



Innovation dans l'IoT

De l' Open Hardware aux nouveaux réseaux pour l'IoT

Nicolas Damour, Directeur des Partenariats Technologiques

Journée IoT INSA - January 2019



SIERRA
WIRELESS

Sierra Wireless – Comprehensive Global IoT Offering



Sierra Wireless & Cars

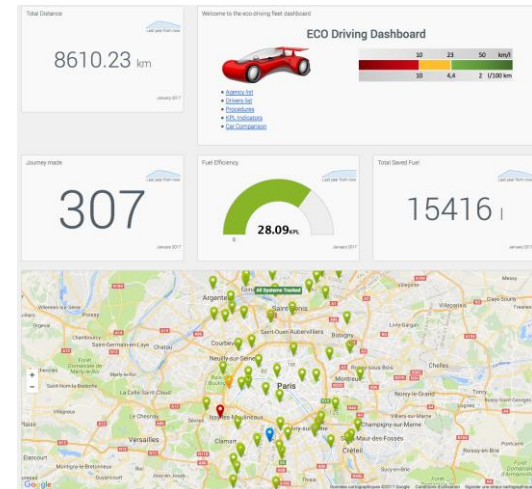


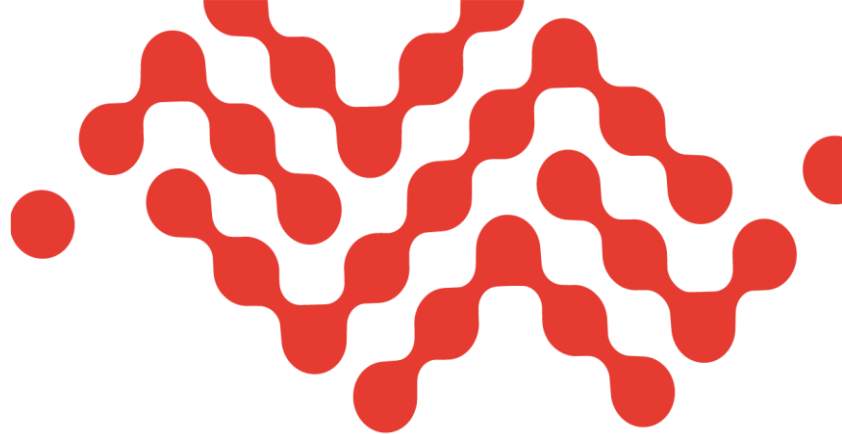
AirPrime® AR Series with Legato® delivers high-speed cellular connectivity for Car-Net platform:

- In-vehicle internet-based services
- Remote vehicle access
- Roadside assistance
- Diagnostics and maintenance



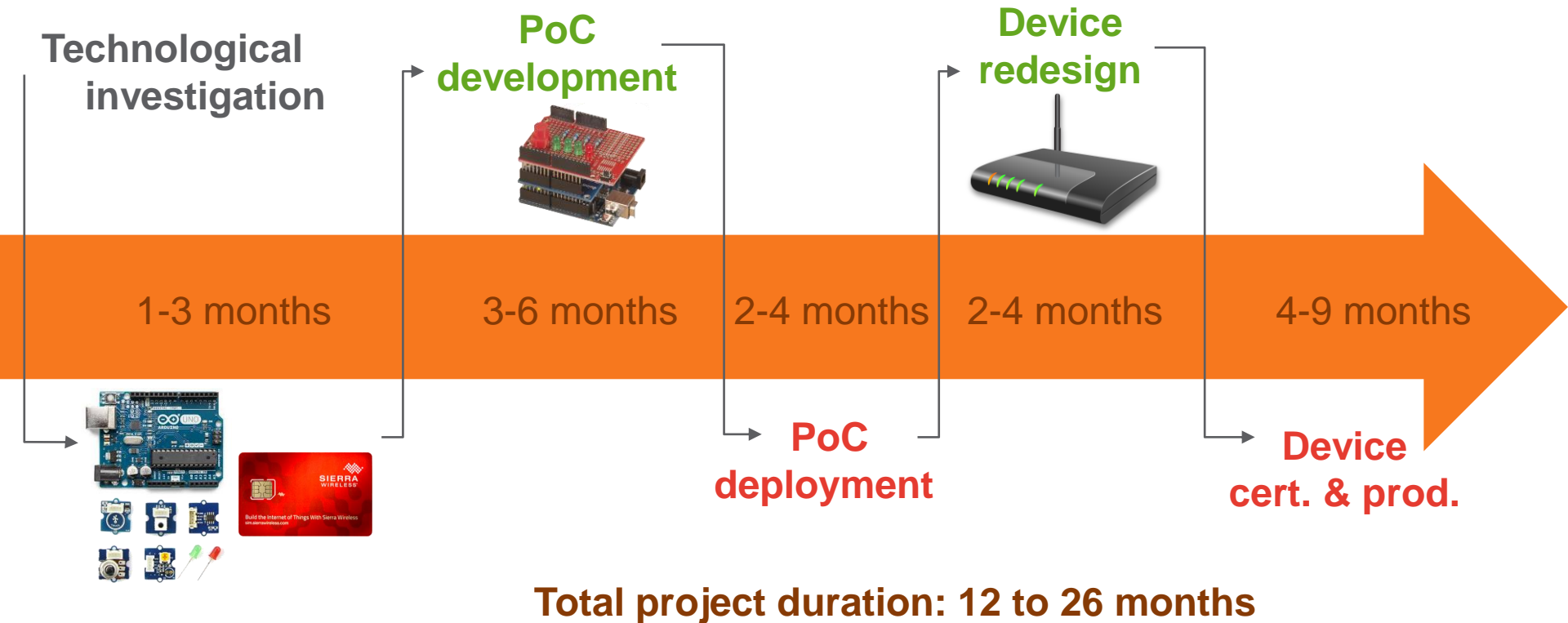
Sierra Wireless and Automotive & Mobility customers





How to foster innovation with open hardware

Typical IoT Solution Development Cycle



Requirement #1 - Easy to prototype

Ease of use

- All-in-one package with HW & connectivity
- Works out of the box

Code samples

- Time To First Hello World < 1 hour

Flexibility

- Application processor choice
- Tooling & language choice
- 3D printable and modifiable files

Expandability

- Arduino & Raspberry Pi ecosystem leverage
- Accept multiple sensors & networks
- Extension boards & options



Requirement #2 - Easy to productize

Industrial design

- Industrial-grade onboard components
- Industrial connectors

Pre-certified hardware

- Pre-certified radio modules

Business-friendly licenses

- Creative Commons Attribution
- Allows to modify & resell with no strings attached

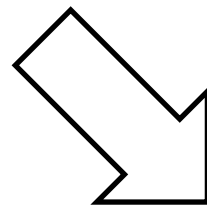
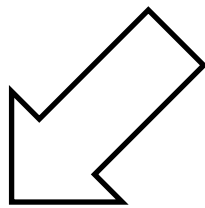
Modular design to continue to adapt

- Accept multiple sensors & networks
- Extension boards & options



Requirement #1: IoT Hardware choices today

Proprietary devkits



Open source boards



Telit



u-blox



Raspberry Pi



Arduino



Gemalto



Sierra Wireless



Beagle Board



MangOH

MangOH Open Hardware: One-go reference platform

IOT Connectors provide
plug and play wireless,
wired, sensor
connectivity



Bluetooth®

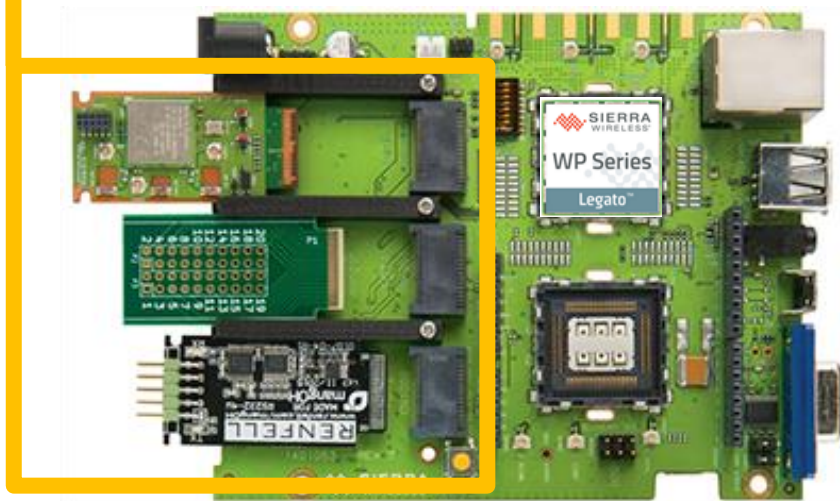
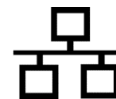


THREAD

dust
networks®

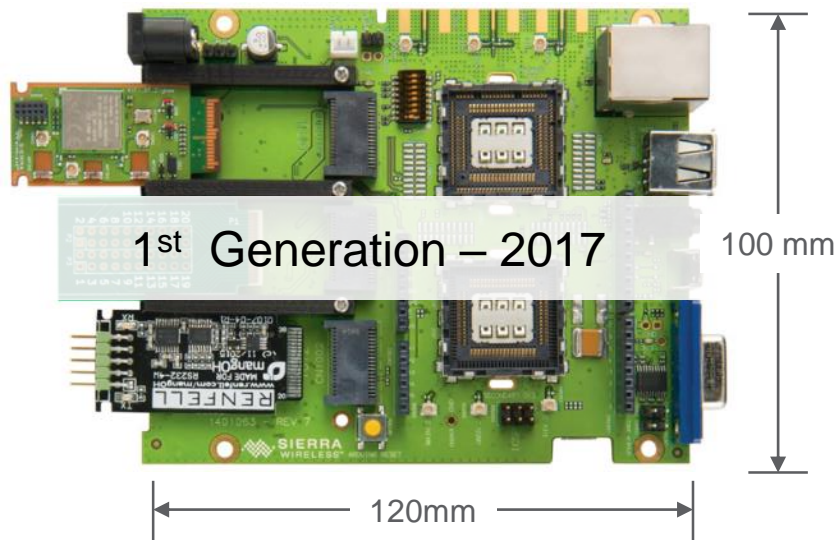


PROFI
BUS

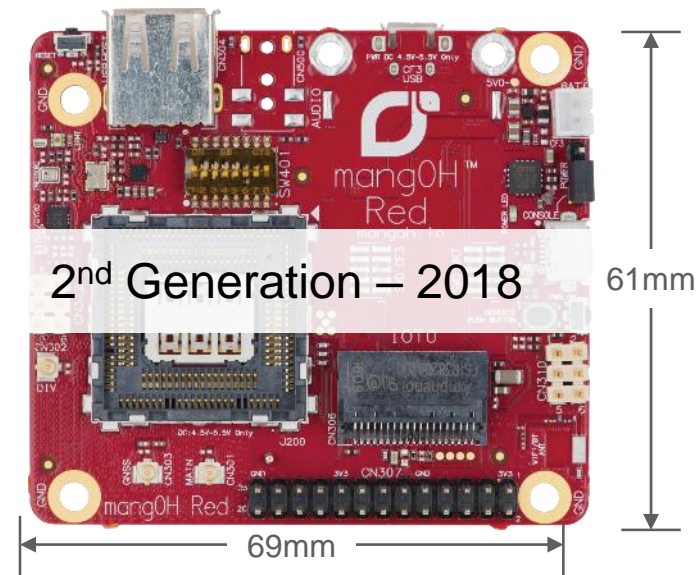


MangOH : Evolving to meet your needs

 mangOH™ Green

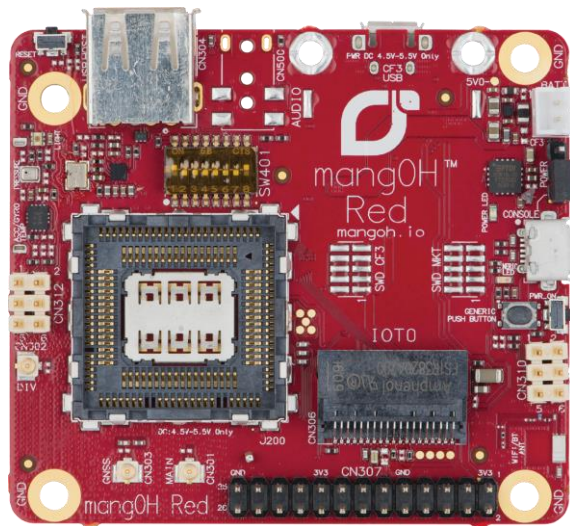


 mangOH™ Red

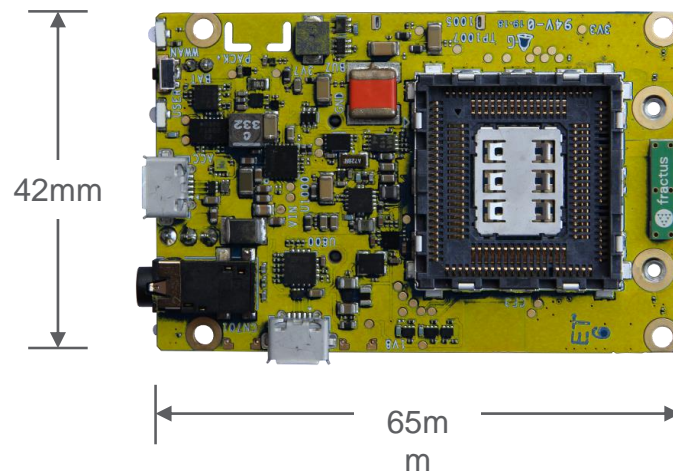


MangOH Yellow: Super Smart Edge for IoT

 mangOH® Red

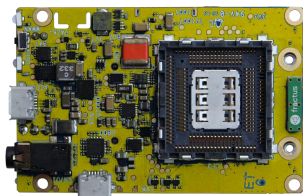
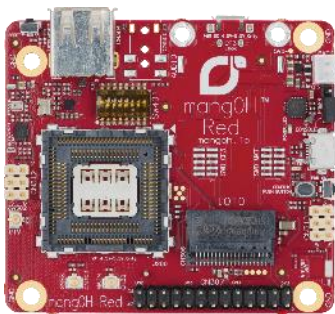


 mangOH® Yellow



MangOH ecosystem ready for you

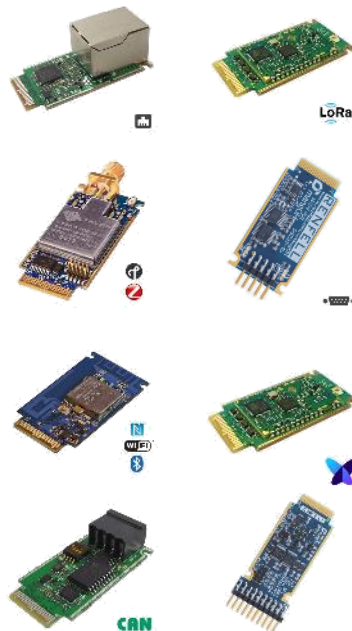
BUILT AND
TESTED



BUILT ACTIVE
COMMUNITY



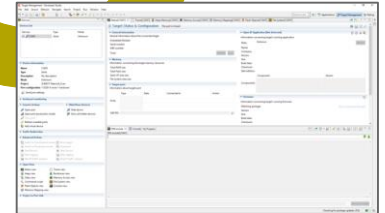
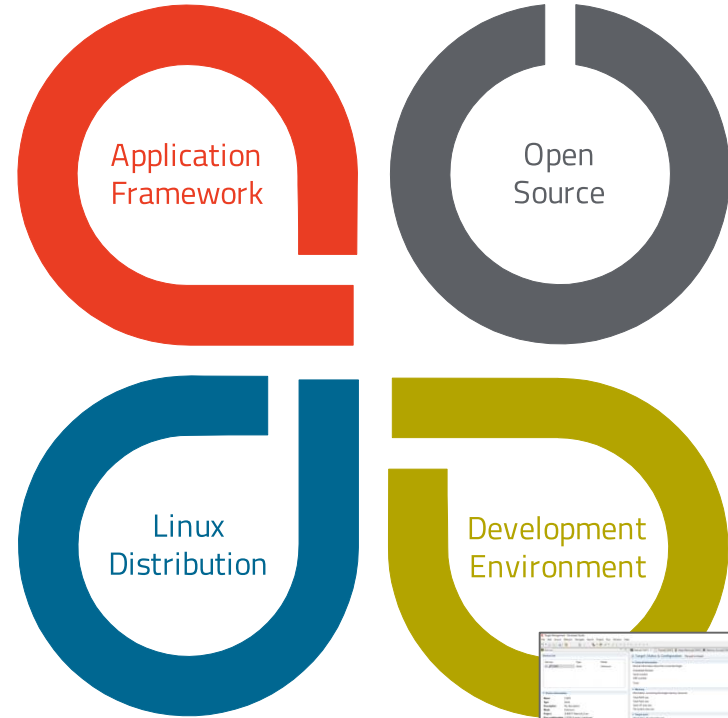
LAUNCHED
IOT CARDS



TUTORIALS
AND VIDEOS



Rapid development on the software side: Legato



MangOH and Legato: Open source initiatives

Test your prototype in market conditions

Develop your applications

 Legato®

Open source Linux embedded
application development platform

legato.io

 mangOH™


Open source sensor-to-
cloud hardware platform



mangoh.io

IDEA
to
PROTOTYPE
to
PRODUCT

The business license issue: what is Open Hardware?

- Design published in the **public domain** (including source files)
- **Business-friendly** Open Source License ( "CC attribution")
 - Freely available to share, copy and modify
 - Freely available to build commercial products with no restrictions / fees attached
 - Non-revocable license
- **IoT needs:** highly expandable (natively, with no need to modify the design)

Goals

- Encourage copies, new hardware designs, business
- Build a developer community & a business ecosystem

Open Hardware Licenses – examples

	Schematics & Gerber published	Free to copy & modify	Business friendly license	Open processor & drivers	Industry Usage
Raspberry Pi	YES	NO – Proprietary	NO – Proprietary	Proprietary (Broadcom)	Demos & technology testing
mBed HDK	YES	NO – Proprietary	NO – Proprietary	Proprietary (ARM)	ARM dev kit
Arduino	YES	YES	CC share-alike*	Atmel + Arduino certified procs	Build open source product upon it
BeagleBoard	YES	YES	CC share-alike*	Proprietary (TI)	Build open source product upon it
Particle (Spark)	YES	YES	CC share-alike*	Proprietary variants (TI, ...)	Build open source product upon it
Tessel	YES	YES	CC share-alike*	Proprietary (ARM)	Build open source product upon it
openPicus	Partly (no Gerbers)	YES	Yes – CC attribution	FlyPort interface OSS framework	Build commercial product upon it
mangOH	YES	YES	Yes – CC attribution	CF3 socket OSS framework	Build commercial product upon it

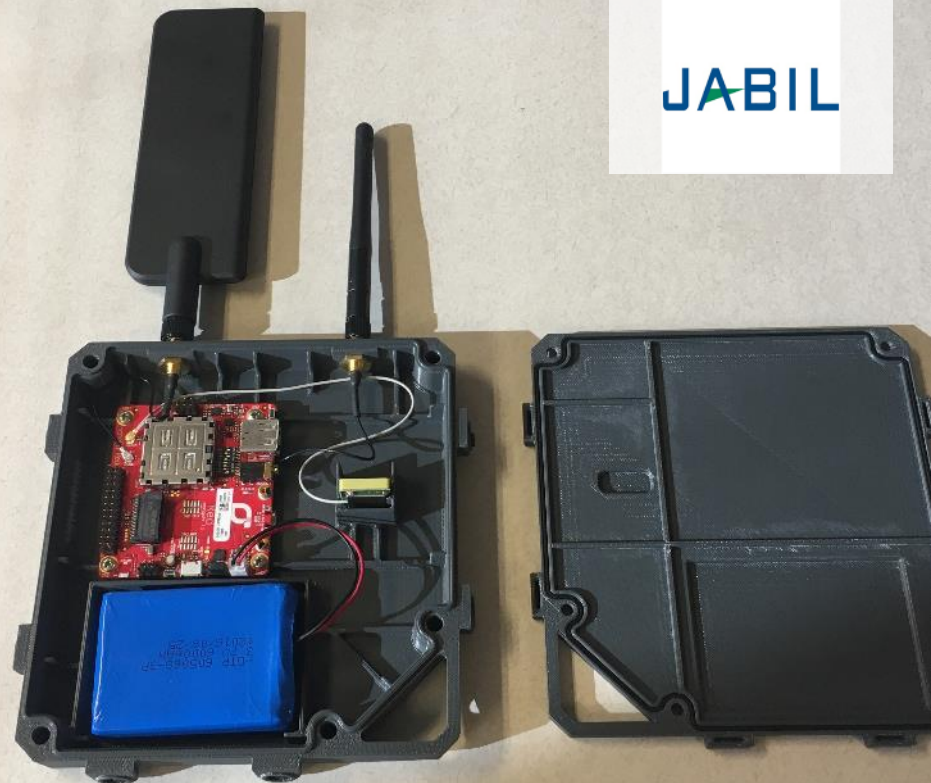
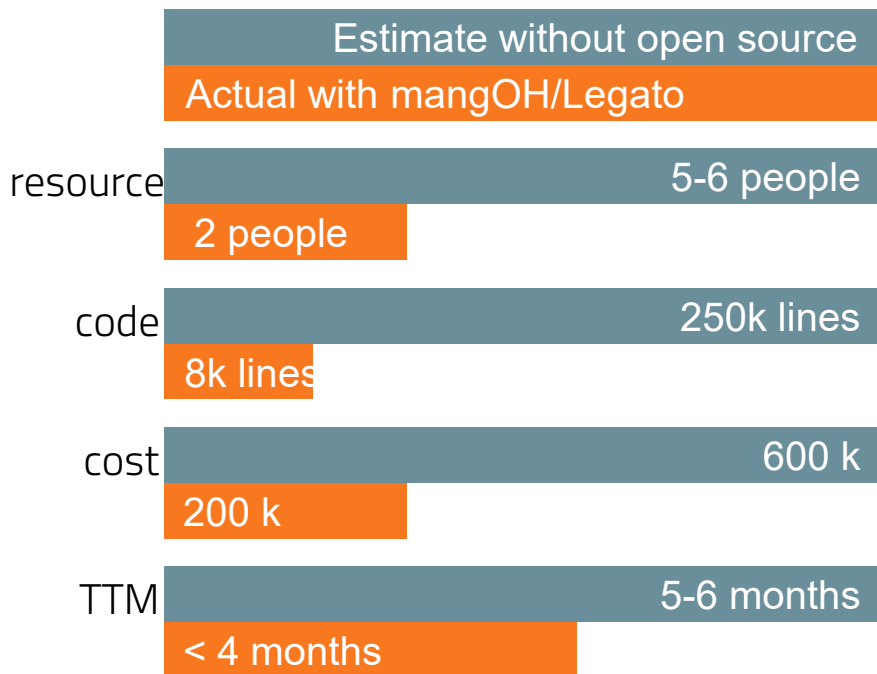
Disclaimer: When selecting an open hardware platform other important criteria to consider include: processor/micro-controller, hardware features, extensions, operating systems, tooling, code samples, community, ...

*viral license: the resulting product must use the same license.

Agricultural Asset Tracking

Location and health of assets

JABIL

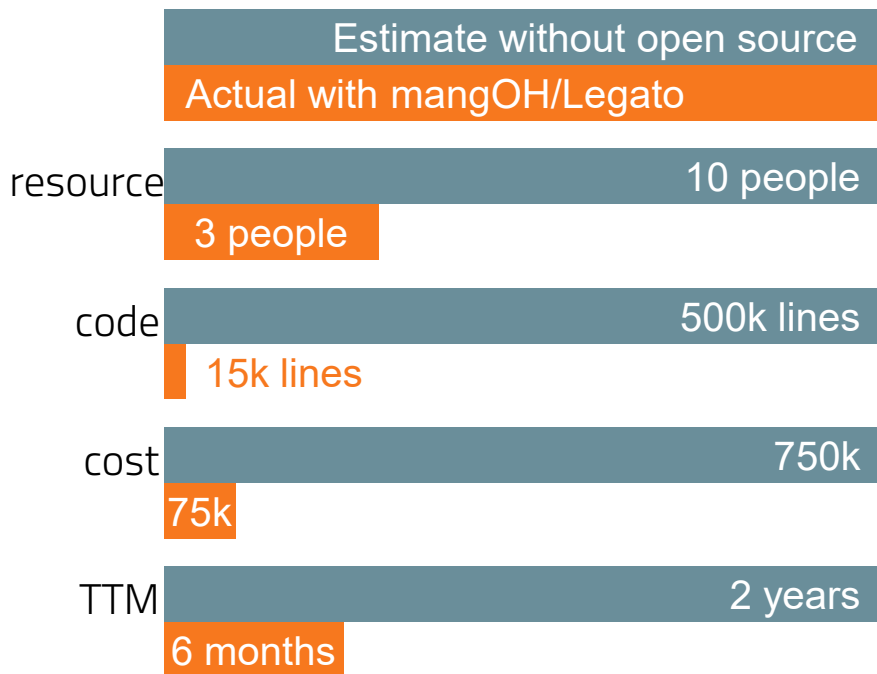


“By using mangOH Red and Legato framework, the POC for 100 units was deployed in field trials within 3 months!”

Rafael Renno
Senior Business Director

Smart Boat

remote monitoring for your boat

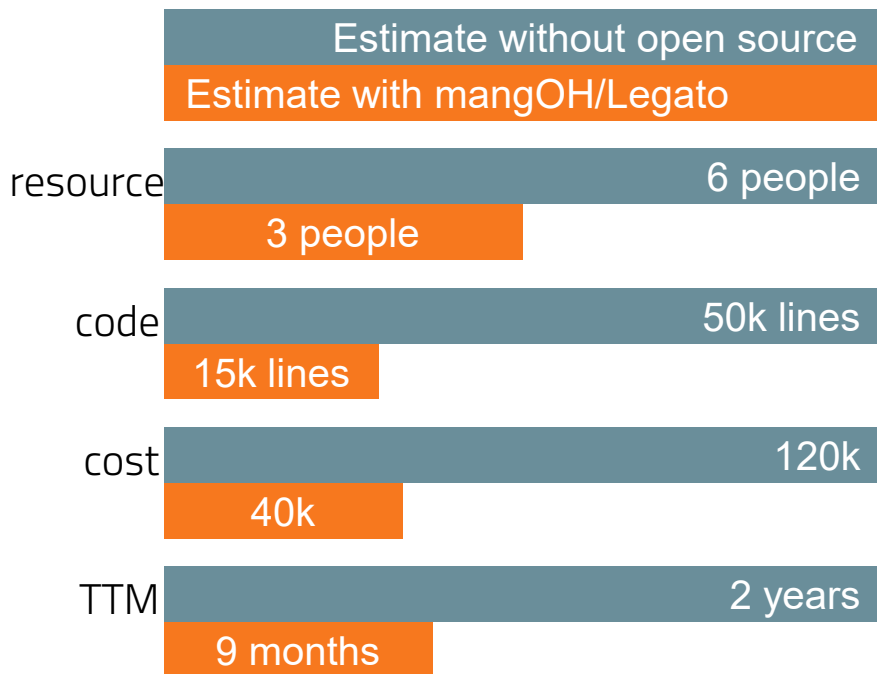


“Legato and the open source MangOH development hardware allowed us to design and launch our product within 6 months!”

Brandon Wright
CEO, Brnkl.io

Drone as a Service

Surveillance Data Provider



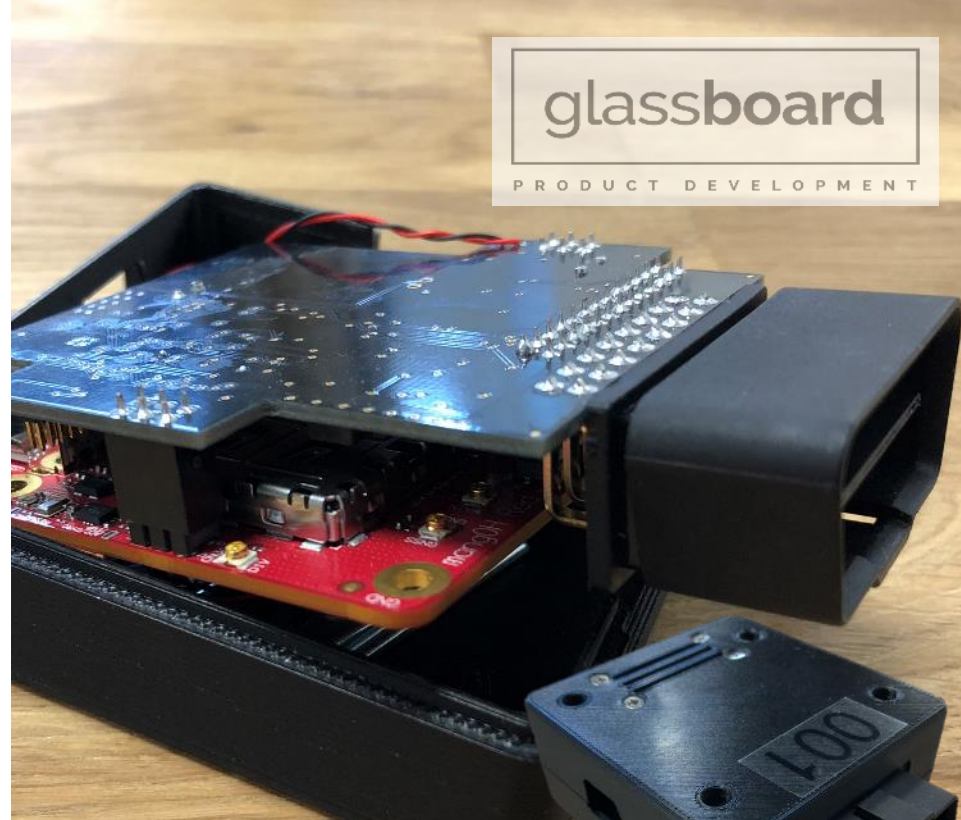
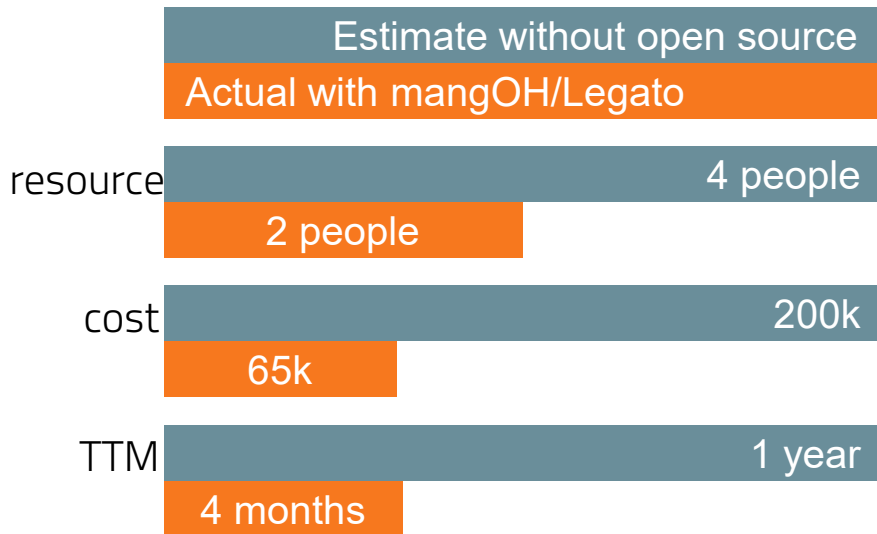
“The MangOH Red open hardware will allow us to create our MVP and redesign and launch or product all within 9 months! Legato has greatly simplified the access to the board sensors!

Enric Pastor

Research Lead, UPC Barcelona

Vehicle Tracking

Telemetry Data

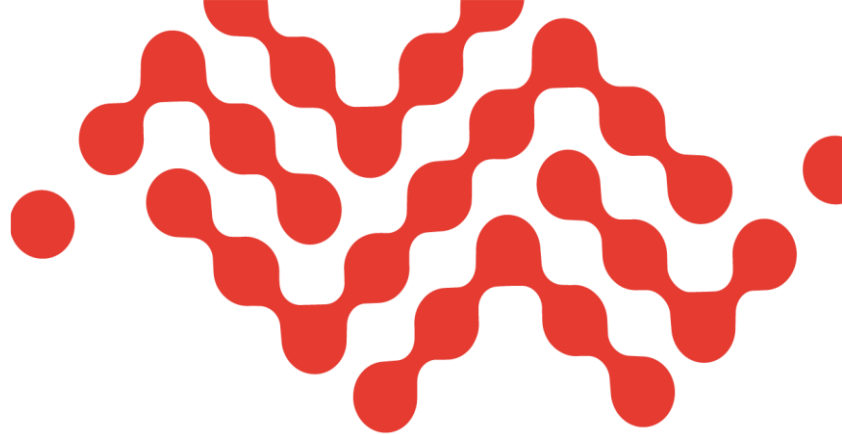


“The mangOH red prototyping platform and Legato application framework allowed Glassboard to design and deploy a 100 device vehicle asset tracking platform pilot in just four months!

Drew Westrick
VP of Technology

Other examples in Toulouse





New Cellular Networks with 4G+ and 5G
Massive IoT (LTE-M and NB-IoT)
Critical IoT

Massive IoT – also known as Cellular LPWA / Mobile IoT



Cellular LPWA – Mobile IoT



NB-IoT

PLUS all the benefits of cellular

C

COVERAGE

5-10x greater than 4G LTE
2x better than LoRa



C

CONSUMPTION

100x lower power than 4G LTE
10+ years battery life



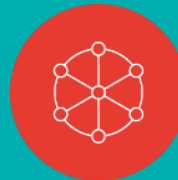
C

COST

50% reduction from 4G LTE
Think 2G or Bluetooth



Global Service



Trusted Ecosystem



Durable Investment

Beyond the 3 C's – do not forget some business aspects



Global Service

Global Coverage
675+ Networks
140+ Countries



Trusted Ecosystem

Healthy competition
Flexibility
Built-in Security



Durable Investment

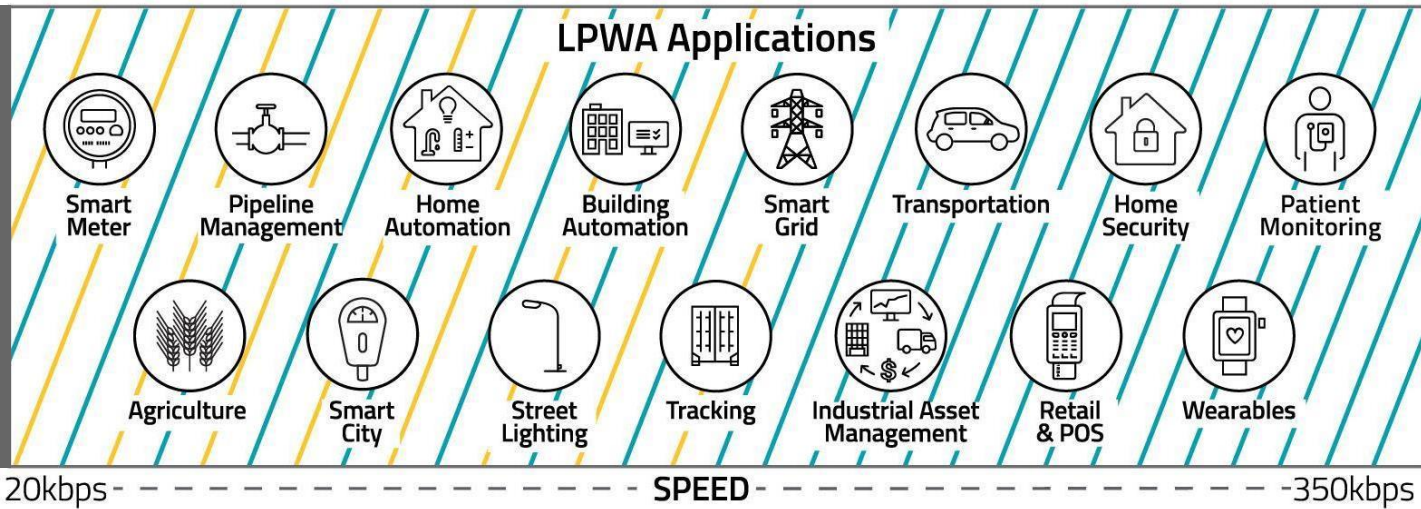
Scalability
Long-term availability
5G-Ready

- Focused on very low data rates
- Ideal for simple static sensor applications
- Highest bandwidth of any LPWA technology
- Ideal for fixed and mobile applications

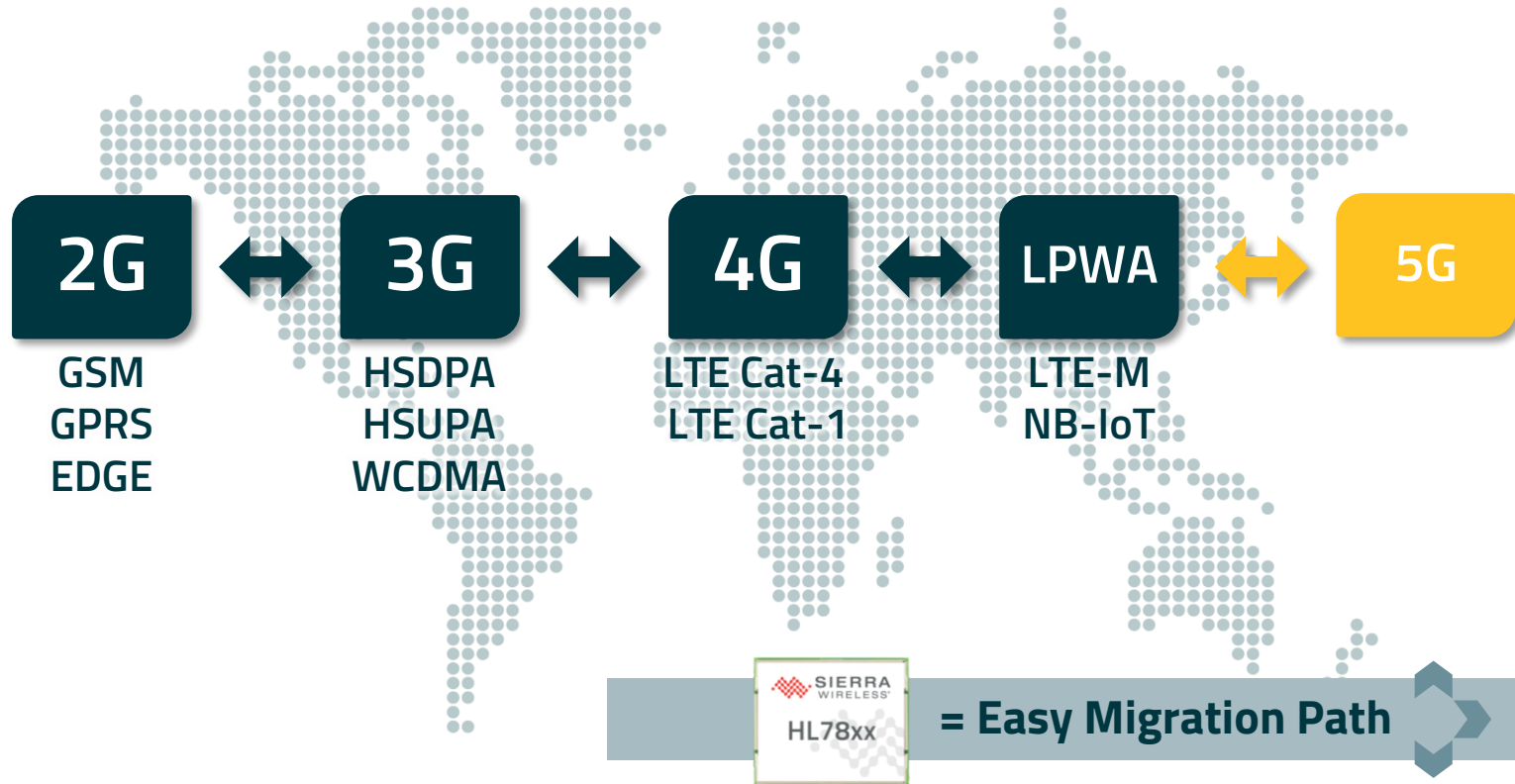
Batch Communication ----- LATENCY ----- Real-Time Communication

Design in multi-mode global modules and choose based on:

- Regional availability
- Lowest rate plans



Scalable cellular module for all cellular generations



Looking forward: think multi-mode modules

- 4G coverage is still a requirement for LTE-M or NB-IoT: think 2G fallback!
- Some operators started with LTE-M, some with NB-IoT
- Network features may not be all available at the same time
- Different use cases may require different access technologies

Focus on scalable multi-mode modules with embedded SIMs



Looking forward: over-the-air evolutions

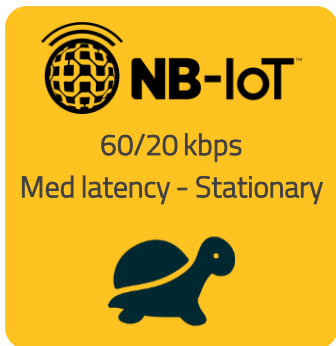
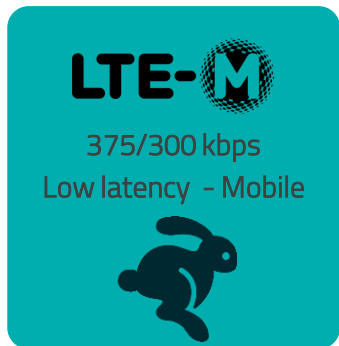
- Firmware upgrades: support for future 3GPP features:
 - Improved coverage (LTE-M EC Mode B), Improved bandwidth (NB-IoT Cat-NB2)
 - Location support (eCell-ID, OTDOA), Message broadcast, Better spectral efficiency...
- Firmware upgrades: the key to security
- Software upgrades: allows your application to evolve
- Smart SIM / eUICC-eSIM upgrades: to switch network operator anytime







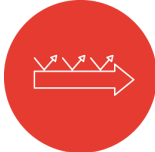

Ready to
Connect
embedded
global SIM



Massive IoT – Cellular LPWA is available NOW



2016: HL77xx First LTE-M modules worldwide
2017: WP77xx LTE-M+NB-IoT (+2G) smart modules
2018: HL78xx 2nd gen. LTE-M/NB-IoT/2G modules
2018: LX60 Integrated LTE-M/NB-IoT routers
All available now

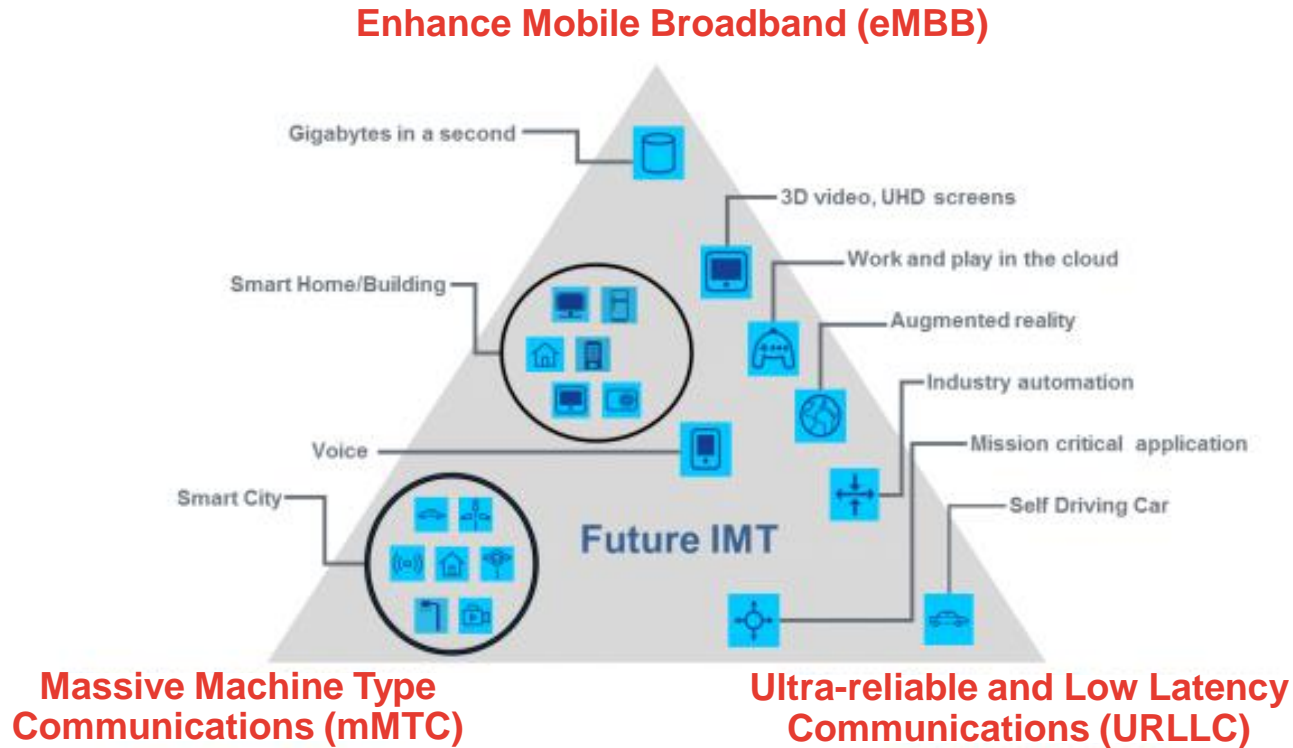
-  Consumption
-  Coverage
-  Cost
-  Global
-  Durable
-  Trusted



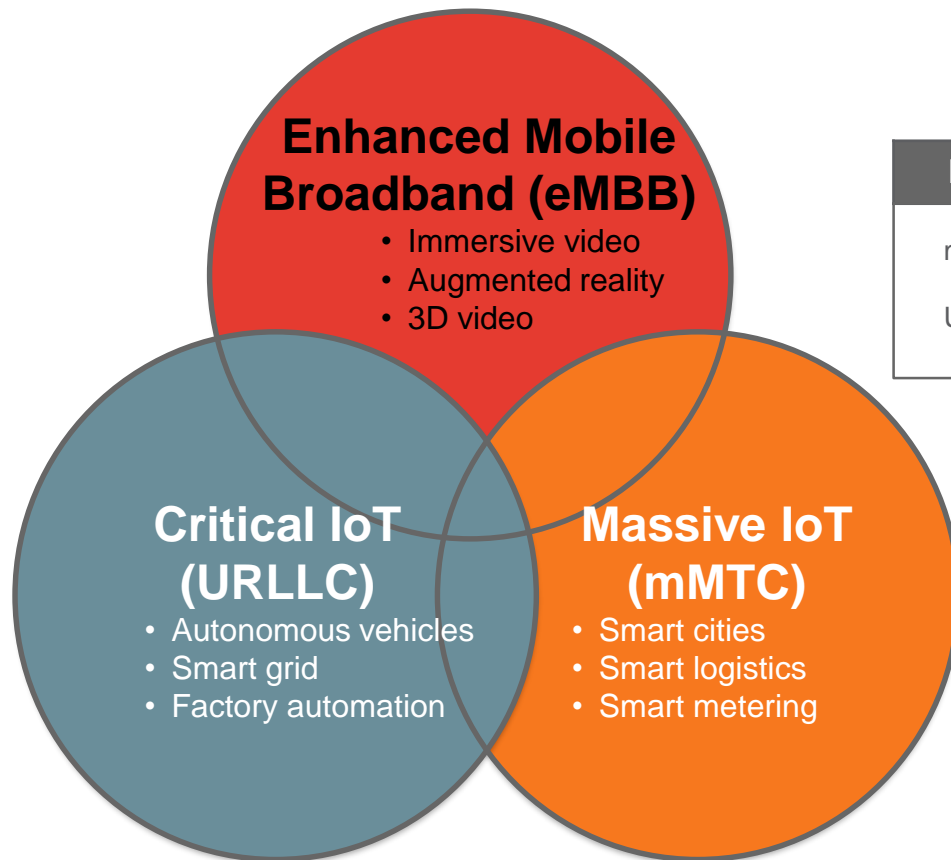
So what was that about...



High-level 5G Use Cases – from ITU



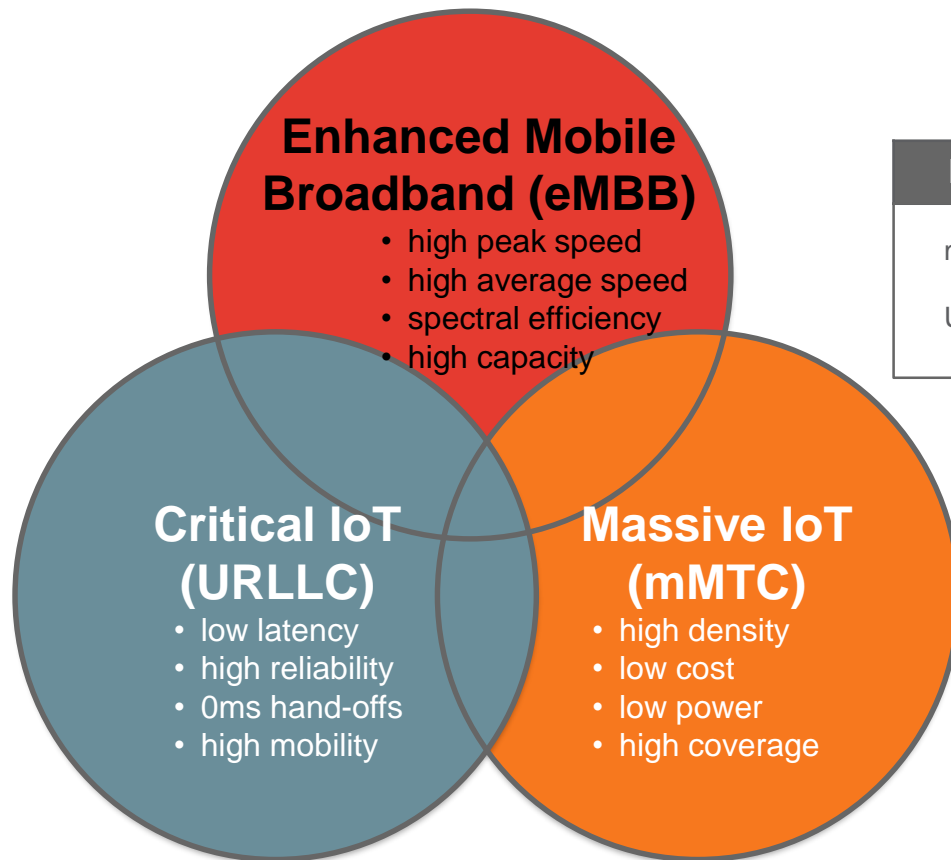
What is 5G exactly?



Definitions

mMTC	massive Machine Type communications
URLLC	Ultra reliable low latency communications

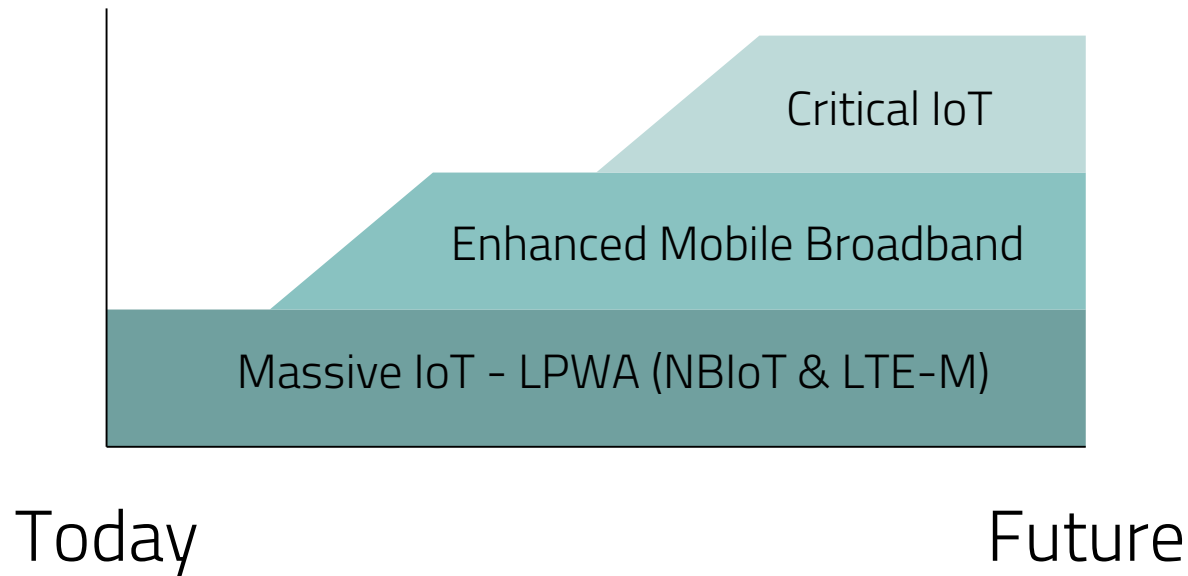
What is 5G exactly?



Definitions

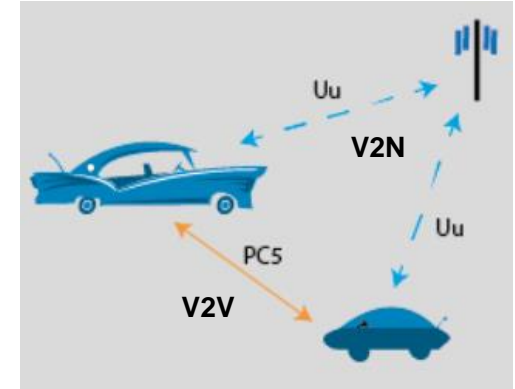
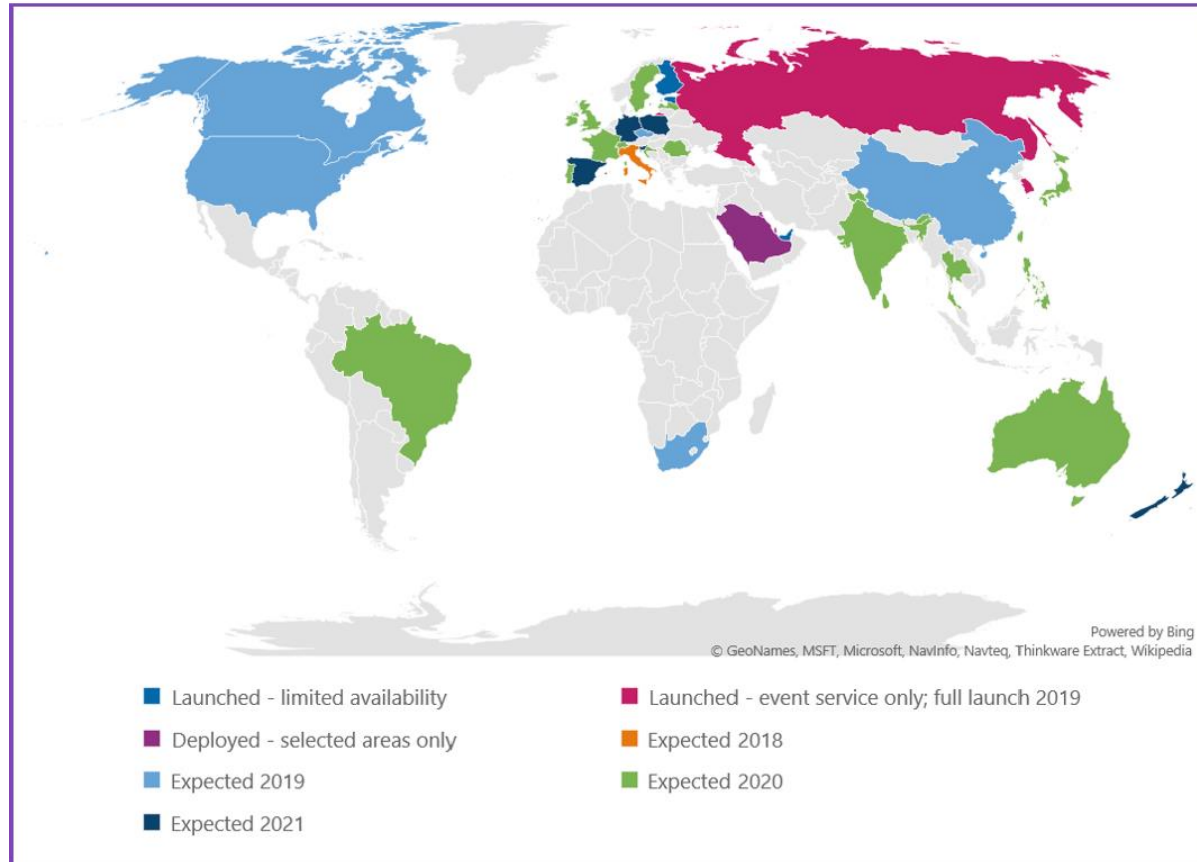
mMTC	massive Machine Type communications
URLLC	Ultra reliable low latency communications

Introduction of 5G pillars over time



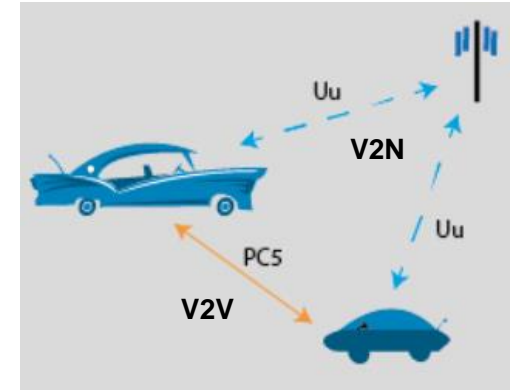
Source: GSM Association

Critical IoT and 5G New Radio – 2019 and 2020



3GPP 5G C-V2X Technology Evolution

- C-V2X includes C-V2N and C-V2V
- C-V2N
 - ONLY SUPPORTED BY LTE – NOT NR!!
 - will naturally follow evolution of 5G LTE and 5G NR
 - requires multi-cast support (MBMS and SC-PTM)
- C-V2V is a major feature V2X
 - C-V2V uses the D2D also called PC5, proximity services, or sidelink
 - In licensed spectrum, V2V needs LTE system support for grants and configuration
 - In dedicated band (5.9 GHz) will not require LTE system support
 - Evolution of C-V2V must be backward compatible
- NR C-V2X is a new R16 study item



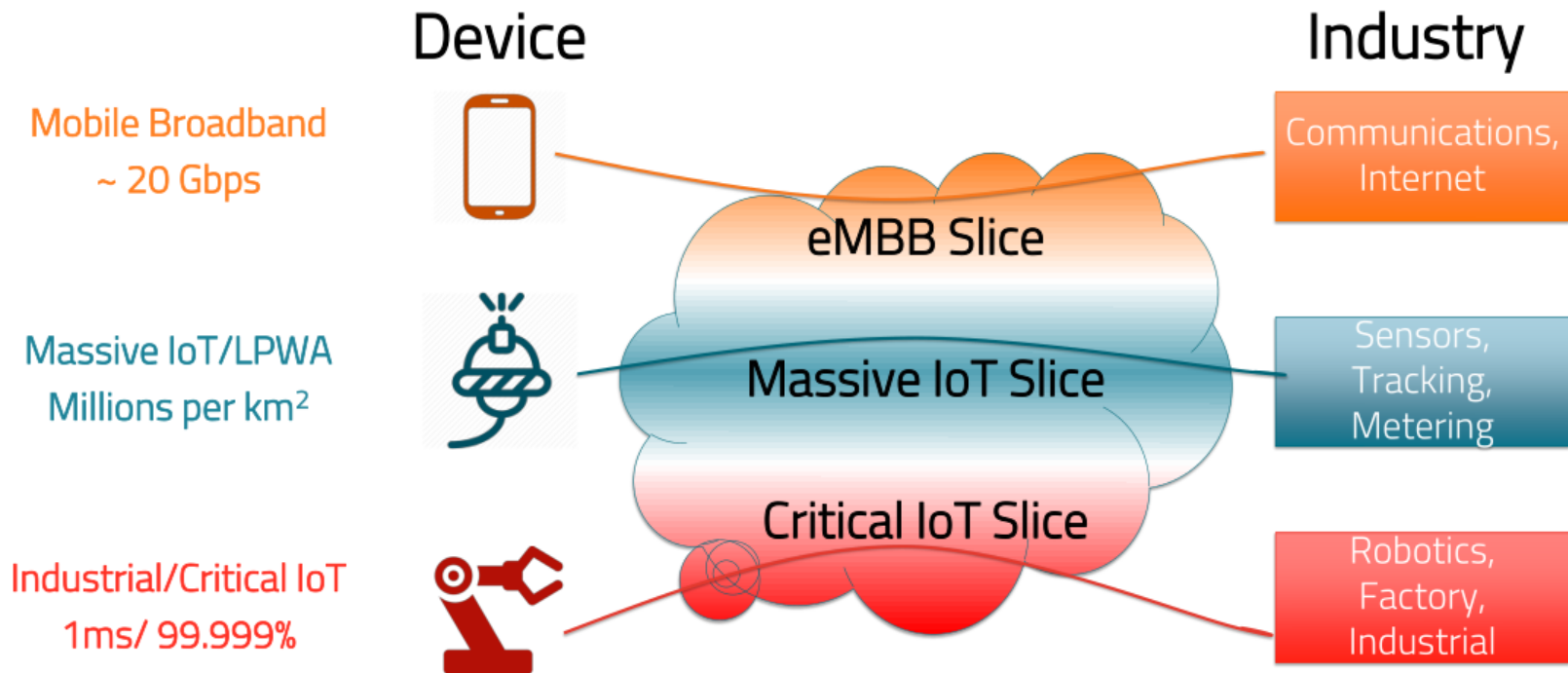
KEY TAKEAWAYS

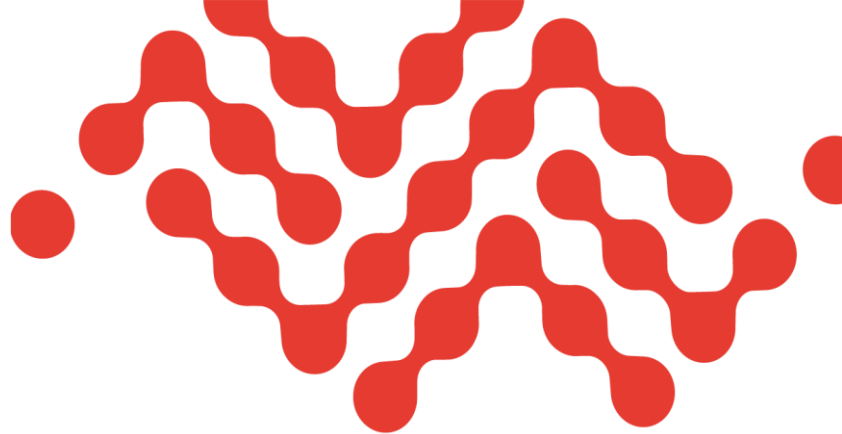
- C-V2N only support by LTE now
- C-V2X evolution independent from 5G LTE and 5G NR
- New Rel 16 NR C-V2X study

5G Bands submitted to 3GPP

Frequency range/LTE band	Operators whose request is included in the frequency range
3.3-4.2 GHz	DOCOMO, KDDI, SBM, CMCC, China Unicom, China Telecom, KT, SK Telecom, LG Uplus, Etisalat, Orange, Telecom Italia, British Telecom, Deutsche Telekom
4.4-4.99 GHz	DOCOMO, KDDI, SBM, CMCC, China Unicom, China Telecom,
24.25-29.5 GHz	DOCOMO, KDDI, SBM, CMCC, KT, SK Telecom, LG Uplus, Etisalat, Orange, Verizon, T-mobile, Telecom Italia, British Telecom, Deutsche Telekom
31.8-33.4GHz	Orange, Telecom Italia, British Telecom
37-40 GHz	AT&T, Verizon, T-mobile
1.427-1.518G	Etisalat
1710-1785MHz/1805-1880MHz (Band 3)	CMCC, China Telecom
2500-2570MHz/2620-2690MHz (Band 7)	CHTTL, British Telecom
880-915MHz/925-960MHz (Band 8)	CMCC
832-862MHz/791-821MHz (Band 20)	Orange
703-748MHz/758-803MHz (Band 28)	Orange
2496-2690MHz (Band 41)	Sprint, China Telecom, C-Spire, China Unicom
1710-1780MHz/2110-2200MHz (band 66)	T-mobile
1920-1980MHz/2110-2170MHz (Band 1)	China Unicom, China Telecom

5G Network Slicing





Recent and future events – on the field

IoT for Mobility: not only in the car, from the train...



orange™

Fichier Édition Affichage Historique Marque-pages Outils ?

Orange Developer Challenge : l'IoT X

https://www.digital.sncf.com/actualites/orange-developer-challenge-l-iot-au-service-des-problematiques-sncf

#DIGITALSNCF

Accueil / Actualites / Orange Developer Challenge : l'IoT au service des...

ORANGE DEVELOPER CHALLENGE : L'IOT AU SERVICE DES PROBLÉMATIQUES SNCF

Lundi 10 décembre, après un mois de travail, les seize équipes en compétition ont pu présenter leur solution aux onze cas d'usage soumis par SNCF lors de la finale de l'Orange Developer Challenge. L'occasion de découvrir de potentiels partenaires et d'aborder de nouveaux cas d'usage.

Publié le 09/01/2019 par La Rédaction

VOTRE AVIS ?

SNCF

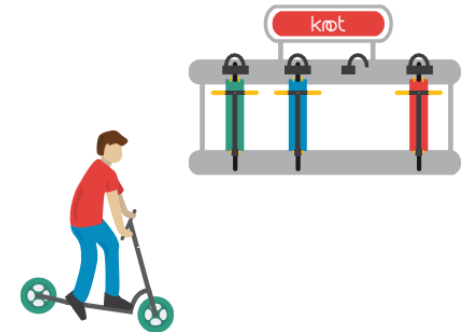
Nov.-Dec.
2018

<https://tinyurl.com/iot-sncf-challenge>

IoT for Mobility: ... to connected bikes and scooters



LTE-M Launch Workshop
November 22nd 2018



Open Connected Car Challenge – Coming up soon

Location: Paris

Kickoff: 19th February 2019

Duration: 1.5 month March-April 2019

Fabrique des mobilités

<http://lafabriquedesmobilites.fr/>



Contact Sierra Wireless if interested!



Sierra Wireless



Kisio
Etudes & Conseil



Movin'On LAB
Michelin



Richardson RFPD



AFD



Agence de l'Environnement
et de la Maîtrise de l'Energie

ADEME

Prizes of 1000, 2000 and 5000 EUR

5G in France with Orange



Challenge 5G

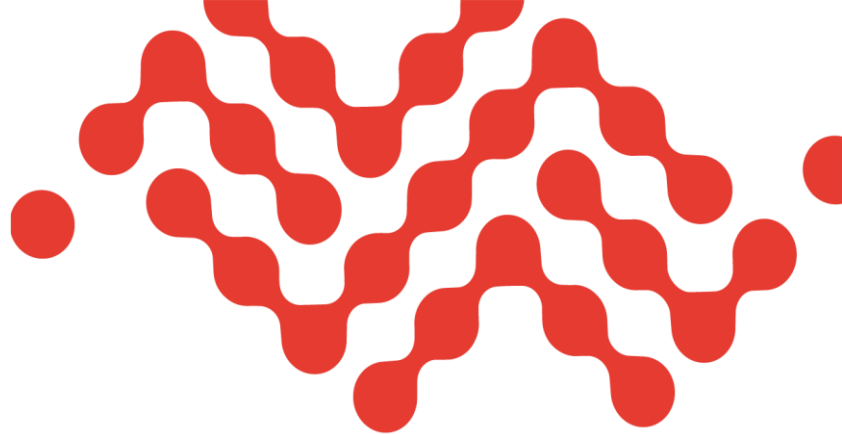
orange™

Challenge 5G

Challenge Start-up

43 jours restants

<https://challenge5g.orange.com/fr/challenges/startup>



Merci

ndamour@sierrawireless.com