**3GPP TSG-RAN5 Meeting #87-e *draft R5-202023r1***

**Online, , 18th May 2020 - 29th May 2020**

**Title: Issues with BeiDou GNSS scenarios**

**Source: Spirent Communications**

**Agenda item: 5.5.16 and 6.5.7.5**

**Document for: Discussion**

**Abstract of document:**

Some issues have been identified with the current GNSS scenarios used for testing BeiDou (BDS), both in the RF and signalling test cases. These are discussed below to trigger discussions amongst interested companies so as to agree a way forward.

**Detail:**

**Issue #1: problem with current BDS scenario #1 used in both RF and signalling testing.**

In the BDS scenario #1 (only), for the Geostationary (GEO) satellites (only), there is a significant discrepancy between the orbits described by the Almanac (also Yuma/Rinex) and the Navigation Model (Ephemeris) data sets. This causes issues for some UE implementations which then ignore the affected GEO satellites.

**Issue #2: use of only 30 satellites and PRNs up to 30 only.**

In both BDS scenarios #1 and #2, for historical reasons RAN 5 uses only 30 BDS satellites and also satellite PRNs from 1 to 30 only, as indicated in a “note” in the RAN 4 specifications. That historical reason no longer applies and RAN 4 is (rather belatedly) in the process of removing the “note”. This means that: a) the number of satellites to be used for testing (specified by RAN 4) will increase from 30 to 35 and b) the PRN range for these BDS satellites in all 3GPP specifications will shortly be 1 to 63. Note that for the PRN issue, this will then match the “real life” situation where in-orbit satellites currently have PRNs ranging from 1 to 60.

For the issue of the number of satellites increasing from 30 to 35, RAN 5 will at some point need to make these changes to remain consistent with RAN 4. For the issue of the PRN values, RAN 5 will at the same time need to assign PRNs to these “extra” 5 satellites, but in theory need not make any other changes – however this would then be unrealistic when compared to the “real life” situation.

**Other possible issues**

**a) Dates of scenarios**

For all RAN 5 A-GNSS testing, dates in 2012 are used. These dates are clearly unrealistic but for BDS they are especially impossible as most of the constellation was not launched at that time. It is increasing likely that UE implementations may make “sanity checks” on the GNSS date and may reject the dates used by RAN 5. It may be sensible to consider this issue at the same time as making any changes for the above two issues.

**a) BDS scenario for Aerial testing**

It should be noted that the recently-agreed BDS scenario for Aerial testing does not comply with the issues raised in Issue #2 above. This could be ignored or changing this scenario could also be considered with the other issues here.

**Discussion:**

Spirent believes that Issue #1 needs to be resolved now (next meeting cycle) for BDS scenario #1 as it is causing issues with test case Validations. Spirent will anyway submit CRs for this issue at the next RAN 5 meeting.

Issue #2 could be ignored for several meeting cycles but needs to be resolved eventually.

It would however seem logical to solve both issues at the same time to avoid multiple changes and re-Validations etc. However, the work to achieve this for both scenario #1 and #2, and for RF and signalling test cases, is substantial and therefore requires support from interested companies to avoid the future rejection of CRs and substantial wasted effort.

The “Other possible issues” could also be considered after a way forward on Issue #1 and #2 has been agreed. For example the date issue could be changed for tests involving BDS but not for other tests, thus minimising the amount of re-Validations necessary, or any change could be “phased in” over a couple of years, or made optional …

**Summary:**

Two main issues are presented for discussion. Interested companies are invited to discuss and agree a way forward to avoid substantial wasted effort.

**Conclusion:**

Agreement reached on the following way forward:

1. We will work to solve issue #2 for the next meeting. This will involve changing both scenario #1 and #2, for both RF and signalling (scenario #1 only) test cases. Exact detail and work share etc. will be discussed off-line between interested companies.

2. We will add a “grace period” clause into the specification to allow the existing scenarios to continue to be used for some time before re-validation is necessary. Exact period will be discussed off-line between interested companies.