

DECT2020:

SUBJECT The evolution of DECT & ULE to a 5G technology

DATE

22.09.2017 IMT2020 Working Group
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Agenda

Why DECT as a 5G technology

DECT milestones

Industry goals for DECT2020

Vertical Markets

openD: opening DECT to new vertical markets

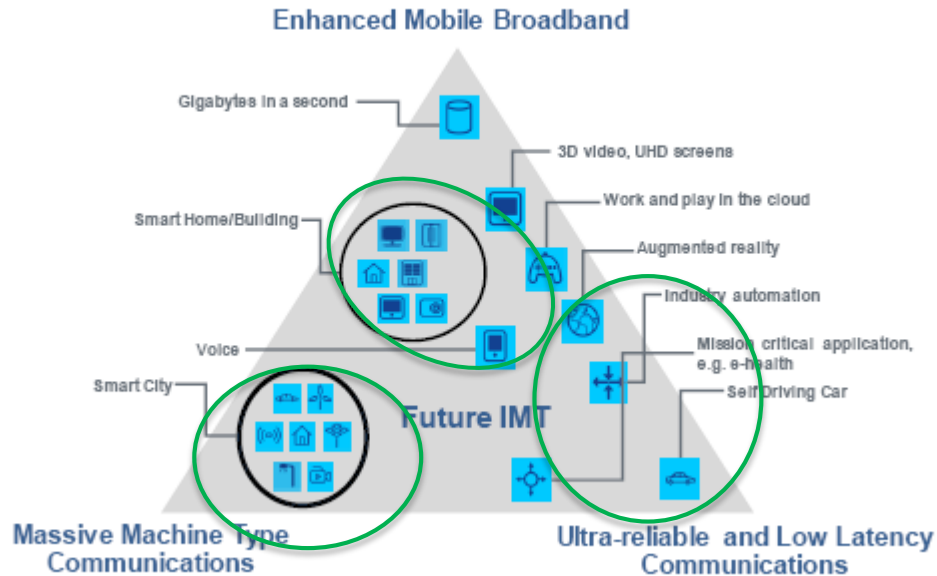
DECT2020:

- Addressing the requirements
- vs Existing technologies
- Key Parameters

Summary

Why DECT as a 5G technology?

5G Usage Scenarios from the ITU-R IMT-2020 Vision Recommendation



IMT2020: Driving DECT to 5G

- ❖ Unique technology addressing key 5G use cases mMTC and URLLC
- ❖ Local Area 5G: mission critical, operator independent
- ❖ Leverages legacy infrastructure, standard and eco system
- ❖ Meets and exceeds the requirements of 5G
- ❖ Ultra low latency, high reliability, scalable, power optimised

DECT Industry Evolution

DECT : Cordless Voice



- ✓ 3BN+ Devices sold
- ✓ Key Innovation cycles

CAT-iq: Integration IP



- ✓ Eco System: Chip, Manufacturing, Product

DECT:Security Certification



- ✓ Standardized
- ✓ Independant/local 5G network

ULE: Smart, Battery powered, connectionless



DECT2020 : 5G Use Cases



Address changing technological climate

- ❖ 5G driving the requirements for data rates, latency, reliability...
- ❖ Adapting to a changing landscape for voice and mission critical applications

Address new vertical markets

- ❖ Industrie 4.0, Healthcare, ASR, PSME...
- ❖ 5G door opener for new vertical and regional markets (China, India)
- ❖ Leverage (voice) USPs and infrastructure
- ❖ Opening DECT/ULE to new verticals: openD

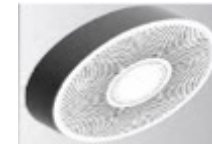
Secure spectrum

- ❖ Spectrum for mission critical 5G apps
- ❖ Unique: Local area 5G (operator independent)
- ❖ Support of ministries, trade orgs and standards bodies

Future proof the technology

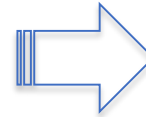
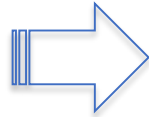
- ❖ 3G to 5G
- ❖ New application profiles
- ❖ Prepare for 2020 and beyond

Target Verticals: Smart Home & Building



- ✓ ULE now a key IoT Smart Home technology
- ✓ Fully mature standard with over 30 home/building automation profiles
- ✓ Open specification and application layer in open source
- ✓ Backing of Europe's largest carriers, device manufacturers
- ✓ Leverages large legacy DECT infrastructure (50 Mio Gateways)

Target Verticals: Voice activated



The age of ubiquitous computing : Voice enabled !



- ✓ Voice: Key USP of DECT industry
- ✓ DECT&ULE provide HD Voice for ASR engines at low power for always on mode
- ✓ DECT2020: Improved codecs, QoS and low power

Target vertical: Industrie 4.0



Mobile Robotics



Factory Automation



Localization



Control



Logistics

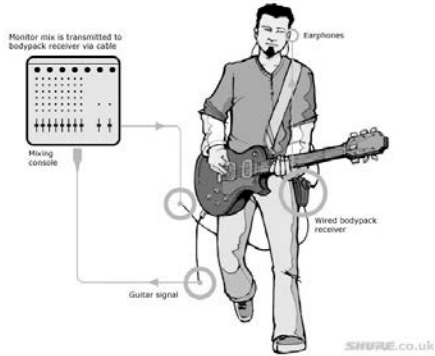
Industrie 4.0 Use case requirements*

DECT for Industry 4.0 Use Cases & Requirements

Industry 4.0				
	Motion Control	Safety Traffic	Condition Monitoring	Augmented Reality
Latency / Cycle Time	250 μ s – 1 ms	~10 ms	100 ms	10 ms
Reliability (PER ¹)	1e-8	1e-8	1e-5	1e-5
Data Rate	kbit/s – Mbit/s	< 1 Mbit/s	kbit/s	Mbit/s - Gbit/s
Typical Data Block Size	20-50 byte	64 byte	1-50 byte	> 200 byte
Battery Lifetime	n/a	1 day	10 years	1 day

→ most challenging
Massive MTC³
Extreme Broadband + Low Latency

Target vertical: Audio Industry



Microphones & In-Ear Monitoring



Wireless
Speakers



Headsets



Audio
Recording



PresenterMedia

Conferencing



Door-Com
Systems

Audio Industry: Use Case Requirements

- IMT-2020 scenario: URLLC (similar)
- Latency: < 1 ms (professional audio),
< 2 ms (consumer with professional requirements)
< 5 ms (consumer)
- Reliability: $1-10^{-2}$ or better (based on link outage probability)
- Data-Rate: kbps to Mbps (audio codec to raw)
- Traffic Profile: audio data streaming
- Battery Lifetime: 6 h to 1 day

- Additional Requirements:
 - Synchronicity of operation on application layer (isochronous operation)

Target vertical: Healthcare



Point of care terminals



- Critical alarms



Vital signs data



- Low speed telemetry



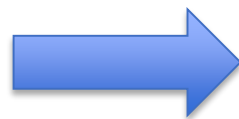
Mission Critical Voice



Engaging New Vertical Industries

opening DECT to new communities:

- open source DECT Forum initiative
- openD community: Global audience of developers
- facilitates DECT and ULE in mission critical, robust, wireless applications.



Engaging vertical industries

- Vertical specific profiles
- Vertical specialist developers
- Specialist Hackathons



Evolving the technology from 2G to 5G

- Channeling vertical requirements into standard
- Preparing the industry for 5G
- Diversifying member base

Coexistence with Legacy DECT

- ❖ Millions of legacy DECT products
- ❖ Strong synergies with existing infrastructure

Flexible/Scalable

- ❖ Accommodate wide range of applications
- ❖ Scalable to higher data rates
- ❖ Improved range
- ❖ (Low) Power versatility

IMT2020

- ❖ Latency: 1 ms
- ❖ Reliability: $1-10^{-5}$ (link)
- ❖ Mobility interruption time 0 ms
- ❖ Data Rates: kbp/s to 100 Mbp/s

Unique

- ❖ Loyal to the uniqueness and simplicity of DECT
- ❖ Local Area 5G for specialist applications
- ❖ Operator independent
- ❖ TDMA / OFDM

DECT2020: Key Parameters

Parameter	Initial value	IMT2000 value	DECT Evolution Target value	DECT2020 Target Value	
Data Rates	kbps to 1 Mbps	kbps to 6.5 Mbps	kbps to 6.5 Mbps	kbps to 100Mbps	
Latency	10 ms	10 ms	10ms - 2 ms	10ms - 1 ms	
Reliability	$1-10^{-3}$	$1-10^{-3}$	$1-10^{-5}$	$1-10^{-5}$	
Mobility	0 ms	0 ms	0 ms	0 ms	Interuption time
Antenna	SISO	SISO	SISO	MIMO	
Connection Density	100K / KM ²	>100K / KM ²	>100K / KM ²	1 Mio Devices / KM ²	
Standby power Consumption	3-10 Years	3-10 Years	3-10 Years	3-10 Years	

DECT and ULE as a 5G technology is a unique proposition

- Opportunity for industries to help shape DECT2020
 - Support for industries of national significance
 - Create the specification according to requirements
 - The Voice of IoT
 - Local Area 5G Network
- Dynamic community driving down time to market
 - Partake with vibrant community of chip, manufacturing and SW engineering driving the standard
- Mission critical applications that require reliability, low latency
 - Smart Home
 - Industrie 4.0
 - eHealth
 - Audio
- 5G Technology:
 - worldwide acceptance
 - Dedicated spectrum



ETSI TC DECT Technology DECT-2020

- 🌐 **Background**
- 🌐 **Key parameters**
- 🌐 **Standardisation Roadmap**

🌐 DECT is an IMT-2000 technology

- Regular technology updates which are contributed to revisions of Recommendation ITU-R M.1457

🌐 DECT 'Ultra Low Energy' (ULE) mode

- Added to cover long time low power operation (10 years with one battery)

🌐 Request for new features have been received

- Support of a wide range of data rates (kbit/s ... Gbit/s)
- Suitability for difficult radio propagation conditions
- Extended range
- Reliable low latency operation (1 ms)

🌐 To cover all new requirements:

=> DECT-2020

Compatibility with legacy DECT

- Channel access: FDMA/TDMA with TDD operation
- Time frame: 10 ms plus additional sub-frames
- Slot structure: full slot with 417 μ s plus additional slot types

Physical packet

- Variable length packet consisting of multiple OFDM symbols
- Carrier spacing: 1728 kHz plus carrier aggregation possibility
- Sub-carrier spacing: 27 kHz or 54 kHz

Technical features

- Adjustable bandwidth 1 ... 30 MHz
- Various modulation constellations and code rates
- Scalable data-rate kbit/s ... Gbit/s
- SISO or MIMO operation

- **Technical Report ‘DECT evolution’**
 - published June 2017
- **Technical Report ‘DECT-2020 radio’**
 - Spring 2018
- **IMT-2020 submission proposal**
 - mid 2018
- **Technical Specifications**
 - end 2019