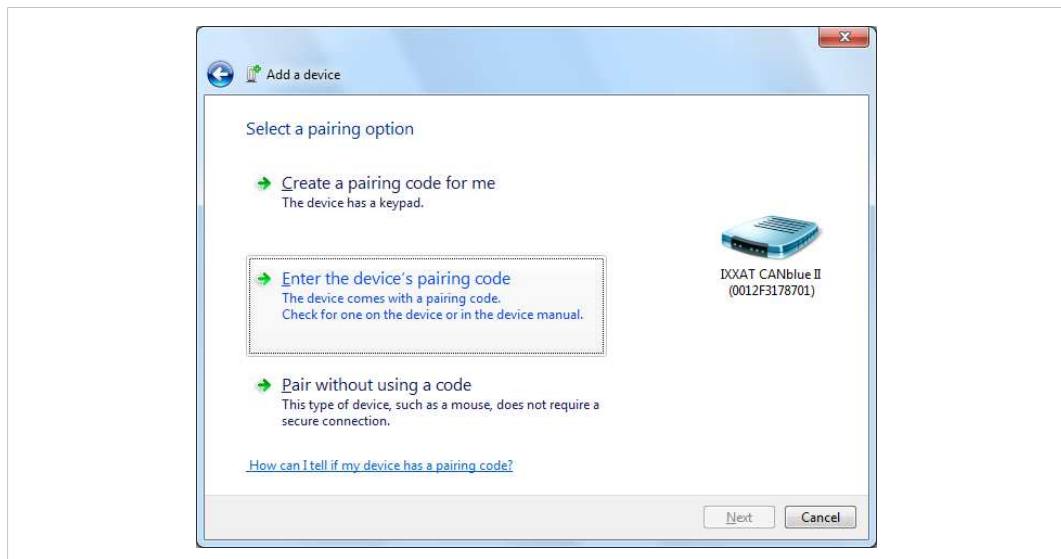


Fig. 4 Add a device

- ▶ Select **Enter the device's pairing code** and click button **Next**.

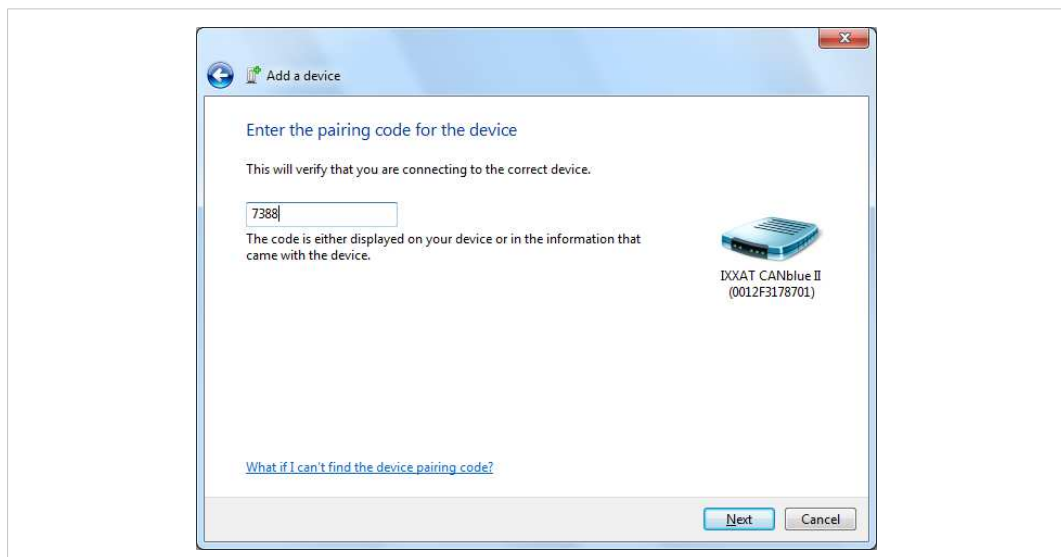


Fig. 5 Pairing code

- ▶ Enter the default pairing code **7388** and click button **Next**.
 - ➡ Added device is displayed in window **Devices and Printers**.



Some Bluetooth drivers do not ask for a pairing code. In this case pairing is possible without code.

Determine the correct COM port:

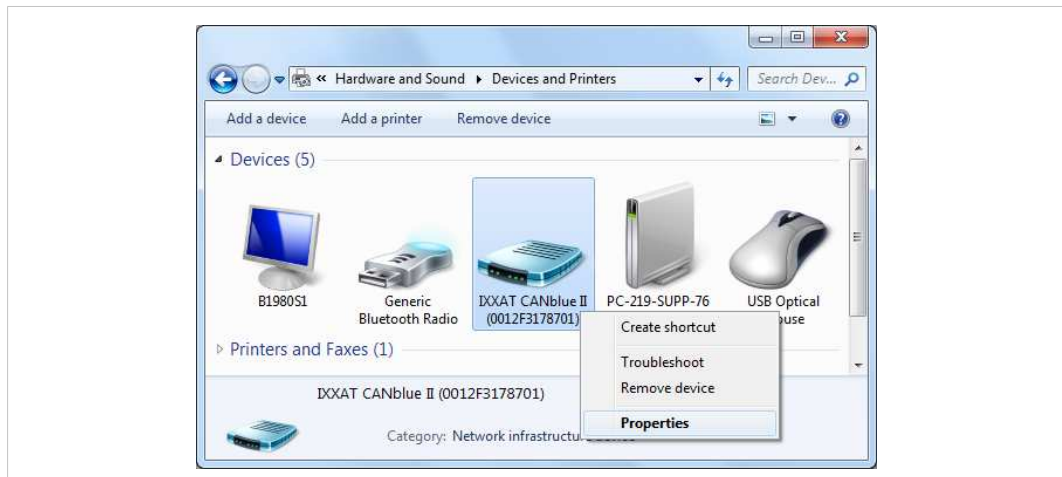


Fig. 6 Devices and printers

- ▶ In window **Devices and Printers** right-click on the newly added CANblue II and in the context menu select **Properties**.
- ➔ Window **CANblue II Properties** is opened.

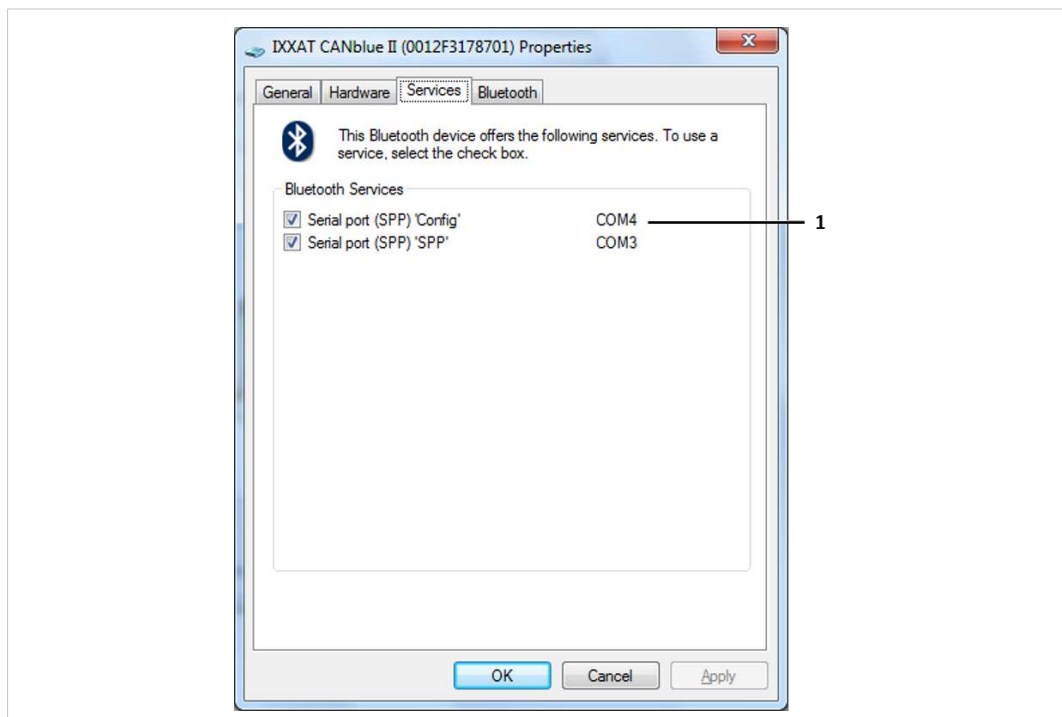


Fig. 7 CANblue II properties

- ➔ Two SPP server of the device are displayed.
- ➔ With the displayed COM port of **Serial port (SPP) 'Config'** (1) a connection to the CANblue II can be established.
- ➔ The COM port of **Serial port (SPP) 'SPP'** is reserved for a connection between two CANblue II devices.

-
- ▶ Make sure that both checkboxes of **Serial port (SPP) 'Config'** and of **Serial port (SPP) 'SPP'** are activated.



If the checkboxes are not activated the driver may not be correctly installed. To download the driver, make sure that an internet connection is established.

- ▶ Click button **Apply**.
 - ➔ The COM port of **Serial port (SPP) 'Config'** can be used to connect to the CANblue II

6 Configuration as PC Interface with VCI Driver

The CANblue II can be configured as a PC interface with the VCI driver for Windows.



HMS recommends to reset the device to factory settings for optimal performance.



Parallel usage with bridge mode is possible with reduced receive and transmit performance. Existing CAN filters are cleared in VCI mode and restored when the VCI mode is closed.

- ▶ Make sure that the VCI driver and the CANblue II software package are installed (see [Installing the Software, p. 10](#)).
- ▶ Make sure that the virtual Config COM port is installed (see [Installing the Virtual COM Port, p. 12](#)).
- ▶ Install the hardware according to the instructions in the Installation Guide *VCI Driver*.
- ▶ Make sure to access the **Device Server Control** with administrator rights.
- ▶ Configure the device with a VCI based tool, for example with the canAnalyser Mini (included on delivery CD).
- ▶ To test if the device is connected, check the list of available devices in the canAnalyser Mini.

7 Configuration as Generic PC Interface or as Bridge

The CANblue II can be configured as Generic PC interface or as Bridge both with two different configuration tools.


7.1 Configuration Tools


To configure the CANblue II a terminal program or the CANblueCon Configuration Tool can be used. Loading of existing configurations (txt- and bat-files) and the use of local commands is only possible with the CANblueCon Configuration Tool.

7.1.1 Terminal Program

- ▶ Make sure that the CANblue II Software package is installed (see [Installing the CANblue II Software Package, p. 10](#)).
- ▶ Make sure that the virtual Config COM port is installed (see [Installing the Virtual COM Port, p. 12](#)).
- ▶ Select the setting **serial** and the correct COM port.
- ▶ Start the terminal program.
- ▶ Activate the local echo.
- ▶ Activate **transmitting of carriage return and linefeed with Enter key** at the end of an entered command.
- ▶ Enter the virtual Config COM port.
 - ➔ Device is connected.
- ▶ Configure a generic interface (see [Configuring an Interface, p. 19](#)) or a Bridge (see [Configuring a Bridge, p. 21](#)).
- ▶ Use ASCII commands to configure the device and observe the following:
 - Enter the commands in capital letters.
 - Execute the commands with key **Enter**.
 - See [Generic Mode Network and Device Communication, p. 29](#) for further information about the commands.

7.1.2 CANblueCon Configuration Tool

 *Configuration examples for a generic interface and a bridge are included on the delivery CD in the folder CANblueCon Examples. The examples can be loaded with the CANblueCon Configuration Tool.*

 *bat-files can be started directly from the file. Adjust the COM port in the bat-file with an editor and in bridge configurations adjust the MAC address in the txt-file. To start the bat-file in the CANblueCon Configuration Tool, double-click the bat-file.*

- ▶ Make sure that the CANblue II Software package is installed (see [Installing the CANblue II Software Package, p. 10](#)).

- ▶ Make sure, that the virtual Config COM port is installed (see [Installing the Virtual COM Port, p. 12](#)).
- ▶ Start the command line.
- ▶ Enter the path to the *CanBlueCon.exe*.

To load an existing configuration:

- ▶ In bridge configurations adjust the MAC address in the txt-file.
- ▶ Enter `CanBlueCon.exe <CONFIG_COM_PORT_NUMBER> <FILE_NAME>` in the command line.
 - Batch mode is started.
 - Commands are read from the configuration file.

To define a new configuration:

- ▶ Enter `CanBlueCon.exe <CONFIG_COM_PORT_NUMBER>`.
 - Interactive mode is started.
- ▶ Configure a generic interface (see [Configuring an Interface, p. 19](#)) or a Bridge (see [Configuring a Bridge, p. 21](#)).
- ▶ Use ASCII commands to configure the device and observe the following:
 - Execute the commands with key **Enter**.
 - See [Generic Mode Network and Device Communication, p. 29](#) for further information about the commands.



*The CANblueCon configuration tool supports a command history. Scrolling through former commands is possible with the keys **Up** and **Down**.*

Local Commands

Additionally to the ASCII commands local commands are supported by the CANblueCon. The commands are interpreted locally and allow for example the implementation of cyclic transmission. Local commands are useful if a configuration is planned to be used in Batch mode of the CANblueCon, for example to implement loops or prints on screen.

Additional Commands with CANblueCon Configuration Tool

Command	Parameter	Description
#delay	<DELAY_TIME>	Delays the execution for the specified time in seconds.
#goto	<LABEL_NAME>	Continues the execution from the string where the label is defined.
#help	-	Shows a help screen.
#label	<LABEL_NAME>	Defines a label.
#pause	-	Waits until any key is pressed.
#print	<TEXT>	Prints <TEXT> on the display.
#exit	-	Closes the CANblueCon.

7.1.3 Examples

CANblue II command and CANblue II reply:

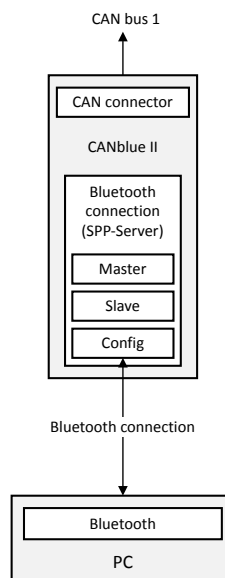
```
>c can_init 1000
I OK: CAN_INIT
```

Local command and local output:

```
>#print CANblue Generic
# CANblue Generic
```

7.2 Configuring an Interface

The installed virtual Config COM port is used to configure the CANblue II to exchange data with a CAN network connected to the CANblue II.



- ▶ Make sure, that the software package and the virtual COM port are installed.
- ▶ Start and configure the desired configuration tool (see [Configuration Tools, p. 17](#)).
- ▶ Reset the device to factory settings with command `D SETTINGS_DEFAULT`.
 - ➔ Existing filters and settings are deleted.
 - ➔ Factory settings are set (information about settings see [Reset to Factory Settings, p. 24](#)).
- ▶ Initialize the CAN controller with the desired baud rate with command `C CAN_INIT <baudrate>`.
- ▶ Set the filter (see [Configuring the Filter, p. 23](#)).
- ▶ Specify further settings (see [Settings in Generic Mode, p. 23](#)).
- ▶ Check the configuration with command `C CONFIG SHOW`.
- ▶ Save the configuration with command `C CONFIG SAVE`.
- ▶ Start the CAN controller with command `C CAN_START`.
 - ➔ If the CAN controller receives a message from the CAN network that matches one of the filters, the message is transmitted on the Bluetooth connection in ASCII format.

- ▶ To transmit CAN messages to the CANblue II or into the connected CAN network, use ASCII or binary format (see [Generic Mode Network and Device Communication, p. 29](#)).
- Transmission format of CAN messages is automatically matched to the received format.

Example Message

- ▶ To transmit a CAN data frame with the Standard identifier 7FF and the data bytes *1A 2B 3C 4D 5E 6F 70* to the CAN bus, use command `M SD7 7FF 1A 2B 3C 4D 5E 6F 70`.

7.3 Configuring a Bridge

Several Bluetooth devices can be connected as Master and Slave.



Use only CANblue II devices with the same firmware version for a bridge. If CANblue II devices with new firmware version (V2.01.07 and higher) and CANblue II devices with an older firmware version are used in a Bridge contact IXXAT support for information about the compatibility.

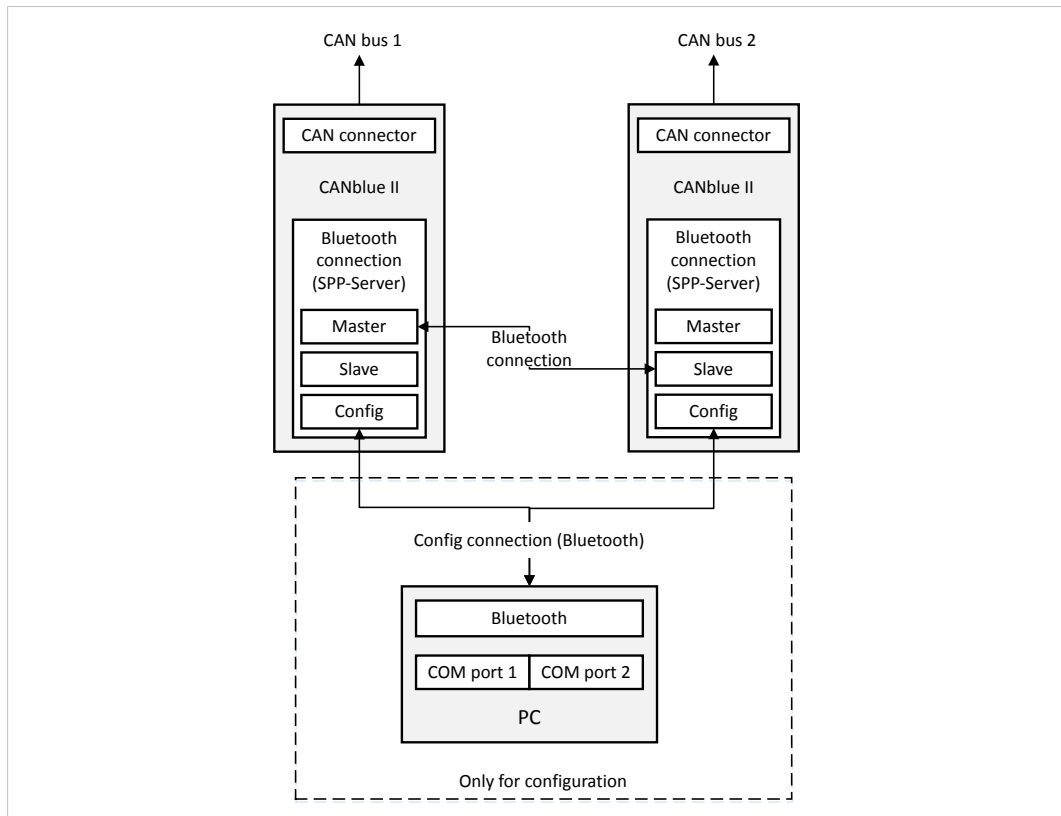


Fig. 8 Configuring a bridge



To simplify the configuration, deactivate the transmission of CAN messages by the Master:
 Stop the CAN controller with command `C CAN_STOP` or disable the transmission of CAN messages on the connection with command `C SEND_CAN_FRAMES OFF`.

- ▶ Make sure, that the software package and the virtual COM port are installed.
- ▶ Make sure, that the virtual COM ports are installed for all devices and that the connection is established.
- ▶ Start and configure the desired configuration tool (see [Configuration Tools, p. 17](#)).
- ▶ Configure the devices like an interface (see [Configuring an Interface, p. 19](#)).
- ▶ Enable the autostart mode with command `C AUTOSTART ON` on both devices (for further information see [Autostart, p. 23](#)).
- ▶ With the desired Master device enter command `D MAC_ADD <address of slave>`.
 - Device acts as Master and connects to the Slave.
 - Devices start automatically.
 - Devices function as a Bridge between the two CAN networks.

- ▶ Save the configurations on both devices with the commands `C CONFIG SAVE`.
- ▶ To achieve the highest possible data rate between the devices, disconnect the Config connection to the computer.

Since the connection is stored on both devices, devices reconnect automatically after turning off and on and resume to forward CAN messages.

7.3.1 Bridge Chain

Configuring a Bridge chain is possible because every Slave can serve as Master for another Slave.

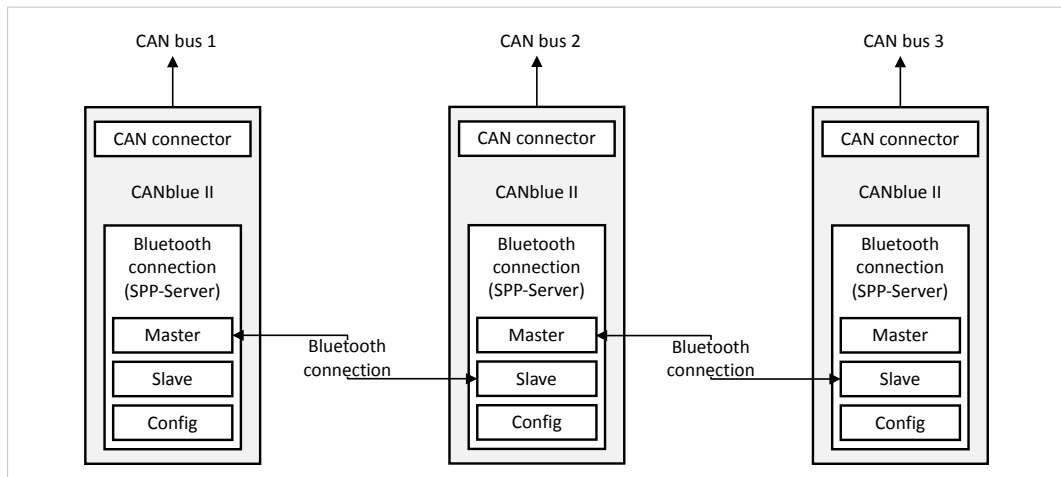


Fig. 9 Bridge configuration



Each additional CAN bus increases the rate of CAN messages on the Bluetooth connections and reduces the maximum possible data rate of all connections.

7.4 Settings in Generic Mode

7.4.1 Configuring the Filter

Filtering of received messages is possible with the following criteria:

- identifier
- frame format (Extended, Standard)
- frame type (data, remote)

The filter works as a positive filter. CAN messages, with defined criteria in the filter list, that are received by the CAN controller are forwarded to the Bluetooth connection.

Up to 4096 Standard filter entries (includes all possible identifiers of Standard frame format) are supported.

For the Extended filter 300 byte memory are provided. An Extended filter entry occupies 8, 16, 24 or 32 bit, dependent on the number of CAN ID digits. 75 to 300 Extended messages can be filtered.

CAN ID range	Memory consumption in bytes
0–7F	1
80–7FFF	2
8000–7FFFFFFF	3
800000–7FFFFFFF	4

For information about the available commands to configure the filter see ASCII commands in [Configuring the Filter, p. 34](#).

7.4.2 Autostart

If the autostart mode of the device is enabled and a Bluetooth connection is established, the device attempts to carry out a handshake to start the CAN controller.

- ▶ To enable the autostart mode, use command `C AUTOSTART ON`.
- ▶ Make sure, that the autostart mode is enabled with both devices.

If the Config connection is established:

- ▶ Transmit the response to handshake messages manually.
 - ➔ Handshake is concluded.
 - ➔ Devices exchange CAN messages in binary format.

7.4.3 Changing the Message Format

The message format changes automatically in the following situations:

- With command `C CAN_START` the transmission format is switched to ASCII.
- When the Config connection is used to transmit a CAN message to the device in ASCII format or binary format the device switches to the same format.
- If the device is in autostart mode and a handshake is carried out on the Config connection, the device switches to the binary format.
- ▶ To switch from ASCII format to binary format or to disable the reception of CAN messages, use command `C SEND_CAN_FRAMES` with Config connection.