

3GPP & unlicensed spectrum

Conference call with WFA Board of Directors

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Outline





 Introduction

 LTE/Wi-Fi interworking

 LTE over unlicensed

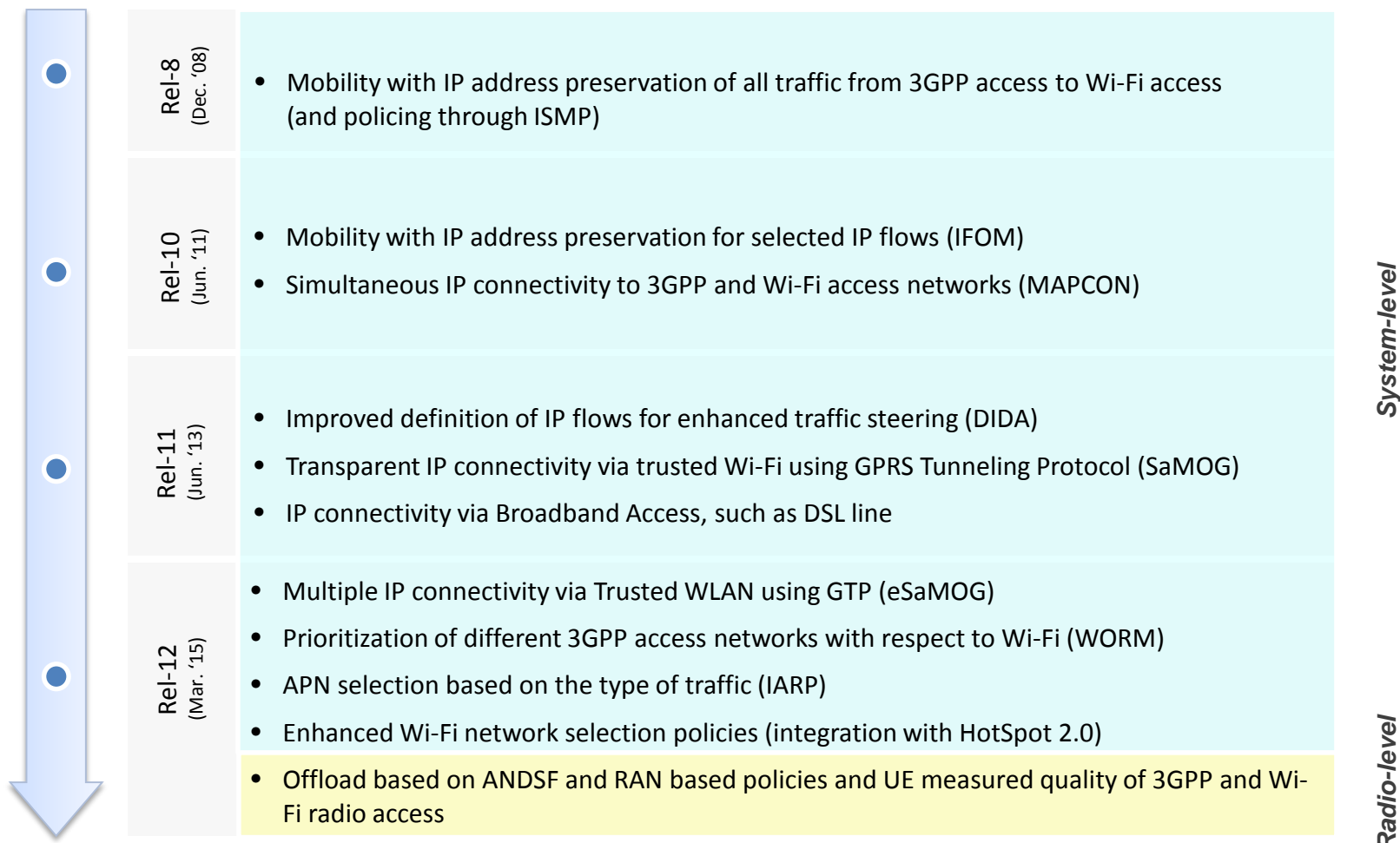
 Cooperation with WFA

Introduction

-  Licensed spectrum remains 3GPP operators' top priority to deliver advanced services and user experience
-  Opportunistic use of unlicensed spectrum is becoming an important complement for operators to meet the growing traffic demand
-  Moving forward 3GPP operators will have two options to offload traffic to unlicensed spectrum:
 1. Wi-Fi (via LTE/Wi-Fi interworking)
 2. LTE over unlicensed
-  It will then be up to each individual operator to choose which approach to use, which will depend on a number of factors

LTE/Wi-Fi interworking

Brief history of LTE/Wi-Fi interworking




LTE/Wi-Fi interworking

- 📶 Framework being developed since the first release of LTE, Rel-8
 - With tighter and tighter forms of interworking added in subsequent releases
 - See previous slide for a brief history of the LTE/Wi-Fi interworking capabilities developed by 3GPP

- 📶 New proposals for even tighter radio-level interworking are currently being evaluated for Rel-13, including:
 - LTE/Wi-Fi aggregation
 - Enhanced network controlled mobility, via enhanced UE measurement reporting and network steering capabilities
 - Interface between LTE eNBs and Wi-Fi APs

LTE over unlicensed

LTE over unlicensed

 The discussion was kicked off by a workshop in Jun. 2014, which established the initial priorities ([RWS-140029](#)):

➡ 5 GHz band

➡ Global solution that can work across regions

➡ Licensed-Assisted Access operation


- Aggregation of a primary cell, operating in licensed spectrum to deliver critical information and guaranteed Quality of Service, with a secondary cell, operating in unlicensed spectrum to opportunistically boost data rate
- The secondary cell operating in unlicensed spectrum can be configured either as downlink-only cell or contain both uplink and downlink

➡ Fair coexistence between LTE and Wi-Fi as well as between LTE operators

Licensed-Assisted Access (LAA)

- 📶 The feature is targeting completion in Rel-13, which is scheduled to freeze in Mar. 2016
- 📶 The Study Item (SI) was approved by RAN in Sep. 2014 and is scheduled to complete in Jun. 2015
 - Main SI goal: study the LTE enhancements needed to operate in unlicensed spectrum and to ensure fair coexistence with Wi-Fi
- 📶 The detailed SI description is available in [RP-141817](#)

LAA SI: feasibility study

 Started in RAN1 in Q4-14, with initial discussions on:

- Regulatory requirements
- Deployment scenarios
- Design targets & functionalities
- Coexistence evaluation & methodology

 The Latest version of the TR is available in [R1-150955](#)

- **Still in draft state** (hence not published yet by 3GPP)!

LAA SI: regulatory aspects

- Produced an overview of the regulatory requirements for unlicensed operation in 5 GHz
 - See [R1-150955](#), Sec. 4
- Different regional requirements emerged, in terms of power levels, channel sensing etc.

LAA SI: design targets & functionalities

- Agreed design targets:
 - Single global solution allowing compliance with any regional regulatory requirements
 - Effective and fair coexistence with Wi-Fi
 - Effective and fair coexistence among LAA networks deployed by different operators

- Based on the above targets, it was agreed that at least the following functionalities are required for LAA:

1. *Listen-before-talk* (Clear channel assessment)
2. Discontinuous transmission on a carrier with limited maximum transmission duration
3. *Dynamic Frequency Selection* for radar avoidance in certain bands/regions
4. Carrier selection
5. *Transmit Power Control*





Note: not all functionalities may have a spec impact; not all functionalities would be mandatory for all LAA eNBs/UEs

- On **fair** coexistence with Wi-Fi

- Initial qualitative definition provided in the SI description:
 - [...] LAA should not impact Wi-Fi services (data, video and voice services) more than an additional Wi-Fi network on the same carrier; these metrics could include throughput, latency, jitter etc. [...]
- Exact metrics to be defined in the coexistence study

Cooperation with WFA

Cooperation with WFA

-  In general we welcome further cooperation with WFA
-  With this presentation we wanted to share with you the general direction of the LAA work in 3GPP
 - We can then have a follow up presentation to provide more details on the progress of the technical discussion and coexistence analysis
-  Any feedback from WFA is welcome and will be taken into account in the regular 3GPP process
 - Lot of interested companies are members of both organizations and can also contribute directly to 3GPP
-  For instance, if WFA had a standardized requirement on Wi-Fi to Wi-Fi coexistence performance that every Wi-Fi device has to meet, this could complement 3GPP coexistence evaluations
 - If so, a pointer to the corresponding WFA specification(s) would be highly appreciated

Thanks!