RFID SysTech 2007
3rd European Workshop on
RFID Systems and Technologies

GRUPO AUTOLOG

DEVELOPMENTS IN SENSORISED SMART RFID TAGS:
MONITORING AND TRACEABILITY OF SENSITIVE PRODUCTS

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- State of the art
- Systems features
- Operating Principle
- Sensor tag
- Base Station
- Applications
- Results and Conclusions.

Motivation

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- **Public concern about the traceability of products**
- **Tracking and monitoring a big variety of products**
- **European directives for special products**
- **Low cost and reliability.**

State Of The Art

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- **ZigBee standards**

ZigBee® Alliance
Wireless Control That Simply Works

- **Wireless LAN**
- **LF and HF combined**
- **New features:**
  - **use of 2.45 GHz and RFID technology**
  - **long operating life.**

System Features

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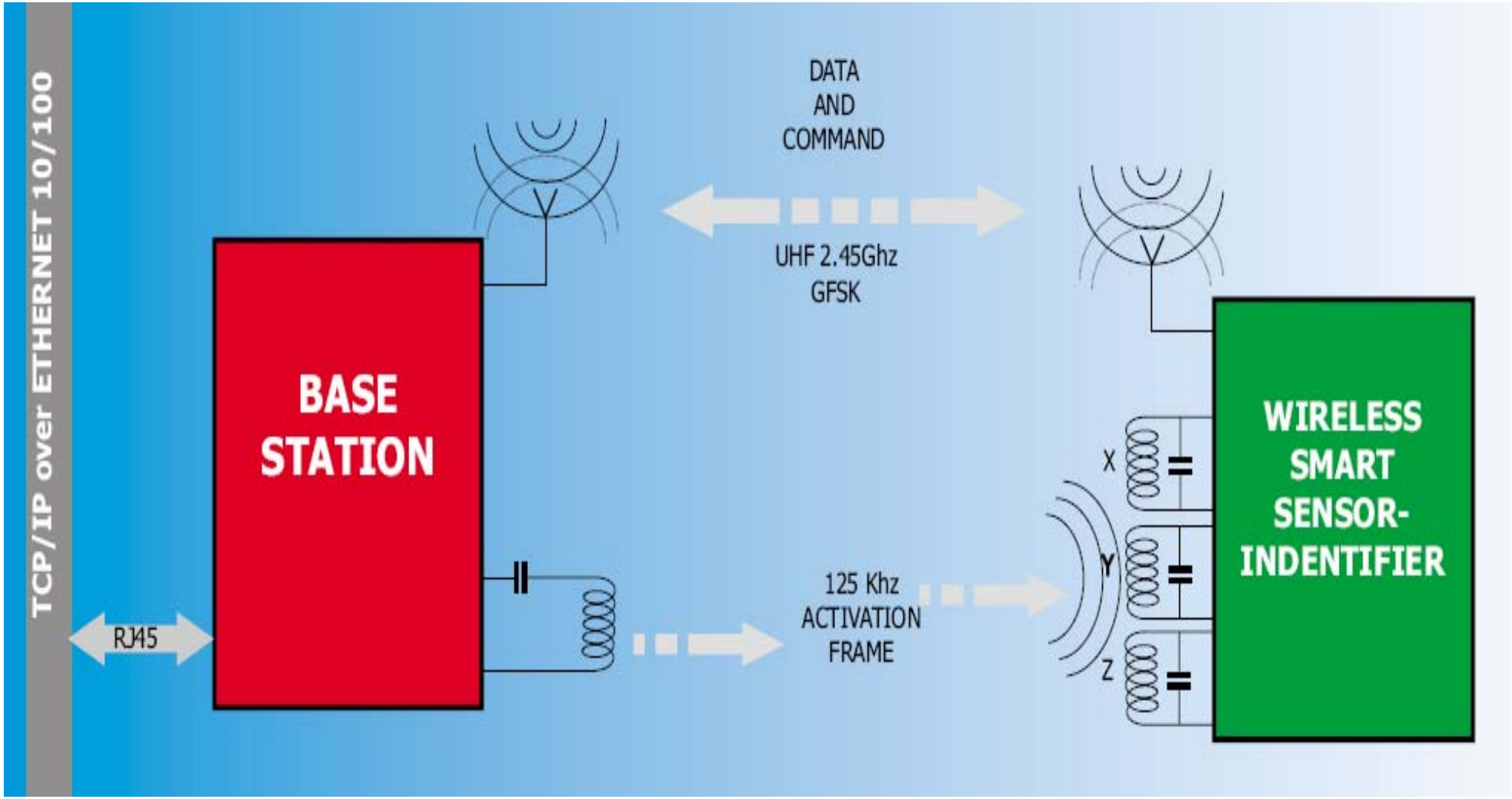
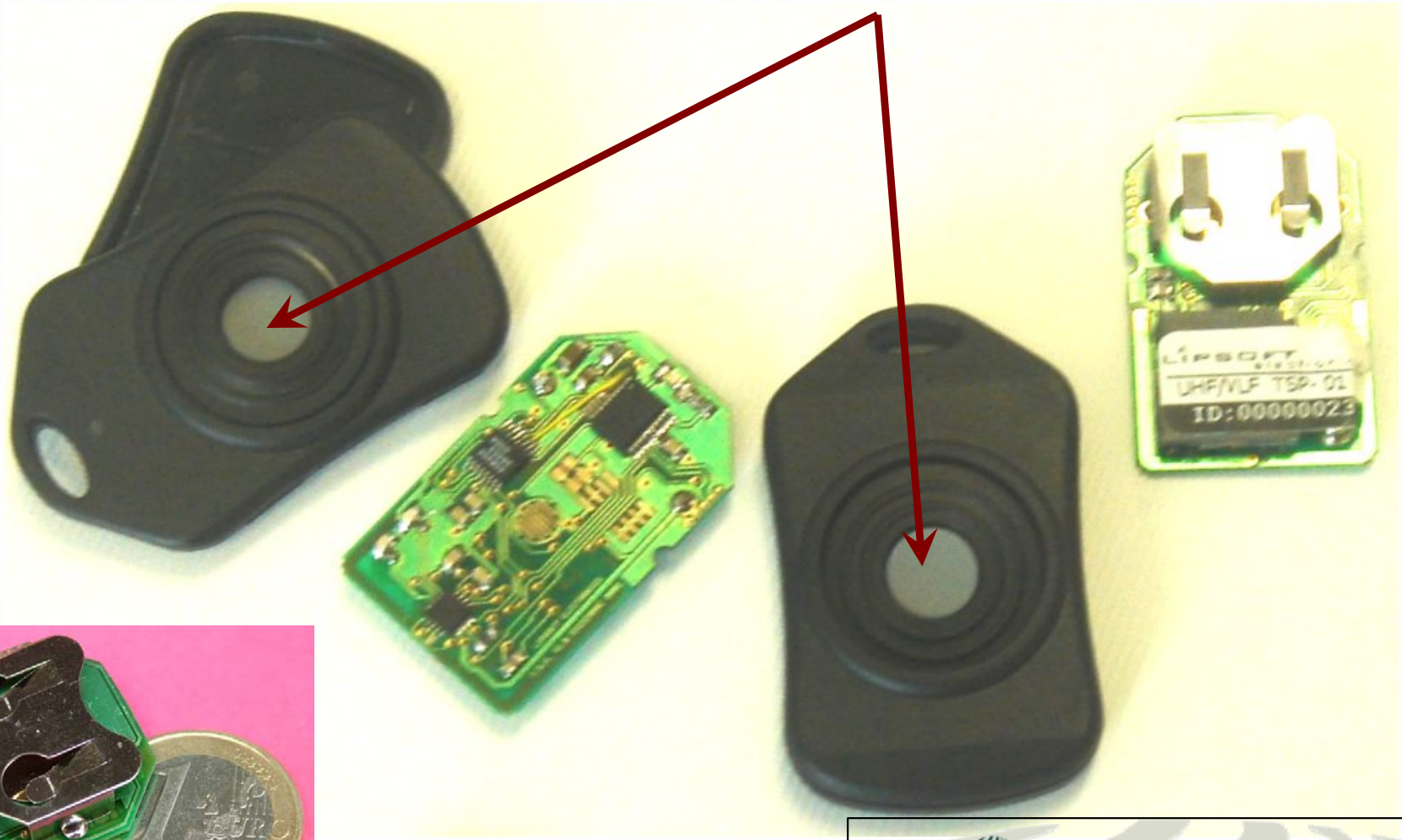
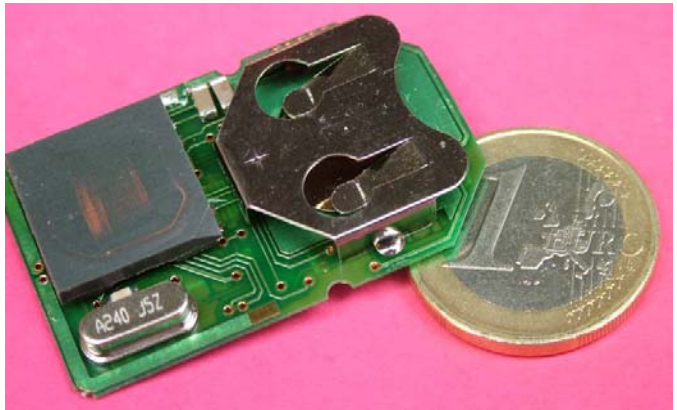
- **Data identification-registration. RFID: LF (125kHz) vs HF (2.45 GHz)**
- **Low consumption mode normally active: 2µA**
- **Efficient memory management**
- **Ethernet 100/10: use EPC and remote control.**

Operating Principle



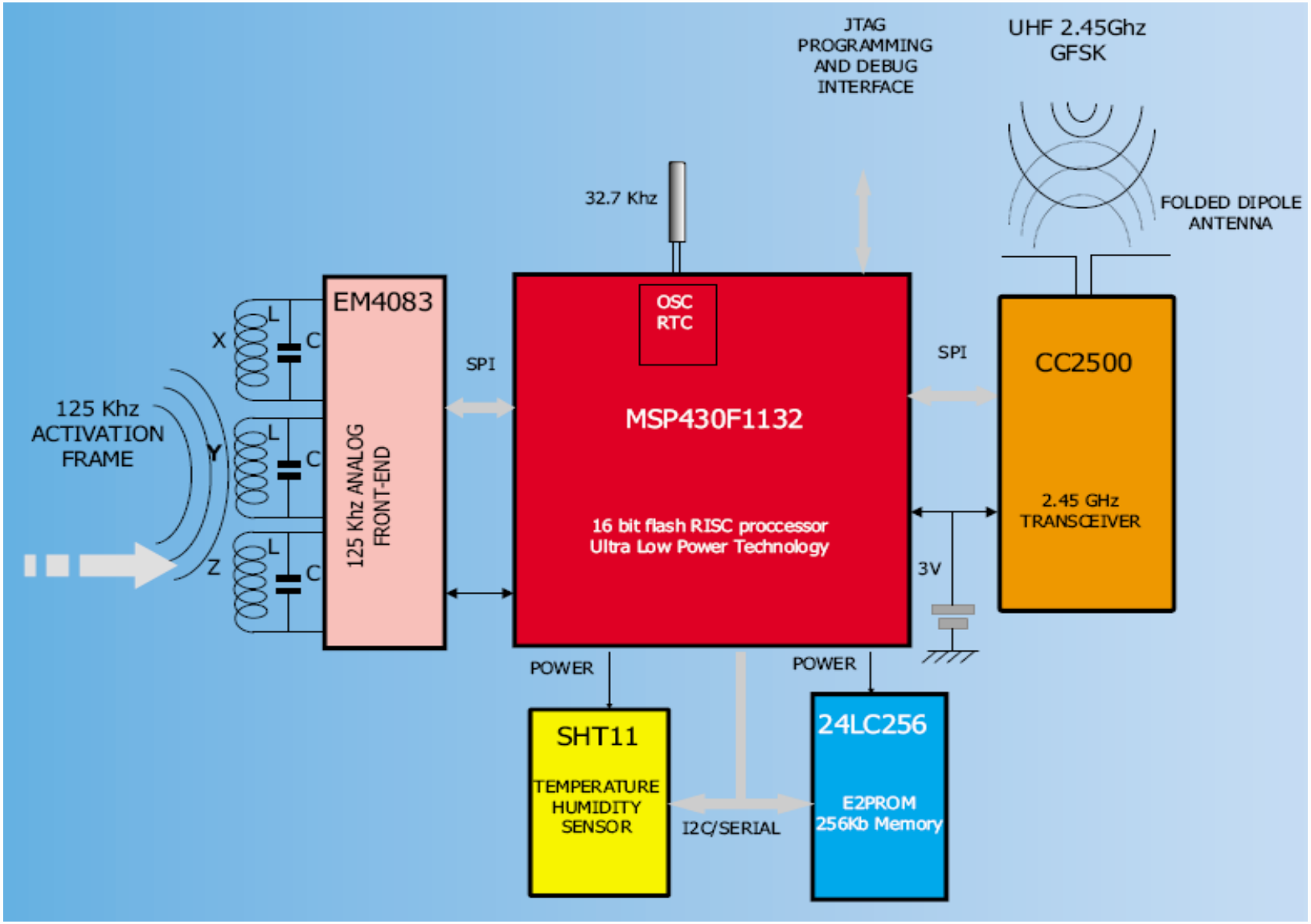
Sensor Tag





How does it work?

Sensor Tag


JTAG
PROGRAMMING
AND DEBUG
INTERFACE
UHF 2.45Ghz
GFSK
32.7 Khz
FOLDED DIPOLE
ANTENNA
EM4083
OSC
RTC
SPI
SPI
CC2500
125 Khz
ACTIVATION
FRAME
X
Y
Z
L
C
125 Khz ANALOG
FRONT-END
MSP430F1132
16 bit flash RISC proccessor
Ultra Low Power Technology
2.45 GHz
TRANSCEIVER
3V
POWER
POWER
SHT11
TEMPERATURE
HUMIDITY
SENSOR
I2C/SERIAL
24LC256
E2PROM
256Kb Memory

Sensor Tag. Firmware.

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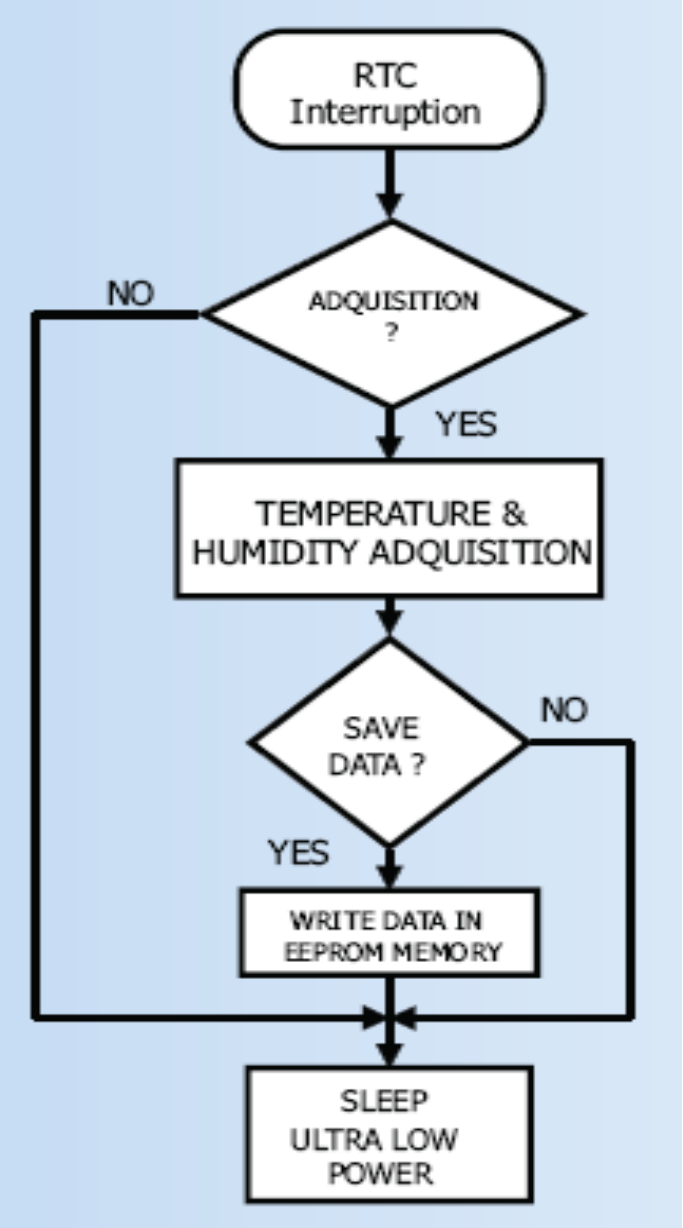
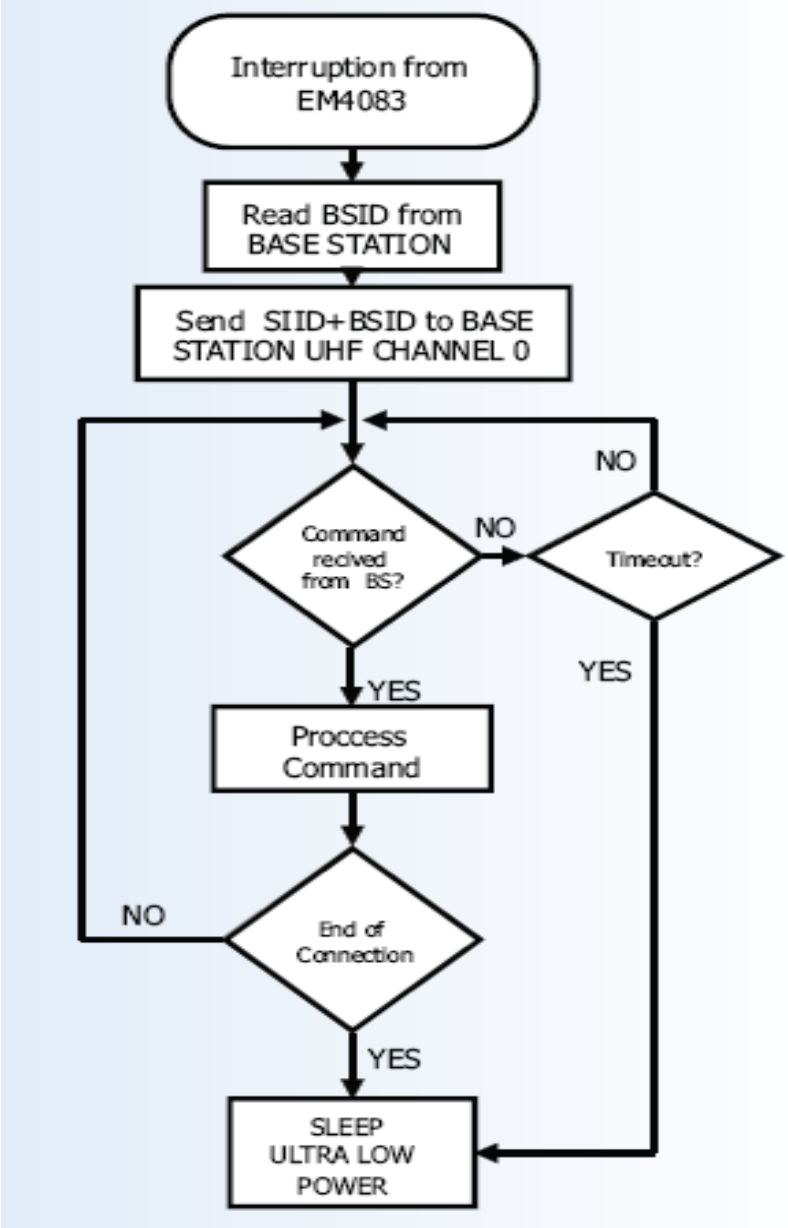
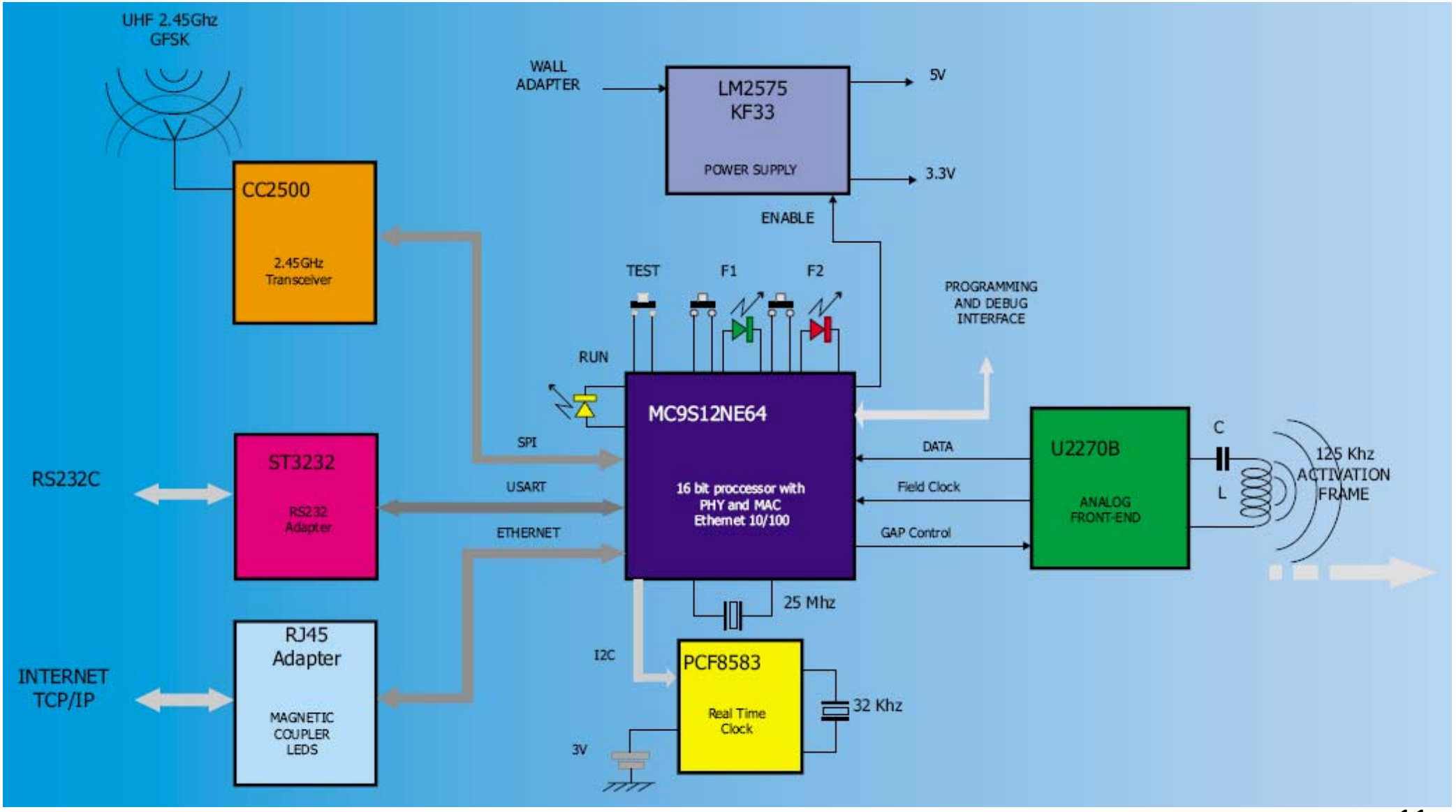




Base Station (BS)



Base Station. Firmware

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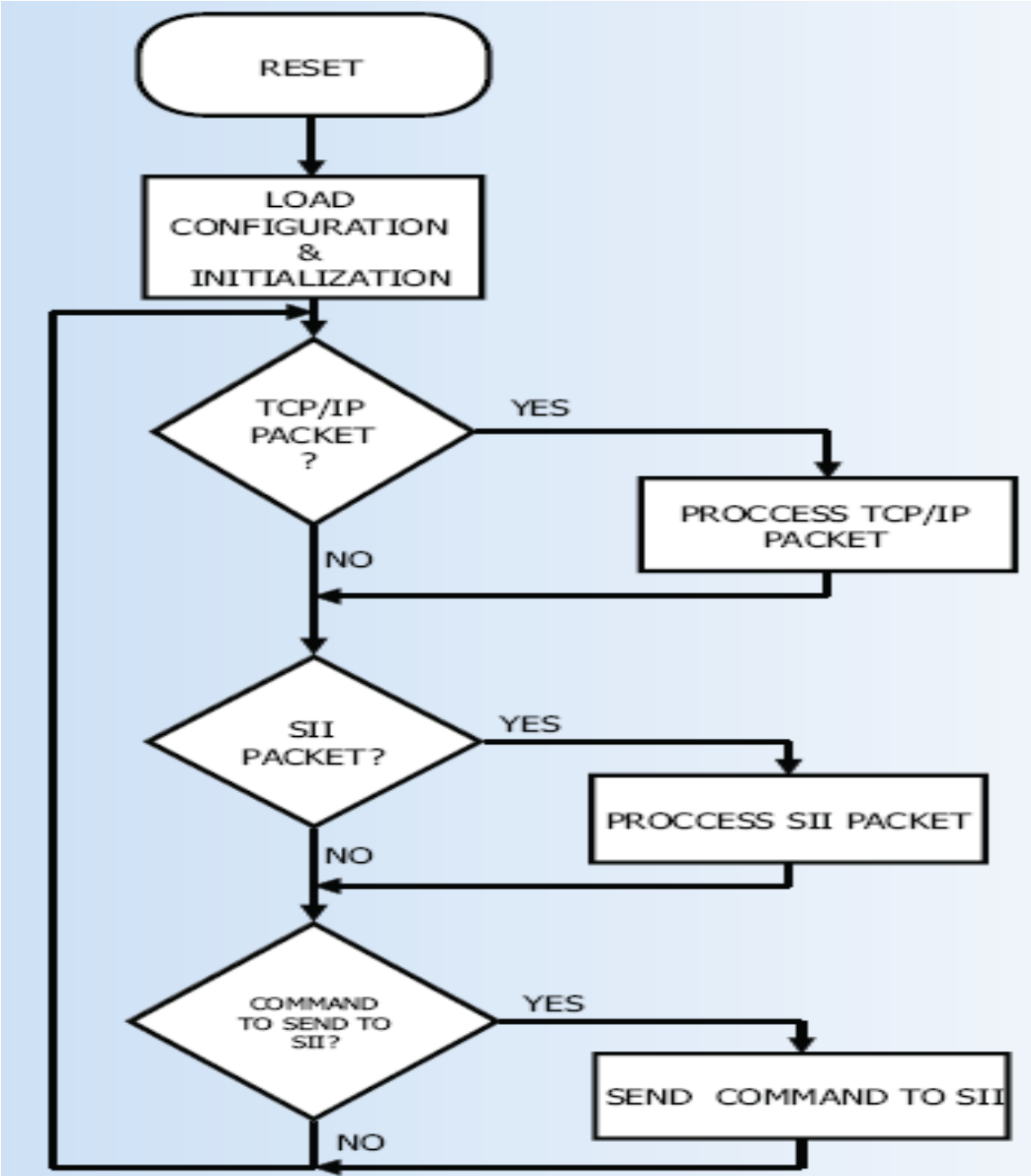

Applications.

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Related developments:

- **RFID smart temperature sensor: Application in monitoring and traceability of hemoderivates**

Applications.

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Application on European Project:

- **FP7-ICT-2007-1**

NORNS

Application. NORNS

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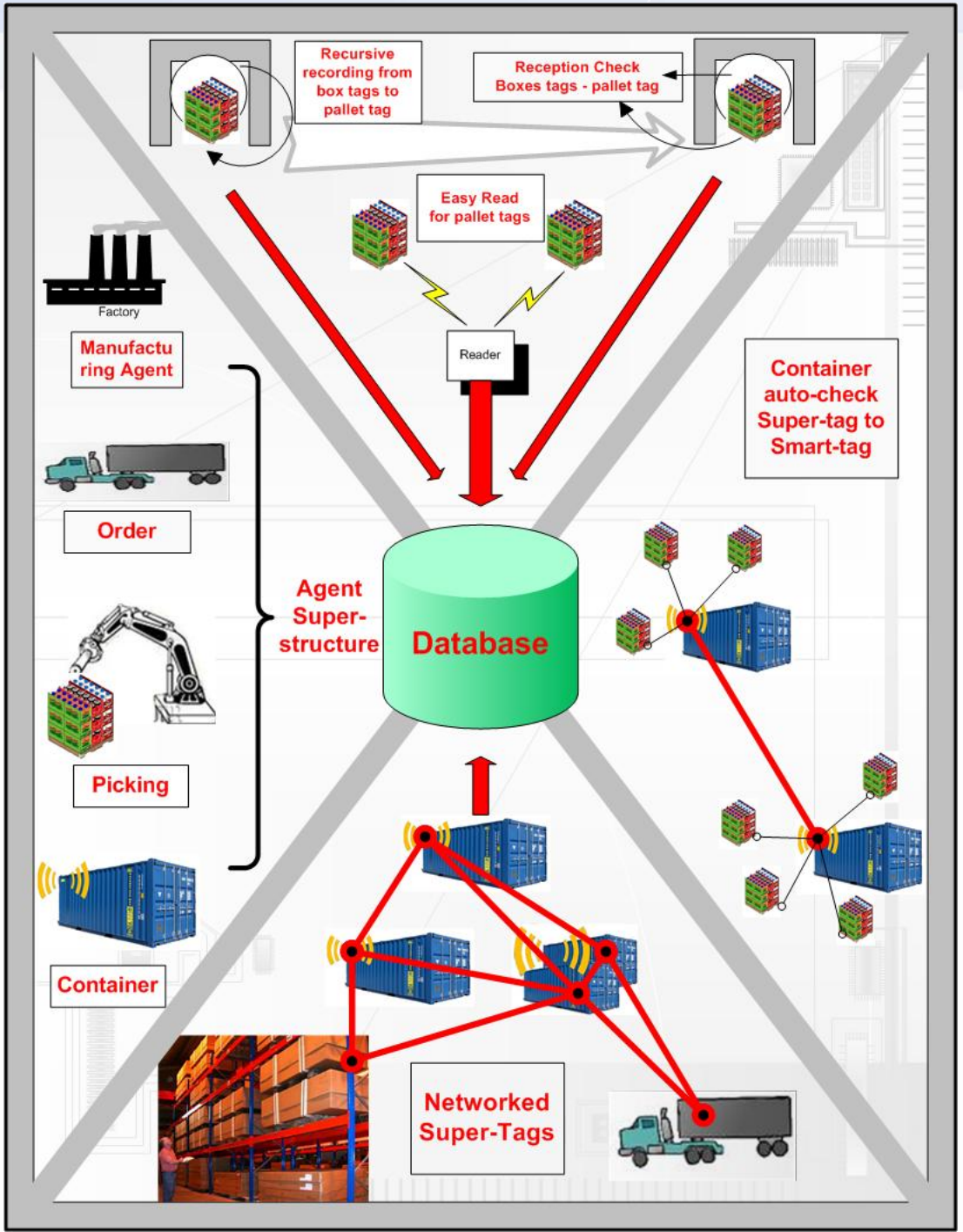
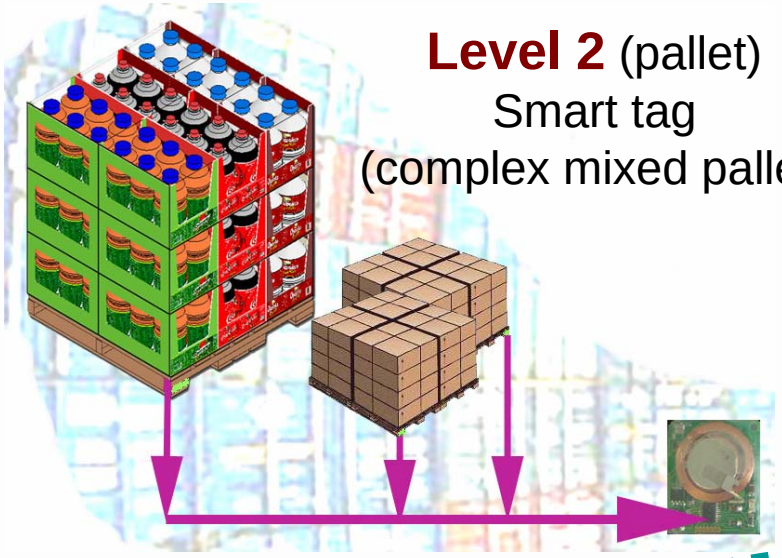


Application: NORNS

RFID tracking systems for non-homogeneous loads

Level 1 (box-item)
Passive tag
(6-12 items)



Level 2 (pallet)
Smart tag
(complex mixed pallet)

Level 3 (container)
Wi-fi enabled
reader/identifier
(complex shipment)

Results and Conclusions

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- **Low energy consumption**
- **Operating range of 5 or 6 meters**
- **Economically viable to introduce for every company**
- **Data retaining of several years**
- **Possible remote control**
- **RFID capabilities: EPC's and extra memory (EPCIS).**

AUTOLOG

Group for the Automation of Products Identification and Tracking in Manufacturing and Logistics

Thank you

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