



RFID FOR TIRES LET'S GET INTO THE HEART OF THE IOT



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RAIN ALLIANCE MEETING
Americas
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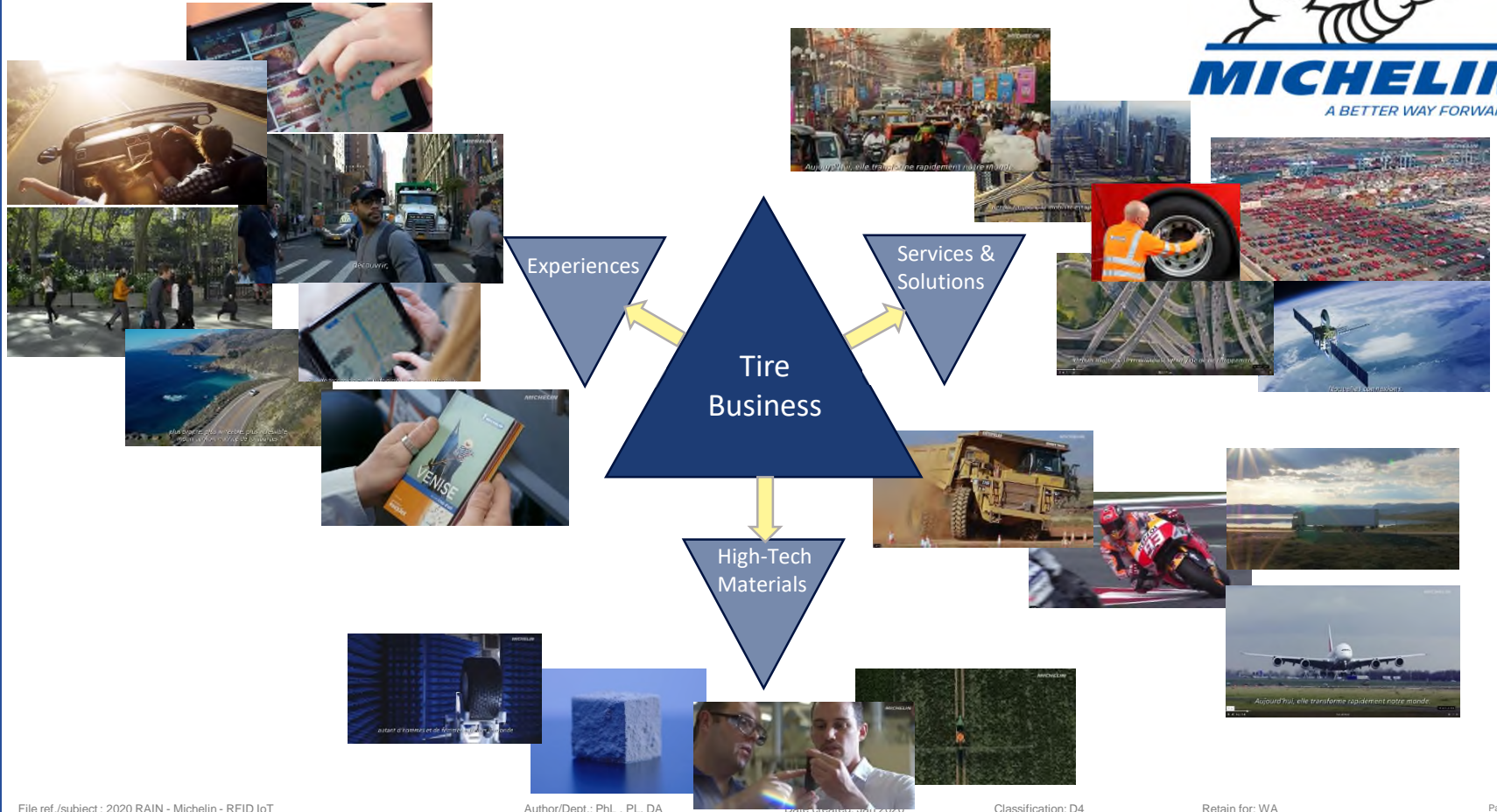


AGENDA

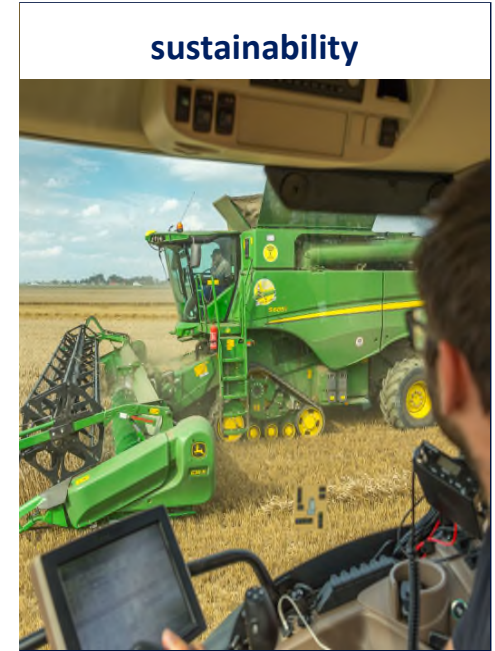
- THE MICHELIN CONNECTED MOBILITY DOMAIN**
- WHY RFID FOR TIRES?**
- WHY RAIN RFID TECH FOR TIRES?**
- KEYS TO GLOBAL TIRE INDUSTRY ADOPTION**
- WHERE WE NEED HELP FROM THE RAIN ALLIANCE**



THE MICHELIN CONNECTED MOBILITY DOMAIN



AIMING AT BRINGING OUR CUSTOMERS A GLOBAL MOBILITY EXPERIENCE





WHY RFID FOR TIRES ?

A COMPLEX PRODUCT LIFE CYCLE : MANY VALUE POINTS

Manufacturing



Storage

1st mounting
OEM



Dealer

After manufacturing equipment



Retreading



Retrofitting



End of Life

RFID embedded

After retreading, embedded RFID identifies the carcass and not necessarily the tire

RFID patch possible

RFID patch

RFID patch can identify the tire when not initially equipped with RFID

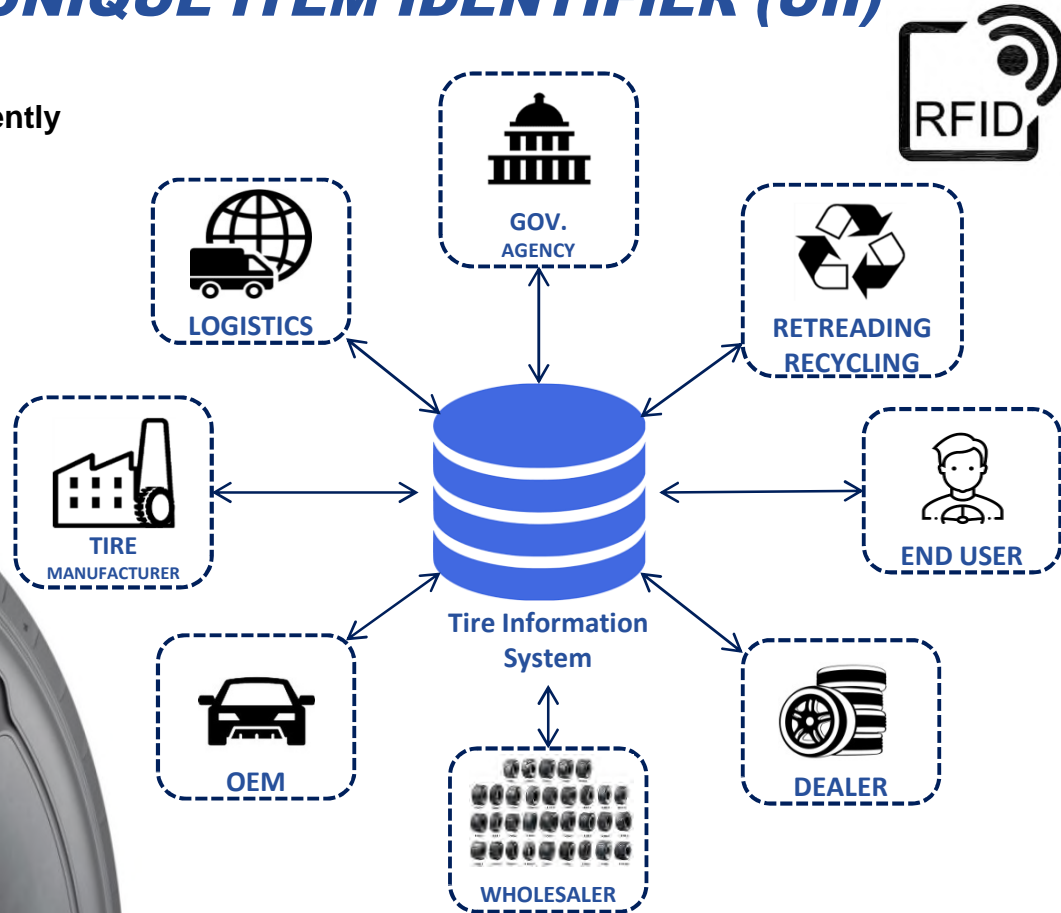
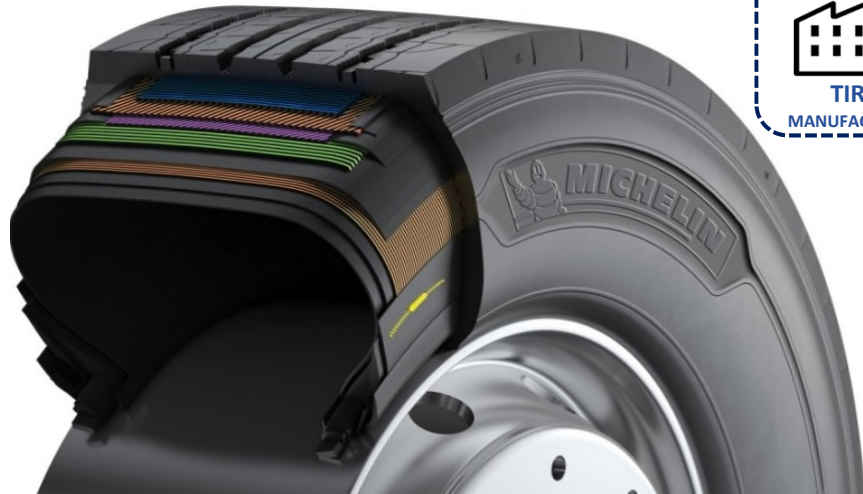
RFID sticker

Fair cost - Some lost on the way



REQUIREMENTS FOR A UNIQUE ITEM IDENTIFIER (UII)

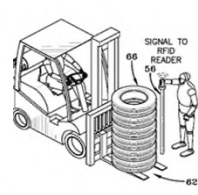
- Identifier: **unique, reliable, unfalsifiable, permanently readable** over the whole life cycle of the product
- Standard coding
- Unique Item Identifier (UII) which points to the industry's databases



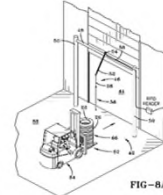
USE CASE: AUTOMATED TIRE INVENTORY WITH DRONE RFID READERS



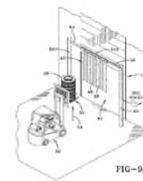
Tire Storage Area



EP2733639

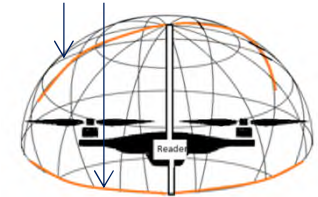


EP2680188



Example of solution

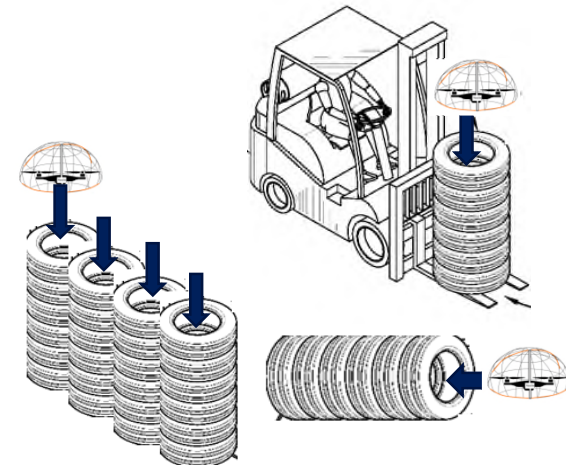
- Embedded RFID Reader
- Light structure protection
- Printed antennas (dipole alike) shifted 90° to cover orientations



Tire RFID Reader Drone

Real time inventory and individual tire location inside a shop

- Drone is equipped with a RFID reader, typically able to read the tire RFID tag
- The drone reader can be used as an operator assistant and guided through a dedicated area of the shop or some pre assigned tire stacks
- The drone can get inside tire stacks and read every tire RFID tag when stacks are oriented either vertically or horizontally and then extract itself from the stack for going to another mission
- The drone can be used in a more autonomous way when guided by an onboard camera and associated image analysis or an onboard radar or contact detectors
- Multiple drones could cooperate and share the work
- Drone can be assisted (localization) with fixed electronic markers inside the shop such as RFID tags fixed to the ceiling of the shop, forming a location map
- The RFID reader antenna can be part of the drone outer structure which helps to protect the drone from possible collisions with the shop structure and/or the tires during operations

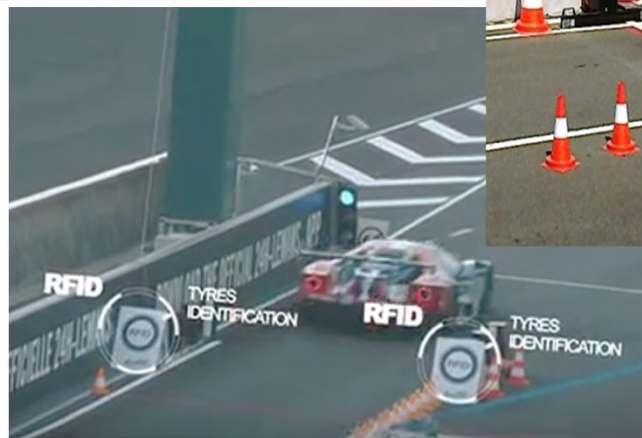


USE CASE: WEC (WORLD ENDURANCE CHAMPIONSHIP) RACING



RAIN RFID enables Live Tire information on TV from “Le Mans 2017”

- Traceability of tires from the factory to the event
- Automatic control of tire consumption per vehicle (along FIA rules)
- Save the cost and the pain from manual control
- Flexible implementation when changing FIA rules
- Enhance Tire & Team information on TV



USE CASE: TRUCK & BUS TIRES MAINTENANCE RFID



Zero data errors with RFID & faster tire inspections (up to x5)

- Fast and reliable information tracking of every tire status, including
- Tire ID , pressure, tread depth, tire aspect



AND MANY MORE CURRENTLY IN DEVELOPMENT...

R&D

- *Field placement*
- *Testing*
- *Traceability*



Supply chain

- *Traceability*
- *Tracking efficiency*
- *Customer satisfaction*

Distribution

- *Logistic efficiency*
- *Recall management*
- *Dealer stock management*
- *End of life*

OEM

- *Tire/wheel/vehicle traceability*
- *Advanced connectivity*
- *Logistic efficiency for fitters*
- *Simplified OE Tire manufacturing requirements*

Fleet

- *Inventory management*
- *Operations follow up*
- *Casing identification*





WHY RAIN RFID TECH FOR TIRES ?

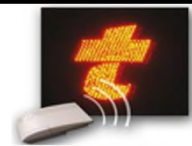
UHF RFID OFFERS A FAIR PERFORMANCE SPECTRUM

UHF frequency band :

- Reasonable tag/antenna size
- Fair read range when inside tire
- Single product identification AND Inventory are both accessible



No Battery / Passive Class 0,1,2



LF
ISO 18000-2

HF
ISO 18000-3

UHF
ISO 18000-6 (860-960Mhz)
ISO 18000-7 (433Mhz)

UHF
ISO 18000-4 (2,4Ghz)

Frequency →



KEY BENEFITS OF RAIN RFID TECHNOLOGY



1. DIGITAL

- Digitally readable
- In all conditions
- High speed in reading and writing

2. SECURE

- Unfalsifiable: Ull coding by the tire manufacturer is permalocked
- Robust against damages/aging/robbery/counterfeiting

3. SUSTAINABLE

- Tire traceability is ensured from production to storage/distribution to the entire operational life
- End of Life management is potentially improved

4. UNIVERSAL

- Fitting needs of numerous stakeholders (OEM, Dealers, Governments, Retreaders, Tire manufacturers)
- Flexible: back-end data linked to the specific tire could be securely modified when required
- Future readability of the RFID by the vehicle for enhanced performance, ADAS, autonomous, etc.



KEYS TO GLOBAL TIRE INDUSTRY ADOPTION

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INDUSTRY STANDARDS

- ETRTO, TC-19, USTMA, ...
- ISO TC31/WG10



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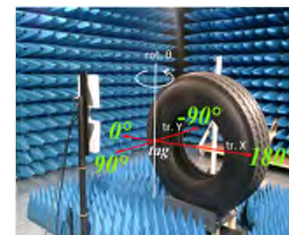
DURABLE TIRE TAG

- Harsh requirements for a RFID tag i.e.
- Survival capability in tough environments: tire manufacturing, retread process, 1 M Km cycling



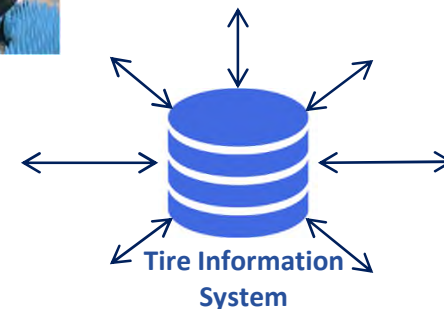
RFID TAG IMPLEMENTATION KNOW HOW

- Mastering of RF communication through tire materials
- Process upgrade / Cost / Tire & Tag durability optimum



CLOUD SERVICE FOR TIRE INFORMATION

- Multi Brands
- WW



BUSINESS / USES CASES GROWTH

FROM LOCAL STANDARD INITIATIVES TO ISO

SUPPORTIVE TIRE RFID STANDARDS INITIATION

- JAIF , AIAG, VDA
- TMC , RMA, ETRTO, USTMA, TC-19

4 ISO STANDARDS TO BE PUBLISHED FROM MID 2019 TO Q1-2020

- Kickoff: 2016
- Conveners : China & France
- Active participant countries : Austria, China, Finland, France, Germany, Italy, Japan, Korea, USA
- Participants : tire manufacturers , RFID tech

FROM LOCAL STANDARD INITIATIVES TO ISO

MID 2019

- ISO/DIS 20909 - Radio Frequency IDentification (RFID) tire tags
 - UHF RFID technology
 - Basic requirements for “Embedded”, “Patch” , “Sticker”
 - 15 cm minimum read distance
- ISO/DIS 20910 - Coding for Radio Frequency IDentification (RFID) tire tags
 - SGTIN96 coding permalocked by tire manufacturer. Optional User Memory

Q1-2020 (FDIS)

- ISO/CD 20911 – Tagging technology classification for RFID tire tags
 - Basic technology definition for “Embedded”, “Patch”, “Sticker”
 - Sidewall marking
- ISO/CD 20912 - Conformance test methods for RFID enabled tires
 - Open Space Method
 - Semi Anechoic Method

CODING FORMAT & TIRE MARKING

**Tire / Unique
Item
Identification**



Format SGTIN96 compliant to the EPC Standard

Header

Company



Item

Serial



RFID emblem (ISO/IEC 29160)
OPTIONAL per ISO/CD 20911



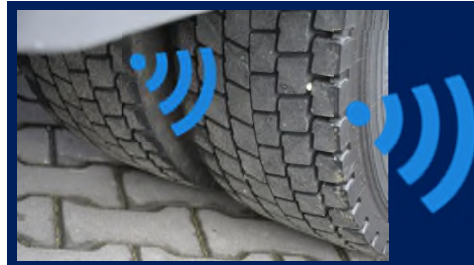


WHERE WE NEED HELP FROM THE RAIN ALLIANCE

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Directional / selective readers or antennas



Distance separation software



Readers/antennas for Batch Inventory Mgt



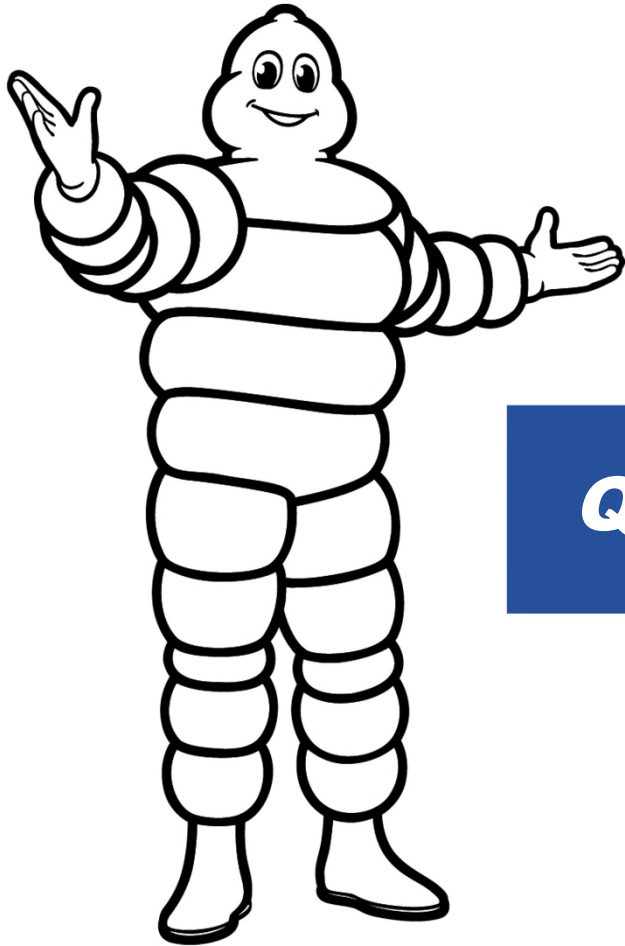
RAIN Smartphones



Embedded readers in cars ?

Thanks to www.clipartkey.com





QUESTIONS ?