D&E event 2017

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1931 CONGRESCENTRUM
BRABANTHALLEN
DEN BOSCH

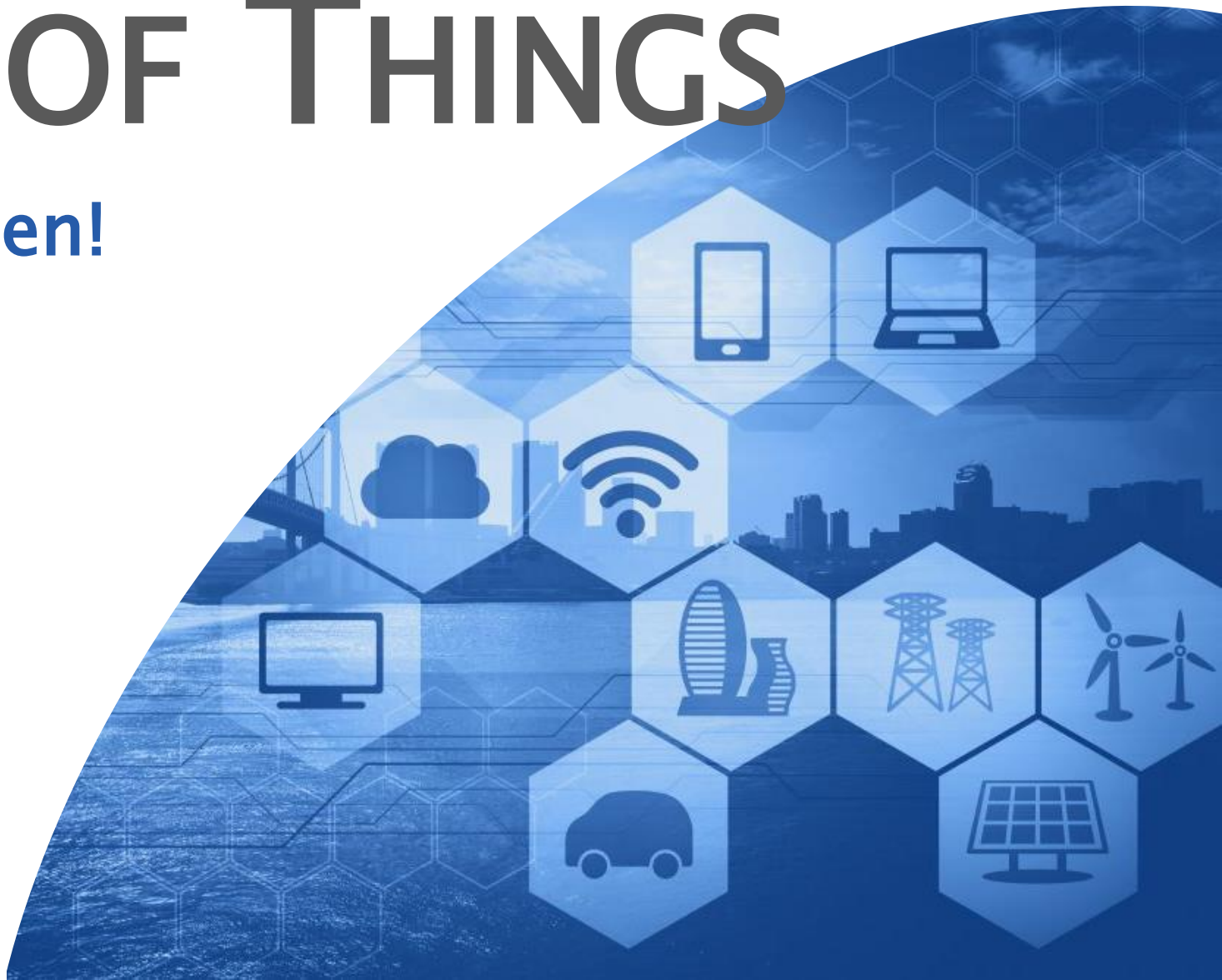
DESIGN AUTOMATION & EMBEDDED SYSTEMS

FPGA - SECURITY - EMBEDDED - INTERNET OF THINGS - PCB TECHNOLOGIEËN - BLUETOOTH LE - ELECTRONIC DESIGN & PRODUCTION

INTERNET OF THINGS

Eerst denken, dan doen!

Alcom electronics



Alcom Electronics

- Independent technical distributor
- 35+ years expertise in semiconductor, modules and wireless solutions
- 50+ people in Netherlands and Belgium
- Technical salesforce and engineering support

- **Frans Lutz**
  Sr. Product Specialist Wireless & Networking

Internet of Things

- Hype or Reality?
- Where are we?
- What is needed to achieve this?

What is needed?

- What kind of data has to be sent / received? (temperature etc.)
- How much data?
- How often do you need to communicate?

What is needed?

- Where do we store the data?
- How long do you store data?
- Is business logic needed?
- Who can access this data?

What is needed?

- How can you access the data?
- Cloud-connector to existing software systems needed?
- Who can access the data?

What is needed for an IoT NODE?

- **Power budget**
- EDGE Computing
- Communication
- Security
- Data Link Quality

- Required average and peak power
- Selection of battery technology
- Keep in mind that communication can fail, which can have a big impact on power usage

What is needed for an IoT NODE?

- Power budget
- EDGE Computing
- Communication
- Security
- Data Link Quality

- Is there a need to analyze the data at the sensor?
  E.g. calculating trends at the sensor and sending these periodically instead of real time.
- EDGE computing can also be done at border routers & gateways.

What is needed for an IoT NODE?

- Power budget
- EDGE Computing
- **Communication**
- Security
- Data Link Quality

- Which wireless technology fits best with your application?
- What aspects are important in your communication:
  - Latency
  - Bidirectional
  - Throughput
  - Reliability
  - Amount of data
  - Security
- Subscription management

What is needed for an IoT NODE?

- Power budget
- EDGE Computing
- Communication
- **Security**
- Data Link Quality

- Do you need end to end security?
- How to handle device authentication?
- Are there parts in the communication path where the security is not under your control?

What is needed for an IoT NODE?

- Power budget
- EDGE Computing
- Communication
- Security
- Data Link Quality

- Dealing with communication errors
- Don’t forget to analyze the communication quality. This can make or break your product’s life time.

Choosing your backoffice

Location of data

- Servers on office site
- Managed servers at datacenter
- Clouds solution (Amazon, Azure, Google Cloud Platform)

Connectivity

Business Logic

Choosing your backoffice

Location of data

Connectivity

Business Logic

- Open or restricted access to the back office (VPN)
- Free or backoffice defined protocol selection
  e.g. JSON, RESTfull API, MQTT
- Wireless device authorization management

Choosing your backoffice

Location of data

Connectivity

Business Logic

- With business logic you define a reaction on the data. For example shutdown a system with a error condition, send a service engineer on error condition
- Connectors to existing CRM systems like SAP

User Application

Not within the scope of this presentation

Choosing the right Wireless Solution

- Required/preferred frequency band
  - ISM or Licensed band?
  - Sub gigahertz needed? (signal penetration)
  - Global deployment/roaming?
- Communication
  - Bidirectional?
  - Message based or (semi)real-time?
  - Latency?
- Power consumption
  - Sleep modes
  - Transmitting speed vs time

Choosing the right Wireless Solution

	Technology	No. Bands often used	Subscription	Private Network	Roaming	End-Device Reachable	Bidirectional Communication	Mobility nodes	Standard
SigFox	LPWAN	2	Yes	No	Yes	No	No	++	Proprietary Sigfix
LoRa	LPWAN	>3	Yes/No	Yes/No	No	No/Yes (1)	Yes (1)	++	LoRaWAN Alliance
WiFi	LAN	>2	No	Yes		Yes	Yes	+	WiFi Alliance
Bluetooth	PAN	1	No	Yes		Yes	Yes	+	Bluetooth Alliance
Zigbee	PAN	>1	No	Yes		Yes	Yes	++	Zigbee Alliance
802.15.4	PAN	>3	No	Yes		Yes	Yes	user def.	IEEE
Propriatary ISM	PAN	>3	No	Yes		Yes	Yes	user def.	Manufacturer dependent
2G	WAN	4	Yes	No	Yes	Yes	Yes	+++	3GPP
3G	WAN	>5	Yes	No	Yes	Yes	Yes	+++	3GPP
4G Cat-1	WAN/LPWAN	>18	Yes	No	Yes	Yes	Yes	+++	3GPP
4G Cat-M1	WAN/LPWAN	(3)	Yes	No	Yes	Yes (2)	Yes (2)	+++	3GPP
4G Cat-NB1	WAN/LPWAN	(4)	Yes	No	Yes	Yes (2)	Yes (2)	+	3GPP

(1)Possible restrictions due to eDRX and Powersleepmode

(2) In Class A end-node only opens Rx Window after transmitting data.
In Class B end-node opens Rx Windows at fixed time intervals.
In Class C Rx Windows are contantly open, except when transmitting data

(3) Live networks in US and Australia, Europe is following. Should be easy for operators to rol out on all their LTE bands

(4) Deployment is starting in Europe, mainly in low frequency LTE (guard)bands

IoT wireless trends

- LTE Cat-NB1 (NB-IOT): Vodafone & T-Mobile
- LTE Cat-M1 (LTE-M): KPN

- Global LTE-M / NB-IOT combination modules with software defined radio technology.

- Integration of eUICC sim-chip in cellular devices.
- Linux core and cellular module in 22x23mm package

What can Alcom do for you?

- Help you to choose the best wireless technology for your solution.
- Solutions for most wireless technology, from silicon, module to box products.
- Wide range solutions for microcontrollers, power management and analog interface for IoT products.

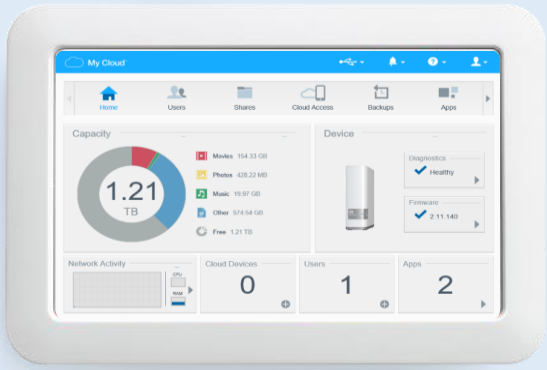
- 38 year active in the electronic components market

NB-IOT Demonstration

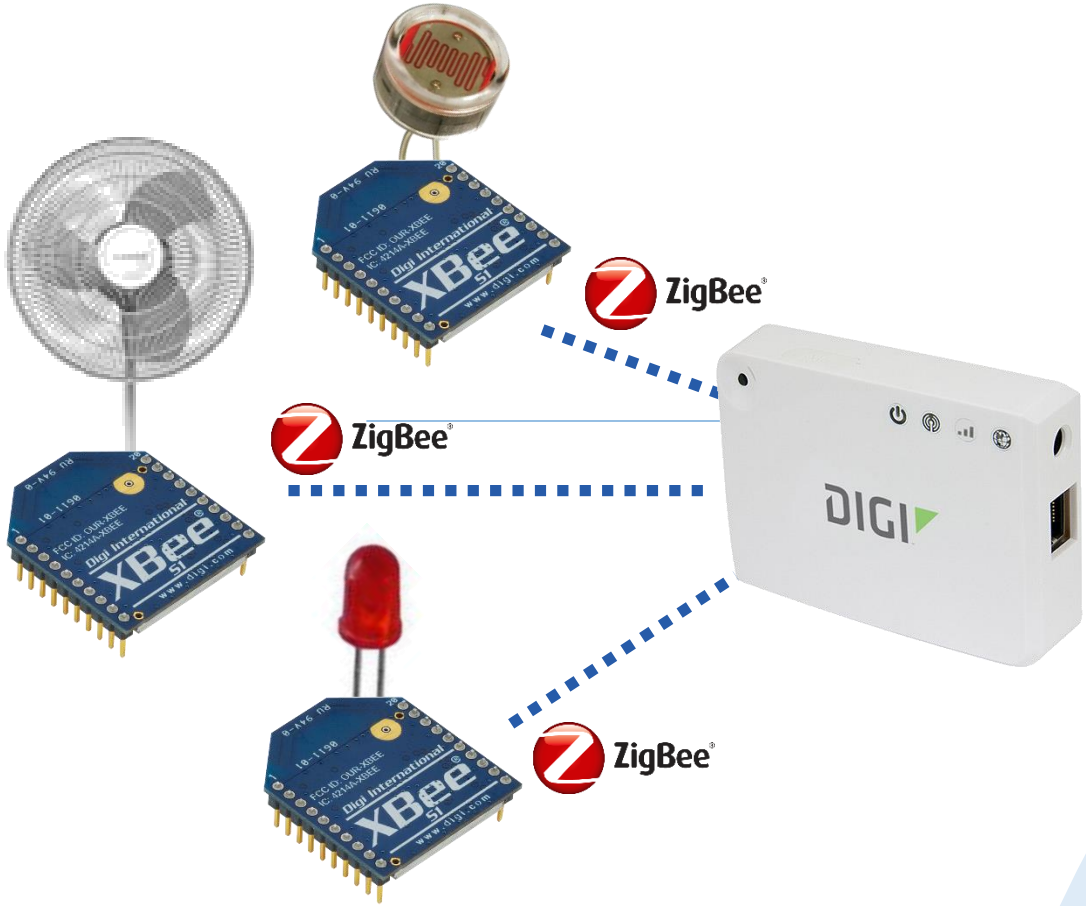
python

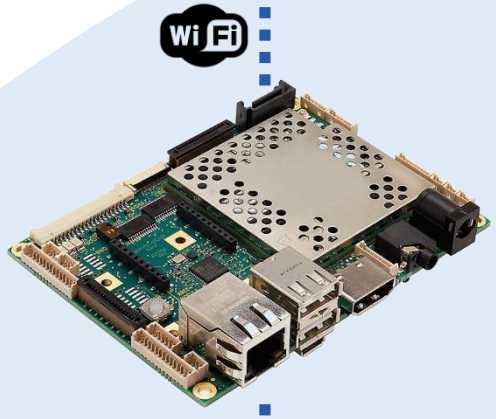
Lte
NB-IOT

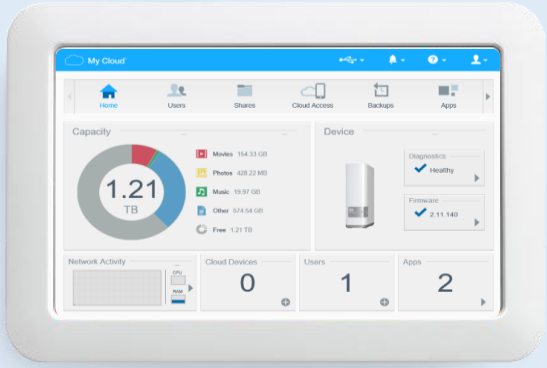
Wi Fi



ZigBee Demonstration







LoRa Demonstration

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