

Hannover Messe

**MulteFire: Reliable
Wireless for
Industrial IoT**

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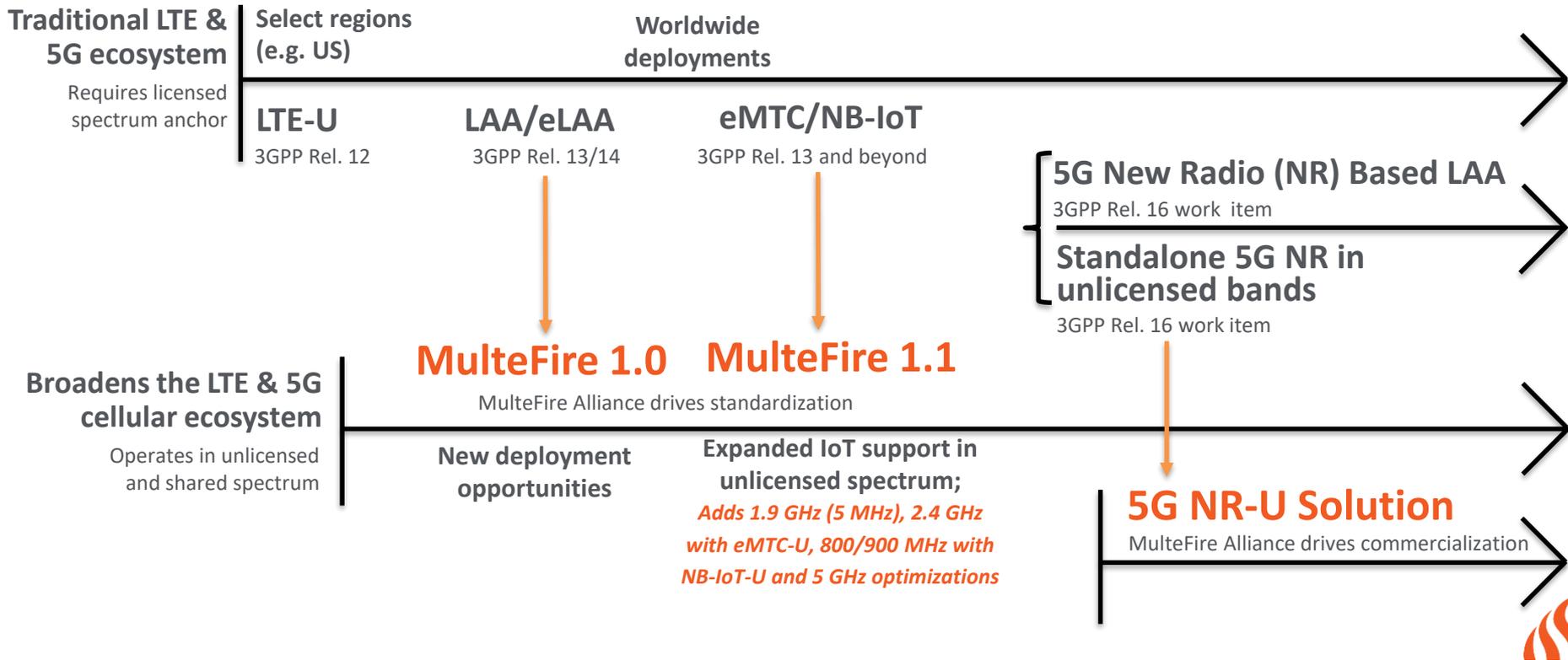


Private Wireless Opportunity for Industrial IoT

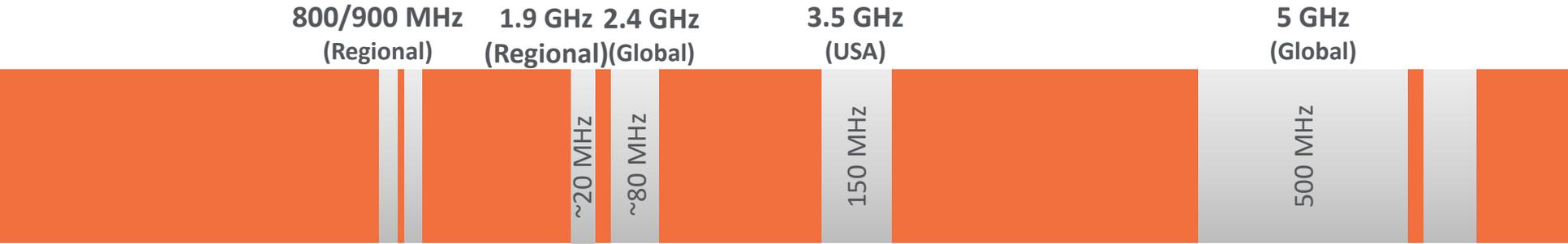
- Extend the LTE ecosystem to Industrial IoT and Enterprise applications
 - Leverage existing 3GPP technology
 - Utilize available unlicensed spectrum bands globally
- Enable new vertical markets and use cases
 - Deliver robust wireless connectivity for industrial IoT applications
 - Support various verticals, such as hospitality, healthcare, mining, oil & gas, etc.
 - Allow anyone to create, install and operate their own private wireless network
- Complement existing wireless infrastructure
 - Not a replacement technology
- **Introducing MulteFire: Cellular-based technology for Industrial IoT**



MulteFire Evolution and Roadmap



Standalone Deployment in Shared and Unlicensed Spectrum



MulteFire 1.0/1.1

For mobile broadband & high-performance IoT. Carrier bandwidth: 10/20 MHz (5 MHz for 1.9GHz)



MulteFire 1.1 eMTC-U

Broadest range of narrowband IoT use cases, Carrier bandwidth: 1.4 MHz



MulteFire 1.1 NB-IoT-U

For low-power, wide-area (LPWA) IoT use cases
Carrier bandwidth: 200 kHz



¹ Use of MulteFire in 3.5 GHz in US possible but not a target band and not part of CBRS focus (regular TD LTE)

² Use of NB-IoT-U at 2.4 GHz also possible

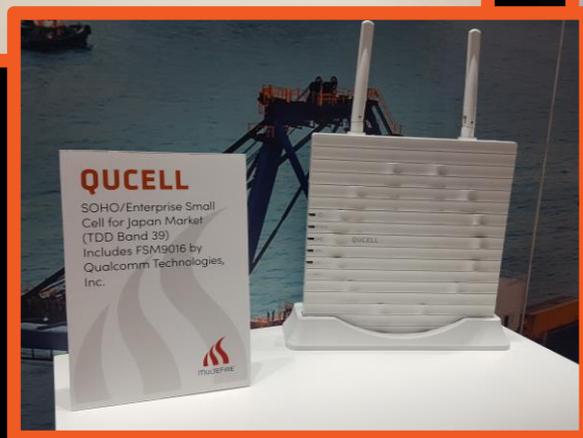
³ Use of eMTC-U at sub 1 GHz also possible

MulteFire Release 1.0 Traction

- Specification is based on 3GPP Release 13 (LAA) and Release 14 (eLAA)
- Supports neutral host and private LTE deployment models
- First products built to Release 1.0 spec are available
- MulteFire 1.0 trials for private networks are currently underway
- Certification program under development



MulteFire Release 1.0 and 1.1 Commercially Available Solutions



Introducing Release 1.1

Focused on IoT Optimizations

**Expanded IoT
Services with Low
Power Wide Area
Support**

**New Lower
Spectrum Bands
Focusing on IoT**

**Enhances Existing
MulteFire 1.0
Broadband Services
in 5 GHz**



Release 1.1: MulteFire Operation in 1.9 GHz

Ready for Commercial Launch in Japan

Targeting Industrial IoT & Enterprise Use Cases

- Japanese regulation allows MulteFire to use existing band 39 devices (such as Cat 5/1 devices in 5 MHz)

Harmonious Co-Existence

- Driven by eNodeB using standard TD-LTE UE Band 39 devices
- Driven hourly by eNodeB Listen-Before-Talk in uplink and downlink

Device Ecosystem in Place

- Massive TD-LTE ecosystem with more than 1 billion devices supporting Band 39 today – no device impact!
- MulteFire 1.1 Band 39 eNBs are commercially available today





Release 1.1

MulteFire Operation in 2.4 GHz Unlicensed Band – eMTC-U

- Supports medium data rate applications – $\sim 1\text{MB/s}$
- Adapts eMTC for unlicensed bands
- Delivers robust wireless connectivity between devices up to several hundred meters
- Enables applications such as factory automation, asset management, or surveillance monitoring for private networks



Release 1.1

MulteFire Operation in 800/900 MHz Unlicensed Bands – NB-IoT-U

- Supports extremely low data rate applications – bits/s
- Adapts NB-IoT for unlicensed bands
- Delivers robust wireless connectivity between devices up to several kilometers
- Enables applications such as smart meters for private networks



MulteFire Deployment Models

*Delivering Key
Benefits for Industrial
IoT and Enterprises*



Private IoT Networks with MulteFire

- **Company Controlled** – Closed, independent network, no obligation to MNOs
- **Optimized** – Tuned for coverage, capacity, application, and latency requirements
- **Flexible Deployment and Secure** – unlicensed spectrum, managed services, built-in LTE security
- **Local Coverage**
- **Customized Services**



MULTEFIRE™

MulteFire-based Private Network for Industrial IoT

Industrial

Factories, warehouses,
power plants, logistics,
refineries

Employee
access



Automated Guided
Vehicle (AGV)



Security
camera



Operator
access



Shipment
arriving



Intelligent Edge
connectivity +
computing



MulteFire-based Private Network for Industrial IoT



Updating entertainment sys.



Ground/flight crew access



Uploading engine data



Hubs

Airports, seaports, container ports, transport hubs

Uploading aircraft logs



Interactive maintenance



MulteFire-based Private Network for Industrial IoT

Hubs

Airports, seaports,
container ports,
transport hubs



Employee
access



Uploading
shipping logs



Automated
crane



Automated Guided
Vehicle (AGV)



Neutral Host - Oper
access



Roadmap to 5G





Looking Ahead

5G NR Standalone Operation in Unlicensed Spectrum

Active Support of 3GPP 5G NR-U Standalone Standardization for Release 16

- Support 3GPP standardization efforts via our overlapping membership
- Ready to support additional standardization within the MulteFire Alliance Technical Specification Group as needed and take on tasks that fall outside of 3GPP Scope

Enabling an Interoperable Ecosystem

- Promote 5G NR standalone operation in unlicensed spectrum
- Foster new 5G NR-U use cases and new business models
- Support the deployment of 5G NR-U for private networks, such as industrial IoT verticals



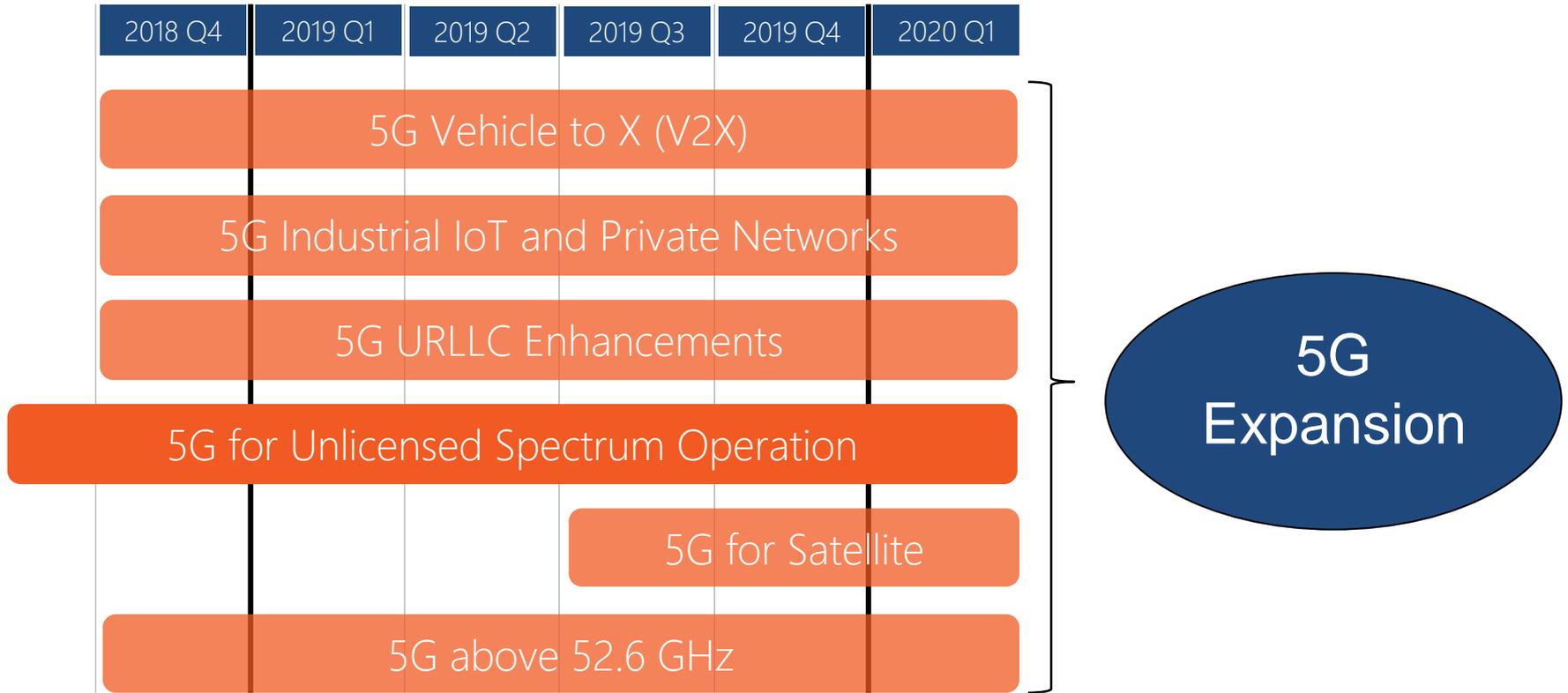
5G NR-U Scope and Timeline



- 3GPP work on unlicensed operation will be focused on 5G NR
 - Operation in unlicensed bands from Release 16 onwards
 - Many of the LTE-LAA technical concepts will be re-used
 - Key focus is on adding Listen-Before-Talk support to NR
- 5G NR-U addresses both LAA and Standalone operation
- Initial focus on bands below 7 GHz
 - Focus on 5 GHz and 6 GHz unlicensed bands
- NR-U specifications to be kept separate from core 5G NR specifications, not part of the ITU IMT2020 submission



Release 16 – 5G Expansion



About the MulteFire Alliance



MulteFire Alliance Members



About the MulteFire Alliance

Independent, international member-driven consortium – 3GPP/ETSI style org with IPR policy and working procedures

Goal to develop technology standards that will be widely adopted in global standards

Join Us – Contribute your requirements and help shape MulteFire technology to meet your needs

Membership information and resources at

www.MulteFire.org



Summary

- MulteFire enables Industrial IoT and Enterprises to easily deploy their own private networks
- Leverage one technology solution for multiple global locations – repeatable process
- Complements existing wireless solutions with harmonious co-existence
- Meets Industrial IoT and Enterprise requirements for robust wireless connectivity with path to 5G NR-U

