DECT ULE: What Is It and Why Use It?

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Presentation Overview

DECT ULE: the Ultra Low Energy Extension for DECT

- What is DECT ULE?
- Why use DECT ULE?
- Target Market Applications
- Sample Applications
- Technical Specifications
- Regulatory Requirements
- Battery Lifetime
- ULE Alliance Overview
- DSP Group Overview
- Summary
- Q & A

DECT – General Overview

DECT: Digital Enhanced Cordless Telecommunications

- Launched in 1987
- Standard for cordless phone communications worldwide
- Available in over 110 countries
- Used in some 600 million households
- DECT is the second most successful standard after GSM

- Evolution of cordless phones….always trying to avoid interference

49 MHz → 900 MHz → 2.4 GHz → 5.8 GHz → 1.8/1.9 GHz (DECT)

- Transition: analog to digital voice to data/networking applications

- DECT 6.0 – US version of the standard (different frequency/TX power)

- CAT-iq: Cordless Advanced Technology – Internet and Quality

What is DECT ULE?

ULE: Ultra Low Energy

ULE: Ultra Low Energy – an extension of the standard

Advantages:

- Extremely low cost
- Low power consumption
- Long range
- Interference free

DECT ULE Advantages

- DECT ULE is a software protocol extension of the DECT standard
- Utilizes star topology – lower cost than mesh network
- Superior Transmission Range: 70 m Indoor, 600 m outdoor
- Interference Free with dedicated/protected spectrum
- Ensured Interoperability (ULE certification program)
- No contention with Wi-Fi, Bluetooth or other ISM band radios
- Utilizes existing DECT infrastructure in millions of homes
- Long Battery Lifetime – up to 10 years
- World Wide Spectrum
- Low System Cost
- Single Chip Solution
- Open Standard/ETSI Standard
- Built in security and authentication
- Low Latency
- Simple Installation
- Supports Voice and Video

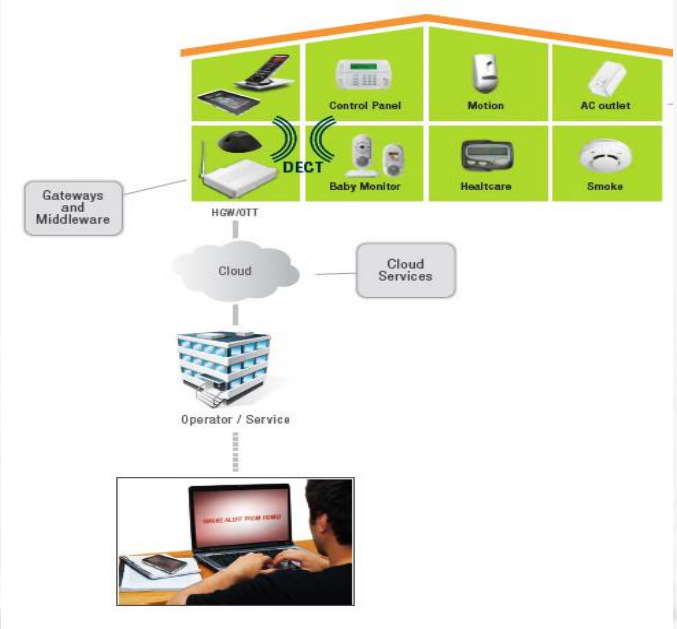
Target Market Applications

ULE positions DECT in new and rapidly growing market segments beyond the traditional DECT telephony market, such as the wireless Machine-to Machine (M2M) market and "Internet of Things". In addition, DECT ULE is ideal for Smart Home and Home Area Network (HAN) sensor applications such as home automation, security, monitoring, metering and healthcare.

- Home Automation
- Security & Life Safety
- Healthcare
- Energy Management

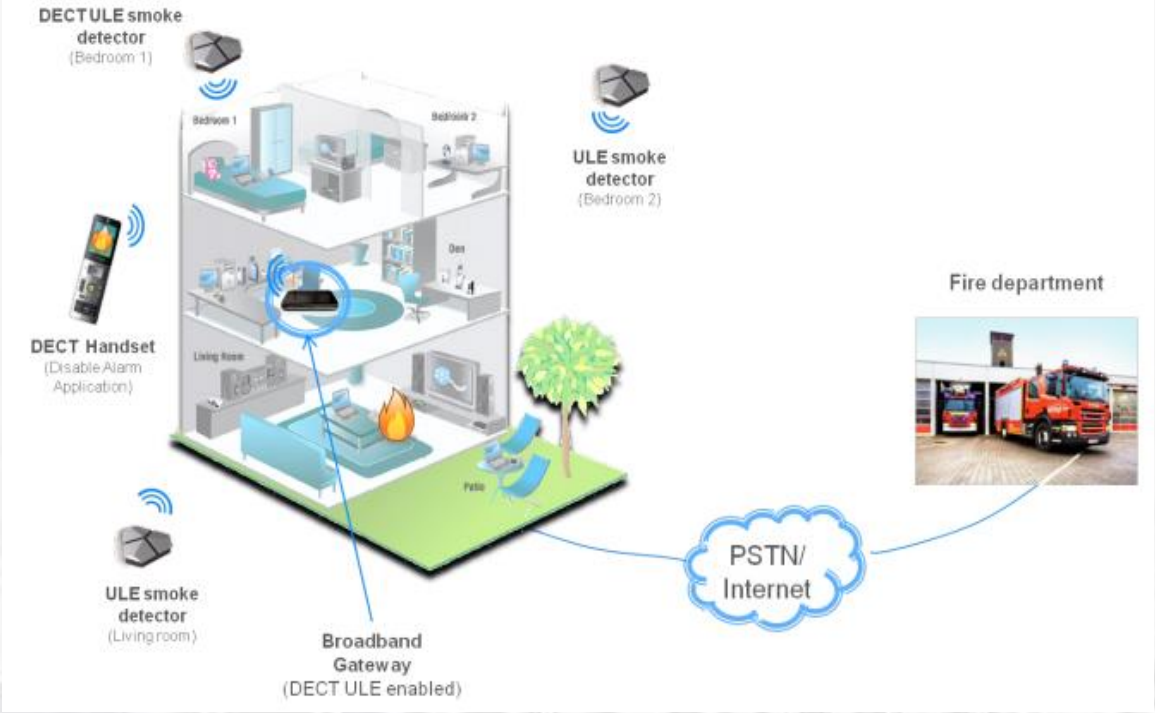
Home Automation

- **Smart Plugs**: provides intelligent monitoring and control of electrical appliances connected to standard electrical sockets
- **Consumption Display & Awareness**: provides home user the display of the monitored power consumption
- **Lighting Controls:** provides the user the ability to control lighting in the home from remote control
- **White Goods/Appliance Control:** provides the user the ability to control appliances from remote control, including setting operation timing in off-peak tariff periods
- **Climate Control:** Thermostat, HVAC, ventilation, remote sensing blinds



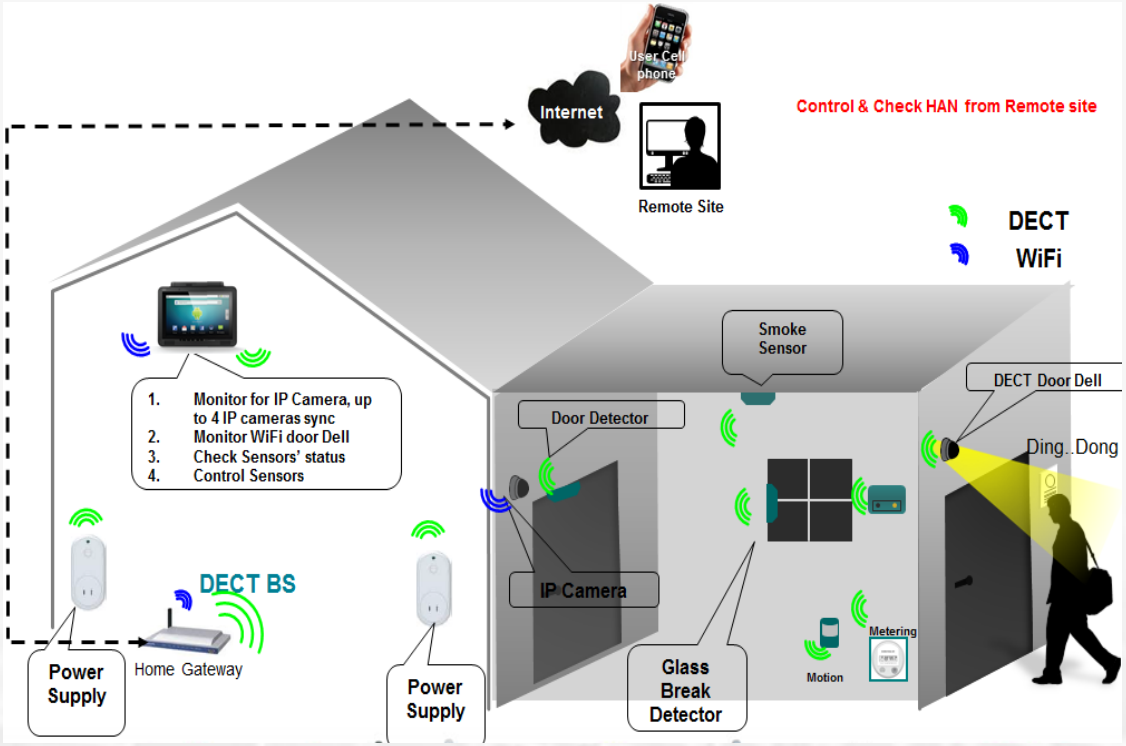
Home Security & Life Safety

- **Doorbell w/ Voice and Video:** allows home user to visually inspect who is at the door
- **Security Systems:** Cameras, Motion Detectors, Glass Breakage Detectors, Door/Window Sensors
- **Access Control, Surveillance Systems w/ Voice and Video**
- **Smoke, CO and Flood Detectors**
- **Voice Enabled Panic Buttons**
- **Baby Monitors**



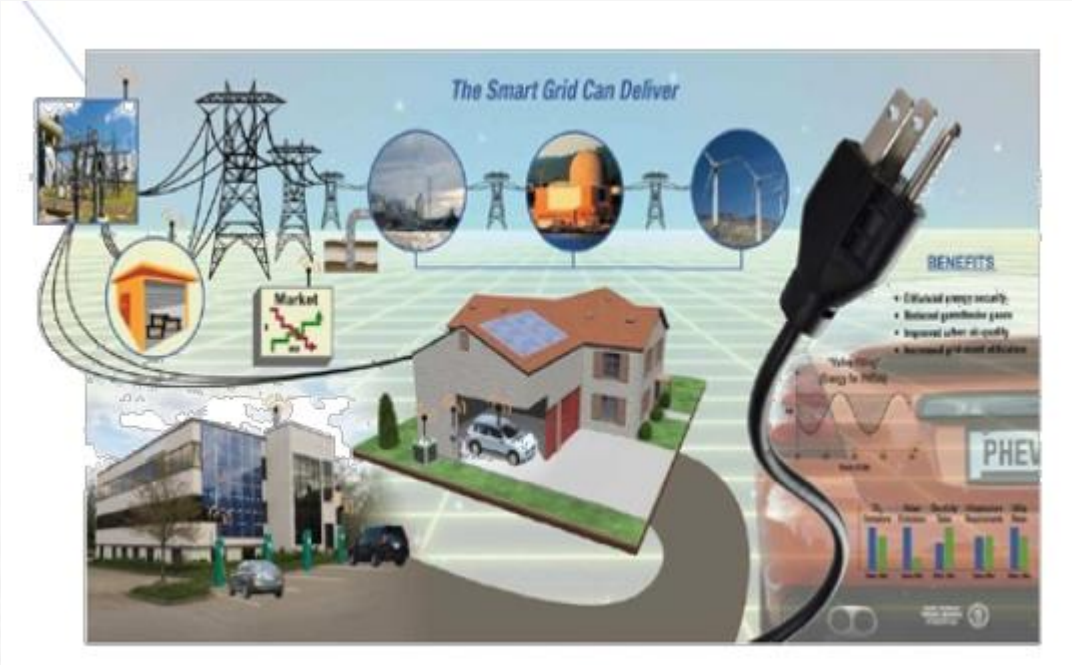
A Complete Smart Home Solution

- DECT integration into Home Gateway (WiFi)
- Remote sensing and monitoring via smart phones
- Smart outlets, smoke detectors, door bells, glass break detectors, motion detectors



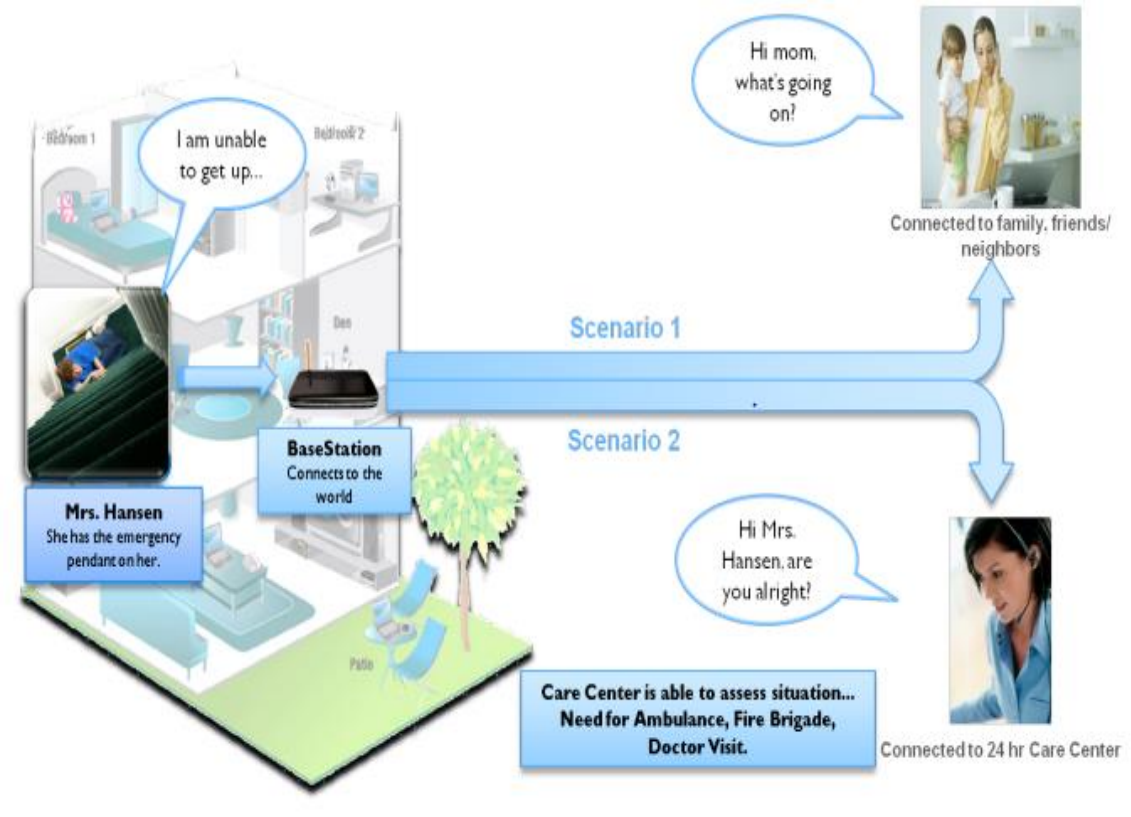
Energy Management

- Remote Metering: allows transmission of consumption information of metered energy sources such as gas, electricity from the home to the energy provider
- Remote (Cloud) Energy Management



Healthcare

- Distress “Panic Button” Pendants
- Assisted Living
- Remote Healthcare & Patient Monitoring



Technical Specifications

DECT ULE: the perfect combination of long battery lifetime, high data rate, low cost and long transmission range.

RF Specifications

- Carrier Frequency: 1.8 GHz Europe, 1.9 GHz US
- RX Sensitivity: -98 dBm
- TX Power: +25.5 dBm (20 dBm US FCC Limit)
- Link Budget: up to 123 dB (BT = 92 dB, Zigbee = 106 dB)
- Channels: 60 to 120 (12 slots x 5-10 RF channels)
- Uses dynamic channel selection to avoid interference
- High Data Rate: 1Mb/s
- Capable of supporting repeaters for enhanced transmission range

Current Consumption

- Very Low Duty Cycle: 100 mS sensor transmission every 20 seconds
- Low average current: <15 uA (only listening to the base looking for paging)

Regulatory Requirements

The DECT standard was developed by ETSI but has been adopted by many countries all over the world.

Frequency Allocations:

- Europe: 1880-1900 MHz
- China: 1900-1920 MHz
- Japan: 1893-1906 MHz
- Latin America: 1910-1930 MHz
- US & Canada: 1920-1930 MHz

DECT World Coverage Map

Regulatory Standards

The DECT standard was developed by ETSI but has been adopted by many countries all over the world.

Regulatory Standards:

- CE Requirement: ETSI EN 300-175
- FCC Requirement: Subpart D – Unlicensed PCS Devices (FCC Part 15.3xx)
- Industry Canada: RSS-213 Issue 2

Key Differences:

- Channel Plan:
  - Europe: 10 channels (1.728 MHz spacing)
  - US: 5 channels (1.728 MHz spacing)
- Average TX Power:
  - Europe: 10 mW (250 mW peak)
  - US: 4 mW (100 mW peak)

•Key Note for FCC Certification: DECT is generally considered a license exempt personal communication service but in the US, in order to free up dedicated spectrum, the FCC had to relocate other devices (primarily point-to-point microwave links). Consequently, the cost of clearing the band of incumbent devices is currently being recovered from DECT users and is called a UTAM Clearing Fee. Each DECT product manufacturer or distributer must pay an upfront $50,000 one-time licensing fee and a UTAM certificate must be presented as part of the FCC filing. This fee is not required if a "FCC certified module" is used as the fees would have been paid by the module manufacturer. This fee is in effect until such a time as when all financial obligations are met.

Protected Spectrum

With the exponential growth in the adoption and use of wireless devices, the 2.4 GHz spectrum is quickly becoming overly crowded. This severely impacts the effectiveness of this spectrum. The growth of WiFi networks, Bluetooth and Bluetooth Low Energy devices, ZigBee networks, microwave ovens, and the wide range of proprietary devices like wireless video cameras, has created significant amounts of interference and leaves little room for additional data capacity in this spectrum.

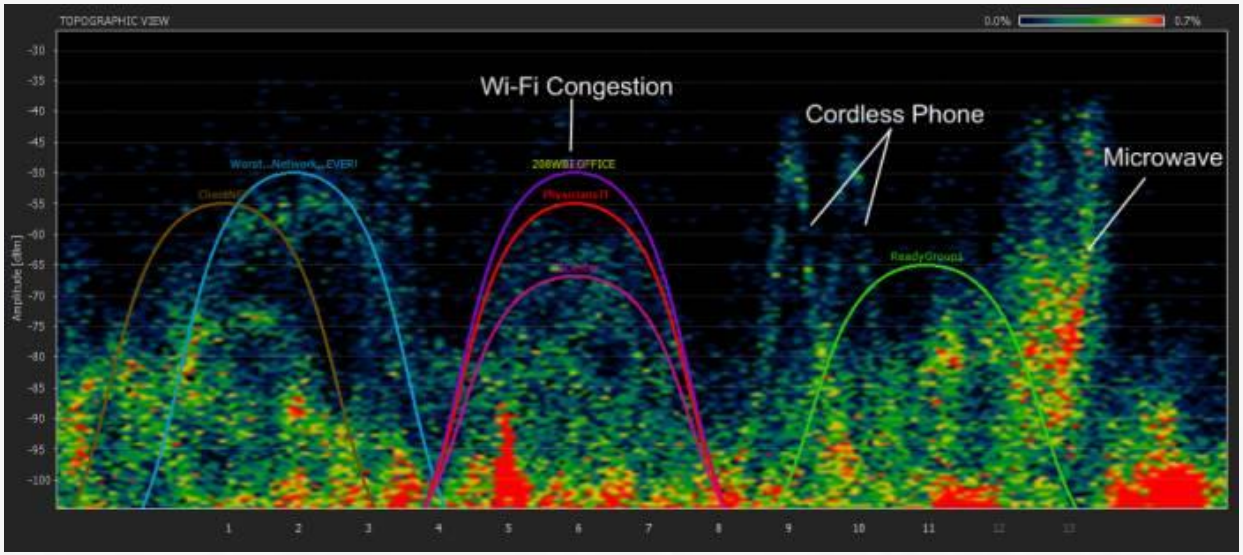


Figure 1 - The very crowded 2.4 GHz band

DECT utilizes a dedicated/ protected spectrum, there is no contention with other wireless devices

Battery Lifetime

The ULE power consumption depends on the operational mode of the ULE device.

- Synchronous Mode (DECT calls this “locked mode”) - consists of a predetermined sleep time (between 1-20 seconds). In the synchronous mode the ULE node autonomously communicates with the base every x seconds (x = 1-20 seconds)
- Asynchronous Mode (DECT calls this “unlocked mode”) - a sleep period of seconds to days is possible.

- The following table, provided by the DECT Forum, provides an indication of expected battery lifetime. Chipsets such as the DHX91 system on a chip (SoC) from DSP Group are able to exceed these lifetime estimates.

Mode	Sleep time	Battery Lasts*
Asynchronous (unlocked)	5-6 mins.	~ 10 yrs
Asynchronous (unlocked)	2½ mins.	~ 5 yrs
Synchronous (locked)	20 second	~ 4yrs

- *Note: Battery lifetime is for 2 x AA alkaline cells. 2 x AAA or coin cells will also be applicable for certain applications.

Power Consumption

Based upon the DHX91 Base Node technology from DSP Group, the power consumption for various home sensors can be estimated as follows:

	PIR	Smoke	Glass Break	Flood	Magnet	Gas	Panic	Valuable
Features								**24dB Tx**
Sensor Circuit [uA]	7	10	12	5	5	10	3	5
MCU [uA]	3	3	3	0	0	3	0	0
PM length [slots]	1	1	1	1	1	1	1	1
Keep Alive every X[min]	15	15	15	15	15	15	0	5
Rx Only every X [sec]	0	0	0	0	0	0	0	60
Alert Event/Day	120	0.034	0.034	0.034	32	0.034	0	0.034
Total Talk Time [min]	0	0	0	0	0	0	10	0
Battery								
Voltage [V]	3	3	3	3	3	3	3	3
Capacity [mAH]	1500	1500	1500	1500	1500	1500	300	300
Efficiency [%]	80	80	80	80	80	80	80	80
Years Operation								
[years]	**11.38**	**9.85**	**8.61**	**23.19**	**22.06**	**9.85**	**9.13**	**2.42**

DHX91 – ULE Main Features:

- Ultra low current consumption: hibernation current less than 2 uA
- Extremely Fast Wakeup: ~10 mS wakeup from hibernation

DECT ULE – Unmatched Advantages

Technology Comparison

	Lowest Cost of Ownership	Performance	Connectivity	Power Consumption	Video/Audio Enabled
DECT ULE					
ZigBee					
Z-Wave					

Simply Secure Connectivity

ULE Alliance

Introduction by Avi Barel

Director of Business Development

and Deputy Chairman

Introduction to ULE Alliance

- Mission/Vision
- Structure
- Membership types & benefits
- Sponsor companies
- ULE advantages
- Target markets
- Summary

Vision

- Establish ULE as the leading eco system for home automation
- Leverage from proven DECT radio technology
- Use a mature system deployed by 100’s of million households
- Cover the whole house
- Build on available infrastructure

***The ULE Alliance vision is to establish ULE as the world’s leading control network eco-system for home and building use by leveraging the proven reliability and range of the DECT radio technology currently in use in 100’s of millions of products worldwide*.**

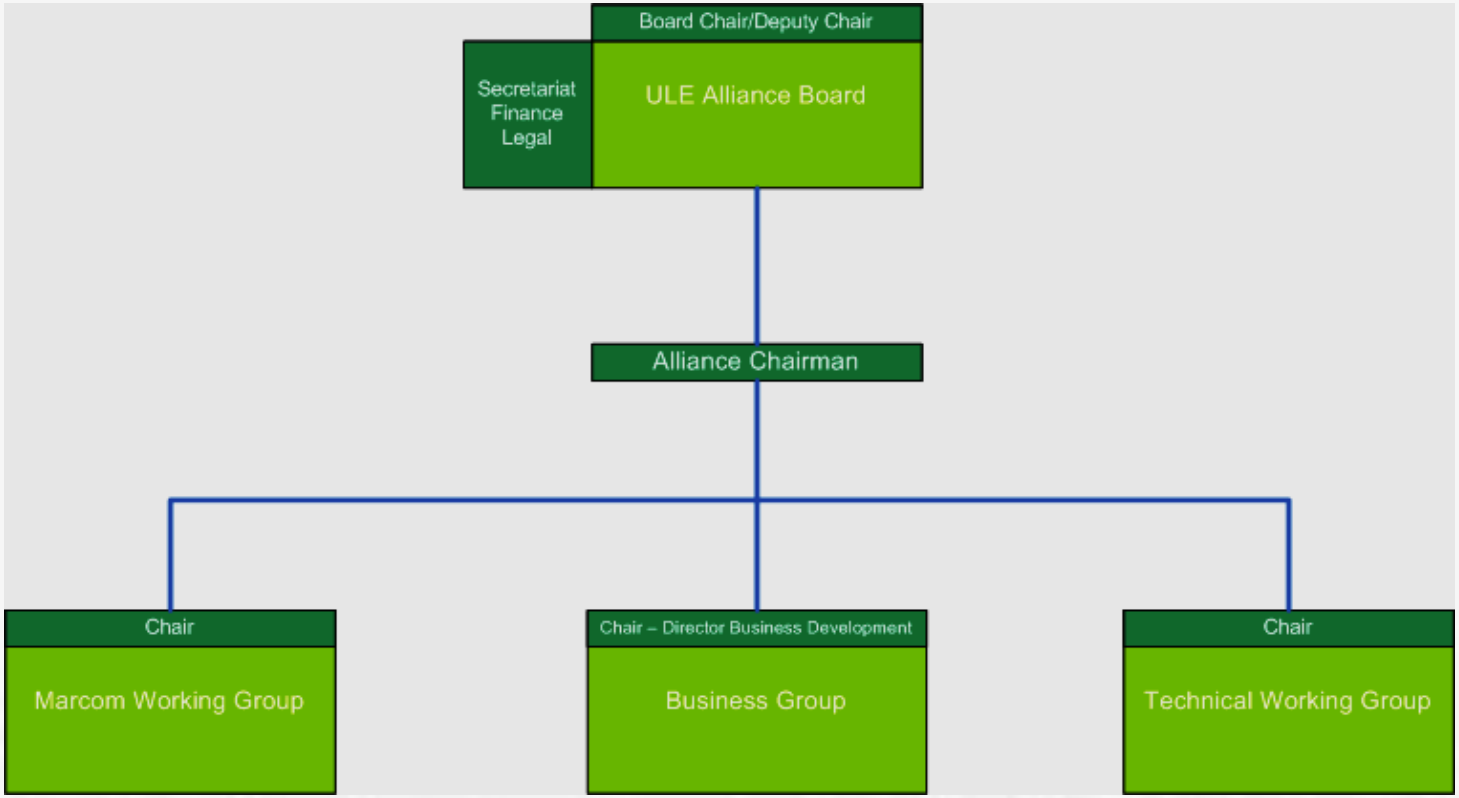
Mission

- **Enable quick development of new products and services**
  - Home automation, Security, Climate control
- **Guarantee interoperability by IOP events**
- **Define ULE certified logo with certification program (mid 2013)**

The ULE Alliance allows its members to quickly develop new products and services in the areas of Home Automation, Security and Climate control by ensuring perfect interoperability between the products of the different vendors conforming to the standards, thereby delivering true customer satisfaction and increasing the overall size of the market for all participants.

Structure

- **The ULE Alliance is a non-profit organization initiated by the DECT Forum.**
- **With a dedicated chairman, a board and three working groups.**



* Promoter members can apply for becoming an ULE Alliance board member.

Membership Types & Benefits

Benefit	Promoter	Contributor	Adopter
Drive the agenda, can be elected to the ULE Board	●		
Participate in the Marketing Working Group	●	●	
Participate in the Technical Working Group	●	●	
Access to all draft ULE Alliance profile specs	●	●	
Access to all internal ULE Alliance documentation	●	●	
Access to all published ULE Alliance profile specs	●	●	●
Access to all published ULE Alliance documentation	●	●	●
Participate in IOP events	●	●	★
Access to the certification program	●	●	★

★ Available at additional costs

Current Sponsor Companies

DECT FORUM

Ruth Wilson

dialog SEMICONDUCTOR

René Kohlmann

DSP GROUP
at home in your wireless world

Ulrich Grote

Gigaset

Erich Kamperschroer

vtech

Andreas Zipp

SIMPLY SECURE CONNECTIVITY

BY JOINING THE ULE ALLIANCE

DSP Group Overview

A Leader in Wireless Chipset Solutions for Converged Communications

Market Leader

- 70% market share in cordless
- Fastest growing share of VoIP and HGW
- Heading the home automation & security with DECT ULE
- Leading the evolution of the multimedia home phone

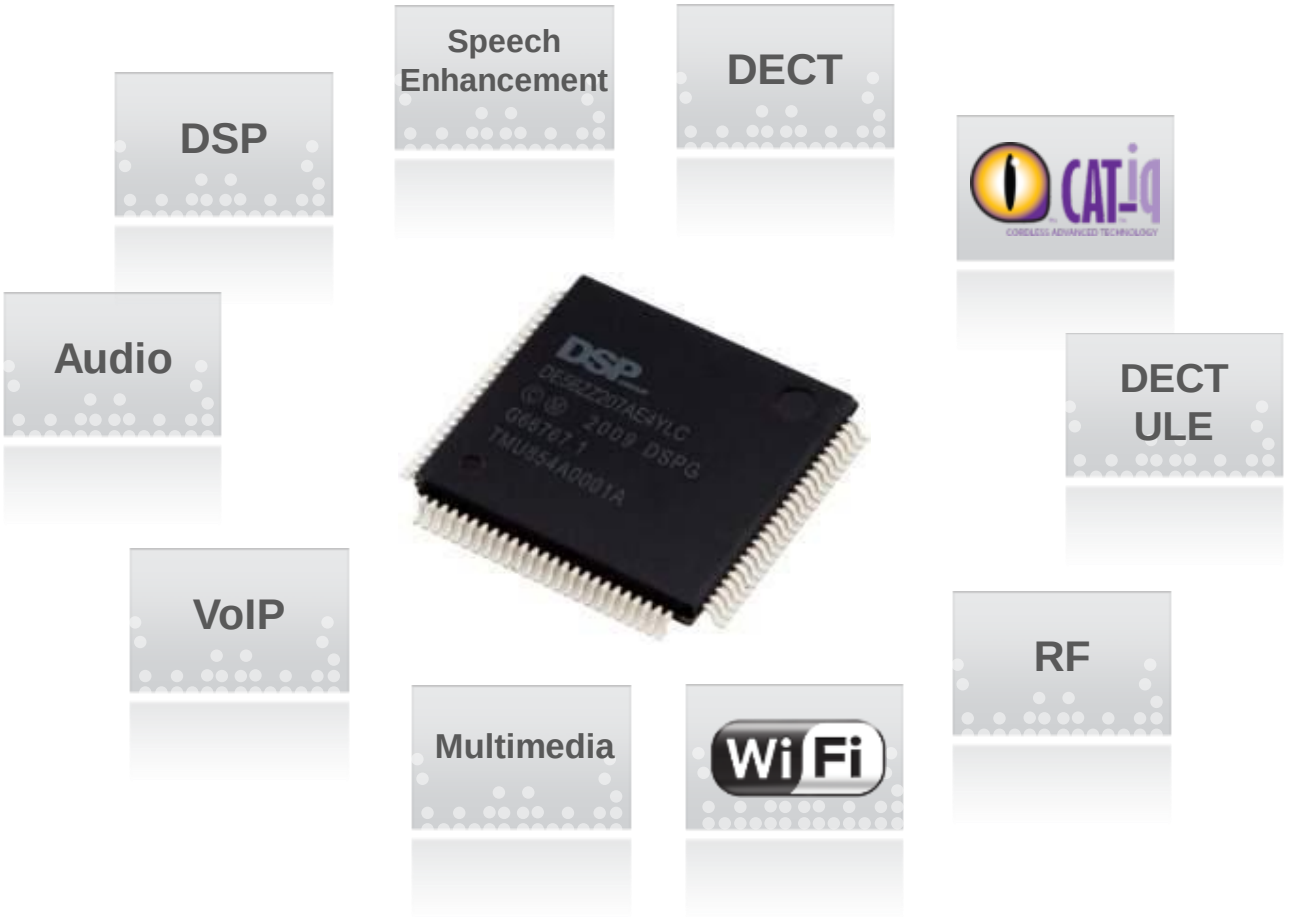
Technology Innovator

- 172 patents granted, 75 pending
- The industry's newest, most advanced speech processing chipset for mobile communications with HDclear™ technology
- Leading the industry's newest ETSI's ultra-low power DECT-ULE standardization with the most innovative DECT ULE chipset

Customer Centric & Reliable Supplier

- **>2B** chips shipped
- Sound financial stability
- Closely partner with customers, including tailored solutions
- Outstanding local support worldwide

Innovative R&D Powerhouse with In-House Advanced Technologies



Mastering:

voice, audio, video, Wi-Fi, DECT CAT-iq, DECT ULE, VoIP, RF and DSP technologies

DSP Group's Solutions Target Three Key Segments

Home			Enterprise		Mobile
Cordless Phones	Gateways	Home Automation & Security	Voice Over IP (VoIP)	Video and Multimedia Communications	HDMobile
					
					
					

DSP GROUP
at home in your wireless world

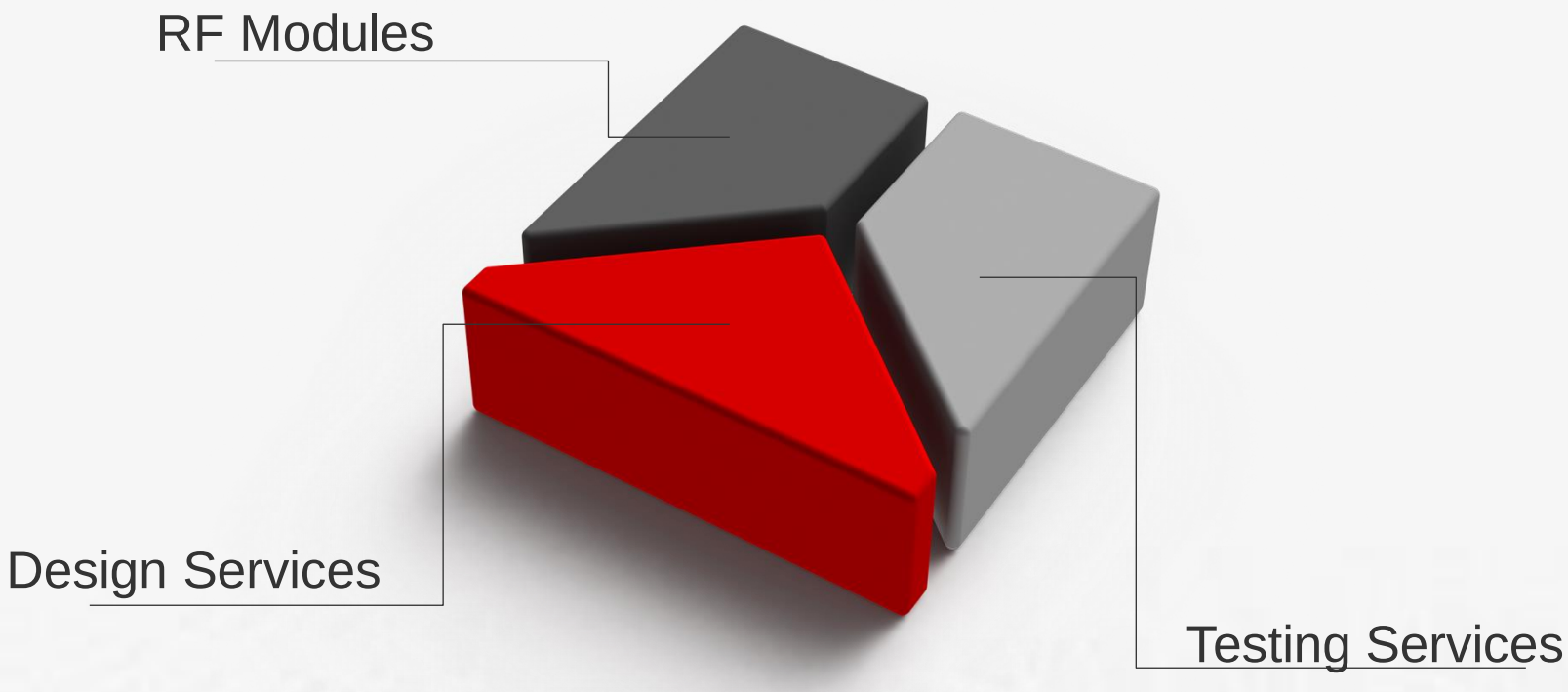
DSP Group's DECT ULE Solution

- DSP Group, a leading IC vendor, offers the most comprehensive Home Area Network solution based on DECT ULE Standard

- DSP Group Solution consists of
  - The most advanced DECT ULE IC in the market for ULE devices – DHX91
  - A variety of Chipsets for a diversity of base station such as HGW, OTT and USB dongle
  - A full DECT ULE Software stack running on top of DSP Group's DECT/DECT
  - References Design Kits for both Devices and Base
  - Dedicated support, shortening customer's Time-To-Market

- DSP Group has partnered with leading ODM/OEM's, Middleware providers, Cloud solution provider and Service providers to create a full and robust Ecosystem

How Can LSR Help?
Complete DECT / DECT-ULE Development Provider!



Design Services

- Hardware, Wireless Design
- Industrial Design
- Mechanical Engineering
- Antenna simulation, design, and testing
- Embedded, FPGA, DSP software
- Schematic and PCB layout
- On-site compliance testing
- Product Manufacturing

Testing Services

On-site Compliance Testing

EMC & FCC Certification Center

- LS Research provides EMC testing and radio certification services for companies worldwide
- Accredited to ISO / IEC 17025
- On-site FCC / IC / CE Certifications
- On-site antenna patterning and scans
- Intentional radiator specialists

LS RESEARCH
WIRELESS PRODUCT DEVELOPMENT

Make LSR Your Wireless Partner!

Whether your need encompasses product development assistance or RF modules, LSR can provide the solution to meet your requirements!

Superior Performance	Committed to Longevity
Best in class support	Licensing and support options

World Class Wireless Design Services	
Hardware Design	Embedded Software/Firmware Development
Antenna Design, Simulation, Testing	EMC and Certification Testing
Industrial Design /Mechanical Engineering	Manufacturing / Supply Chain

We want to partner with you!

Summary

- The ULE addition to DECT provides new marketing opportunities where low cost, long battery lifetime and interference free, long range coverage is desired. DECT ULE can be considered as both a competing and complimentary technology to other ISM based alternatives such as Zigbee, WiFi and Bluetooth. Based upon a standards based technology; DECT ULE can provide a cost effective, low risk, quick time-to market solution for a variety of M2M and Home Area Network sensor node applications.

We would like to thank both the DECT Forum website and DSP Group for providing significant technical input that was leveraged in the development of this presentation.

Questions?