



WRAP THOR - NOKIA 12 INTEGRATION
DESIGN REFERENCE

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1. INTRODUCTION

1.1 Overview

The purpose of this document is to describe the main issues that must be taken into account when integrating BlueGiga's WRAP THOR Bluetooth module and NOKIA 12 EGSM900/1800MHz module. The document describes the necessary hardware and software requirements and presents a few example usage scenarios.

The document is intended for system integrators, software designers and product managers.

1.2 Components

The WRAP™ THOR is a robust, small size, configurable and 100m range *Bluetooth* module optimized for embedded applications. It enables device manufacturers to easily add secure and robust wireless communications elements in new or existing applications. It supports the following features:

- Wireless communication module corresponding to *Bluetooth* Specification V1.1
- High sensitivity, supports connections up to 100 m, *Bluetooth* class 1
- Built-in flash memory and system clock
- Support for Virtual Machine applications inside the module
- Metal shielding
- Compact package size (25.6 * 14 * 2.5 mm)

Interface options

- WRAP THOR ASCII Interface. using UART
- HCI using UART/USB
- PIO and SPI

Nokia 12 EGSM900/1800MHz is a small, high performing and low cost module designed mainly for M2M solutions. It also includes EDGE and Java to provide new M2M features and capabilities. Nokia 12 is also easy to integrate into different customer devices and applications to provide wireless connectivity. It supports following bearers:

- EDGE multi-slot class 2 (2+1) and mobile station class B
- GPRS multi-slot class 6 (3+1, 2+2, 2+1) and mobile station class B
- CSD
- HSCSD
- SMS, text/data messaging
- USSD, data messaging

For more information about WRAP THOR and Nokia 12 modules, please visit the links below:

WRAP THOR:

URL: <http://www.bluegiga.com/default.asp?f=2&t=1&p=1200&subp=200>

Nokia 12:

URL: <http://www.nokia.com/nokia/0,,46278,00.html>

BlueGiga contacts can be found from the end of this document.

1.3 Benefits of the integration

The integration of WRAP THOR module with N12 offers several advantages for creating dynamic machine to machine setups:

1. Cost Reduction

Using Bluetooth wireless communications link it is possible to create connectivity to a local area using only single Nokia 12 and therefore, only single SIM card. This means that, for example, connecting 5 nearby devices to the backbone network needs only one N12 for GPRS/GSM/EDGE connectivity and WRAP THOR will act as a gateway between the devices and the cellular link. Local area approach leveraging *Bluetooth* technology can easily cut operating costs to a fragment of the original.

2. Local Connectivity

As *Bluetooth* is a standard with huge support from different vertical industries it is possible to make the machine to machine setup communicate with variety of different equipment. This equipment includes, but is not limited to, mobile handsets, laptops, measuring equipment, printers and so on.

3. Communications Redundancy

On a larger scale with bigger pool of devices and several Nokia 12 modules, *Bluetooth* can be used also as the backup method for sending data between devices in case some troubles are experienced on the GSM/GPRS/EDGE bearer. As the device in question notices that data is not going through over the cellular link it can send the data to the nearest cellular point by passing the data between nodes using *Bluetooth*.

2. MECHANICAL INTEGRATION

The hardware integration of WRAP THOR and Nokia 12 modules is basically quite straightforward and therefore no complete details or hardware schematics are presented here. Only the hardware block diagram and the WRAP THOR wise schematics are presented.

All other details considering WRAP THOR can be obtained from BlueGiga and have to be requested separately. All other details considering Nokia 12 module will be delivered by Nokia.

Below is a very simple hardware block diagram describing the basics of the logical integration.

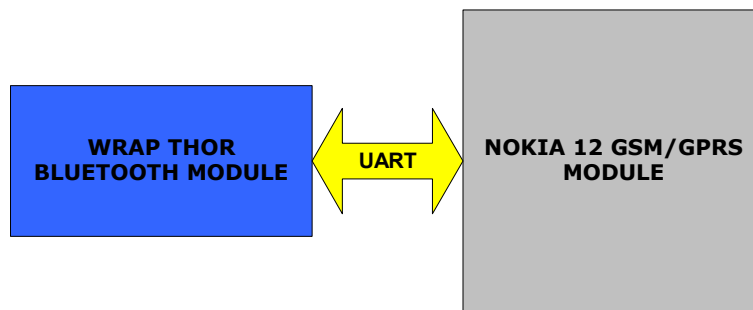


Figure 1: Hardware block diagram

More detailed schematics of the integration are described in the Figure 2 on the next page.

In the figure are shown the wires must be pulled to connect WRAP THOR module's UART into the corresponding UART (J2ME serial port or COM3) in the Nokia 12 module.

Additionally the schematics include the implementation of the following parts:

- The programming connector for upgrading and modifying the firmware in the WRAP THOR module (SPI).
- Chip antenna for the WRAP THOR module (RFANT_MLCA)
- Regulator for the WRAP THOR module (MIC5219)

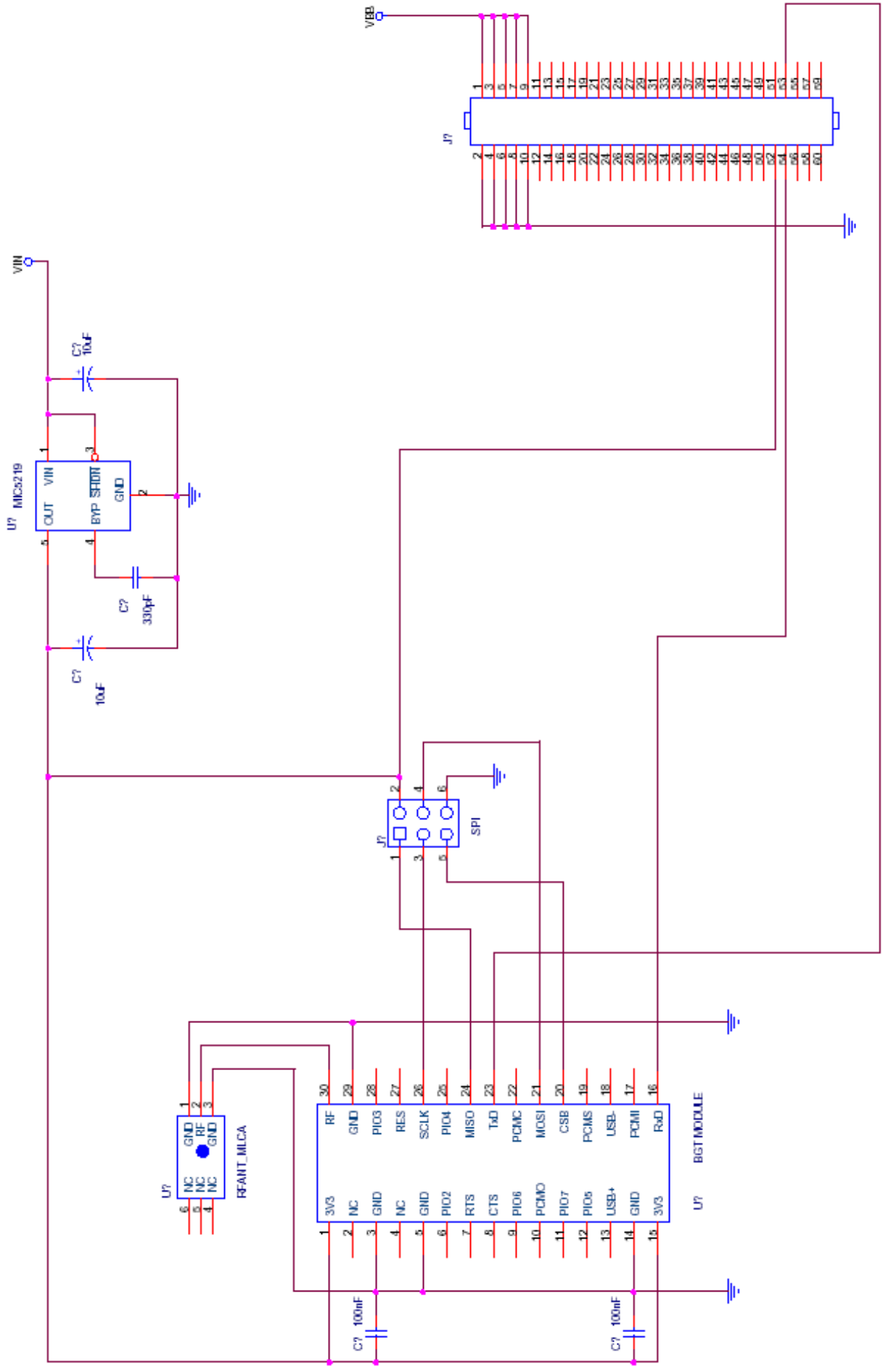


Figure 2: Hardware schematics

3. SOFTWARE INTEGRATION

3.1 OVERVIEW

When integrating WRAP THOR with Nokia 12, no need for implementing any embedded code for Bluetooth modules is needed. All available functionality is accessed from the N12 using ASCII Interface command protocol over Java Serial communications API. The ASCII Interface is very simple and easy to understand command set which allows external applications to command the Bluetooth module over the physical UART interface.

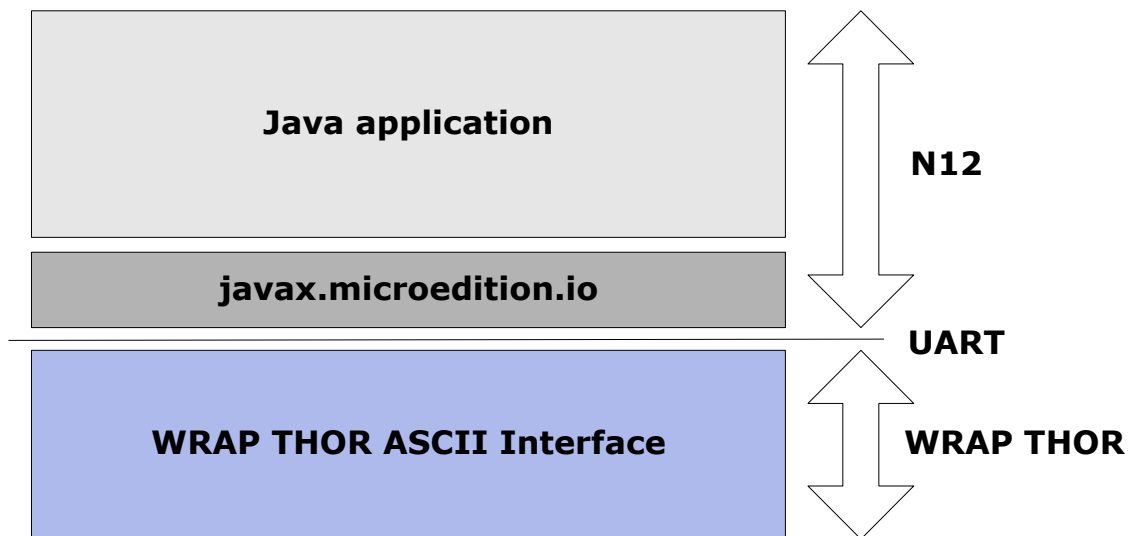


Figure 3: Software block diagram

3.2 WRAP THOR ASCII INTERFACE

WRAP THOR *Bluetooth* modules are pre-installed with ASCII Interface firmware. This firmware is analogous to Hayes AT command set. WRAP THOR modules can operate either in command or data mode and act accordingly. Modules can be commanded to perform inquiry to find nearby *Bluetooth* equipped devices, they can be commanded to perform connections and tear connection down.

For full description and manual of the ASCII Interface please refer to:

http://www.bluegiga.com/attachments/WRAP_THOR_ASCII_Interface_Manual.pdf

3.3 JAVA SERIAL API FOR ASCII INTERFACE

To make the software integration furthermore easier BlueGiga offers a Java API that allows you to use the ASCII interface as a simple Java class in your own application. Since it offers the very same commands as the ASCII interface you can add the *Bluetooth* functionality into your application without paying any attention to the communication with the ASCII interface.

4. EXAMPLE SCENARIO

Below is a simple scenario that illustrates the possibilities of WRAP THOR and Nokia 12 modules. The local *Bluetooth* network is formed with several WRAP THOR modules and the connection to the cellular with the Nokia 12 module.

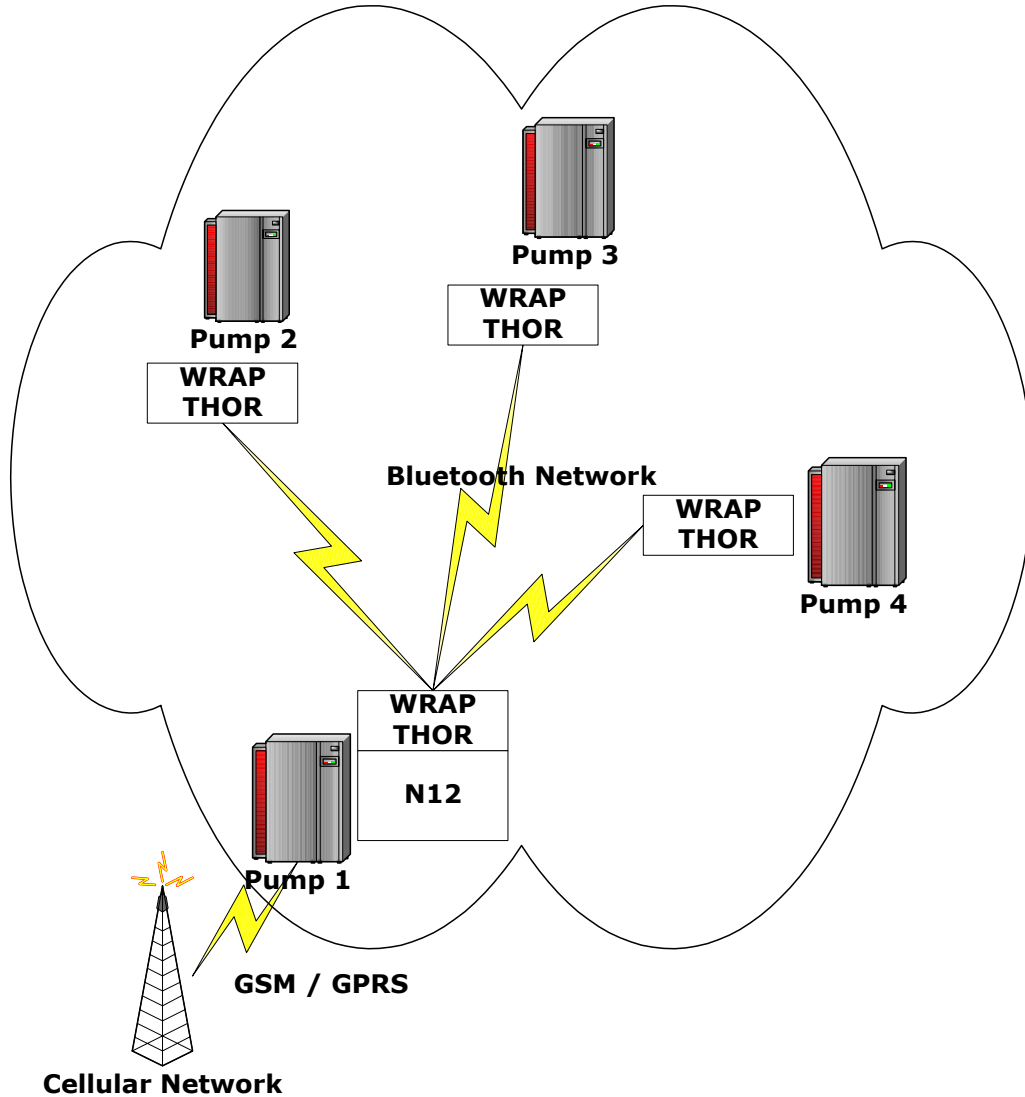


Figure 4: A simple example scenario

5. CONTACTS

Please find the contact below.

BlueGiga Technologies Oy

Head Office

Taivalmäki 11
FIN-02200 Espoo
Finland

Phone: +358 9 4124 0450
Fax: +358 9 4124 0452
E-mail: info@bluegiga.com
WWW: www.bluegiga.com

Contact person:

Mikko Savolainen
E-mail: mikko.savolainen@bluegiga.com
GSM: +358 40 848 3341

Nokia M2M:

WWW: www.nokia.com/m2m/

Contact person:

Tero Toppila (esim.)
E-mail: tero.toppila@nokia.com
GSM: ?

6. TERMS & ABBREVIATIONS

ABBREVIATION:	EXPLANATION:
CSD	Circuit Switched Data
EDGE	Enhanced Data rates for Global Evolution
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communication
HSCSD	High Speed Circuit Switched Data
M2M	Machine to Machine
RF	Radio Frequency
SMS	Short Message Service
SIM	Subscriber Identity Module
UART	Universal Asynchronous Receiver Transmitter
HCI	Host Controller Interface
SPI	Serial Peripheral Interface
PIO	Peripheral Input Output
J2ME	Java 2 Micro Edition

7. DOCUMENT HISTORY

VERSION:	DATE:	AUTHOR:
1.0	15.1.2004	Savolainen, Mikko mikko.savolainen@bluegiga.com