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wireless technology



(ETSI standard DECT-2020 NR)

- Introducing the new NR+ Standard
- Application Areas & Benefits
- The NR+ Technology
- Vision for the future



# Introducing the new NR+ Standard

- Developed by ETSI TC-DECT
- Initial Application Areas :
  - IoT applications such as Smart Cities and Industrial IoT (Industry 4.0)
  - Professional Audio applications such as Program Making & Special Events (PMSE) and Unified Communications
- Ongoing roadmap to include more market areas
- The world's first non-cellular 5G technology standard
- Recognized by WP5D of the International Telecommunication Union's Radiocommunication Sector (ITU-R) as IMT-2020 technology
- Note:
  - In ETSI the standard is referred to as DECT-2020 NR
  - DECT Forum will promote the standard under the name NR+



# Application Areas & Benefits: IoT

## IoT Benefits :

- Infrastructure-less architecture
- Autonomous
- Decentralized
- No single-point-of-failure
- Low cost
- Simple to deploy
- The first 5G technology which can support shared spectrum operation and multiple local networks in mobile system frequencies
- Free of charge and licence-free
- Dedicated 1,9 GHz band

## IoT applications :

- **Smart Cities** : One of the World's frontiers in the battle to combat Climate Change. Smart Cities will reduce carbon emissions using an array of applications such as; traffic management, finding parking spaces, optimizing refuse collection and street lighting, smart energy storage etc., All of these applications require remote sensor & control (IoT) solutions connected through a network to control centers. NR+ has been designed to incorporate highly reliable high-performance wireless mesh networking, that will make deployment of such massive machine-type communication possible and practicable.
- **Industrial IoT (Industry 4.0)** : One of the key technologies that will enable the new industrial revolution (4.0) is Ultra-Reliable Low Latency IoT solutions for industry, that will be able to orchestrate unmanned operations across huge factory floors and warehouses. Bringing together DECT's historic ability to send and receive messages with microsecond-synchronism with NR+'s lower latency and IoT capabilities, opens up great opportunities in this industrial sector



# Application Areas & Benefits: Pro-Audio

## Pro-Audio Benefits :

- Significant improvements in indoor radio performance and in large arenas, stadiums etc.
  - Adding Forward Error Correction
  - Better Multipath performance
  - Better sensitivity
- Higher user densities (2-4 x)
  - Re-designed  $\frac{1}{2}$  slot configuration that prioritizes payload
  - MIMO
- Audio latency (one-way) approaching 2 msec
- Higher bit rates (for the same density) providing up to 24-bit professional quality audio
- Access to territories not supporting the DECT band



# Application Areas & Benefits: Pro-Audio

## Pro-Audio Applications :

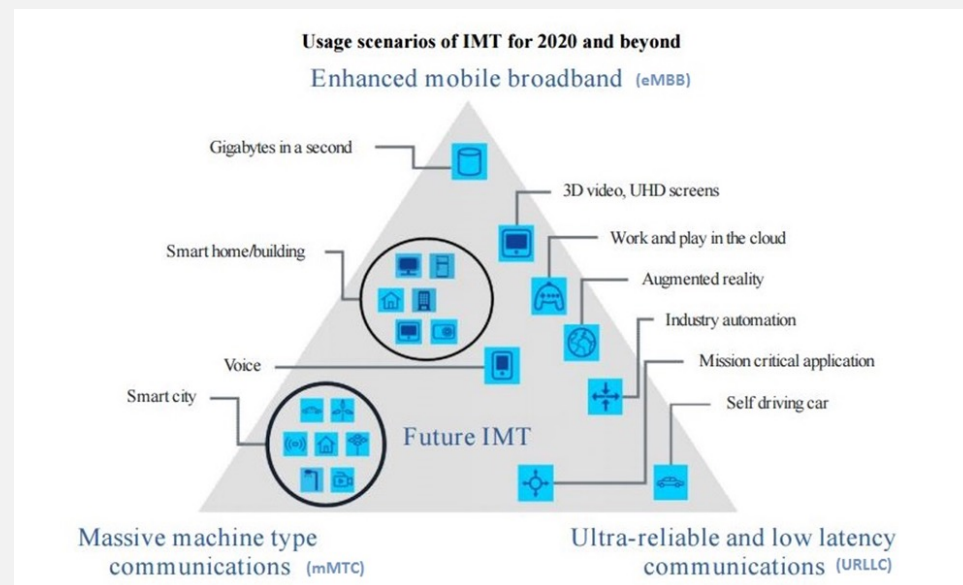
- **PMSE Microphones** : NR+ has been designed to deliver the higher performance required for microphones used by touring bands, recording studios, theatres and broadcasting (including electronic news gathering). The use of NR+ for performance microphones will facilitate the ever-increasing demand for wireless microphones in all live & recorded entertainment and media streaming sectors.
- **PMSE Intercom** : already deployed with DECT, PMSE Intercoms will benefit from higher user densities and the ability to deploy in other IMT2020 frequencies as special touring events (sporting, rock tours & music festivals etc.) need to be deployed world-wide
- **Unified Communication** : already deployed with DECT, in the post-Covid world, large business communication installations will require even more over-the-air communication as work habits change to more flexible work arrangements. NR+ will deliver even higher density of users and better indoor performance

# The NR+ Technology

- NR+ (DECT-2020 NR) meets the IMT-2020 requirements of Ultra Reliable Low Latency Communications (URLLC) and massive Machine Type Communications (mMTC)

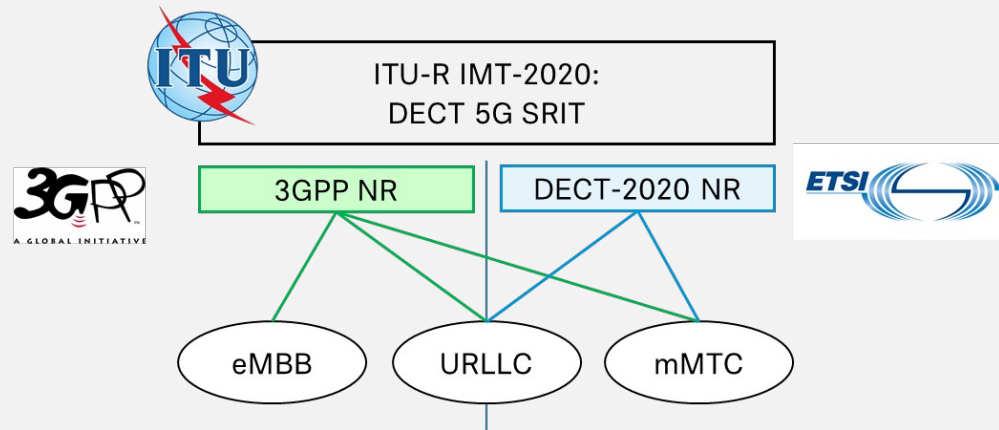
- Modern radio technology:

- OFDM
- Efficient channel coding
- HARQ
- High-level modulation





# 3GPP NR & DECT-2020 NR



<b>Deployment</b>	Public Network (outdoor); Non-Public Network (indoor/outdoor)	Anywhere, Anytime, Anyone (indoor/outdoor)
<b>Topology</b>	Cellular	P2P, P2M, Star, Mesh Tree, Cellular
<b>Device Types</b>	BS, UE	RD with context-based roles
<b>Spectrum</b>	Spectrum Auctioned to MNO; Site Licensed (Campus)	1,9 GHz, IMT, Campus, SRD/RLAN
<b>Spectrum Management</b>	Planning by MNO; Expert / Tool	Local Self-Organizing
<b>Infrastructure</b>	MNO; Campus	User deployed RDs
<b>User devices</b>	UEs	RDs



# The NR+ Technology

NR+ benefits from state-of-the-art radio design:

- Modern CP-OFDM radio access supporting robust performance and low latency on each communication link.
- Higher layers are designed to support efficient spectrum use by having an advanced coexistence capability thanks to optimized physical and MAC layer design
- NW and device identity concept support very large and dense networks
- Autonomous device operation and cost-based routing between devices supports future device based mMTC deployments
- The performance results are enabling new use cases for the industry with local networks



# The NR+ Technology

ETSI has published following release 1 DECT-2020 NR specifications:

- TS 103 636-1, DECT-2020 NR, Overview
  - [https://www.etsi.org/deliver/etsi\\_ts/103600\\_103699/10363601/01.03.01\\_60/ts\\_10363601v010301p.pdf](https://www.etsi.org/deliver/etsi_ts/103600_103699/10363601/01.03.01_60/ts_10363601v010301p.pdf)
- TS 103 636-2, DECT-2020 NR, Radio reception and transmission
  - [https://www.etsi.org/deliver/etsi\\_ts/103600\\_103699/10363602/01.03.01\\_60/ts\\_10363602v010301p.pdf](https://www.etsi.org/deliver/etsi_ts/103600_103699/10363602/01.03.01_60/ts_10363602v010301p.pdf)
- TS 103 636-3, DECT-2020 NR, Physical Layer
  - [https://www.etsi.org/deliver/etsi\\_ts/103600\\_103699/10363603/01.03.01\\_60/ts\\_10363603v010301p.pdf](https://www.etsi.org/deliver/etsi_ts/103600_103699/10363603/01.03.01_60/ts_10363603v010301p.pdf)
- TS 103 636-4, DECT-2020 NR, MAC Layer
  - [https://www.etsi.org/deliver/etsi\\_ts/103600\\_103699/10363604/01.03.01\\_60/ts\\_10363604v010301p.pdf](https://www.etsi.org/deliver/etsi_ts/103600_103699/10363604/01.03.01_60/ts_10363604v010301p.pdf)
- TS 103 636-5, DECT-2020 NR, DLC and Convergence Layer
  - [https://www.etsi.org/deliver/etsi\\_ts/103600\\_103699/10363605/01.03.01\\_60/ts\\_10363605v010301p.pdf](https://www.etsi.org/deliver/etsi_ts/103600_103699/10363605/01.03.01_60/ts_10363605v010301p.pdf)



## Vision for the future

Future evolution of the standard will enable other applications such as:

- Enterprise:
  - High-quality voice
  - Advanced messaging
  - Device locationing
- Healthcare:
  - Integrations with medical devices
- Residential and Smart Home:
  - High quality audio systems
  - Alarm systems
  - Virtual assistants



# DECT-2020 vision for Enterprise

Functionality of DECT in Enterprise systems includes:

- Voice calls and conferencing
- Messaging
- Alarm functionality (push-button, man-down/no-movement, pull cord)
- Locationing

Improvements DECT-2020 can bring to Enterprise:

- Higher bandwidth enabling apps on (smart) DECT handsets
- Accurate locationing capability
- Low latency to control machinery
- Higher density
- Addition of (massive) IoT to complement existing solutions

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