

# **BlueRS+BD**

Bluetooth Serial Adapter Firmware

User Manual

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## 1 Introduction

We are very pleased to see that you have bought a Stollmann product and would like to express our appreciation.

This documentation is valid for BlueRS+BD Bluetooth Serial Port Profile Software, version V1.1.025 or later.

### 1.1 Product description

BlueRS+BD is a Bluetooth Serial Port Profile Software for use with Zeevo ZV 4002 and ZV 4301 chip and implements the following functions:

- Connect devices with a **serial port** to any Bluetooth link. It gives access to other devices situated in the same Bluetooth area (piconet).
- Data transmission with rates from 300 up to 230400 baud.
- The connected serial device can drive BlueRS+BD software by using
  - asynchronous AT commands
  - automatic connection setup
  - accept incoming Bluetooth links.
- Configuration of the BlueRS+BD software can be performed via the serial interface (local configuration) or via the Bluetooth link (remote configuration).

The following profiles are supported:

- One serial profile channel for transparent data communication via the Bluetooth link.
- A second serial profile channel for management access from another Bluetooth device using a Bluetooth link.

## 2 Operation Modes of BlueRS+BD Software

The BlueRS+BD software supports two different modes:

- Running on a Bluetooth module with a Stollmann Bluetooth address enables full functionality.
- Running on a Bluetooth module with a Bluetooth address other than a Stollmann Bluetooth address the duration of the Bluetooth links is limited to about 20 minutes. Afterwards the connection is terminated automatically.

To get Stollmann Bluetooth addresses for your product please contact Stollmann.

### 3 Using BlueRS+BD Software

Before using the BlueRS+BD the address of a Bluetooth partner device has to be selected - if not predefined within the hardware - that shall be the communication partner in the Bluetooth link.

Compatible devices can be scanned using the configuration command "binq". The found devices are listed in "binqlist". One Bluetooth device from that list has to be selected.

If you are using an automatic connecting mode the Bluetooth address has to be entered and stored using the configuration command "brad" (see BlueRS+BD Configurator activation on page 21).

In addition to the selected Bluetooth address a PIN may be setup, if a restricted mode connection has to be setup (command "bpin" and "bsecout"/"bsecin"). This PIN has to be identical to the PIN used in the remote Bluetooth device.

You can select different operation modes for the BlueRS+BD. These operating modes are used to control Bluetooth links and to configure the BlueRS+BD software.

Supported operating modes for Bluetooth link control:

- Automatic connecting after Power up.
- Automatic connecting controlled by control line DTR.
- Automatic connecting on activity on the serial input.
- Automatic accepting of incoming connections.
- Connection control using the asynchronous mode for devices that need the AT command set.

You can configure BlueRS+BD software in the following ways:

- By using BlueRS+BD Configuration commands entered by a locally connected PC.
- By using the AT command set entered by a locally connected PC.
- By using BlueRS+BD Configuration commands entered via the Bluetooth link (remote configuration).

### 3.1 Automatic connection establishment

Automatic connection establishment is available in the following modes:

- An automatic connection will be initiated when control line DTR is on.
- An automatic connection will be initiated when a character is received on the serial port.
- An automatic connection will be initiated independent of any status line – automatically after power up and initialization.
- No connection establishment initiated by this module. Bluetooth connection requests from other Bluetooth devices will be automatically accepted (if compatible).

To enable automatic call you have to set the BlueRS+BD Configuration parameter "*cmds*" to 6, 7, 8 or 12 (see below).

<i>cmds</i>	function
6	Automatic connection establishment when DTR is ON
7	Automatic connection establishment on any character received on serial port
8	Automatic connection establishment independent of any status line
12	No connection establishment initiated by this module

An established connection will be indicated by a status line (default: DCD). See also configuration commands "*cdcd*" and "*cdtr*".

If a connection cannot be established successfully, an automatic retry will be started. The duration of trying to establish the connection and the pause for next retry can be configured.

The Bluetooth devices to be accessed are taken from the parameter "*brad*", "*brad2*" and "*brad3*", they have to be set up to the Bluetooth device addresses of the remote Bluetooth devices. Additionally the server channel has to be set up if not fitting to the default (1), with the parameter *brsch* or using the address extension syntax for the address.

*cato n*            call abort of a not successful call after *n* seconds.  
*n* = {3..255},    default: **15** seconds.

*capa n*            call pause for *n* seconds before next call attempt.  
*n* = {0..255},    default: **3** seconds.

Hint: The configuration command "*idle*" can be used, to automatically disconnect after a predefined time without data transmission.

### 3.2 AT command set for BlueRS+BD

All parameters can be changed by using an extended AT command set described in this chapter.

Please check if the factory setting will fit with your environment. The factory setting is described (highlighted) in the parameter list below.

If you require a configuration different from the factory default setting, please perform the following steps:

- Plug the hardware to a COM-Port of a PC.
- Power up the hardware.
- Start a terminal emulation on the PC; please verify that the baudrate setting of the terminal emulation fits the value configured within BlueRS+BD.
- Set up the parameter within BlueRS+BD from the terminal emulation and save the parameter using the AT command set.

Example:

To change the access mode on incoming connections to "bond unknown" please enter the following commands:

**AT\*\*BSECIN=1<↵>** (perform authentication on connection setup)

**AT&W<↵>** (store the new configuration)

- Leave your terminal emulation and start your application program.

With the exception of the command **A/** (Repeat command) all commands begin with the prefix **AT** and are terminated with <↵> ("Return"). Corrections within a command line are done with <BACKSPACE>. A command line has a maximum length of 80 characters. The command line is automatically cancelled by longer input. Blanks are ignored; the command line input is not case sensitive.

The parameter settings of BlueRS+BD obtained when using the AT commands can be permanently stored (AT&W) and are not lost by resetting or by leaving the AT command mode.

To enter the AT command mode during an active data connection you must use the following sequence ("Escape sequence"):

At least 1 sec pause <+><+><+> 1 sec pause.

The interval between each two plus signs must not exceed 1 sec.

The escape sequence is transmitted transparently to the remote device.

All commands and parameters marked as [deprecated] should not be used as on new implementations they might no longer be supported.

**Supported commands:**

---

**A/** Repeat last command line

---

This command repeats the commands of the last entered command line.

Note: No prefix **AT** is required.

A/

---

**A** Accept incoming call

---

Using this command you can accept an incoming call, if automatic call acceptance is not set (Register S0 = 0). An incoming call is always displayed by the message "RING" or the code "2", also if automatic call acceptance is selected.

Must be the last command in an AT command line.

---

**CONF** Enter BlueRS+BD Configurator

---

Enters directly into the BlueRS+BD Configurator, the configuration prompt "#" will be displayed. Leave the BlueRS+BD Configurator with the command "quit" (or "exit" or "go").

ATCONF

---

**&C** DCD control

---

This command selects the behavior of the DCD control line from the BlueRS+BD.

AT&C	BlueRS+BD control line DCD is always ON
<b>AT&amp;C1</b>	DCD ON indicates Bluetooth connection is established (default)
AT&C2	DCD line follows DTR
AT&C4	DCD follows remote DCD



## D Initiate Bluetooth link

This command addresses a Bluetooth device directly through its address or name. If a connection to a Bluetooth device requiring the restricted mode the PIN has to be set up using command AT\*\*BPIN.

### ATD <brad>[,cn][dx,sx,uy

- brad:** called Bluetooth remote device address (12 digits)
- cn:** Server channel for the requested service on remote device
- dx:** references called Bluetooth remote device number in *binqlist* (d01...d16)
- sx:** reference to remote device service number in *binqlist*
- uy:** with y=UUID of a service, if the remote device presents more than one service with the same UUID the last one is selected (for a list of valid UUIDs see chapter 3.3 "Table for coding Bluetooth services")

This command must be the last command in an AT command line. Any character input while the BlueRS+BD is dialling will cancel the dialling procedure.

#### Examples:

- ATD 0080371443AB Connect to Bluetooth device 0080371443AB
- ATD d1 Connect to 1<sup>st</sup> Bluetooth device in *binqlist* (server channel number defined in *brsch*)
- ATD d3,u1101 Connect to Bluetooth device to service with UUID1101 (serial port) of device d3

The characters W, >, P, T, ' ', ';', /, R, ^, !, L, @, (, ), '-', ' ' (lower and upper case) are ignored within an dialstring.

#### Note:

The remote Bluetooth device has to be determined before issuing this link request. This can be done in the following ways:

- Get it manually by reading from the sticker of the remote Bluetooth device.
- Inquire the address and services by using the commands AT\*\*BINQ=1 and AT\*\*BINQLIST
- Give BlueRS+BD about 10 seconds after reset to initialize before issuing the first command.

---

**&D** DTR control

---

This command selects the behavior of BlueRS+BD, when the DTE control line DTR changes from ON to OFF.

- |                  |   |
|------------------|---|
| AT&D             | DTE control line DTR setting is ignored   |
| AT&D2            | DTE control line DTR is evaluated: dropping the DTR line by the DTE will disconnect an existing Bluetooth link. An incoming call will be accepted only with DTR active.                                 |
| <b>AT&amp;D4</b> | DTE control line DTR is partly evaluated:<br>- dropping the DTR line by the DTE will disconnect an existing Bluetooth link (default).<br>- An incoming call will be accepted independent of DTR status. |
- 

**E** Local echo

---

This command selects the local echo in command mode.

- |             |  |
|-------------|--|
| ATE         | No local echo                            |
| <b>ATE1</b> | Local echo on in command phase (default) |
- 

**&F** Load factory defaults

---

Factory default will be loaded. (For storing in non volatile memory please use the command AT&W).

- |       |  |
|-------|--|
| AT&F  | setup all parameter concerning data port.                        |
| AT&F1 | setup all parameter including Bluetooth specifics and passwords. |
- 

**H** Disconnect

---

This command disconnects existing Bluetooth connection, after issuing the escape sequence (see page 7).

ATH

## I Display version information

Displays different information about version number and settings:

ATI	Returns the "Modem"-type; name of the hardware adapter
ATI1	Returns "0"
ATI2	Returns "OK"
ATI3	Returns version string: "V1.xyz"
ATI4	Returns manufacturers name: "Stollmann E+V GmbH"
ATI5	Returns "OK"
ATI6	Returns copyright string: "(c) Copyright Stollmann GmbH"
ATI7	Returns "OK"
ATI8	Returns "ERROR"
ATI9	Returns "OK" (Plug&Play ID-Request not supported)
ATI77	Returns Bootloader version string
ATI99	Returns software creation date

## &K Flow control

This command selects the flow control behavior of the BlueRS+BD while in data communication phase.

AT&K	No local flow control between the DTE and BlueRS+BD is used
<b>AT&amp;K3</b>	Local flow control is set to hardware handshake RTS/CTS (default)

## O Return to online state

If BlueRS+BD is in command mode after issuing an escape sequence out of an existing connection, ATO brings BlueRS+BD back to data phase.

It must be the last command in AT command line.

ATO

## Q Suppress results

With this command result codes or messages can be suppressed.

<b>ATQ</b>	Returns status - codes after command input (default)
ATQ1	No result codes are returned

## &R CTS control

This command selects the behavior of the CTS control line of the hardware controlled by BlueRS+BD.

AT&R	Control line CTS is following all changes of RTS
<b>AT&amp;R1</b>	CTS is always ON (default)

---

**S** Display and set internal S register
 

---

**ATSnn?** Show actual values (decimal) of selected register *nn*  
**ATSnn=xxx** Set selected register *nn* to the decimal value *xxx*.  
 See S register definitions on page 19.

---

**&S** DSR control
 

---

This command selects the behavior of the DSR control line of the hardware controlled by BlueRS+BD.

**AT&S** Control line DSR is always ON (default)  
**AT&S1** DSR ON indicates Bluetooth link is established

---

**V** Result format
 

---

**ATV** Result is presented as numbers (followed by <↵>)  
**ATV1** Result is presented as text (default)

---

**&V** Display configuration
 

---

**AT&V** Displays the actual configuration of AT command setting  
**AT&V1** Displays the actual configuration of extended AT command setting

---

**W** Extended result codes
 

---

**ATW** Result is presented without extended result codes.  
**ATW1** Result is presented with extended result codes, Result messages include error causes.

---

**&W** Store active configuration
 

---

The active configuration will be stored in non volatile memory.

**AT&W**

---

**Z** Load stored settings
 

---

The active configuration will be reset to the stored configuration.

Must be the last command in an AT command line.

**ATZ**

---

**\*\*DBITS**                                      Number of data bits *x* asynchronous chars (7,8)

---

Number of data bits *x* for asynchronous character (7, default: **8**).  
AT\*\*DBITS=*x*

---

**\*\*PRTY**                                      Set parity of asynchronous characters

---

This command selects the parity for asynchronous characters.

**0**: no parity; **1**: even parity; **2**: odd parity

AT\*\*PRTY=**0**                              No parity (default)

AT\*\*PRTY=**1**                              Odd parity

AT\*\*PRTY=**2**                              Even parity

### 3.2.1 Bluetooth specific AT commands

---

#### **\*\*BINQ [mode]** Search Bluetooth devices

---

With this request the automatic search and service of all discoverable Bluetooth devices will be initiated.

As a result the creation of the list *binqlist* will be initiated. The list can be read out using the command `at**binqlist`. If the inquiry has not been terminated while issuing the command `at**binqlist`, the BlueRS+BD will return "inquiry active".

The entries contain the Bluetooth device addresses, the Bluetooth device names and available services (profiles).

The creation of this list may take up to 20 seconds due to the reaction time of the accessible Bluetooth devices; a maximum of 16 Bluetooth devices can be listed.

When issuing the command "`at**binq 1`" the command terminates with "OK" when the search process is finished. During the search process BlueRS+BD reports the device and service information.

*Note: The performance of the command is influenced by the parameters BINQND and BINQSD.*

Example:       `at**binq`               request Bluetooth devices with name and service  
          Response:            OK

---

#### **\*\*BINQLIST** Show inquired Bluetooth devices

---

With this request the list of found Bluetooth devices will be returned, the entries show the Bluetooth device address and the Bluetooth device name requested by the command `at**binq`. For every Bluetooth device in addition the available services (profiles) will be shown (for a list of valid services see chapter 3.3 "Table for coding Bluetooth services").

These entries can be accessed by the selector *d1...dn* to address the Bluetooth device and the selectors *s1...sn* to address the Bluetooth devices service channel.

A maximum of 16 Bluetooth devices will be displayed.

---

Example:     at\*\*binqlist  
 Responses:   d01: <bradr1> <cod1> <brname1>  
               s01: <service1> <server channel> <bsname1>  
               s02: <service2> <server channel> <bsname2>  
               d02: <bradr2> <cod2> <brname2>  
               s01: <service1> <server channel> <bsname3>  
               ...  
               OK

              or

              inquiry active   if the search initiated by at\*\*binq  
               OK               is still active

              or

              list empty       if no Bluetooth device found  
               OK

**bradr**           found Bluetooth remote device address (12 digits)  
               **cod**             class of device  
               **brname**          found Bluetooth remote device name  
               **service**         coding of service type  
               **server channel**   used channel number for service type  
               **bsname**          used service name for service type

---

**\*\*BINQDEL <dx>,[sy]**           Delete remote device or service

---

To delete a remote device or service from the binqlist within BlueRS+BD, issue the command "AT\*\*BINQDEL".

Example:     at\*\*binqdel d1       delete device d1  
 Response:    OK  
               at\*\*binqdel d1,s2   delete service s2 of device d1  
 Response:    OK

---

**\*\*BINQSERV <brad>| <dx>**       Discover services of device

---

Performs a service discovery on a single device.

**brad:** Bluetooth remote device address (12 digits)  
**dx:**   References Bluetooth remote device number in binqlist (d01...d16)

The commands needs a Bluetooth device address or a device selector dx from the binqlist as a parameter.

The information gathered is responded immediately and inserted into the binqlist.

---

Example:     at\*\*binqserv d03   get service information for device d03  
 Response:    d03: <bradr1> <cod1> <brname1>  
               s01: <service1> <server channel> <bsname1>  
               s02: <service2> <server channel> <bsname2>  
               OK

---

**\*\*BINQND <mode>**                   Request device name during device search

---

If the parameter BINQND is set to 1, a name request is performed on each inquired device during execution of the BING command.  
 If the parameter is set to 0 name are not requested.

default: **1** – names are requested from remote device

Example:     at\*\*binqnd 1  
 Response:    OK

---

**\*\*BINQSD <mode>**                   Discover services during device search

---

If the parameter BINQSD is set to 1, a service discovery is performed on each inquired device during execution of the BING command.  
 If the parameter is set to 0 services are not discovered.

default: **0** – do not discover services

Example:     at\*\*binqsd 1  
 Response:    OK

---

**\*\*BDINQ**                            Inquire Bluetooth devices [deprecated]

---

With this request the automatic scan of all discoverable Bluetooth devices will be initiated.

As a result the creation of the list *bdlist* will be initiated. The list can be read out using the command at\*\*bdlist. If the Inquiry-scan has not been terminated while issuing the command at\*\*bdlist, BlueRS+BD will return "inquiry active".

The entries contain the Bluetooth device address, the Bluetooth device names and available services (profiles).

The creation of this list may take up to 20 seconds due to the reaction time of the accessible Bluetooth devices; a maximum of 16 Bluetooth devices can be listed.

When issuing the command "at\*\*bdinq 1" the inquiry scan will only request the Bluetooth addresses, name and service inquiry will not be performed.

Example:     at\*\*bdinq            request Bluetooth devices with name and service  
 Response:    OK  
               at\*\*bdinq 1        request Bluetooth device addresses only



---

Response: OK

---



---

**\*\*BDLIST** Show inquired Bluetooth devices [deprecated]

---

With this request the list of found Bluetooth devices will be returned, the entries show the Bluetooth device address and the Bluetooth device name requested by the command *at\*\*bdinq*. For every Bluetooth device in addition the available services (profiles) will be shown.

These entries can be accessed by the selector *d1...dn* to address the Bluetooth device and the selectors *s1...sn* to address the Bluetooth devices service channel.

Example: *at\*\*bdlst*  
 Responses: d1: <bradr1>, <brname1>  
               s1: <service1>, <server channel>, <bsname1>  
               s2: <service2>, <server channel>, <bsname2>  
               d2: <bradr2>, <brname2>  
               s1: <service1>, <server channel>, <bsname3>  
               ...  
               OK

or

inquiry active if the search initiated by *at\*\*bdinq*  
 OK is still active

or

list empty if no Bluetooth device found  
 OK

***bradr*** found Bluetooth remote device address (12 digits)  
***brname*** found Bluetooth remote device name  
***service*** coding of service type  
***server channel*** used channel number for service type  
***bsname*** used service name for service type

Additional Bluetooth specific commands can be found in chapter 4.4 List of BlueRS+BD Configurator commands.

---

**\*\*<cmd>** Execute configuration command

---

Executes one configuration command, for definition of commands see page 23.

AT\*\*<cmd>

More than one configuration command have to be separated by a ";".

AT\*\*cmd1;\*\*cmd2



### 3.2.2 AT command S register set

- S0** 0: No automatic call acceptance, acceptance of an incoming call is controlled by the data terminal (command ATA after RING)  
 1: Immediate call acceptance by the terminal adapter (default)  
 2..*n*: Call acceptance through the terminal adapter after *n* "RING" messages.
- S2** Escape Character (default = 43h)
- S3** Carriage Return Character (default = 13)
- S4** Line Feed Character (default = 10)
- S5** Backspace Character (default = 08)
- S7** Wait time for Carrier (sec) (default = 30 sec)
- S9** Enable PNP functionality for Windows95 (default=1, enabled)
- S91** 0: default  
 1: all unknown AT commands will be answered with OK.  
 2: Windows 2000 compatibility: some AT commands will be answered with OK, unknown AT commands will be answered with OK.

### 3.2.3 AT result codes

#### Result codes (numerical and verbose):

Code	Text	Meaning
0	OK	Command completed
1	CONNECT < <i>radr</i> >	Connection established
2	RING < <i>radr</i> >	Indicates an incoming call (Link request received)
3	NO CARRIER < <i>berr</i> >	No synchronization ( <i>berr</i> = BT error cause)
4	ERROR	Illegal command or error that can not be indicated otherwise
6	NO DIALTONE < <i>berr</i> >	No access to Bluetooth? network ( <i>berr</i> = BT error)
7	BUSY < <i>berr</i> >	Number engaged ( <i>berr</i> = BT error cause)
8	NO ANSWER < <i>berr</i> >	No connection; addressed Bluetooth device can not be reached ( <i>berr</i> = BT error cause)

<*radr*> = Address of the remote device

the display of the remote device address must be enabled with the command ATW1.

#### Error cause display:

<*berr*> = Bluetooth release (error) cause, hexadecimal

Example: NO CARRIER <0104>

In AT command mode, error cause display (does not belong to the AT command standard) can be turned on by issuing the command ATW1 . The shown error

causes use the coding defined by the Bluetooth definition (see page 39).

### 3.3 Table for coding Bluetooth services

List of Bluetooth services (profiles/UUIDs):

Code	Text	Meaning
1101	SerialPort	Serial port, serial data link without any restriction
1102	LANAccessUsingPPP	Lan Access with PPP protocol
1103	DialupNetworking	Dial Up Networking to establish switched connections to the ISDN or PSTN
1104	IrMCSync	
1105	OBEXObjectPush	OBEX Object Push
1106	OBEXFileTransfer	OBEX Filetransfer
1107	IrMCSyncCommand	
1108	<i>Headset</i>	<i>Headset access via Bluetooth</i>
1109	Cordless Telephony	
1100	Intercom	
1111	Fax	Fax
1112	<i>HeadsetAudioGateway</i>	<i>Headset Gateway for audio signals</i>
1113	WAP	
1114	WAP_CLIENT	

## 4 BlueRS+BD Configurator command set

The BlueRS+BD settings for the serial and Bluetooth interfaces are called configuration. Hardware driven by BlueRS+BD is delivered with a set of pre-set values. In the following section it will be shown how, by using the configuration commands, you can examine the configuration of BlueRS+BD and, if necessary, change it. The values can be stored in non volatile memory; this means they will remain unchanged even if the power supply is disconnected.

You can configure BlueRS+BD in the following ways:

- By using BlueRS+BD Configurator commands entered by a locally connected PC.
- By using the AT command set entered by a locally connected PC.
- By using BlueRS+BD Configurator commands entered via the Bluetooth link (remote configuration).

BlueRS+BD Configurator can be entered in the following ways:

- By using a special command from the asynchronous dialup command interface (AT: "ATCONF").
- Remote via a Bluetooth connection from another Bluetooth device.
- By the escape sequence in power up phase if enabled (rsttim>10, rstmsg=1).

### 4.1 Configuring BlueRS+BD after power on

- Connect the hardware to PC's COM port.
- Start a terminal emulation program (i.e. Hyper-Terminal) with the following settings:  
9600 Baud, 8 databits, No Parity (**8N1**)
- Power up the hardware
- Wait until the message to enter the config sequence is displayed:  
"+++ Press <CR>,<CR>,<ESC>,<ESC> to enter [Hardware Name]Configurator +++"
- Type in within 2 seconds after the message appears: <RET> <RET> <ESC> <ESC>, to call up the BlueRS+BD Configurator.
- The BlueRS+BD Configurator acknowledges by giving a welcome string and a "#" as the prompt character. You can now work with the BlueRS+BD Configurator by using the configuration commands (see page 23).
- Set up the parameters for BlueRS+BD from your terminal program and store them.

Example:

To **set** the baudrate to 9600 baud, please enter the following commands:

<b>br=4</b> <↵>	(set baudrate to 9600 baud)
<b>save</b> <↵>	(store the new configuration)
<b>quit</b> <↵>	(leave the BlueRS+Configurator and activate the new

value settings)

Hint: The active set of parameters can be displayed on screen by the BlueRS+BD Configurator command "**show**<↵>".

- Leave the terminal program and start your application.

Now you can use BlueRS+BD with the new set of parameters by running the needed PC application.

## 4.2 Configuring BlueRS+BD with AT commands

To execute one BlueRS+Configuration command *cmd* out of the AT command mode you have to issue the command: "at\*\**cmd*".

To call up the BlueRS+BD Configurator, use the command "atconf".

You can leave the BlueRS+BD Configurator by issuing the command "quit" (or „exit“ or „go“).

## 4.3 Remote configuration using the BlueRS+BD Configurator commands

The BlueRS+BD software to be configured is referred here as "*remote* BlueRS+BD". The BlueRS+BD performing the configuration is referred to as "*local* BlueRS+BD". Please make sure that the *remote* Bluetooth device to be configured is powered up.

- Connect the PC's com-port to the DTE interface of the *local* Bluetooth device.
- Power up the local device.
- Start a terminal emulation program (i.e. HyperTerminal)
- Configure the *local* BlueRS+BD with the special service channel 30 (brsch=30).
- Set up a Bluetooth-Link to the *remote* Bluetooth device to be configured by using the command: ATD<*brad*><↵>.

The called BlueRS+BD Configurator acknowledges by requesting the remote password. Please enter the correct password (default: no password, just return). Now you can work with the BlueRS+Configurator by using the BlueRS+Configurator commands (see page 21).

- Configure the parameters for the *remote* BlueRS+BD from within your terminal program and store them (if wanted). (See page 23).

Hint: The active set of parameters can be displayed on screen by the BlueRS+BD Configurator command "**show**<↵>".

If necessary the *remote* BlueRS+BD can be reset using the command "**reset**<↵>".

- Hang up the Bluetooth connection by leaving the BlueRS+BD Configurator using the command **quit**.

Leave your terminal program. After the next reset the changes will be active.

- Restore the local BlueRS+BD's channel to the desired value, default to 1 (brsch=1).

Now the configured *remote* BlueRS+BD with the new set of parameters can be used by running the needed PC application.

#### 4.4 List of BlueRS+BD Configurator commands

The BlueRS+Configurator commands typed in must have the correct syntax and be complete, including all blanks.

Configurator commands are case insensitive.

The bolded values are factory defaults. The usage is:

**[?]<command>[=parameter]**

Example to **set** the baudrate to 9600 baud:

**br=4**

Example to **show** the selected baudrate:

**br**

Example to **show all** selectable baudrates:

**?br**

Most important BlueRS+BD Configurator commands:

<b>show</b>	show the parameters usually used
<b>showall</b>	show all changeable parameters
<b>quit</b>	leave BlueRS+BD Configurator
<b>help</b>	show all available commands
<b>defa 1</b>	setup factory default parameter set
<b>save</b>	store parameter non volatile

---

**at.sx** AT command parameter set

---

AT command set only:  
Handle AT specific settings.  
Show and change AT S registers by entering the new value.  
**at.s0** show setting of S0-Register  
**at.s0=1** set Register S0 to 1

---

**bacctab** Show bonding information [deprecated]

---

To show the bonding information (setup due to a successful restricted connection) within BlueRS+BD you have to issue the command "AT\*\*BACCTAB". The BlueRS+BD stores up to 4 bonds.  
If all 4 entries are used a new bond will overwrite the oldest one.

Example: at\*\*bacctab  
Response: 1: used: YES BD: 00803714ECA4 name: <name>  
2: used: YES BD: 008025000105 name: <name>  
3: used: NO  
4: used: NO  
OK

---

**bclass** Set Bluetooth class of device

---

Allows the manipulation of the Bluetooth Class of Devices/Service  
The default setting is 1F00 = no services class, unspecified device class

---

**bcrypt** Switch encryption on or off

---

Enable or disable the encryption of the information transferred via Bluetooth.  
Please note the Bluetooth connection must be authenticated (see parameter BSECOUT,BSECIN) to allow encryption.

Possible values are:  
0: encryption switched off  
1: encryption enabled

Example: at\*\*bcrypt 1  
Response: OK



---

**bdel** Delete pairing information [deprecated]

---

To delete the pairing information (setup due to a successful restricted connection) within BlueRS+BD you have to issue the command "AT\*\*BDEL 1" . The paired Bluetooth device can be read out by the command "AT\*\*BACCTAB".

Example:       at\*\*bdel 1  
              Response:       OK

---

**bpin** Bluetooth device PIN (Passkey)

---

Set the PIN for establishing a connection in the restricted mode by the command "AT\*\*BPIN=<old\_pin>,<new\_pin>".

This PIN is always checked if

- BlueRS+BD is set to restricted mode
- BlueRS+BD is not set to restricted mode, but the partner Bluetooth device is set to restricted mode.

The PIN has a maximum length of 16 alphanumeric characters, factory default: **0000**.

Note: You should prefer to use a passkey composed from decimal digits. You can not ensure that a remote device with limited user interface capabilities supports alpha characters.

To reset the PIN to factory default please use the command AT&F1 (all parameters will be set to factory default).

Example:       at\*\*bpin=0000,1234   set PIN to 1234 (old PIN was 0000)

Note: After a pairing has taken place (PIN successful exchanged) Bluetooth links can be established between these paired devices independent of the setting of the restricted mode and the PIN!



---

**bnds** <mode> Set the storage mode for bonds

---

If the parameter BNDS is set to 1, bonding information (link keys) are stored permanently in the NVRAM of the hardware driven by BlueRS+BD.

If the parameter is set to 0 bonds persist for the duration of the authenticated connection.

Example:     at\*\*bnds 1  
              Response:     OK

---

---

**bpsm** Set scanning capability

---

This parameter controls the visibility and the ability to be connected and the reaction to paging and/or inquiry requests.

If set to 0 all paging/inquiry requests from other Bluetooth devices will be ignored and the RF receive part of the hardware driven by BlueRS+BD will be disabled.

Possible values are:

- 0 : Page scan and inquiry scan are disabled (hardware is not connectable and not discoverable)
- 1 : Inquiry scan is enabled (hardware is discoverable, but not connectable)
- 2 : Page scan is enabled (hardware is connectable, but not discoverable)
- 3 : Page scan and inquiry scan are enabled (hardware is connectable and discoverable, default)

Example:     at\*\*bpsm=2     enable page scan, but do not answer on inquiry requests

---

---

**bpsrm** Set the page scan repetition mode

---

This parameter allows the modification of the page scan repetition mode of the Bluetooth hardware.

Possible values according to the Bluetooth baseband specification are:

- 0 : R0 - continuous scan
- 1 : R1 - 1,28 sec's interval 11,25 ms window (default)
- 2 : R2 - 2,56 sec's interval 11,25 ms window

Continuous scan decreases the connect time down to about 200 ms:

- R0:     about 200 ms
- R1:     about 2,2 sec
- R2:     about 3,5 sec

The BPSRM should be set to the same value for the scanning and the paging device.

Example: `at**bpsrm=0` set page scan repetition mode to R0 – continuous.

Note: Setting the page scan repetition mode to continuous scan significantly increases hardware power consumption.

---

**bsecin** <mode> Authorization mode for incoming connections

---

The BSECIN parameter configures the authorization behavior of the Bluetooth hardware on incoming connections.

<mode>	mode name	behavior
0	bondable	accept bond request from remote device no active authentication (default)
1	bond unknown	perform authentication on connection setup, if not bonded with remote device perform a bonding
2	bond always	always perform a bonding
3	bonded only	accept only connections from bonded devices, authenticate the link authorization
4	rebond always	accept only connections from bonded devices, always perform a bonding
5	do not connect	

---

**bsecout** <mode> Authorization mode for outgoing connections

---

The BSECOUT parameter configures the authorization behavior of BlueRS+BD for outgoing connections.

<mode>	mode name	behavior
0	bondable	accept bond request from remote device no active authentication (default)
1	bond unknown	perform authentication on connection setup, if not bonded with remote device perform a bonding
2	bond always	always perform a bonding
3	bonded only	accept only connections from bonded devices, authenticate the link authorization
4	rebond always	accept only connections from bonded devices, always perform a bonding
5	do not connect	

---

**boad** Bluetooth own device address

---

With this command you can read out the own Bluetooth device address. This value can not be changed.

Example: AT\*\*BOAD

---

**bname** Bluetooth own device name

---

This command defines the device name. bname is shown on a remote Bluetooth terminal device during a service discovery sequence. It is a string constant according to V.250.

Example:     at\*\*bname                    show own device name  
          at\*\*bname=<rs+name>        set own device name to *rs+name*

---

**bofcon** Set fast connection mode

---

With this parameter the fast connection mode for outgoing calls can be switched on and off. The Bluetooth hardware uses a different page mode to establish the Bluetooth connection to the remote device and decreases the timeout for a unsuccessful paging.

Note: The remote device must be configured to use page scan mode R0 (parameter bpsrm) to achieve the full speed advantage.

Example:     at\*\*bofcon=1   enable the fast connection mode.

---

**bosch** Set own server channel number

---

Set up server channel number of the serial service supplied by the local device. The channel number is used for incoming connections only.

Note: The server channel 30 is reserved for the remote configuration access, do not use it for the serial port service.

---

**bosrv** Own service (profile) UUID

---

Defines the service the Bluetooth hardware announces to the world. “*bosrv*” influences the type that is shown on a remote Bluetooth terminal device during a service discovery sequence. The value must be entered as a hex number.

default: **0x1101** serial port

Example: at\*\*bosrv set own service to DialUp networking

---

---

**brad, brad2, brad3** Bluetooth remote device address

---

With this parameter you can setup up to 3 Bluetooth addresses of remote Bluetooth devices, that should be connected using an automatic link setup. BlueRS+BD will try to connect the device with address “brad” first, if that fails because the device is busy or unreachable it tries to connect the device “brad2” afterwards “brad3”. Then the sequence starts again with “brad”

The address can be any dial string as specified for the command ATD.  
The address can be deleted using the command brad -.

Example: brad=0080371443AB

---

---

**brbd** Displays connected device address

---

This command displays the device address of the connected Bluetooth device.  
This value can not be changed.

Example: at\*\*brbd show connected device address

---

---

**brname** Displays connected device name

---

This command displays the device name of the connected Bluetooth device.  
This value can not be changed.

Example: at\*\*brname show connected device name

---

**brsch** Set remote Bluetooth server channel

---

Set up server channel of the remote Bluetooth module, to which the Bluetooth link shall be established.

The own server channel number can be changed with parameter `bosch`. Remote management between BlueRS+BDs is achieved using the server channel 30.

default:1

Example: `at**brsch=1`

---

**bsname** Bluetooth service name

---

Defines the service name of the Bluetooth hardware. "*bsname*" is shown on a remote Bluetooth terminal device during a service discovery sequence.

default:[Product Name]/serial port

Example: `at**bsname`  
`at**bsname=<rs+srvname>` set own service name to *rs+srvname*

---

**brestr** Set restricted mode [deprecated]

---

Control the security behavior of the Bluetooth hardware.

When set to 1 the bonding information from the list of bonded devices or the passkey stored with parameter `bpin` will be used for authentication.

When set to 2 connections are allowed with bonded devices only. The passkey will not be used to authenticate the remote device.

The PINs of two Bluetooth devices have to set to the same value, if one of these devices allows only restricted connections. If a restricted connection has been established one time between two Bluetooth devices these devices know each other and are called as "bonded" (see command "AT\*\*BACCTAB" for information about the bonded Bluetooth devices).

After a bonding has taken place Bluetooth links can be established between these bonded devices independent of the setting of the restricted mode!

To delete the bonding information within BlueRS+BD you have to issue the command "AT\*\*BDEL".

---

**pwd** Set power down mode

---

Setting this parameter to 1 allows the Bluetooth hardware to enter power down state. This leads to reduced power consumption if no Bluetooth link is established.

The power down state is entered automatically (after approx. 1-2 seconds) if a Bluetooth link is disconnected and the line DTR is set to low.

Rising DTR will signal the Bluetooth hardware to leave power down, all functions will be available.

Please note, that in power down state the AT command handler is not available.

Possible values are:

**0** : power down not allowed (default)

**1** : power down state will be achieved automatically

Example:      at\*\*pwd=1                    enable power down mode

---

**br** Baudrate asynchronous

---

Selection of the asynchronous baudrate for the DTE interface

- 1: 1200 bits/s
  - 2: 2400 bit/s
  - 3: 4800 bit/s
  - 4: 9600 bit/s
  - 5: 19200 bit/s
  - 6: 38400 bit/s
  - 7: 57600 bit/s
  - 8**: 115200 bit/s (default)
  - 9: 230400 bit/s
  - 20: 300 bit/s
  - 21: 600 bits/s
  - 26: 10400 bits/s
- 

**cato** Call timeout to abort

---

Time to abort a call if not successful connected after *n* seconds.

*n* = {3..255}, default: **15** seconds.



---

**capa** Call pause

---

Automatic call: Set a call pause for  $n$  seconds before next call attempt.  
 $n = 0$  : no call retry, default: **3** seconds.

---

**ccts** CTS control

---

CTS control  
0 : CTS follows local RTS  
1 : CTS always ON (default)  
2 : CTS follows local DTR  
3 : CTS follows remote CTS line status

---

**cdcd** DCD control

---

DCD control  
0 : DCD always ON  
1 : DCD indicates a Bluetooth connection (default)  
2 : follows local DTR  
4 : follows remote DCD

---

**cdsr** DSR control

---

DSR control  
0 : DSR always ON (default)  
1 : DSR indicates a Bluetooth connection  
4 : DSR follows remote DSR line status

---

**cdtr** DTR control

---

Usage of DTR to control a Bluetooth connection

0 : No control:

Incoming calls will be accepted independent of DTR status;  
DTR drop does not disconnect an active connection.

2 : DTR off disconnects

Incoming calls will be accepted only when DTR is ON;  
DTR drop disconnects an active connection.

4 : DTR ignore and DTR drop disconnects (default)

Incoming calls will be accepted independent of DTR status;  
DTR drop disconnects an active connection.

7 : Reset device

DTR drop initiates a software reset.

---

**cmds** Command set

---

Command set for connection control

0: AT command set (default)

6: Automatic connection establishment when DTR is ON.

7: Automatic connection establishment when char is received.

8: Automatic connection establishment independent of any status line.

12: No connection establishment initiated by this module.

Note: For details see the appropriate chapters.

---

**cri** RI control

---

RI control

0 : RI is set with an incoming Bluetooth link request (default)

1 : RI follows remote RI line status

---

**defa** Default settings

---

Sets up factory default parameter setting.

defa 0: setup all parameter concerning data port

defa 1: setup all parameter to factory defaults including Bluetooth parameter.

---

**dbits** Asynchronous databits
 

---

Number of data bits asynchronous chars (default: 8) **7,8**

---

**flc** Flow control
 

---

Flow control to DTE  
 0 : No flow control  
**3** : Hardware flow control RTS/CTS (default)  
 6 : RTS to remote RI

---

**flash** Load new firmware
 

---

This commands loads new firmware into the Bluetooth hardware. The actual firmware will be overwritten.

The firmware will be stored into the used part of the flash memory. While uploading the following checks will be performed:

- File transfer protocol is XMODEM1K
- An overall firmware checksum is used.
- The firmware type written in the module header of the firmware must be compatible to the hardware- and allowed firmware type (stored inside the Bootloader).

This command is available only via the local serial port.

---

**idle** Idle data timeout
 

---

Timer to disconnect the Bluetooth link after inactivity on the serial line (sec).

**0**: inactive (default)

1..*n*: delay time to disconnect in seconds (1..255).

---

**load** Load stored parameter setting
 

---

All parameters stored in non volatile RAM will be loaded.

---

**prty** Asynchronous parity
 

---

Parity of asynchronous character (default: no parity)

**0** : No parity; **1** : Odd parity; **2** : Even parity

---

---

**quit, exit, go**                      Activate parameter changes

---

Activates the actual parameter settings and leave the BlueRS+BD Configurator (without storing the parameter in non volatile memory ).

---

**rbaccl**                              Remote config port access level

---

Defines the accessibility and visibility of the Bluetooth remote configuration port. The following values are applicable:

- 0 config port is not accessible nor visible
  - 1 config port is accessible but not visible**
  - 2 config port is accessible and visible
- 

**rbsname**                              Remote config port service name

---

Defines the service name of the Bluetooth remote configuration port. "*rbsname*" is shown on a remote Bluetooth terminal device during a service discovery sequence.

default:config port

Example:      `at**rbsname`  
              `at**rbsname=<rs+config>`      set own device name to *rs+config*

---

**rpwd**                                  Remote port config password

---

Sets password for remote configuration to *nn* (1..32 chars)

`AT**RPWD=nn`

Default: empty, just press return key.

---

**rpc** Remote port config control
 

---

Bluetooth provides the feature to control serial port parameters like baudrate, parity etc. from the remote side. To distinguish if a device is the Master regarding RPC (settings are provided by the DTE) and which one is the Slave (gets its settings via the Bluetooth link) the parameter *RPC* is used.

*RPC* uses a single numeric parameter value, the default is 0 = Master mode. Any value different from 0 places the Bluetooth hardware in slave mode.

To facilitate a finer setting each bit of the *RPC* value has a control function for one port setting. If the bit is set the settings follows the remote setting (slave mode) and the corresponding local parameter is used as initial value and as setting in command mode (no Bluetooth link active).

bit	function	corresp. parameter
0	baudrate	br
1	number of data bits	dbits
2	number of stop bits	sbits
3	parity type	prty
4	flow control	flc

**reset** Reset Bluetooth hardware
 

---

Resets the whole functionality by a forced hardware reset (like Power off / on). Refer also to parameter *rstim*.

**rstim** Startup timer
 

---

Startup delay timer after reset. Within this period the configuration can be entered after reset.

1 .. 255 : reset phase in 100 milliseconds, default: **40** (4 seconds)

**save** Store parameter changes
 

---

Stores the actual set of parameters in non volatile memory.

**sbits** Number of stop bits
 

---

Number of stop bits of asynchronous character

1 : One stopbit (default); 2 : two stopbit

---

<b>show</b>	Show parameters
-------------	-----------------

---

Displays the actual set of parameters

---

<b>showall</b>	Show all parameters
----------------	---------------------

---

Displays the all accessible parameters

---

<b>txfwd</b>	Timer for data forwarding
--------------	---------------------------

---

If no character is entered within the defined period, the received data will be transmitted to the Bluetooth link.

**0** : minimum delay time (appr. 10 ms, default)

**1..n**: delay time in 50 ms ticks.

Note: Valid for AT command set only.

---

<b>ver</b>	Show version string
------------	---------------------

---

Displays detailed information about the software and hardware version.

---

<b>verb</b>	Show version string of Bootloader
-------------	-----------------------------------

---

Displays detailed information about the software version of the Bootloader.

---

<b>&lt;cmd&gt;?</b>	More information for one command
---------------------	----------------------------------

---

Displays the allowed values for one selected command *<cmd>*

## 5 Diagnostic and error messages

### 5.1 Error messages from AT command set

When the extended result messages are selected using the command ATW1, Bluetooth error codes are displayed in addition to the standard AT result messages. Bluetooth error codes are always coded as <xxxx>. The meaning can be taken from the following tables Bluetooth error codes (see page 39).

### 5.2 Bluetooth error codes

Note: error codes marked with (i) are internal errors.

Error cause hexadecimal	Meaning	Translation to AT result codes
0x0000	no error, no explanation	3
0x0001	driver and application version mismatch	3
0x0002	application id provided is not correct	3
0x0003	unknown message code in message	3
0x0004	not enough resources to complete request (out of descriptor etc)	3
0x0005	at least one parameter of the message is wrong	3
0x0006	no adapter plugged in	3
0x0007	too much outstanding messages in downstream direction	6
0x0008	driver is busy, repeat request later	6
0x0009	Error in message transport system (driver not correct installed?)	3
0x0101	(i) HCI_ERR_UNKNOWN_COMMAND	3
0x0102	(i) HCI_ERR_NOCONNECTION	3
0x0103	Bluetooth adapter crashed	3
0x0104/260	Remote Bluetooth device not found (wrong address?, out of range?)	8
0x0105	Authentication error (wrong pin code supplied?)	3
0x0106	(i) HCI_ERR_KEY_MISSING	3
0x0107	(i) HCI_ERR_MEMORY_FULL	3
0x0108/264	lost connection to remote Bluetooth device (out of range)	3
0x0109	max no of connections exceeded	6
0x010a	max no of voice connections exceeded	6
0x010b	(i) HCI_ERR_ACL_CONN_ALREADY_EXISTS	3
0x010c	(i) HCI_ERR_COMMAND_DISALLOWED	3
0x010d	connection attempt by remote side rejected	3

0x010e	connection attempt by remote side rejected	3
0x010f	connection attempt by remote side rejected	3
0x0110	connection attempt by remote side timed out	8
0x0111	(i) HCI_ERR_UNSUPPORTED_PARAM_VALUE	3
0x0112	(i) HCI_ERR_INVALID_HCI_PARAMETER_VALUE	3
0x0113	connection terminated by remote side	3
0x0114	connection terminated by remote side	3
0x0115	connection terminated by remote side	3
0x0116	connection terminated by local side	3
0x0117	(i) HCI_ERR_REPEATED_ATTEMPTS	3
0x0118	authentication rejected by remote side	3
0x0119	incompatible remote Bluetooth adapter	3
0x011a	unspecified error	3
0x011b	(i) HCI_ERR_UNSUPPORTED_LMP_PARAMETER_VAL	3
0x011c	master slave role switch not allowed	3
0x011d	connect lost to remote Bluetooth adapter (link manager)	3
0x011e	(i) (HCI_ERR_LMP_ERROR_TRANSACTION_COLLISION	3
0x011f	(i) HCI_ERR_LMP_PDU_NOT_ALLOWED	3
0x0120	attempt to enable encryption failed	3
0x0121	information: unit key used	3
0x0122	(i) quality of service not supported.	3
0x0123	(i) HCI_ERR_INSTANT_PASSED	3
0x0124	(i) unit key not supported	3
0x0164	(i) HCI_ERR_ILLEGAL_HANDLE	3
0x0165	initialization of adapter failed (timeout)	6
0x0166	initialization of adapter failed (synchronization)	6
0x0201	(i) connection went to state pending	3
0x0202	protocol not supported by remote side	3
0x0203	connection refused due to security conditions	3
0x0204	out of resources	3
0x02ee	remote side timed out	3
0x0301	version of remote SDP entity not compatible	3
0x0302	invalid service record handle	3
0x0303	invalid request syntax	3
0x0304	invalid size of pdu	3
0x0305	continuation state is invalid	3
0x0306	not enough resources to complete operation	3
0x0364	client received unhandled SDP opcode	3
0x0365	No answer from server(timeout)	3
0x0366	specified service not found	3
0x0367	Syntax Error in Response from server	3
0x0464	Connection setup was rejected by remote side (DM), i.e. the Pin exchange has failed in restricted mode	3
0x0465	Connection timed out (no response)	8



0x0466	Non Supported Command received (incompatible remote side)	3
0x0467	Illegal parameter	3

Note: error codes marked with (i) are internal errors.

## **6 Regulatory Information**

### **6.1 Copyright and Trademark Notices**

Products and brand names may be the trademarks or registered trademarks of their respective owners.

BLUETOOTH is a trademark owned by Bluetooth SIG, Inc, U.S.A and licensed to Stollmann Entwicklung und Vertrieb GmbH.

## 7 History

Ver	Date	by	Changes since last Version
1.06	11/03/2004	lv	removed sections related to specific hardware

End users may not be provided with the module installation instructions. OEM integrators must inform the end users with the following statements.

**RF Exposure statement:**

The antenna shown in this filing must not be co-located or operated in conjunction with any other antenna or transmitter. End users may not be provided with the module installation instructions. OEM integrators and end users must be provided with transmitter operating conditions for satisfying RF exposure compliance.

For portable applications OEM integrators need no SAR evaluation. The max radiated source-based time-averaged output of 0.0016 W is below the low threshold of 24mW for  $d < 2.5$  cm.

**Statement according to FCC part 15.21:**

Modifications not expressly approved by this company could void the user's authority to operate the equipment.

**Statement according to FCC part 15.105:**

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- . Reorient or relocate the receiving antenna.
- . Increase the separation between the equipment and receiver.
- . Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- . Consult the dealer or an experienced radio/TV technician for help.

**Statement according to FCC part 15.19:**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The EUT is labeled with its own FCC ID number . If the module is inside of an end product, the label will not be visible. In this case the end product will be labeled exterior with the FCC ID: TGZBT001.