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Agenda Item: 8
Source: TSG RAN WG4
To: TSG RAN WG1
cc: TSG RAN WG2
Title: Reply to LS on RSSI measurement
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1. Introduction

RAN WG4 thanks RAN WG1 for the answers and comments in their LS R1-00-1290 (R4-000957). According to the received LS, RAN WG1 has considered and decided the following:

- change of name to 'received total wide band power'
- measurement bandwidth defined to be 'UTRAN uplink channel bandwidth'.
- reference point defined to be antenna connector

These changes are reflected in CR 25.215-075r1: Definition of UTRAN RSSI.

RAN WG1 also asks from RAN WG4 whether the 'linear average' is appropriate term and if the above mentioned changes should apply also for UE RSSI measurements.

In addition, RAN WG1 has decided in its 16th meeting to further clarify reference point definition in CR 25.215-077r1 (Tdoc R1-00-1256): Clarification of reference point for UE/UTRAN measurements. This CR states that for all UTRAN measurements the antenna port "...refers to the BS antenna connector (test port A)" as defined in TS25.104.

RAN WG4 has considered these changes in its 14th meeting, and would like to inform RAN WG1 its position.

2. Discussion

2.1 Measurement bandwidth

Unfortunately, both the previously proposed definition by RAN WG4 (UTRAN carrier uplink channel bandwidth) and the RAN WG1 proposal (UTRAN uplink channel bandwidth) are currently undefined, and therefore require further consideration. RAN WG4 has understood that RAN WG1 considered 5MHz to be correct bandwidth.

RAN WG4 has defined terms 'nominal channel spacing' and 'occupied bandwidth'. 'Nominal channel spacing' is defined to be 5MHz, but it is allowed to be adjusted to other

values, for example 5.2MHz or 4.8MHz. 'Occupied bandwidth' shall be less than 5MHz. Unfortunately, these should not be used in the measurement definition, as they are not constant values but depend on deployment scenario and used equipment.

RAN WG4 believes the main purpose of the measurement is to support RRM functions (e.g. admission control, load control, UE open loop power control). Therefore the relevant bandwidth is considered to be the one seen by the BS receiver after pulse shape filtering. Pulse shape filtering is defined both for BS and UE transmitter and a matched filter is then used in UE and BS receiver. Definition is given e.g. in TS25.104 in section 6.8.1. Bandwidth of the pulse shape filter is 3.84MHz.

2.2 Reference point

From WG4 point-of-view the 'reference point' is assumed to be a point in which a reference measurement can be made. As an example, if an antenna connector is used as a reference point, a reference measurement can be done by disconnecting signal generator (or other test equipment) from the BS antenna connector and measuring the input signal by an external measurement equipment; measurement result from BS and from the external device should be the same.
Previously RAN4 requested RAN WG1 to include also the receiver noise into the 'received total wide band power' measurement. In practise this means that the reference point can not be the antenna connector, as the measurement result reported by the BS would be different from that of measured by external device from the reference point.
In RAN WG1 CR concern is expressed that the measurement accuracy can not be verified without an external reference point. RAN RRM ad hoc in Feb. 2000 decided that there will not be tests defined for UTRAN measurement accuracy requirements defined in 25.133. Therefore RAN WG4 is not considering testability in detail. RAN WG4 still believes it is possible to test this requirement even in case the reference point is defined to be within the receiver. In practise this could be achieved for example by evaluating the receiver noise is separately and combining with a wide-band noise measurement result from an external measurement point.
RAN WG4 proposes that the reference point is defined to be the output of the pulse shape filter in the receiver.

2.3 Diversity receiver

It is proposed to use term 'linear average' in case of two or more receiver antennas. RAN WG4 believes this is a proper term to indicate that the average of the powers shall be calculated in linear scale (average of powers in [W]) and not by averaging power values in logarithmic scale. However, the averaged value is reported in logarithmic scale [dBm].

2.4 Text proposal for measurement definition

Taking into account the comments on measurement bandwidth, reference point and use of diversity receivers, RAN WG4 would like to propose a definition that possibly could be used RAN WG1. 'Received total wide band power' is:
"the received wide band power, including noise generated in the receiver, within the bandwidth defined by pulse shaping filter. In case of receiver diversity the reported value shall be linear average of the power in the diversity branches. The reference point for the Received total wide band power measurement shall be the output of the pulse shaping filter in the receiver."

2.5 Test port

The text introduced by CR 25.215-077r1 reads:

The term “antenna connector” used in this sub-clause to define the reference point for the UTRAN measurements refers to the “BS antenna connector” (test port A) as described in [19]. The term “antenna connector” refer to Rx or Tx antenna connector as described in the respective measurement definitions.

Reference [19] points to TS25.104, which defines test port B in addition to test port A mentioned above. Furthermore, TS25.104 defines when 'antenna connector' refers to test port A and when to test port B. This is rather important, as for example in the case of 'received total wide band power' measurement the noise generated (or reduced) by an external amplifier should be taken into account in the measurement. Another example is the transmitted carrier power: one could have a configuration with an external PA and according to the definition in CR the tx power is measured and reported excluding the gain of external PA.

RAN WG4 believes that test port B should be included in the definition and the text could read for example:

The term “antenna connector” used in this sub-clause to define the reference point for the UTRAN measurements refers to the “BS antenna connector” test port A and test port B, as described in [19]. The term “antenna connector” refer to Rx or Tx antenna connector as described in the respective measurement definitions.

2.6 UE RSSI

RAN WG4 believes most of the comments given above are relevant also for UE. RAN WG4 will further consider the UE RSSI measurement definition and will inform RAN WG1 the outcome of the discussions later.