

Source: SoftBank Mobile
Title: On B8+B28 Quadplexers: preliminary results
Agenda item: 7.30.2.2
Document for: Discussion

1. Introduction

Since the WIs relevant to 8+28 CA were approved [1][2], there have been a couple of comments such as [3] that performance of 8+28 might not be so good due to quadplexers. This paper is to give some observation on the performance of the B8+B28 quadplexer based on simulation results from vendors.

2. Simulation results of B8/B28 quadplexers

The tables below summarizes simulation results of two RF filter vendors. There is a caution that the results are “preliminary”. Note that two quadplexers are needed for B28 (A/B) then the Band 8 IL will be increased by a switch toggling between B28A and B28B [3]-[5].

| | | Vendor A | Vendor B | Remark |
|----------------------|------------------------------------|----------|----------|---------|
| Additional IL | Band 8 Tx | 1.2 | 1.6 | +0.4/SW |
| | Band 8 Rx | 1.4 | 1.3 | +0.4/SW |
| | Band 28A Tx | 0.4 | 0.7 | |
| | Band 28A Rx | 0.9 | 1.2 | |
| Isolation | Band 8 Tx -> Rx @ Band 8 Tx | 53 | 48 | |
| | Band 8 Tx -> Rx @ Band 8 Rx | 51 | 55 | |
| | Band 28A Tx -> Rx @ Band 28A Tx | 55 | 50 | |
| | Band 28A Tx -> Rx @ Band 28A Rx | 55 | 50 | |
| Cross-band Isolation | Band 8 Tx to Band 28A Rx @ B8 Tx | 55 | 60 | |
| | Band 8 Tx to Band 28A Rx @ B28A Rx | 42 | 52 | |
| | Band 28A Tx to Band 8 Rx @ B28A Tx | 55 | 55 | |
| | Band 28A Tx to Band 8 Rx @ B8 Rx | 40 | 60 | |

Note : all the values are under ETC.

Table. 1 Simulation results on quadplexers for B8 and B28A (lower arm)

| | | Vendor A | Vendor B | Remark |
|----------------------|------------------------------------|----------|----------|---------|
| Additional IL | Band 8 Tx | 1.2 | 1.6 | +0.4/SW |
| | Band 8 Rx | 1.4 | 1.3 | +0.4/SW |
| | Band 28B Tx | 0.6 | 1.2 | |
| | Band 28B Rx | 0.7 | 1.2 | |
| Isolation | Band 8 Tx -> Rx @ Band 8 Tx | 53 | 48 | |
| | Band 8 Tx -> Rx @ Band 8 Rx | 51 | 55 | |
| | Band 28B Tx -> Rx @ Band 28B Tx | 55 | 50 | |
| | Band 28B Tx -> Rx @ Band 28B Rx | 55 | 50 | |
| Cross-band Isolation | Band 8 Tx to Band 28B Rx @ B8 Tx | 55 | 60 | |
| | Band 8 Tx to Band 28B Rx @ B28B Rx | 44 | 49 | |
| | Band 28B Tx to Band 8 Rx @ B28B Tx | 55 | 60 | |
| | Band 28B Tx to Band 8 Rx @ B8 Rx | 43 | 58 | |

Note : all the values are under ETC.

Table. 2 Simulation results on quadplexers for B8 and B28B (upper arm)

Based on the available data above, while B28 additional ILs would be likely to around 1dB (still big though), additional ILs for Band 8 are expected to be fairly big, say 1.4dB for both Tx and Rx. As noted above, Band 8 RF chain will need additional 0.4dB for a SW then the averaged additional IL would be around 1.8dB.

While further feedback from other vendors (or some revisions of the data above) are expected, the simulated values so far unfortunately align with the observations made in [3]. Then the owners of both bands might address how to deal with such a big additional IL for CA, especially for one of the essential coverage bands.

3. Conclusion

This paper reports preliminary results for B8+B28 quadplexer performance based on simulations by RF parts vendors and relatively huge additional ILs in Band 8 are expected. While additional data come up or some values might be revised, the current data could represent general trends of possible quadplexers.

4. Reference

- [1] RP-141826 New Work Item Proposal: LTE Advanced 3 Band Carrier Aggregation (3DL/1UL) of Band 1, Band 8 and Band 28, SoftBank Mobile
- [2] RP-142193 New Work Item Proposal: LTE Advanced 3 Band Carrier Aggregation (3DL/1UL) of Band 3, Band 8 and Band 28, SoftBank Mobile

- [3] R4-150979 Dual quadplexer for B8+B28, Qualcomm Incorporated
- [4] R4-150034 TP for Rel-13 2DL TR36.8xx : IMD/Harmonics Issues on LTE-A Inter-band Carrier Aggregation (2DL/1UL) of Band 8 and Band 28, SoftBank Mobile
- [5] R4-151459 TP for Rel-13 2DL TR36.852-13 : BS aspect and reference architecture on LTE-A Inter-band Carrier Aggregation (2DL/1UL) of Band 8 and Band 28, SoftBank Mobile