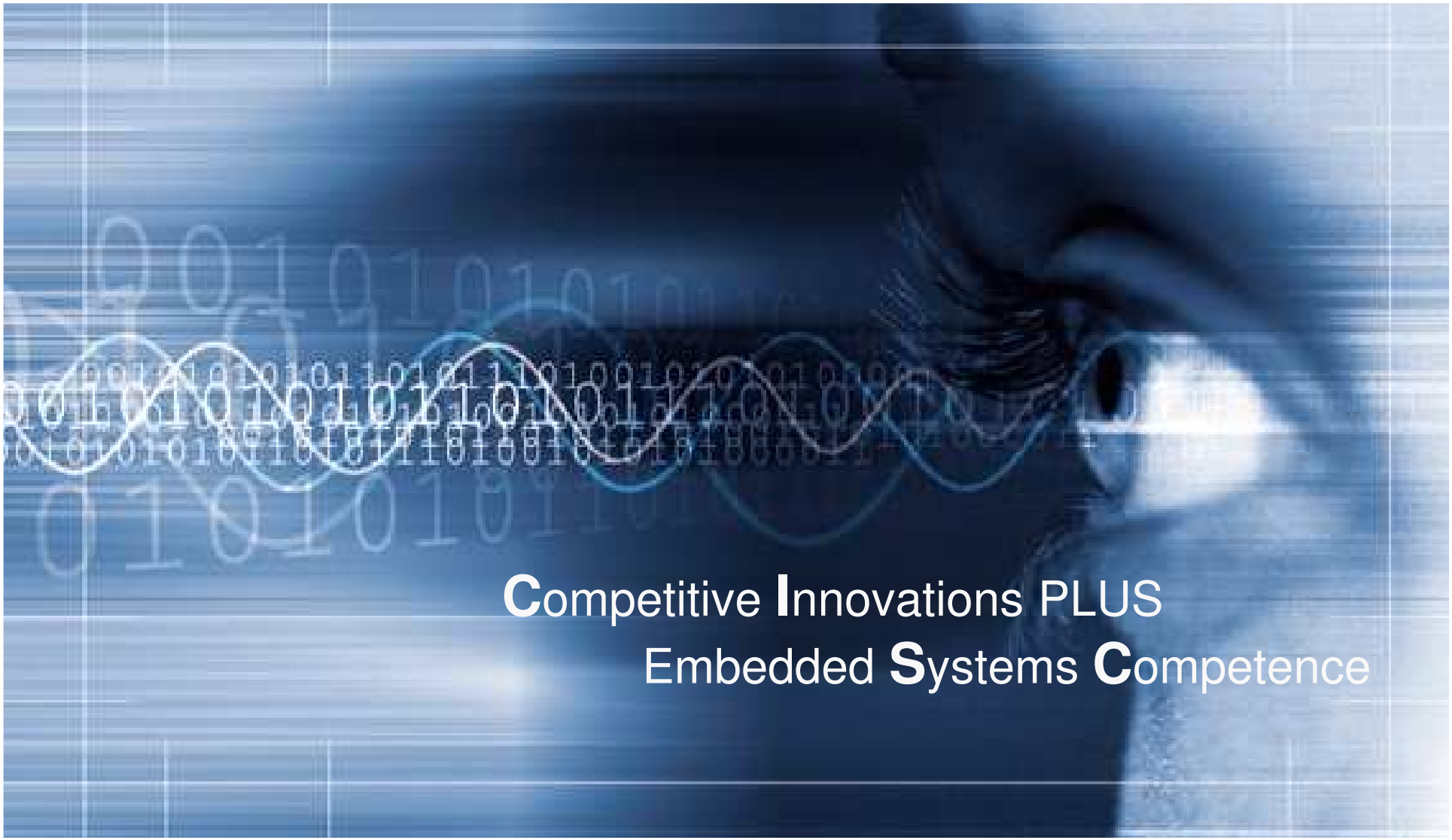

UHF RFID in Europe
Where Will Be Our Space In The Frequency Spectrum?

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ISSUE: May 2017

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Independent - CISC was founded in 1999 and is a 100% private owned company

Experienced - CISC is managed by an international team of highest skilled experts & working with NFC+RFID for more than 20 years

Global - we serve the whole industry worldwide

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- Corp. Headquarters
- R&D
- Sales

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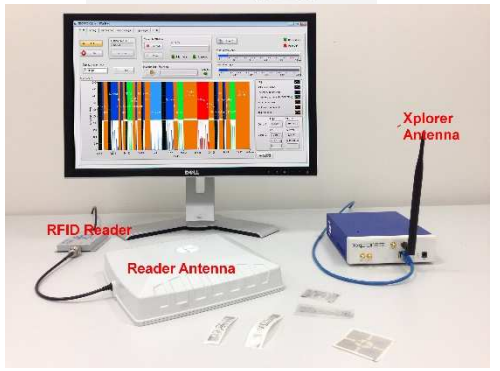
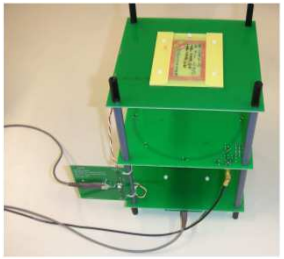
8010 **Graz**, Austria

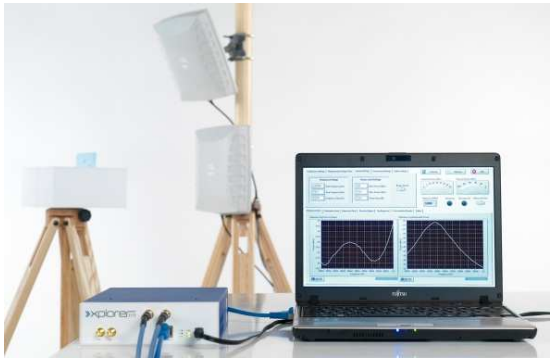
- R&D

About CISC RFID+NFC

- Team of **RFID/NFC professionals** with long-term, international reputation
- **Performance improver** of RFID/NFC products and systems through our solutions
- **Measurement tool provider** for RFID and NFC conformance, performance and interoperability tests
- **Standardization leader** in RFID



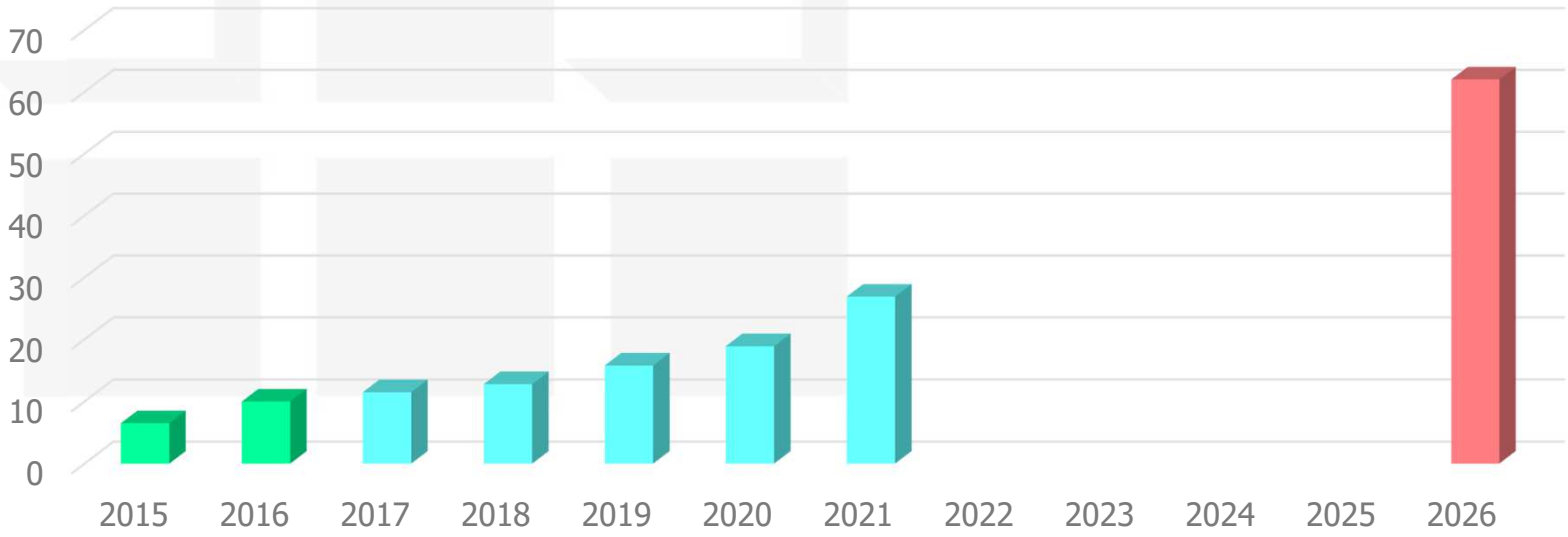




Roles in RFID Industry

- Convener/Chairman:
  - ISO/IEC JTC1 SC31 WG4 – Radio communications (RFID, RTLS, Security)
  - Austrian ASI K001 - Information technologies
  - Austrian ASI AG 001.31 - RFID for Item Management
  - GS1 EPCglobal UHF AI + GS1 EPCglobal TLRPP
- Project Editor:
  - ISO/IEC 18000-4 - RFID 2.45 GHz
  - ISO/IEC 18000-6 - UHF RFID
  - ISO/IEC 18000-63 - UHF RFID
  - ISO/IEC 18000-7 - Active RFID
  - ISO/IEC 29143 - MIIM air interface
  - ISO/IEC 29167-1 - RFID Security
- Vice chairman:
  - ETSI ERM TG34 RFID
- Member
  - ISO/IEC JTC1 SC17 Smart Cards
  - ISO/IEC JTC1 SC6 NFC
  - NFC-Forum
  - RAIN RFID

UHF RFID Tag (IC) Volume



Sources: RAIN RFID, IdTechEx

European RFID Radio regulations

CEPT REC 70-03

ETSI EN 300 330
LF (<135 kHz)
HF (13.56 MHz)

EN 302 208
UHF (865-868 MHz)
UHF (915-921 MHz)

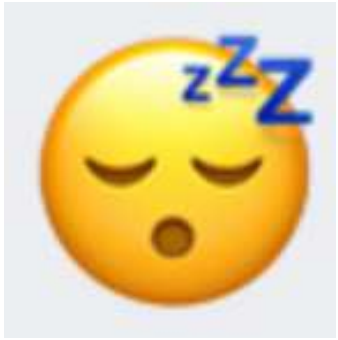
EN 300 440
UHF (1–6 GHz)

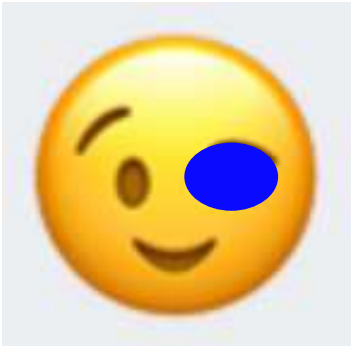
EN 300 220
UHF (400–1000 MHz)

RED (Radio Equipment Directive)

- Key date **13 June 2017**

- LF, HF EN 300 330
- UHF EN 302 208





865-868 MHz band
4 channel-plan, since 2008-04

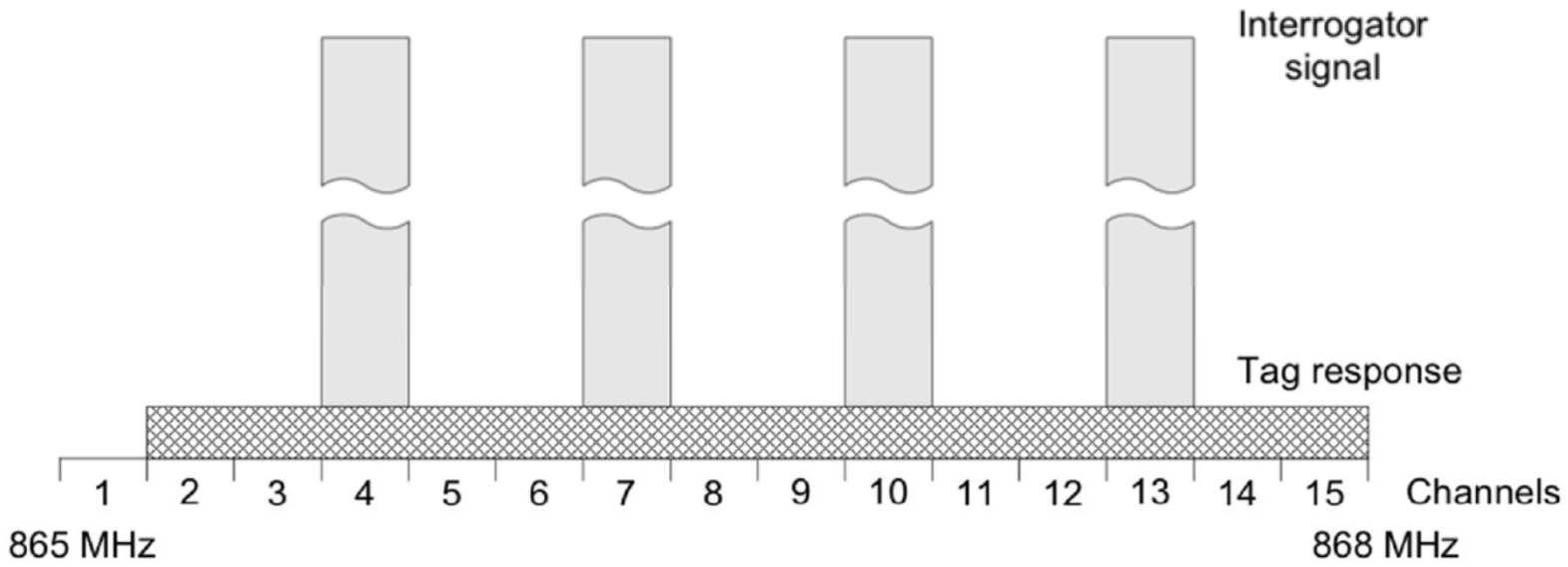


Figure 1: Channel plan for lower band

Source: ETSI EN 302 208 V3.1.1

915-928 MHz band
4 channel-plan, since 2015-02

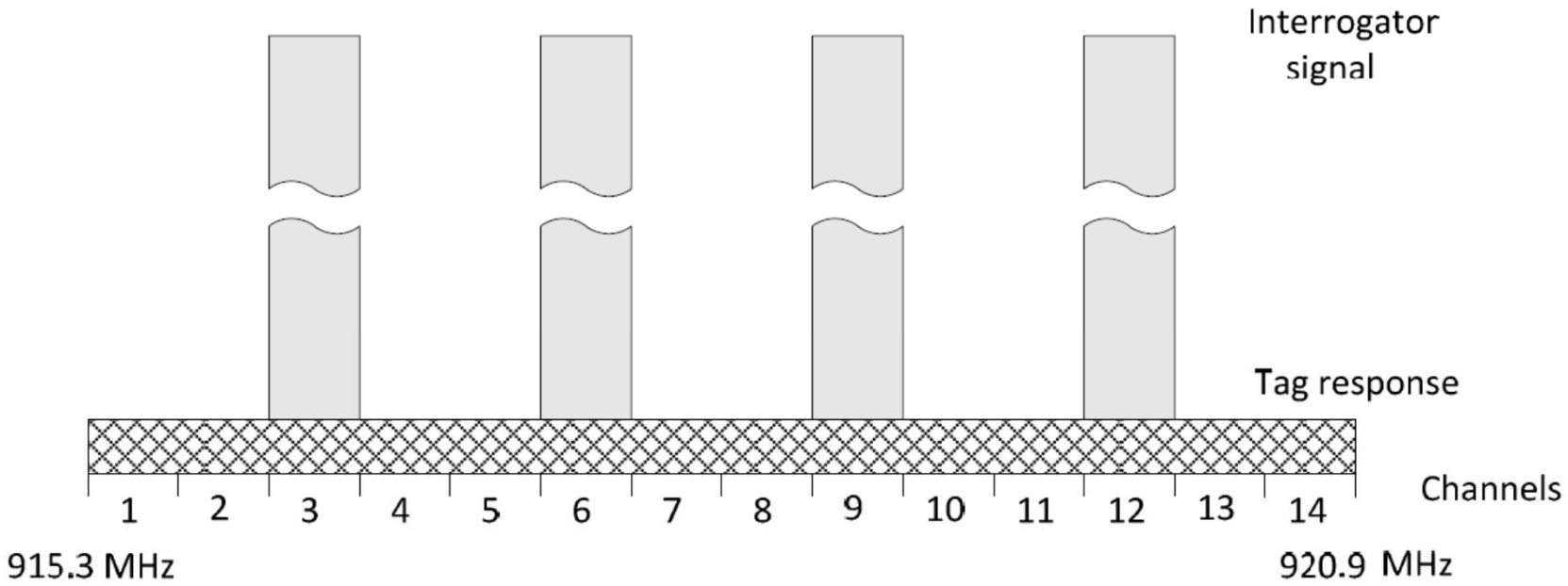


Figure 2: Channel plan for upper band

Source: ETSI EN 302 208 V3.1.1

UHF RFID Bands

- 865 – 868 MHz
- 4 transmit channels
- 200 kHz transmit channels
- 600 kHz channel spacing for tag responses
- 2 Werp
- 100 ms pause every 4 sec

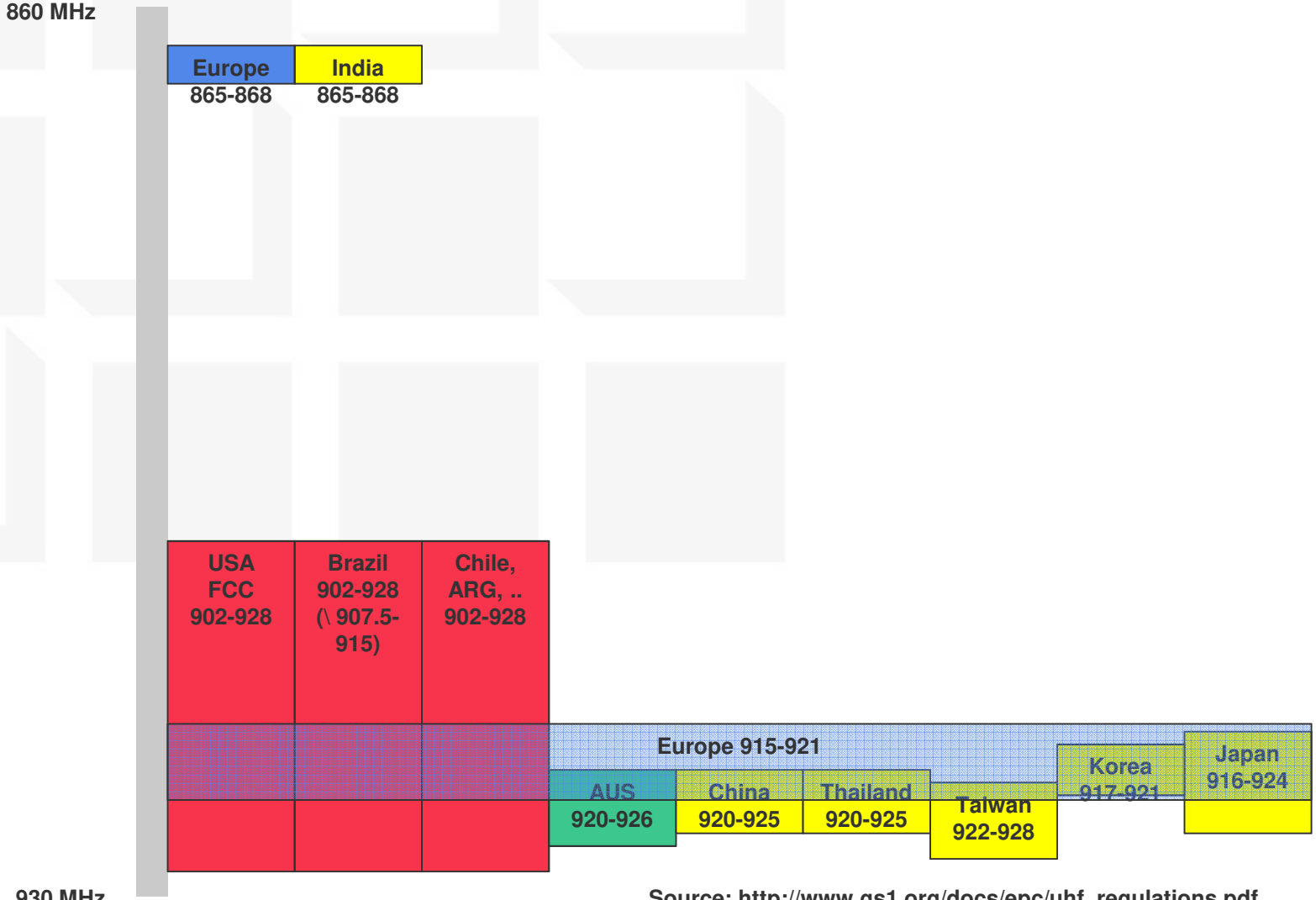
Fits for GLOBAL tags

- 915 – 921 MHz
- 4 transmit channels
- 400 kHz transmit channels
- 1200 kHz channel spacing for tag
- 4 Werp
- 100 ms pause every 4 sec

Doubled speed

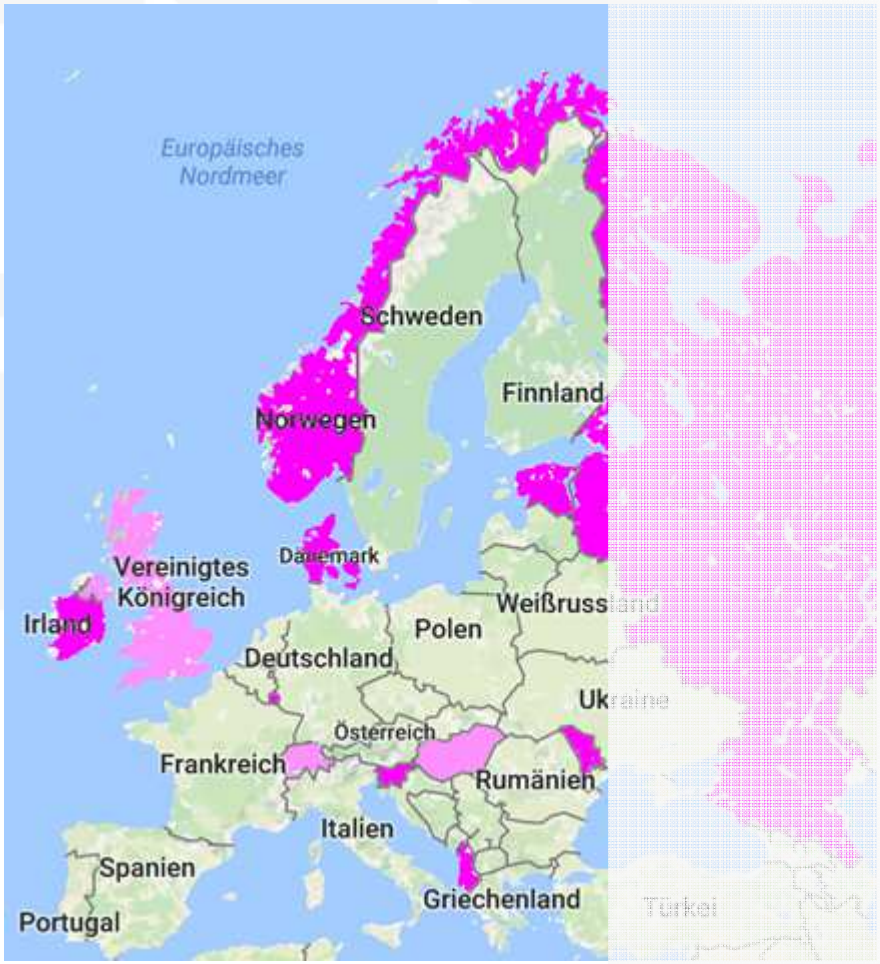
40% more range
Better reading through objects

Global UHF RFID bands



Source: http://www.gs1.org/docs/epc/uhf_regulations.pdf

Adoption of 915-921 MHz
46 CEPT countries



Source: CEPT REC 70-03
Status of 3 February 2017

915 – 921 MHz band

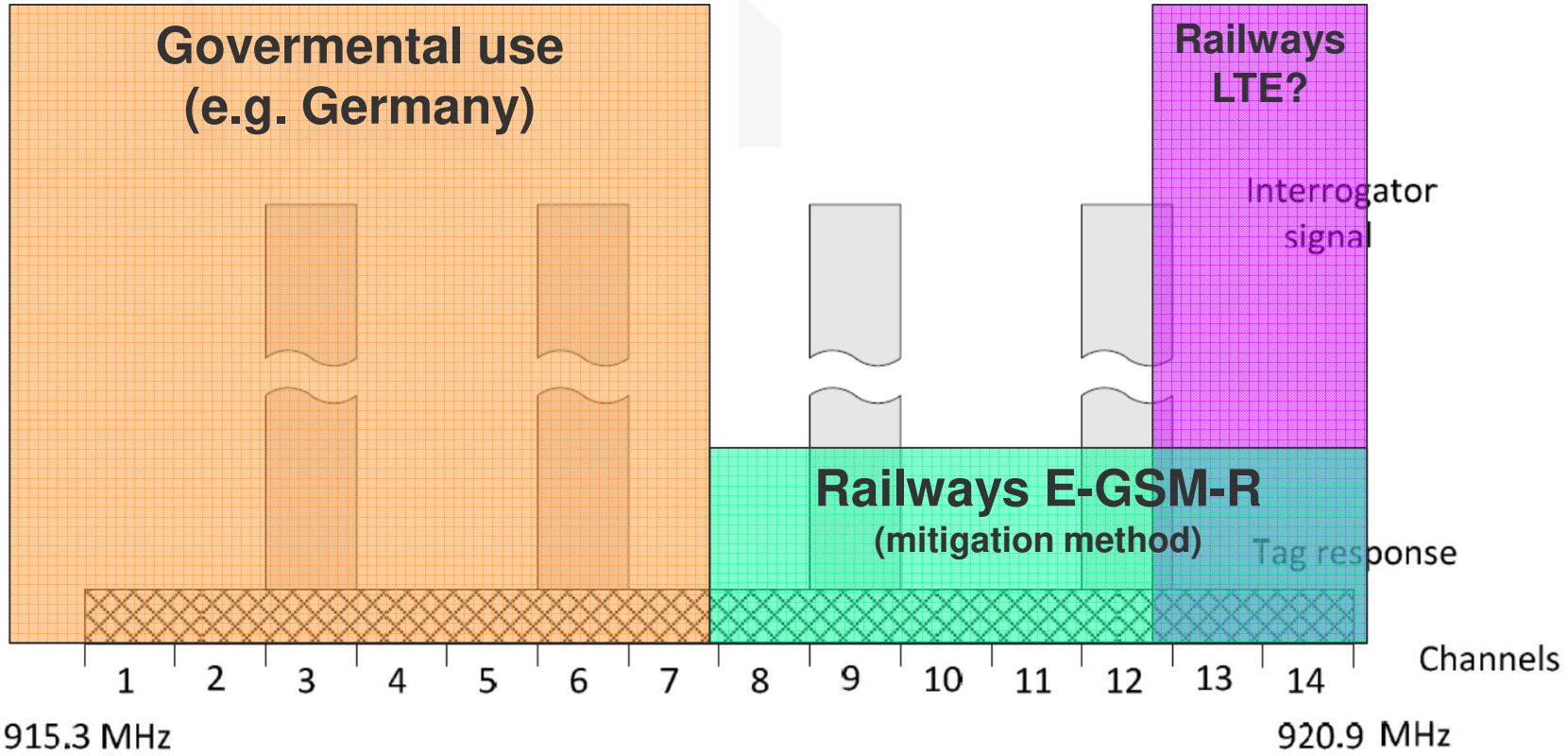


Figure 2: Channel plan for upper band

The two UHF RFID bands

865 – 868 MHz

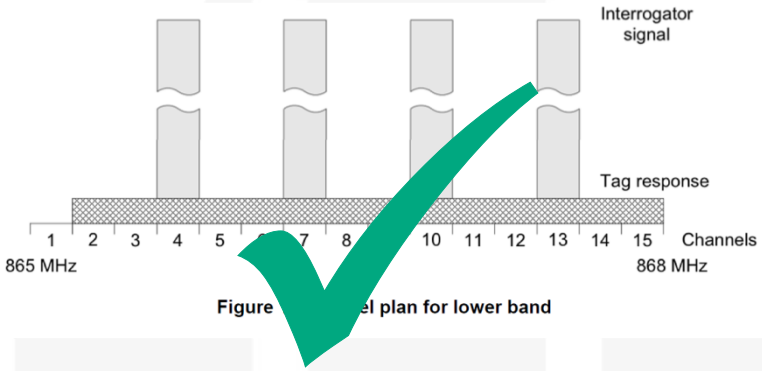


Figure [illegible]el plan for lower band

- Major efforts from 2003 - 2011
- Everyone is using it
- Many want to do other things

915 – 921 MHz

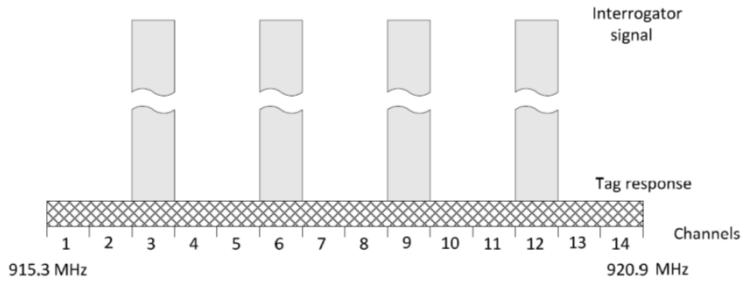


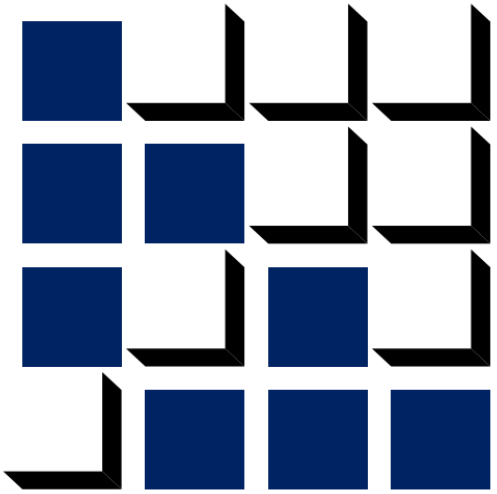
Figure 2: Channel plan for upper band

- Band is available (CEPT, ETSI)
- Everyone wants it as it fits to the global 900 – 930 MHz band
- Too less countries adopted it
- Lots of new ideas
  - Railways
  - LTE
  - IoT active technologies

There are things to be done

- RFID is very relevant
  - 10B tags in 2016
  - Accumulated 100B tags until 2020
- Continue to work on co-existence
  - As successfully as with the SRDs in last 15+ years
- RFID needs a part in RF spectrum
- Global RFID is happening between 900-930 MHz

➔ Europe would benefit a lot from a fully available 915-921 MHz band



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