RFID SysTech 2008

4th European Workshop on

RFID Systems and Technologies

- June 10th to June 11th, 2008
- Freiburg, Germany

GRUPO AUTOLOG

RFID System for Airport Control on a MAS-DUO Agents Platform

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Introduction

- **Modern Control Systems: increasing number of assets**

- **Alternatives: Distributed Control Systems, Multi-Agent Systems (MAS)**

- **Need of a better and easier access to physical information**

- **Solution: MAS-DUO tech.**

- **Physical Agents: RFID Systems.**

Agents Platforms: MAS-DUO
Agents

◆ **Agents: elements of software in charge of managing the blocks in a highly Distributed Control environment**

◆ **Coordination, negotiation, hierarchy**

◆ **Drawback: physical events interrupt software operation**

◆ **Implementation and installation of the hole is complicated.**

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Agents Platforms:
MAS-DUO
MAS-DUO Technology

◆ **Agents Level division:**

　◆ **Physical agents: monitoring environment**

　◆ **Information System Agents (I.S. Agents): management and planning**

◆ **Physical inconveniences do not disturb correct operation of software units: scheduling and timing**

◆ **Merging into blocks: assets are shared in the same location**

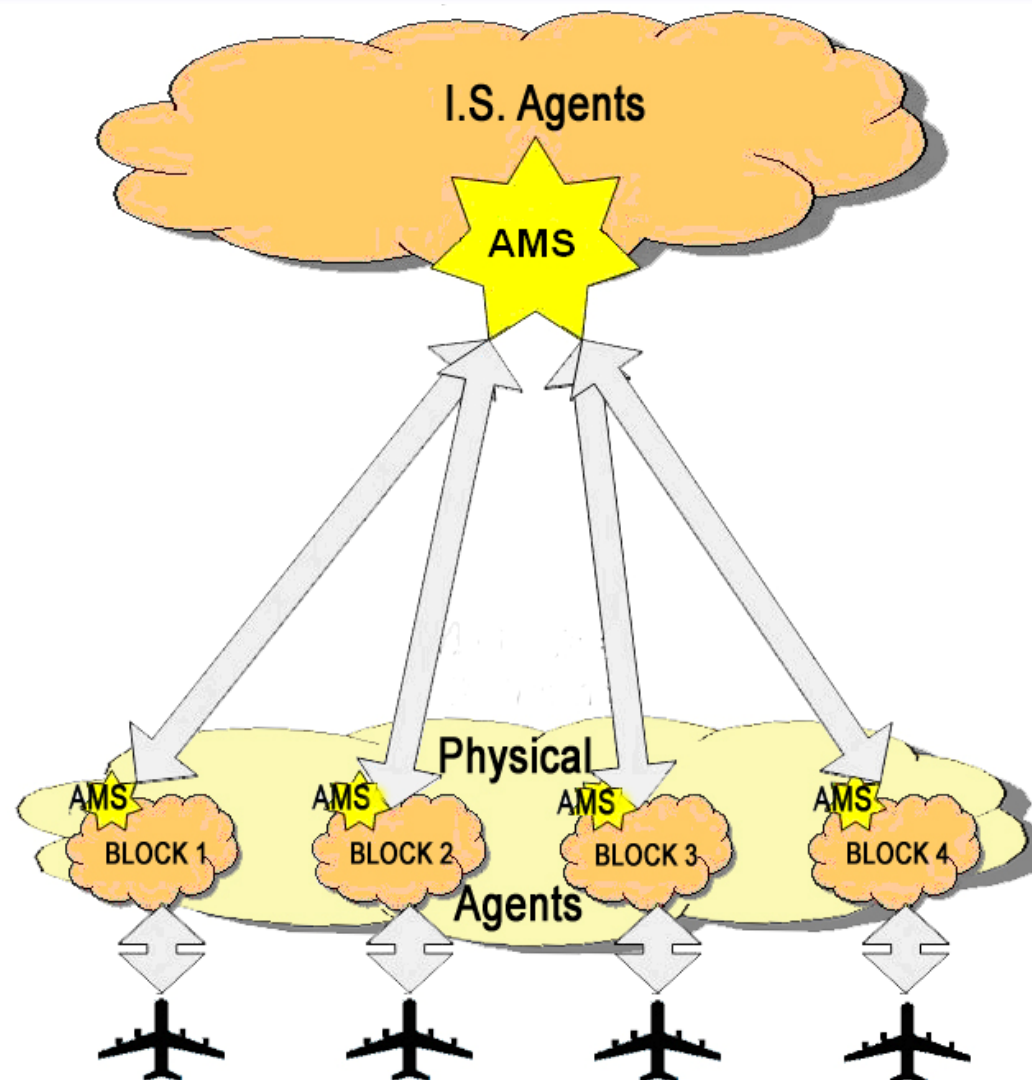◆ **Coordination between agents blocks: Agent Management Systems.**

Agents Platforms: MAS-DUO
Example of Application

CONTENTS

- Introduction
- ☑ **Agents Platforms: MAS-DUO**
- Airports control
- RFID Agents
- Agents Operation
- RFID System
- Results and Conclusions

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Agents Platforms: MAS-DUO

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- □ Introduction
- ☑ **Agents Platforms: MAS-DUO**
- □ Airports control
- □ RFID Agents
- □ Agents Operation
- □ RFID System
- □ Results and Conclusions

◆ **Physical Agents need accurate and precise access to physical world in order to provide the best behavior of the system in real time.**
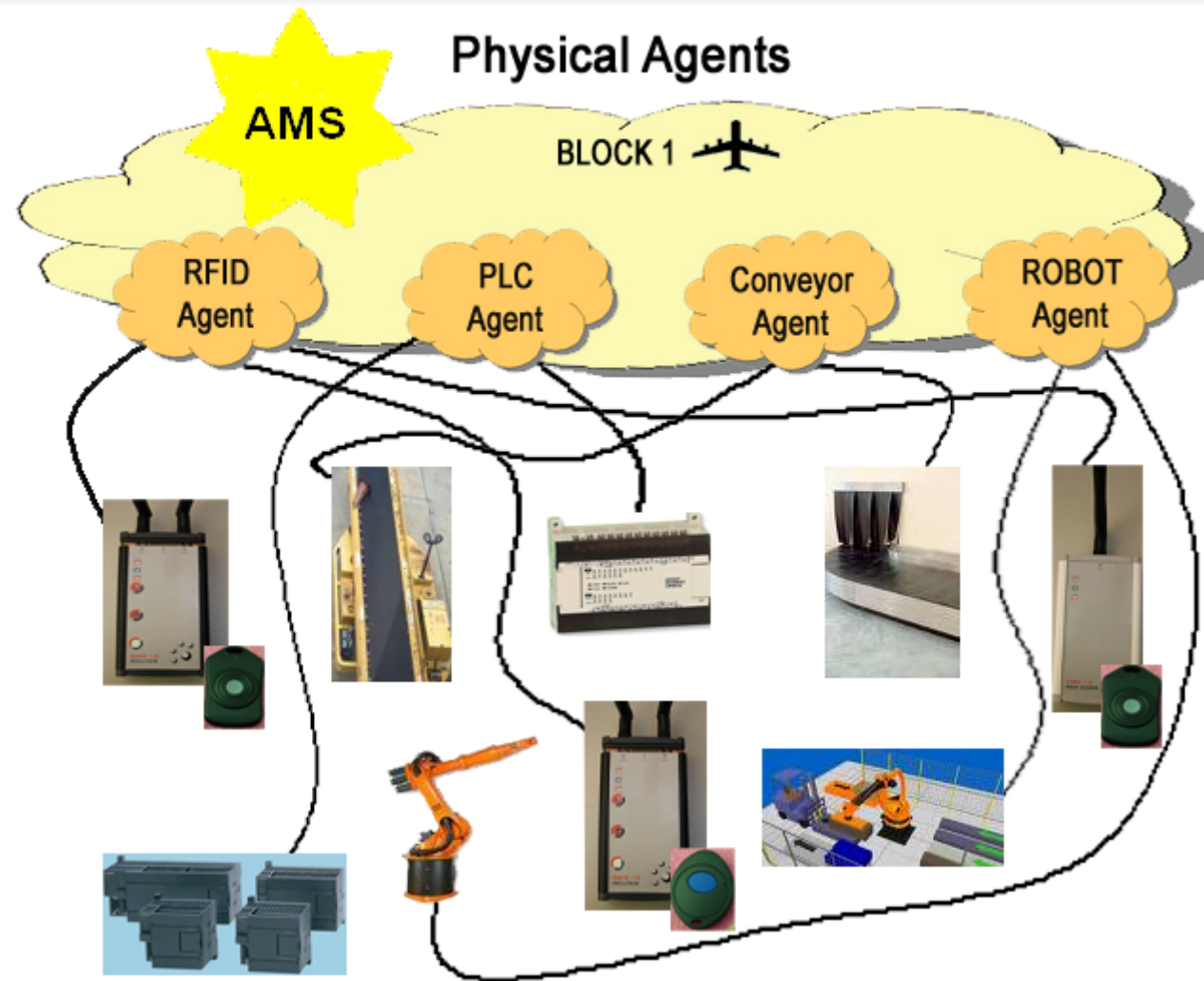
Airports control

CONTENTS

- ◆ **Increasing of number of flights in airports and complexity of maintenance**

- ◆ **Low cost companies: layover flights have increased**

- ◆ **Shared ramp resources has to be well controlled in order to make good work schedules**

- ◆ **Eventual delays or unexpected mistakes may cause a complete disaster**
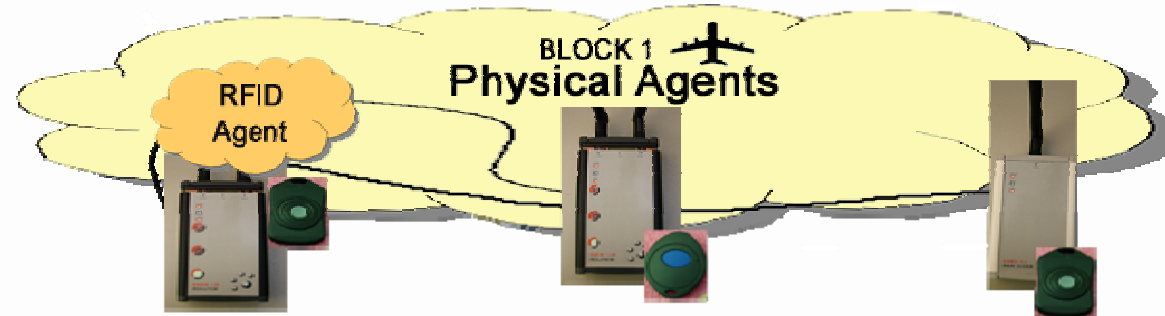
- ◆ **Application of MAS-DUO tech. is a good solution.**

Airports control

CONTENTS

RFID Agents

◆ **In charge of autonomous operation of each RFID System and the coordination between them**

◆ **They manage all the events that come from and go to the RFID Systems**

◆ **CPU+ Ethernet + connection with readers of the RFID Systems.**

Agents Operation

CONTENTS

◆ **Hash Table: list of all subscriptions and possible reader ID's to be subscribed**

◆ **Possible events:**

 ◆ **Tag event: launched when a tag goes throw a reader**

 ◆ **Reader event: launched when a reader detects a tag**

◆ **Subscription to tag: external agent wants to know a tag location**

◆ **Subscription to reader: external agent wants to know tags going by one reader.**

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Agents Operation

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◆ **Process of subscription and launching of events**
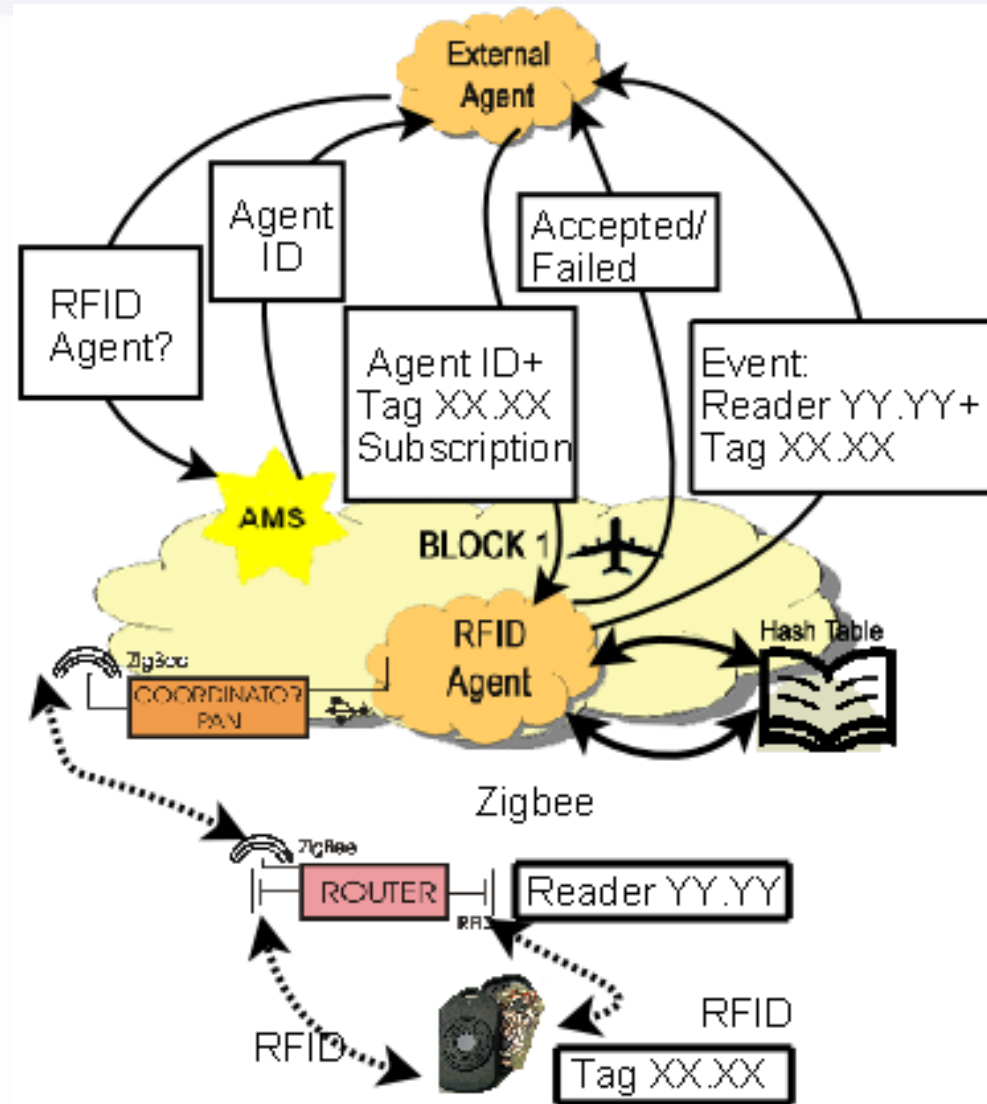
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RFID System

Characteristics

◆ **People, vehicles, materials, tools, rest of ramp resources tagged with RFID label**

◆ **Possible modification of the Enterprise Resource Planning (ERP)**

◆ **Zigbee network: mesh type**

◆ **Coordination stations: "Coordinator Pan"**

◆ **Boosters modules: "Buffers"**
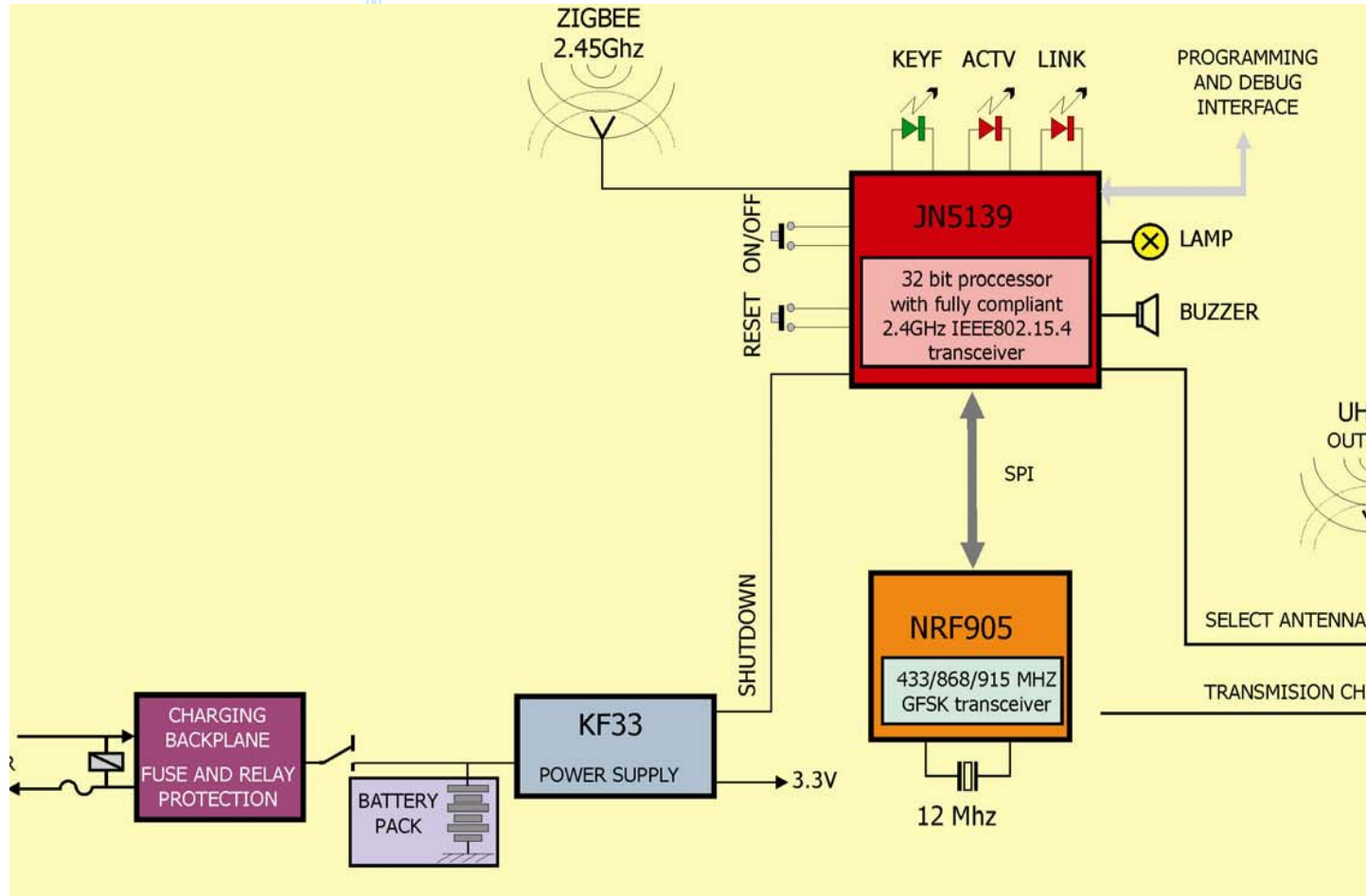
◆ **Readers: "Routers"**

◆ **Active tags: "KeyFobs"**
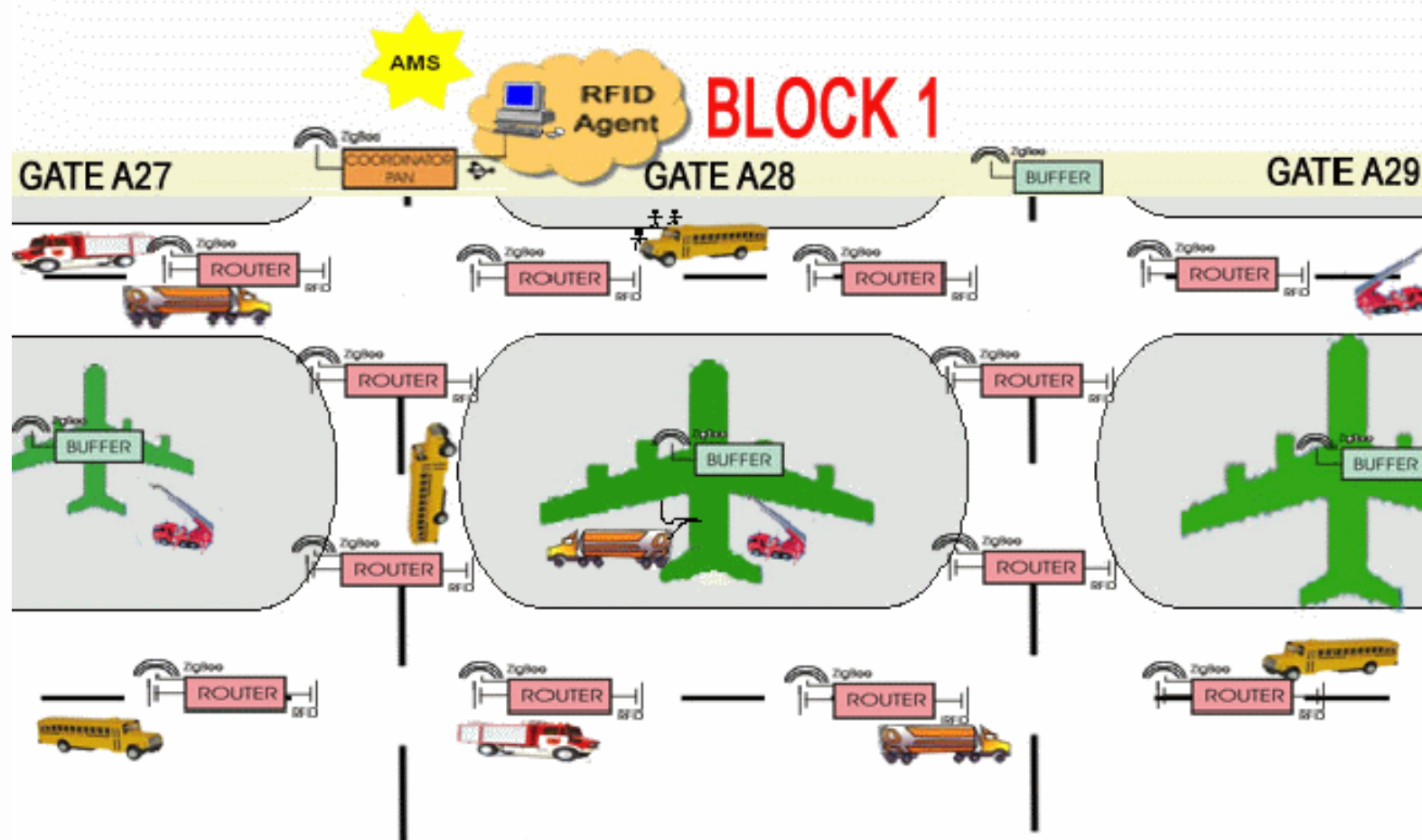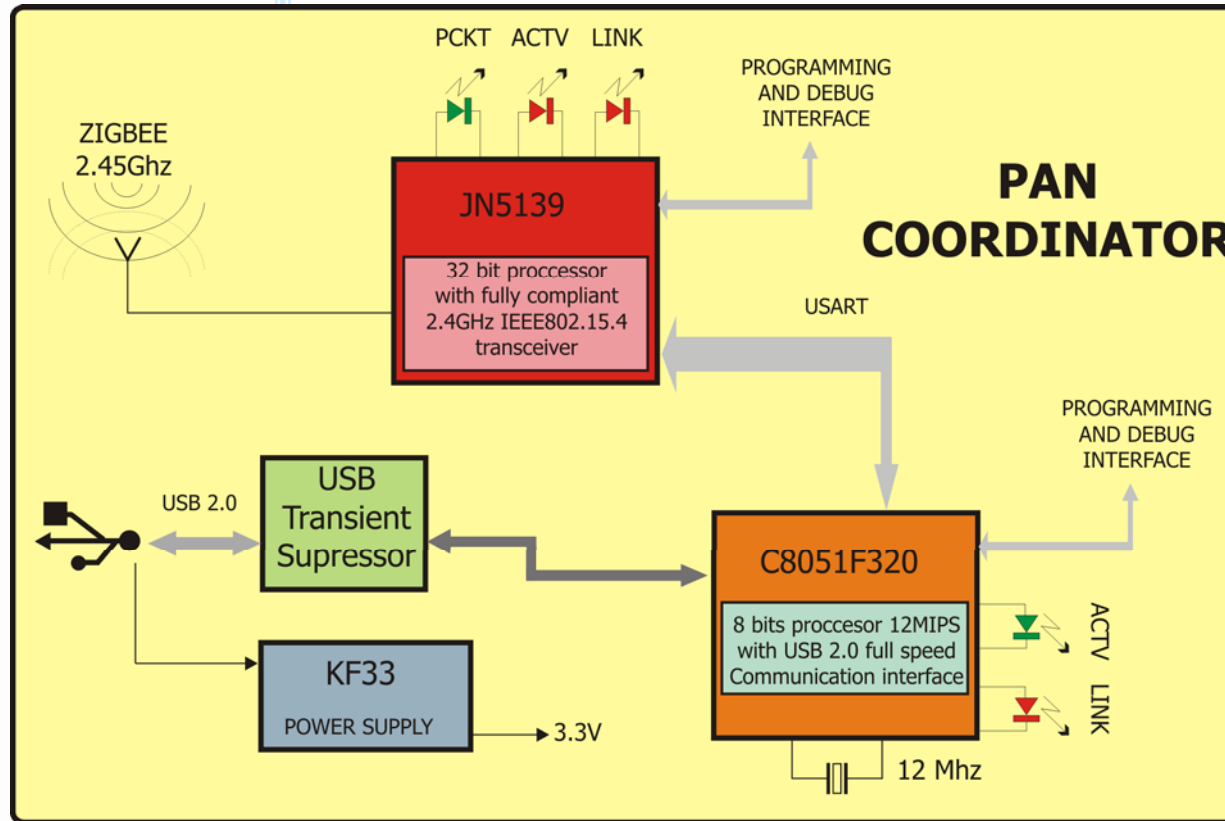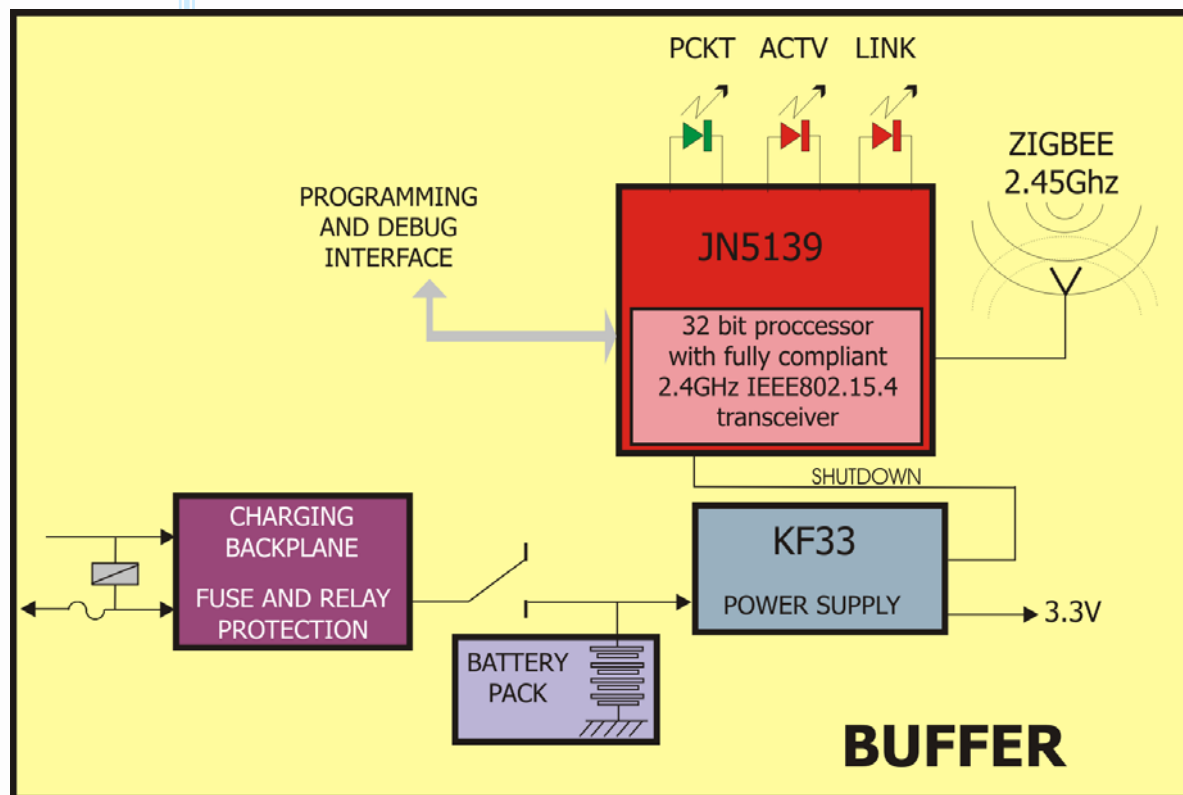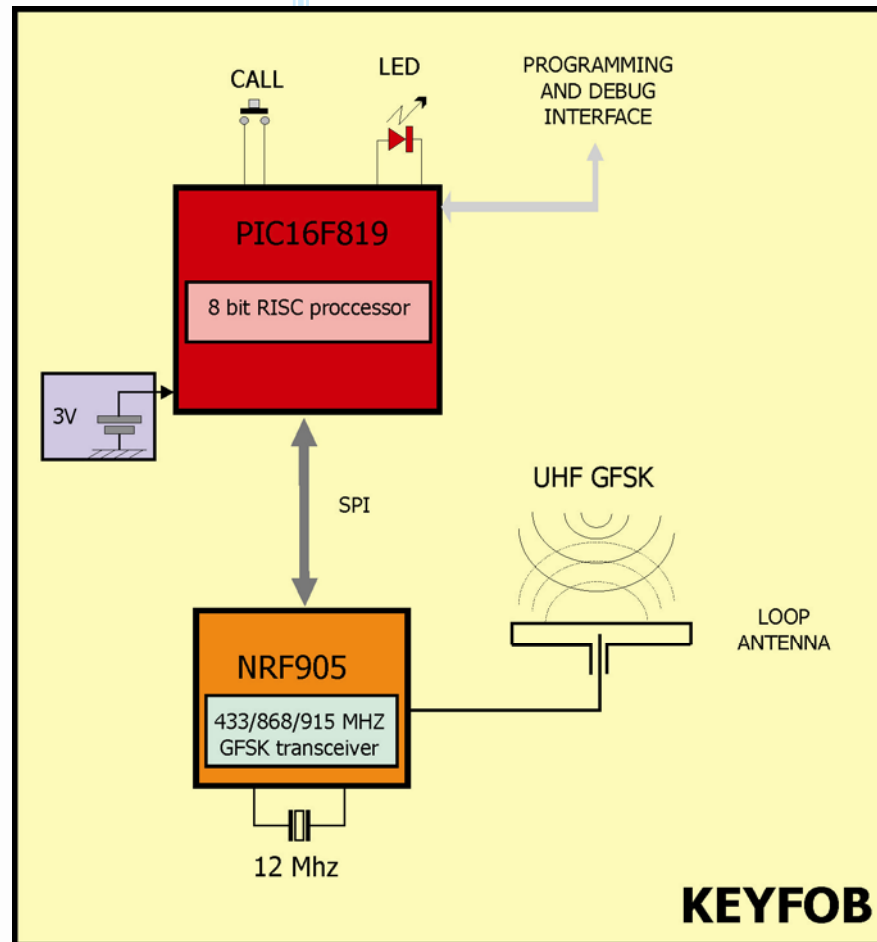
RFID System

System Layout

RFID System

Pan Coordinator

RFID System

Router (Reader)

ROUTER

RFID System

Buffer

RFID System

Keyfob

Results and Conclusions

- **MAS-DUO technology: separation between physical world and management system**

- **Management software optimization: easier detecting of errors.**

- **Monitoring of physical events in real time**

- **Changes in resource planning and management operations due to events in the I.S. Agents**

- **RFID Readers: reach of 5/6 meters**

- **RFID Tags: 1 year batteries lasting**

- **Cost: Zigbee modules+ readers, not very high. Tags less than 8 €**

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Thank you

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