DESIGN AUTOMATION EMBEDDED SYSTEMS

2 NOV 1931 CONGRESCENTRUM BRABANTHALLEN DEN BOSCH

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

LoRa[™] Enabling Global IoT Lora®

David Royet - Semtech



D&E

even

2016

IoT requires multiple open standards





Where Does LPWAN Fit

	Local Area Network Short Range Communication	Low Power Wide Area (LPWAN) Internet of Things	Cellular Network Traditional M2M		
	40%	45%	15%		
\odot	Well established standards In building	Low power consumption Low cost Positioning	Existing coverage High data rate		
$\overline{\mathbf{S}}$	Battery Live Provisioning Network cost &	High data rate Emerging standards	Autonomy Total cost of ownership		
	dependencies Bluetooth	LoRa	3G* / H* (4G		



LoRa : a Smart Physical Layer

- Spread Spectrum modulation scheme, trading data rate against sensitivity.
- Extremely efficient modem architecture.
- Increasing the range by 10x or reducing by 10x the output power.



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Building Blocks





LoRa[®] Network Features





Differentiators & Benefits



True Location

- In/out door
- Accurate
- No Battery Impact



Bidirectional

- Acknowledge
- Scalable Capacity
- Broadcast



LoRaWAN

- Global Standard
- **True Mobility**
- Seamless
- Roaming



Security

- Unique ID
- Application
- Network



LoRaWAN Solutions





Multiple sourcing on every level





LoRa Public Network Availability

LoRaWAN – an open global LPWAN standard for IoT driven by the industry

2015

- January Announcement of LoRa Alliance at CES
- March Launch at Mobile World Congres & first All Members Meeting (30 companies)
- June LoRaWAN R1.0 released
- July 2nd All Members Meeting (60 companies)
- November 3rd All Members Meeting (120 companies)
- > 4000 LoRaWAN specification downloads

2016

- January LoRa Global Challenge at CES
- March Mobile World Congress & R1.01 LoRaWAN
- April 4th All Members Meeting (USA 300 companies)
- May R1.1 LoRaWAN incl LBT/additional frequencies
- July 5th All Members Meeting (Europe)
- October 6th All Members Meeting (Asia)



27 Announced roll outs +100 on going trials & deployments



Multiple Level Playing Field



Positioning of LPWA technologies - Machina Research Dec. 2015

LoRa device classes for optimal fit with most use cases

- Uplink only and bidirectional
- Sub-second latency
- Low component cost
- Stationary nad moving objects
- Embedded location determination
- B2B or B2C
- Multinational, regional or building centric networks



Example: Smart Metering

- Type of application Deep Indoor, Fixed objects
- □ Markets Water, Gas, Electricity
- Critical business issues
 - □ Legislative compliance
 - Meter reading
 - Leak detection, also in network
 - □ Reduce flow to manage consumption
 - □ Shut down flow for safety and damage control
 - □ Manage disconnections/reconnections
 - Manage updates for pricing
 - □ Increase public awareness





Cost comparison wireless M-Bus vs. LoRa WAN

2000 apartments 80 buildings/staircases Sensor cost equal				Ń	An average of 5 sensors/apartment (temperature, humidity and warm water consumption). Fire detection optional. Potential IoT revenue with LoRa.			
	M-Bus wireless () 400 repeaters 80 concentrators					LÔR	a™	A contract of the second
WM-Bus				LoRa Network Operator				
		Design, prep	4 000	€100/hour		Design, prep	1 600	€100/hour
	Ä[Repeaters	32 000	€80/each	EX	GW	6 000	€1500/each (500apts/GW)
	2	Concentrators	20 000	€250/each	5	Installation	880	€55/hour
		Installation	24 200	€55/hour				
	SUM € 80 200			SUM	€ 8 480			
VENUE	в	Business logic & Statistics	26.042		Ш	Business logic & Statistics		Yearly occuring
	ž.	Billing, Invoice	36 842	2 Yearly occuring		Billing, Invoice		Yearly occuring
	Ê,				۳ ا	Other IoT services		Occuring



	Current Solutions	LoRa®		
No. of fields	1	900		
Coverage Area	0.5 mile radius / 0.75 Sq. miles	15 mile radius / 706 Sq. miles		
Solution Cost	High	Low		
Ease of use	Complex	Out of the box		
Battery longevity	1-2 years	> 5 years		

0.5 MILE Radius / 0.75 sq. miles /20 sensors

15 mile radius / 706 sq. miles /18k sensors





Smarter Buildings





2016

Driving one global standard - LoRaWAN[™]





www.lora-alliance.org

- □ 450 Members
- □ > 9000 specification downloads
- **Global Certification Program for sensors**

