SIEMENS

# Technical Description

# Bluetooth™ LAN Access Point blue2net

# S50037-D*-*

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# 0 General Information

## History

| Issue | Date | Reason for Changes |
|---|---|---|
| 01 | 2000-12-15 | creation of document - draft |
| 02 | 2001-04-12 | Redesign of document structure |
| 03 | 2001-10-11 | Update of Product Name |
| 04 | 2001-10-12 | SW Overview has been added |
| 05 | 2002-02-06 | Update blue2net |
| 06 | 2002-02-15 | Editorial Corrections |

*Table 1: History*

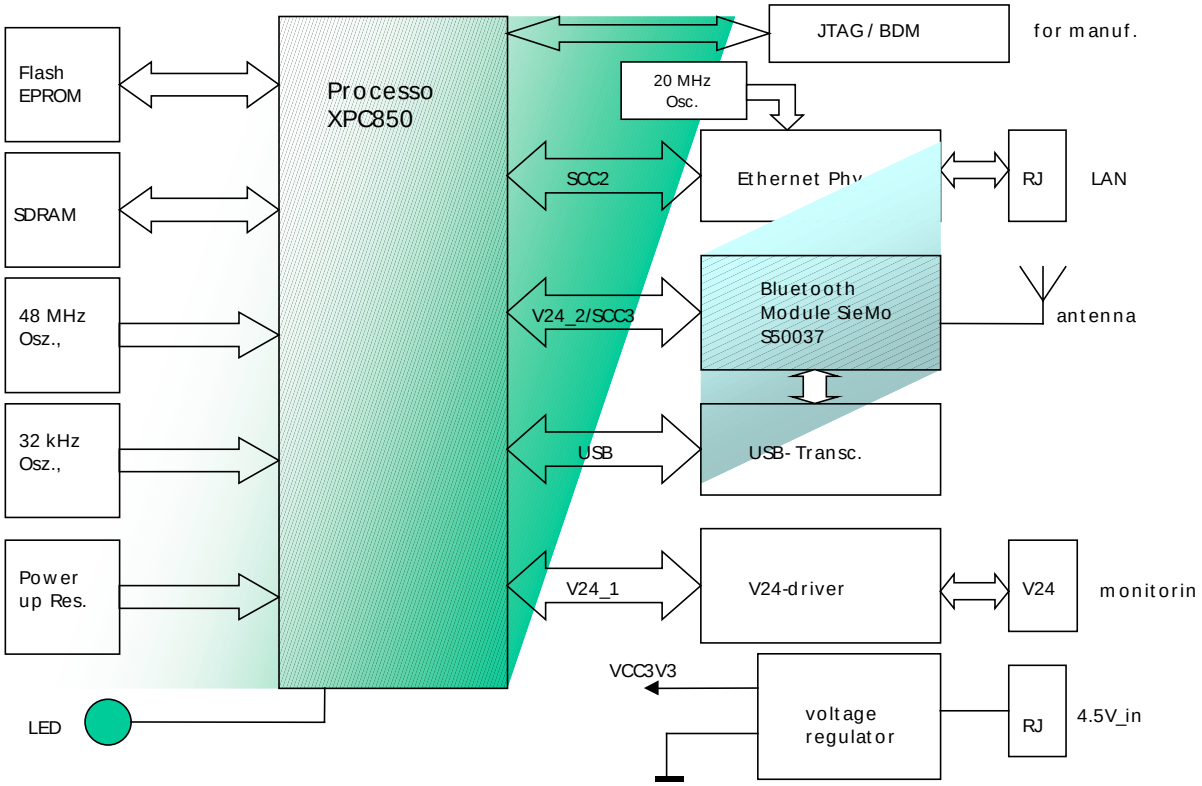
## References

[1] http://www.bluetooth.com

# 1 Introduction

**Bluetooth™ LAN Access Point blue2net** makes a wireless access to a **L**ocal **A**rea **N**etwork (10Base-T Ethernet) over Bluetooth™ possible. The SW is stored in an internal Flash-EPROM from which the system is booting after power up.

# 2 Hardware Block Diagram of blue2net



# 3 Construction of blu e2net

**Blue2net consists substantially of following main parts**:
A microprocessor (MPC850 von Motorola) including all peripheral parts such as 16 MBit flash memory, 128 Mbit SDRAM, 48 MHz clock oscillator, as well as a 32 kHz low power clock, a Phy plus transformer for the LAN interface, a RS232 service interface (integrateted into the power connector), a prequalified Bluetooth sub-module and a power supply unit, consisting of a 3.3V low dropout regulator. The operating system running on the MPC850 is Embedded Linux.

The 2.4 GHz RF antenna is integrated into the PCB. For future application it is possible to extend the flash memory up to 32 MBit without changing the layout.
As an interface between the Bluetooth module and the microprocessor may be used either UART or USB. The RF antenna is connected by a printed transmission line to the RF output of the Bluetooth module.

All components are placed on the 115 x 100 mm sized, one sided PCB.
There are four external interfaces, power supply connector, a RS232 service interface and the LAN connector (10Base-T Ethernet), as well as the radio interface over Bluetooth.

# 4 Interface Bluetooth Module SieMo S50037- blue2net (b2n)

All connected pins from the Bluetooth module are listeted in the following table:

| Pin Name | Direction | Description |
|---|---|---|
| RXD | b2n to Module | RX data, connected to the TX pin of the microprocessor |
| RTS | b2n to Module | Request to send from UARTof the module |
| TXD | Module to b2n | TX data, connected to the RX pin of the microprocessor |
| CTS | Module to b2n | Clear to send from UARTof the module |
| D+ | bidirectional | USB data pin |
| D- | bidirectional | USB data pin |
| WAKE_UP | Module to b2n | indicates, that the module wants to be attached to the USB |
| DETACH | b2n to Module | indicates, that the USB host wants to detach to the module |
| ON | b2n to Module | powers down the module when tied to GND |
| RESET | b2n to Module | active low, resets the module |
| ANT | Module to b2n | 50 Ohm antenna connection |
| VCC_IO, VCC | | connected to 3.3V power rail |
| GND | | connected to the ground plane |

# 5 Powering up blue2net

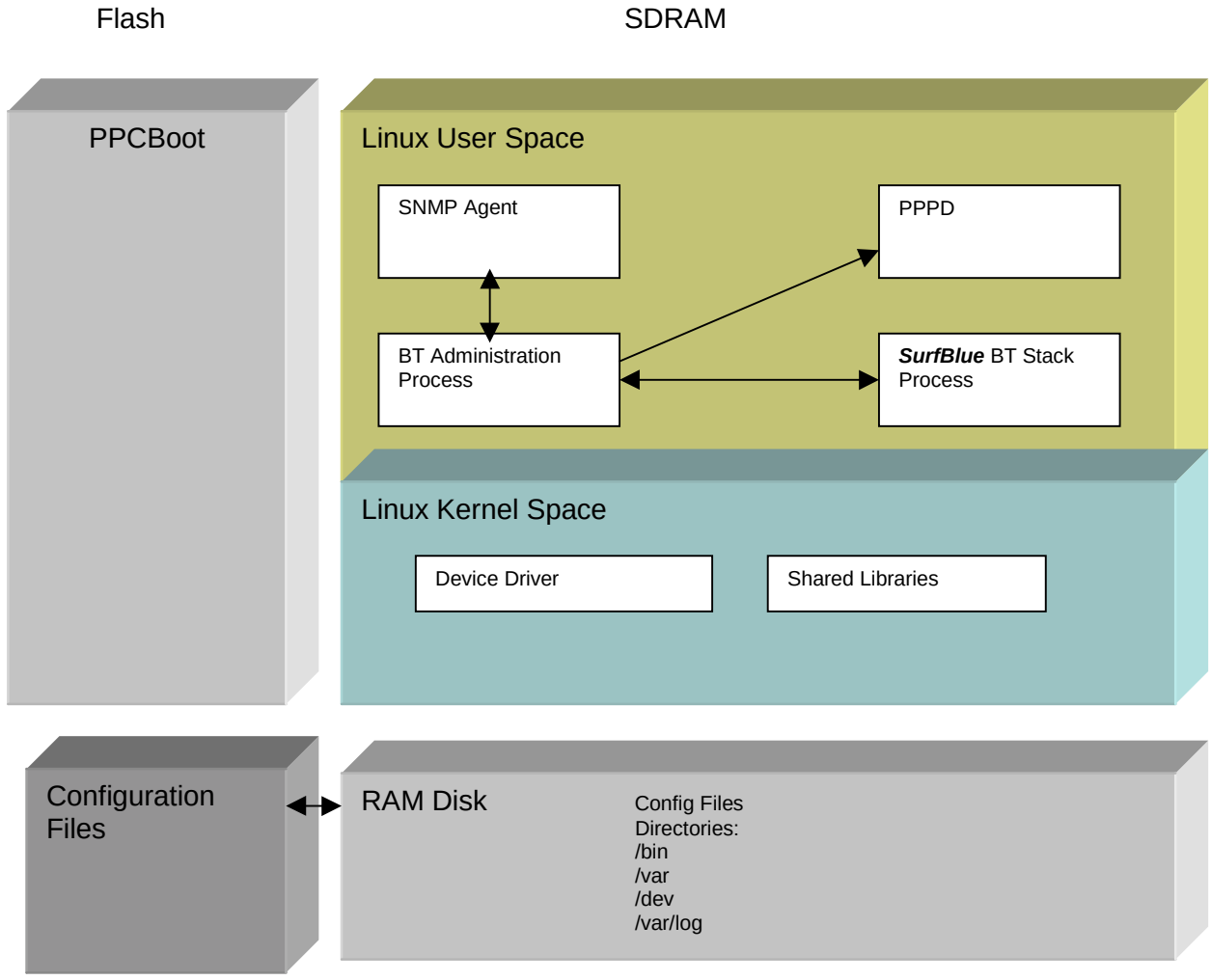
After connecting the enclosed power supply unit to blue2net, the system will start booting from the internal Flash-memory. The LED indicator on the system flashes while blue2net is booting. After booting successfully the LED will be on continuous. A quick flashing LED indicates an error.

Reset of blue2net may done by disconnecting the power supply.
After booting the system is in stand-by and waits for an iquiry from Bluetooth enabled devices to establish a connection. In this case blue2net acts as a master that is able to serve up to 7 slaves.

# 6 Technical Data

| | |
|---|---|
| Frequencyband: | 2400 – 2483,5 MHz (ISM) |
| Number of channels: | 79 |
| Modulation: | FFH-GFSK (Fast Frequency Hopping-Gaussian Frequency Shift Keying) |
| Datarate: | 1 Mbit/s brutto |
| Powerclass: | Bluetooth Power Class 2 (max. power output 4dBm) |
| Range: | typ. 10m |
| Power supply: | connect the enclosed 4.4V power supply to the 6-pin jack |
| max. power consumption: | < 3W |
| Dataconnector: | RJ-45 Ethernet (10Base-T) |
| Ambient temperature: | 0 – 40°C operating |

# 7 Software Overview



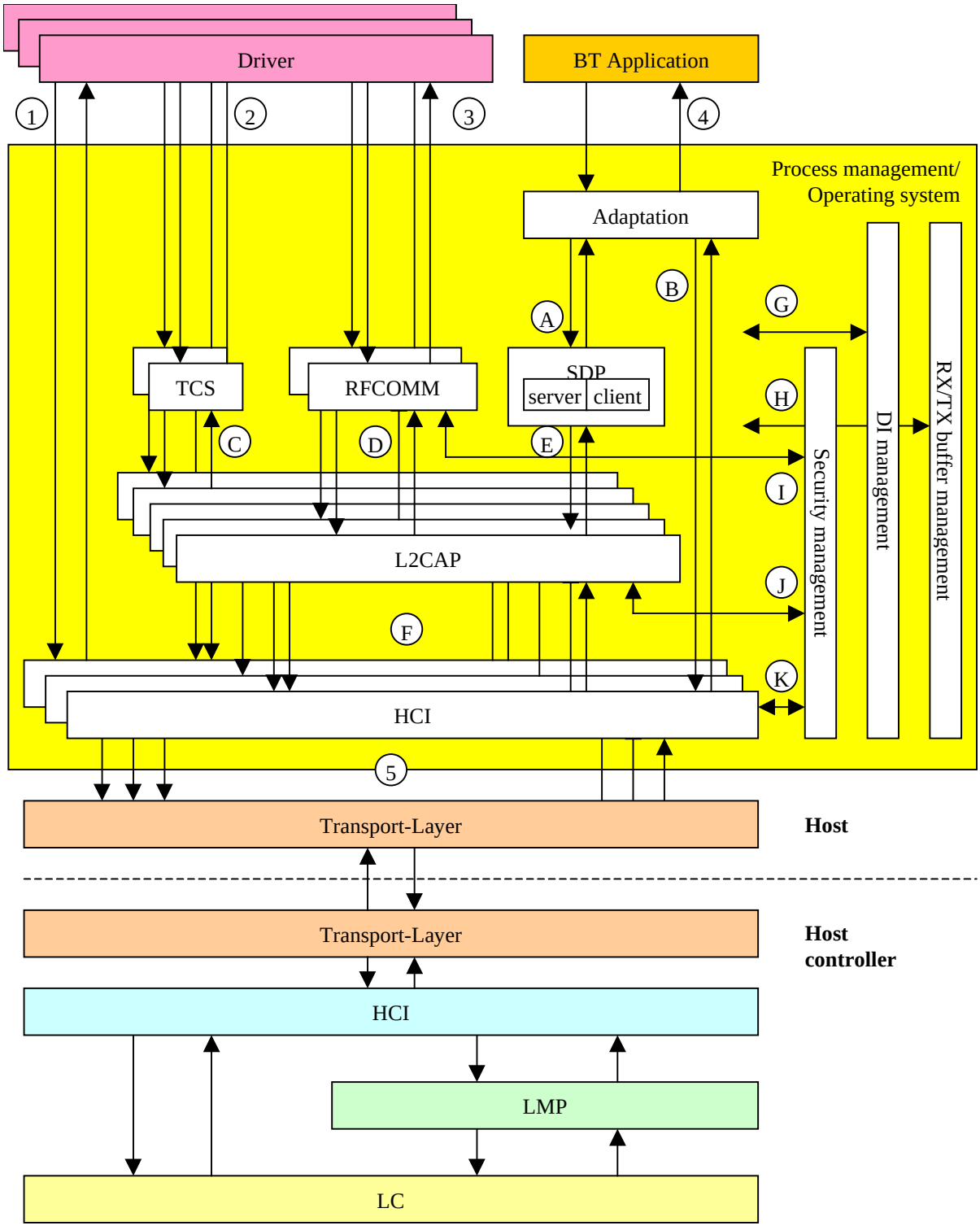

*: Software Structure Overview*

*Embedded Linux* is used as Operating System, which gives all the advantages of a well tested, free open source system. The Management Entity, the L2TP, the Bluetooth Administration and the Bluetooth Stack are running in the user space of Linux.

## Bootloader PPCBoot

The PPCBoot, a monitor for Embedded PowerPC boards, which can be installed in a boot ROM and used to test the hardware or download and run application code.
The development of PPCBoot is closely related to Linux: some parts of the source code originate in the Linux source tree, there are still some header files in common, and special provision has been made to support booting of Linux images.
Some attention has been paid to make this software easily configurable and extendable. For instance, all monitor commands are implemented with the same call interface, so that it's very easy to add new commands. Also, instead of permanently adding rarely used code (for instance hardware test utilities) to the monitor, you can load and run it dynamically.
See also [14].

## Bluetooth Stack




The Bluetooth stack running on the host controller communicates with the Bluetooth stack on the host via the HCI (Host controller interface). The transport layer encloses hardware interface and its software driver in order to transport data between the two hardware components host and host controller. The LMP (Link manager protocol) provides messages for link setup, security and control. The LC (Link controller) provides and controls SCO and ACL links.
The BT-Application provides a Bluetooth specific user interface to visualise the services of the Bluetooth devices in close proximity. The driver provides the interface to any other application which are going to make use of Bluetooth.

The TCS, RFCOMM, SDP, L2CAP and HCI are the Bluetooth layers which run on the host. The Security management controls authentication and encryption. The ID management manages all Identifier which are necessary for the different Bluetooth components. The RX/TX buffer manages the RX and TX buffer which are used to transmit and receive SCO user data, ACL user data and control messages to the host controller.
The components of the Bluetooth stack on the host, the DI manager, security manager and the RX/TX buffer manager are specified in the further chapters of this document and in their component specification in more detail.
The multiple entities of each layer are realised by keeping one data set for each entity. There is one HCI – entity for each connection. The entity is associated by the connection ID. There is one L2CAP – entity for each channel. The entity is associated by the local channel ID.

## Bluetooth Administration

BT admin SW consists of 2 parts, bt admin process, which is a conventional unix daemon process, and btadmin.o , which is a conventional unix device driver. Additionally some adaptions have to be done in the Axis BT stack in Version 0.1, in later versions another stack will probalbly be used (especially calling of registered functions in case of some events, exporting of functions and variables, and synchronisation of multiple access have to be done).

BT admin is a unix daemon process, which works as interface between the ME (Managment entity) process and the administration part of the Bluetooth stack represented by the btadmin device.