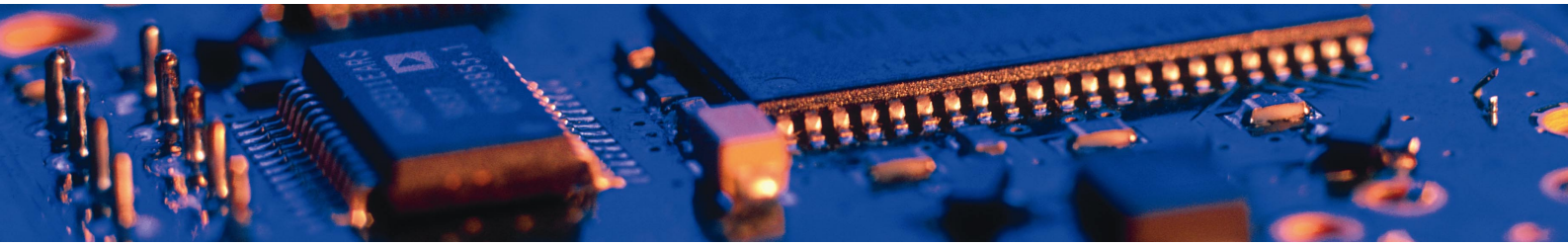

Wireless Network Platform

User Manual 3.6

connectBlue

Wireless Network Platform

User Manual 3.6

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Contents

Chapter 1

Introduction

The Wireless Network Platform™ (in this manual referred to as the ***WNP***) works as a Wireless Access Point, an Ethernet Port Adapter, a Serial Port Adapter and as a Terminal Server that forwards data from a TCP connection to a Bluetooth SPP connection.

It can also be used to add a standard web based user interface to industrial machines. It's then possible to use a web browser to view the machine's user interface, it's easy to control the machine or configure it from standard devices such as laptops and PDA:s without the need for development and installation of proprietary client-side software.

1.1 What is Bluetooth wireless technology?

Bluetooth makes it possible to connect any compatible portable and stationary communications device without using cables. The technology uses a radio link that offers fast and reliable transmission of voice and data information. Due to the nature of radio technology, there is no need for a free line-of-sight between devices that wish to communicate with each other. The Bluetooth wireless technology uses a globally available frequency range intended to ensure communication compatibility worldwide. Bluetooth is very often standard in for example mobile phones, laptops and handheld computers.

1.2 Technical overview

The WNP works as a **Wireless Access Point** with the PAN and LAN profile. It supports up to 7 Bluetooth connections.

When the WNP works as an **Ethernet Port Adapter** it establishes a connection to one or several other WNPs. In this scenario the WNP forwards all data from the Ethernet cable to all connected peers. A switch will filter unwanted mac addresses.

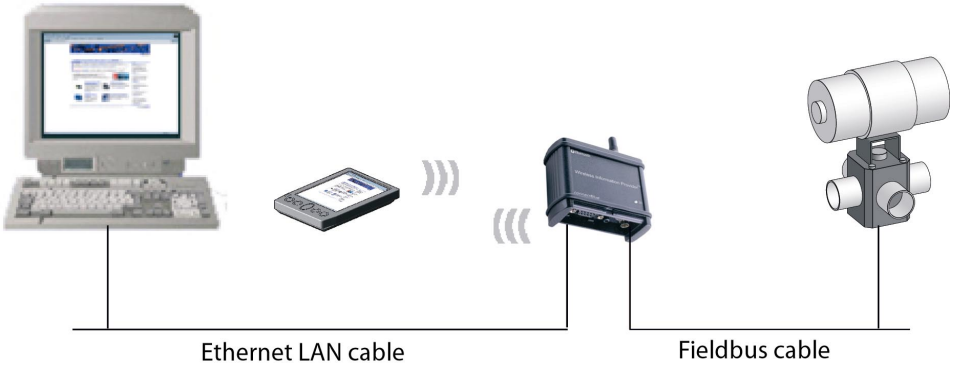
The WNP can work as a **Serial Port Adapter**, because it always has an SPP service enabled. When another device connects to this service the WNP will forward all the data from the Bluetooth connection to the physical serial port.

There is also a scenario where the WNP act as a **Terminal Server**. In this case the WNP waits for a TCP connection from Ethernet and starts a Bluetooth connection when someone connects to the preconfigured TCP port. All data that is sent on the TCP connection is sent to the Bluetooth SPP connection.

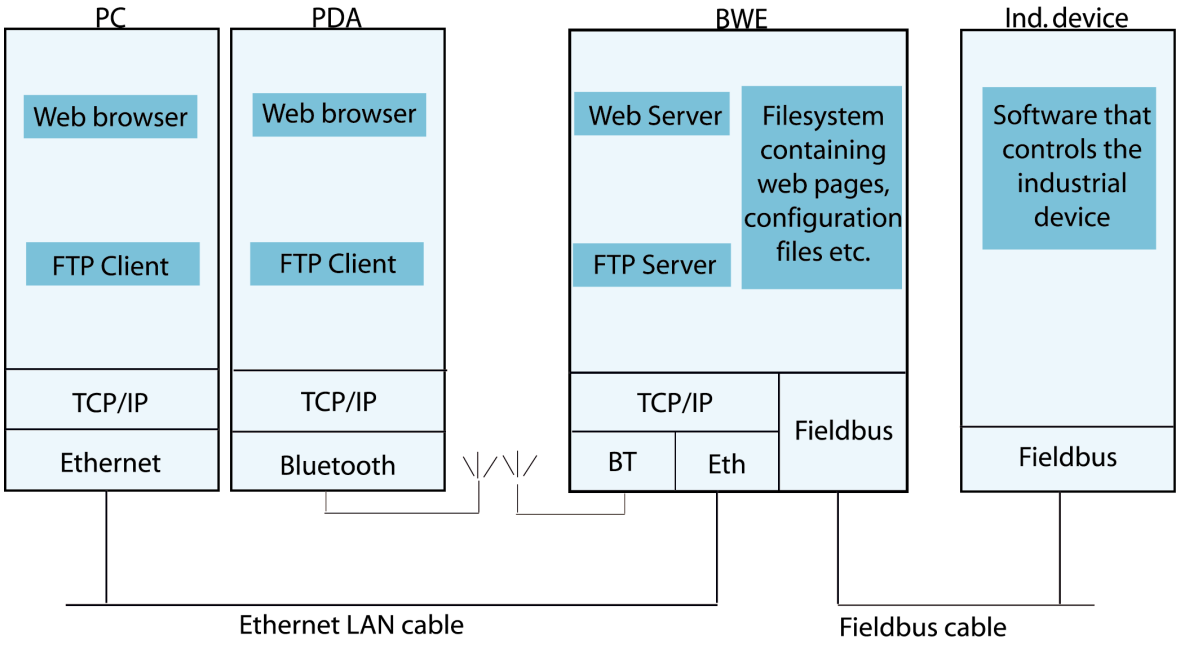
In the picture below there's an illustration of a system setup where the ***WNP*** is working as a **Web Enabler** and is attached via a serial cable to a machine.

To be able to present this information, the ***WNP*** incorporates a small web server together with a set of web pages that dynamically can include the data that has

been collected from the industrial equipment. After creating a connection from a Bluetooth enabled PDA or Laptop to the ***WNP***, these web pages can easily be viewed in a standard web browser. Using this web based technique it's also possible to send information (such as new settings) to the machine by having the user fill in a HTML form in a web page, and submitting it to the web server in the ***WNP***. The web server will then process the submitted information and convert it into corresponding fieldbus operations.



To help you gain a deeper insight of how the technique works, the picture below describes the inner workings of the devices in the picture above. As is shown in this picture, the ***WNP*** incorporates a file system that holds a set of configuration files and web pages. These files make up the actual application and the user interface to your industrial equipment. Since each case where the ***WNP*** is used tends to be different, you will have to create a set of files that match your own certain system setup. This gives you full freedom in designing the user interface and configuration to suit your specific needs. How this is done is described in the following chapters.



Chapter 2

Getting started

This chapter helps you get started using your ***WNP***. The following topics will be discussed:

- How to mount your ***WNP*** and connect the electrical interfaces
- How to connect to your ***WNP*** from a device such as a PDA, Laptop or computer
- How to access web pages that are stored in your ***WNP***
- How to use the application that is pre-installed in your ***WNP*** at delivery time

2.1 Mounting instructions

Mounting your ***WNP*** involves:

- Connecting the serial cable (RS-232/422/485).
- Connecting the Ethernet LAN cable
- Connecting the power cable.

Note: The ***WNP*** cannot be mounted arbitrarily, since it uses radio communication. The ***WNP*** cannot be mounted in a metal enclosure. Also, if you are going to mount the antenna parallel to a metal ground plane at a distance shorter than 50 cm, make sure the distance is not a multiple of a half wavelength. The length of one half wavelength is 62.5 mm.

2.2 Electrical Interfaces

RS-232/422/485 serial connector (9-pin DSUB type)

The meanings of the pins of the DSUB are described below for the RS-232 and RS-422/485 cases respectively.

RS-232

In the RS-232 case the following pinning is used:

Pin 1: NC, not connected

Pin 2: RD, input, receive data

Pin 3: TD, output, transmit data

Pin 4: NC, not connected

Pin 5: GND, ground

Pin 6: NC, not connected

Pin 7: RTS, output, request to send

Pin 8: CTS, input, clear to send

Pin 9: NC, not connected

RS-422 and RS-485

Note: These two options are not mounted as standard!

In the RS-422 case, the following pinning is used:

Pin 1: R-, input, receiver

Pin 2: T-, output, transmitter

Pin 3: NC, not connected

Pin 4: NC, not connected

Pin 5: NC, not connected

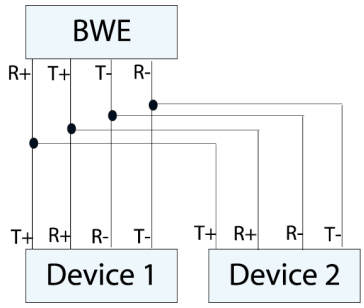
Pin 6: R+, input, receiver

Pin 7: NC, not connected

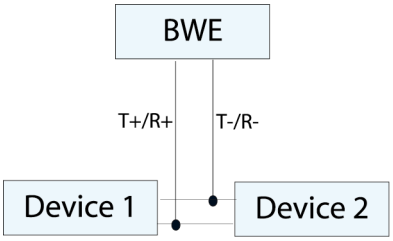
Pin 8: T+, output, transmitter

Pin 9: NC, not connected

For four-wire RS-422 multi-drop cases, the following connection setup shall be used:



In the case of RS-485, the same pinning as for RS-422 is used, except that pins 1 and 2 must be connected externally and pins 6 and 8 must be connected externally to produce the signals T+/R+ and T-/R-. For two-wire RS-485 multi-drop cases, the following connection setup shall be used:



Note: The definition of R+/R-, T+/T- may vary between manufacturers.

Power Connector

TBD

Power, 9-30 V DC

2.3 Status LEDs

System status LED

The color of the LED that's placed next to the))) sign on the top of your *WNP* indicates the system status.

- Solid green and blue led at the same time means that your *WNP* is **starting up**. The *WNP* is not working if it stays in this mode.
- Blinking green (1 to 5 blinks per second) means that your *WNP* is **getting configured**. The *WNP* is configured wrong if it stays in this mode.
- Blinking green 3 times and blue 1 time that your *WNP* has been **configured from the web pages** recently and is waiting for a reset. The changes are only done after the *WNP* has been reset.
- Solid green means that your *WNP* is powered on, has **started up successfully** and is ready to accept incoming connections.
- Blinking blue and green with blue for 50 ms and green for 200 ms means that your device is **connecting**.
- Blue means that a device is **connected** to your *WNP* via a Bluetooth link.
- Blinking blue once per second means that **data is being transferred** on the Bluetooth link.

LAN Valid Link and LAN Link Activity LED

This led is placed in the middle of the three leds on top of your *WNP*.

The "LAN Valid Link" status is a yellow light that will be shown as long as your *WNP* receives 10BASE-T link pulses. Normally this means that your *WNP* has been correctly attached to an active Ethernet LAN.

The "LAN Link Activity" is a green light, which will be shown whenever your *WNP* sends or receives an Ethernet frame. The LED will remain green until there has been no activity for 6 ms.

Serial Activity LED

This led is placed opposite to the System Status LED. It will be green whenever the UART receives data on the serial line and yellow when the *WNP* sends data on the UART.

2.4 Connecting to your *WNP* via Bluetooth

Your ***WNP*** supports the LAN Access profile, PAN profile, and SPP profile. These can be used for accessing the Ethernet network, the serial interface or Web Server in the ***WNP***. See below for more information how to establish different connections.

Setting up a Bluetooth Ethernet bridge

It is possible to establish an Ethernet bridge between two ***WNPs***. The ***WNP***s will then work as an Ethernet cable replacement.

If the device has the default settings you shall do the following:

- Power up two devices and wait a minute until both have moved from flashing blue to solid blue LED.
- The two devices will always try to be connected to each other and they will be invisible to other devices as long as they are connected.

If the device doesn't contain the default settings, then go through the following:

- Go to the unit's web page and press the Bluetooth link. In order to go to your unit's web page you shall enter the unit's ipaddress, e.g. 10.0.0.100, in Internet Explorer. Normally DHCP is activated in your ***WNP*** and in order to be sure that the device gets its static ipaddress, you shall start the WNP without the Ethernet cable connected to the network.
- Set PAN role to "PANU" on the Bluetooth page.
- Set Automatic Pairing to "Off".
- Press Edit PAN Remote Peers.
- Delete all remote peers and press reset.
- Go to the other unit's web page and press the Bluetooth link.
- Set PAN role to "PANU".
- Set Automatic Pairing to "Off".
- Press Edit PAN Remote Peers and press "Search for devices".
- Click in the check box next to the device that you would like to connect to and press "Save".
- Finally press reset so the changes will take effect.
- Make sure that both diodes turn blue within 30 seconds. If not it can depend on that the passkeys on the Bluetooth page in both devices doesn't match or that it's the wrong Bluetooth device.

Setting up a Direct Connection

Use this when you would like to access a network using a PC or PDA.

- Power up the Access Point and wait until the led is solid green.
- Pair your Bluetooth device with the Access Point. (Enter the menu "Add a Bluetooth Device" if you're using Windows XP). The default pin code is 0000.
- Join the "Personal Area Network" and you'll be able to start accessing the network. (If you're using WindowsXP, then enter the menu "Join a Personal Area Network" and connect to the WNP.)

If the device doesn't contain the default settings, then go through the following:

- Go to the unit's web page and press the Bluetooth link.
- Set PAN role to "PANU" on the Bluetooth page.
- Set Automatic Pairing to "Off".
- Press Edit PAN Remote Peers.
- Delete all remote peers and press reset.
- Pair your Bluetooth device with the Access Point. (Enter the menu "Add a Bluetooth Device" if you're using Windows XP). The default pin code is 0000.
- Join the "Personal Area Network" and you'll be able to start accessing the network. (If you're using WindowsXP, then enter the menu "Join a Personal Area Network" and connect to the WNP.)

Setting up a multipoint Network Access Point

This setting makes it possible for up to 7 Bluetooth devices to connect to a network.

- Power up the Access Point that will be the center of the communication.
- Connect it to your PC with an Ethernet cable or via a Direct Connection as described above.
- Enter the configuration page by writing "10.0.0.100" in the address field of the Internet Explorer and press the link named "Bluetooth".
- Enter username "admin" and password "admin".
- Change PAN Role to be "NAP" and then press "Save".
- Press "Edit" under Pan Remote Peers, then press the "Delete" button next to the remote device.
- Press the "Reset" link and press the "Reset" button. Make sure the LED turns green again.
- Your unit is now a Network Access Point that supports up to 7 connections!
- Pair your Bluetooth device with the Access Point. (Enter the menu "Add a Bluetooth Device" if you're using Windows XP). The default pin code is 0000.
- Join the "Personal Area Network" and you'll be able to start accessing the network. (If you're using WindowsXP, then enter the menu "Join a Personal Area Network" and connect to the WNP.)

Note: If you use the PANU service instead of the NAP service your WNP will not be able to handle more than one connection, because it will become a slave to the connected device.

In order for your WNP to be a multipoint Network Access Point, it shall have the following settings on the Bluetooth configuration page:

- Security mode: on
- PAN Role: NAP
- Automatic pairing: off

- PAN Remote Peers shall be empty. However, if you would like your WNP to connect to other PANU devices, it's possible to add devices by pressing "Edit PAN Remote Peers".

Setting up a multipoint Ethernet bridge

This is used for transfering data between up to 8 Ethernet connected AP's and act like a switch.

- **ONLY** power up the device that shall be the center of the communication and configure it as a multipoint Network Access Point as described above. NOTE: Do not change the Bluetooth name, it will be used in the next step!
- Power up **ONE** device and WAIT until the LED goes from green to solid blue. This takes about 20 seconds. Power up next device…**NOTE:** Do only power up one device at a time and wait until connected, because otherwise the units might connect to each other.
- Your devices will always try to stay connected to the Network Access Point after this configuration.

If your devices doesn't contain the default settings, then go through the following:

- Setup the device that shall be the center of the communication and configure it as a multipoint Network Access Point as described above.
- Enter the webpage of every connecting device and set the following:
    - Set PAN role to "PANU".
    - Set Automatic Pairing to "Off".
    - Press Edit PAN Remote Peers and press "Search for devices".
    - Click in the check box next to the device that you would like to connect to and press "Save".
    - Finally press reset so the changes will take effect.
- All devices shall now have a blue diode. In order to test if all devices has been configured correctly you can power off the NAP device and all other devices shall turn green after a while.

Setting up and using the Terminal Server

This setting connects a PC's virtual COM port to a Bluetooth Serial Port Adapter. (Ethernet to Bluetooth Serial Port)

It is possible to access up to seven remote serial services through TCP/IP connections. When a TCP/IP connection is established to a TCP port in the WNP, the WNP will try to connect to a remote serial service on a Bluetooth unit.

Do the following to configure the WNP:

- Set up the device as a Network Access Point as described above.
- Enter the Bluetooth configuration page again.
- Press "Edit" under Terminal Server remote peers and press "Search for devices".
- Check the "Add" box for the Serial device you would like to connect to and choose a TCP port number for the TCP connection. Press "Save".

- Press the "Reset" link and press the "Reset" button. Make sure the LED turns green again.
- Start your COM Port Redirector program, e.g. Lantronix Com Port Redirector, and setup a virtual COM port to this device. Make sure that you choose the same TCP port as you configured in the WNP! Open the virtual COM port to establish the Bluetooth connection.
- Make sure that your other serial device is connectable and has the same Bluetooth passkey.

Com Redirector from Lantronix is a program that could be used on the PC to install a virtual COM port. For more information and guidance, go to http://www.lantronix.com/support/downloads.html.

Connecting using the LAN Access profile

Search for Bluetooth devices in the neighborhood. Select your WNP device and perform pairing if necessary. Connect to the LAN Access Profile. The TCP/IP connection will then automatically be established. If you use a PDA you can enter "wnp" in the address field in the Internet Explorer and you will access the web server in the WNP.

Connecting to the WNP as a Serial Port Adapter

The WNP can act as a Serial Port Adapter, which means that everything that is sent on the serial Bluetooth connection is sent to the physical serial port on the WNP and vice versa.

Configure the device that shall connect to the WNP. If it's a PC or PDA you open the Bluetooth manager and search for Bluetooth devices in the neighborhood. Select your WNP device, perform pairing if necessary and connect to the SPP service. The WNP will now act as a Serial Port Adapter.

Connect to name and roaming

It is possible to configure the WNP to connect to a name both for the Terminal Server remote peers and for the PAN remote. Do the following to configure that:

- Enter the units webpage and press the Bluetooth link.
- Press "Edit" under PAN or Terminal Server.
- Press "Specify name".
- Enter the name of the remote device and press save.
- Finally press reset to let the changes take effect.

When your device connects to the remote device it will search for devices and if there is a device with a name that contains the substring entered in the configuration it will try to connect to that device.

If you're using the PAN profile it will try to connect two times per minute. This function will work as slow **roaming** feature. If the connection is lost, then the WNP will try to connect directly again and if there is a new WNP with the same name the new connection will be establish in less then 5 seconds.

If you're using Terminal Server the device will try to connect to the name when someone establishes a TCP connection to the configured port.

2.5 Accessing web pages in your *WNP* via Bluetooth

Before you can access the web pages in your ***WNP*** you will have to connect to it, as described in the section "Connecting to your ***WNP*** via Bluetooth". Once the connection is established, bring up a web browser on your terminal, type in the address of the web page you want to view in the address field and press <ENTER>. The selected web page will now be downloaded from your ***WNP*** and displayed in your web browser. You can for example write "10.0.0.100" or "10.0.0.100/sysoview.asp".

If you don't know the IP address of your ***WNP*** and you're using PDA with the Lan Access profile, you can enter "http://wnp" in the address field and press <ENTER> to get to the default web page. This is possible since your ***WNP*** contains a local DNS server that is able to resolve the host name "wnp" into the IP address of your ***WNP***. For more information on how this works, see the chapter "Creating your custom configuration", section "Parameters in the configuration files" under "Network".

2.6 Accessing web pages in your *WNP* via Ethernet

If the ***WNP*** is connected to an Ethernet LAN, you can access the web pages in your ***WNP*** from computers attached to the same LAN without performing any special connection procedure first. Just start a web browser on your computer, type in the address of the web page you want to view in the address field and press <ENTER>. You can for example write "10.0.0.100" or "10.0.0.100/sysoview.asp".

If you can't access the webpage, the WNP could have retrieved an ip address from DHCP. In order to let the WNP get it's static ip address you need to start the WNP without the network cable. Then when the WNP is started you plug in the network cable and try with the static ip address.

If you have forgotten the ip address there a couple of ways to handle this:

- Connect to the WNP via LAN and enter "wnp" in the address field. Then you'll connect to the web server in the WNP and you'll see the ip addresses.
- Use Etherreal to listen on Ethernet when the WNP starts. The WNP will then do a gratuitous arp that contains the current ip address.
- Flash the WNP with a firmware file that contains both the firmware and the default file system. The WNP will then contain the default settings with the default ip settings. See the chapter about Serial upgrade.

2.7 The security framework in your *WNP*

Your ***WNP*** comes with a framework to manage security and access rights for the connecting users. The security framework consists of three different parts:

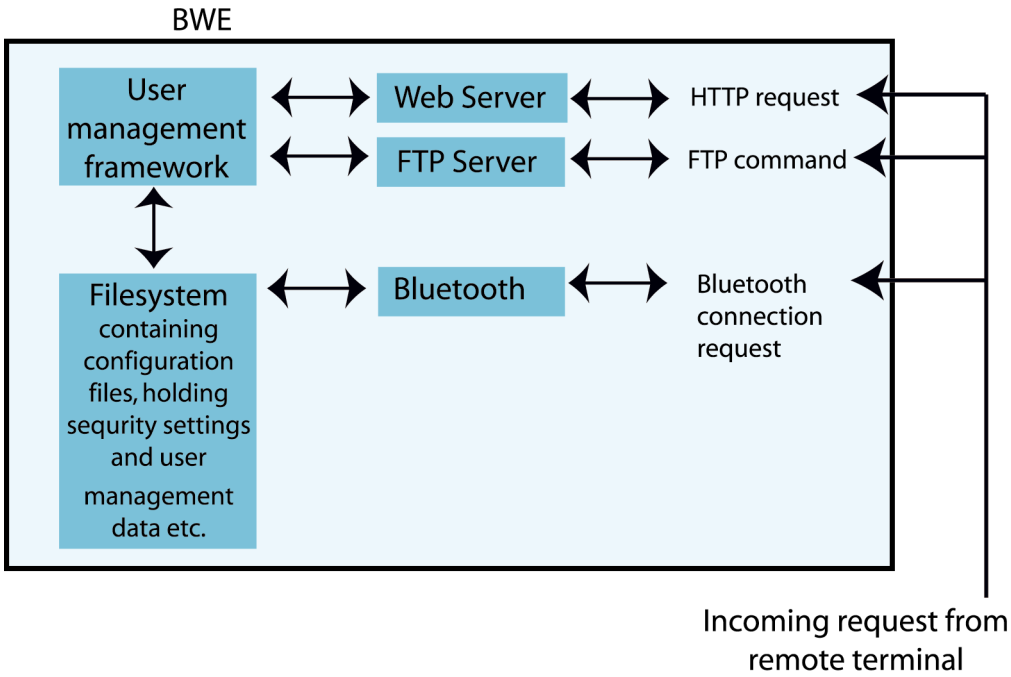
1. **Bluetooth security.** The first time you connect a new Bluetooth device to your ***WNP*** you will be asked to enter a Passkey. To be granted access to your ***WNP***, the

Passkey you enter must match the one that is stored in your ***WNP***. The Passkey in your ***WNP*** is configurable (see "Creating your custom configuration"), and in the pre-installed application it is set to "0000".

2. **Web security.** Using the User Management framework in your ***WNP*** it is possible to specify the access level for each user, and what access level that is required to be granted access to a specific file. The username and password is verified via the standard HTTP Basic Authentication procedure when a protected web page is requested. The User Management framework can easily be administered via a web based user interface, such as the one that is a part of the pre-installed application in your ***WNP*** (see the "User Management" section of the chapter called "The pre-installed application"). In the security configuration for the pre-installed application there is a default a default user (User ID: admin, Password: admin1234, Access Level: 5) and a set of access limits that are placed on the files that handle the user management functionality.

3. **FTP security.** (Not implemented yet, now the user name is always admin and the password is admin1234.)

The following functionality is NOT implemented yet:
The FTP server in your ***WNP*** shares its User Management framework with the web server. Hence the usernames, passwords and access levels are the same when logging in on the FTP server. However, in contrast to accessing files via the web server, access is not granted per file. Instead it is required that the user logging in has the highest access level, which is 5. If this requirement is fulfilled, the user is granted full access to all the files in the file system of your ***WNP***. For further information about FTP server in your ***WNP***, see the section called "Accessing the FTP server".



The Bluetooth security settings are stored in a configuration file called "bluetooth.cfg", and the User Management data is stored in another configuration file called "umconfig.txt".

Chapter 3

How to create your custom *WNP* application

The previous chapter described how to mount your ***WNP*** and how to use the pre-installed application. In this chapter we present the basic steps in creating your own ***WNP*** application.

By a ***WNP*** application we mean a set of configuration files and web pages that are stored in the file system of your ***WNP***. The configuration files set up your ***WNP*** to match your specific use case and the web pages make up the actual user interface to your industrial equipment.

3.1 Creating you own custom application

Creating you own custom application typically means performing the following three steps in sequence:

1. Creating your custom configuration

The configuration files are used to set up your ***WNP*** to match the circumstances under which it shall work in your specific case. This involves specifying IP addresses, configuring the serial port, setting the default home page, etc. In the chapter "Creating your custom configuration" there is a thorough description of how the configuration of your ***WNP*** works, along with specifications of all the configurable parameters.

2. Creating your custom web pages

Once you have created your configuration files, the next step is to make the web pages that form the user interface to the industrial equipment for which your ***WNP*** was set up. In the chapter "Creating your custom web pages" there is a description of how to make such web pages for your ***WNP***.

3. Installing your custom application

When the configuration and web page files that make up your application are finished you must download them to your ***WNP***. This can be done in two ways, either via FTP or via a utility called the connectBlue Flash Loader that you will find on the CD that comes with your ***WNP***. For step-by-step instructions, see the chapter "Installing your custom application" where both methods are described in detail.

Chapter 4

Creating your custom configuration

This chapter describes how to configure your ***WNP*** to fit your particular system setup. It also specifies all the parameters that are configurable in your ***WNP***.

The following parts of your ***WNP*** has to be configured:

- Bluetooth
- TCP/IP Networking
- Web server
- Modbus interface (including serial communication settings)
- Logger
- User Management

4.1 Configuration files

The configuration parameters are divided into groups, where each group of parameters is located in a separate configuration file. The name of each configuration file is predetermined, so that your ***WNP*** knows what file to look for. Below is a summary of the all the configuration files in your ***WNP***:

Configurable component	Configuration file name
Bluetooth	"bluetooth.cfg"
TCP/IP Networking	"network.cfg"
Web server	"webserver.cfg"
Modbus interface	"modbus.cfg"
Logger	"logger.cfg"
User Management	"umconfig.txt"

The configuration files themselves are plain ASCII text files, which can be created and edited in a normal text editor such as Notepad or WordPad for Windows. The only exception to this rule is the User Management configuration file ("umconfig.txt"), since some of its contents are stored in an encrypted format.

File format

All configuration files have one or more entries. Each entry specifies the value of a separate configurable parameter. The syntax of all the entries are of 'Key =Value' type. The 'Key' uniquely identifies a certain configurable parameter, and the 'Value' specifies the value of that parameter.

Each configurable parameter uses a different format for its 'Value'. Therefore this format is always specified along with the description of each parameter (see the section "Parameters in the configuration files").

It is possible to add comments to your configuration files, in order to ease the understanding of its content. A line containing a comment starts with a hash sign (#) and ends with a line feed.

Note: It is very important that you follow the exact format specifications for each file when you create a new configuration. Otherwise your ***WNP*** might have problems interpreting it, which can result in a faulty or non-expected behavior.

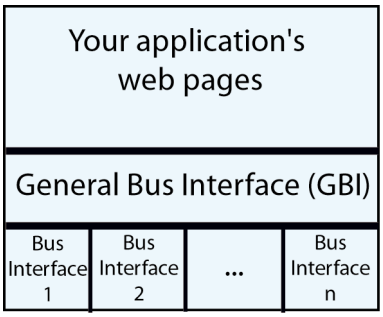
Example showing the format of a configuration file:

```
#
# connectBlue AB configuration file
#
ExampleKey1 = Value1
ExampleKey2 = Value2
```

4.2 Modbus configuration

Before your application can access the industrial equipment that your ***WNP*** is attached to, the Modbus interface has to be configured.

A part of this configuration consists of making the Modbus registers in the industrial devices visible to your application's web pages. When your application wants to access the industrial equipment that is attached to your ***WNP***, it calls a set of pre-defined functions in a bus interface abstraction layer called the General Bus Interface (GBI). The General Bus Interface is described in the following section.



The General Bus Interface (GBI)

The General Bus Interface (GBI) is a generalized interface to any kind of industry standard bus interface, such as Modbus or Profibus. The idea behind GBI is to provide a common way of accessing all bus types, without having to worry about their proprietary techniques and protocols.

When calling the GBI functions, you always use an Interface Descriptor and an Id as in-parameters. The Interface Descriptor selects which kind of bus interface to use, and the Id is an identifier for a specific property or object on a device attached to the selected bus interface. How the mapping between an Id and a device property (such as a Modbus register) is done varies, and it is specific for each kind of bus interface. To find out how the mapping is done for the Modbus interface, see the section "Mapping Modbus to GBI".

Note: Currently the ***WNP*** support the following interfaces: Modbus, MMS, and BMS. However, with the use of the GBI concept the ***WNP*** is well prepared if support for other industry standard bus interfaces is to be added in the future.

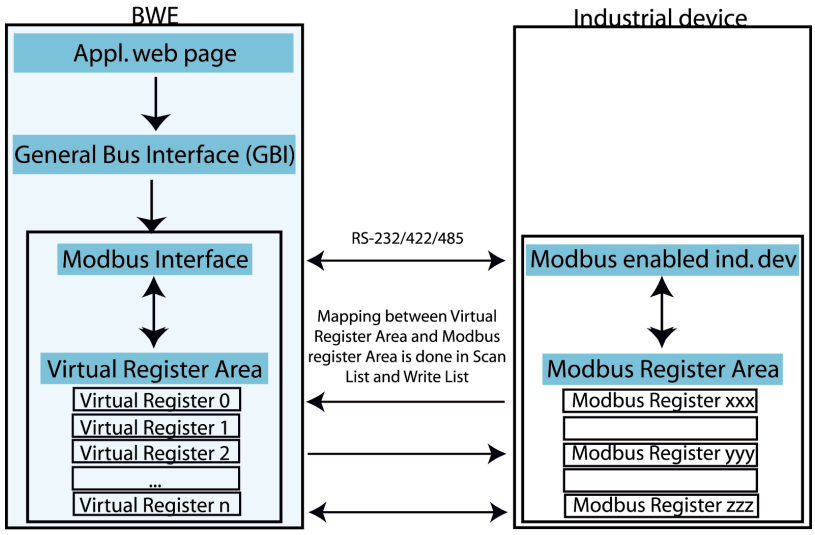
Mapping Modbus to GBI

The natural way to access a Modbus device is to read from and write to a set of 16-bit registers. In order make these registers accessible from the GBI interface (see section "The General Bus Interface"), it is necessary to map these Modbus registers to a set of GBI Id:s. This mapping is done in the configuration file for the Modbus interface (see section "Parameters in the configuration files", subsection "Modbus").

In the case with Modbus, your ***WNP*** stores all the data in a Virtual Register Area (see picture below). The register numbers in this Virtual Register Area are used as the Id parameter when calling GBI functions that access the Modbus interface.

Periodically, the values of the Modbus registers of the attached industrial equipment will be copied to the Virtual Register Area, according to an entry in the Modbus configuration file, called the Scan List (see section "Parameters in the configuration files", subsection "Modbus"). When your ***WNP*** application wants to read a value from a Modbus device via GBI, it will in fact read from a Virtual Register and not from a device directly.

Similarly, when writing data to a Virtual Register, the data will propagate to a corresponding Modbus register on the industrial equipment that is attached to your ***WNP***, if this Virtual Register has been mapped in the Write List entry of the Modbus configuration (see section "Parameters in the configuration files", subsection "Modbus").



4.3 Parameters in the configuration files

In this chapter all the configurable parameters in your ***WNP*** are described. The configuration parameters are divided into groups, where each group of parameters is located in a separate configuration file. For each of these configuration files there is a separate subsection below describing its contents.

If the entry for a parameter is left out of the configuration file, it will be given a default value. The default value for each parameter is specified in the summary at the end of each subsection.

Modbus

This group of configuration parameters is used to configure the Modbus interface in your ***WNP***. The configuration file that contains these parameters must be named "modbus.cfg " in your ***WNP***. Below is a list of all the entries in this configuration file. The key name is written within parenthesis after the parameter name in the headings below.

Serial Interface (mb_interface)

The *Serial Interface* configuration parameter selects which type of serial interface to use (RS-232/422/485).

Parity (mb_parity)

The *Parity* configuration parameter sets which type of parity to use.

Stop Bits (mb_stop_bits)

The *Stop Bits* configuration parameter sets the number of stop bits to use.

Baud Rate (mb_baud_rate)

The *Baud Rate* configuration parameter sets which baud rate to use.

Query Response Hold Time (mb_query_response_hold_time)

The *Query Response Hold Time* specifies the time (in number 10 millisecond ticks) that your ***WNP*** shall wait after receiving a response before it may send the next query. This parameter is only applicable when RS-422/485 is used.

Scan List (mb_scan_list)

The *Scan List* configuration parameter is used to map Modbus registers in your industrial equipment onto corresponding Virtual Registers in your ***WNP***. Periodically, your ***WNP*** will poll these Modbus registers for their current value by sending Read-queries to your Modbus devices. The data that is read will then be copied to the corresponding Virtual Register in your ***WNP***.

The Scan List has the following format: "Entry;Entry2;…;EntryN;", where each entry defines one mapping. The entries contain a list of variables in the format "Slave,Function,Starting Virtual Register,Scan Period,Starting Slave Register,Number Of Registers". Below is a description of what these variables mean:

Variable	Description	Valid Value
Slave	The Modbus slave that this query shall be sent to.	[1-255]
Function	The Modbus function to use when sending the query.	1, 2, 3, 4
Starting Virtual Register	The Virtual Register where your ***WNP*** shall start to store the data retrieved by	[0..1024]

	this query.	
Scan Period	The number of seconds between each refresh of the Virtual Registers	[1..255]
Starting Slave Register	The Modbus register address in the slave where this query shall start to read from.	[0..65535]
Number of Registers	The number of Modbus registers that shall be read by this query.	[0 ..126] Note: Some slaves only support a limited number of registers to be read in one query-response operation. You must check how many registers your certain device supports.

Note: The Scan List may not contain more than 20 entries.

Write List (mb_write_list)

The *Write List* configuration parameter is used to map Modbus registers in your industrial equipment onto corresponding Virtual Registers in your ***WNP***. It is only possible for your application to write to Virtual Registers that have been mapped in the Write List.

When data is written to a Virtual Register in your ***WNP*** that has been mapped in the Write List, a corresponding Modbus Write-query will be sent to one of your Modbus devices. This query will tell the device to write the data that it receives in the query to one (or more) of its registers.

The Write List has the following format: "Entry;Entry2;…;EntryN;", where each entry defines one mapping. The entries contain a list of variables in the format "Slave,Function,Starting Virtual Register,Starting Slave Register,Number Of Registers". Below is a description of what these variables mean:

Variable	Description	Valid values
Slave	The Modbus slave that this query shall be sent to.	[1-255]
Function	The Modbus function to use when sending the query.	5, 6, 16
Starting Virtual Register	The Virtual Register where your ***WNP*** shall start to write the data that will be sent to the slave.	[0..1024]
Starting Slave Register	The starting Modbus register address in the slave, where the data that it receives shall be written.	[0..65535]
Number of Registers	The maximum number of registers that can be sent to the slave when performing a write to the Starting Virtual Register in this entry. Note: The actual number of registers sent will be determined when a GBI write function is called, however it can never exceed the Number of Registers specified in this entry.	[0..126]

Note: The Write List may not contain more than 20 entries.

Summary of the entries in the "modbus.cfg" configuration file:

Parameter name	Key name	Valid values	Default value
Serial Interface	mb_interface	"RS232", "RS422","RS485"	RS232
Parity	mb_parity	"ODD", "EVEN", "NONE"	ODD
Stop bits	mb_stop_bits	"1", "2"	1
Baud rate	mb_baud _rate	"110" "300" "1200" "2400" "4800" "9600" "19200" "38400" "57600" "115200"	9600
Query Response Hold Time	mb_query_response_hold_time	[0..100]	0
Scan List	mb_scan_list	Entry1;Entry2;…;EntryN; Where each Entry = "Slave, Function, Starting Virtual Register, Scan Period, Starting Slave Register, Number of Registers;"	None
Write List	mb_write_list	Entry1;Entry2;…;EntryN; Where each Entry = "Slave, Function, Starting Virtual Register, Starting Slave Register, Number Of Registers;"	None

File example:

```
#
# Modbus configuration (modbus.cfg)
#
mb_interface =RS232
mb_parity =ODD
mb_baud_rate=19200
mb_stop_bits =1
mb_query_response_hold_time =10
mb_write_list =1,16,1,8000,1;1,16,2,8009,1;
mb_scan_list =1,3,1,1,8000,10;1,3,7,1,8014,7;
```

Network

This group of configuration parameters is used to configure the TCP/IP Network interface in your ***WNP***. The configuration file that contains these parameters must be named "network.cfg" in your ***WNP***.

Using DHCP to acquire the TCP/IP network settings

If the ***WNP*** is attached to an Ethernet LAN, you can use DHCP to automatically acquire the TCP/IP network settings. Assuming that there is a correctly configured DHCP server attached to the same LAN, all the network configuration parameters can be acquired in this way. This includes the parameters for the Default Gateway and the DNS Server.

The choice to use DHCP or not is made separately for each interface (PPP and Ethernet). Hence you can for example chose to have statically assigned settings for the Ethernet interface, and use DHCP to acquire the network settings for the PPP interface.

If you choose to acquire the network settings for an interface via DHCP, any parameter values specified for this interface in the configuration file will be ignored. However, if a parameter is missing in the settings that are sent to your ***WNP*** from the DHCP server, your ***WNP*** will fall back to the value that is specified for that parameter in the network configuration file. If your configuration file doesn't contain an entry for that parameter, the default value for the parameter will be used.

If you have selected to use DHCP for the Ethernet interface, but there is no DHCP server reachable on the LAN, your ***WNP*** will perform automatic retries until there is one that answers. During the time your ***WNP*** tries to contact a DHCP server, your ***WNP*** will of course not be reachable from the LAN, since it hasn't yet acquired its settings for the Ethernet interface.

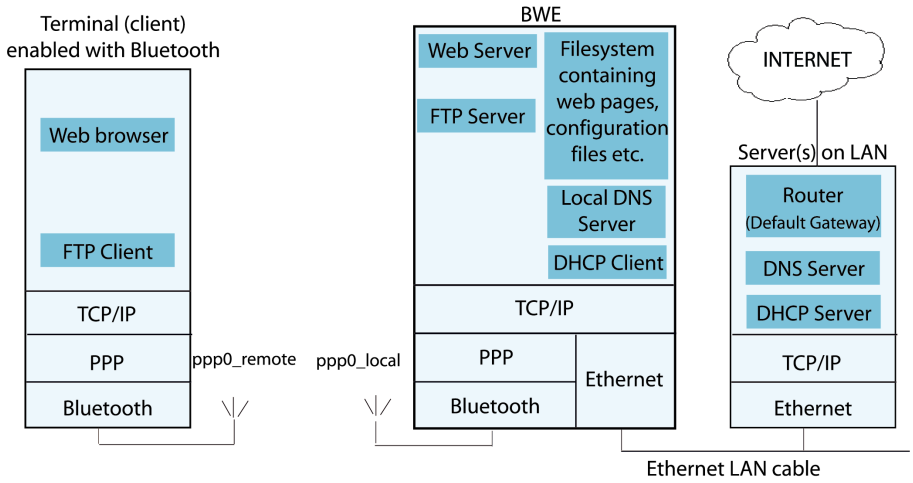
If you have selected to use DHCP for the PPP interface, but there is no DHCP server reachable on the LAN when a Bluetooth enabled client connects to your ***WNP***, your ***WNP*** will perform automatic retries to reach a DHCP server. If no DHCP server has answered within 15 seconds, your ***WNP*** will fall back to using static settings for the PPP interface during this connection.

The local DNS server in your *WNP*

Your ***WNP*** incorporates a local DNS server capable of resolving its own host name, which by default is "wnp". The IP address that is returned for this URL is the IP ad-

dress of the network interface of your ***WNP*** on which the DNS request arrived. This is very useful if you connect to your ***WNP*** via Bluetooth and you don't know what IP address it has. Then you can simply enter "http://wnp" in the address field of your web browser and press <ENTER>, in order to get to the default web page of your ***WNP***.

When connecting to your ***WNP*** via Bluetooth, the IP address of the local DNS server in your ***WNP*** will be sent to your terminal during the PPP connection establishment procedure. Hence, if you for example enter an URL in the address field of the web browser on your terminal and press <ENTER>, a resolve request will be sent to the local DNS server. If the URL is "http://wnp", the local DNS server will successfully resolve it. For all other URL:s the it will forward the request to the external DNS server specified in the network configuration file (or received via DHCP) and let that DNS server handle the request.



Below is a list of all the entries in this configuration file. The key name is written within parenthesis after the parameter name in the headings below.

PPP use DHCP (ppp0_use_dhcp)

The *PPP use DHCP* parameter specifies whether or not DHCP is to be used to acquire the settings for the PPP interface.

PPP Local IP Address (ppp0_local_ipaddr)

The *PPP Local IP Address* parameter specifies the IP address for the local side of the PPP interface in your ***WNP***. By this we mean the IP address that the PPP interface in your ***WNP*** will be given when a client connects via PPP over Bluetooth.

PPP Remote IP Address (ppp0_remote_ipaddr)

The *PPP Remote IP Address* parameter specifies the IP address for the remote side of the PPP interface in your ***WNP***. By this we mean the IP address that a client will be given when connecting to your ***WNP*** via PPP over Bluetooth.

Ethernet use DHCP (eth0_use_dhcp)

The *Ethernet use DHCP* parameter specifies whether or not DHCP is to be used to acquire the settings for the Ethernet interface.

Ethernet IP Address (eth0_ ipaddr)

The *Ethernet IP Address* parameter specifies the IP address of the Ethernet interface in your ***WNP***.

Ethernet Subnet Mask (eth0_netmask)

The *Ethernet Subnet Mask* parameter specifies the subnet mask for the Ethernet interface in your ***WNP***.

Default Gateway (default_gateway)
The *Default Gateway* parameter specifies the IP address of a Default Gateway to be used by clients connecting via PPP. This typically is the IP address of a Router on your Ethernet LAN. The IP address is sent to the clients during the PPP connection establishment procedure.

DNS Server (dns_server)
The *DNS Server* parameter specifies the IP address of an external DNS server to be used by clients connecting via PPP.

DNS Host Name (dns_hostname)
The *DNS Host Name* parameter specifies the hostname of your ***WNP***. Clients that connect via Bluetooth LAN Profile can use this name instead of the IP address when accessing your ***WNP***, providing their terminal has support for DNS name resolution. For example the web server of your ***WNP*** can be accessed by entering "http://<hostname>" instead of "http://<ipaddress>" in the address field of the web browser.

WINS Server (wins_server)
The *WINS Server* parameter specifies the IP address of a WINS server to be used by clients connecting via PPP. The IP address is sent to the clients during the PPP connection establishment procedure.

Summary of the entries in the "network.cfg" configuration file:

Parameter name	Key name	Valid values	Default value
PPP DHCP	ppp0_use_dhcp	"yes" or "no"	"yes"
PPP Local IP Address	ppp0_local_ipaddr	"xxx.xxx.xxx.xxx"	10.0.0.200
PPP Remote IP Address	ppp0_remote_ipaddr	"xxx.xxx.xxx.xxx"	10.0.0.201
Ethernet DHCP	eth0_use_dhcp	"yes" or "no"	"yes"
Ethernet IP Address	eth0_ ipaddr	"xxx.xxx.xxx.xxx"	10.0.0.100
Ethernet Subnet Mask	eth0_netmask	"xxx.xxx.xxx.xxx"	255.255.0.0
Default Gateway	default_gateway	"xxx.xxx.xxx.xxx"	The IP address of the Ethernet interface, if an Ethernet interface is present. Otherwise no default gateway will be used.

DNS Server	dns_server	”xxx.xxx.xxx.xxx”	If not specified, DNS won’t be negotiated during PPP connection establishment.
DNS Host Name	dns_hostname	A valid DNS host name up to 40 characters long.	“wnp”
WINS Server	wins_server	“xxx.xxx.xxx.xxx”	If not specified, WINS won’t be negotiated during PPP connection establishment.

File example:

```
#
# Network configuration (network.cfg)
#

# Common settings
default_gateway = 10.0.0.2
dns_server = 10.0.0.2
dns_hostname = wnp
wins_server = 10.0.0.2

# PPP interface
ppp0_use_dhcp = no
ppp0_local_ipaddr = 10.0.0.200
ppp0_remote_ipaddr = 10.0.0.201

# Ethernet interface
eth0_use_dhcp = no
eth0_ipaddr = 10.0.0.100
eth0_netmask = 255.255.0.0
```

Bluetooth

This group of configuration parameters is used to configure the Bluetooth interface in your ***WNP***. The configuration file is called “bluetooth.cfg”. Below is a list of all the entries in this configuration file.

Device Name (bt_local_name)
The *Device Name* specifies a user-friendly name for your ***WNP*** to help distinguish it from other Bluetooth devices in the vicinity.

If you want to include the Bluetooth Device Address of your ***WNP*** in its *Device Name*, you can include the string “%BD_ADDRESS%” in the parameter value. Your ***WNP*** will automatically replace this string with the Bluetooth Device Address of your ***WNP*** when the parameter is set, as shown in the example below.

Example: Assume that the Bluetooth Device Address of your ***WNP*** is 0x0000803F8E6A, and you set the *Device Name* to “WNP Unit 28,

%BD_ADDRESS%". Then the user-friendly name that will be presented to other Bluetooth devices is "WNP Unit 28, 0000803F8E6A".

Passkey (bt_passkey)
The *Passkey* is used to assure that only authorized persons are granted access to your ***WNP***. When a Bluetooth device connects to your ***WNP***, the user of that device will be prompted to enter a passkey. The passkey that the user enters must correspond to the one that is stored in your ***WNP***, or access will be denied. The *Passkey* may contain 1 to 16 characters.

Note: The Bluetooth Passkey authentication mechanism will only be used if Bluetooth security mode 3 is turned on in your *WNP*.

Security Mode (bt_security_mode3)
The *Security Mode* parameter is used to turn Bluetooth security mode 3 on or off. If it is turned on, this will require users connecting to your ***WNP*** to enter a Passkey on their terminal in order to be granted access. For some PAN devices to be able to connect to this device this parameter must be set to "on".

LAN Access Service Name (bt_lan_service_name)
The *LAN Access Service Name* parameter specifies the name of the LAN Access service in your ***WNP***. When remote Bluetooth units discover the services of your ***WNP***, this user-friendly name will be used to present the LAN Access service.

PAN role (bt_pan_role)
This parameter specifies if the device is NAP or PANU. If the device is NAP, then it can connect to the devices that are specified with the bt_pan_remote_peers parameter. Other devices can also connect to this device and access the network services.

If the device has the role as PANU, then it can only have one connection, because it is always slave.

PAN NAP service name (bt_pan_nap_service_name)
This parameter can be set if the default name of the service shall be changed.

PAN PANU service name (bt_pan_panu_service_name)
This parameter can be set if the default name of the service shall be changed.

PAN remote peers (bt_pan_remote_peers)
This parameter shall be set if an Ethernet bridge shall be setup between this device and one or several PANU devices. Make sure that this device is configured as a NAP device. When this device starts it will try to connect to all the peers specified in this list.

Terminal server remote peers (bt_ts_remote_peers)
This parameter shall be set if terminal server is required. Up to seven remote peers can be configured.

Field bus configuration (bt_fieldbus_type, bt_fieldbus_baudrate, bt_fieldbus_databits, bt_fieldbus_stopbits, bt_fieldbus_parity, bt_fieldbus_flowcontrol)
These parameters can be set to change the default values of the field bus. The values will be discarded if the ***WNP*** is set up to use the field bus for other communication such as modbus or bms.

Summary of the entries in the Bluetooth configuration file:

Parameter name	Key name	Valid values	Default value
Local Name	bt_local_name	Up to 80 characters	Access Point
Passkey	bt_passkey	1 to 16 characters [A..Z][a..z][0..9]	0000
Security Mode	bt_security_mode3	“on” or “off”	“off”
LAN Access Service Name	bt_lan_service_name	Up to 100 characters	“LAN Service”
PAN role	bt_pan_role	“NAP” or “PANU”	“NAP”
PAN NAP Service Name	bt_pan_nap_service_name	Up to 100 characters	“NAP Service”
PAN PANU Service Name	bt_pan_panu_service_name	Up to 100 characters	“PANU Service”
Remote PANU servers	bt_pan_remote_peers		“{}”
Remote TS servers	bt_ts_remote_peers		“{}”
Field bus type	bt_fieldbus_type	“RS232”, “RS422”, “RS485”	“RS232”
Baud rate	bt_fieldbus_baudrate	“9600”, ”19200”, “38400”, ”57600”, ”115200”, ”230400”, “460800”	“9600”
Data bits	bt_fieldbus_databits	“5”, “6”, “7”, “8”	“8”
Stop bits	bt_fieldbus_stopbits	“1”, “2”	“1”
Parity	bt_fieldbus_parity	“NONE”, “ODD”, “EVEN”	“NONE”
Flow control	bt_fieldbus_flowcontrol	“CTS/RTS”, “NONE”	“NONE”

File example:

```
# Bluetooth configuration

bt_local_name = My Bluetooth device
```

```
bt_passkey = 0000
bt_security_mode3 = on
bt_spp_service_name = SPP Service
#bt_lan_service_name = LAN Service

# PAN role to use (NAP or PANU)
bt_pan_role = NAP
#bt_pan_nap_service_name = NAP Service
#bt_pan_panu_service_name = PANU Service

#Remote panu servers
bt_pan_remote_peers =
{
00:12:F3:00:9A:05
0012f3009a06
}
#Remote terminal server peers
#"Bluetooth address"%"port number"
bt_ts_remote_peers =
{
00:12:F3:00:9A:05%2000
0012f3009a06%2001
}
#Field bus configuration
#bt_fieldbus_type = RS232
#bt_fieldbus_baudrate = 9600
#bt_fieldbus_databits = 8
#bt_fieldbus_stopbits = 1
#bt_fieldbus_parity = NONE
#bt_fieldbus_flowcontrol = CTS/RTS
```

Web Server

The configuration file is called "webserver.cfg ".

Default Home Page (ws_default_home_page)
This parameter is used to set the default home page of the web server in your *WNP*. The default home page may be up to 20 characters long, which is the maximum file name length in your *WNP*.

Summary of the entries in the web server configuration file:

Parameter name	Key name	Valid values	Default value
Default home page	ws_default_home_page	Up to 20 characters	index.html

File example

```
#
# Webserver configuration (webserver.cfg)
#
ws_default_home_page =index.html
```

Logger

This group of configuration parameters is used to configure the logger in your ***WNP***. The configuration file that contains these parameters must be named "logger.cfg " in your ***WNP***. Below is a list of all the entries in this configuration file. The key name is written within parenthesis after the parameter name in the headings below.

Note: The Logger collects its data via the General Bus Interface (GBI). For a description of this interface, see the section "The General Bus Interface".

Log List (logger_log_list)

This parameter specifies which data from the industrial equipment to log.

The *Log List* has the following format: "Entry;Entry2;…;EntryN;", where each entry defines one GBI ID to log from a certain bus interface. The entries contain a list of variables in the format "Interface Descriptor,ID,Data Type,Hysteresis,Ring Buffer Number,Bit Number". Below is a description of what these variables mean:

Variable	Description	Valid values
Interface Descriptor	The GBI bus interface type to use.	1
ID	The GBI ID to log on the selected bus interface.	Bus specific
Data Type	The data type that shall be logged.	Bit, I1Bit, I2Bit, I4Bit, I1, UI1, I2, UI2, I4, UI4
Hysteresis	To actually be logged, the currently polled value must differ by at least the Hysteresis from the previously logged value for this entry. The Hysteresis variable only applies if the data type used is I1, UI1, I2, UI2, I4 or UI4. For the other data types the currently polled value will always be logged if it differs from the previously logged value for this entry (no hysteresis used). Example: Data Type = UI2, Hysteresis = 200 Comment Polled value nr 1 = 3428 First value is always logged Polled value nr 2 = 3571 |3428-3571| = 143 <= 200 (Hysteresis) => Value not logged Polled value nr 3 = 3112 |3428-3112| = 316 > 200 (Hysteresis) => Value logged	[0..2147483647]
Ring Buffer Number	In which ring buffer shall the logged value be stored?	0,1

Bit Number	This variable is only applicable if the data type used is I1Bit, I2Bit or I4Bit. In this case the logger will read an 1, 2 or 4 byte integer from the selected GBI ID, and if the bit Bit Number in the integer has changed from its previously logged value, the new value will be logged. For other data types this variable is ignored.	[0..7] for I1Bit [0..15] for I2Bit [0..31] for I4Bit

Log Period (logger_log_period)
This parameter determines how often the entries in the Log List shall be polled for their value. The period is specified in number of seconds, and it is common for all entries in the *Log List*.

Ring Buffer 0 (logger_ring_buffer_0)
The logger has two ring buffers that are used to store the entries that are logged. The *Ring Buffer 0* parameter value uses the following format: "Ring Buffer Size,Number of Backup Files". The Ring Buffer Size variable specifies the number of entries that the ring buffer can store. The Number of Backup Files variable specifies the number of backup files used for the ring buffer.

When an entry is stored in the ring buffer, the logger starts writing from the beginning of the ring buffer, and then continuously adds new entries until the end is reached. At the point when the end is reached, the logger will first save the entries in the ring buffer to a backup file in the file system (providing the ring buffer has been configured to use backup files). Then the logger will start writing at the beginning of the buffer again, thereby overwriting the oldest entry.

Depending on how many backup files are used the following will happen when a ring buffer gets full, before the logger starts writing over old entries in the ring buffer.

Number of backup files	Action taken when the ring buffer gets full
0	No action will be taken. The logger will start writing over old entries immediately.
1	The entries in the ring buffer will be stored in backup file on the file system named "logbackup0_1.txt". If a previous backup file named "logbackup0_1.txt" exists, it will be overwritten.
2	The entries in the ring buffer will be stored in backup file on the file system named "logbackup0_1.txt". If a previous backup file named "logbackup0_1.txt" exists, it will first be renamed to "logbackup0_2.txt". If a previous backup file named "logbackup0_2.txt" exists, it will be overwritten.

For each entry logged in the ring buffer the GBI Interface Descriptor, GBI ID and a Time Stamp is stored. The format of the backup files is the same as that used when the ASP script function "aspDumpLogToFile()" is called. See chapter "Creat-

ing your custom web pages", section "ASP script functions", sub section "Logger".

Ring Buffer 1 (logger_ring_buffer_1)
See description of the "Ring Buffer 0" parameter. The only difference is that the backup files used are named "logbackup1_1.txt" and "logbackup1_2.txt" instead of "logbackup0_1.txt" and ""logbackup0_2.txt" respectively.

Summary of the entries in the logger configuration file:

Parameter name	Key name	Valid values	Default value
Log List	logger_log_list	Entry1;Entry2;…;EntryN; Where each Entry = "Interface Descriptor,ID,Data Type,Hysteresis,Ring Buffer Number,Bit Number"	None
Log Period	logger_log_period	[1.. 4294967295]	1
Ring Buffer 0	logger_ring_buffer_0	[1..1000],[0,1,2]	500,0
Ring Buffer 1	logger_ring_buffer_1	[1..1000],[0,1,2]	500,0

File example:

```
#
# Logger configuration (logger.cfg)
#
logger_log_list = 1,64,Bit,0,0,0;1,0,UI1,100,0,0;
logger_log_period = 4
logger_ring_buffer_0 = 100,0
logger_ring_buffer_1 = 500,2
```

User Management

To configure the User Management framework in your ***WNP***, it is recommended that you use the User Management web pages that are a part of the pre-installed default application. Feel free to modify them as you like in order to make them match the visual design of your own custom application.

It is not recommended that you manually alter the contents of the User Management configuration file named "umconfig.txt". One of the reasons for this is that the password of a user is stored in an encrypted format in order to keep it secret from the other users on your ***WNP***. Hence, it must be read and written by the software in your ***WNP***, which is able to encrypt and decrypt the passwords stored in the User Management configuration file.

Chapter 5

Creating your custom web pages

The web pages stored in your ***WNP*** form the actual user interface to your industrial equipment. These web pages have the ability to include data, such as a temperature or speed measurement, that has been collected from the devices in the network to which your ***WNP*** is attached. It is also possible to set parameters in the devices from the web interface. In order the manage those tasks the web server inside the WNP contains functionality to handle dynamic behavior on web pages.

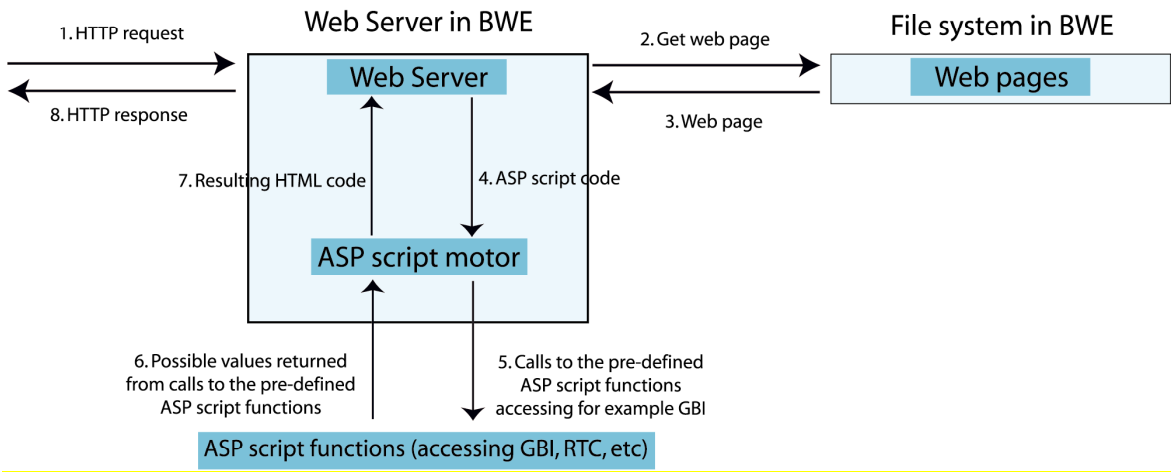
The web server comes from a company called GoAhead. It's especially created to run in embedded systems with limited CPU and memory resources. This means that it is designed to be very efficient and sparse in its memory requirements. Still, in contrast to a lot of other embedded web servers, the GoAhead web server has a framework to create dynamic content that is very easy to learn and use. Much of this is due to the fact that it uses the well-known standard techniques ASP and JavaScript, while many other embedded web servers rely on proprietary solutions to create dynamic content.

For a description of which parts of ASP and JavaScript are supported in the GoAhead web server, please visit http://www.goahead.com . Follow the links that direct you to the GoAhead webserver. There you'll also find an online documentation and a functionality overview.

5.1 ASP scripts

To insert ASP scripts in a web page, the script code must be encapsulated between the special tags "<%" and "%>". A web page containing script code must also have an ".asp" extension in the filename so that the web server can distinguish it from normal HTML pages.

When the web server receives a HTTP request for an ASP web page, it will get the web page from the file system and then scan through it looking for script sections. Whenever the web server detects a script section, it will cut this section out of the web page and send it to the ASP script motor that evaluates the script code. The evaluation of the script code can involve calls to the pre-defined ASP functions in your ***WNP*** that are used for example to access the GBI interface. If the script code returns any resulting HTML code, this will be inserted into the web page in the place where the script code originally was. When all script sections in the ASP web page have been processed, the resulting web page is returned to the client's web browser in a HTTP response.



Commands in the GoAhead's JavaScript Interpreter

- Variables and variable declarations (var)
- Global functions with support for local JavaScript variables
- If, then, else
- For loops
- Expressions including: + - / * % ++ -- | & || && << >> < <= == > >=
- Statements: return, braces, comma, semicolon
- Comments

Missing from the embedded implementation are arrays, objects, regular expressions and object methods. The resulting implementation is a 15K Embedded JavaScript interpreter that is highly tuned to the needs of embedded devices, rather than a 200K conventional memory footprint.

Below are two typical examples of how script code can be used.

Example1: Present data in a web page

This is an example where dynamic data that is read from a device is incorporated in a web page. Here we use the ASP script function *aspGBIReadI2* to retrieve a temperature value from a fictive device to which the ***WNP*** is supposed to be attached. The ASP script functions that your ***WNP*** supports are described in the section "ASP script functions".

"temperature.asp"

```
<HTML>
<BODY>
Current Temperature =
<%
var Temp;
Temp = aspGBIReadI2(1, 14);
write(Temp);
%>
```

```
</BODY>
</HTML>
```

When the web server has processed this ASP web page, the following result will be returned to the client's web browser (assuming the read temperature was 57 degrees).

```
<HTML>
<BODY>
Current Temperature = 57
</BODY>
</HTML>
```

Example2: Set a device parameter

In this example we set a device parameter according to a value that is entered by the user. This is typically performed in a three-step process.

1. The first step consists of the user requesting a web page containing a HTML form, where the new parameter value can be entered:

"speed_form.html"

```
<HTML>
<BODY>
<FORM action="set_new_speed.asp">
Please enter new speed: <INPUT type="text" name="new_speed">
<INPUT type="submit" value="Set Speed">
</FORM>
</BODY>
</HTML>
```

2. In the second step the user views the web page above, enters the new speed value, and presses the [Set Speed] button. This will trigger his web browser to send a request for the web page "set_new_speed.asp". The new speed value is sent along with the request, as a CGI variable with the name "new_speed".

3. When the web server receives the request for "set_new_speed.asp", it detects that a CGI variable is sent along with the request. This variable (new_speed) and its value is extracted by the web server, and made available to the script code in the web page that is requested. We use this to call a script function that passes along the variable value to a fictive device. Here's what is might look like:

"set_new_speed.asp"

```
<HTML>
<BODY>
<%
aspGBIWriteI2(1, 14, new_speed);
%>
The new speed was successfully set to <%write(new_speed);%>!
</BODY>
</HTML>
```

When the web server processes this web page, it will call the script function *aspGBIWriteI2* with the "new_speed" variable as input parameter. This function will make the ***WNP*** send a message to a certain device telling it to set its speed parameter to the value of "new_speed". The second script section,

"<%write(new_speed);%>", is used to include the value of "new_speed" in the web page.

Finally, the processed web page will be returned to the client's web browser, informing that the operation was successful. Here's what it would look like, if the user had entered 1200 as the new speed value:

```
<HTML>
<BODY>
The new speed was successfully set to 1200!
</BODY>
</HTML>
```

5.2 ASP script functions

This section describes the predefined ASP functions that your ***WNP*** supports. These functions can be called from the script sections of your ASP web pages. They perform operations that use the primary functionality of your ***WNP***, such as accessing registers on a Modbus device that is attached to your ***WNP*** or setting your ***WNP***'s system time. Please note that these functions have been added to the GoAhead web server by connectBlue, and that they are especially designed for the ***WNP***. Therefore you won't find any information about these functions on the GoAhead website.

General functions

This section describes the ASP functions that handle general tasks that don't belong to any special function category. Typically these functions perform utility operations such as extracting the value of a CGI variable.

string aspVarExists(variableName)

Description: Checks if a web server or CGI variable with the name `variableName` exists.

In-parameters:

Parameter	Description	Valid values
variableName	The name of the variable to check for.	A variable name that may exist.

Return value: If the variable exists, 1 is returned. Otherwise 0 is returned.

string aspGetVar(variableName)

Description: Extracts the value of the web server or CGI variable with the name `variableName`.

In-parameters:

Parameter	Description	Valid values
variableName	The name of the variable whose value shall be extracted.	The name of an existing web server or CGI variable

Return value: The value of the selected variable is returned as a string.

string aspAND(valueA, valueB)

Description: Returns the result of the bit-wise logical operation "`valueA` AND `valueB`". Both the input parameters and the return value are 32-bit signed integers, specified as decimal numbers (for example 1035482 or –124691).

In-parameters: `valueA` and `valueB` are the values that the AND operation is performed on.

Return value: The result of the bit-wise logical operation "`valueA` AND `valueB`".

string aspOR(valueA, valueB)

Description: Returns the result of the bit-wise logical operation "`valueA` OR `valueB`". Both the input parameters and the return value are 32-bit signed integers, specified as decimal numbers (for example 1035482 or –124691).

In-parameters: `valueA` and `valueB` are the values that the OR operation is performed on.

Return value: The result of the bit-wise logical operation "`valueA` OR `valueB`".

string aspXOR(valueA, valueB)

Description: Returns the result of the bit-wise logical operation "`valueA` XOR `valueB`". Both the input parameters and the return value are 32-bit signed integers, specified as decimal numbers (for example 1035482 or –124691).

In-parameters: `valueA` and `valueB` are the values that the XOR operation is performed on.

Return value: The result of the bit-wise logical operation "`valueA` XOR `valueB`".

string aspWaitTime(waitTime)

Description: Halts the processing of the current web page for `waitTime` milliseconds before continuing.

In-parameters:

Parameter	Description	Valid values
waitTime	The number of milliseconds to wait before the processing of the web page is resumed.	[0..4294967295]

Return value: This function doesn't have a return value.

string aspGetFirmwareVersion()

Description: Returns a string specifying the firmware version of your ***WNP***.

In-parameters: This function doesn't have any in-parameter.

Return value: A string specifying the firmware version of your ***WNP*** is returned.

string aspGetSystemStatus()

Description: Returns the current system status of your ***WNP***.

In-parameters: This function doesn't have any in-parameter.

Return value: The current system status is returned as string holding a status code. Below is a list of the status codes that can be returned:

Status code	Meaning
0	Invalid status code (Error).
1	Your WNP is starting up.
2	Your WNP hasn't been able to receive its IP settings for the Ethernet interface from a DHCP server on the LAN yet
3	Your WNP is powered on, has started up and is working correctly.
4	Your WNP is in the process of establishing a Bluetooth link.
5	Your WNP is connected to another device via a Bluetooth link.
6	Your WNP has detected a recoverable error that must be attended to.
7	Your WNP has detected an irrecoverable error.

string aspResetSystem(timeout)

Description: This function will trigger a system reset after `timeout` milliseconds. The reset operation is asynchronous, so the web server will continue its operation after this function has been called until the system reset actually is performed. This makes it possible to set a timeout that long enough for the web server to be able to return the contents of the web page that triggered the reset operation to the client.

In-parameters:

Parameter	Description	Valid values
timeout	The number of milliseconds to wait before the web server triggers the reset.	[0..30000]

Return value: This function doesn't have a return value.

Configuration Manager

The Configuration Manager is a part of your *WNP* that handles the configuration of the different components that your *WNP* is built up of (such as Bluetooth and the web server). Using the ASP function that accesses the Configuration Manager you can retrieve the settings for these components, in order to for example include them in a status web page. Note that with aspCMSetKeyValue and aspCMGet-KeyValues it is possible to configure all parameters in the configuration files, see chapter "Creating your custom configuration", section "Parameters in the configuration files".

string aspCMAvailable(cfgFileName)

Description: This function checks whether a file exists in the WNP's file system.
In-parameters:

Parameter	Description	Valid values
cfgFileName	The name of the file.	Any string

Return value: The function returns "OK" if the file exists.

string aspCMGetKeyValue(cfgFileName, key)

Description: This function returns the value of a key in a file. The syntax in the file could for example be: bt_local_name = MyDevice
The key is the string to the left of the equal sign and the value is the string to the right.

Parameter	Description	Valid values
cfgFileName	T he name of an existing file. Use aspCMAvailable to check if the file exists.	A string
key	The name of the variable to retrieve.	A string

Return value: The function returns the value of the key.

string aspCMSetKeyValue(cfgFileName, key, value)

Description: This function writes a value to a file. If the key already exists, then the value will be replaced. If the key doesn't exist, then the key will be added to the file.

Parameter	Description	Valid values
cfgFileName	The name of an existing file. Use aspCMAvailable to check if the file exists.	A string
key	The name of the variable to retrieve.	A string
Value	The value to be written in the file.	A string

Return value: The function returns "OK" if the call succeeded.

string aspCMGetParam(componentId, parameterId)

Description: This function returns the value of a certain setting for a selected component.

Parameter	Description	Valid values
componentId	Selects which component to access	See table below.
parameterId	Specifies which parameter from the selected component to get.	See table below.

`componentId` selects which component to access, see the table below.

Component Name	Component ID	Notes
Network	1	
Smtp	2	Currently not accessible
Logger	3	Currently not accessible
Modbus	4	Currently not accessible
FTP	5	Currently not accessible
Web server	6	
Bluetooth	7	

`parameterId` specifies which parameter from the selected component to get, see the tables below.

Network

Parameter Name	Parameter ID
Loopback interface IP address	1
Loopback interface net mask	2
Ethernet interface IP address	3
Ethernet interface subnet mask	4
Ethernet interface broadcast address	5
Ethernet interface MAC/hardware address	6
PPP interface local IP address	7
PPP interface remote IP address	8
PPP interface subnet mask	9
Default gateway IP address	10
DNS server IP address	11

Web server

Parameter Name	Parameter ID
Default home page	1

Bluetooth

Parameter Name	Parameter ID
Bluetooth local name	1
Bluetooth passkey	2

Return value: The value of the selected parameter is returned as a string.

Example: aspCMGetParam(7, 2) will return your ***WNP***'s Bluetooth passkey.

Note: When trying to retrieve the value of a parameter that currently is not available from the Network component, a space character (" ") will be returned. This happens for example if you try to get the remote IP address of the PPP interface when no active PPP connection exists.

General Bus Interface (GBI)

This section describes the ASP functions used to access the General Bus Interface (GBI) which is described in chapter "Creating your custom configuration", section "The General Bus Interface". It's important that you have configured the bus interface you want to access correctly before calling these functions.

Note1: Some of these functions that read or write integers come in three different versions. Each version works with a different integer size (1, 2 or 4 bytes). The dif-

ferent versions are recognized by two letters in the function name (I1, I2 or I4) indicating which integer size they use.

Note2: Some of these functions use floating-point numbers. When this data type is being used, numbers must be specified as decimal numbers, for example "34.189" or "-0.00822". Hence, the functions will **not** accept formats such as "323E+9" or "7541E-2".

string aspGBIReadBit(interfaceDescriptor, id)

Description: Reads the status of a bit from GBI.

Parameter	Description	Valid values
interfaceDescriptor	Selects which bus interface to use.	1
id	A bus specific identifier specifying which object or property to read from	Bus specific

Return value: If successfully executed, the status is returned as a string with the value 0 or 1. Otherwise the string "ERROR" is returned.

string aspGBIWriteBit(interfaceDescriptor, id, dataBit)

Description: Writes the status of a bit to GBI.

Parameter	Description	Valid values
interfaceDescriptor	Selects which bus interface to use.	1
id	A bus interface specific identifier that specifies which object or property to write to.	Bus specific
dataBit	The value of the bit to be written	0 or 1

Return value: If successfully executed, the string "OK" is returned. Otherwise "ERROR" is returned.

string aspGBIReadStr(interfaceDescriptor, id, strLen)

Description: Reads a string from GBI.

In-parameters:

Parameter	Description	Valid values
interfaceDescriptor	Selects which bus interface to use.	1

id	A bus interface specific identifier that specifies which object or property to read from.	Bus specific
strLen	The number of characters to be read.	[0..80]

Return value: If successfully executed, the string that was read from GBI is returned. Otherwise the string "ERROR" is returned.

Remarks: If "strLen" is set to the value "0", the whole string will be read, until the string-terminating null-character is reached. However, if the string is longer than 80 characters, it will be truncated.

string aspGBIWriteStr(interfaceDescriptor, id, "textStr")

Description: Writes a text string to GBI.

Parameter	Description	Valid values
interfaceDescriptor	Selects which bus interface to use.	1
id	A bus specific identifier specifying which object or property to write to.	Bus specific
textStr	The string to be written.	Up to 80 characters

Return value: If successfully executed, the string "OK" is returned. Otherwise "ERROR" is returned.

string aspGBIReadI1(interfaceDescriptor, id)

string aspGBIReadI2(interfaceDescriptor, id)

string aspGBIReadI4(interfaceDescriptor, id)

Description: Reads an integer from GBI.

Parameter	Description	Valid values
interfaceDescriptor	Selects which bus interface to use.	1
id	A bus specific identifier specifying which object or property to read from.	Bus specific

Return value: If successfully executed, the value of the read integer is returned as a string. Otherwise the string "ERROR" is returned.

string aspGBIWriteI1(interfaceDescriptor, id, integerData)

string aspGBIWriteI2(interfaceDescriptor, id, integerData)

string aspGBIWriteI4(interfaceDescriptor, id, integerData)

Description: Writes an integer to GBI.

Parameter	Description	Valid values
interfaceDescriptor	Selects which bus interface to use.	1
id	A bus specific identifier specifying which object or property to write to.	Bus specific
integerData	The value of the integer to be written.	[-128..127] for integer size 1 [-32768..32767] for integer size 2 [-2147483648..2147483647] for integer size I4

Return value: If successfully executed, the string "OK" is returned. Otherwise "ERROR" is returned.

string aspGBIReadI1Dec(interfaceDescriptor, id, nrDecimals)

string aspGBIReadI2Dec(interfaceDescriptor, id, nrDecimals)

string aspGBIReadI4Dec(interfaceDescriptor, id, nrDecimals)

Description: Reads an integer from GBI, converts it to a floating-point number, divides the float by 10 ^ `nrDecimals`, and returns the result.

Parameter	Description	Valid values
interfaceDescriptor	Selects which bus interface to use.	1
id	A bus specific identifier specifying which object or property to read from.	Bus specific
nrDecimals	The number of decimals to use.	[-10..10]

Return value: If successfully executed, the resulting floating-point number is returned as a string. Otherwise the string "ERROR" is returned.

Example: Integer data read from GBI =38423, `nrDecimals` =3 =>The floating-point number "38.423" is returned.

string aspGBIWriteI1Dec(interfaceDescriptor, id, "floatData", nrDecimals)

string aspGBIWriteI2Dec(interfaceDescriptor, id, "floatData", nrDecimals)

string aspGBIWriteI4Dec(interfaceDescriptor, id, "floatData", nrDecimals)

Description: Multiplies the floating-point number stored in `floatData` with 10^`nrDecimals`, converts the result to an integer which then is written to GBI.

In-parameters:

Parameter	Description	Valid values
interfaceDescriptor	Selects which bus interface to use.	1
id	A bus specific identifier specifying which object or property to rwrite to.	Bus specific
floatData	The floating-point number to be written.	A floating-point number
nrDecimals	The number of decimals to use.	[-10..10]

Return value: If successfully executed, the string "OK" is returned. Otherwise "ERROR" is returned.

Remarks: Please note that the resulting integer that is to be written to GBI must fit within the boundaries of the selected integer size (I1, I2 or I4). These boundaries are presented below:

Integer size	Boundaries
I1	[-128..127]
I2	[-32768..32767]
I4	[-2147483648..2147483647]

Example: `floatData` =38.423, `nrDecimals` =2 => The integer 3842 is written to GBI.

string aspGBIReadI1Scale(interfaceDescriptor, id, “minVal”, “maxVal”, nrDecimals)

string aspGBIReadI2Scale(interfaceDescriptor, id, “minVal”, “maxVal”, nrDecimals)

string aspGBIReadI4Scale(interfaceDescriptor, id, “minVal”, “maxVal”, nrDecimals)

Description: Reads an integer from GBI and maps/scales it to a floating-point number, which is returned. The floating-point number will be within the range `minVal` to `maxVal`.

In-parameters:

Parameter	Description	Valid values
interfaceDescriptor	Selects which bus interface to use.	1
id	A bus specific identifier specifying which object or property to read from.	Bus specific
minval	The lowest point on the floating-point scale.	A floating-point number
maxval	The highest point on the floating-point scale.	A floating-point number
decimalPrecision	The number of decimals to be used for the return value.	[-10..10]

Return value: If successfully executed, the resulting floating-point number is returned as a string. Otherwise the string “ERROR” is returned.

string aspGBIWriteI1Scale(interfaceDescriptor, id, “minVal”, “maxVal”, “floatData”)

string aspGBIWriteI2Scale(interfaceDescriptor, id, “minVal”, “maxVal”, “floatData”)

string aspGBIWriteI4Scale(interfaceDescriptor, id, “minVal”, “maxVal”, “floatData”)

Description: Maps/scales the floating-point number stored in `floatData` to an integer. The float number must be within the range `minVal` to `maxVal`.

Parameter	Description	Valid values
interfaceDescriptor	Selects which bus interface to use.	1

id	A bus specific identifier specifying which object or property to write to.	Bus specific
minval	The lowest point on the floating-point scale.	A floating-point number
maxval	The highest point on the floating-point scale.	A floating-point number
floatData	The floating-point number to be written.	[minVal..maxVal]

Return value: If successfully executed, the string "OK" is returned. Otherwise "ERROR" is returned.

string aspGBIReadI1Time(interfaceDescriptor, id)

string aspGBIReadI2Time(interfaceDescriptor, id)

string aspGBIReadI4Time(interfaceDescriptor, id)

Description: Reads an integer from GBI holding a time value specified in number of seconds, and then converts it to a string in the format "hh:mm:ss " which is returned.

Parameter	Description	Valid values
interfaceDescriptor	Selects which bus interface to use.	1
id	A bus specific identifier specifying which object or property to read from.	Bus specific

Return value: If successfully executed, the time is returned as a string in the format "hh:mm:ss". Otherwise the string "ERROR" is returned.

string aspGBIWriteI1Time(interfaceDescriptor, id, "time")

string aspGBIWriteI2Time(interfaceDescriptor, id, "time")

string aspGBIWriteI4Time(interfaceDescriptor, id, "time")

Description: Converts the string `time` specified in the format "hh:mm:ss" to number of seconds and then writes this as an integer to GBI.

Parameter	Description	Valid values
interfaceDescriptor	Selects which bus interface to use.	1
id	A bus specific identifier specifying which object or property to write to.	Bus specific
time	A string holding the time to be written.	hh:mm:ss

Return value: If successfully executed, the string "OK" is returned. Otherwise "ERROR" is returned.

Remarks: Please note that the resulting integer that is to be written to GBI must fit within the boundaries of the selected integer size (I1, I2 or I4). These boundaries are presented below:

Integer size	Boundaries
I1	[-128..127]
I2	[-32768..32767]
I4	[-2147483648..2147483647]

Real Time Clock

This chapter describes the functions used to access the Real Time Clock (RTC) in your ***WNP***. Using these functions, you can set and get the date and time of your ***WNP***.

string aspRTCGetTime()

Description: Returns the current time of the RTC in your ***WNP*** as a string with the format "hh:mm:ss".

In-parameters: This function doesn't have any in-parameter.

Return value: If successfully executed, this function returns the current time of the RTC in your ***WNP*** as a string with the format "hh:mm:ss". If the power to the RTC has been lost, the string "Power lost" is returned. If a general error in the RTC has been detected "ERROR" is returned.

string aspRTCSetTime("time")

Description: Sets the time of the RTC in your ***WNP*** according to the `time` string, specified in the format "hh:mm:ss".

Parameter	Description	Valid values
time	A string holding the time which the RTC shall be set to.	[0..23]:[0..59]:[0..59]

Return value: If successfully executed, the string "OK" is returned. Otherwise "ERROR" is returned.

string aspRTCGetDate()

Description: Returns the current date of the RTC in your ***WNP*** as a string with the format "20yy/mm/dd".

In-parameters: This function doesn't have any in-parameter.

Return value: If successfully executed, this function returns the current date of the RTC in your ***WNP*** is returned as a string with the format "20yy/mm/dd". If the power to the RTC has been lost, the string "Power lost" is returned. If a general error in the RTC has been detected the "ERROR" is returned.

string aspRTCSetDate("date")

Description: Sets the date of the RTC in your ***WNP*** according to the `date` string, specified in the format "20yy/mm/dd".

Parameter	Description	Valid values
time	A string holding the date which the RTC shall be set to.	[2000..2037]/[1..12]/[1..31]

Return value: If successfully executed, the string "OK" is returned. Otherwise "ERROR" is returned.

Logger

string aspDumpLogToFile("filename", ringBufferNumber)

Description: Dumps the entries currently stored in one of the Logger's ring-buffers to a file.

In-parameters:

Parameter	Description	Valid values
filename	The name of the file to which the Logger entries shall be written.	Up to 20 characters
ringBufferNumber	The number of the ring buffer that contains the entries to be stored.	1,2

Return value: This function doesn't have a return value.

Remarks: The log file that is created as a result of calling this function contains a list of log entries. Each entry is placed on a separate line, and consists of a comma-separated list of variables in the following format "Interface Descriptor,ID,

Type,Value,Time Stamp". Below you find a description of what these variables mean:

Variable	Description	posible values
Interface Descriptor	The GBI bus interface where this log entry comes from.	1
ID	The GBI ID that has been logged in this entry.	Bus specific
Type	The data type for the Value in this log entry.	Bit, I1Bit, I2Bit, I4Bit, I1, UI1, I2, UI2, I4, UI4
Value	The value that has been logged in this entry.	Depends on the Type for this entry.
Time Stamp	A timestamp specifying when this Value was logged.	yy/mm/dd hh:mm:ss

Example: Here is an example of what a log file might look like:

```
1,124,I2,32177,03/05/24 14:48:47
1,124,I2,112,03/05/24 14:49:16
1,130,Bit,HIGH,03/06/12 02:52:33
1,80,I4Bit,HIGH,03/06/12 05:49:59
```

Note: Since the logger uses a ring buffer that wraps around when it gets full, the entries in the log file are not guaranteed to be in chronological order.

User Management

To access the User Management framework in your ***WNP***, it is recommended that you use the User Management web pages that are a part of the pre-installed default application. Feel free to modify them as you like in order to make them match the visual design of your own custom application.

Black Board

This chapter describes Black Board component, which can write and read data to a RAM buffer. It's also possible to store the data to flash with the two functions described below. Use the page testPage.txt in the default file system to get acquainted with the component.

The Black Board is a GBI interface which has the GBI id number 6. It is a byte buffer which contains 8192 bytes. It's possible to access these bytes with the following asp code:

```
var id = "6";    // This number refers to Black Board.
var gbiVar = "4"; // This number points to a byte in the byte array.
result = aspGBIWriteI1(id, gbiVar, value);
result = aspGBIWriteI2(id, gbiVar, value);
result = aspGBIWriteI4(id, gbiVar, value);
```

```
result = aspGBIWriteF4(id, gbiVar, value);
result = aspGBIWriteStr(id, gbiVar, value);
value = aspGBIReadI1(id, gbiVar);
value = aspGBIReadI2(id, gbiVar);
value = aspGBIReadI4(id, gbiVar);
value = aspGBIReadF4(id, gbiVar);
value = aspGBIReadStr(id, gbiVar);
```

Note that the byte array is byte oriented! Do the following to write two 4-byte integers:

```
result = aspGBIWriteI4(6, 0, theInt);
result = aspGBIWriteI4(6, 4, theOtherInt);
```

It's possible to use Black Board to convert an int to a float:

```
result = aspGBIWriteI4(6, 0, value);
value = aspGBIReadF4(6, 0);
```

It's also possible to save the contents to and from flash:

```
aspBLACKBOARDSave("settings.txt");
aspBLACKBOARDLoad("settings.txt");
```

See descriptions below.

string aspBLACKBOARDSave(fileName)

Description: Used for saving BlackBoard's RAM buffer to flash.

In-parameters: filename is the name of the file, e.g. "mySettings.txt"

Return value: Return value: If successfully executed, the string "OK" is returned. Otherwise "ERROR" is returned.

string aspBLACKBOARDSave(fileName)

Description: Used for loading BlackBoard's RAM buffer from flash.

In-parameters: filename is the name of the file, e.g. "mySettings.txt"

Return value: If successfully executed, the string "OK" is returned. Otherwise "ERROR" is returned.

Chapter 6

Installing your custom application

When you have created your application, you have to install the configuration files and web pages that it consists of in your ***WNP***.

Before you install a new application, please take some time to check your configuration files once again, since an invalid configuration file might put your ***WNP*** in an error state. If your ***WNP*** ends up in an error state where it can't be reached via the Bluetooth or Ethernet interface, debug the configuration files and then install the application files again.

6.1 Installing file system using FTP

This section describes the general steps you need to perform if you want to install your application using an FTP client. Since every FTP client has its own user interface, the exact procedure will differ somewhat depending on which one you decide to use. Please turn to the manual for your specific FTP client for information on how a certain step is performed.

To install your application files using FTP, follow the procedure below:

1. Use an FTP client on your PC to establish a connection to the FTP server in your ***WNP***. For example: Windows Explorer or WS_FTP LE or WS_FTP Home.
2. Logon with the ip address of your device, 10.0.0.100 as default, and the username "admin" and password "admin1234".
3. Use your FTP client to send your application files to the FTP server in your ***WNP***. The FTP server will store the files it receives in the file system of your ***WNP***. If a file with the same name already exists in your ***WNP***, the new one that is received via FTP will replace it.
4. Disconnect your FTP client from the FTP server in your ***WNP***.
5. Reset your ***WNP*** by unplugging the power cable, and then plugging it in again. This will activate your new application. If all goes well, the Status LED of your ***WNP*** will become green.

6.2 Installing file system using the serial port

See the chapter about Upgrading file system via the serial port.

Chapter 7

Firmware upgrade

There are two ways to upgrade the FW. It can either be done via a serial cable or via the network. The device can always be configured via the serial interface even when the device is configured wrong. In order to upgrade the FW via the network the network connections must work via Ethernet or Bluetooth.

7.1 Serial upgrade

This upgrade is done via the serial port in the DSUB.

Upgrading firmware via the serial port

1. Install the program "connectBlue Flash Loader". Open the program by pressing "Start->Programs->connectBlue->Flash Loader->Flash Loader".
2. Choose any Product/Platform. This choice doesn't matter for this product!
3. Select application file by pressing the button with "three dots" to the right of the drop down list. The application file shall be the bin-file that represents the firmware.
4. Select correct com port.
5. Press "Load" and wait until the status bar is finished.
6. Wait for your device to restart itself. You do not need to restart it manually!

If your device doesn't start it might have the wrong firmware and then you can just flash it again with the correct firmware.

Upgrading the file system via the serial port

The WNP contains a number of configuration files and web pages, which control the behavior of the WNP. If the configuration files becomes faulty or if the WNP for some reason doesn't start it might be necessary to reflash all files in the filesystem.

Do the same as described for upgrading firmware above, but instead of using the firmware release you shall use a bin file which contains both the firmware and the file system. Do the following to retrieve such a file.

1. Use an FTP client on your PC to establish a connection to the FTP server in your ***WNP***. For example: WS_FTP LE, WS_FTP Home or the Windows native FTP Client. **NOTE:** The FTP Client must be able to retrieve a file from the FTP server which doesn't exist when listing all files.
2. Logon with the ip address of your device, 10.0.0.100 as default, and the username "admin" and password "admin1234".
3. Retrieve the file "imageAndFileSystem.bin". In WS_FTP you do this by pressing the arrow pointing to the left without marking any file and then enter the file name in the dialog box that pops up.

4. Now you can use this file to flash another ***WNP*** to get the same settings.

7.2 Network upgrade

This upgrade of the firmware can be done either via the Ethernet network or via Bluetooth.

1. Rename the binary firmware file to "image.bin".
2. Connect the ***WNP*** with an FTP client. The default static ip address is 10.0.0.100. Username is "admin" and password is "admin1234".
3. Download the image.bin file to the WNP.
4. Close the FTP connection.
5. Wait for the device to reset itself. Do not restart it manually!

If the device doesn't start again or if it keeps restarting, then something has went wrong and you must reflash it via the serial port in the DSUB. See instructions for serial upgrade.

Chapter 8

Regulatory information

8.1 Declaration of conformity

We, **connectBlue AB**, of
Norra Vallgatan 64 3V
SE-211 22 Malmö, Sweden

declare under our sole responsibility that our products:

Wireless Network Platform (cB-3013-01, cB-3021-01, cB-3022-01, cB-3023-01, cB-3024-01, cB-3025-01 and cB-3026-01)

to which this declaration relates, conforms to the following product specifications:

R&TTE Directive 1999/5/EC

EN 300 328 V1.6.1 (2004-11)

EMC Directive: 89/336/EEC

EN 61000-6-2 (2001)

EN 61000-6-4 (2001)

01/03/2006 Malmö, Sweden

Mats Andersson

CTO of connectBlue AB

More information at: *http://europa.eu.int/comm/enterprise/rtte/gener.htm*

8.2 FCC Statement

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.

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

Antenna

The end-user product will be professionally installed in such a manner that only the authorized antennas are used.

Caution

Any changes or modifications NOT explicitly APPROVED by connectBlue AB could cause the module to cease to comply with FCC rules part 15, and thus void the user's authority to operate the equipment.

8.3 IC Compliance

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.

This device has been designed to operate with an antenna having a maximum gain of 8.5dBi.

Having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the

general population; consult Safety Code 6, obtainable from Health Canada's website www.hc-sc.gc.ca/rpb.

8.4 Safety

The unit must be supplied by a limited power source in according to EN 60950-1.

8.5 RF-exposure Statement

This modular transmitter MUST have a separation distance of at least 20 cm between the antenna and the body of the user or nearby persons, excluding hands, wrists, feet, and ankles.

If the radio module is installed in a laptop display, transmission MUST be prevented if the lid is closed to ensure that the minimum distance of 20 cm between the user and the transmitting antenna is maintained.

Any notification to the end user of installation or removal instructions about the integrated radio module is NOT allowed.

8.6 UL listing information

If a customer intends to UL list a product including any of the Bluetooth modules based on the PCB cB-0901-03 this information is useful:

The printed circuit board if produced according to the following specification:

- UL recognized ZPMV2 min. 105 °C flame class V-0 or better.

8.7 Compliance with RoHS directive

All products are produced according to the RoHS (Restriction of the use of certain Hazardous substances in electrical and electronic equipment) directive and complies with the directive.

8.8 Bluetooth Qualification information

Table 1 - Bluetooth Qualification information

Module	Bluetooth specification	Bluetooth identifier	Qualification date
cB-3013-01, cB-3021-01, cB-3022-01, cB-3023-01, cB-3024-01, cB-3025-01 and cB-3026-01	2.0	B03088	2006-04-24

The following Bluetooth profiles are supported (covered functionality):

- Generic Access Profile (GAP)
- Serial Port Profile (SPP)
- Personal Area Networking Profile (PAN)
- LAN Access Profile

When creating end products based on the Bluetooth Web Enabler the following applies:

- The end product does not have to be re-qualified.
- The end product or the end product documentation based on:
    - cB-3013-01, cB-3021-01, cB-3022-01, cB-3023-01, cB-3024-01, cB-3025-01 and cB-3026-01 products shall make the following information available: "This product contains a Bluetooth qualified product QPLN B03088".
- The Bluetooth Trademark may be placed on the end product (requires Bluetooth SIG membership, for more information see www.bluetooth.org).
- The Bluetooth Trademark may be used in material related to the end product (requires Bluetooth SIG membership, for more information see www.bluetooth.org).

For more information please contact connectBlue.

Chapter 9

Additional information

9.1 Troubleshooting

This section describes the solutions to some of the most common problems. For additional information see the FAQ (Frequently Asked Questions) for the ***WNP*** on connectBlue's website www.connectblue.se .

1. I can't connect to my ***WNP*** using Bluetooth:
   i. Make sure that you indeed are trying to connect to your ***WNP*** and not another Bluetooth device. This can be done by checking the Bluetooth Local Name and the Bluetooth Device Address of the device you are trying to connect.
   ii. If your ***WNP***, or the Bluetooth device you use to connect to your ***WNP***, require authentication, make sure that the same passkey is used on both devices.
   iii. If your ***WNP***, or the Bluetooth device you use to connect to your ***WNP***, require authentication, make sure that both devices support pairing.

2. I can't establish a TCP/IP connection to my ***WNP***:
   i. Review the TCP/IP settings on your ***WNP***, by checking the TCP/IP networking configuration file.
   ii. Review your TCP/IP network settings on the device you use when trying to connect to your ***WNP***.

3. I can't access the web pages in my ***WNP***:
   i. Make sure you are connected to your ***WNP***.
   ii. Make sure you have entered the correct URL.
   iii. Make sure that the web page you are trying to access actually is stored in your ***WNP***. You can do this by logging in with an FTP client and view the contents of your ***WNP***'s file system.
   iv. Review the TCP/IP settings on your ***WNP***, by checking the TCP/IP networking configuration file.
   v. Review your TCP/IP network settings on the device you use when trying to connect to your ***WNP***.

4. My ***WNP*** can't communicate with units on the Modbus network to which it is attached:
   i. Make sure that the RX and TX pins are correctly mounted on the cable attaching your ***WNP*** to the Modbus network. See the chapter "Getting started".

ii. Make sure your Modbus configuration is correct by checking the Modbus configuration file, see the chapter "Creating your custom configuration".

iii. Make sure the Modbus unit you are trying to communicate with accepts the Modbus query packet size that your ***WNP*** sends to it. Some Modbus units only support small Modbus packet sizes.

5. The status LED of my ***WNP*** is red, and I can't access it:

A serious error has been encountered. Try the following in order:

i. Restart your ***WNP***.

ii. If the color of the status LED is still red, check the format and contents of your configuration files. If you find any error, fix them and then install the corrected configuration files using the Flash Loader utility, as described in the section "Installing your custom application".

9.2 Guidelines for efficient and safe use

Important: Read this information before using your ***WNP***.

For any exceptions, due to national requirements or limitations, when using your ***WNP***, please visit *www.bluetooth.com*.

Product Care

- Do not expose your product to liquid or moisture.
- Do not expose you product to extreme hot or cold temperature (see "Technical Specification" for further information).
- Do not expose your product to lit candles, cigarettes, cigars, open flames, etc.
- Do not drop, throw or try to bend your product since rough treatment could damage it.
- Do not paint your product as the paint could prevent normal use.
- If you will not be using your product for a while, store it in a place that is dry, free from damp, dust and extreme heat and cold.

Radio Frequency Exposure

Your ***WNP*** contains a small radio transmitter and receiver. During communication with other Bluetooth products your ***WNP*** receives and transmits radio frequency (RF) electromagnetic fields (microwaves) in the frequency range 2400 to 2500 MHz. The output power of the radio transmitter is very low, 0.001 Watt (1 mW). When using your ***WNP*** you will be exposed to some of the transmitted RF energy. This exposure is well below the prescribed limits in all national and international RF safety standards and regulations.

Electronic Equipment

Most modern electronic equipment (for example in hospitals and cars) is shielded from RF Energy. However, certain electronic equipment is not. Therefore:

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

Potentially Explosive Atmospheres

Do not turn on or off your electronic device when in any area with potentially explosive atmosphere. It is rare, but your electronic device could generate sparks. Sparks in such areas could cause an explosion or fire resulting in bodily injury or even death. Areas with a potentially explosive atmosphere are often, but not always, clearly marked. They include fuelling areas, such as petrol station, below deck on boats, fuel or chemical transfer or storage facilities, and areas where the air contains chemicals or particles, such as grain, dust, or metal powders.

Power Supply

- Only connect your power supply to designated power sources as marked on the product.
- Make sure all cords and cables are positioned so that they will not be stepped on, tripped over or otherwise subject to damage or stress.
- To reduce risk of electric shock, unplug the unit from any power source before attempting to clean it.

9.3 Important information

Important: Changes or modifications not expressly approved by connectBlue AB will void the user's authority to operate the equipment.

9.4 Technical specification

Bluetooth Interface

Supported Bluetooth Profiles: General Access Profile, Serial Port Profile, LAN Access Profile, PAN Profile

Bluetooth radio: Up to 20 dBm power output.

Range (line of sight): Up to 150 meters.

Bluetooth Qualification

The product is Bluetooth qualified according to the Bluetooth 2.0 specification.

Serial Interface

Serial connector: Standard male RS-232/422/485 9-pin DSUB connector.

Supported bit rates: 300 – 460 800 bits/second.

Flow control for RS-232: CTS/RTS or none.

Flow control for RS-422/485: None.

Power/current consumption

Power connector: Power connector for industrial use.

Power supply: 9-30 V DC.

Power consumption: TBD

File system

The file system in your ***WNP*** has 1 MB available for data storage. Filenames may consist of up to 20 characters. Directories are supported.

Configuration Files

A set of configuration files stored in the file system of your ***WNP*** are used to configure:

- Modbus
- TCP/IP Networking
- Bluetooth
- Web server
- Logger
- Security/User Management

Compatibility

The FTP server in your ***WNP*** has been tested successfully with the following FTP clients in both passive and active mode:

- Windows 2000 DOS FTP client
- Windows 2000 Windows Explorer
- Windows XP Windows Explorer
- WS_FTP LE
- FTP Commander 7.33

The Flash Loader utility (on your ***WNP*** product CD) is compatible with the following platforms:

- Windows 2000
- Windows ME
- Windows XP

Environmental

IP 20

Operating temperature: -30 to +85 °C

Storage temperature: -40 to +85 °C

Humidity: 5-90% RH (non-condensing)