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# ***MICHELIN RFID TECHNOLOGY FOR RFID APPLICATIONS***

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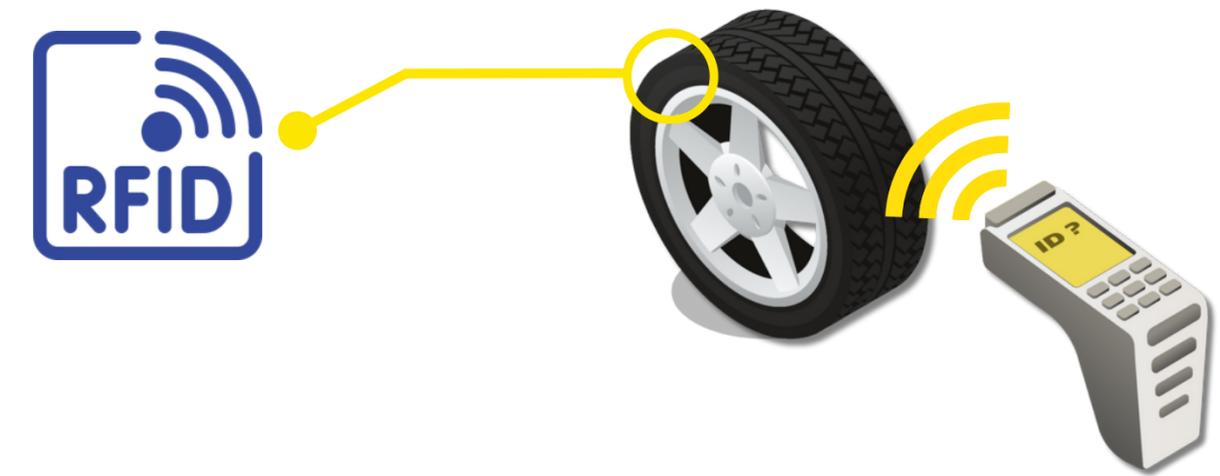
## **MICHELIN BELIEVES THAT “EVERY TIRE SHOULD BE CONNECTABLE!”**

And is promoting the adoption of RAIN/RFID technology as a key enabler for the whole tire life cycle traceability across the entire industry.

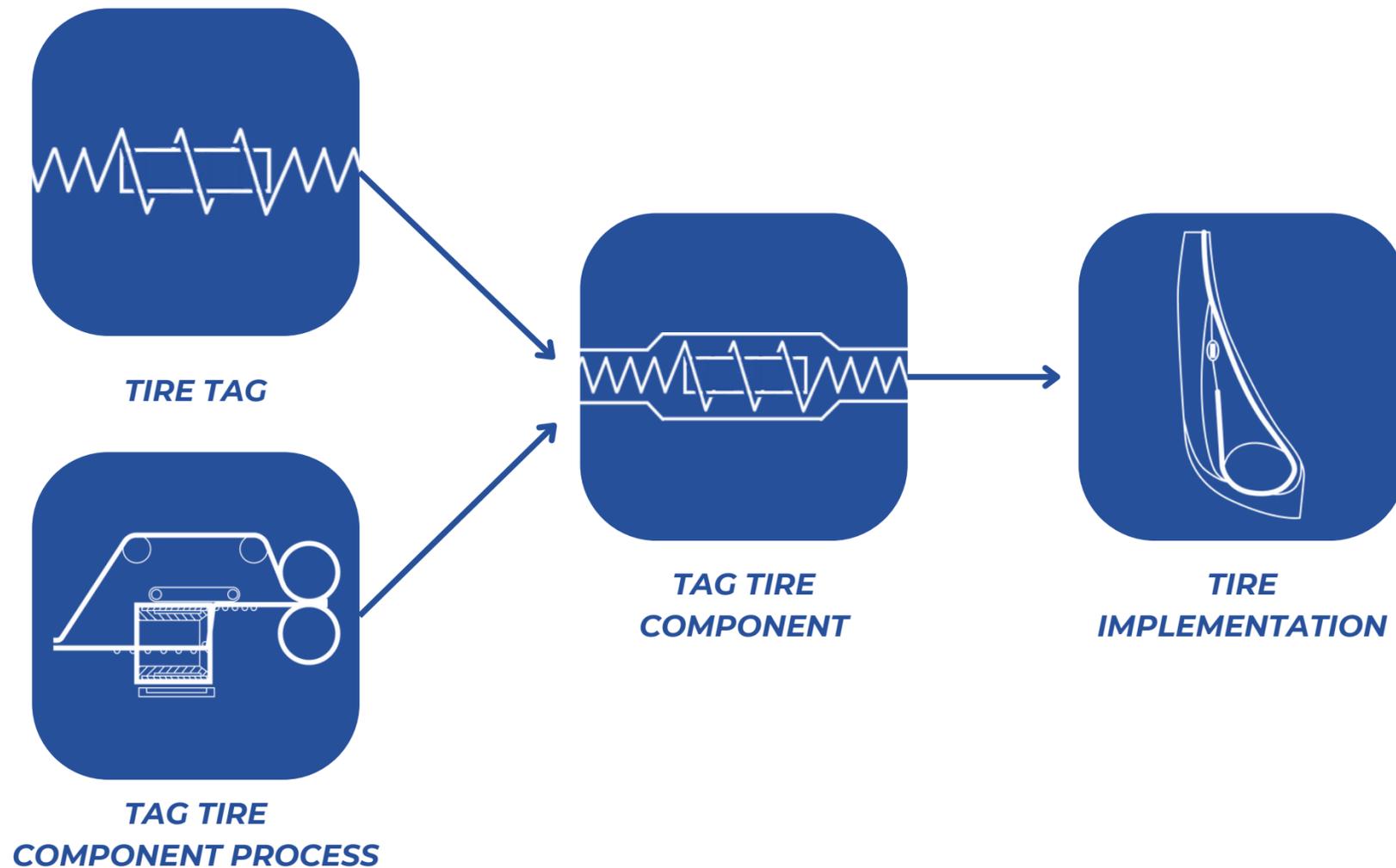
As Michelin and several other tire manufactures have already moved towards extended tire RFID applications, we acknowledge that Intellectual Property control and assessing “freedom of use” of the technology can be among the key questions for every player entering in this new connected tire & mobility era. That is why we have decided to explain, through this brochure, how Michelin has organized its own IP portfolio and under what circumstances Michelin patents could be opened for discussions and licensing.

# IP PORTFOLIO SEGMENTS

Our Tire RFID IP Portfolio is organized in 5 technical domains or segments which could be of different levels of interest for RFID tire Tag makers and/or RFID tag component makers and/or tire manufacturers.



Accessing relevant IP is a good opportunity to accelerate any new technology implementation and to minimize its own company R&D cost !



Company type / Activity type	TAG MAKER	COMPONENT MAKER
Tire Tag	Limited licensing	NA
Tire Component	NA	Open to licensing
Tire implementation	Limited licensing	NA

# TIRE TAG

Tire Tag patent families are related to the RFID tire tag design such as geometry, materials, coating, chip implementation, connectivity, parts assembly.

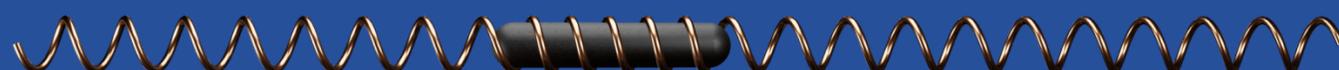
Michelin has significantly invested through its R&D to develop with its partners a so called embedded “tire tag” which can survive not only the tire manufacturing process (new tire and retreads when applicable) but also the whole tire life cycle while in use (sometimes up to one million km / ~0.6 million miles).

Our IP related to the tire tag design is currently licensed to our selected tag manufacturers (See contact information in the Reference section).

We have decided, in the spirit of promoting and accelerating the RFID adoption, that any tire manufacturer could buy the so called “Michelin approved tag” through our selected tag manufacturer, clear of any Michelin tag IP question

## TAG GENERATIONS

Currently the tag design on catalog is from generation 4.x



A new generation of tag 4.x has recently completed a validation process with our suppliers. This new tag generation brings a new paradigm and more specifically a cost reduction. Again, Michelin has decided to open access to this new technology to other tire companies. Our selected tag manufacturer can be directly and privately contacted (See contact information in the datasheet document, Reference section).

DESCRIPTION	PCT PUBLICATION NUMBER
Antenna with conduction coating, insulation, adhesion and process	WO2012020202
Process for tag antenna/wire coating with 2 layers	WO2012020203
Helicoidal / extensible tag antenna combined with an insulation layer/coating Insulation material around a tag	EP1580041 US7009576
RF transponder for tires - Antenna / Helix design	WO2019186068
Antenna characteristics	WO2019025713
Tag with 2 antennas, one for chip-dipole coupling	WO2016193457
RF transponder for tires - Antenna / Helix pitch	WO2019186066
RF transponder for tires - Antenna / Diameters	WO2019186067

# TAG / TIRE COMPONENT, PROCESS, IMPLEMENTATION

A preferred process for implementing an embedded RFID tire tag during the uncured tire assembly is to laminate the RFID tag itself between 2 rubber skims or layers. This “rubber laminated tag” can then be easily placed and attached at the appropriate location while manufacturing the uncured tire.

Laminated RFID TAG



**The tag / Tire Component Patents** families are related to the properties and/or materials of the component itself, including those in the close surroundings of the tire tag.

**The Tag / Tire Process Patents** families are related to the process (manufacturing, machinery) for assembly of the component. Michelin is open for licensing negotiation with manufacturer (potentially component maker).

**The tire Implementation** patent families are related to specific positioning of the tag in the tire construction, material properties in the close surrounding of the tag, means for implementing the tag/component, and coding protocols of the RFID EPC / chip memory. This domain is also propose in the license with the tag generation 4.x.

DESCRIPTION	PCT PUBLICATION NUMBER
Tag location and orientation in the tire bead (APEX) Tag surrounding material properties (stiffness, dielectric)	EP1977912 CN101279574 US9114671 BRP10800915
Tire with tag positioned on the « DOT side” and opposite section of inner liner join On vehicle application of such tires	WO2012/004521
Tag positions in the tire sidewall and in the crown area	WO2018/104620
Various tag positions into a tire construction with reference to specific tag/component properties	WO2021/058905
Various tag positions into a «T&B» tire construction with reference to specific tag/component properties	WO2021/058903
Tag positioning in a self-supporting / run flat tire	WO2018104623
Tag positions in a run flat tire construction	WO2018234649
Tag positions in a run flat tire construction associated to material properties within the tag surrounding	WO2018234650
Codage EPC/SGTIN96	WO2012069753
Codage EPC/SGTIN96 + DOT	WO2013175122
Material properties related to metal adhesion and electrical insulation	WO2018104622
Component with specific material properties including a tag with specific antennas and coatings	WO2018104611



## **REFERENCES**

- ISO 20909 - Radio frequency identification (RFID) Tyre tags.
- ISO 20910 - Coding for radio frequency identification (RFID) tyre tags.
- ISO 20911 - Radio frequency identification (RFID) tyre tags - Tyre attachment classification
- ISO 20912 - Conformance test methods for RFID enabled tyres

4.x Tag specifications :

[LOGO 4.xspecifications.pdf](#) 

**Tire RFID applications :**

<https://www.youtube.com/watch?v=jADlyHQ01N8>  
<https://youtu.be/-gB9J4PC3-k>

**Tire Technology :**

[https://www.youtube.com/watch?v=TK\\_EZ\\_mBXi8&t=9s](https://www.youtube.com/watch?v=TK_EZ_mBXi8&t=9s)

## **CONTACT**

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