

Motivation for New WI on LTE bandwidth flexibility enhancements

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RAN#65 WI Proposal (RP-141365)

- This proposal was formerly submitted as a study under the name of Spectrum Sharing in Licensed Bands.
- Considering feedback received in earlier meetings, the proposal is re-focused on physical layer aspects.
- Considering discussions on LTE bandwidth flexibility in earlier releases, it is proposed to maintain backward compatibility and to avoid changes to the UE RF bandwidth.
- With the more focused objectives, a work item is now proposed.

Spectrum Availability

- Portions of the licensed spectrum identified for IMT-advanced services are under-utilized:

Where allowed, spectrum sharing with radars, satellites, telemetry, program making and special events

- e.g. bands that could be made available by Licensed Shared Access

Parts of bands are becoming available from displaced/re-farmed licensed RATs

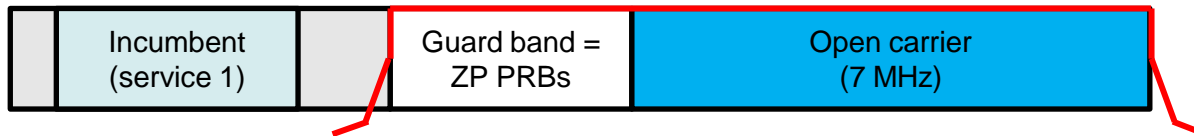
- e.g. GSM channels are gradually released and made available for LTE in the granularity of 200 kHz

Some licensed bands do not exactly fit the LTE bandwidth sizes and cannot be efficiently utilised even with CA

- e.g. a 6 MHz or 7 MHz block

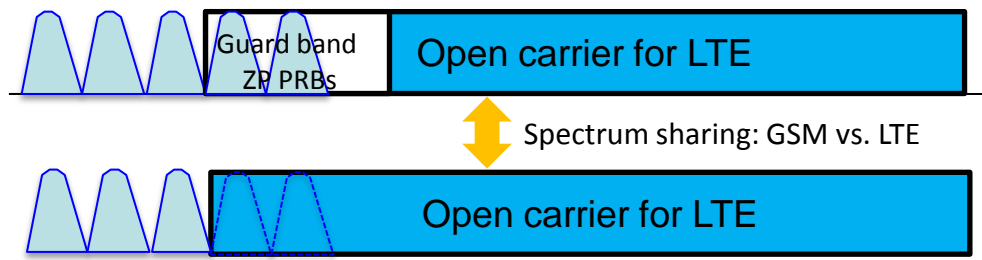
Use Cases and Performance Gain

Case 1: Licensed Shared Access: licensed used of a block by sharing in an incumbent's band

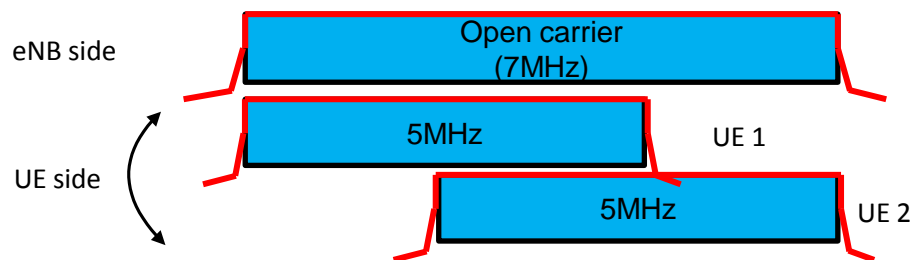


Performance Gain: Example for a 7 MHz block

Case 2: GSM gradual re-farming: licensed spectrum sharing within one operator's network



Case 3: Unusual licensed spectrum block sizes



Available bandwidth (MHz)	LTE Baseline 1	Open Carrier	Network gain (example A)
7	1x5 MHz carrier Usable: 4.5 MHz	6.3 MHz (+40%)	40%

Available bandwidth (MHz)	LTE Baseline 2	Open Carrier	UE gain (5 MHz filter)
7	2x3 MHz carriers Usable: 5.4 MHz	6.3 MHz (+17%)	67% (4.5 vs. 2.7 MHz)

Objectives

Specify solutions for increasing network spectrum utilization in spectrum blocks of size not fitting 1.4/3/5/10/15/20 MHz

No impact on UE RF bandwidth:

- * Legacy UEs can access at least some part of the carrier
- * New UEs can receive data transmissions on any part of the carrier, while any accessible part is limited to one of the existing bandwidth sizes of 1.4/3/5/10/15/20 MHz

Enhancements should be applicable to TDD and FDD, support downlink and uplink with and without carrier aggregation, and all services supported by LTE.

Standard Impact

- Downlink transmission of common control channels and common reference signals is limited to a contiguous set of PRBs that correspond to a legacy system bandwidth size
- Downlink transmission of PDSCH and EPDCCH can occur in any available PRB overlapping or non-overlapping with PRBs that carry common control channels and common reference signals
- Legacy UEs can access and operate on the part of the carrier where PRBs carry common control channels and common reference signals
- UEs supporting the new solution can access and operate on a set of PRBs that occupy a part of the carrier spanning a bandwidth equal to a legacy system bandwidth size

Expected work in 3GPP

- The expected work is mostly in RAN1 and RAN4
 - RAN4 work to be done with minimal impact on UE RF requirements (no new bandwidth from the UE perspective)
 - RAN1 should define physical layer enhancements to avoid full system bandwidth occupancy by reference signals and channels, and related UE procedures
- The proposed work is meant to optimize the spectrum utilization in the identified use cases. It is not a pre-requisite for the implementation of LSA
 - The work in ETSI RRS on LSA in 2.3-2.4 GHz band and the national trials to build spectrum maps do not need to be impacted by this proposal. In fact the timing would mostly preclude any impact on the first implementation of LSA.

Proposed RAN Workplan

- 6 WG meetings for RAN1/2/4 core work
 - From RAN66 (Dec 2014) to RAN70 (January 2015)

All RRC impact
completed ↓

All core aspects
completed ↓

	WG meeting 1	WG meeting 2	WG meeting 3	WG meeting 4	WG meeting 5	WG meeting 6	WG meeting 7	WG meeting 8
RAN1	Define design targets, identify candidate solutions 2 TU	Work on design targets 2 TU	Work on design targets 2 TU	Complete design 2 TU				
RAN2 (MAC and RRC)	0	0	1 TU	1 TU	1.5 TU	1.5 TU		
RAN4 Core	0	Feasibility of candidate solutions RD: 0.25 RF: 0.25	Feasibility of candidate solutions RD: 0.25 RF: 0.25	Work on core requirements RD: 0.25 RF: 0.25	Work on core requirements RD: 0.5 RF: 0.5	Work on core requirements RD: 0.5 RF: 0.5		
RAN4 Perf.	0	0	0	0	RD: 0.25 RF: 0.25	RD: 0.25 RF: 0.25	RD: 0.5 RF: 0.5	RD: 0.5 RF: 0.5

Thank you !

