WIDE Meeting

- Johannes Bleuel -

Siena
Sep. 26th, 2008

E-Senza® Technologies

Leveraging Power of Wireless ®

Company Introduction

Leveraging Power of Wireless®

- Established in Sep 2005
  by automation industry veterans
- ISO9001 Certified
- 15 Employees and growing
  + External development resources
- Excellent Development & Manufacturing
  Infrastructure @1000 qm of Office space

Active member of industry associations

HART COMMUNICATION PROTOCOL · ISA · IEEE · IETF

Large and growing Customer base

BOSCH · Panasonic ideas for life · ROSHARD AG · Jacob · CLAAS · TATA MOTORS · blum Perfecting motion · HY-LINE AUTOMATION PRODUCTS · atlantik elektronik · MESA · ENERGIA CONFIABLE S.A. E.S.P.

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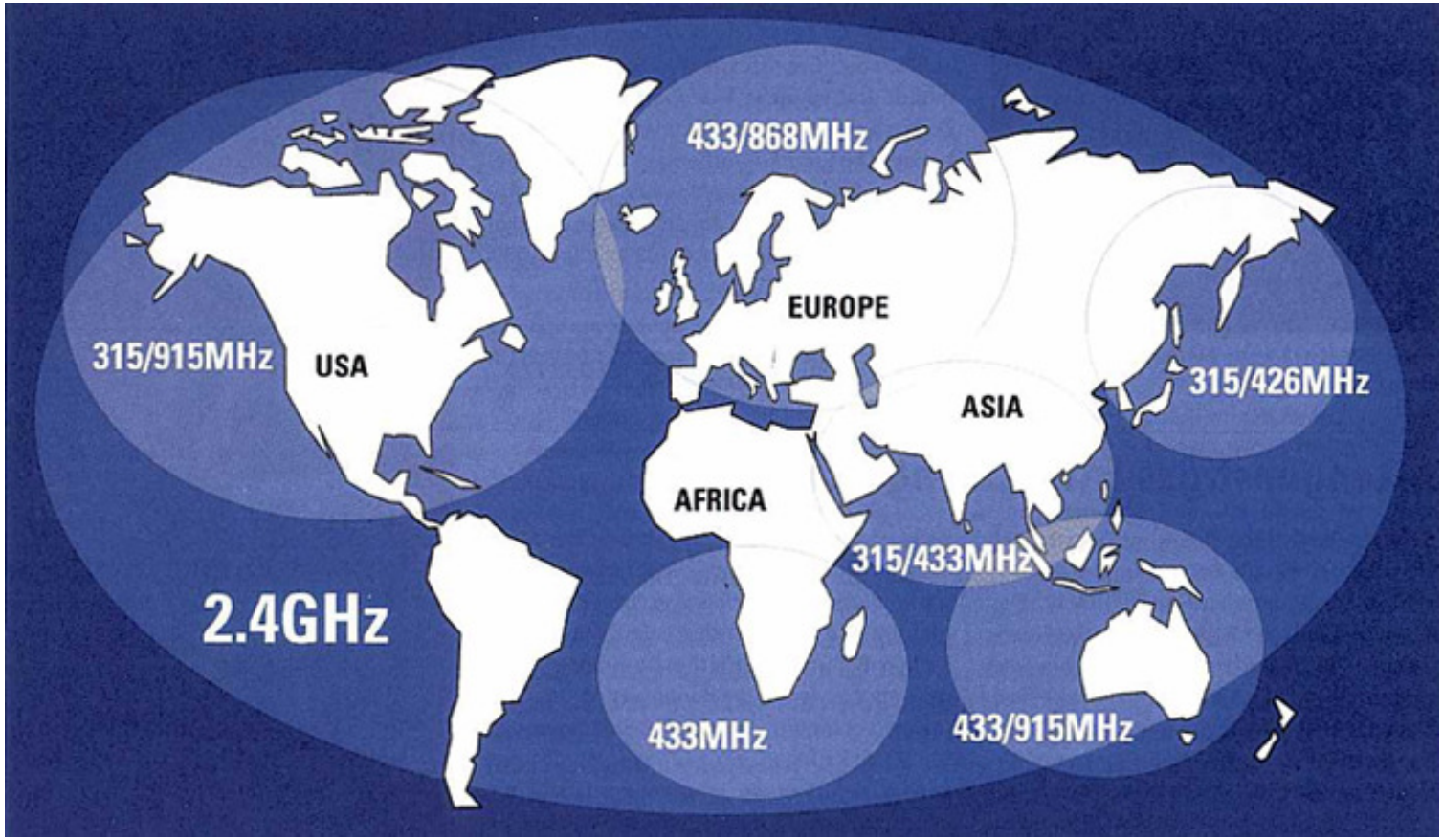
Agenda

1. Coexistence of Wireless Systems
2. Technology standards relevant for Wireless Sensor Networks
3. How to deal with Power consumption
4. Integration into system environment
5. Fields of application

Frequency Bands available



2.4 GHz is available worldwide

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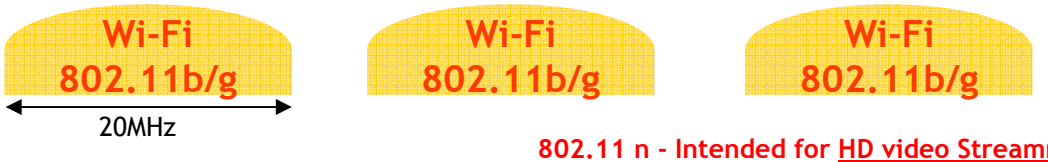
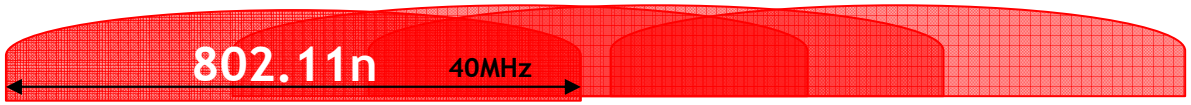
2.4 GHz ISM Band

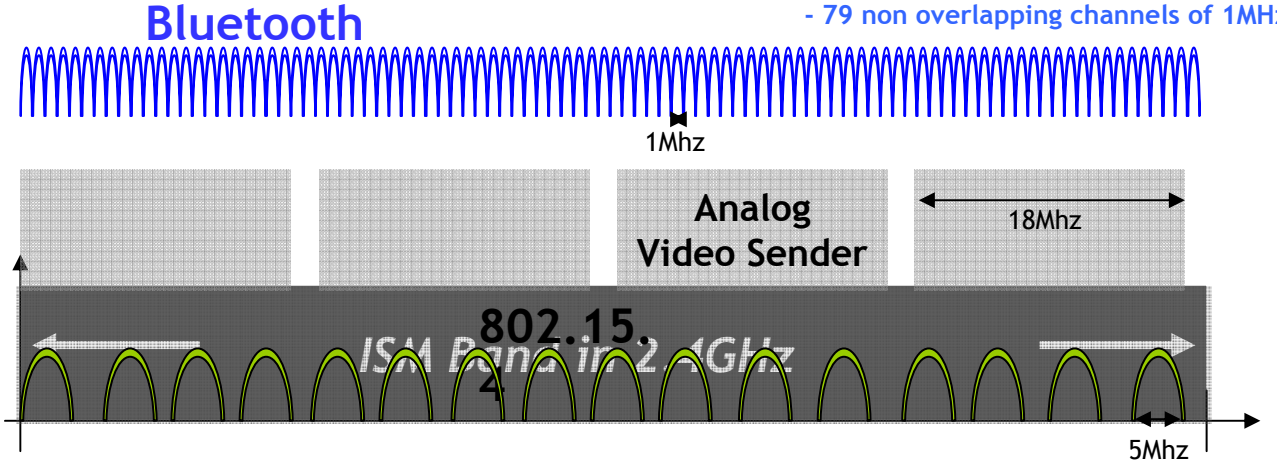
- It's getting very crowded!



802.11 n - Intended for HD video Streamming and others.
- 4 overlapping channels of 44MHz each.



BlueTooth - Intended for voice and data at short range.
- 79 non overlapping channels of 1MHz each.



2,4GHz

2,4835GHz

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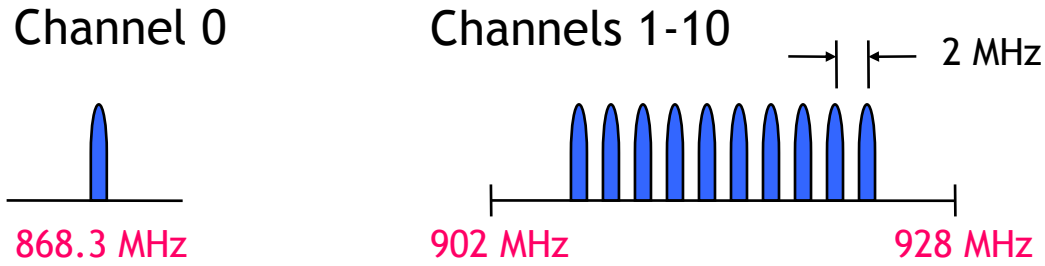
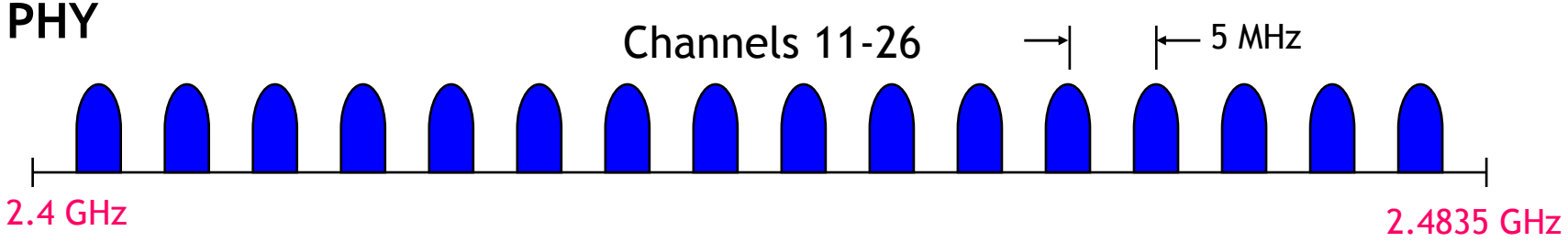
IEEE805.15.4 Physical Layer

868MHz / 915MHz PHY



2.4 GHz PHY



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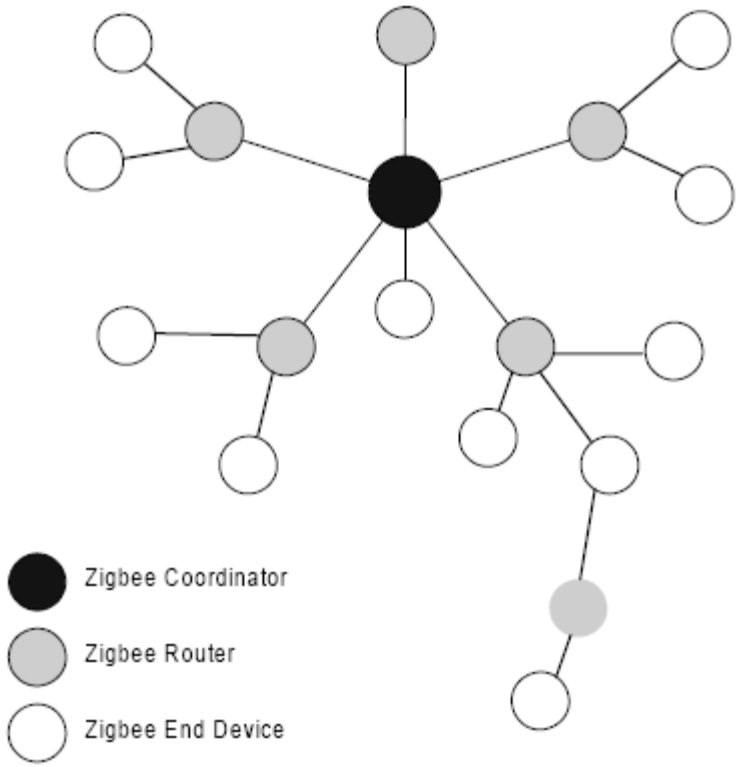
Some aspects of ZigBee

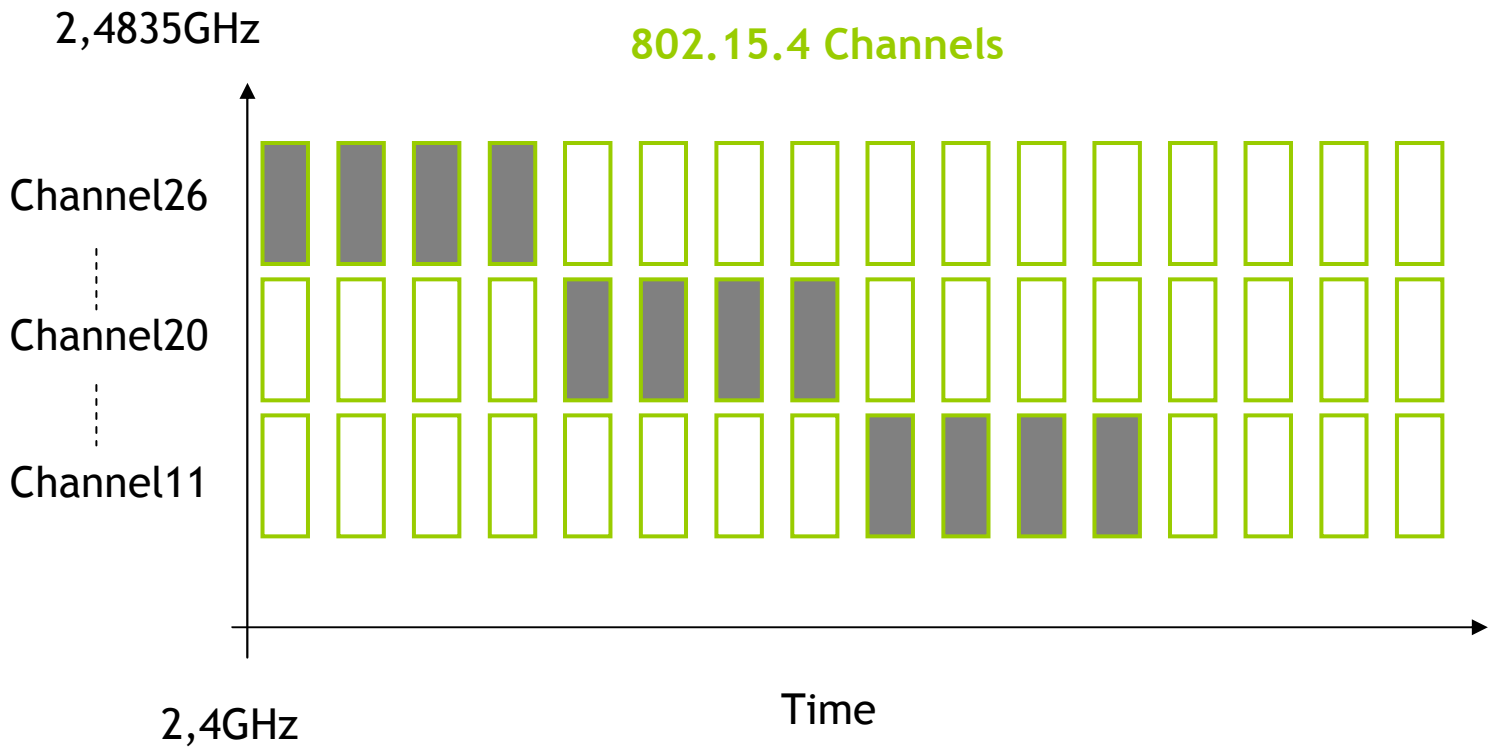
- No time-sync.
- ZigBee End Devices (ZEDs) trigger wake up themselves. No regular active intervals for receiving data
- No routing-capability of battery-powered nodes
- Random re-sent in case of Collisions Latency troubled then
- No Channel Hopping

  → interference, multi-path fading !



Frequency Agility in ZigBee

- Frequency Agility



- Network Hops Channel in each cycle

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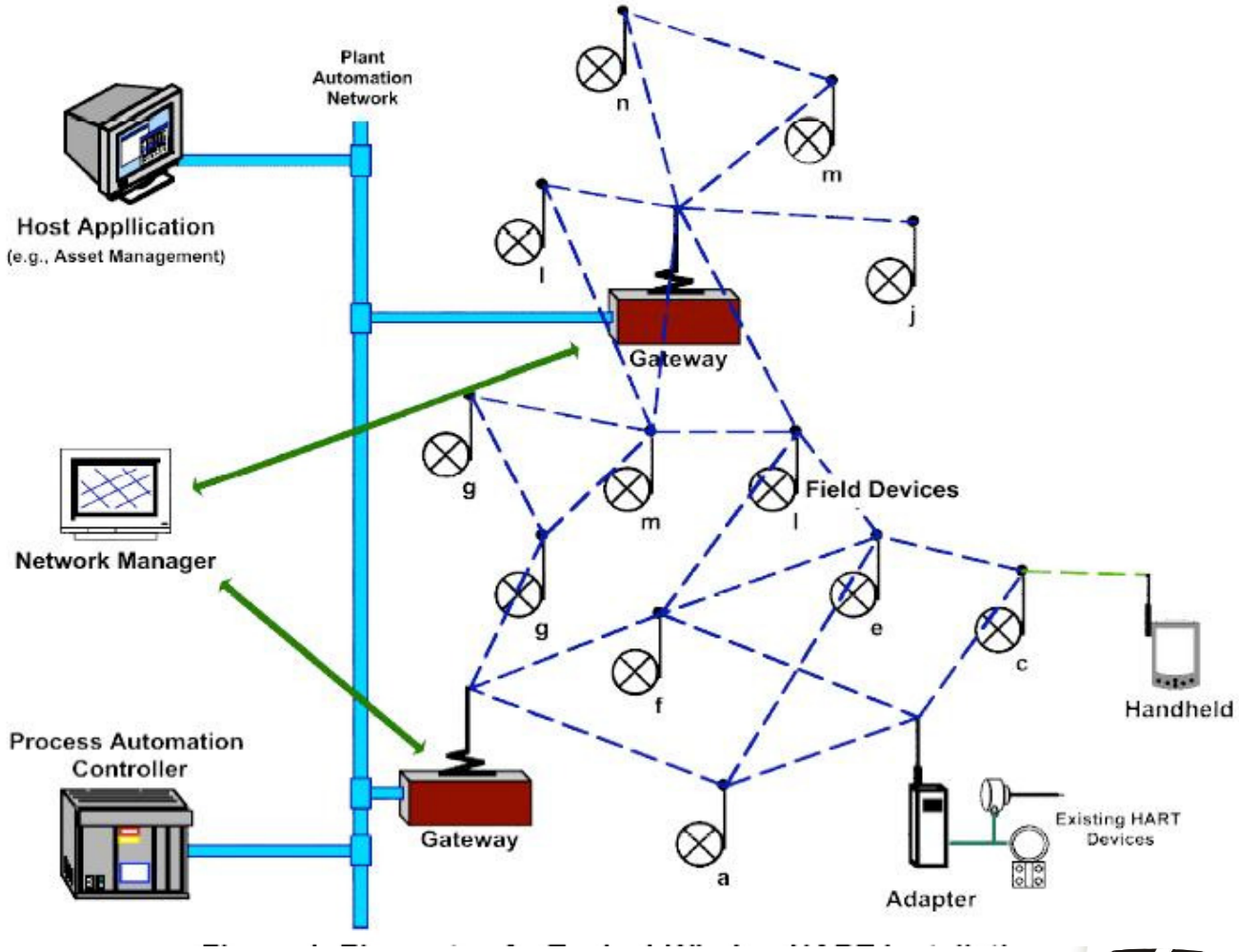
WirelessHART approach



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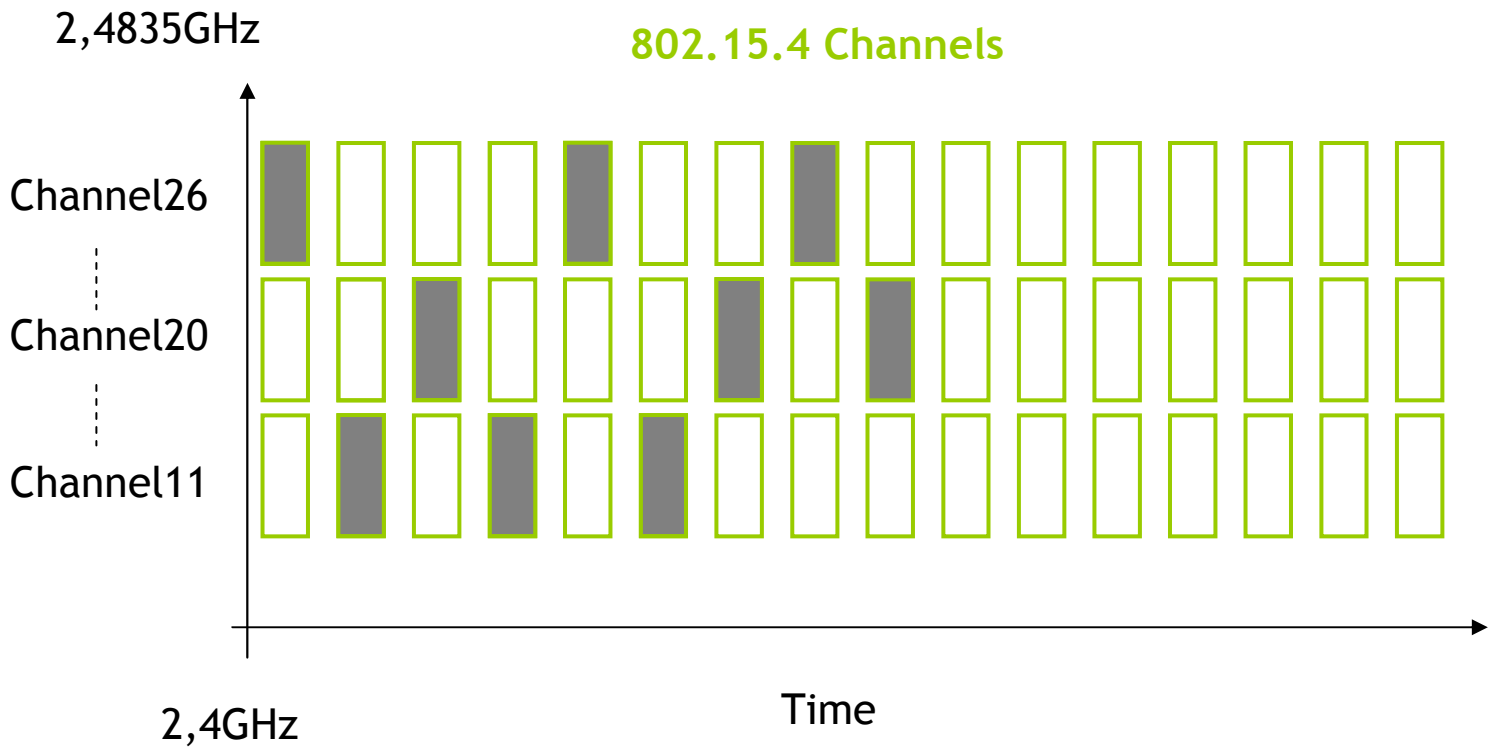
WirelessHART Characteristics

- Full Time-sync. of network
- Battery-powered nodes can store/forward other nodes' data
- Comprehensive Security concept
- Mesh networking technology
- Frequency hopping for reliability and coexistence
- Wireless AP – gateways, control system interfaces and hand-held tools
- Supported by all major Vendors! Emerson, E+H, Siemens, ABB…

Channel Hopping in WirelessHART

- TDMA-Channel Hopping



- Each Cycle is a new Channel –Improved Noise immunity!

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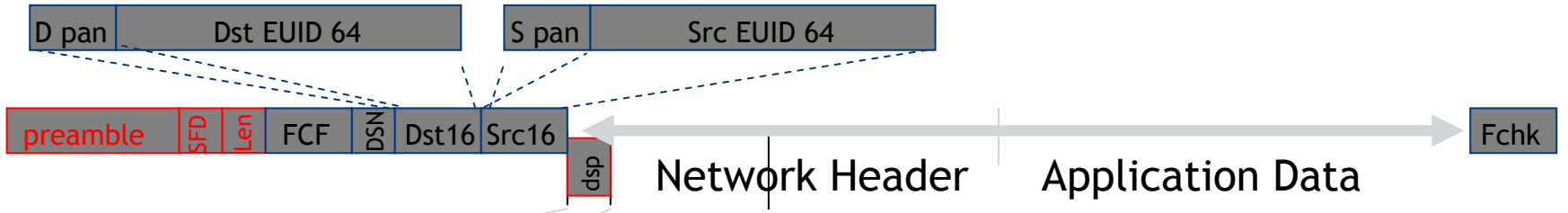
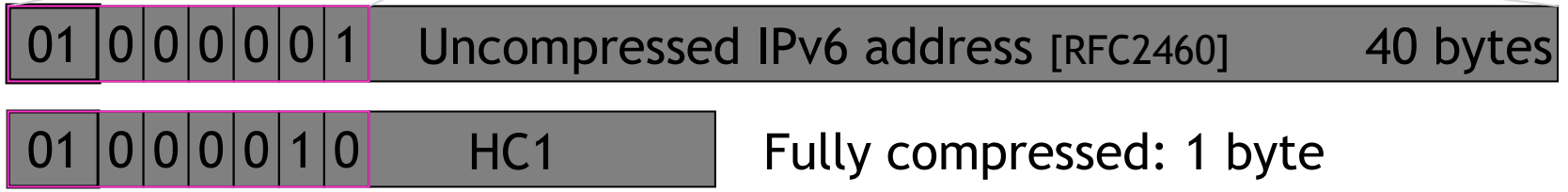
Network Layer IPv6LowPAN

IEEE 802.15.4 Frame Format



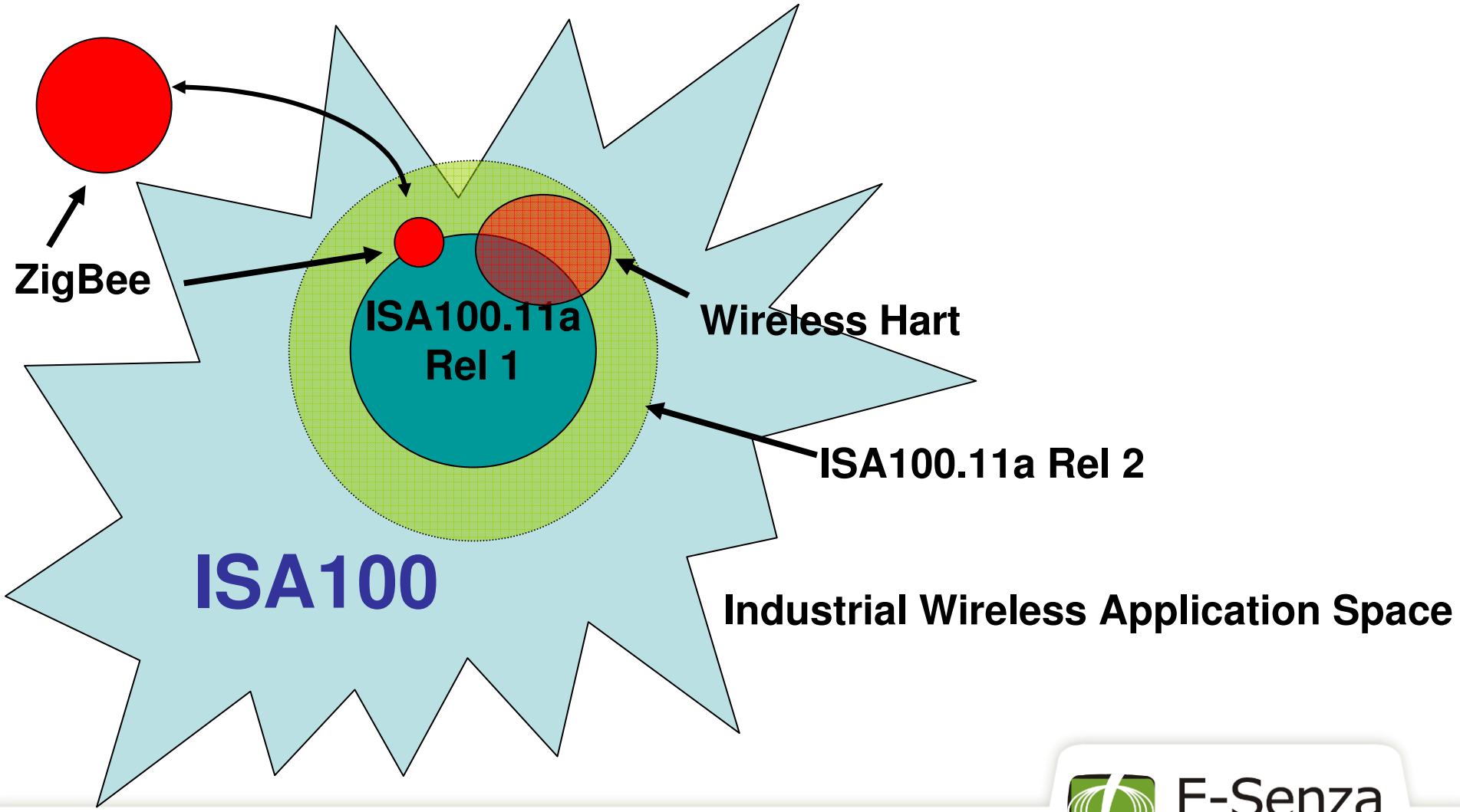
IETF 6LoWPAN Format



Source address	: derived from link address
Destination address	: derived from link address
Traffic Class & Flow Label	: zero
Next header	: UDP, TCP, or ICMP

- Enables connectivity in IP World!

ISA100.11a – One point in wireless space/time



ISA100.11a – Systems approach to Wireless

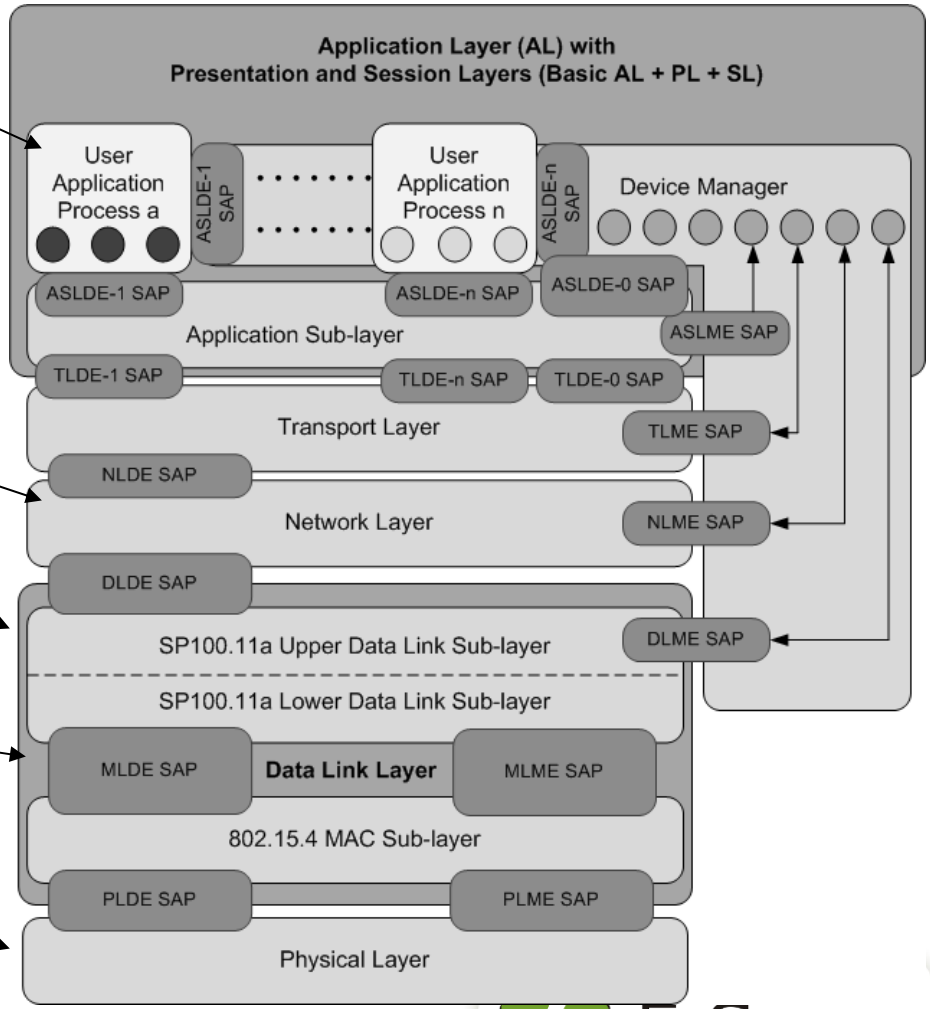
Multiple Application Layers

64 bit unique device addressability

Mesh Network on the field side

MAC level modifications For Reliability

Leverages IEEE 802.15.4 Standards



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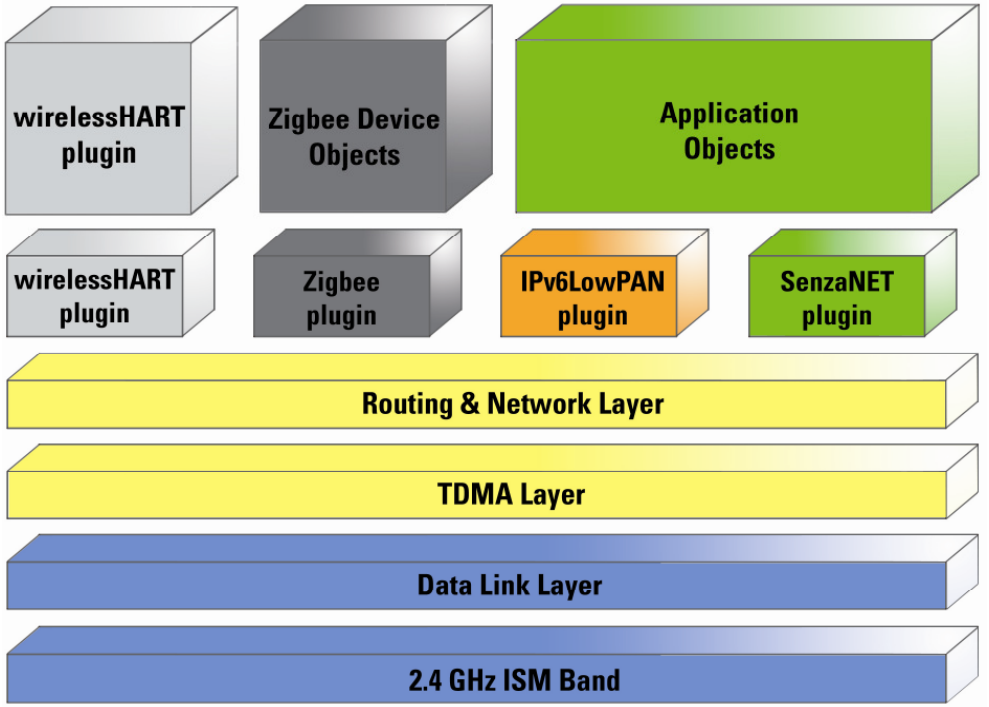
SenzaNET Architecture

- **SenzaNET is a multi-standard framework based on the IEEE802.15.4 standard**
- **WirelessHART-certification as soon as Interoperability-testing available from HART foundation**
- **Upgrade of existing field-installations is possible**



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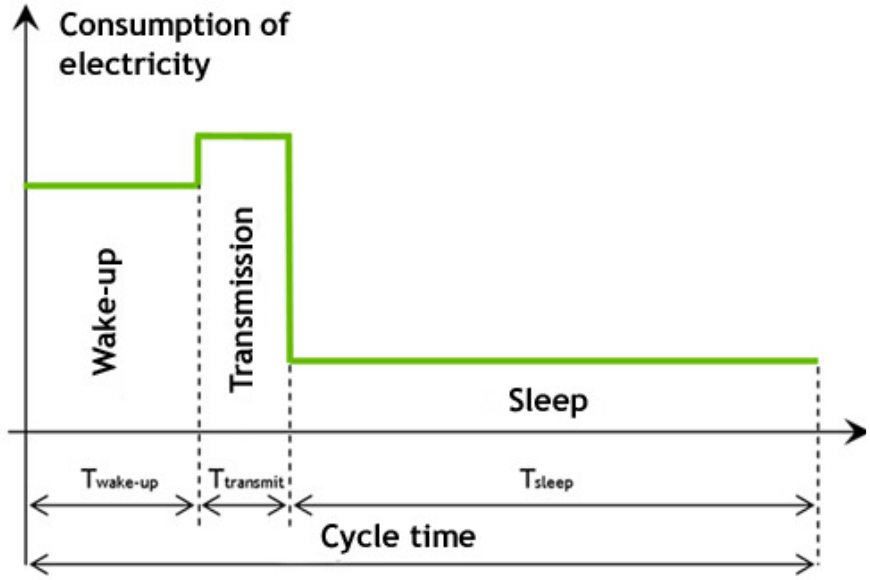
Low-power Networking

- Battery-lifetime is determined by:
  - Cycle time (“heartbeat”)
  - Needed On-time for processing sensors
  - Managing Sensors
  - Expected system reaction time



- Alternative power-sources:
  - So far, only photovoltaic Cells relevant in outdoor applications

Power-supply concept must be integral part of each solution

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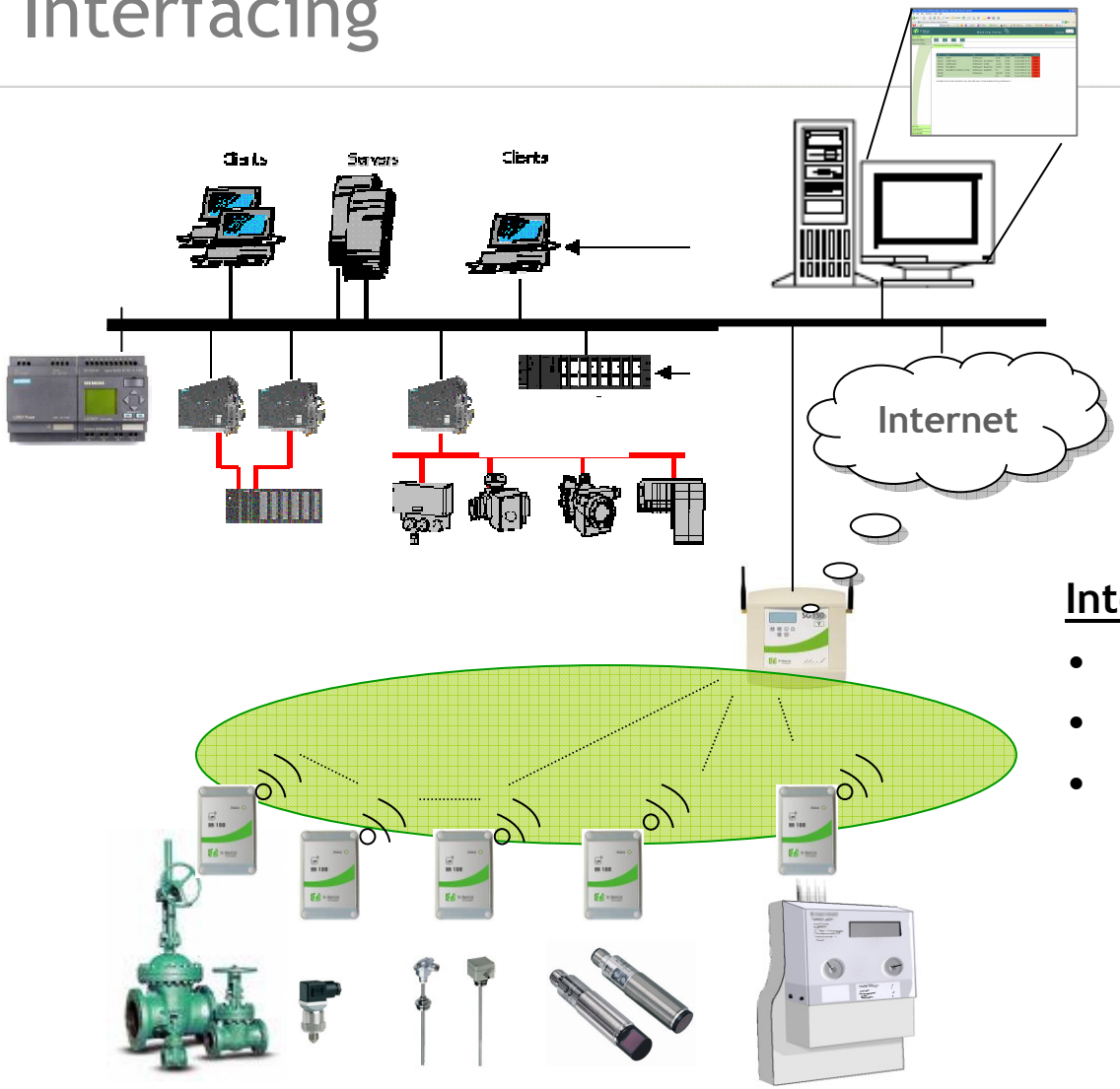
Interfacing



Interfacing to be understood:

- **Device-Interfaces**
- **Gateway-Interfaces to Fieldbus**
- **Application-Interfaces (Software)**

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Case Study: Water

- Water quality parameters in a purification plant to be monitored
- Customer needs real-time information on plant usage and breakdowns and is required to document water quality
- SenzaWMS was deployed to meet customer needs
- No additional investment required for customer
- No hidden system integration costs
- Web interface helps customer to offer better service level

Benefit:

Dramatic improvement in quality of service & continuous Monitoring at no additional cost of infrastructure

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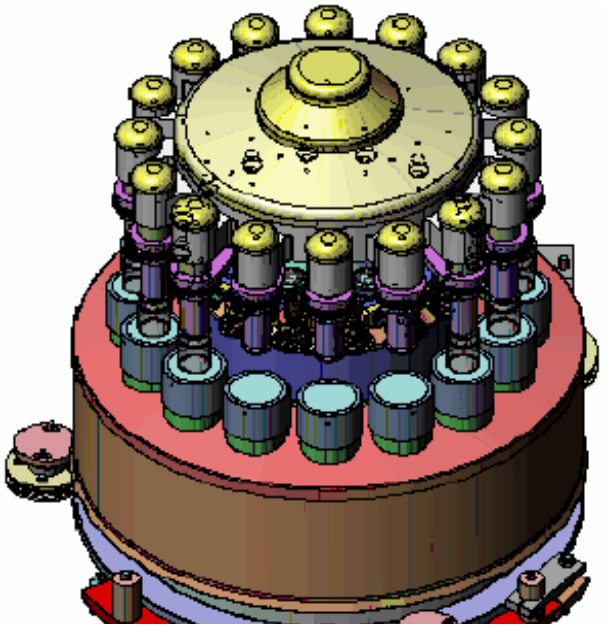
Case Study: Automation

- Process parameters in pharmaceutical production must be monitored continuously
- Regulatory authorities (e.g. FDA) stipulate norms
- Cabled power-supply and data transmission were impossible due to rotating parts
- Real-time requirements fulfilled through optimized SenzaNet
- **ProfiBus- DPV1-Slave interface** implemented into SenzaGate



Benefit:

Wireless acted as enabler for customer to measure data from previously not reachable areas

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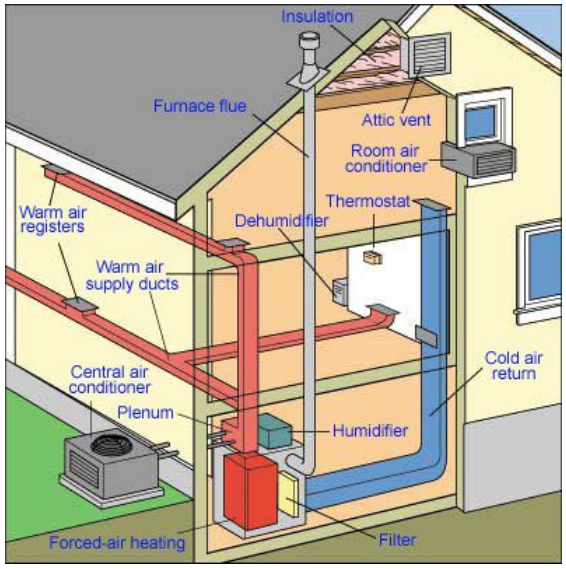
Case Study: Home Application

- Energy efficiency is the trend for home & building automation
- Customer started in Aug 2007 with E-Senza to develop a new product line based on wireless sensor networks for improved energy efficiency



Comprehensive Sensor/Actuator Network.
Product slated for launch in 2009

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Environmental & Agriculture

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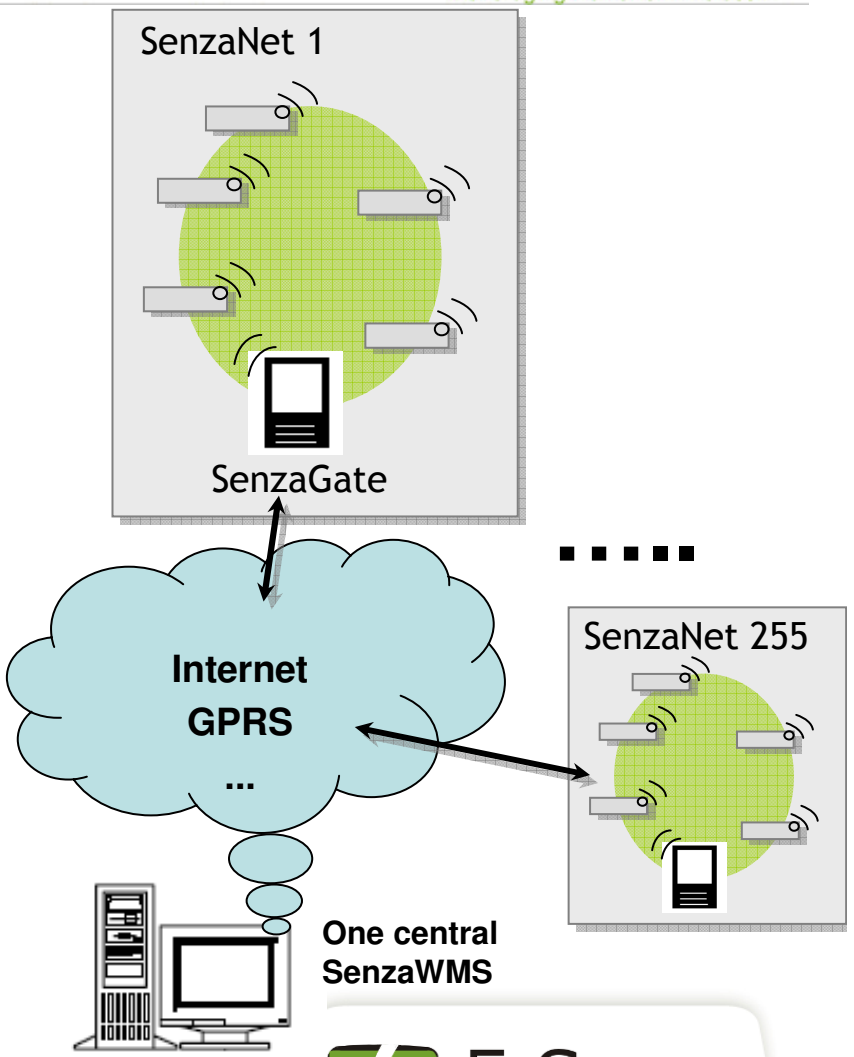
- Environmental
  - GPRS-solution and multi-network management in SenzaWMS for distributed monitoring
  - New EU environmental regulations (SEIS, EIONET, Inspire) expected to drive the sector, esp. water (WISE)
  - Customers are often governmental organizations
- Agriculture
  - The business case works for Irrigation & Fertilization applications
  - “Precision farming” is accepted technology basis, potentially an enabler
  - Sensor-systems for greenhouses are expensive and point-to-point. Replacement-opportunity.



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