MulteFire and a Balanced Approach to Wireless

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MULTEFIRE™

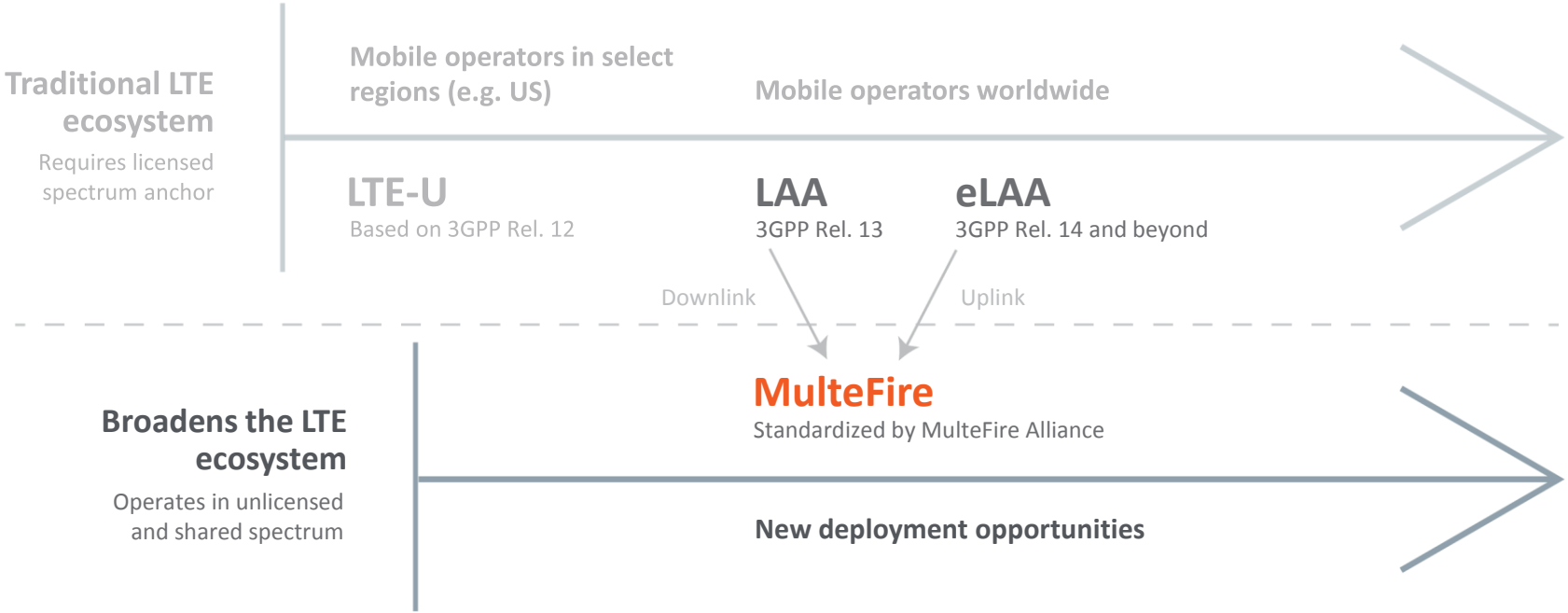
What is MulteFire?

LTE-based Technology for Unlicensed and Shared Spectrum

- LTE-like Performance with Wi-Fi-like deployment simplicity
- Brings enhanced data and voice services to local area deployments
- Suitable for any band that needs over-the-air contention for fair sharing
- Broadens the LTE ecosystem to enterprises, industrial IoT, cable operators, venues and more

MulteFire is an LTE-based Technology Built on 3GPP Standards

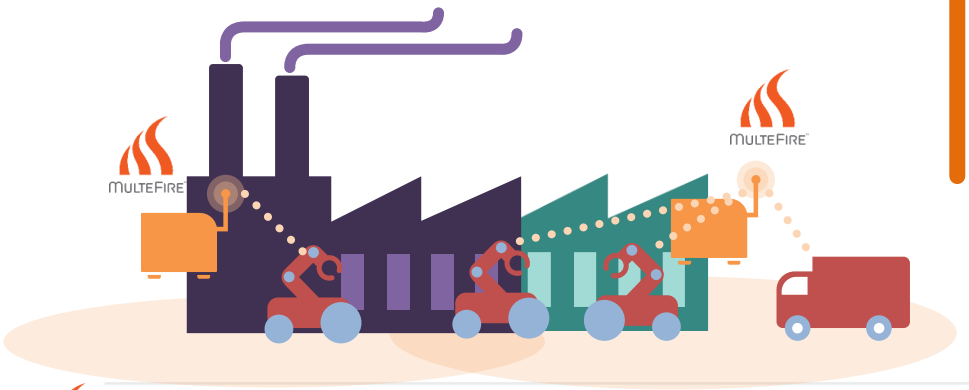
Similar performance benefits and same coexistence as LAA/eLAA



MulteFire Supports Customized Networks and Services

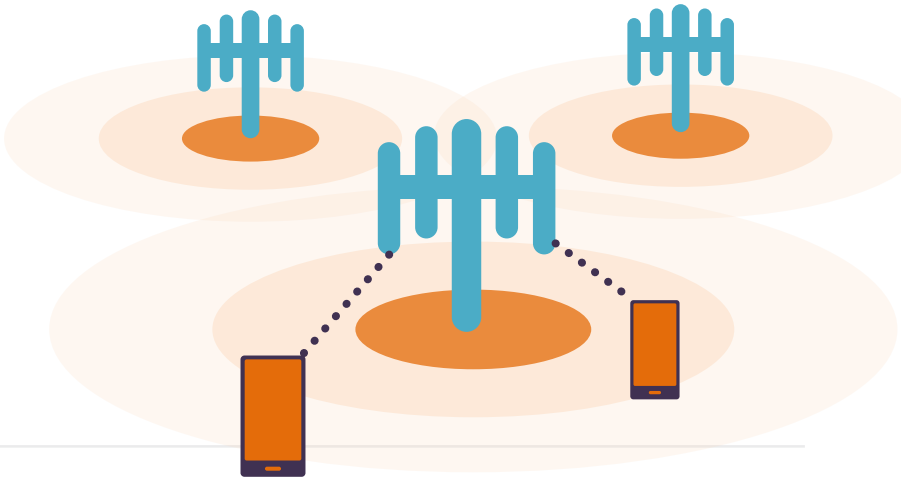
‘Private’ MulteFire Network

- Unlicensed/Shared spectrum
- Controlled by company
- Local coverage
- Customized services



‘Public’ MulteFire Network

- Unlicensed/Shared spectrum
- Controlled by service provider
- Part of wide-area coverage
- Generic voice/data services



MulteFire Delivers Key Performance Advantages

Capacity
Low to high data rate applications,
large number of devices

Coverage
Superior range,
both indoors and outdoors

Seamless mobility
Seamless handovers, high mobility devices,
service continuity with WAN

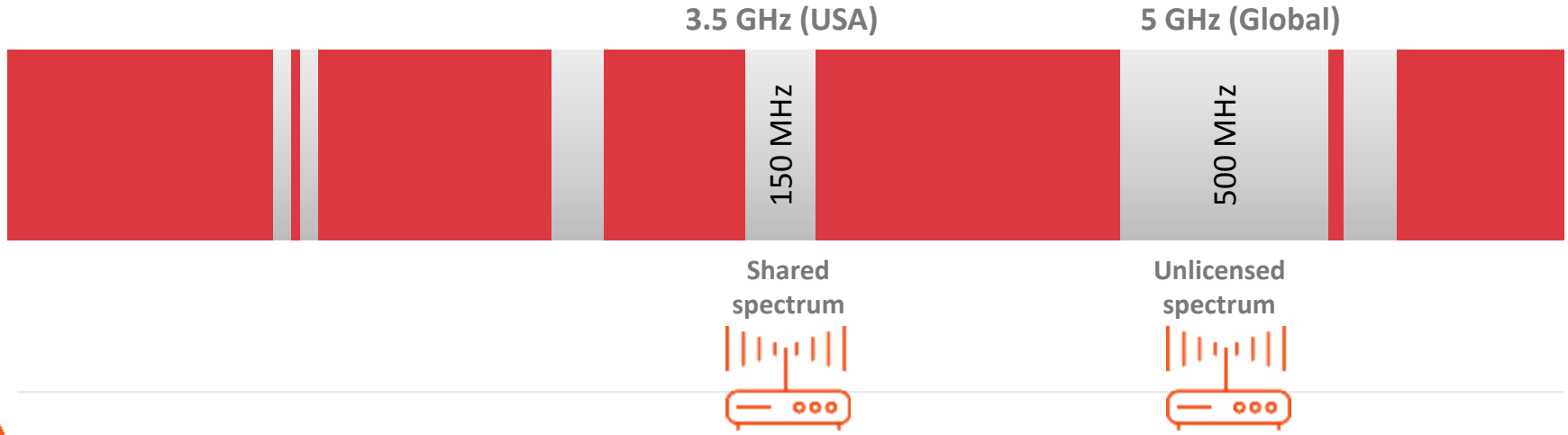
Industry-grade reliability
Customized QoS classes
guaranteed latency

LTE-based security
Both SIM & non-SIM credentials,
locally routed traffic for privacy

Future proof
Rich LTE roadmap: VoLTE/voice,
IoT optimizations like eMTC

MulteFire Release 1.0 Specification Completed

- Based on 3GPP standards – leverages 3GPP for seamless mobility, security and interworking with 3GPP networks
- Pioneering technology for standalone unlicensed operation, over-the-air spectrum sharing and neutral host network architecture
- Implements Listen-Before-Talk (LBT) for fair co-existence with Wi-Fi and LAA and between different MulteFire networks



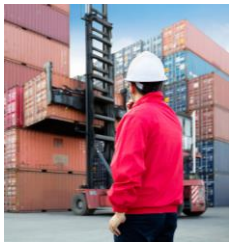
MULTEFIRE™

Innovative Business Opportunities

MulteFire Enables Innovation and New Business Opportunities

- Delivers LTE-like performance with Wi-Fi-like deployment simplicity
- Allows anyone to create, install and operate their own private or neutral host MulteFire network
- Creates new business opportunities that allow existing and new market verticals to deploy and benefit from the LTE technology and ecosystem

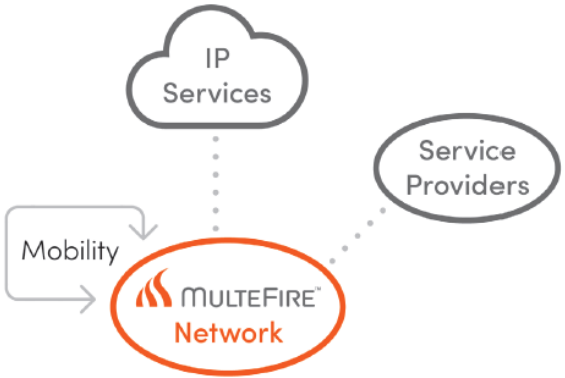



MulteFire Deployment Models Serve New Business Opportunities

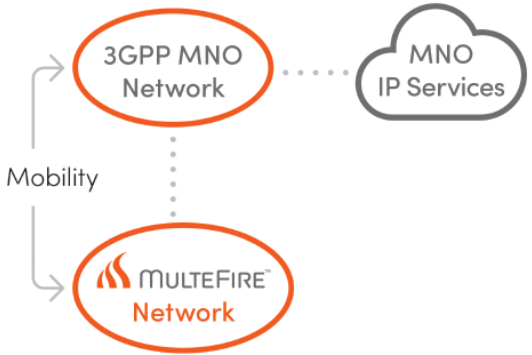
Allows more entities to deploy and benefit from the LTE technology and ecosystem

Neutral Host Access Mode



Self-contained, single deployment
can serve multiple operators

Traditional Access Mode



Single network operator,
e.g. private IoT Network or MNO

Neutral Host Enterprise Example – Challenges for a Hotel Chain

Capacity/Coverage: wide area network cannot fully serve all geographically dispersed sites

Cost sensitivity: Partnership with MNO deployed DAS/small cell at all locations not always cost-effective

Reliable wireless required: robust wireless connectivity is a required amenity—serving any user

Neutral Host Enterprise Example – Benefits for an Airport

Enhanced voice and data cellular access for passengers, guests and MNO subscribers

Dedicated access to business tenants such as restaurants, bars, lounges, etc.

Secure wireless to airport operating agencies, support staff and government agencies

Additional IoT services: wireless surveillance, monitoring of assets and IoT devices

Industrial IoT Example – Challenges for a Port

Capacity: Hundreds of Wi-Fi access points are deployed to accommodate multiple-services; adding more APs increases interference and decreases capacity

Coverage: Signal blocked by complex surroundings (containers, cranes, trucks) that interrupt connectivity links

Mobility and Reliability: Requires low latency (<100ms), high link stability with high mobility 24/7

Port Services that MulteFire Supports

- ***Control and command***: Automated Guided Vehicle
- ***Task dispatching:*** Tallyman/Crane Terminal Operating System, Trunking
- ***Broadband data:*** Crane controller video transmission, surveillance
- ***IoT services:*** Robotic Container Management System, Truck status monitoring
- Co-existence with Wi-Fi

Private MulteFire Networks Enable New IoT Deployment Scenarios

Locally controlled

Dedicated LTE equipment, independent of surrounding cellular network

Optimized

Network tailored for industrial applications, e.g., quality-of-service, latency

Readily deployed

Unlicensed/shared spectrum available, hosted or self-contained EPC, self-organizing network

MulteFire Alliance

- An independent, international member-driven consortium – 3GPP/ETSI style organization with IPR Policy and working procedures
- Goal is to develop technology that will be widely adopted in global standards
- Dedicated to building a global ecosystem in support of the common interests of members, developers and users in the application of LTE and next generation mobile cellular technology in configurations that use unlicensed and shared radio spectrum
- Voluntary call for membership – join us!

www.MulteFire.org

In Summary

- MulteFire delivers LTE-like performance with Wi-Fi-like deployment simplicity
- MulteFire provides enhanced coverage, capacity, reliability, security and seamless mobility
- Supports both neutral host and single operator deployments
- Exciting new opportunity for ‘Private Networks’ – especially suited for Industrial IoT

Thank You