

Source: RAN WG1
To: RAN WG3
Cc: RAN WG2, RAN WG4
Subject: Response to liaison on STTD indication in the RRC message
Contact: Kari Pehkonen
Email: kari.pehkonen@nokia.com
Tel.: +81 90 4590 7234

RAN WG1 would like to thank RAN WG3 for their liaison on STTD indication in the RRC message. It is the understanding in RAN WG1 that among the neighbouring cell measurements, a UE can be required to perform CPICH Ec/No or CPICH RSCP measurements. In case Tx diversity is used on any of the downlink channels of the neighbouring cell, the Primary Common Pilot Channel will be transmitted from both antennas using different predetermined patterns.

To perform the required measurements on the CPICH, the UE will be informed of the DL primary scrambling code of the neighbouring cell, however the UE also needs to synchronise to the Primary Common Pilot Channel. If the *Tx diversity indicator* (as it is now called in 25.331 v3.2.0) is not provided to UE it could either try to detect the neighbour cell Tx diversity status from SCH or always assume that CPICH is transmitted from 1 or 2 antennas.

In case the UE performs the detection of the SCH, it will be informed of the usage of Tx diversity on PCCPCH and SCH because the Primary and Secondary SCH are modulated by a symbol which indicates it. In addition, UE will know if CPICH is transmitted from 1 or 2 antennas. However detecting neighbour cell Tx diversity status from SCH will add quite considerable delay to neighbour cell measurements which is not desirable. It will also impact the complexity of the UE.

In case UE assumes that the Primary Common Pilot Channel is transmitted without transmit diversity, it will detect only the sequence corresponding to antenna 1 and provide an erroneous measurement to the UTRAN if the assumption is incorrect. Alternatively, it could systematically detect also the sequence corresponding to antenna 2 to ensure that all the energy sent on the Primary Common Pilot Channel is captured. This would add noise to the measurement if only one antenna was actually used to transmit CPICH. Thus, it is our understanding that not having the *Tx diversity indicator* on neighbor list will have some impact on the performance and as such will also affect the RAN WG4 minimum performance requirements. That is because according to our understanding the WG4 minimum performance requirements assume the knowledge of Tx diversity status of neighboring cells at the UE. Without such knowledge either new performance requirements needs to be derived or UE complexity needs to be increased to fulfill the current requirements.

Note that as the Tx diversity status of the cells does not change dynamically, it is expected that communicating this information between RNCs will be very infrequent.

Therefore RAN WG1 would like to inform RAN WG3 that not providing the information on the usage of Tx diversity will lead to system performance degradation and may even impact UE implementation complexity depending on WG4 decisions. **Thus, in order to avoid above mentioned problems, WG1 recommends that it is mandatory to provide the *Tx diversity indicator* IE to UE as part of neighbour cell information.**