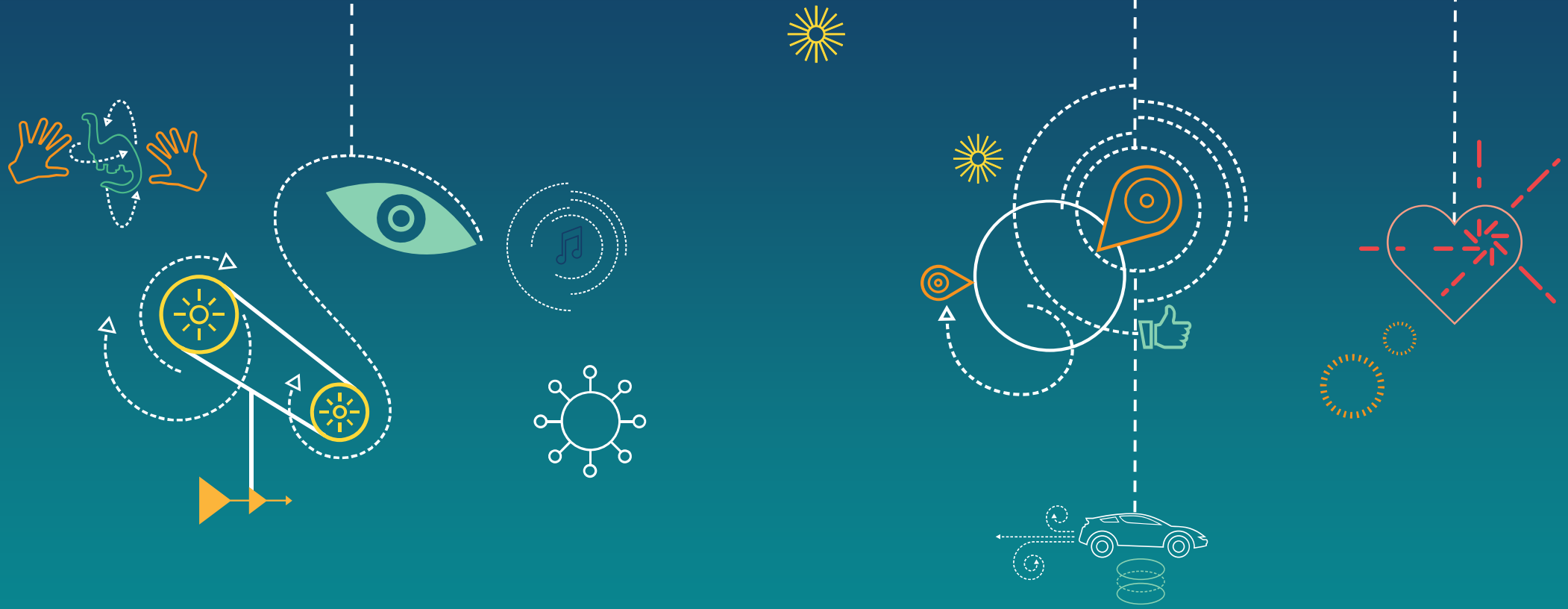


QUALCOMM®

Authorized Shared Access (LSA/ASA)

Wassim Chourbaji
Qualcomm Technologies, Inc.

ITU WP 5A Seminar on Cognitive Radio Systems

18 November 2013

Mobile data traffic growth—industry preparing for 1000x

preparing for

1000x

data traffic growth**

global data traffic growth

~2x

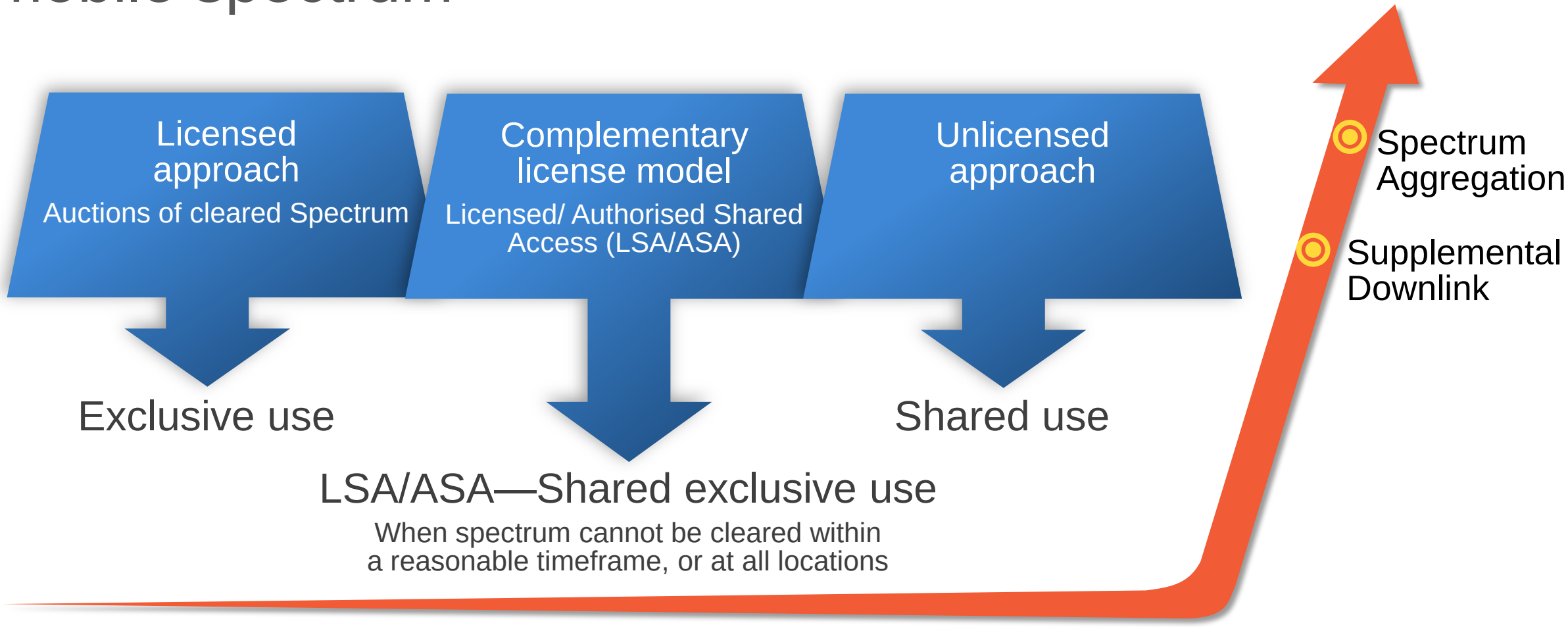
from 2010- 2011*

*Global growth per 'Cisco, May '12 ', some regions grew more/less. **1000x would be e.g. reached if mobile data traffic doubled ten times, but Qualcomm does not make predictions when 1000x will happen, we work on the solutions to enable 1000x

Complementary solutions to meet the 1000x mobile data challenge

- **More spectrum**
  In low and higher bands
- **Heterogeneous Networks**
  with small cells
- **Higher efficiency**
  Evolved 3G/4G, SON, carrier aggregation/SDL, intelligent access, LTE Broadcast, unlicensed, D2D…

Multiple parallel approaches to access more mobile spectrum



Notes: Spectrum Aggregation Across bands, LSA/ASA spectrum (carrier aggregation), as well as unlicensed spectrum. Supplemental Downlink: Aggregate FDD paired with unpaired spectrum.

LSA/ASA enables timely release of harmonized quality spectrum for mobile use

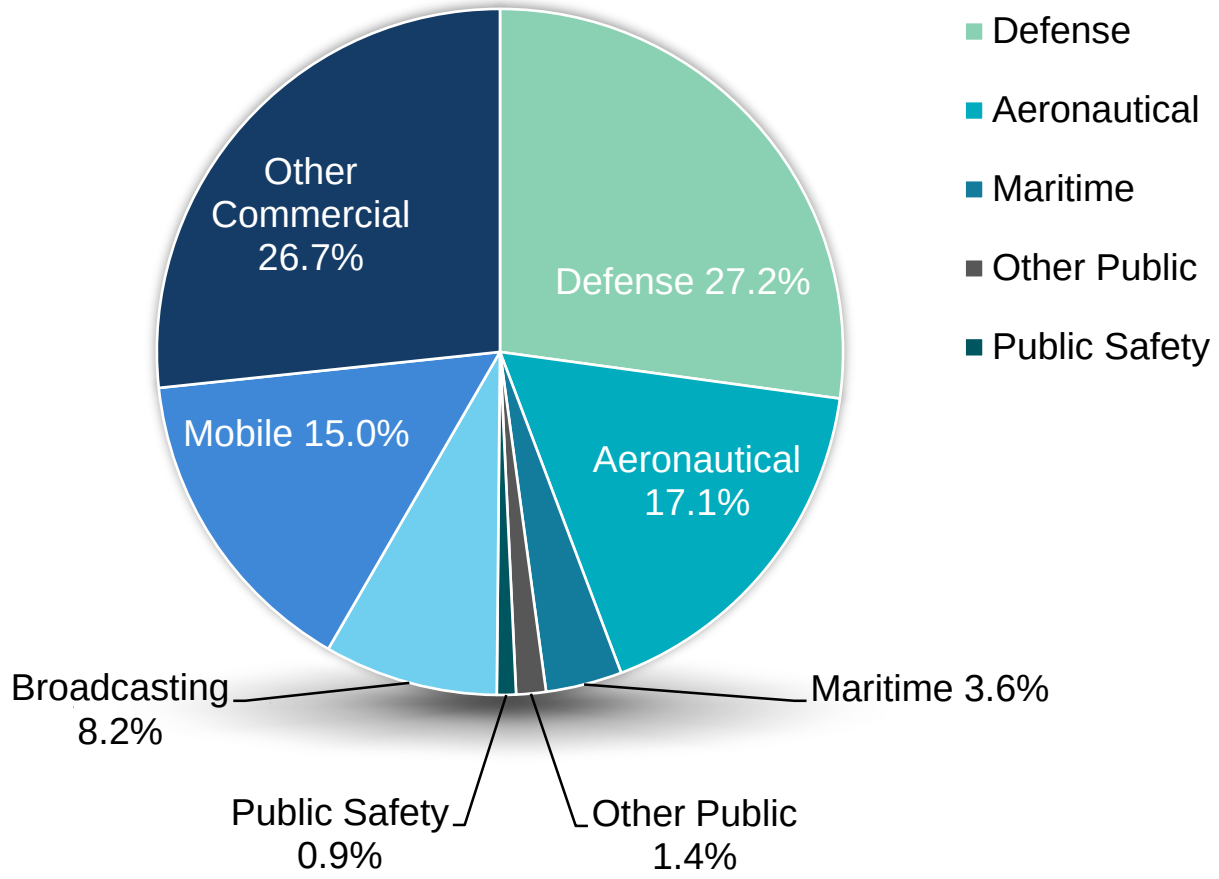
Incumbents[1] (e.g. government) may not use spectrum at all times and locations

Challenge today

Vacating and auctioning spectrum takes longer and longer time

LSA/ASA opportunity

- Accelerate harmonization
- Access underutilized spectrum, which may always have incumbent spectrum holders



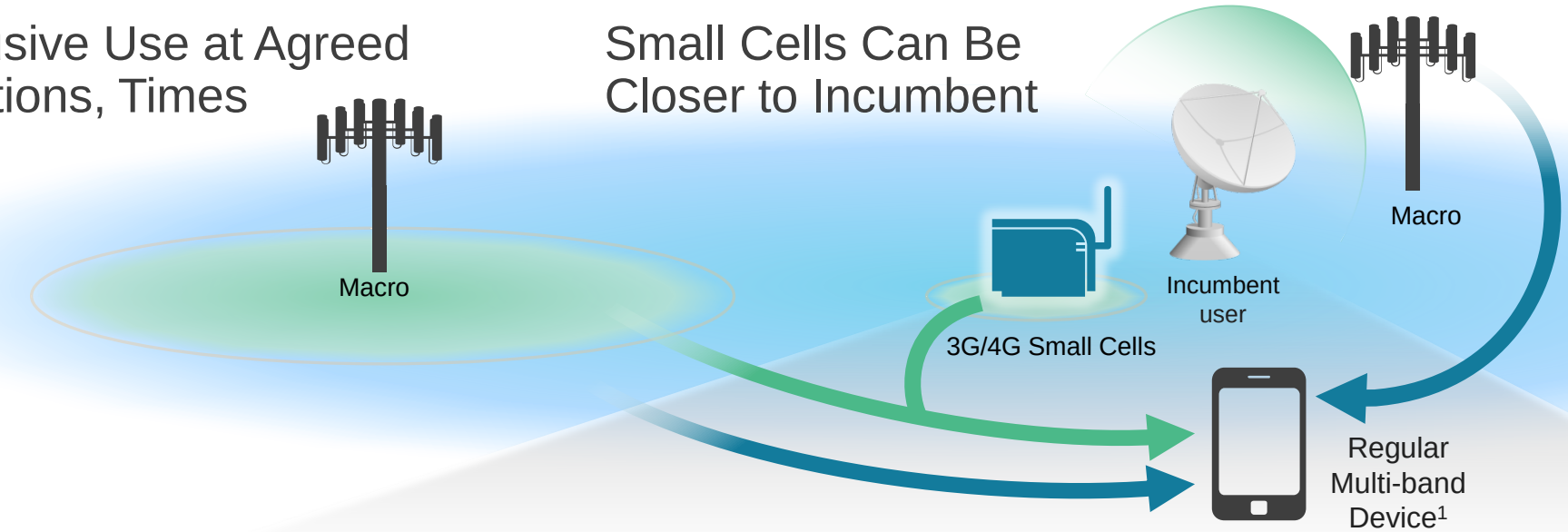
[1] Incumbent: a current holder of spectrum rights of use which have not been granted through an award procedure (beauty contest, auction) for commercial use
Figure shows Spectrum Allocation by Sector within in a typical EU country 108 MHz – 6 GHz

LSA/ASA leverages existing mobile technologies and standards – optimal for small cells

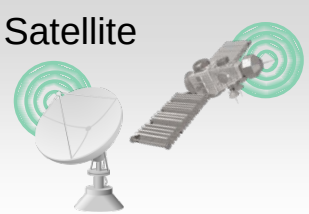
Exclusive Use at Agreed Locations, Times

Small Cells Can Be Closer to Incumbent

Does not Interfere with Incumbent



Incentive-Based Cooperation Model



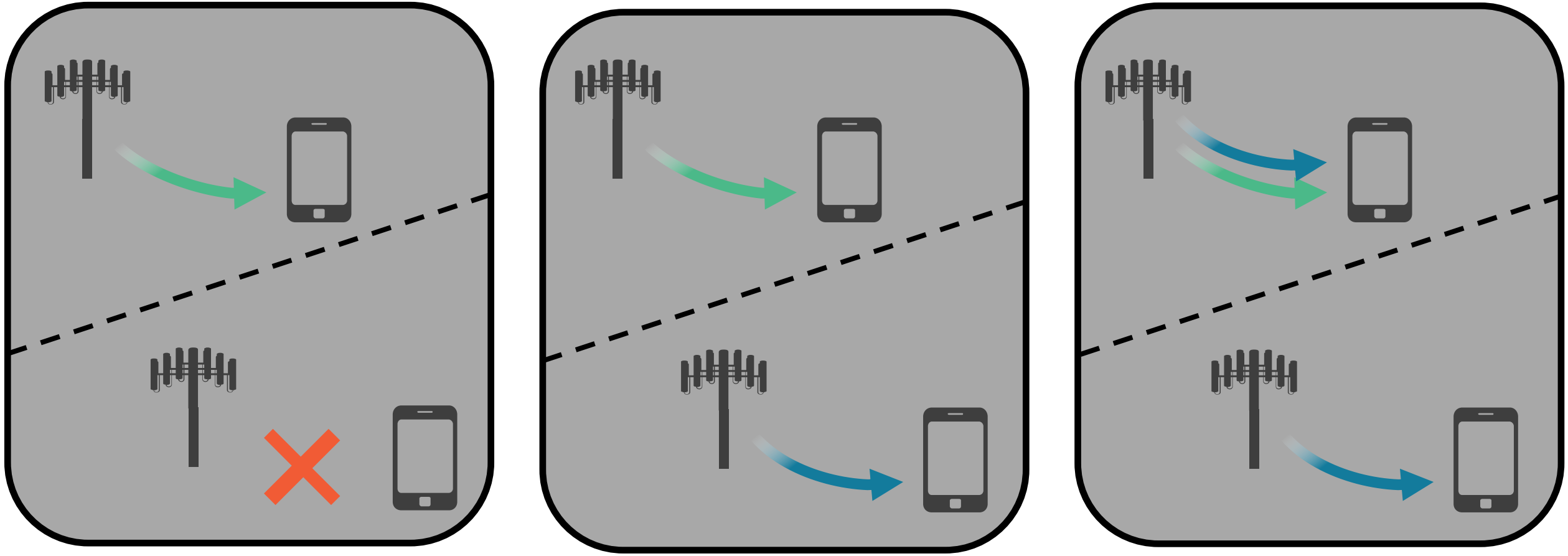
[1] No device impact due to LSA/ASA, just a regular 3G/4G device supporting global harmonized bands targeted for LSA/ ASA. Carrier aggregation would be beneficial to aggregate new LSA/ASA spectrum with existing spectrum, but is not required.

LSA/ASA — spectrum use options

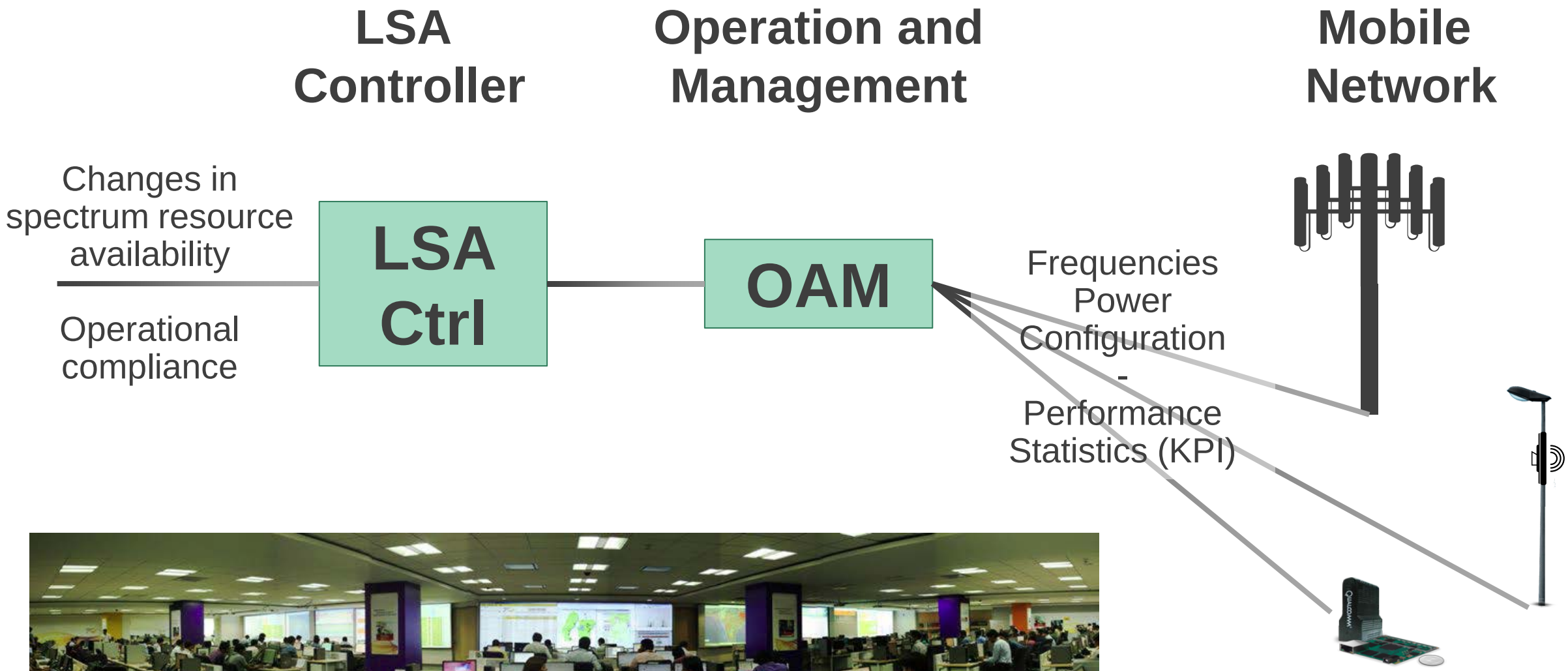
LSA/ASA standalone

LSA/ASA with handover

LSA/ASA with carrier aggregation

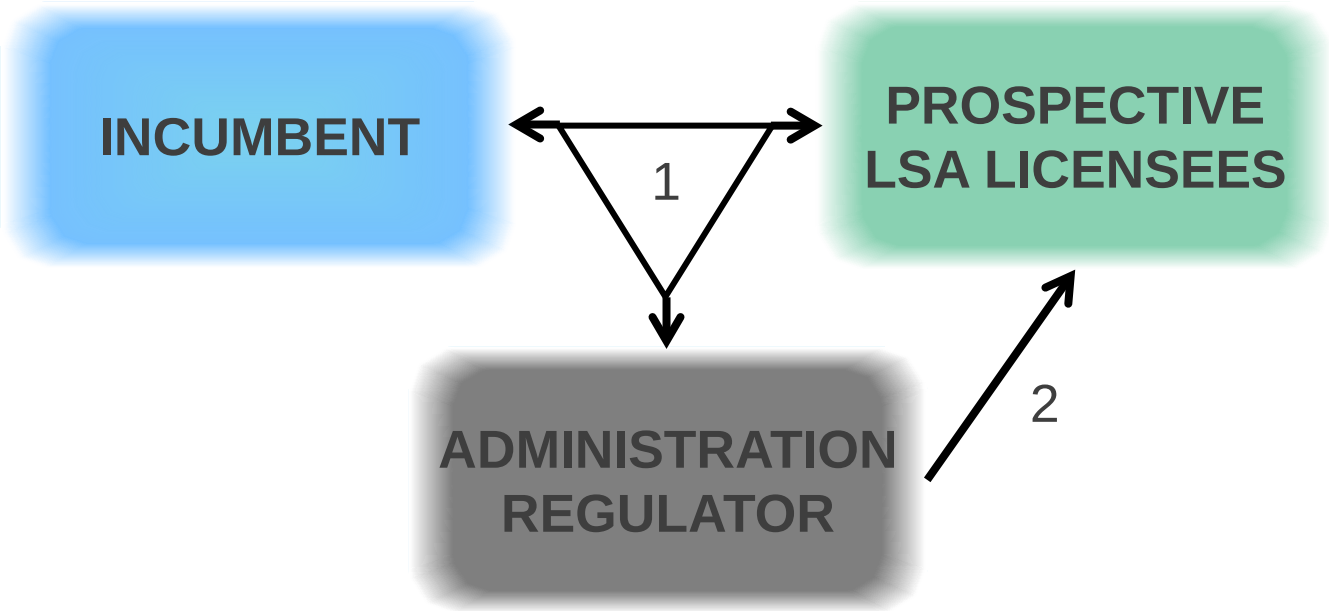


LSA — network integration and architecture

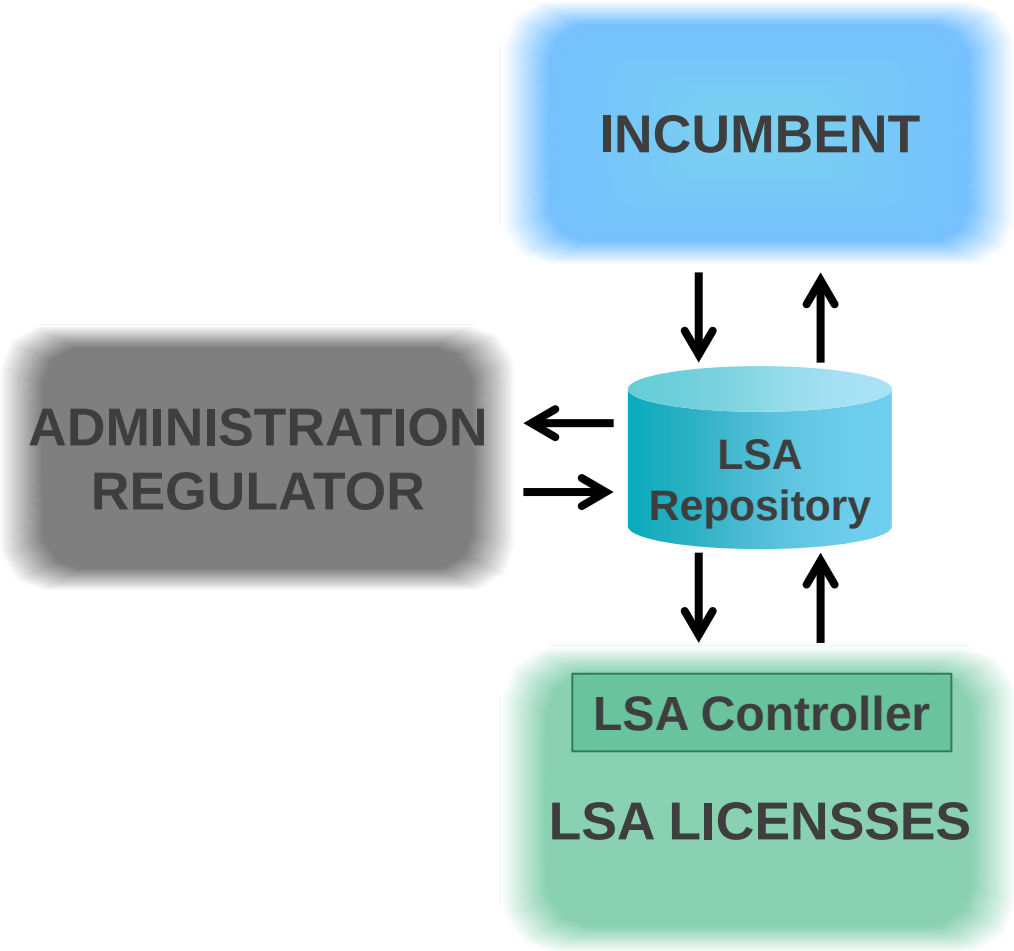


LSA/ASA — put into practice

REGULATORY ASPECTS



IMPLEMENTATION



1) Definition of the sharing framework

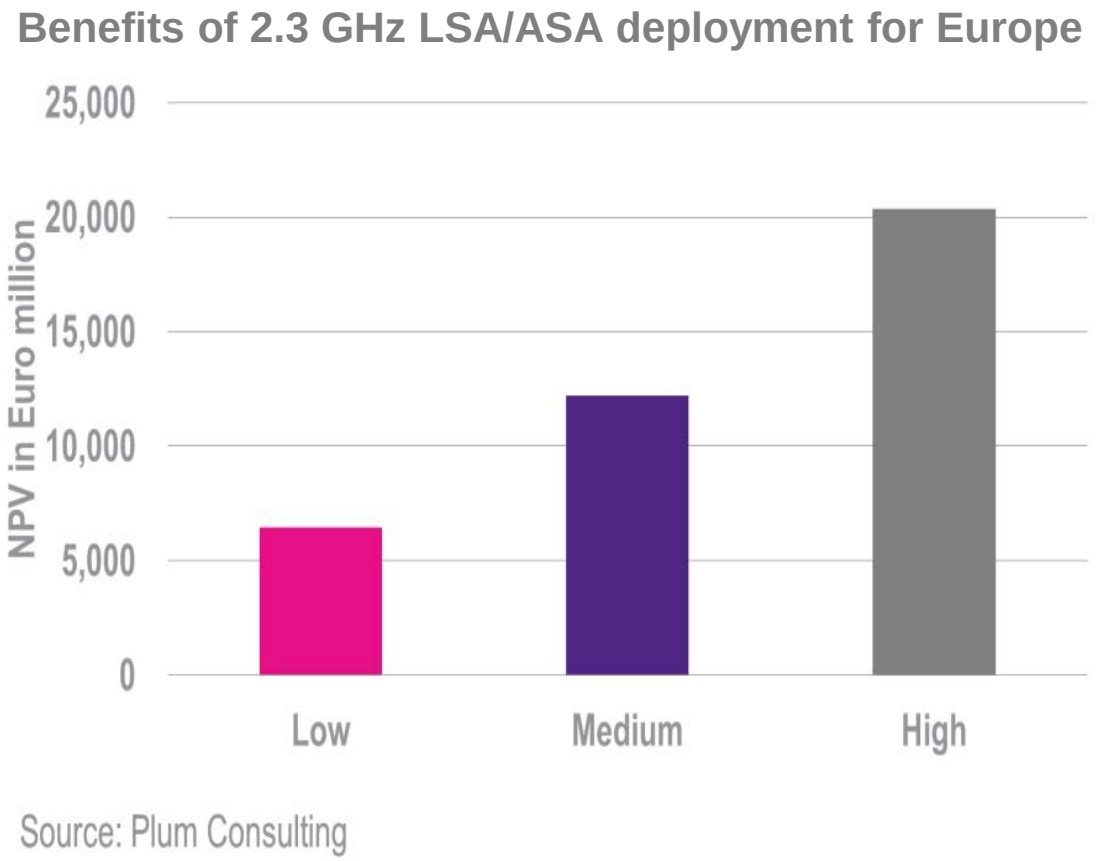
2) Individual authorizations / licenses

LSA/ASA — key regulatory aspects

- **Binary and exclusive** access to spectrum
- **Vertical sharing** between incumbent and LSA/ASA Licensees
- Targets release of **ITU harmonized mobile bands**
- **Voluntary and incentive based** cooperation model
- Controlled environment for **predictable quality of service**
- Compatible with **existing regulatory frameworks**
- ASA is the generic **LSA applied to mobile broadband**

LSA/ASA — economic benefits

LSA in 2.3 GHz shown to bring significant benefits to Europe[1]



- Net economic benefits ranging from €6.5bn to €22bn
- Benefits enabled by:
  - Access to a globally harmonised band (device availability)
  - Reduced costs of network deployment
  - Opportunity to generate additional revenue from customers

[1] Plum Consulting study for Ericsson, NSN and Qualcomm : "*the economic benefits of LSA in 2.3 GHz in Europe*" , November 2013

LSA/ASA — implementation underway in Europe

Endorsed by the EU 28 Member States – Radio Spectrum Policy Group (RSPG) Opinion on LSA released in November 13

Defined by CEPT – Approved draft ECC Report 205 on LSA for public consultation in September 13; publication in February 14

Implemented by CEPT – Drafted ECC Decision harmonizing 2.3GHz[1] for mobile broadband using LSA; publication planned in June 14

Specified by ETSI – Approved SRdoc TR103 113 on mobile broadband in 2.3 GHz under LSA; now working on LSA 2.3 GHz requirements

Trialed in Finland – First live LSA/ASA trial successfully performed in Helsinki in September 13

[1] 3GPP Band 40, 2300 - 2400 MHz

Thank you

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