Konnex Scientific Conference 2005

Framework for Smart Surveillance In Konnex Environments

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Current Security Systems

Activate / Deactivate paradigm → Human - dependent

Triggered by Sensors → Several False Alarms

No modularity → You can only get a Full protection

Objectives

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- High "Signal to Noise" ratio i.e. **False Alarms Reduction**
- "**Always On**" mode of operation
- Protection **Modularity** upon **Differentiated Alarm Conditions**

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Methods

- **RFID infrastructure** for wireless identification of people and objects
- **Pattern Recognition**
- Abstract **Model** describing the logical structure of an event

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Tiny chips with no battery to identify objects and people

Towards Ambient Intelligence

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The Fact: Massive introduction of RFID tags in 5/10 years

Home Environments likely to be soon populated by several RFID tagged objects

Home Automation could exploit this presence to realize **Smart Applications based on Context Awareness**

RFID Infrastructure

Towards Ambient Intelligence

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The Issue: No RFID appliance is designed for Home Automation

Current RFID readers target industrial environments and their specific requirements

Need of a class of

"Home" RFID Readers

RFID Infrastructure

Towards Ambient Intelligence

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"Home" RFID Readers

5 – 10 m

- Cost
- Size
- **Read range**
- Read Speed
- Packaging
- **Interfaces**
- Power
- Installation

Powerline
Twisted Pair

Pattern Recognition

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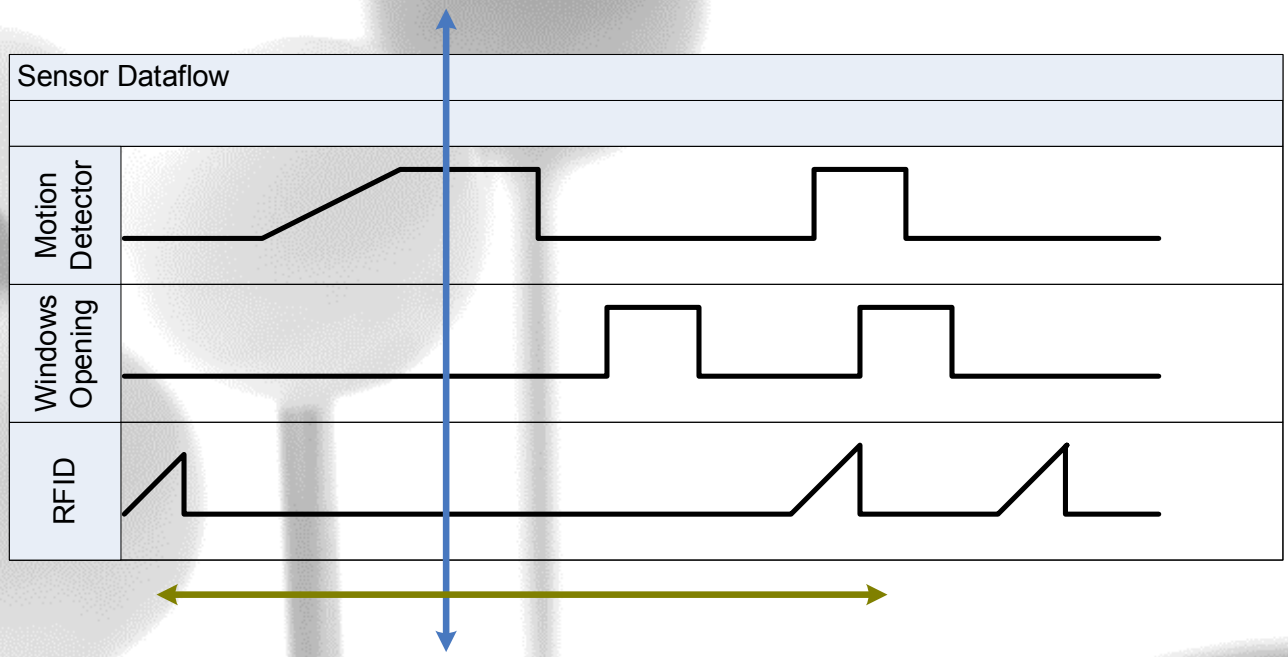
To distinguish **Consistent Data** from **Sensor Noise**



Dataflow Analysis

⇩

Event Detection

Context Awareness ⇦

Pattern Recognition

Continuous Knowledge of **Who** is in **Which** room and **What Event** is taking place.

No need for an explicit Alarm Activation

Instead Alarm is **Always On** and upon each **Event** triggers a suitable and sensible **Reaction**

Security Model

A **logical model** is needed to provide the System with the correct tools to distinguish normal conditions from abnormal ones

1 A Surveillance System deals with "**Actions**" performed by humans

2 An **Action** can be performed by a **Recognized or by an Unknown User**

Security Model

So we have 3 alternatives

1. Actions performed by Recognized Users
2. Actions performed by Unknown Users
3. Not Actions (that is **Sensor Noise**)

Sensor Noise can be seen as an **Incomplete Action**
For Example a motion detection in a room not
Preceeded nor followed by a peripheral breach

Security Model

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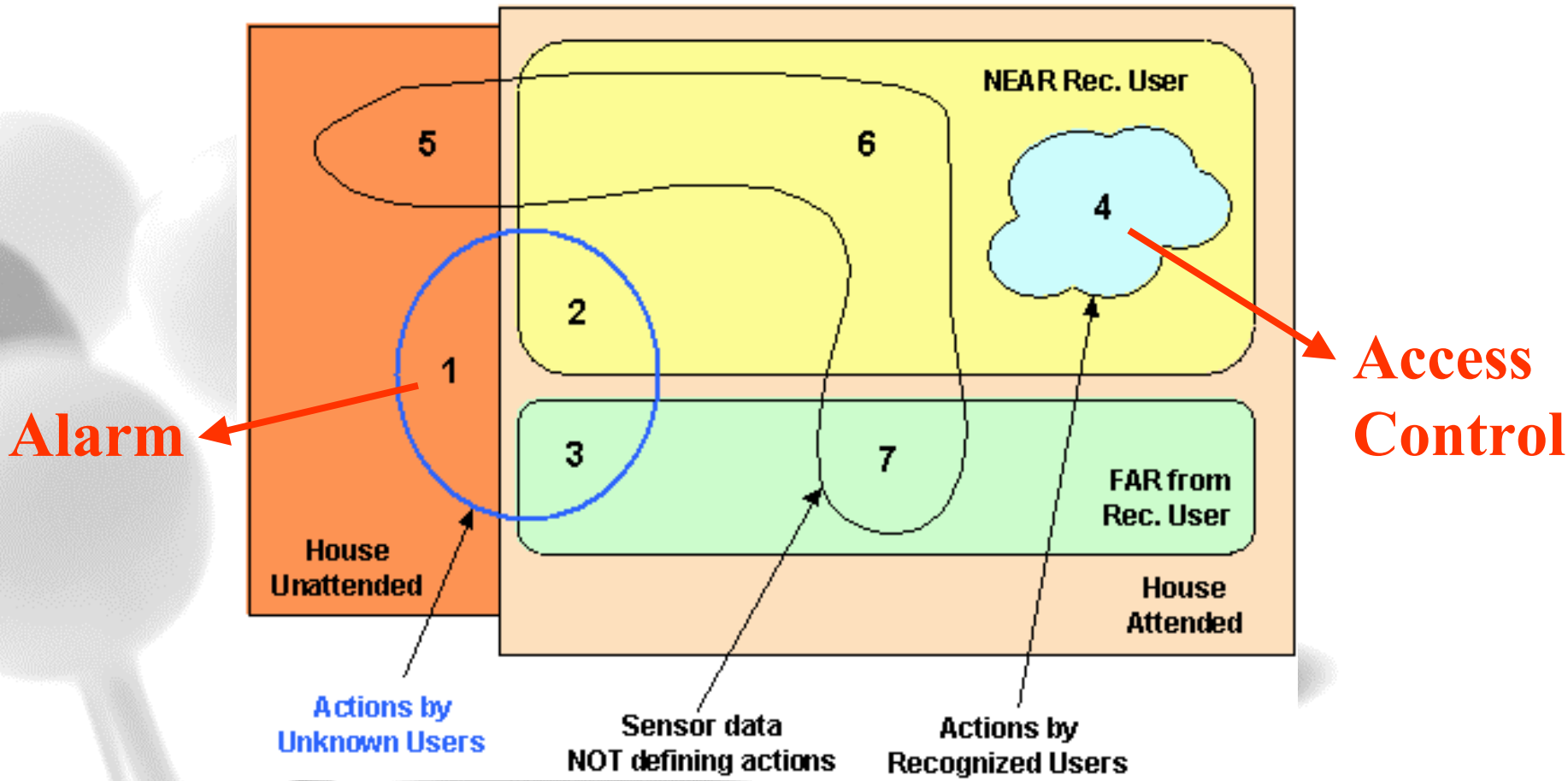

Issues to solve

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- **Connecting RFID readers to Konnex media**
- **Bandwidth requirements and messages length**
- **Access to EPC worldwide services**

*EPC (**Electronic Product Code**) is a worldwide standard and **Service Infrastructure** that links RFID Product codes to related information*

Connecting RFID to Konnex

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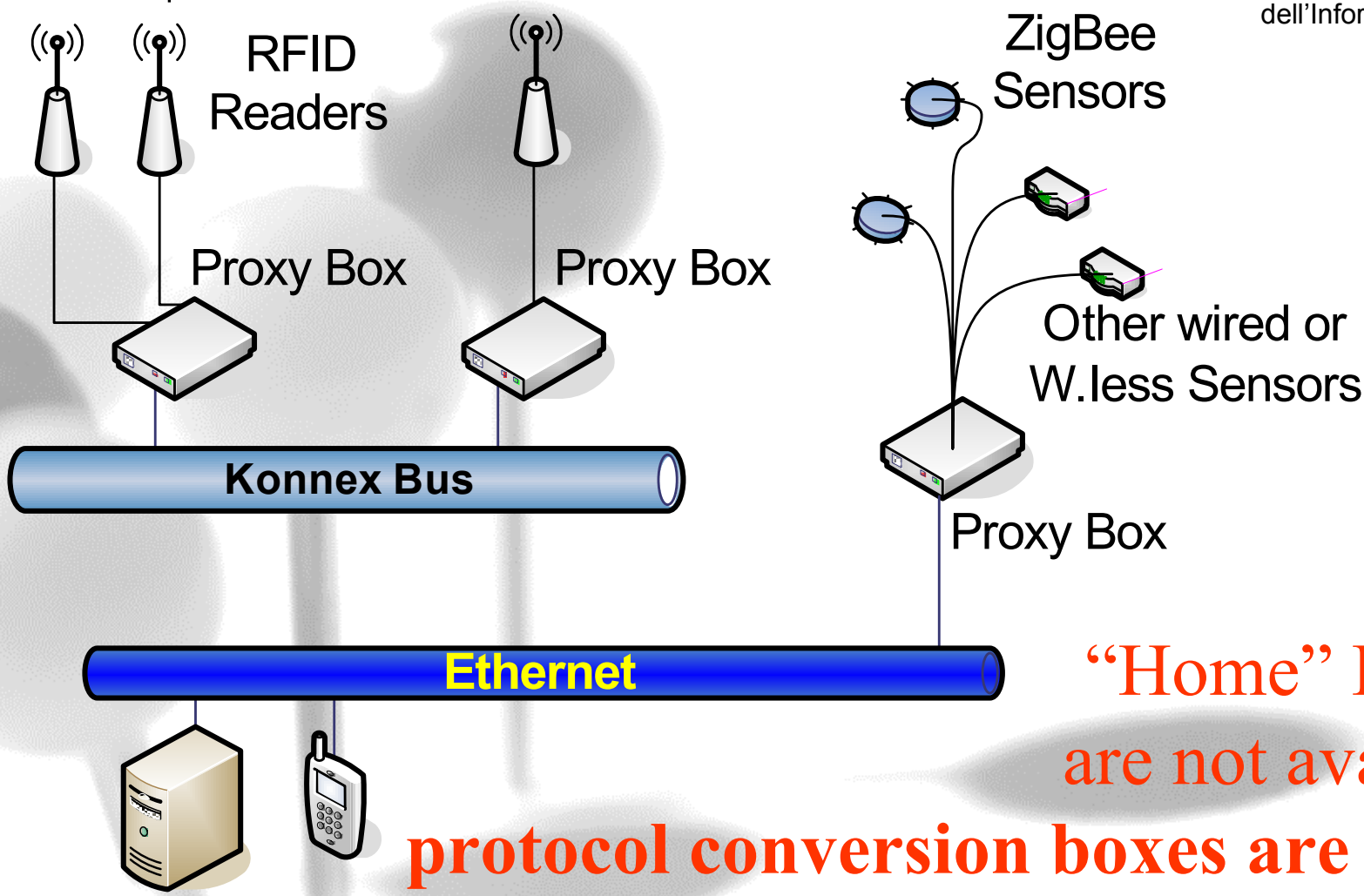

Until
"Home" Readers
are not available,
protocol conversion boxes are needed

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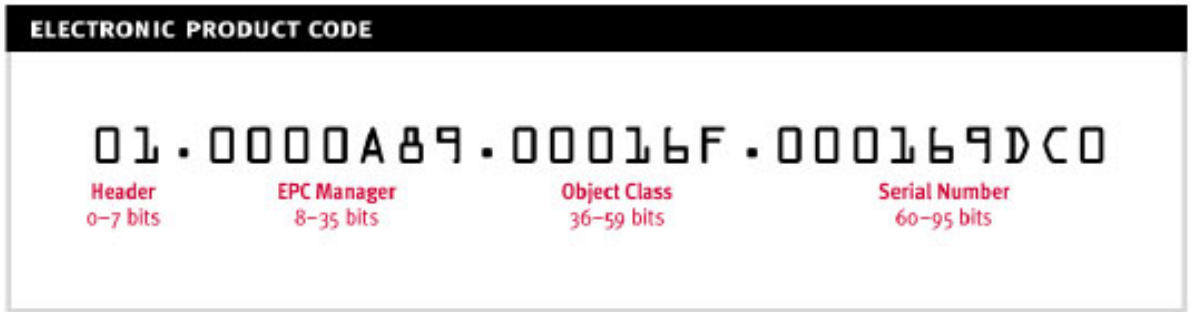
EPC Codes can be 64, 96 or 256 bits long



How do EPC - RFID messages impact network performance on Konnex Bus?

RFID Messages on KNX Bus

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Knx Specification Supplement 13 for Extended Frame Format defines a max length of 64 octects APDUs

- Even the longest EPC Code will fit on a Knx Frame
- No big impact has to be expected on Knx Network, since only half of the frame is required (at most)

Sending an EPC Code on a PL110 cable takes ¼ sec and on a TP1 line 8 times less

Access to EPC Services

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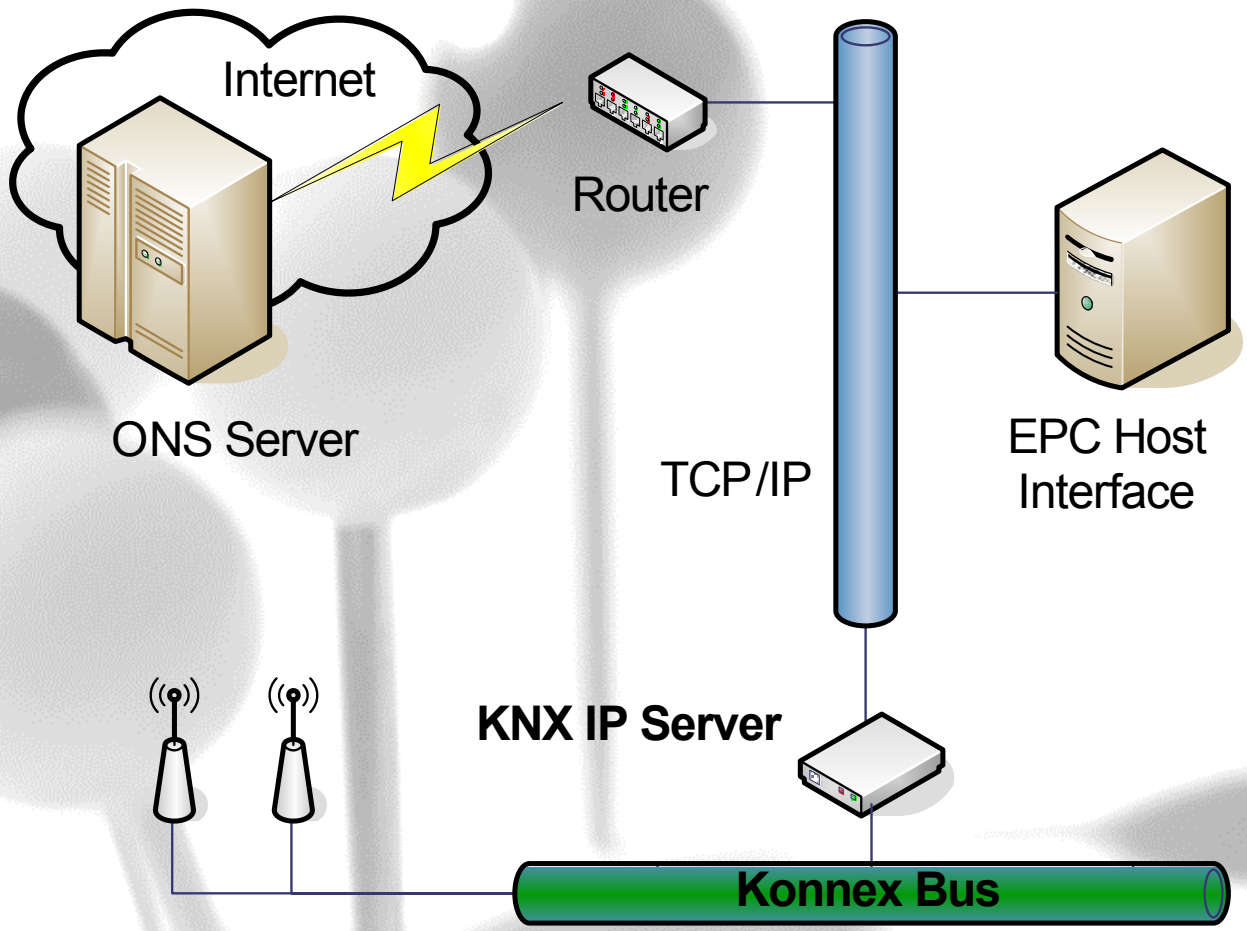
Basic Approach



EPC Host contains Static Configuration for the logic binding of Rfid messages to EPC services

Access to EPC Services

OSGi Approach

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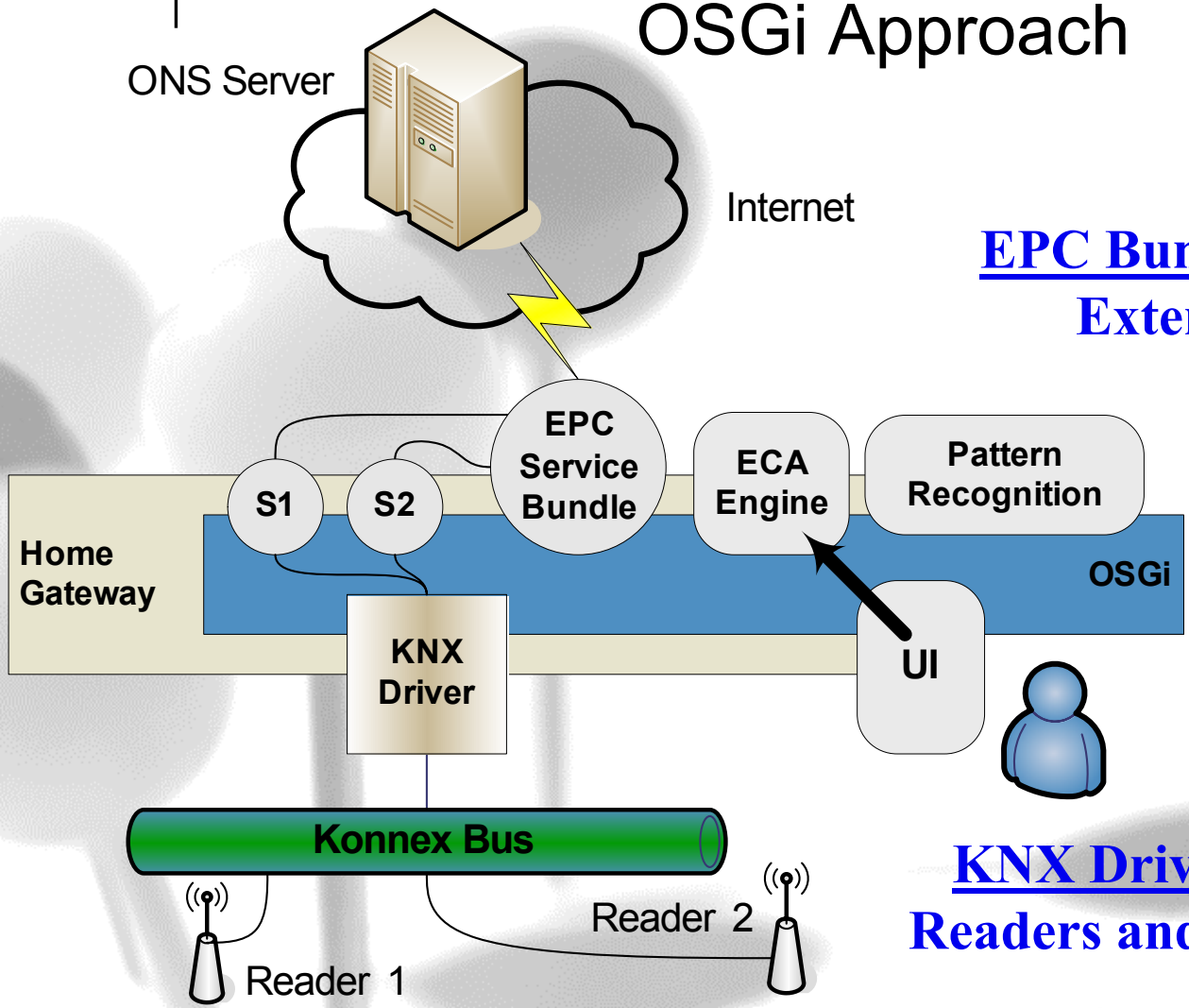

EPC Bundle interacts with the External EPC services

KNX Driver discovers RFID Readers and creates the services

Discussion and Future Work

- **Wireless Coexistence** of RFID with other protocols, including Knx itself, ZigBee, Bluetooth, W-Lan …

- **User Acceptance** of RFID technology (especially for what concerns wearable tags and health-related issues)

- Further research about **RFID Readers' Connectability** to Knx media such as Powerline or Twisted Pair