

deect

wireless technology



DECT NR+ Webinar Series

29 April 2024





DECT NR+ webinar series

- Welcome from the DECT Forum
- First of a new series of webinars in 2024
- Speakers today:



Roel Ottink
DECT Forum



Lauri Piikivi
Nordic
Semiconductor



Jari Hämäläinen
Wirepas



Today's topics

- Overview DECT NR+
- DECT Forum activities
- Update from Nordic Semiconductor
- Update from Wirepas
- NR+ at events
- Questions



Some notes

- The presentations will take around 45 minutes
- Questions:
 - Can be asked by using the 'Questions' button in the bottom righthand corner
 - Any questions about DECT NR+ are welcome
 - Following the presentations we will provide answers to the questions that have come in.
- The webinar will be recorded and made available to all who have registered
- FAQ page: <https://www.dect.org/news.aspx?id=390>



Overview DECT NR+



ETSI DECT-2020 NR

TS 103 636 series:

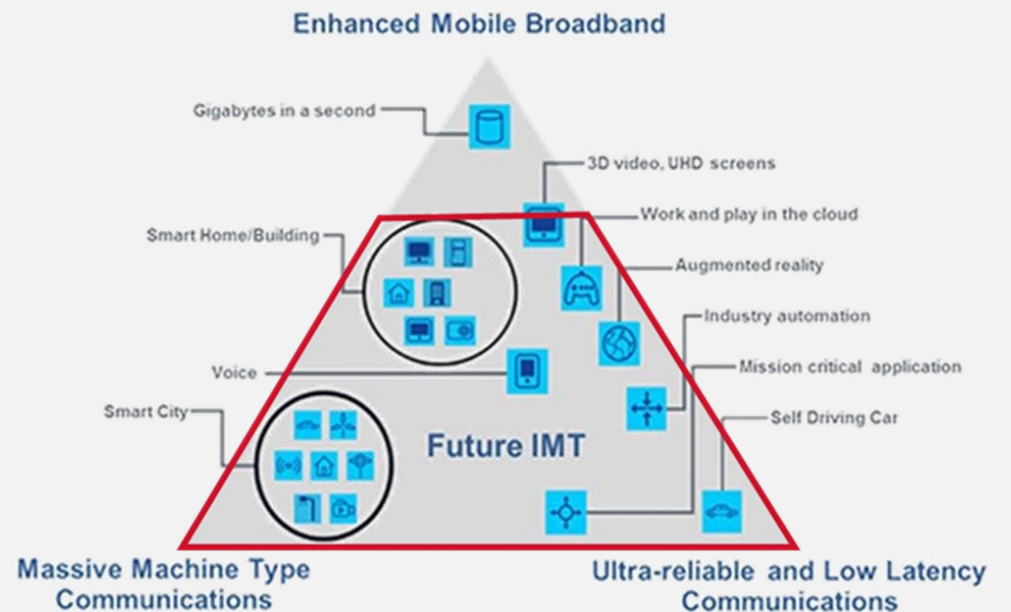
- Part 1: Overview;
- Part 2: Radio reception and transmission requirements;
- Part 3: Physical layer;
- Part 4: MAC layer;
- Part 5: Data link control and Convergence layer.

EN 301 406-2:

- Harmonised standard: Technical requirements supporting European Commission mandates



IMT-2020 ITU-R 5G





Applications of DECT NR+

Smart Metering & Grids



Smart Homes & Buildings



Smart Cities



Industrial IoT



Professional Audio

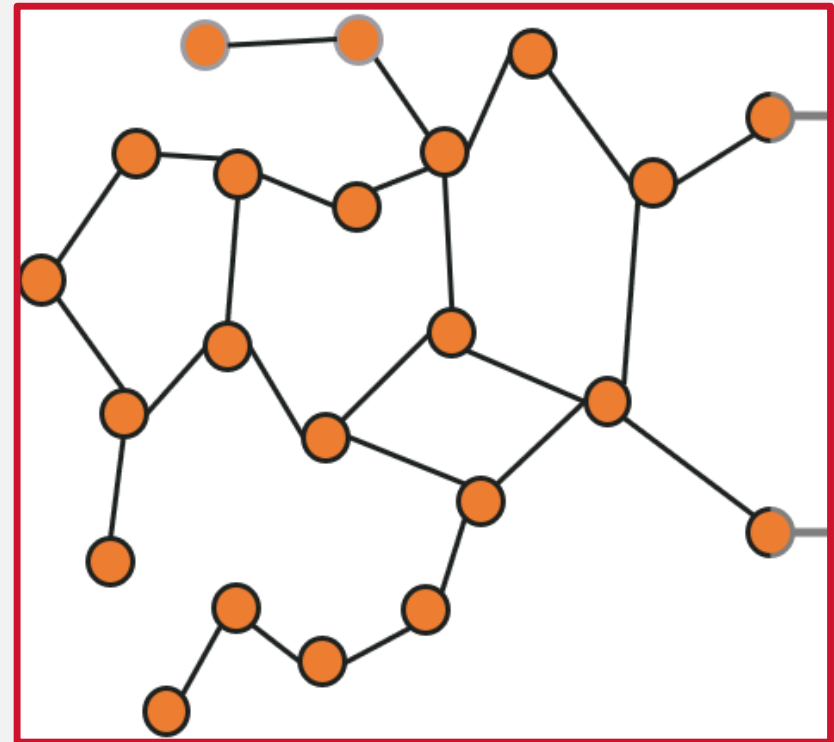


DECT NR+ has been designed for:

- Smart metering & Smart grid
- Smart homes and buildings
- Smart cities
- Industrial IoT
- Professional audio applications

Features and benefits:

- Licensed and license free operation
- Dedicated frequency band
- Self-healing and robust Mesh networking
- Long range
- High density machine to machine communication
- Ultra low latency
- Reliability





DECT Forum activities

- Approvals process in the US started
- Europe: 3.8-4.2 GHz band – assigned by the EU for Wireless Broadband Systems
- Focus on IoT but increasing interest from other segments:
 - Professional audio
 - Healthcare
 - Smart Home – contacts with CSA about Matter
- Marketing:
 - Hannover Messe
 - DECT World event (November 14-15)



HW

Lauri Piikivi



Nordic Product Family for DECT NR+



nRF9161 SiP



nRF9131 mini SiP



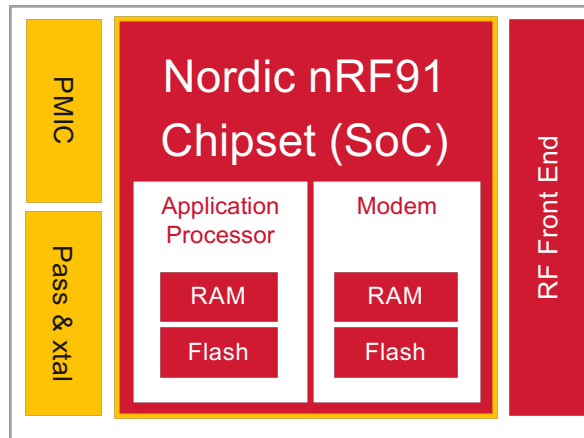
nRF9151 SiP

nRF91 Series

- 1 MB Flash & 256 KB RAM Application core
 - 4 x SPIM/SPIS/UART/TWIM/TWIS
 - PDM, I2S, PWM, ADC
 - 32 GPIOs
- DECT NR+ PHY firmware is alternative modem firmware for nRF91-family
 - No concurrent operation with LTE modem

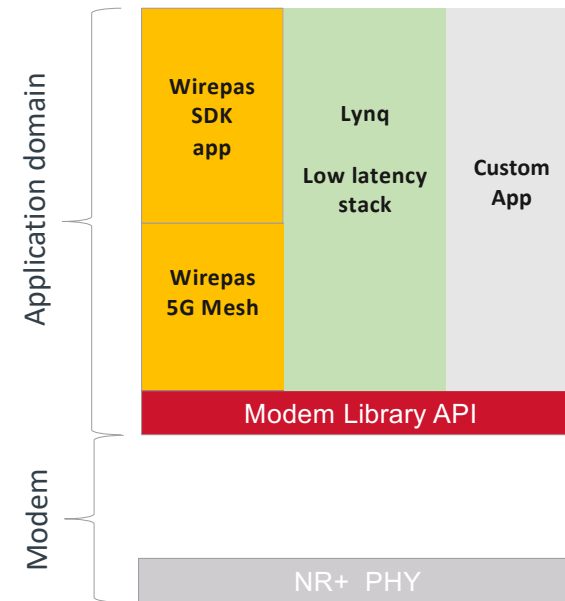


Nordic DECT NR+ HW



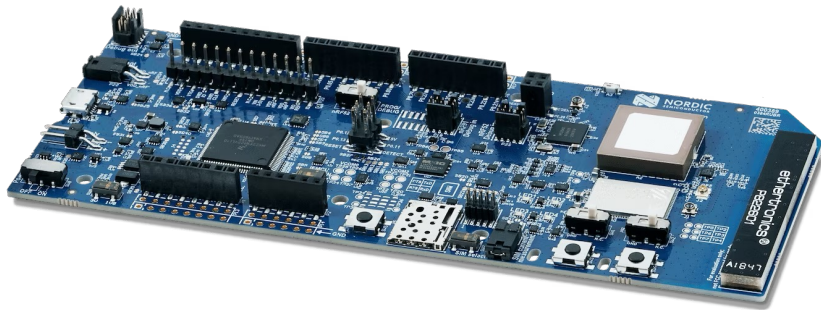
Nordic NR+ SW 2024

- Nordic implements NR+ PHY-level only
- 3 Paths for customers
 - Wirepas: 5G Mesh solution, smart meters focus, mains-powered large networks
 - Separately licensed from Wirepas
 - Lynq Networks: low latency audio and real-time sensors
 - Separately licensed from Lynq Networks
 - Push-to-talk and full-duplex audio
 - Customers make their own stack implementation on Nordic PHY





Nordic nRF9161 DevKit



- SEGGER J-Link OB Debugger with debug out support
- UART interface through VCOM port
- USB connection for debug/programming and power
- Arduino Uno form factor extension
- Supports Bluetooth LE
- 4 LEDs user-programmable, 2 buttons, 2 switches
- nrf9151 DevKit coming soon
- All the 91-family SIPs are SW compatible

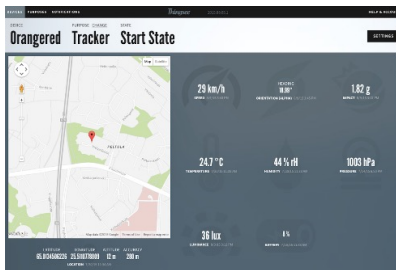


Mesh System

Jari Hämäläinen



Wirepas Mesh Use Cases



Customer
Web UI
Example



Customer
Hardware
Examples

Multiple Applications

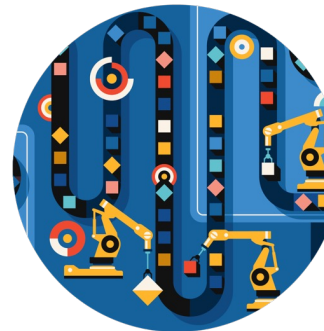
Smart Metering



Smart Tracking



Smart Manufacturing



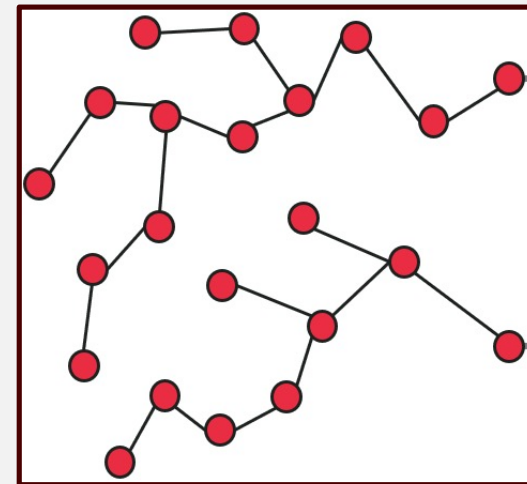
Smart Buildings



Benefits of NR+ Mesh Technology

Amazing performance in unseen cost point

- Operates on a free, license-exempt, global spectrum
- No SIM-cards
- Reliability
 - Service Level Agreements >99.9 %
- Scalability
 - Thousands of equipment in an area sized of a stadium
 - Thousands of devices per gateway
 - Range extended by each node
- Superior coverage
 - For the most demanding environments, inside and outside.
 - No black spots, e.g., cellars, machine rooms

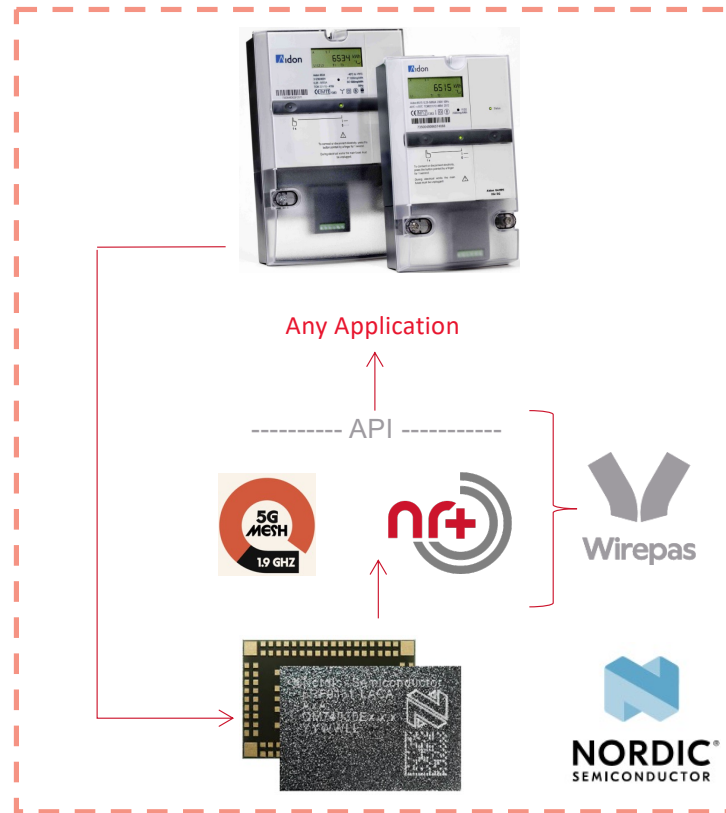




Case example of Smart metering system

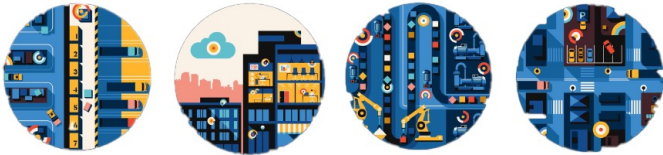
End-customer:
Utilities

Product:
Smart electricity metering



- **1) End customer**
Utilities company building a new solution selects their smart metering provider
- **2) Product**
Smart metering company selects the right chipset that has Wirepas 5G Mesh pre-integrated
- **3) Product**
Smart metering company uses Wirepas SDK to integrate Wirepas 5G Mesh with their applications, and provides the product to the end customer.
- **4) End customer**
Utility provider run their business

How do you get started NR+



As an industrial end-customer

- Look for the right partner for your application from Wirepas partner program



As a product or solution provider

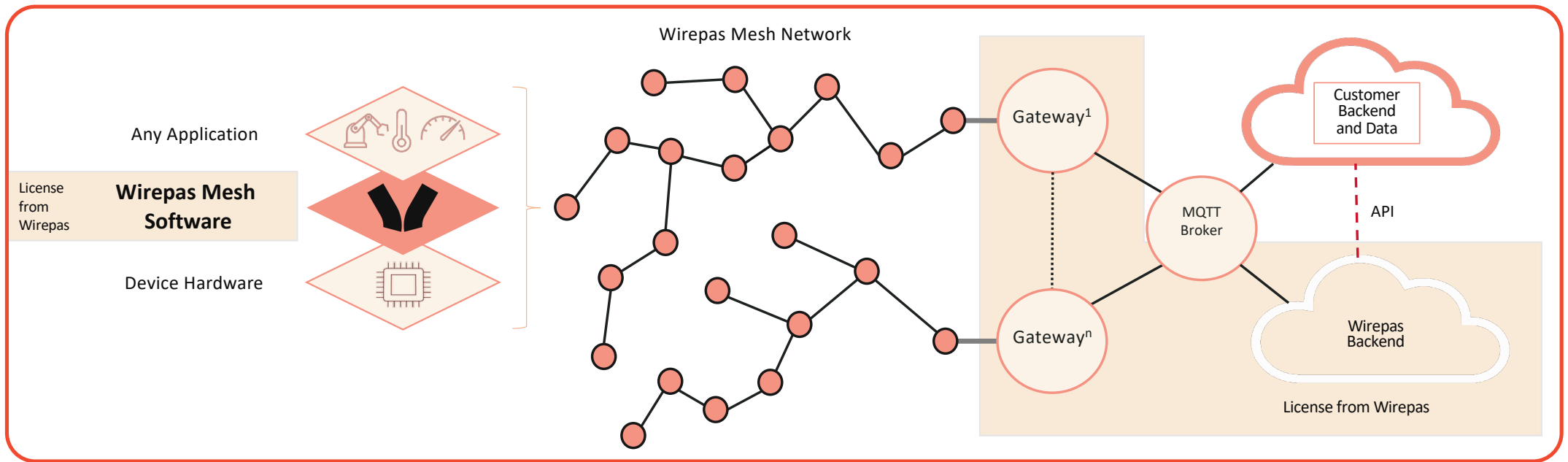
- Join Wirepas Partner Program in order to get access to Mesh products
- Choose your chipset
- License Wirepas product
- Get prepared to fulfill the
 - Harmonised standard
 - Product certification



As a wireless technology provider

- Get familiar with the ETSI standards
- Join ETSI DECT-2020 NR standardisation in order to become a leading wireless technology provider

Wirepas Software Products

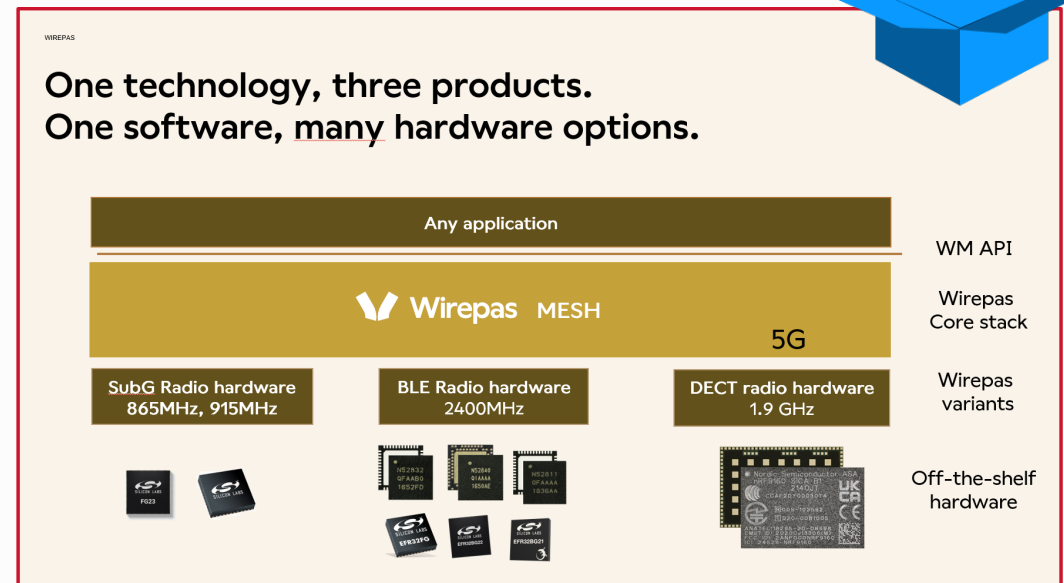


Wirepas Connectivity Suite

How to get hands-on with Wirepas 5G Mesh?

- Read documentation on Wirepas Connectivity Suite
- <https://developer.wirepas.com/>
- Contact Nordic Semiconductor
 - nRF9161, nRF9151 or nRF9131 hardware
- License and get access to Wirepas 5G Mesh software
- Download the latest SDK and software binaries from Github
- <https://github.com/wirepas>
- and run on Nordic semiconductor nRF91 platform
- For smart electricity metering
 - Quick start with our reference application to support DLMS based communication

One Wirepas SDK – three radio profiles





Wirepas 5G Mesh 1.0 focuses on mMTC use cases

• CVG Layer

- Segmentation and reassembly
- PDU max 1500 bytes (including IPv6 payload)
- OTAP, for Physical layer modem, protocol and application software.

• DLC Routing support

- Uplink packet routing to the selected next hop with backend addressing,
- Downlink packet routing with selective flooding to unicast/multicast/broadcast addresses.

• DLC Transmission support

- QoS with two traffic classes,
- Cumulative transfer delay, through the mesh network,
- DLC Service type 2 with ARQ for lower layer failures or route changes.

• MAC layer spectrum management support

- Dynamic operating channel selection
- Synchronized operating channel change,
- Optimized Cluster Beacon transmission timing,
- Auto role mode selection between router and non-router modes (FT and PT or PT only),
- Dynamic route cost calculations with load balancing.

• MAC layer next-hop selection support

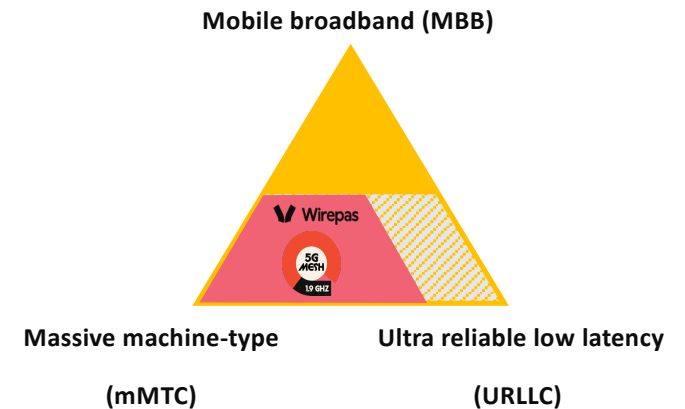
- Dynamic next hop selection based on minimum signal quality and minimum route cost.
- Network Beacon scanning and synchronized Cluster Beacon detection,
- Neighboring cluster discovery from own cluster and Synchronized neighbouring cluster detection,

• MAC transmissions support

- Transmission power control.
- Random Access transmission with LBT and exponential backoff.
- Transmission length adaptation with a single sub-slot granularity.
- Maximum transport block size 1664 bits with TX duration 1.66ms (8 sub-slots)

• Compatibility to the following ETSI standards:

- TS103.636 series and HS EN301.406-2
- TS103.874-2 profile specification



• Physical layer and chipset

- Nordic Semiconductor nRF9161, nRF9151 and NRF9131 System-in-Package chipsets

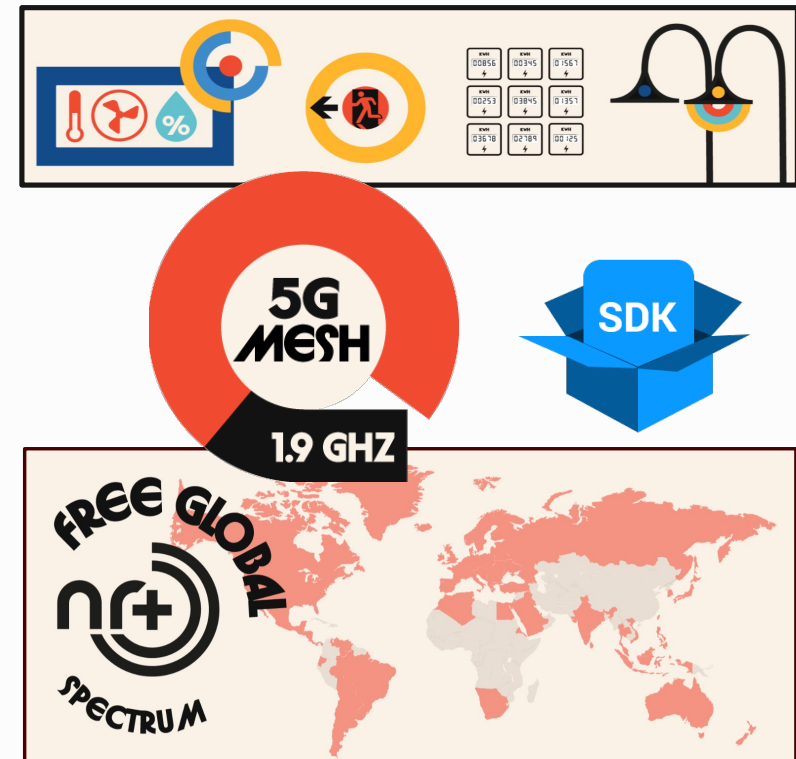
• Long range profile – radio parameters

- 1880-1900 MHz (band 1, 11 channels)
- Physical layer with 1.728MHz per channel, MAC Layer data rate is 1.1 Mbps
- Max +19 dBm outpower, min power -40 dBm.
- Retransmissions for data reliability.
- Range over 5 km Line of Sight

Summary: NR + Availability by Wirepas

Wirepas 5G Mesh

- Available now, covering
 - Long range profile
 - Mains powered devices
 - E.g Smart metering, emergency lighting, street lighting and heating, ventilation, and air conditioning (HVAC) systems
- EU and additional CEPT countries, Australia, New Zealand, South Africa, India: 1880-1900MHz (band 1, 11 channels)



Non-cellular 5G connectivity network for enterprise IoT

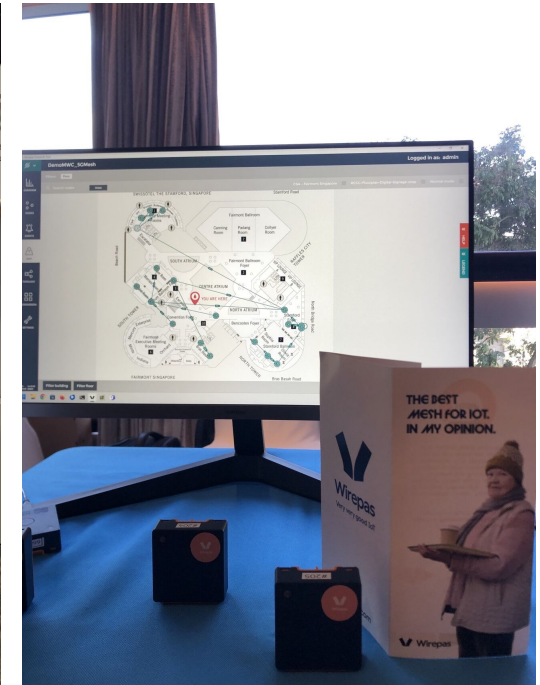
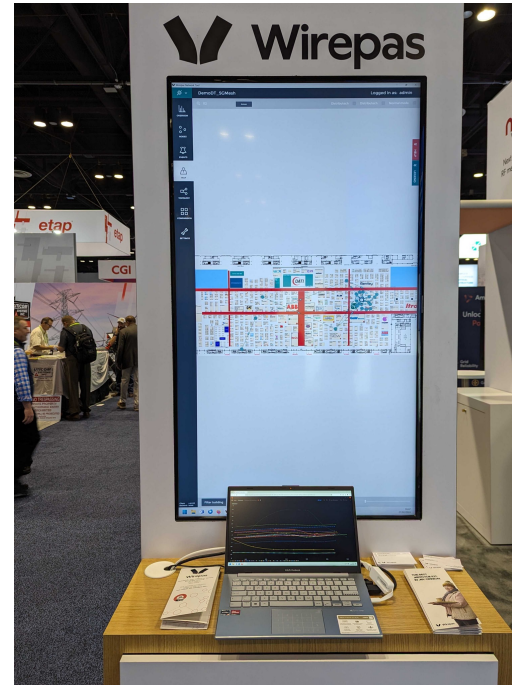
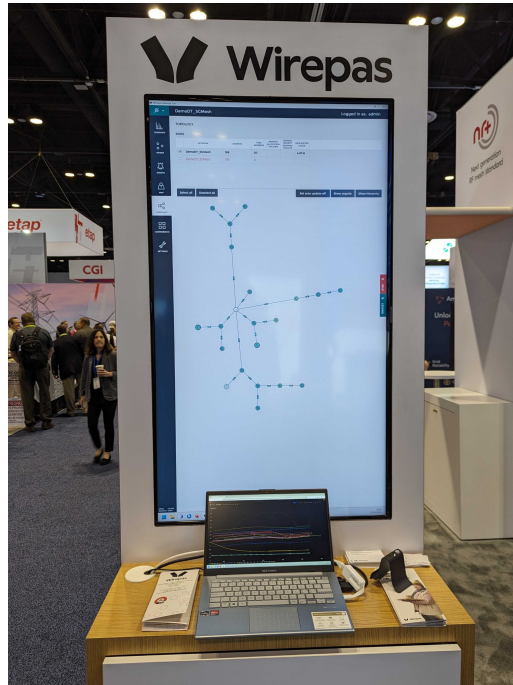


NR+ demo



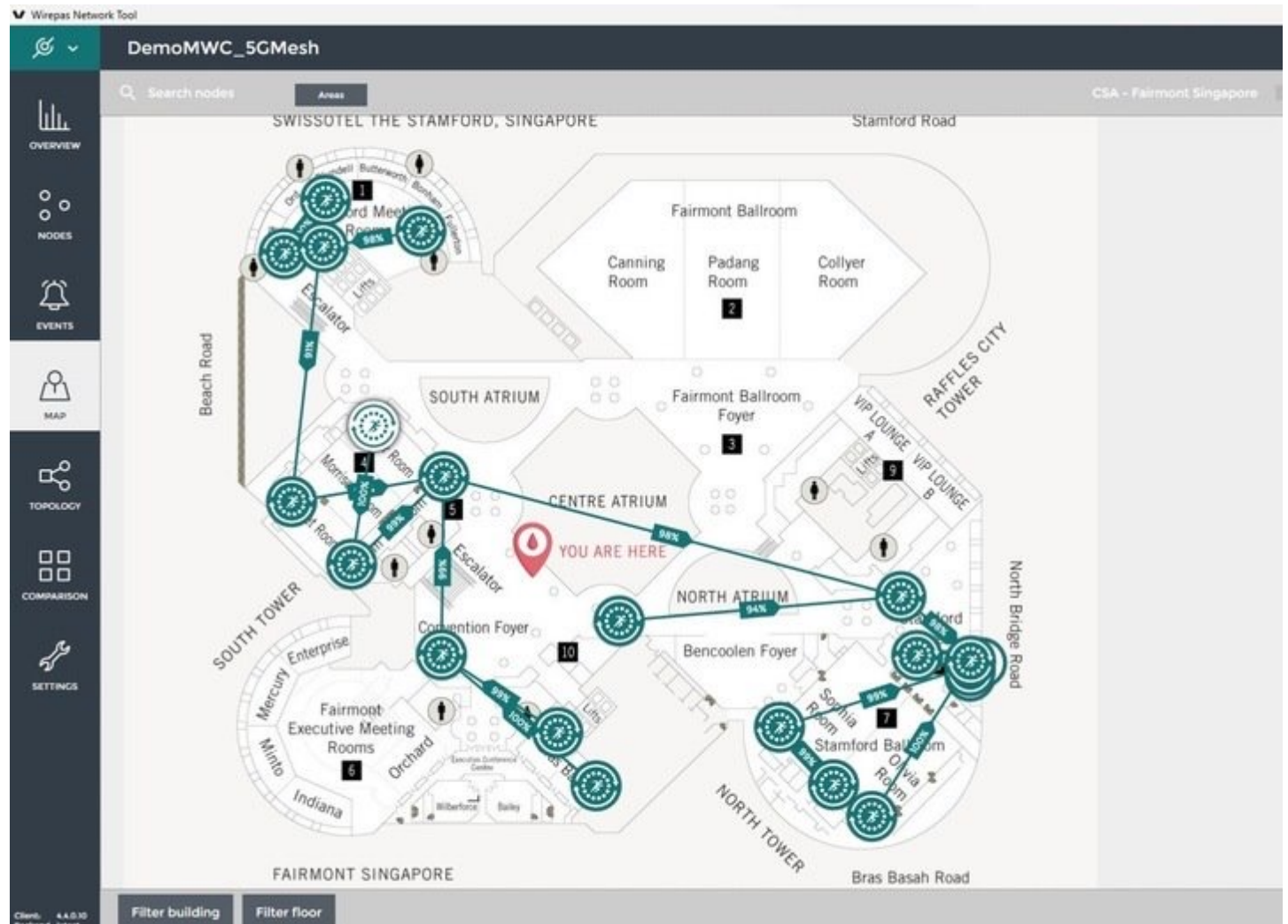


Demo in action at events





Close up of the demo screen



Feedback from past events and demos

The technology has been widely presented at events such as

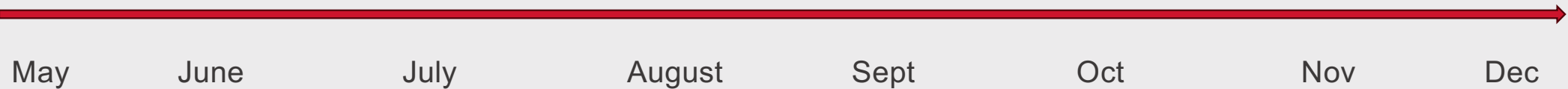
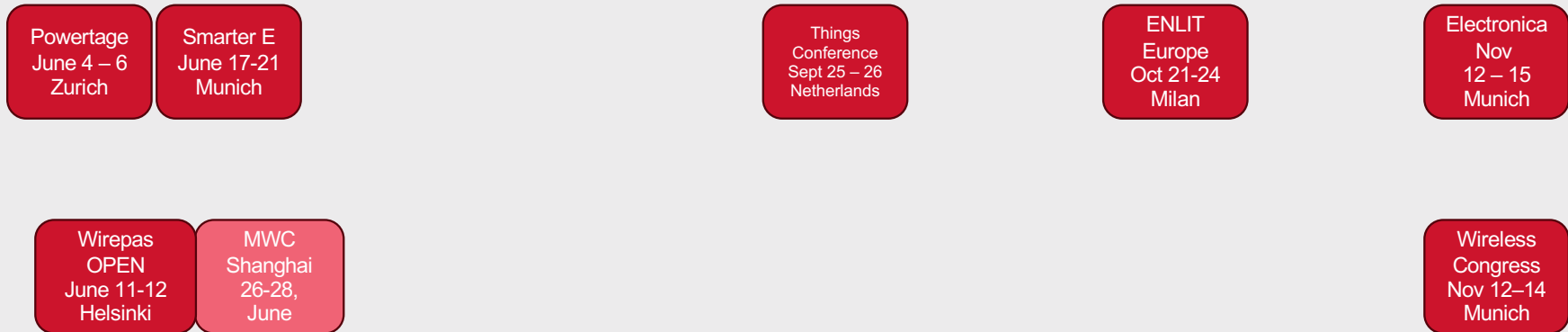
- MWC (Mobile World Congress)
- NFMT (National Facilities Management and Technology Conference and Expo)
- Distributech
- CSA member meeting
- Schneider Innovation Summit
- Embedded World
- Hannover Messe



Feedback received

- Impressive was the most used expression, esp. when showing range and scale.
- Loads of question on the availability:
 - of spectrum throughout regions
 - of stacks and chip vendors
 - of standard protocols (such as DLMS, Matter, OPC etc.)
- High demand for (free) evaluation
- Amazing to see the connections just working in a big busy hall with a lot of other radio traffic

See the NR+ demo live at these events





Special invitation
for attendees of
this webinar only.

See the demo
live at Wirepas
OPEN in Helsinki
June 11 -12.





Wrap-Up





Wrap-up – Now you can start with NR+

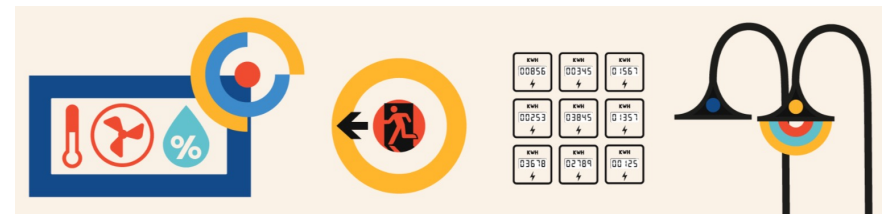
NR + is a non-cellular 5G connectivity network for enterprise IoT

Nordic Semiconductor offering

- nrf9161 and nrf9131
- Production started end of 2023, samples available
- Development Kit available

Wirepas 5G Mesh offering

- Generally available now, covering
 - Long range profile
 - Mains-powered applications
 - Smart metering, emergency lighting, street lighting and heating, ventilation, and air conditioning (HVAC) systems



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