



Ostfalia

Hochschule für angewandte
Wissenschaften

Elektrotechnik

DECT NR+: Unveiling the Essentials of a new non-cellular 5G Standard for Verticals

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Agenda

- Introducing the new DECT 2020 NR+ Standard
- System Architecture
- Technology Key Features
- Vision and Roadmap

Introducing the Standard

- Developed by ETSI TC-DECT
- Recognized by ITU-R as IMT-2020 technology
- The world's first non-cellular 5G technology standard
- Initial Application Areas:
 - mMTC applications, e.g., Smart Cities and Industrial IoT (Industry 4.0)
 - URLLC applications e.g., Professional Audio and Unified Communications
- Ongoing roadmap to include more market areas
- Branding:
 - In ETSI the standard is referred to as DECT-2020 NR
 - DECT Forum promotes the standard under the name NR+



ITU-R IMT-2020:
DECT 5G SRIT



3GPP NR

DECT-2020 NR



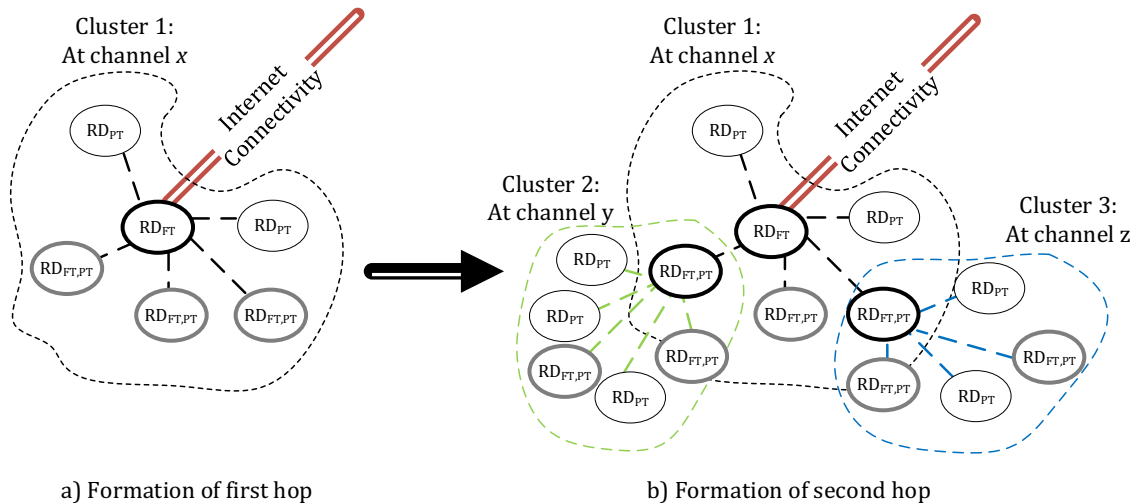
eMBB

URLLC

mMTC

Deployment	Public Network (PLMN); Non-Public Network (NPN)	Anywhere, Anytime, by Anyone
Topology	Cellular	P2P, P2M, Star, Mesh Tree, Cellular
Device Types	BS (gNB), UE	Radio Device (RD) with context-based roles
Infrastructure	MNO; Campus	User deployed RDs
Spectrum	Spectrum Auctioned to MNO; Site Licensed (Campus)	1,9 GHz, IMT-Spectrum, site licenses, unlicensed (SRD/RLAN)
Spectrum Management	Planning by MNO; Expert / Tool	Local, Self-Organizing
Network Operation	MNO (PLMN, NPN); User (Standalone-NPN)	User

DECT-2020 NR – System Architecture



- **Supports multiple deployment scenarios**
 - Mesh topology based on Radio Device (RD) to RD communication
 - Local area network (Star Topology)
 - Direct P2P and P2M connections
- **Co-existence capabilities support multiple networks in the same area sharing spectrum**
 - Between independent DECT-2020 NR networks
 - Between DECT-2020 NR networks and any other wireless systems
- **Device centric, decentralized decisions, enable autonomous operation**
- **Over the air synchronization between different DECT-2020 NR equipment**
- Cost-effective RD design thanks to symmetric radios (UL/DL)

DECT-2020 NR related Standards

DECT-2020 New Radio (NR) Technical Specifications

- ETSI TS 103 636-1: "DECT-2020 New Radio (NR); Part 1: Overview"
- ETSI TS 103 636-2: "DECT-2020 New Radio (NR); Part 2: Radio Reception and Transmission requirements"
- ETSI TS 103 636-3: "DECT-2020 New Radio (NR); Part 3: Physical layer"
- ETSI TS 103 636-4: "DECT-2020 New Radio (NR); Part 4: Medium Access Control layer"
- ETSI TS 103 636-5: "DECT-2020 New Radio (NR); Part 5: DLC and Convergence layers"

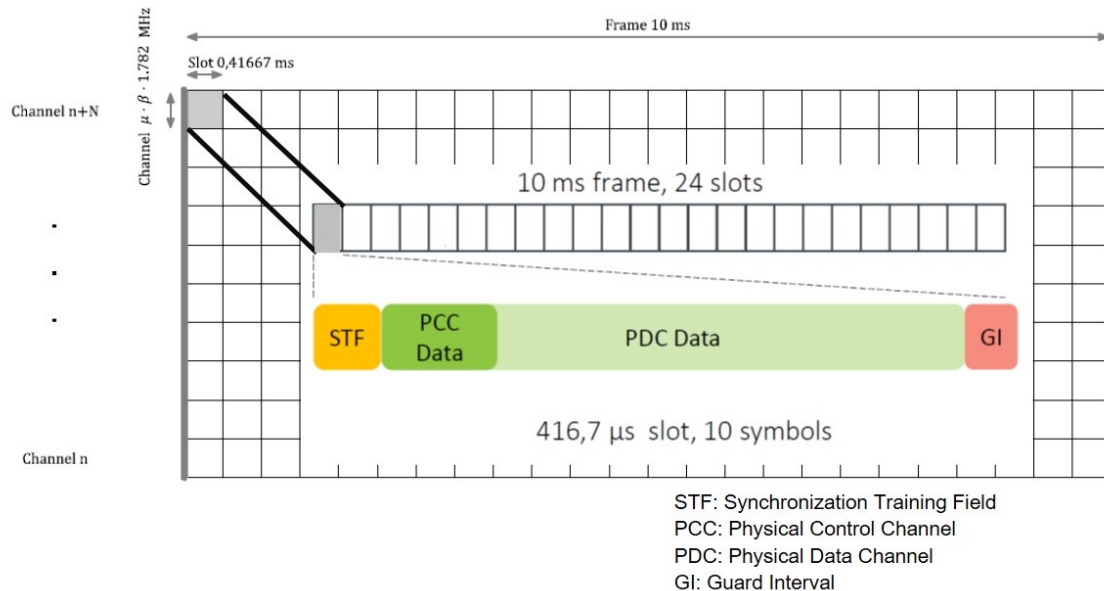
Under Development

- **Interworking**
 - TR 103 670: "DECT Study on Interworking of DECT with 3GPP network"
- **Radio Spectrum**
 - DTR/DECT-00389 : "Study on radio spectrum and related technical requirements for DECT-2020 NR"
- **Application Profiles**
 - TR 103 777: "Study on DECT-2020 technical requirements and additional functionality for the support of new applications in further releases"
- **Harmonized EN (European Norm)**
 - EN 301 406-2: "DECT; Harmonised Standard to access radio spectrum; Part 2: DECT-2020 NR"

Key Features

- Flexible radio access technology with dynamic channel selection based on cognitive radio (spectrum sensing)
 - No frequency planning required, ideal for local network deployments
 - Compatible with legacy DECT technology including uncoordinated systems
 - Allows multiple overlaying of DECT-2020 NR networks in the same area
- Improved transmission quality, link budget and increased data rate compared to legacy DECT
 - Applies state-of-the art OFDM Physical layer combined with advanced channel coding and Hybrid ARQ providing state of art performance
- Flexible Spectrum Use:
 - Opening of additional bands beyond the DECT core band, i.e., IMT bands and unlicensed bands below 6 GHz
 - Operation under different spectrum regimes: licensed, unlicensed, sharing frameworks
- Dual mode MAC architecture supporting unscheduled and scheduled services
 - Listen before Talk (LBT) to protect other systems and other transmissions
 - Capability to schedule protected resources for high-quality services
- Interworking profiles to complementary radio technologies: 3GPP NR, WiFi

Technical Characteristics



- OFDM with MIMO support
 - Sub-carrier spacing (SCS) is 27 kHz with 2^{μ} scaling options up to 216 kHz
- Basic channel width 1.728 MHz; scalable bandwidth support up to 221 MHz
- TDMA/FDMA based channel access
 - Basic frame is 10 ms, split into 24 slots and subslots
 - Minimum transmission unit is a subslot
 - Length of the subslot between 26 us – 208 us, depending on used SCS
 - Single transmission over multiple slots/subslots

Applications Areas (Examples) and Benefits

- mMTC
 - Telemetry of Fixed and Mobile Sensor Units
 - Large area environmental monitoring and warning systems for e.g., wildfires, heavy flooding, crop and cattle growth
 - Connectivity of Autonomous Mobile Robots
 - Asset Tracking of e.g., Tools, Pallets, Containers
- URLLC
 - Factory automation with deterministic cyclic-traffic requirements
 - Professional media content production
 - Unified Communications for enterprises: high-quality audio, messaging (alarm, control), positioning
 - Healthcare (institutional and home)

➤ Benefits

- Easy set up and operation of self-organizing, decentralized, low latency, locally confined wireless networks → ideal for mobile ad-hoc deployments
- No need for separate network infrastructure or network planning
- Industry players can focus on application and solution development, keeping them completely under their control
- No additional costs and complexity of network commissioning (e.g., by MNOs)

DECT-2020 NR Roadmap

