

Welcome to the
**MulteFire Open
Day**

MWC 2019



Mazen Chmaytelli

MulteFire Alliance President

Mazen Chmaytelli joined Qualcomm in 1995 as an engineer, and currently serves as Senior Director, Business Development for Qualcomm Technologies, Inc. Over the past 20+ years, he has a proven record of wireless technology leadership spanning technical marketing, product management and global business development roles. Recently, he worked on the continued evolution and adoption of Cellular-based technology for unlicensed and shared spectrum such as 4G-LTE Licensed Assisted Access (LAA), CBRS, MulteFire®, Internet of Things (eMTC-U, NB-IoT-U), 5G-NR U and Cellular Vehicular Communications (C-V2X).

Mazen is also appointed as the MulteFire Alliance President, holding responsibility for the overall functions and management of the global ecosystem and operations to support development of MulteFire technical specifications, certification programs, and coordination with related industry groups and regulators. Mazen also served as a Board Member for the CBRS Alliance.

Mazen is a registered professional engineer in the State of California, a Senior IEEE member, a registered attorney with the California Bar, and a registered patent attorney with the USPTO. As an inventor, he holds 40 USPTO granted patents covering a range of telecommunications and software inventions. Mazen has a B.S. and an M.S. degree in Electrical Engineering from the University of California - Los Angeles (UCLA) and holds a Juris Doctor degree from the University of San Diego School of Law.



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

Voluntary call for membership – Join Us

Membership information at
www.MulteFire.org/join



MulteFire Alliance Milestones

- December 2015: MulteFire Alliance Formed
- February 2016: Formal Launch at MWC
- January 2017: Release 1.0 Specification Completed
- February 2018: Release 1.0 Products Announced
- December 2018: Release 1.1 Specification Completed, Optimized for IoT
- February 2019: MulteFire 1.9 GHz Launch in Japan, eNB and device ecosystem in place for commercial deployment



MulteFire Works



MulteFire Alliance Members



Industry Liaisons



Alliance of Industrial Internet – Executed in September 2018

- MoU to advance MulteFire technology operation in the industrial internet as well as harmonize various aspects of connectivity



CBRS Alliance – Executed in April 2017

- Liaison Agreement with the objective to promote LTE technologies in the USA CBRS band (3.55-3.7 GHz band), including *systems based on MulteFire* technology



Global mobile Suppliers Association (GSA) – Executed in October 2017

- Marketing MoU focused on marketing efforts in areas of mutual interest in the field of MulteFire and 5G communication systems and networks



Industrial Internet Consortium (IIC) – Executed in December 2017

- Liaison Agreement to work together to advance shared interests, promoting the digital economy by harmonizing various aspects in the fields of the industrial Internet



Wireless Broadband Alliance (WBA) – Executed in October 2016

- Marketing MoU focused on developing mutual marketing engagement



XGP Forum – Executed in March 2017

- Liaison Agreement with the objective to promote MulteFire technology operation using the 1.9 GHz band in Japan (sXGP)



New White Papers

[www.MulteFire.org/
white-papers](http://www.MulteFire.org/white-papers)

- MulteFire Release 1.1 Technical Overview
- **MulteFire Release 1.1 5 GHz Enhancements**
- MulteFire 1.9 GHz
- **MulteFire eMTC-U**
- MulteFire NB-IoT-U





**MulteFire
Open Day
Krakow**

March 26

**Hannover
Messe
Hall 8, Booth F31**

April 1-5



MulteFire Alliance
Hall 7, Stand 7F81



MulteFire Open Day Agenda

MulteFire Works, *Yoshioki Chika*, **MulteFire Alliance Board Member and Senior Strategy Director, SoftBank**

MulteFire Evolution and Roadmap, *Stephan Litjens*, **MulteFire Alliance Board Chair and GM Nokia Digital Automation**

Panel Discussion: Industrial IoT: Private Networks and the role of Small Cells (in partnership with the Small Cell Forum)
Moderator: James Blackman, Enterprise IoT
Panelists: 5G-ACIA, American Tower, Druid Software, Small Cell Forum

MulteFire Alliance Reception



Thank You



MulteFire Works

MulteFire Launch
in Japan



Yoshioki Chika

Board Member, MulteFire Alliance

Senior Director, Solution Strategy, SoftBank

Mr. Chika is the Senior Technical advisor and chairperson of PWG (Promotion Working Group) for XGP Forum, an organization promoting the XGP (TD-LTE) and PHS eco-system.

Prior to joining SoftBank, Mr. Chika joined DDI CORPORATION (KDDI) in 1985. He spent 20 years in (K)DDI in charge of engineering sector, continuing his involvement in the development of PHS system in 1989. He was appointed to CTO and executive vice president of WILLCOM in 2007. Mr. Chika joined SoftBank in 2011 and appointed to CTO & Board of Directors at Wireless City Planning in December 2011. He has been leading the designing and development of the overall PHS eco-system, resulting in developing superior technology of XGP. Mr. Chika has been leading the promotion of unlicensed TD-LTE band in Japan and achieved B39(1.9GHz) in December 2017. Mr. Chika has seconded to Sprint as Technical advisor for CTO in December 2014. He has a BA in Physics from Ibaraki University in Japan.



MulteFire Works!

Celebrating the
Launch of MulteFire
in Japan





sXGP – MulteFire 1.1 Variant in 1.9 GHz Bands *Ready for Commercial Launch*

Targeting 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

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



Live Technology Demonstrations



1.9 GHz Demonstrations

NOKIA

5 GHz Demo



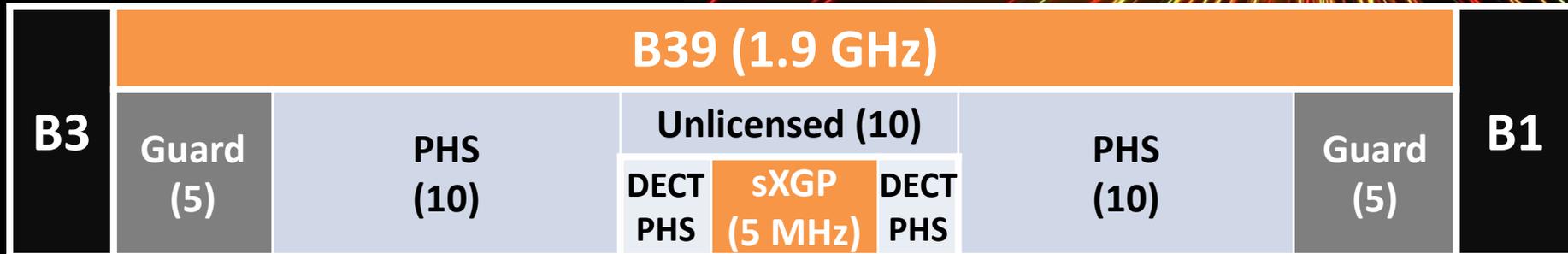
Test House /
Test Services







Bandwidth Expansion (planned)



MulteFire (sXGP)

~ 40 MHz



Thank You



MulteFire Evolution and Roadmap

Stephan Litjens
MulteFire Alliance Board Chair



Stephan Litjens

MulteFire Alliance Board Chair

Stephan Litjens serves as the MulteFire Alliance Board Chair and is the GM of Digital Automation at Nokia. His responsibilities include innovations both internally and externally with customers, partners, and governments to achieve Nokia's ambition to create the Programmable World. Prior to his current role, Stephan was responsible for Nokia's Mobile Broadband portfolio strategy.

Stephan joined Nokia in 1997 and has held several R&D, product marketing, services, product support and portfolio / product management and leadership positions in the mobile networks business. During the rise of 3G in the early 2000s, Stephan moved to Finland from the Netherlands. Since then he has been working for Nokia in Germany and in Japan before moving back to the Nokia headquarters in Espoo, Finland. He is enthusiastic about exploring opportunities, new ways of working and business prospects that can make a difference and inspire others.



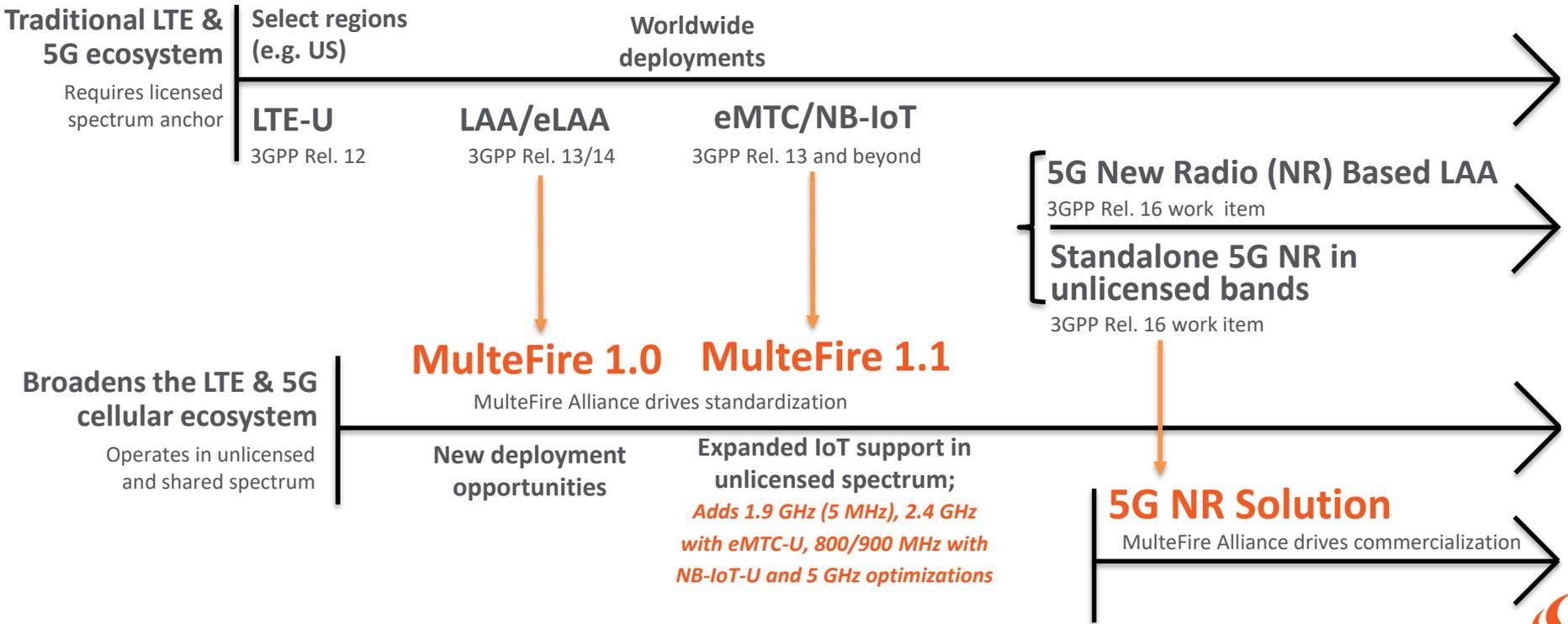
The MulteFire Alliance Mission

Committed to accelerating the commercialization of cellular-based technology — LTE or 5G NR — for standalone operation in unlicensed or shared spectrum

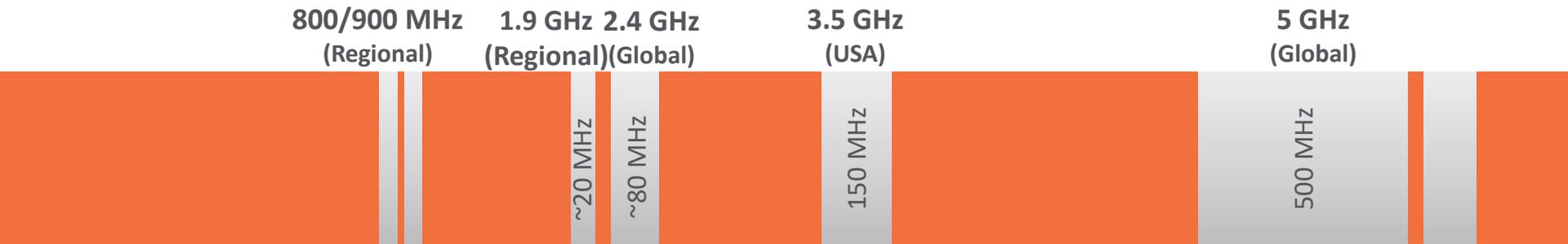
- Support technology standardization and evangelization
- Build out new use cases and business models, such as private IIoT networks
- Enable a robust ecosystem and certified interoperable devices



MulteFire® Evolution and Roadmap



Standalone Deployment in Unlicensed and Shared 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



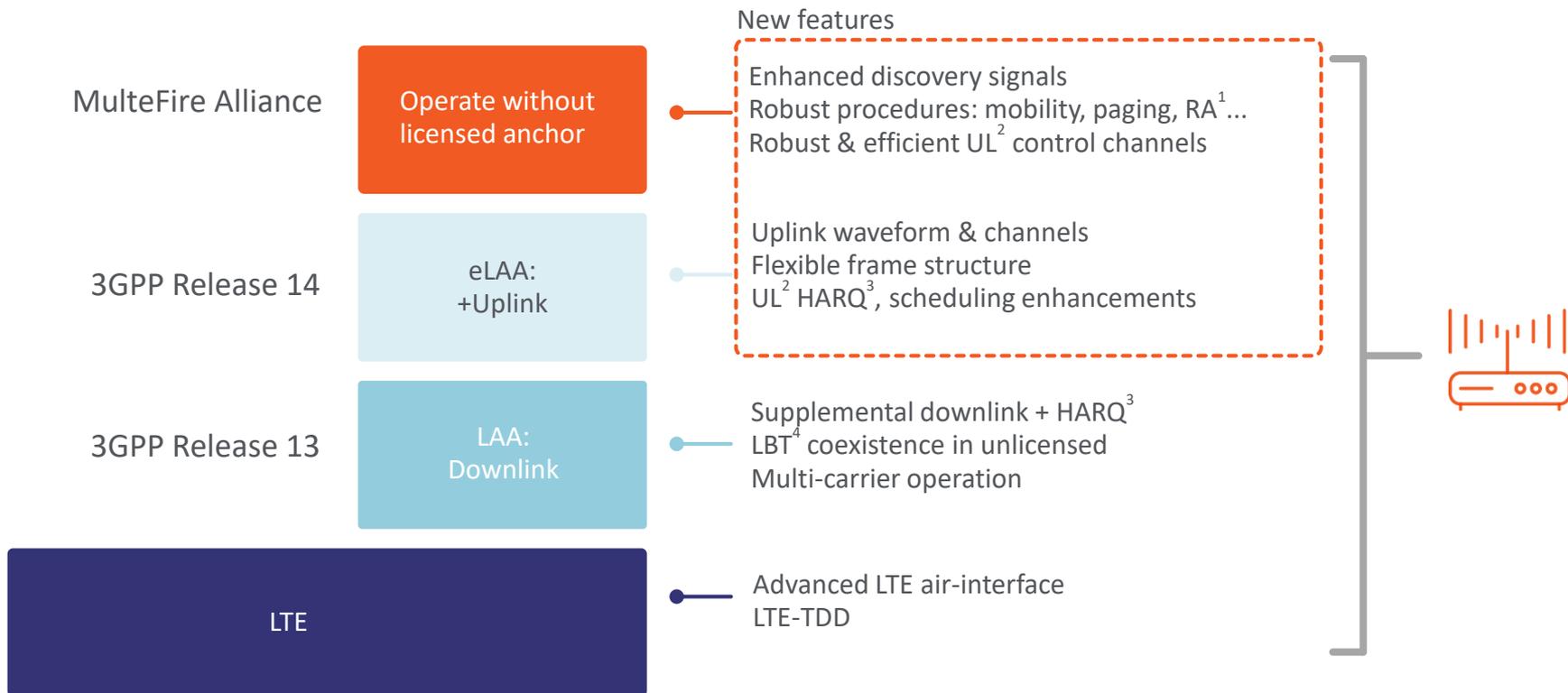
¹ Use of MulteFire in 3.5 GHz in US possible but not a target band and not part of CBRS focus (regular TD LTE)

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

Based on 3GPP LAA and eLAA



MulteFire Release 1.0 Traction

- Specification is publicly available to download since April 2018
- 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



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

5 GHz Enhancements for Release 1.0 broadband services

Autonomous UE Mobility

- Enhancements for more robust mobility in up to 50 km/h speed
- UE performs autonomous handover without explicit network command

Grant-less Uplink

- Enhancements allow faster uplink (UL) data transmissions
- Allows UE to start transmitting immediately

Wideband Coverage Enhancements

- Enhancements to improve downlink (DL) coverage
- Resolves imbalance between DL and the better UL
- Introduces Discovery Reference Signal subframe

Self-organizing Network (SON) Capabilities

- Enhancements deliver SON for unlicensed spectrum, considering LBT impact
- Enables SON for neutral host networks





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



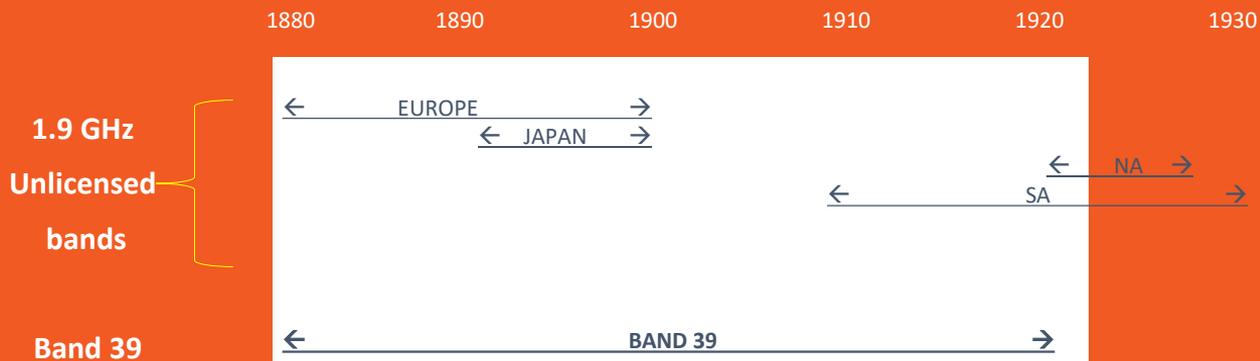
Release 1.1

MulteFire Operation in 800/900 MHz Unlicensed Band – 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 1.1 Support for 1.9 GHz sXGP in Japan – Leveraging Available Band 39 Devices



TD-LTE Band 39 ecosystem has 1358 types of devices — Based on January 2017 GSA

Band 39 covers most 1.9 GHz unlicensed bands





Looking Ahead

5G NR Standalone Operation in Unlicensed Spectrum

Active Support of 3GPP 5G NR 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 use cases and new business models, and support the deployment of 5G NR for private networks, such as industrial IoT verticals
- Develop and run a certification program



Thank You

