R4-120757

Lower frequency edge for the Lower E850 band (Way Forward)

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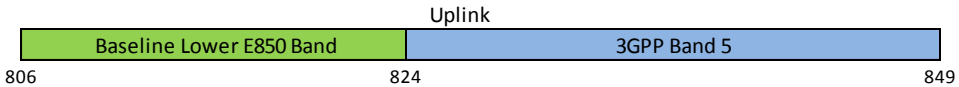
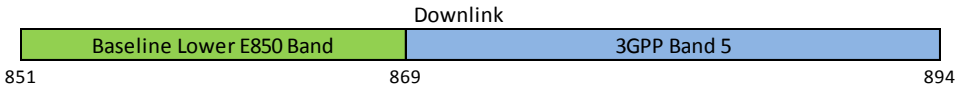
800 MHz band History

- 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 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 there the bands were used for narrowband deployments.
- When CDMA was deployed at the top for 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.
- Likewise, Band V/5 UMTS or LTE deployments have needed to protect themselves from the licensed use above 851 MHz





Band Edge Concerns

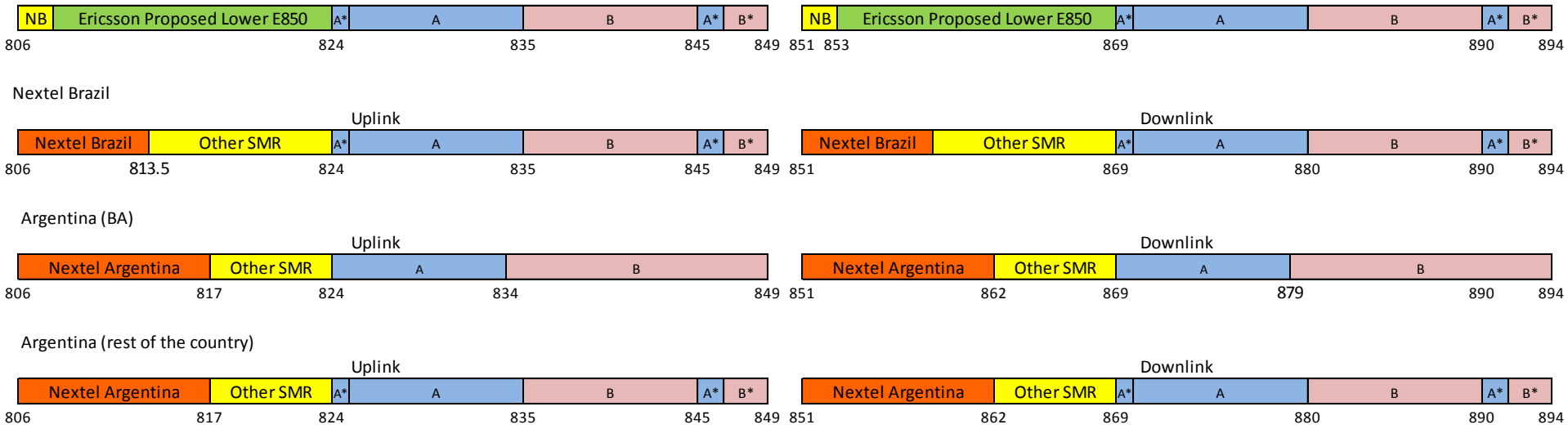
- It has been stated often that the primary concern is about BS-BS coexistence

- 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 from NSN and Huawei have shown they can meet the requirements with a 2 MHz gap, while a larger gap could allow smaller Lower E850 band filters. It is preferred to leave that a business decision for the Lower E850 operators
  - Blocking or ACS of Band 5 or Band 26 Basestations below 849 MHz from transmissions above 851 MHz
    - One vendor 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 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.
    - Correspondingly, LTE in the band will result in *less* blocking or ACS.

- 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, but a larger gap could allow for smaller filters
    - Even if the band edge were moved, narrow band services above 806 MHz, which could include Public Safety, would need to be protected
  - 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

Ericsson's proposal

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



Point and Counterpoint

- Point: "iDEN sites aren't very dense compared to LTE sites"
  - Counterpoint: iDEN deployments are very dense in most major metropolitan regions in the Americas. NII has sites as close as 150 meters in urban areas because of capacity requirements

- Point: "3GPP needs to protect legacy 3GPP bands from new 3GPP bands"
  - Counterpoint 1: The 3GPP blocking specs for band 5 specify -43 dBm interfering signal mean power from 20 MHz between F_{UL_low} and F_{UL_high}. Moving the band edge from 2 MHz to 4 MHz away, doesn't help with the blocking performance of a BS that just meets the minimum blocking requirements. It won't help much with ACS either if the BS operates at 3GPP minimum specs, and will be worse for ACS if there is higher power narrowband in 851-853 MHz.
  - Counterpoint 2: The 716-728 MHz Downlink Only band is directly adjacent to legacy Band 12 and Band 17 uplink
    - A single operator doesn't own all of the 710-716 MHz licenses in the US, and the US 700 MHz bandplan is being deployed in Canada, so the DL only band isn't a single operator issue
    - Contribution R4-115759 discussed a possible rearrangement of the band to 717 MHz, leaving a 1 MHz guard band.
    - Either way, the Lower E850 Band is farther away from Band 5 than the DL Only band is from Band 12 or 17.
  - Counterpoint 3: 3GPP needs to set requirements that provide coexistence with neighboring services. 3GPP cannot force licensed spectrum to be vacated. 3GPP vendors need to protect operators from legal blockers operating in licensed spectrum.

Consistency check with other bands (Quotes from Ericsson contribution R4-115759)

- "The same operator is expected to deploy in both LTE DL FDD 716-728 MHz and Band 12/17."
  - The same operator doesn't own 710-716 MHz and 716-722 MHz in the entire US.
  - The US bandplan will also be deployed in Canada and potentially other countries.
- "Band 12/17 is 17/12 MHz wide, which means that the largest LTE carrier which can be fit is 15/10 MHz. Assuming that this carrier is allocated in the middle of Band 12/17, degradation could be allowed at Band 12/17 UL highest edge."
  - This same logic would say that RAN4 should consider deployment of a 1.4 MHz carrier in the lower end of the B* block in most of Region 2, leaving 848-849 MHz as guard band.
- "Certain IL degradation can also be allowed at the highest edge of band 12 UL, i.e. 699-715 MHz passband, taking into account the current deployment scenario."
  - This is inconsistent with the position that there can be no change to filters for legacy Band 5, and that the Band 5 filters must cover the entire band
- "BS-BS co-location between LTE DL FDD 716-728 MHz and Band 12 requires challenging filters. However, this can be facilitated by considering a real deployment scenario on which carriers in Band 12 UL are allocated below 715 MHz and above 717 MHz in LTE DL FDD 716-728 MHz. In this way, guard band between UL and DL is increased."
  - This is the same scenario that NII, and two Band 5 operators agreed for band 5/26 and Lower E850 coexistence, except that the resulting gap would go from2 to 4 MHz, instead of 0 to 2 MHz!

Moving 1 MHz vs. 2 MHz

- Moving the Lower E850 band edge by 1 MHz will allow vendors the option of deploying Band 5/26 filters with an 848 MHz cutoff, and 4 MHz to LTE above 852 MHz.
  - Two Band 5 Operators have *already* indicated that this would be an acceptable way forward for them.

- While there can be no guarantees, it is more likely that the operators above 851 MHz will allow 1 MHz of spectrum to sit idle as guard band than 2 MHz. If the edge of the band is moved up by 2 MHz, it is more likely that there will be financial and even regulatory pressures to continue to use the spectrum from 851-853 MHz for narrowband services.

- Because of the above point, band 5/26 operators and vendors may be better served in reality by moving the Lower E850 band edge by 1 MHz by 2 MHz.

Other iDEN Operators

- 15 iDEN operators are listed in the E850 TR as having spectrum below the Upper E850 band

- TELUS owns both the B* block, and SMR band above 851 MHz in Canada. It would be especially unfair to TELUS to move the Lower E850 band edge by 2 MHz, since they own the B* block in Canada and because there will not be APAC700 in Canada.

Summary

- 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 and other operators prefer to keep the lower edge of the band at 806/851 MHz so that we can deploy LTE in our SMR spectrum, which is a vital company asset
- NII and TELUS previously offered to move the edge of the band to 807/852 MHz as a compromise, but that was not accepted so far
- NII and two Band 5 operators in Latin America agreed on a proposal that Lower E850 deployments would be limited to above 852 MHz and Band 5/26 LTE deployments would be limited to below 848 MHz which would achieve a 4 MHz gap that proponents of moving the band edge says they need. So far this approach has not been accepted by the vendor vendor, saying the standard needed to provide 4 MHz separation between the bands.
- We need a way forward so that we can make progress. The E850 study item was approved in May of 2009, and the Work Item began in June of 2011. We have done nothing but coexistence work so far. Progress will be halted as long as the position of the lower end of the band is being challenged.
- 3GPP also needs to treat bands fairly. It should not impose unwritten rules one band, while setting completely different rules for other bands.

Proposed Way Forward

- NII and TELUS propose to move the lower edge of the Lower E850 band up by 1 MHz to 807/852 MHz. We feel this is a generous offer that should be accepted so everyone can move forward. We believe it will result in better coexistence for Band 5 and Band 26 than if the edge was moved by 2 MHz. We are asking RAN4 to approve this as a way forward.

- NII and other operators prefer to keep the lower edge of the band at 806/851 MHz if no other compromise can be reached