

Title : **Response LS to "LS on TSG-SA4 request for information with regard to RAN handling of bit erroneous SDUs within packet switched domain radio bearers" (S4-000652)**

Source : **TSG-RAN WG1**

To : **TSG-SA WG4**

Cc : **TSG-RAN WG2**

Contact person : **Evelyne Le Strat (Nortel Networks) elestrat@nortelnetworks.com**

3GPP TSG-RAN WG1 (RAN1) has reviewed the questions asked by 3GPP TSG-SA WG4 on of bit erroneous SDUs within packet switched domain radio bearers. Questions on CRC options are in the scope of RAN1:

2 CRC options

SA4 as a group of codec experts has limited understanding on the Layer 1 and 2 options. We assume that the detection of erroneous SDUs is based on various length CRCs. However, SA4 does not know what is the accepted CRC usage for packet domain bearers. We would like to understand

- *How the varying CRC length affects the required radio access bearer properties for a fixed bit-rate user plane data stream.*
- *What implications a short CRC length (e.g., length 0 or length 8) has for the RAN behaviour and bandwidth efficiency. Specifically, does using a very short CRC bring significant radio capacity benefits for real-time packet switched services?*

The CRC length is chosen among 0, 8, 12, 16, 24 bits. It affects the error detection capabilities. I.e. the length has to be chosen so as to minimize the false detection rate for a given block size. Also, the presence of a CRC enables measurements to assist fast power control procedures. Finally, the presence of the CRC reduces the bandwidth efficiency.

As an indication, when radio bearers were designed with AMR circuit speech in mind, a CRC of 8 bits was considered for the class A bits of the AMR frame. However, when Blind Transport Format Detection is used, a CRC of 12 bits is a minimum for reliable format detection.

In the case of Equal Error Protection/Detection, if the CRC applies to the complete payload, the length as to comply with the BTFD requirement and should probably be longer than 8 bits since the payload size is bigger than the class A size (frame + RTP/UDP/IP header). A 16 bits CRC seems sufficient for a reasonable level of false detection but this needs more study. The loss of bandwidth efficiency is felt limited in this case but this also needs more study.

As a conclusion, using a very short CRC does not seem to bring significant radio capacity benefits. This does not preclude gains given other means like header compression and unequal error protection/detection.