

Agenda Item: 8.2
Source: Nokia
Title: Service independent BLER measurements
Document for: Discussion, decision

1. INTRODUCTION

The issue whether BER (Bit Error Rate), FER (Frame Error Rate), BLER (Block Error Rate) or something else should be used in measurements has been discussed within RAN4 and T1 in previous meetings. Also a joint meeting between these WGs was arranged in Miami and minutes of that meeting can be found in [T199059].

In this document it is proposed that tests in Section 8 (Performance requirements) in S25.101 should be defined to be as service independent as possible. It is also proposed with justifications that BLER measurements should be used instead of BER measurements in Section 8. It should be noted that this document does not propose any changes to RF tests in section 6 and 7 in S25.101 i.e., those tests can use BER measurements.

2. BLER MEASUREMENTS FOR SERVICE INDEPENDENT TESTS

It has been stated in previous meetings that the measurements in Section 8 have to be related somehow to quality of services. Since 3GPP system supports many different services, many of them currently unknown, the number of tests would increase in the future very easily to the level, which is unpractical. Furthermore, each service might have some specific performance criteria such as BER, FER, BLER or Frame Erasure Ratio with some specific values for those. Thus by choosing this way of specifying tests for Section 8, we will get huge number of tests that are using different performance criteria. This seems to be unpractical and confusing way of specifying tests for Section 8.

A solution for this problem is to define tests in Section 8 so that they are service independent. This is very well in line with the purpose of these tests i.e., to check whether receiver's baseband parts are working correctly. Note that this strategy has been also used in Sections 6 and 7 since service independent measurement channels have been defined for these tests in Annex A.2. However in Section 8 a single measurement channel is not enough as in sections 6 and 7, since physical layer parameters are dependent on data rates. A limited number of tests with different data rates are needed in order to guarantee correct operation of receiver's baseband parts with different physical layer parameters.

BER measurements can be seen as the service independent measurements. Also FER measurements are service independent given that frame is defined in a general way i.e., frame length is equal to radio frame i.e., 10 ms. FER is believed to be slightly better metric than BER due to following reasons:

- Most of services QoS is defined as FER rather than BER
- The FER performance could suffer if there is a higher error probability e.g. at the end of the frame due to improper implementation of decoding and tail bits.
- Both parameters probably take similar time to measure with similar degree of accuracy

However, there are some problems with FER measurements with high user data rates. Namely, frames would contain so many bits, e.g., 3840 bits, so in practice every frame would be in error. In this case

frames will be segmented into smaller blocks by L2. The length of these blocks is typically at most few hundred bits. Therefore, the whole frame needs not to be retransmitted in packet service case, only blocks which contained errors need to be retransmitted. This means that BLER measurements are more relevant than FER measurements for many applications and give more information on the receiver performance. As a conclusion Nokia proposes that BLER should be used as a criteria for performance measurements in Section 8 in S25.101. Bit length of the blocks are for further studies.

It is up to T1 to decide how to measure BLER, but one solution is to use CRC checking to detect erroneous blocks. Note that CRC bits are added to each block.

If there is in future some service dependent performance criteria and the proposed BLER tests cannot guarantee the quality of the service, then a special test case for that specific service needs be included. However the terminal in question has to pass also other tests in Section 8 that are seeking for possible receiver baseband incapacibilities.

3. TEXT PROPOSAL

Replace BER with BLER in Section 8 and Annex B.1 in S25.101v2.1.0. Replace values for BLER (former BER) with TBD.

Modify Table B1 in Annex B.1. Merge "Speech" row with Circuit Switched Data row. Rename that row to "Circuit Switched Services". Take a similar action in Annex A, Section A.3 and A.4.

4. CONCLUSIONS

In this document it is proposed that tests in Section 8 in S25.101 are defined to be as service independent as possible. It is also proposed that BLER should be used as a performance criteria in the same section.