

Agenda item: 6.8
Source: BT, France Telecom, Mannesmann, NTT DoCoMo, Omnitel, Sonera, Telefonica, Telenor, Telia, Vodafone group
Title: On the 3.84 Mcps TDD and 1.28 Mcps TDD coexistence study.
Document for: Approval

The 1.28 Mcps TDD option is a technique, which many operators might find interesting¹, and would like to have the possibility to use. Operators therefore find the work to harmonise this technique with the other UTRAN modes, and to introduce it into the 3GPP specifications, very important.

However, a well-known difficulty² inherent to TDD techniques is BS to BS and UE to UE interference. A crucial part of the harmonisation work is to study the coexistence of the 3.84 Mcps TDD and 1.28 Mcps TDD modes with focus on BS to BS and UE to UE interference in order to ensure operational flexibility and possibilities to avoid harmful interference.

The need for such a study was identified at an early stage by RAN WG1, and a liaison statement was sent to RAN WG4 [3]. In an answer [2] to the liaison statement, RAN WG4 stated that operation in adjacent bands would be studied by WG4 but that the operational scenarios in the same band would not be studied by WG4. It was also said that the studies would be performed related to spectrum mask, ACLR and ACS issues, but not related to differences in the physical frame structures. RAN WG1 claim that they do not possess the expertise for identifying interference scenarios and calculating/evaluating the interference. RAN WG4, on the other hand claim that this is not within the scope of their terms of reference. Thus, the responsibility for the study of a number of crucial coexistence scenarios has been lost between RAN WG1 and RAN WG4.

A number of operators have tried to resolve the deadlock by pushing for a coexistence study both in RAN WG1 [1], and in RAN WG4 [4], but the discussion has been deferred to TSG RAN. It is now up to TSG RAN to decide where the study should be made. Since RAN WG1 does not possess the expertise for identifying interference scenarios and calculating/evaluating the interference, we propose that RAN WG4 should perform the coexistence study. RAN WG1 will of course be responsible for making necessary harmonising adjustments, based on the results in RAN WG4. For instance, ensuring that it is possible to avoid fatal interference by synchronising the UL/DL transmissions of the modes

The study would investigate UE to UE, and base station to base station interference taking the differences in frame structure into account. The following operational scenarios would be studied:

- Co-ordinated and uncoordinated operation in space and time
- Operation in the same and in neighbouring geographical areas
- Operation in the same and in adjacent frequency band

This work has been seriously delayed, and the study should now be given high priority in order not to further delay the 1.28 Mcps TDD work item.

¹ One reason is that many operators are getting licences for only a 5MHz TDD band and will be able to operate only a single 3.84 Mcps TDD carrier or possibly three 1.28 Mcps TDD carriers. The 1.28 Mcps TDD alternative has a technical advantage of allowing interference avoidance that could be useful in some operational scenarios (since there are more than one carrier to choose from, a UE can avoid interference from a nearby UE by selecting a frequency that is not close to the frequency used by that UE).

² These problems are typically solved through a combination of interference avoidance (i.e. a UE's avoids interference from a nearby UE by selecting a frequency that is not close to the frequency used by that UE) and synchronisation of uplink and downlink transmission periods. A crucial harmonisation task is therefore to make sure that synchronisation of the uplink and downlink transmission periods of the two TDD modes can be achieved.

References:

[1] RAN WG1, Telia, Vodafone Group, BT, Mannesmann Mobilfunk, Telenor, " Coexistence between the 3.84 Mcps TDD option and the 1.28 Mcps TDD option", TSGR1#15(00)1131, TSG-RAN WG1 Meeting #15

[2] RAN WG4, "LS answer on low chip rate TDD interference/deployment scenarios", Doc. TSGR1-00-0773, TSG-RAN Working Group 1 meeting No. 13

[3] RAN WG1, "LS on low chip rate TDD interference/deployment scenarios", TSGR1#12(00)0614, TSG-RAN Working Group 1 Meeting #12

[4] RAN WG4, Telia, NTT DoCoMo, Telenor, BT, " Coexistence between the 3.84 Mcps TDD option and the 1.28 Mcps TDD option", Doc. TSGR4-00-0633, TSG-RAN Working Group 4 meeting No. 13