3GPP TSG RAN Meeting #65 **RP-141421**
Edinburgh, September 9-12, 2014

Document for: Discussion
Agenda Item: 14.1.1

Scope and Workplan for the Study on Licensed-Assisted Access

Huawei, Ericsson, Qualcomm, Alcatel-Lucent, Alcatel-Lucent Shanghai Bell, CMCC, HiSilicon

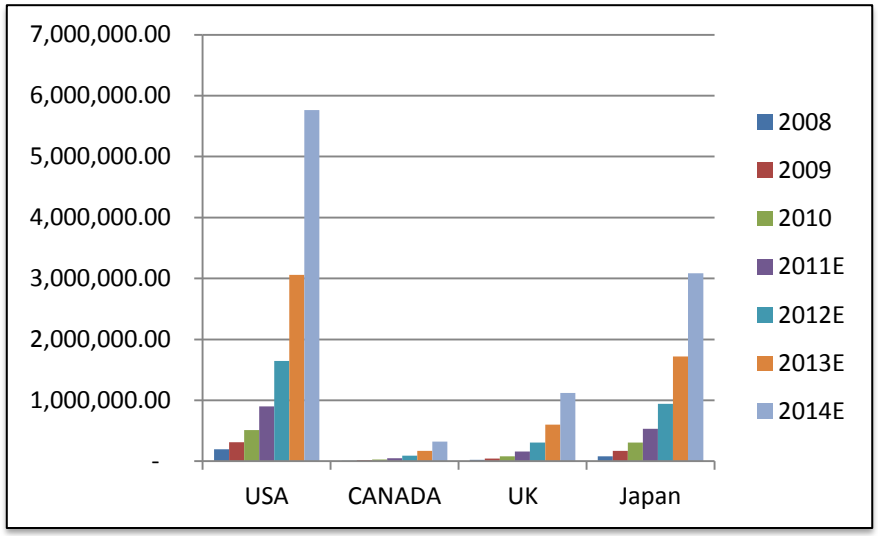
Goal of the presentation

- This documents presents the prioritized use cases & scenarios of highest interest for Licensed Assisted Access

- A work plan for completing the specification of Licensed Assisted Access within Rel-13

Motivation

- MBB traffic is predicted to be doubled every year.



- Striving to meet the market demands, there has been increasing interest from operators in deploying some complementary access schemes utilizing unlicensed spectrum
  - Some operators use WiFi offloading for capacity boosting
  - LTE-based access can provide benefits, with licensed-assisted access
- Licensed spectrum with exclusive usage is superior for telecommunication services
  - Guaranteed security, coverage, mobility, QoS, …
  - Spectrum resources might be limited in some areas making it difficult to meet MBB traffic requirements during busy hours

Licensed Assisted Access

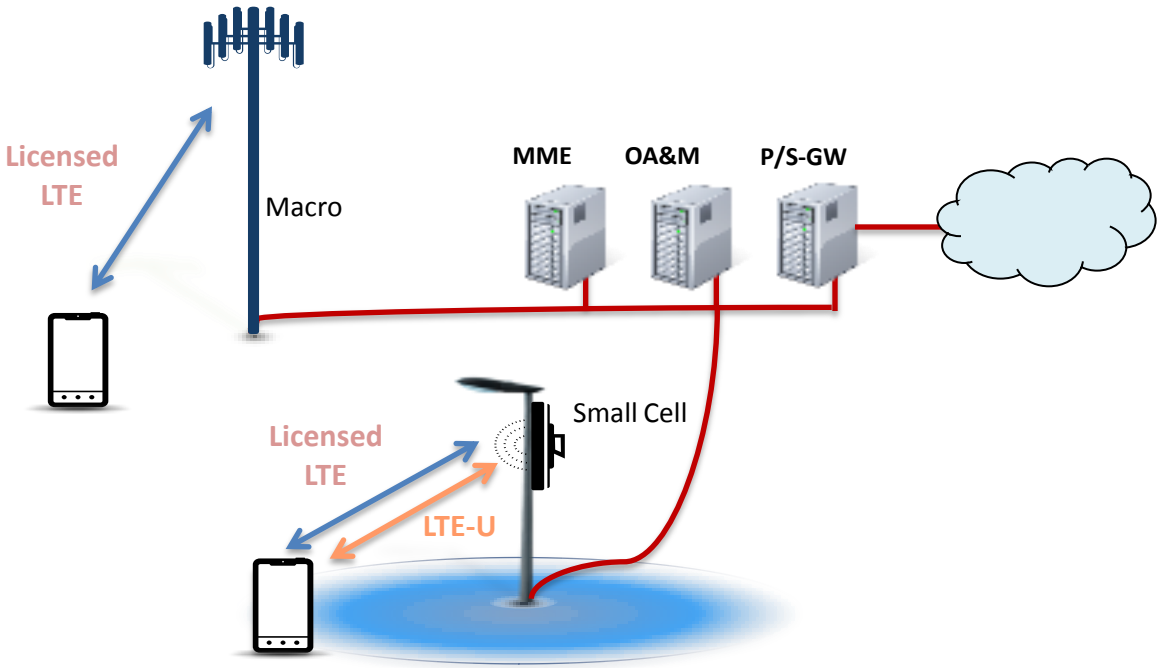
- Leverage existing LTE Carrier Aggregation framework
  - LTE transmissions in unlicensed spectrum according to unlicensed spectrum regulation
    - The Study should focus on the 5GHz bands. The core techniques developed for LAA should be frequency agnostic, as much as possible.
  - Accompanied by a licensed carrier; standalone mode should be avoided

- **Primary Carrier** always uses licensed spectrum
  - FDD or TDD
  - Control signalling, mobility, user data

- **Secondary Carrier(s)** use unlicensed spectrum
  - Best-effort user data

Use Case of highest priority

- The scenarios of interest are **operator-deployed small-cell** scenarios where licensed and unlicensed spectrum is accessed from the same eNodeB building upon the existing carrier-aggregation framework.



Prioritized Scenarios

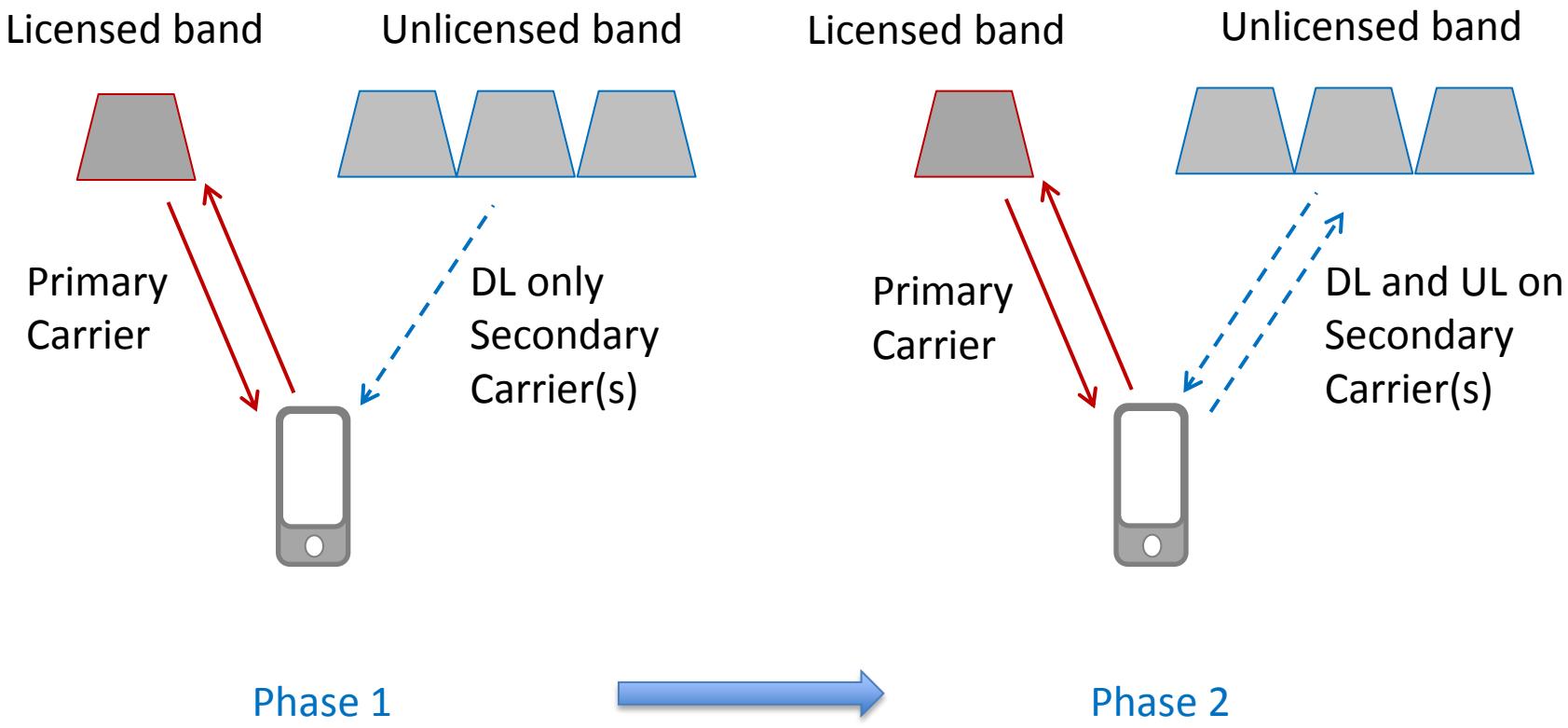
- Two scenarios for exploiting unlicensed spectrum can be foreseen initially:

  (1) Unlicensed spectrum used for DL only
  - UE does not transmit, carrier aggregation in downlink only

  (2) Unlicensed spectrum used for DL and UL
  - UE receives and may potentially transmit, carrier aggregation in downlink and uplink. This is relevant for UEs that support UL CA.

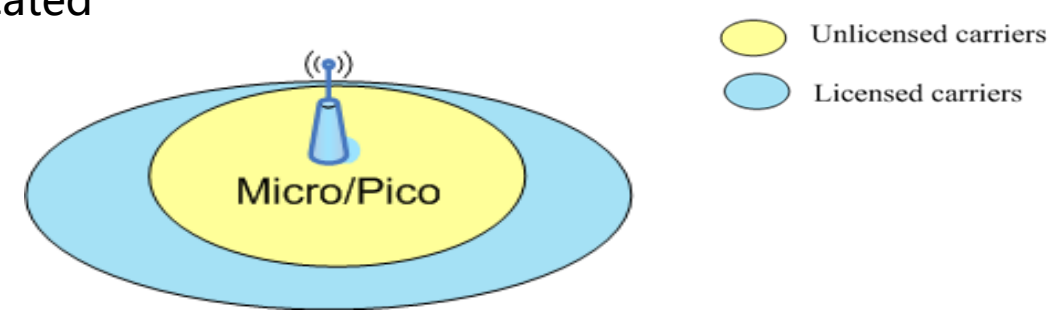
The corresponding 3GPP Study Item could start working on scenario (1) followed by scenario (2)

Prioritized Scenarios (cont.)

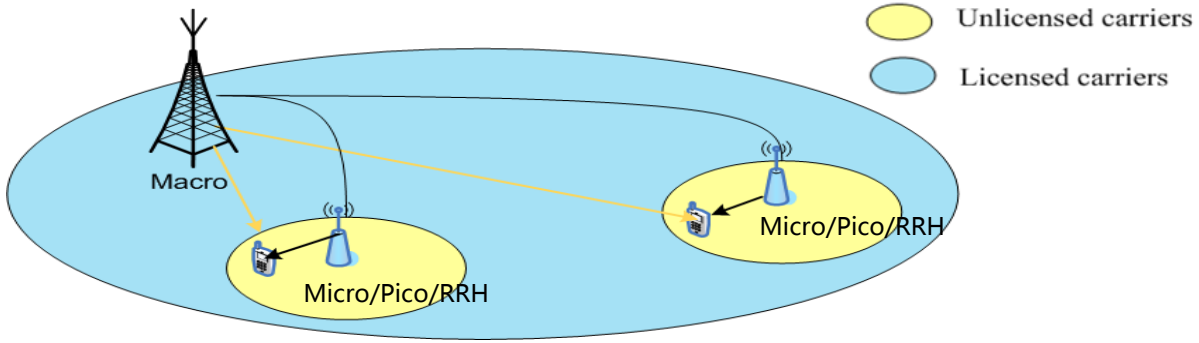


Prioritized Scenarios (cont.)

Co-located



Non-co-located



In both cases, the carriers operating in licensed or unlicensed spectrum are from the same eNB.

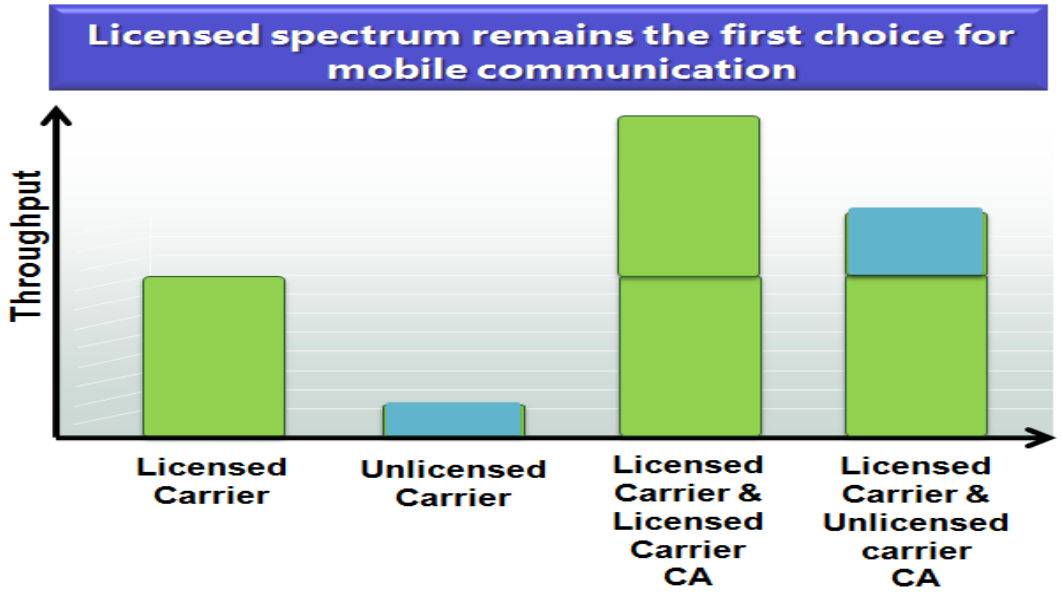
Coexistence

- Coexistence requirements
  - Coexistence with WiFi and other unlicensed devices in the considered bands (RAN1)
  - Coexistence among cells from the same or different operators (RAN1)
  - Possible in-device coexistence issues (RAN4)

- Both intra-operator case as well as inter-operator case should be covered
- Both co-channel case as well as intra-band inter-frequency case should be covered

Spectrum Allocation Impact

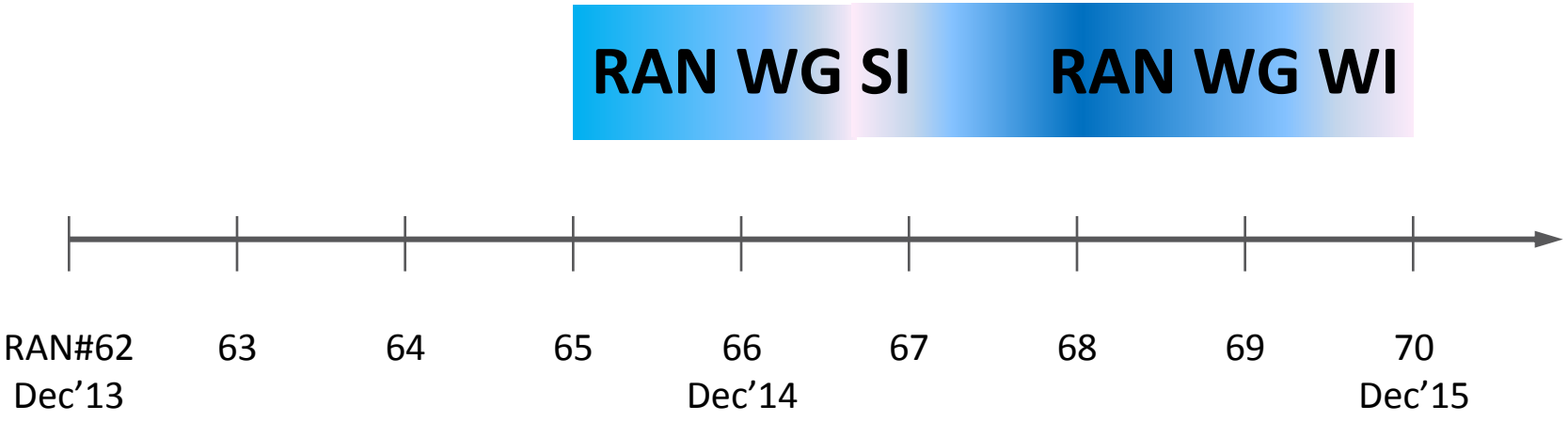
- Using licensed spectrum compared to unlicensed spectrum is always superior in terms of reliability, quality, etc.



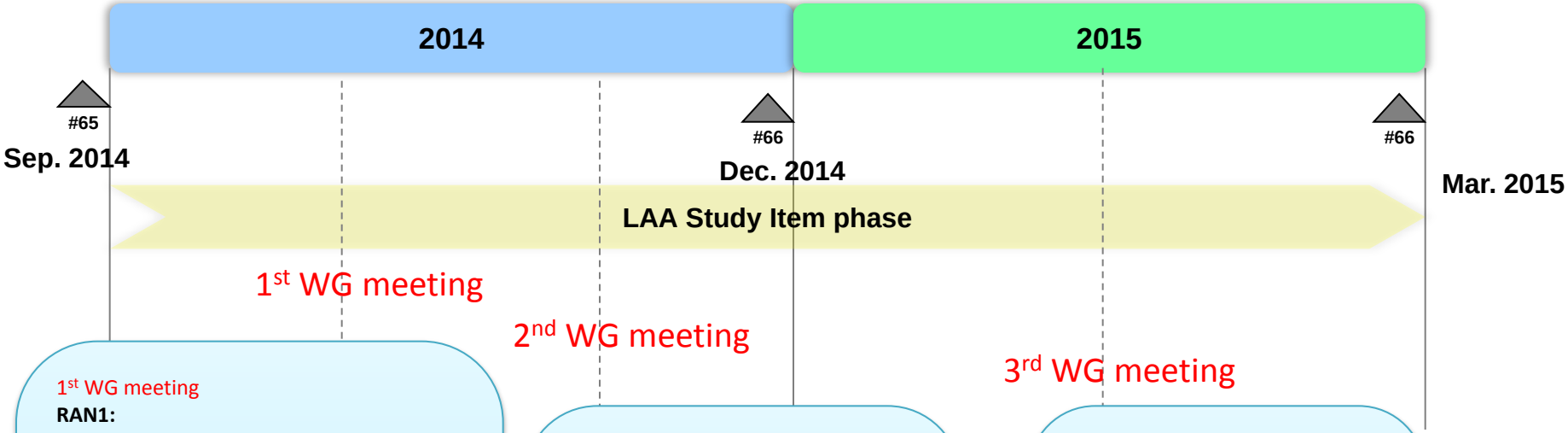
- Using LTE for a Licensed-Assisted Access to unlicensed spectrum can only be a complement in some areas where spectrum resources might be limited
  - Some operators use WiFi offloading for capacity boosting
  - LTE-based access can provide benefits, with licensed-assisted access

Proposed 3GPP plan

- **Proposed standard schedule:**
  - Start Study Item at RAN#65
  - Complete global solution in Rel-13



LAA SI Work Plan (Ericsson)



1st WG meeting

RAN1:

- Summary of regulatory requirements (e.g. channel occupancy etc.)
- Define deployment scenarios (Licensed and unlicensed carrier BWs) and unlicensed band coexistence scenarios (WiFi+LTE and LTE+LTE)
- Identify new/modified functionality required for LAA (e.g. LBT, aggregated bandwidth, DFS etc.)
- Identify PHY layer options for DL in unlicensed band
- Evaluation methodology (e.g. traffic model, deployment of nodes…)

RAN2/(RAN3):

- Discussion on LTE RAN protocol enhancements

RAN4:

- Summary of RF regulations (e.g., spectral masks etc.)
- Evaluation assumptions for adjacent channel coexistence study in 5GHz

2nd WG meeting

RAN1:

- Initial evaluation results for DL in unlicensed band
- Identify PHY layer options for UL in unlicensed band
- Analysis of standards impacts of identified options for DL and UL in unlicensed band

RAN2/(RAN3):

- Identify LTE RAN protocol enhancements

RAN4:

- Initial evaluations for adjacent channel coexistence study in 5GHz

3rd WG meeting

RAN1:

- Final evaluation results for DL and UL in unlicensed band
- Summary of evaluations of PHY layer options
- Document the PHY layer options in the TR

RAN2/(RAN3):

- Document the candidate protocol enhancements

RAN4:

- Summary of evaluations for adjacent channel coexistence study in 5GHz

Conclusions

- We propose that the Rel-13 study focuses on the highest priority use cases & scenarios for Licensed Assisted Access in Rel-13

  (a)Operator Deployed Small Cells
  - Co-located and non-co-located deployment of licensed and unlicensed carriers within the same eNB (ideal backhaul)
  - Indoor and outdoor deployments

  (b)Carrier Aggregation Framework

  (c)Usage of unlicensed spectrum for the Secondary Carrier, i.e., always assisted by a Primary Carrier in licensed spectrum
  1)DL-only in unlicensed spectrum (phase 1)
  2)Possible DL & UL in unlicensed spectrum (phase 2)