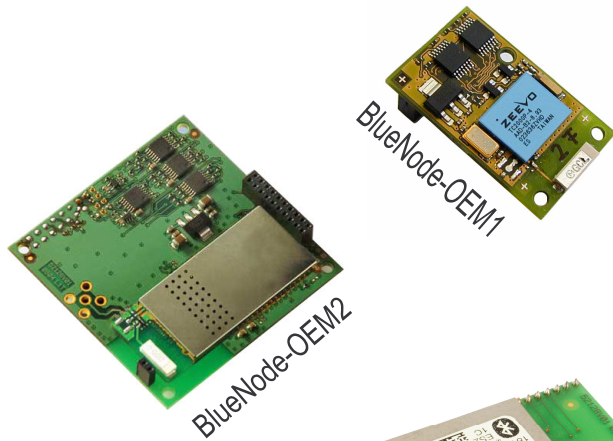




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Manual BlueNode



ComPoint-BlueTooth



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1 Introduction

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

This documentation is valid for the following models of the BlueNode product family

- **BlueNode-OEM1** (Class1 plug on module, antenna internal, 5V/3.3V DC)
- **BlueNode-OEM2** (Class1 plug on module, antenna internal, 5V/3.3V DC)
- **BlueNode-SOC** (Class2 plug on module, antenna internal, 3.3V DC)
- **BlueNode-TA** (class1/Class2 plug in module, antenna internal, 5V DC)
- Software versions V1.124.003 or later

1.1 Product description

The RS+ is a Bluetooth adapter with the following functions.

- The BlueNode connects devices with a **serial port** to any Bluetooth link. It gives access to other devices situated in the same Bluetooth area (piconet).
- Data can be transmitted with the following rates:
 - limited by the baudrate of the serial link from 1200 up to 230400 baud.
- The connected serial device can drive the BlueNode by using
 - asynchronous AT commands
 - automatic connection setup

The following profiles are supported:

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

BlueNode may be used in two product versions:

- The BlueNode- **module** may be integrated into different devices and connects them with the Bluetooth interface via a serial TTL/CMOS compatible interface. These modules are referenced as **BlueNode-SOC/OEM** in this document
- The BlueNode **Desktop** device is an external device that connects the terminal equipment with the Bluetooth interface via a serial V.24 / RS-232 interface. These devices are referenced as **BlueNode-TA** in this document



1.2 Safety

The BlueNode is conform to the European safety requirements IEC 60 950. Please use only the delivered power supply or an original replacement from AK-NORD.

The homologation for the Bluetooth compatibility tests according the Bluetooth standard V1.1 has been started.



2 Using the BlueNode

Before using the BlueNode the address of another Bluetooth device has to be selected - if not predefined by factory – that shall be the communication partner in the Bluetooth link.

The compatible devices can be scanned using the configuration command "bdinq". From that list one Bluetooth device has to be selected.

If you are using an automatic connecting mode that Bluetooth address has to be entered and stored using the configuration command "brad" (see BlueNode Configurator activation on page 23).

You can select different operation modes for the BlueNode. These operating modes are used to control Bluetooth links and to configure the BlueNode.

Supported operating modes:

- Automatic connecting deriving from DTR or always connected.
- Automatic accepting of incoming connections.
- Asynchronous mode for devices that need the AT command set.

You can configure the BlueNode in the following ways:

- by using BlueNodeConfiguration commands entered by the locally connected PC.
- by using the AT command set entered by the locally connected PC.
- by using BlueNodeConfiguration commands entered via the Bluetooth link (remote configuration).



2.1 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 transmit data is received from the DTE device. All data received before the Bluetooth connection is established will be buffered inside the BlueNode and automatically sent via the Bluetooth link.
- 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 BlueNodeConfiguration parameter "*cmds*" to 6, 7, 8 or 13 (see below).

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.

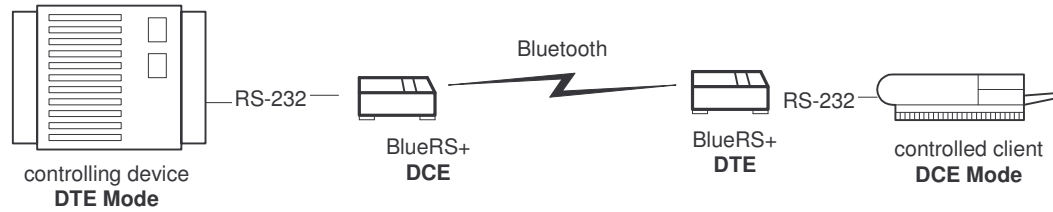
The Bluetooth device to be accessed is taken from the parameter "*brad*", it has to be set up to the Bluetooth device address of the remote Bluetooth device. Additionally the server channel has to be set up if not fitting to the default (1), see parameter *brsch*.

<i>cmds</i> 6	Automatic connection establishment when DTR is ON.
<i>cmds</i> 7	Automatic connection establishment when transmit data are received by the BlueNode.
<i>cmds</i> 8	Automatic connection establishment independent of any status line.
<i>cmds</i> 12	No connection establishment initiated by this module.
<i>cato</i> <i>n</i>	call abort of a not successful call after <i>n</i> seconds. <i>n</i> ={3..255}, default: 15 seconds.
<i>capa</i> <i>n</i>	call pause for <i>n</i> seconds before next call attempt. <i>n</i> = 0 : no call retry. <i>n</i> ={0..255}, default: 3 seconds.

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



Example:



Setting of BlueNode **DCE**:

cmds=8

brad= boad of BlueNode**DTE**

Setting of BlueNode **DTE**:

cmds=12

Don't forget to set the baudrate to the correct setting.



2.2 AT command set for BlueNode

All parameter 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 want another configuration as set in the factory default setting, please do the following steps:

- Connect the PC's com-port to the DTE interface of the BlueNode.
- Connect the power supply to the mains socket.
- Start a terminal emulation on your PC, please verify that the baudrate setting of the terminal emulation fits those of the BlueNode.
- Set up the parameter of the BlueNode from the terminal emulation and save the parameter using the AT command set.

Example:

To change the access mode to restricted please enter the following commands:

ATBRESTR=1**<↵> (set restricted mode to ON)

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 <↵>. Corrections in a command line are done with <BACKSPACE>. A command line has a maximum of 80 characters. The command line is automatically cancelled by longer input. Blanks are ignored, capital/small letters are not significant.

The parameter settings of the BlueNode 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 time gap between all three plus signs may not exceed 1 sec.

The escape sequence is transmitted transparent to the remote device.



By using initialization strings to configure the TA which includes more than one parameter to be configured please follow the examples below:

- Initialization string includes standard AT commands:

AT&F&D2&C1E0&W

By using a special configuration command (at**<cmd>) in the initialization string you have to set a semicolon <;> in case that additional commands will follow.

- Initialization string includes special AT commands:

AT&F****BR=8**;&D2&C1E0&W

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 BlueNode Configurator
-------------	-----------------------------

Enters directly into the BlueNode Configurator, the configuration prompt "#" will be displayed. Leave the BlueNode 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 BlueNode.

AT&C	BlueNode control line DCD is always ON
------	--

AT&C1	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 **Fehler! Verweisquelle konnte nicht gefunden werden. "Fehler! Verweisquelle konnte nicht gefunden werden."**)

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

Examples:

ATD 0080371443AB	Connect to Bluetooth device 0080371443AB
ATD d1	Connect to 1 st Bluetooth device in <i>binqlist</i> (server channel number defined in <i>brsch</i>)
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 BlueNode about 10 seconds after reset to initialize before issuing the first command.



&D DTR control

This command selects the behavior of BlueNode, 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.
 - AT&D4** DTE control line DTR is partly evaluated:
 - dropping the DTR line by the DTE will disconnect an existing Bluetooth link (default).
 - 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
 - ATE1** 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 8).

- ATH



I Display version information

Displays different information about version number and settings:

AT1 Returns the "Modem"-type; name of the hardware adapter
 AT11 Returns "0"
 AT12 Returns "OK"
 AT13 Returns version string: "V1.xyz"
 AT14 Returns manufacturers name:
 AT15 Returns "OK"
 AT16 Returns copyright string
 AT17 Returns "OK"
 AT18 Returns "ERROR"
 AT19 Returns "OK" (Plug&Play ID-Request not supported)
 AT177 Returns Bootloader version string
 AT199 Returns software creation date

&K Flow control

This command selects the flow control behavior of the BlueNode while in data communication phase.

AT&K No local flow control between the DTE and BlueNode is used
AT&K3 Local flow control is set to hardware handshake RTS/CTS (default)

O Return to online state

If BlueNode is in command mode after issuing an escape sequence out of an existing connection, ATO brings BlueNode 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.

ATQ 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 BlueNode.

AT&R Control line CTS is following all changes of RTS
AT&R1 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 **Fehler! Textmarke nicht definiert..**

&S DSR control

This command selects the behavior of the DSR control line of the hardware controlled by BlueNode.

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



****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 BlueNode 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 BlueNode 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 **Fehler! Verweisquelle konnte nicht gefunden werden. "Fehler! Verweisquelle konnte nicht gefunden werden."**).

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 BlueNode, 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 BINQ 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 BINQ 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*, BlueNode 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:	<i>at**bdinq</i>	request Bluetooth devices with name and service
	Response:	OK
	<i>at**bdinq 1</i>	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**bding 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 3.4 List of BlueNode Configurator commands.

**<cmd>	Execute configuration command
----------------------	-------------------------------

Executes one configuration command, for definition of commands see page 26.

AT**<cmd>

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

AT**cmd1;**cmd2



2.2.1 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.

2.2.2 AT result codes

Result codes (numerical and verbose):

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

Error cause display:

< *berr* > = BT 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 (default). The shown error causes use the coding defined by the Bluetooth definition (see page 51).



2.3 Cable replacement

A pair of BlueNode devices can be used to operate as a RS232 cable replacement. Typically one BlueNode has to operate as a DCE interface ("BlueNodeDCE", DSU9 female) and the other one as a DTE interface ("BlueNodeDTE", DSUB9 male). These devices have to be ordered with the correct interfaces.

When ordering a pair of BlueNode both devices will have the correct setting to operate without changing any parameter. The default behavior is as follows:

- The Bluetooth link is established directly and automatically after powering on from the BlueNode operating in DCE mode
- the restricted mode is disabled
- data transfer is transparent set to baudrate 115200 bit/s
- all status lines are transparently transferred to the other device (local flowcontrol is disabled).
- LED2 shows the Bluetooth connection status (ON = link established)

In detail the following settings differ from the factory default setting:

BlueNodeDCE:

cmds 8	Automatic connection establishment independent of any status line.
cdtr 0	DTR line is not controlling the Bluetooth link
cdsr 4	DSR Output line of BlueNodeDCE follows DSR input line of BlueNodeDTE
ccts 3	CTS Output line of BlueNodeDCE follows CTS input line of BlueNodeDTE
cdcd 4DCD	Output line of BlueNodeDCE follows DCD input line of BlueNodeDTE
cri 1	RI Output line of BlueNodeDCE follows RI input line of BlueNodeDTE
flc 0	no hardware flowcontrol

BlueNodeDTE:

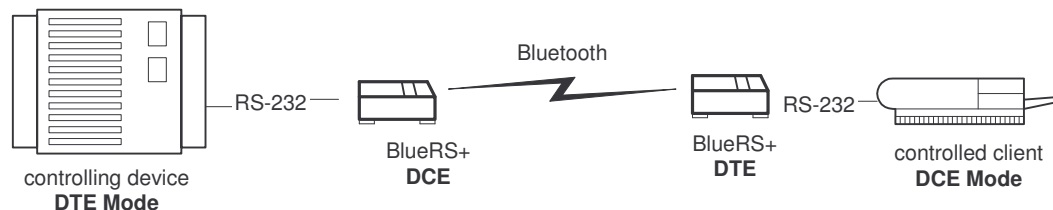
cmds 12	Only acceptance of incoming Bluetooth link requests.
cdtr 0	DSR line is not controlling the Bluetooth link (DTR is mapped internally to DSR)
cdsr 4	DTR Output line of BlueNodeDTE follows DTR input line of BlueNodeDCE (DTR is mapped internally to DSR)
ccts 3	RTS Output line of BlueNodeDTE follows RTS input line of BlueNodeDCE (RTS is mapped internally to CTS)
flc 0	no hardware flowcontrol



Note: to readout the mode of operation of the BlueNode please use the command "devmode".

Don't forget to set the baudrate to the correct setting.

Example:



2.4 Table of coding of Bluetooth services

List of Bluetooth services (profiles):

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	Headset	Headset access via Bluetooth
1109	Cordless Telephony	
1100	Intercom	
1111	Fax	Fax
1112	HeadsetAudioGateway	Headset Gateway for audio signals
1113	WAP	
1114	WAP_CLIENT	



3 BlueNode Configurator command set

The settings of the BlueNode for the serial interface and the Bluetooth interface are called configuration. The BlueNode 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 the BlueNode and if necessary change it. The values can be stored in non volatile memory; this means they'll remain unchanged even if the power supply is disconnected.

You can configure the BlueNode in the following ways:

- by using BlueNode Configurator commands entered by a locally connected PC.
- by using the AT command set entered by a locally connected PC.
- Seite: 23
by using BlueNode Configurator commands entered via the Bluetooth link (remote configuration).

The BlueNode Configurator can be entered in the following ways:

- by entering a special escape sequence (default: "!!!") after initialization independent whether a Bluetooth link is established or not.
- by using a special command from the asynchronous dialup command interface (AT: "ATCONF").
- Seite: 23
remote via a Bluetooth connection from another Bluetooth device.
- or escape sequence in power up phase if enabled (rsttim>10, rstmsg=1).

3.1 Configuring the BlueNode after power on

- Connect the PC's com-port to the DTE interface of the BlueNode.
- Start a terminal emulation program (i.e. Hyper-Terminal) with the following settings: 9600 Baud, 8 databits, No Parity (**8N1**)
- Connect the BlueNode to the mains by the mains plug adaptor
- Wait until LED 2 starts blinking (after about 5 sec, see config cmd "rsttim") and the message to enter the config-sequence is displayed:
**"+++ Press <CR>,<CR>,<ESC>,<ESC> to enter BlueNode Configurator
 +++"**
- Type in quickly within 2 seconds after the message appears: <RET> <RET> <ESC> <ESC>, to call up the BlueNode Configurator.
- The BlueNode Configurator acknowledges by giving a welcome string and a "#" as the prompt character. Now you can work with the BlueNode Configurator by using the configuration commands (see page 26).
- Setup the parameter for the BlueNode from your terminal program and store them.

Example:



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

br=4<↵> (set baudrate to 9600 baud)
save<↵> (store the new configuration)
quit<↵> (leave the BlueNode Configurator and activate the new value settings)

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

- Leave the terminal program and start your application.

Now you can use the BlueNode with the new set of parameters by running the needed PC program.

3.2 Configuring the BlueNode with AT commands

To execute one BlueNodeConfiguration command *cmd* out of the AT command mode you have to issue the command: "at***cmd*".

To call up the BlueNode Configurator please use the command "atconf".

You can leave the BlueNode Configurator by the command "quit" (or „exit“ or „go“).

3.3 Remote Configuration using the TA+Configurator commands

The BlueNode to be configured is referred here as "*remote* BlueNode".

The BlueNode to configure is referred as "*local* BlueNode".

Please make sure that the *remote* BlueNode to be configured at the other end is powered up.

- Connect the PC's com-port to the DTE interface of the *local* BlueNode.
- Connect the power supply to the mains socket.
- Start a terminal emulation program (i.e. Windows-Terminal)
- Configure the *local* BlueNode with the special service channel 30 (brsch=30).
- Set up a Bluetooth-Link to the *remote* BlueNode to be configured by using the command: ATD<*brad*><↵>.
 The called BlueNode Configurator acknowledges by requesting the remote password. Please enter the correct password (default: no password, just return). Now you can work with the BlueNode Configurator by using the BlueNode Configurator commands (see page 23).
- Configure the parameter for the *remote* BlueNode from your terminal program and store them (if wanted). (see page 26).

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



If necessary the *remote* BlueNode can be reset using the command
"reset<↵>".

- Hang up the Bluetooth connection by leaving the BlueNode Configurator using the command **quit**.
Leave your terminal program. After the next reset the changes will be active.
- Restore the server channel to the desired value, default to 1 (brsch=1).

Now the configured *remote* BlueNode with the new set of parameters can be used by running the needed PC program.



3.4 List of BlueNode Configurator commands

The BlueNode Configurator commands typed in must have the correct syntax and be complete, including all blanks. Capital/small letter use is not important. The entry is not case sensitive.

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**

To get an overview about the commands of your BlueNode some major commands here as a preview:

show	show the usually used parameter
showall	show all changeable parameter
quit	leave BlueNode Configurator
help	show all available commands
defa 1	setup factory default parameter set
save	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 BlueNode you have to issue the command "AT**BACCTAB". The BlueNode 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 BlueNode 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)

This PIN is always checked if

- © AK-Nord



bndlist	Show bonded device list
----------------	-------------------------

To show information about the devices bonded with BlueNode you have to issue the command `AT**BNDLIST`.

Example: `at**bndlist`
 Response: `b01: <bradr1> <bname1>`
 `...`
 `OK`

bnddel <bndsel>	Delete bonding information
------------------------	----------------------------

To delete the bonding information held within BlueNode you have to issue the command `AT**BNDDEL <bndsel>`. The bonded Bluetooth devices can be read out by the command `AT**BNDLIST`. `AT**BNDDEL all` deletes all bonded devices.

Example: `at**bnddel b1`
 Response: `OK`



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 BlueNode.
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 BlueNode 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 BlueNode 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. BlueNode 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 brsch. Remote management between BlueNodes 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 BlueNode 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 BlueNode 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. " <i>rbsname</i> " is shown on a remote Bluetooth terminal device during a service discovery sequence.	
default:	config port
Example:	at**rbsname at**rbsname=< <i>rs+config</i> > set own device name to <i>rs+config</i>
rpwd	Remote port config password
Sets password for remote configuration to <i>nn</i> (1..32 chars) AT**RPWD= <i>nn</i>	
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	
show	Show parameters
Displays the actual set of parameters	
showall	Show all parameters
Displays the all accessible parameters	
txfwd	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.	
ver	Show version string
Displays detailed information about the software and hardware version.	
verb	Show version string of Bootloader
Displays detailed information about the software version of the Bootloader.	
<cmd>?	More information for one command
Displays the allowed values for one selected command <i><cmd></i>	
??	help

Displays help texts for all commands

3.5



3.6 User Manual add-on

Firmware Version 1.1.054 and newer

****BSMODE** sniff support

AT-Syntax: **AT**BSMODE | AT**BSMODE=<mode>**

Configurator-Syntax: **bsmode | bsmode=<mode>**

Using this command sniffing can be enabled on the Bluetooth link. Sniffing is used to reduce power consumption during an active Bluetooth connection.

When a Bluetooth link is in the sniff state both connected devices can enter a power saving state. This is done for short time intervals. The length of this interval is called "sniff interval" and is negotiated between the connected devices. The maximum and minimum acceptable values for the sniff interval can be set using appropriate AT commands.

The sniff interval value has an impact on the propagation delay and maximum throughput on the Bluetooth link. Take note that to enter sniff mode both devices need to support sniff mode.

AT**BSMODE	Show sniff mode support level
AT**BSMODE=0	No sniff support
AT**BSMODE=1	Passive sniff support
AT**BSMODE=2	Active sniff support

Passive sniff support means that the device accepts sniff requests from the remote device with an interval between the values of BSMIN and BSMAX. To accept sniff requests from the remote device bit 2 of the parameter BLINKP must be set.

If active sniff support is enabled the device tries to setup a sniff interval with the value of BSMAX.

Note: The performance of the command is influenced by the parameters BLINKP, BSMIN and BSMAX.

Examples:

AT**BSMODE=1 and AT**BLINKP=5	Sniff requests from remote devices will be accepted
AT**BSMODE=2 and AT**BLINKP=1	Device tries to initiate sniff mode on the Bluetooth link



****BROLE** device role

AT-Syntax: **AT**BROLE | AT**BROLE=<mode>**

Configurator-Syntax: **brole | brole=<mode>**

With this command the role the device requests for a new Bluetooth link can be controlled. Without any action the device that initiates the connection is the master. The terminating device (the one accepting a connection) is the slave.

AT**BROLE=0	Slave required
AT**BROLE=1	Slave preferred
AT**BROLE=2	Don't care
AT**BROLE=3	Master preferred
AT**BROLE=4	Master required

If the role is set to "required" the device enforces a switch. If this fails the link is disconnected.

"Preferred" means that the device tries to perform a switch but doesn't care about the result.

****BLINKP** link policy

AT-Syntax: **AT**BLINKP | AT**BLINKP=n**

Configurator-Syntax: **blinkp | blinkp=n**

With this command (bit mask) the link policy the device requests for a new Bluetooth link can be defined.

bit 0	ENABLE_SWITCH
bit 2	ENABLE_SNIFF

Examples:

AT**BLINKP=1	Device processes role switch from remote device
AT**BLINKP=4	Device processes sniff requests from remote device
AT**BLINKP=5	Device processes role switch and sniff requests from remote device



****BSUPTIM** supervision timeout

 AT-Syntax: **AT**BSUPTIM | AT**BSUPTIM=n**

 Configurator-Syntax: **bsuptim | bsuptim=n**

This command defines the supervision timeout the device requests for a new Bluetooth link. Possible values are between 1 and 65535 (in 0,625ms steps).

Note: The supervision timeout can only be set by the Piconet master.

Example:

AT**BSUPTIM= 32000	20 sec's.

****BSMIN** minimum sniff interval

 AT-Syntax: **AT**BSMIN | AT**BSMIN=n**

 Configurator-Syntax: **bsmin | bsmin=n**

This command defines the minimum of accepted sniff interval in ms for a new Bluetooth link. The default value is **100** (ms). Possible values are profile dependent.

Note: Currently the value must be divisible by 5. Other values are accepted but sniff will not work.

****BSMAX** maximum sniff interval

 AT-Syntax: **AT**BSMAX | AT**BSMAX=n**

 Configurator-Syntax: **bsmax | bsmax=n**

This command defines the maximum of accepted sniff interval in ms for a new Bluetooth link. The default value is **300** (ms). Possible values are profile dependent.

Note: Currently the value must be divisible by 5. Other values are accepted but sniff will not work.



****BNDSize** bonded devices list size

 AT-Syntax: **AT**BNDSize | AT**BNDSize=n**

 Configurator-Syntax: **bndsize | bndsize=n**

With this command the number of entries the bonded device list can hold may be reduced. The default size depends on product for which the Firmware is build. Currently it is 4 for SPP versions and 1 for versions that support audio profiles (HS-HS/HS-AG)

This may be used in combination with a reference to the bonded device list from a dial string to setup connection to a bonded device.

Example:

AT**BNDSize=1	Limit the number of bonded devices to 1.
---------------	--

****BNAME** local device name

 AT-Syntax: **AT**BNAME | AT**BNAME=<name>**

 Configurator-Syntax: **bname | bname=<name>**

This command allows the modification of the local device name. The device name is shown on a remote Bluetooth device during device/service discovery.

The device name can contain a format string to include the own device address or parts of it in the name.

Format: "%[<s>][<d>]a"

"%" ==> Identifier start format string

<s> ==> Char separator on byte border (optional)

<d> ==> Number (1-12) of digits included in device name (optional, default is 4)

"a" ==> Identifier end format string

Example: Device address = "0123456789AB"

AT**BNAME=BlueNode %:4a	Display on remote side: BlueNode 89:AB
AT**BNAME=BlueNode %4a	Display on remote side: BlueNode 89AB
AT**BNAME=BlueNode %:3a	Display on remote side: BlueNode 9:AB
AT**BNAME=BlueNode %3a	Display on remote side: BlueNode 9AB
AT**BNAME=BlueNode %:12a	Display on remote side: BlueNode 01:23:45:67:89:AB



****BSTPOLL** update interval for radio statistics

AT-Syntax: **AT**BSTPOLL | AT**BSTPOLL=<interval>**Configurator-Syntax: **bstpoll | bstpoll=<interval>**

This parameter allows the configuration of the updating interval for Bluetooth radio specific statistics like RSSI etc. the interval can be configured in ms. If set to 0 no statistics are performed.

Example:

AT**BSTPOLL	Show actual setting
AT**BSTPOLL =500	Update statistics every 500 ms



****BARSSI** read absolute rssi value

 AT-Syntax: **AT**BARSSI**

 Configurator-Syntax: **barssi**

This read-only parameter contains the absolute receive signal strength value acquired on the last poll interval (see parameter bstpoll). The value is returned as a signed byte in hexadecimal format. If the update interval is 0 the returned value is 0.

The result for the barssi command is a signed byte in hexadecimal notation. That means if the highest bit (bit 7) is 1 the number is negativ and you get the value by building the two's complement see <http://www.duke.edu/~twf/cps104/twoscomp.html>

Conversion table:

0x10 = 10 dBm
 0x00 = 0 dBm
 0xFF = - 1 dBm
 0xFE = - 2 dBm
 0xFD = - 3 dBm
 0xFC = - 4 dBm
 0xFB = - 5 dBm
 0xFA = - 6 dBm
 0xF9 = - 7 dBm
 0xF8 = - 8 dBm
 0xF7 = - 9 dBm
 0xF6 = -10 dBm
 0xF5 = -11 dBm
 0xF4 = -12 dBm
 0xF3 = -13 dBm
 0xF2 = -14 dBm
 0xF1 = -15 dBm
 0xF0 = -16 dBm
 0xEF = -17 dBm

..
0xBA = -70 dBm

..
0xB5 = -75 dBm

..
0xB0 = -80 dBm

..
0xA6 = -85 dBm

The higher the value (hex value) the better the receive signal. Most common results are in the range of -20dBm to -80dBm.

When there is no Bluetooth connection the result isn't defined, amongst other things thats because there is no "neutral" value.

Example:

AT**BARSSI	Show actual receive signal strength indication
------------	--



****BACCL** serial port access level

 AT-Syntax: **AT**BACCL | AT** BACCL=<access level>**

 Configurator-Syntax: **baccl | baccl =<access level>**

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

AT**BACCL=0	Serial port is not accessible nor visible
AT**BACCL=1	Serial port is accessible but not visible
AT**BACCL=2	Serial port is accessible and visible

Extended dial string feature

The syntax of the dial string has been extended to the following format:

<brad>,[cn] | remdev, [service]

with

remdev = dx | bx

bx: reference to bonded device list entry

Please refer the manual for the unchanged parameters.

The dial string can be used with commands/parameters ATD, BRAD, BRAD2 and BRAD3

Example:

ATDb1,c2	Connect to first entry in bonded device list on server channel 2
----------	--



3.7 Software update

The BlueNode uses a Flash-EPROM for software updates to store the operational software. This software can be updated from a local connected PC via the COM port or via an remote configuration connection. Please fulfill the following steps to update the BlueNode:

- Start a terminal emulation on your PC with the capability to run an X-MODEM-1K file transfer (i.e. HyperTerminal).
- Local update: enter the BlueNode Configurator.
- Enter the BlueNodeConfiguration command "flash".
- Wait for end of erasing the Flash-EPROM and the prompt to start your X-MODEM transfer.
- Start the 1k-X-MODEM file transfer (send file or upload) by selecting the Transfer / Send File menu point in your terminal emulation and select the new software.
- After completion you will get the information whether the software update ended successfully or erroneous.
- The loaded new firmware will be activated automatically.
- Due to new functionality the last stored configuration setting may be lost, please check before using.

For more details refer to the description of the commands flash in the chapter "List of BlueNode Configurator commands" on page 26.

Note:

Due to an error it may be that no firmware is active within the BlueNode. This will be indicated by continuous flashing of the LEDs L1, L2 (Bootloader active). To store a new firmware correctly you have to enter the command `at**flash` and load a firmware using the XMODEM protocol as described above. This Bootloader supports only `AT**cmd` with fixed baudrate of 115.200 Baud.



4 Diagnostic and error messages

For the diagnostic of erroneous situations the following functionality is supported. Please check first the behavior of LED displays, if an Bluetooth link can not be established. Refer to list of LED displays on page **Fehler! Textmarke nicht definiert..**

4.1 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 51).

4.2 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.



4.3 Diagnostic using the internal Trace

For more sophisticated debugging an internal trace functionality is implemented. This logging mechanism allows to write activities of the Bluetooth interfaces and the serial interface into a wrap around buffer. The type of entries can be selected by a trace mask.

trcmask set trace mask

trcmask *par* Setup the mask to select the type of data to be written into the trace buffer.
 Default: Bluetooth HCI and Blueface messages, DTE interface lines, DTE-Data in connection-setup and clearing-phase.
 The parameter *par* has to be setup in the following way, all bytes have to be entered (default 00 00 00 00 00 00 00 00 04):
 par := bl1 bl2 bl3 dl1 dl2 dl3 sl1 app bt1

bl1	reserved (00)
bl2	reserved (00)
bl3	reserved (00)
dl1	reserved (00)
dl2	reserved (00)
dl3	reserved (00)
sl1	Serial line 1 ; i.e. first V.24 port; default: 00
	bit0: control lines after change
	bit2: data bytes while connection control (call phase)
app	reserved (00)
bt1	Bluetooth; default: 04
	bit0: hci interface, commands and events
	bit1: hci interface, acl data
	bit2: Blueface interface: signaling
	bit3: Blueface interface: traffic while DCD off
	bit4: Blueface interface: traffic

examples:

trcmask 00000000000000000004 Trace Bluetooth messages and V.24 commands.

trcon start trace write

trcon set trace to active regarding to trace mask



trcoff stop trace write

trcoff set trace to OFF independent of trace mask

trcclr clear trace buffer

trcclr clear actual trace buffer contents

trcread read trace buffer

trcread Output of the complete trace buffer in hexadecimal chars (ASCII, max. line length 72 chars).

Every entry of the trace buffer is output using the following format:

Entry number – Timestamp – Type – Length – Databytes

<i>Entry number</i>	Sequence number of entry
<i>Timestamp</i>	in units of 10 ms
<i>TypeAndSource</i>	Source of traceentry: bit0-7: type from trace mask bit8-14: source of trace entry: bit15: 0xxx : incoming event (from Bluetooth link) 8xxx : outgoing event (to Bluetooth link) "FFFF" : Reset for firmware
<i>Length</i>	Length of following data bytes
<i>Databytes</i>	Data bytes; continued lines are indicated by an ">".

Coding of trace data bytes dependent of *TypeAndSource*:

0901/8901: Serial line control line change:
bit0 : 1 = DSR is ON
bit1 : 1 = DCD is ON
bit2 : 1 = CTS is ON
bit3 : 1 = RING is ON
bit4 : 1 = RTS is ON
bit5 : 1 = DTR is ON



5 Appendix

A1: Technical data BlueNode – OEM1

BlueNode module serial interface:

functional:	V.24
electrical:	TTL
mechanical:	double pin rows P1

Transmission speeds:

DTE:	1200 – 230400 bit/s (asynchronous)
------	------------------------------------

Character representation:

8Bit no Parity, 1 stop bit
7Bit even/odd Parity, 1 stop bit

Character synchronization:

asynchronous

Operating mode:

half duplex or full duplex

Flowcontrol

Hardware (RTS/CTS)

Bluetooth link:

RF part: 0 dBm Radio,
About 10 m (Bluetooth Power Class 2)
Bluetooth Spec: 1.1
Flowcontrol credit based

Bluetooth antenna:

internal or external via coax SMC connector

Physical dimensions:

BlueNode-OEM1:	casing: 31 x 16 x 65 mm (WxHxD)
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Power supply:

BlueNode-OEM1:	external power supply 5V DC. Idle: ca. 1 mA, active: ca. 50 to 70 mA.
----------------	--



A3: Technical data BlueNode- OEM2

BlueNode-SOC/OEM2+module serial interface:

functional:	V.24
electrical:	TTL
mechanical:	double pin rows

Transmission speeds:

DTE:	1200 – 230400 bit/s (asynchronous)
------	------------------------------------

Character representation:

8Bit no Parity, 1 stop bit
7Bit even/odd Parity, 1 stop bit

Character synchronization:

asynchronous

Operating mode:

half duplex or full duplex

Flowcontrol

Hardware (RTS/CTS)

Bluetooth link:

RF part: +4 dBm Radio,
20 m (Bluetooth Power Class 2)
Bluetooth Spec: 1.0 B (1.12.1999)
Flowcontrol credit based

Class 1 module:

RF part: +20 dBm Radio,
100 m (Bluetooth Power Class 1)

Bluetooth antenna:

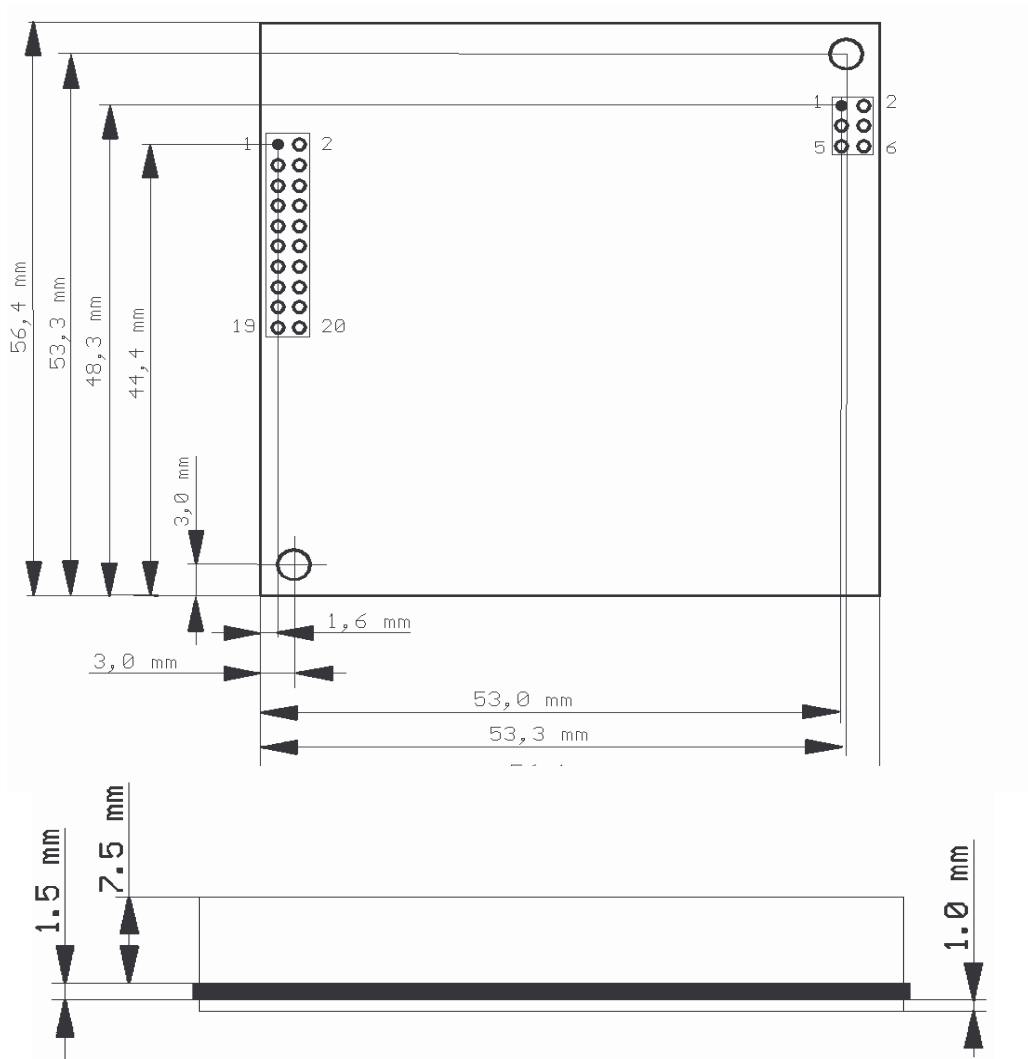
internal or external via coax SMC connector

Physical dimensions:

BlueNode-OEM2	plug on module: 56 x 56 x 12s mm (WxHxD)
---------------	--

Power supply:

BlueNode-OEM2	5V DC, +-5%, via double pin row P2 idle: ca. 30 mA, active: ca. 70 mA.
---------------	---

A4: Mechanical dimensions of the BlueNode module



A5: BlueNode OEM2 Connector P1

P1-Pin	Signal	Direction from BlueNode	BlueNode usage	External interfacing
1	GND	I	0V-Power	0V supply Power
2	VCC	I	+5V-Power	+5V supply Power
3	GND		GND	GND
4	TXD~	I		
5	GND		GND	GND
6	RXD~	O		
7	ID2	O	GND	NC or READ
8	RTS~	I		
9	ID1	O	GND	NC or READ
10	CTS~	O		
11	RESET	I	RESET active low (OC)	NC
12	DTR~	I		
13	L3~ (UA0)	O	(internal 10k Pull up)	NC or status info
14	DCD~	O		
15	RI~	O		
16	DSR~	O		
17	UA~	O	User Output 1	NC or status info
18	UE~	I	User Input 1	10k Pull up
19	UA2	O	User Output 2	NC or status info
20	UE2	I	User Input 2	GND

Outputs:

UA: default: similar to L1 of BlueNodeDx
 L3: Bluetooth link established
 UA2: reserved

Inputs:

UE: reserved
 UE2: select DCE/DTE mode. GND=DCE mode.

Inputs and output lines with '~' are low active (i.e. ON has the TTL level 0VDC)

**A6: Technical data BlueNode- SOC**

BlueNode-SOC/OEM2+module serial interface:

functional:	V.24
electrical:	TTL
mechanical:	double pin rows

Transmission speeds:

DTE:	1200 – 230400 bit/s (asynchronous)
------	------------------------------------

Character representation:

8Bit no Parity, 1 stop bit
7Bit even/odd Parity, 1 stop bit

Character synchronization:

asynchronous

Operating mode:

half duplex or full duplex

Flowcontrol

Hardware (RTS/CTS)

Bluetooth link:

RF part: +4 dBm Radio,
20 m (Bluetooth Power Class 2)
Bluetooth Spec: 1.0 B (1.12.1999)
Flowcontrol credit based

Class 1 module:

RF part: +20 dBm Radio,
100 m (Bluetooth Power Class 1)

Bluetooth antenna:

internal or external via coax SMC connector

Physical dimensions:

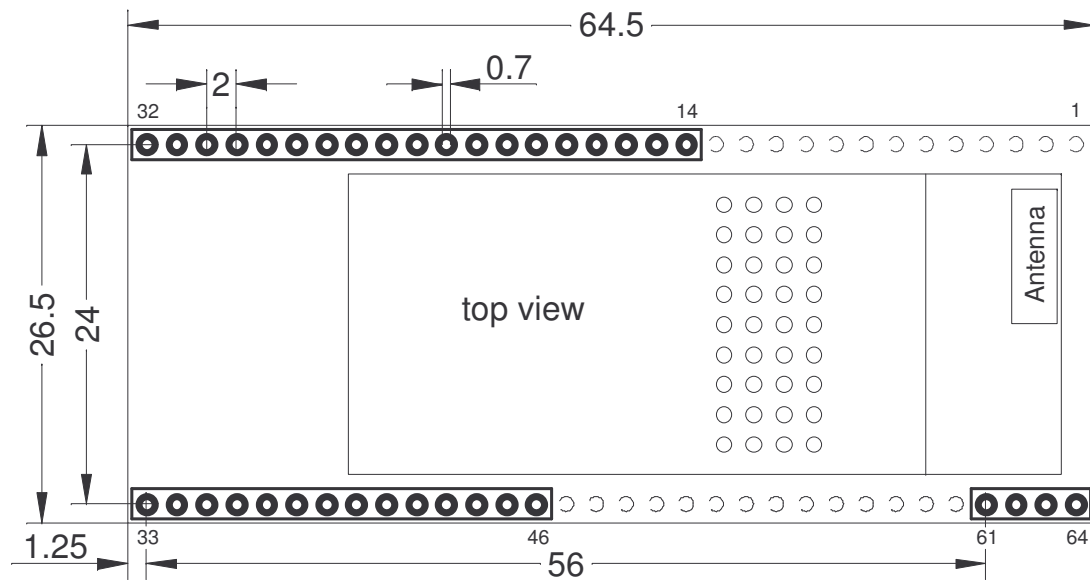
BlueNode-SOC

plug on module: 26,5 x 14 x 64,5 mm (WxHxL)

Power supply:

BlueNode-SOC

3,3 V +- 2% low noise, <100mV_{pp} ripple
150 mA peak

A7: Mechanical dimensions of the BlueNode SOC module



A8: BlueNode SOC Connector P1

General Pin Assignment

Pin	Signal	Dir	active	Description
12	USB_DM	I/O		USB D-, Data pin
13	USB_DP	I/O		USB D+, Data pin
16	GPIO8 (PCM_IN)	I		General Purpose IO
14, 30	GPIO9 (PCM_CLK)	O		General Purpose IO
15, 28	GPIO10 (PCM_OUT)	O		General Purpose IO
17, 27	GPIO7 (PCM_SYNC)	O		General Purpose IO
20	GPIO4	I/O		General Purpose IO
21	GPIO5	I/O		General Purpose IO
24	/EXT_RES	I	L	Reset low active
25	GPIO3 (SPI_CLK)	I/O		General Purpose IO
33	/RTS	I	L	Request to send
34	RXD	O		Receive Data
35	TXD	I		Transmit Data
36	GPIO6	I/O		General Purpose IO
37	GPIO14	I/O		General Purpose IO
38	/CTS	O	L	Clear to send
39	GPIO15	I/O		General Purpose IO
40	GPIO13	I/O		General Purpose IO
44	GPIO0 (SPI_DO)	I/O		General Purpose IO
45	GPIO1 (SPI_DI)	I/O		General Purpose IO
46	GPIO2 (SPI_CS)	I/O		General Purpose IO
48	ATDO	O		JTAG test data output
49	ATCK	I		JTAG clock
50	ATMS	I		JTAG mode select
51	ATDI	I		JTAG test data input
52	/ATRST	I	L	Reset via JTAG
53	/ATTRST	I	L	Reset JTAG interface
54	MODE1	I		Test pin – do not connect
55	MODE0	I		Test pin – do not connect
61	VCC	P		+3.3V Power
26,41, 63	GND	P		GND

**A9: BlueNode SOC Connector P1**

SPP configuration

Pin	Pin Name	SPP Function	Dir.	active	Description
25	GPIO3	Break out	O	tbd	generate break
44	GPIO0		I/O		General Purpose IO
45	GPIO1	Break detect	I		optional, connect external to RXD special firmware required
46	GPIO2		I/O		General Purpose IO
16	GPIO8	ID1	O		Identification signal 1
15, 28	GPIO10	UA2	O		User Output 2
17, 27	GPIO7	/LED1	O	L	Device ready
14, 30	GPIO9	/LED2	O	L	Bluetooth connected. Active if a Bluetooth connection exists. Inactive in idle state. Flashes during startup.
37	GPIO14	/RTC-OUT	O	L	DSR in DCE mode DTR in DTE mode
39	GPIO15	/DCD	I/O	L	DCD input in DTE mode, output in DCE mode
40	GPIO13	/RTC-IN	I	L	DTR in DCE mode DSR in DTE mode
33	/RTS		I	L	Request to send
38	/CTS		O	L	Clear to send
34	RXD		O		Receive Data
35	TXD		I		Transmit Data
36	GPIO6	/RI	I/O		Ring Indicator input in DTE mode, output in DCE mode
21	GPIO5	ID2	O		Identification signal 2
20	GPIO4	DTE-/DCE	I		DTE DCE mode selector
61	VCC	VCC	P		+3.3V Power
26, 41, 63	GND	GND	P		GND
24	/EXT_R ES	/EXT_RES	I	L	Reset low active
12	USB_D M				do not connect
13	USB_DP				do not connect

**A10: Technical data ComPoint-Bluetooth**

BlueNode-SOC/OEM2+module serial interface:

functional:	V.24
electrical:	V.24
mechanical:	SUB-D

Transmission speeds:

DTE:	1200 – 230400 bit/s (asynchronous)
------	------------------------------------

Character representation:

8Bit no Parity, 1 stop bit
7Bit even/odd Parity, 1 stop bit

Character synchronization:

asynchronous

Operating mode:

half duplex or full duplex

Flowcontrol

Hardware (RTS/CTS)

Bluetooth link:

see OEM1 or OEM2

Bluetooth antenna:

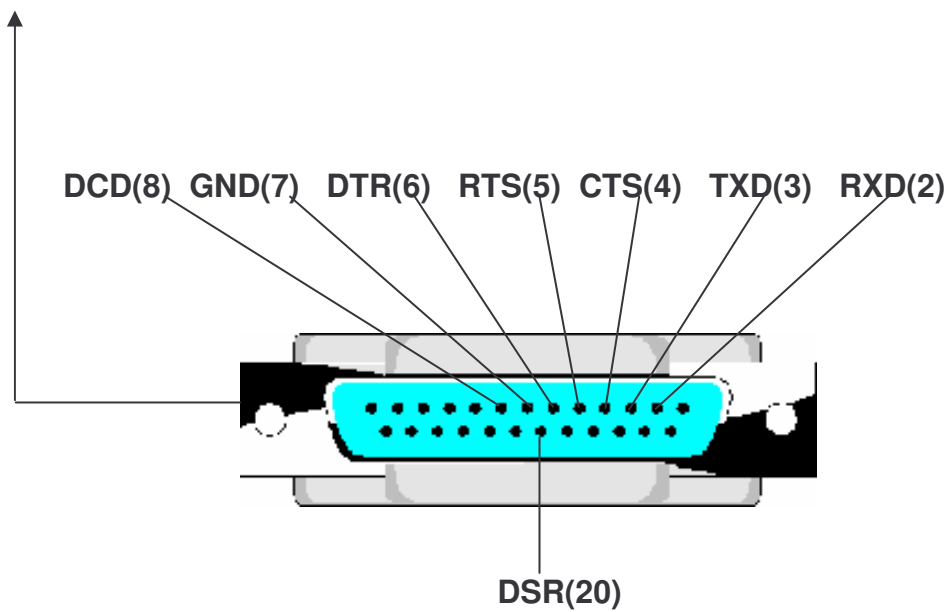
internal or external via coax SMC connector

Physical dimensions:

Power supply:

6V DC

A11: Pin - description ComPoint-BlueTooth



**A12: Technical data AK-DINRAIL-BlueTooth**

BlueNode-SOC/OEM2+module serial interface:

functional:	V.24
electrical:	V.24
mechanical:	SUB-D

Transmission speeds:

DTE:	1200 – 230400 bit/s (asynchronous)
------	------------------------------------

Character representation:

8Bit no Parity, 1 stop bit
7Bit even/odd Parity, 1 stop bit

Character synchronization:

asynchronous

Operating mode:

half duplex or full duplex

Flowcontrol

Hardware (RTS/CTS)

Bluetooth link:

OEM2

Bluetooth antenna:

internal or external via coax SMC connector

Physical dimensions:

Power supply:

6-40Volt DC

Dimensions:

70 x 90 x 58 (mm)



A13: Pin - description AK-DINRAIL-BlueTooth

