



RP-120275

Lower e850 band edge

Way Forward

3GPP TSR-RAN Meeting #55

Xiamen, China 28Feb-2Mar 2012

Source: NII Holdings

Agenda Item: 11.5.11.1, LTE_e850_LB-Core

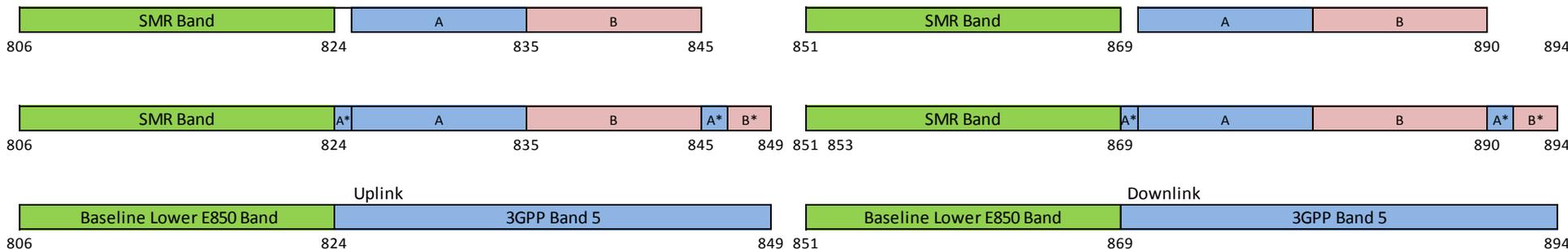
Type: Discussion

Lower E850 band Work Item history

- The E850 Study item was approved in May 2009 [RP-090666]
- The sub-band arrangement (806-824/851-869 MHz and 814-849/859-894 MHz) were agreed in R4-100637
- The LTE E850 - Lower Band for Region 2 (non-U.S.) Work Item was approved in March 2011 [RP-110439], with work to begin in June 2011
 - The frequency range in the WID specifies 806-824/851-869 MHz
- Concerns about coexistence were raised at RAN4#59 in R4-112629, and in R4-113651
 - “it is essential that when new band is introduced, the operation in legacy band is not affected, ”
- Coexistence was studied in detail, and contributions showed that deploying LTE in the lower E850 band will result in **8 dB lower** blocking than the current situation today.
- At RAN4 #60bis, there was a proposal to consider moving the band edge up by 2 MHz to 808/853 MHz in R4-115073, and again in R4-120767.
- There was a compromise proposal at RAN4 #60bis in R4-116115 and again in R4-121048 to move the band edge by 1 MHz
- Contribution R4-121048 shows that Band 5 will be better served by moving the Lower E850 band edge by 1 MHz, rather than moving the band edge by 2 MHz and keeping high power narrowband in 806-808/851-853 MHz.

800 MHz band History

- The Cellular 850 band was 825-845 MHz prior to 1986, with 6 MHz of guard band between the 850 band uplink and the 851-869 MHz SMR band downlink
- In 1986, the Cellular 850 band was expanded to 849 MHz, only 2 MHz away from the SMR band. This was no problem as long as the 850 band was used for narrowband deployments like AMPS, TDMA and eventually GSM.
- When CDMA was deployed at the top of the Cellular 850 band in the B* block, operators had to employ techniques, including BS Rx filters, to protect their uplink below 849 MHz from SMR band downlink signals above 851 MHz.
- With the FCC A, B, A', B' arrangement, only 1.4 MHz LTE could be deployed above 845 MHz
- One operator has 834-849 MHz in one region in Argentina, and other operators have said they plan to seek a similar rearrangement of the 850 band.
- Now that there are plans to deploy wide carrier LTE in the top end of 850 band, there is a claim is that 2 MHz is not enough of a gap, and the SMR band operators are the ones who should surrender the use of licensed spectrum to increase the gap to 4 MHz.

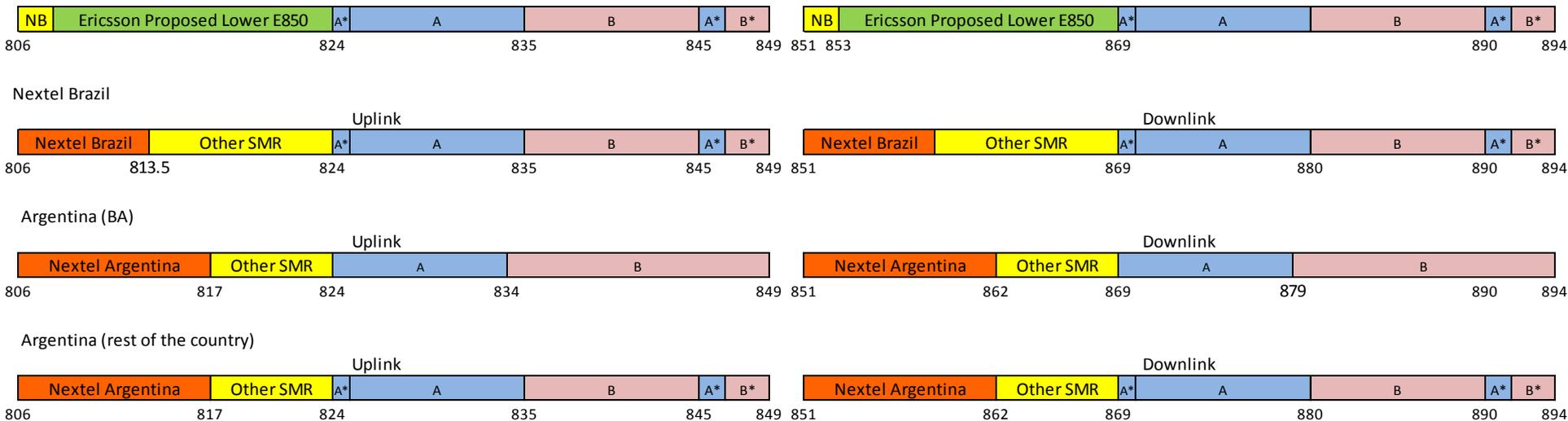


Band Edge Concerns

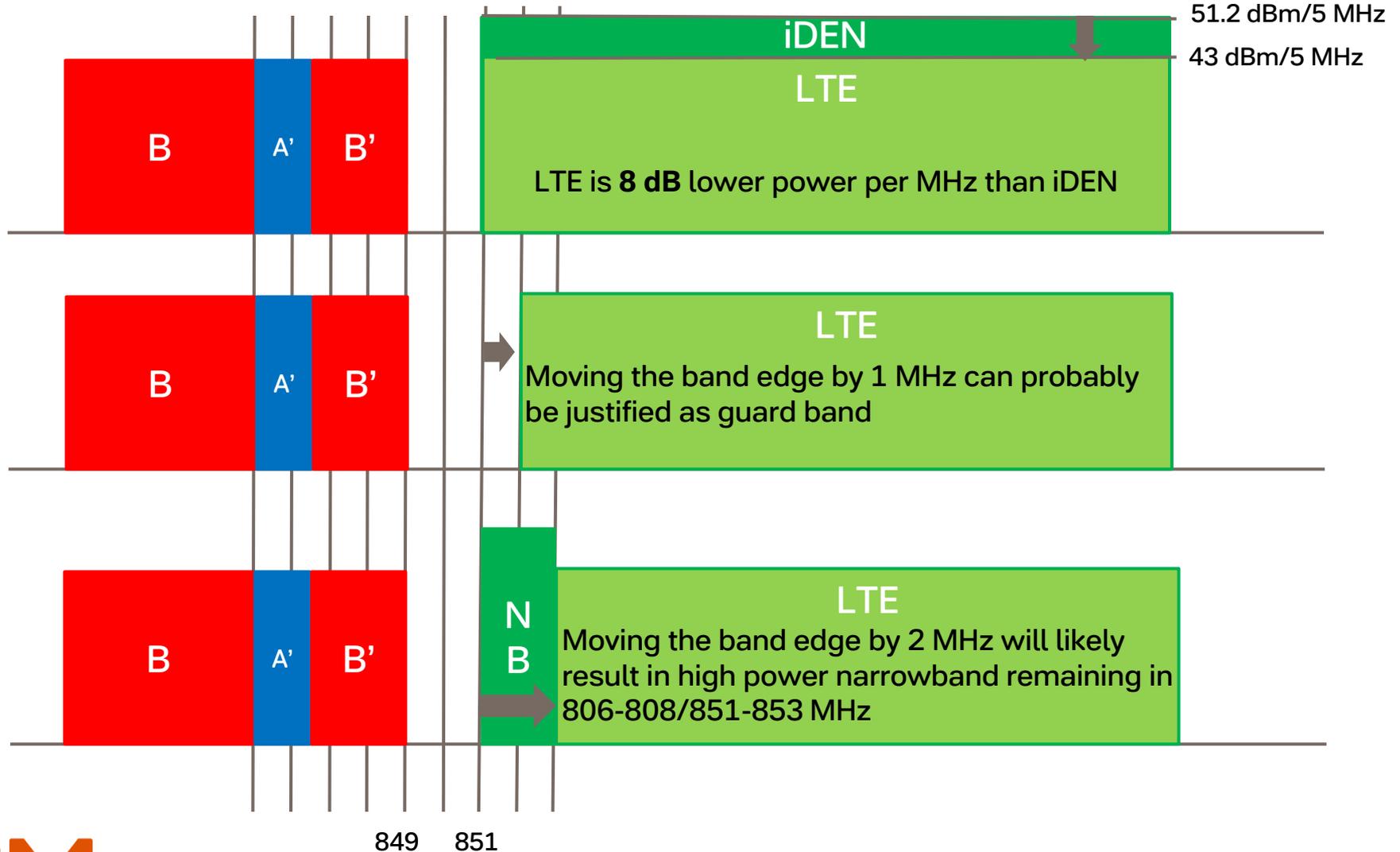
- It has been stated often that the primary concern is about BS-BS coexistence
- Between Band 5/Band 26 at 849 MHz and the Lower E850 band at 851 MHz
 - Out of band emissions from Lower E850 at 851 MHz into Band 5/26 at 849 MHz
 - Contributions have shown it is possible to meet the protection for Band 5, especially if the band edge is moved up to 852 MHz. [R4-112775], [R4-114603], [R4-114975], [R4-116079]
 - Blocking or ACS of Band 5 or Band 26 Basestations below 849 MHz from transmissions above 851 MHz
 - Ericsson says they need at least 4 MHz for product specific reasons
 - NII has pointed out that 851-853 MHz currently is licensed spectrum. It is in use today for high power narrowband service like iDEN. It will continue to be used for narrowband services in the future especially if the Lower E850 band is moved above 853 MHz.
 - NII has shown in R4-113858 that a typical iDEN basestation transmits 51.2 dBm/5 MHz, per sector, compared to a typical 43 dBm of transmit power for an LTE basestation. Hence, deploying LTE at the low end of the SMR band will result in 8 dB *less* blocking than iDEN does today.
- Between the APAC700 band and the Lower E850 band at 803-806 MHz
 - Out of band emissions from APAC700 at 803 MHz into the Lower E850 band above 806 MHz
 - 3 MHz has been shown to be adequate with sub band filters [R4-121070]
 - Blocking of Lower E850 band BS above 806 MHz from APAC 700 BS below 803 MHz
 - Contributions have presented filter data showing that 3 MHz is adequate to protect the Lower E850 band from APAC700 blocking [R4-115854]

2 MHz band edge proposal

- Ericsson and Telefonica have proposed moving the lower edge of the Lower E850 band up by 2 MHz to 808/853 MHz
- This change would cost NII the ability to use of 2+2 MHz of valuable spectrum for LTE in Brazil and Argentina. It would also impact other iDEN operators who plan to use the Lower E850 band.
- The proposed change won't improve coexistence for any manufacturer or their operators, because there will still be high power narrowband services operating above 806/851 MHz

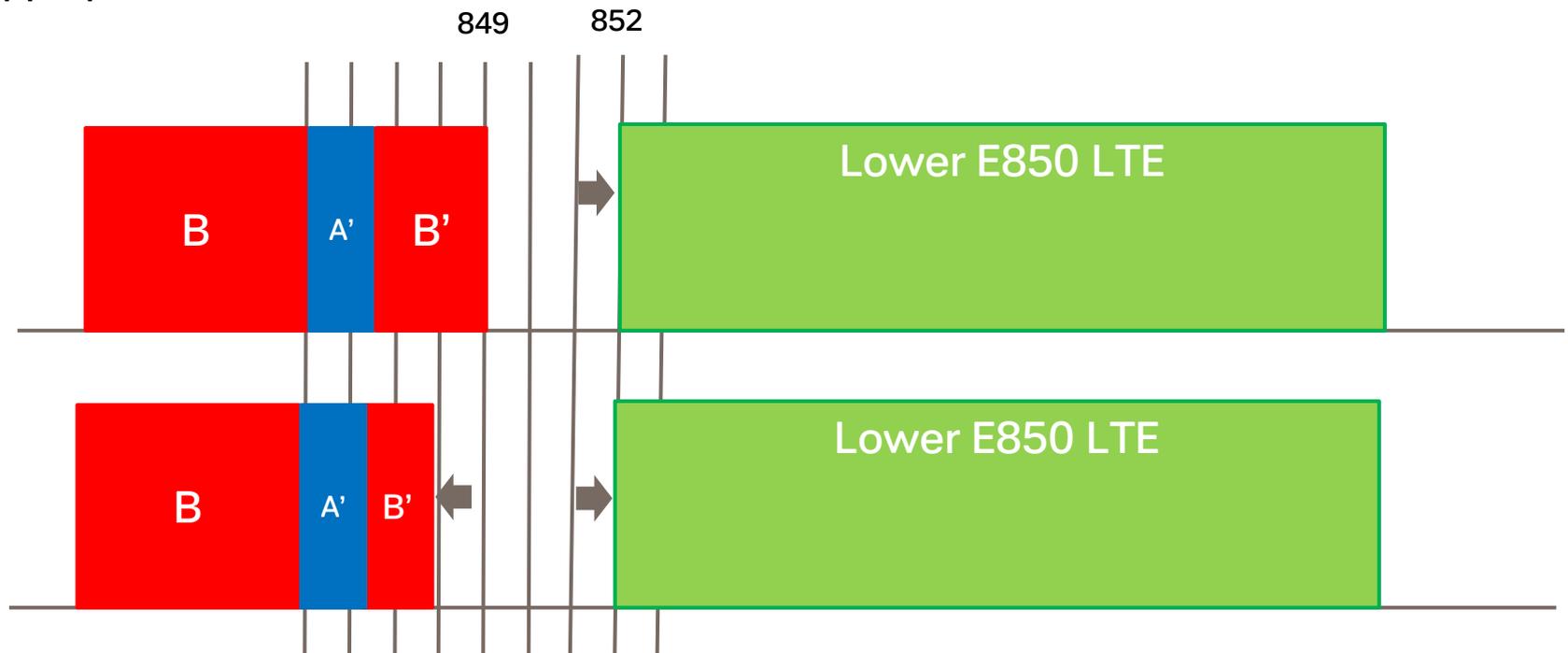


Without moving the Lower e850 band edge, Coexistence will be improved by 8.2 dB if iDEN is replaced by LTE above 851 MHz



A way to achieve the desired 4 MHz guard band if the Lower E850 band edge is moved 1 MHz

- Move the edge of the Lower E850 band up by 1 MHz to 807/852 MHz
- Operators in regions with the A, B, A', B' arrangement could deploy 1.4 MHz LTE in 846.5-848, with cutoff filters at 848 MHz. This results in the desired 4 MHz UL/DL gap.
- Operators with more contiguous spectrum at the top of the 850 band could choose to transmit up to 848 MHz with a 4 MHz gap, or up to 849 MHz with a 3 MHz gap and appropriate filters.



Summary of BS-BS coexistence issues

- It has been shown that -49 dBm/MHz out of band emissions from Lower E850 above 852 MHz into Band 5/26 below 849 MHz can be met [R4-112775]
- It has been shown that deploying LTE above 851 MHz will allow for less filtering to protect Band 5/26 BS than when iDEN is deployed above 851 MHz [R4-113858]
- It has been shown that reasonable filters allow the lower E850 band BS can be protected from APAC700 BS transmissions below 803 MHz [R4-115854]
- It has been shown that sub-band filters allow APAC700 BS to provide -49 dBm/MHz
- The real issues for the lower band edge appear to be commercial, not technical

Technical vs. Commercial issues

- The 2-3 MHz gap between UL and DL does not appear to be technical issue. Filter technology exists to solve BS-BS coexistence. We have seen in a contribution from the proponent of moving the band edge by 2 MHz, that 2 MHz Uplink/DL ratio is sufficient. In fact, less filtering will be required when LTE is deployed above 851 MHz than is required to protect Band 5 from narrowband basestations today.
- This appears to be a commercial issue, pitting the filter costs of the 850 band operators and their vendors against the legal spectrum rights of the operators in the SMR band. Moving the edge of the band would make less spectrum available for mobile broadband.
- Regulators in Argentina believe 2 MHz is sufficient guard band between Band 5 and the SMR band, and 3 MHz is sufficient between APAC700 and the SMR band. 3GPP is setting a dangerous precedence if they decide that operators who are currently operating in licensed spectrum, must effectively give up the use of that spectrum so their competitors can use cheaper filters than what they need today. Keep in mind we are not talking about out of band emissions here, but the right of operators to radiate in spectrum that is licensed and already in use for other technologies.

Consistency in how nearby bands are treated

- The 700 MHz downlink only band is currently defined as 716-728 MHz, which is directly adjacent to the Band 12 and Band 17 uplink.
- Contribution R4-115759 for the DL only band show that 2 MHz gap between UL and DL is technically feasible for the more stringent co-location requirements. This was under the assumption that the same operator controlled the spectrum below 716 MHz and above 716 MHz, which will not always be the case.
- It has not yet been decided how much guard band will be required between legacy Band 12/17 and this new DL only band.
- 3GPP should have a consistent policy for addressing coexistence with nearby bands, especially for spectrum that is already licensed and already in use for other technologies.

Summary

- NII has over 8,400 iDEN basestations deployed today in the SMR band today.
- iDEN basestations are deployed in all major metropolitan areas in Latin America and Canada, with sites as dense as 150 meters apart.
- LTE above 851 MHz will be significantly (8 dB) easier for Band 5 and Band 26 basestations to coexist with than iDEN is today.
- Moving the band edge up by 2 MHz is a lose-lose situation – SMR band operators would lose the use of the lowest 2 MHz of spectrum for LTE and Band 5/26 operators and vendors would still have to deal with higher power narrowband BS blockers above 851 MHz. SMR band operators would get the pain and the 850 band operators and vendors would see no gain.
- NII has made a generous, unprecedented compromise offer to move the band edge by 1 MHz and give up the use of 1+1 MHz of licensed spectrum for LTE to progress the WI
- Band 5 and Band 26 operators and vendors would be better off with LTE above 807/852 MHz than if the Lower E850 band is limited to above 808/853 MHz and high power narrowband transmissions remain in 806-808/851-853 MHz
- NII is again proposing as a way forward the compromise position to move the band edge by 1 MHz to 807/852 MHz if the current band edge must be altered.