3GPP TSG-RAN WG4 Meeting # 102-e R4-2205976

Electronic Meeting, 21 Feb – 03 Mar, 2022

**Source:** Huawei

**Title:** TP to TS 38.108: section 4

**Agenda Item:** 10.13.3

**Document for:** Approval

# Introduction

Based on the worksplit agreed in [1] (Issue 3-3-2), in this contribution a TP to TS 38.108 section 4 is provided for approval.

TS 38.108 skeleton in [2] was used as the starting point.

As the OTA Rx spurious emissions requirements was subject to the emission scaling in the NR specification, please refer to the related discussion paper in [3]. As multiple open issues were identified, part of the proposed TP text is captured in [] until the technical conclusion is reached.

Please note, that the FRC for demodulation performance requirements are out of scope of this TP, as those are to be captured in different agenda.

# Conclusions

**Proposal 1**: Approve the attached TP to TS 38.108.

# References

[1] R4-2203080 Way Forward on NTN\_solutions\_Part1, RAN4#101bis-e

[2] R4-2203087 Skeleton for TS 38.108 NR Satellite Access Node radio transmission and reception v0.0.1, RAN4#101bis-e

[3] R4-2205978 Discussion on the AAS architecture and consideration of the emissions scaling

# Annex A: TP to TS 38.108

*------------------------------ Modified sections ------------------------------*

# 4 General

## 4.1 Relationship with other core specifications

The present document is a single-RAT specification for a SAN, covering RF characteristics and minimum performance requirements. Conducted and radiated core requirements are defined for the SAN architectures and SAN types defined in clause 4.3.

The applicability of each requirement is described in clause 4.6.

## 4.2 Relationship between minimum requirements and test requirements

Conformance to the present specification is demonstrated by fulfilling the test requirements specified in the conformance specification TS 38.181 [x].

The minimum requirements given in this specification make no allowance for measurement uncertainty. The test specification TS 38.181 [x] define test tolerances. These test tolerances are individually calculated for each test. The test tolerances are used to relax the minimum requirements in this specification to create test requirements. For some requirements, including regulatory requirements, the test tolerance is set to zero.

The measurement results returned by the test system are compared - without any modification - against the test requirements as defined by the shared risk principle.

The shared risk principle is defined in recommendation ITU‑R M.1545 [x].

## 4.3 Requirement reference points

### 4.3.1 *SAN type 1-H*

For *SAN type 1-H*, the requirements are defined for two points of reference, signified by radiated requirements and conducted requirements.



Figure 4.3.1-1: Radiated and conducted reference points for *SAN type 1-H*

Radiated characteristics are defined over the air (OTA), where the *operating band* specific radiated interface is referred to as the *Radiated Interface Boundary* (RIB). Radiated requirements are also referred to as OTA requirements. The (spatial) characteristics in which the OTA requirements apply are detailed for each requirement.

Conducted characteristics are defined at individual or groups of *TAB connectors* at the *transceiver array boundary*, which is the conducted interface between the transceiver unit array and the composite antenna.

The transceiver unit array is part of the composite transceiver functionality generating modulated transmit signal structures and performing receiver combining and demodulation.

The transceiver unit array contains an implementation specific number of transmitter units and an implementation specific number of receiver units. Transmitter units and receiver units may be combined into transceiver units. The transmitter/receiver units have the ability to transmit/receive parallel independent modulated symbol streams.

The composite antenna contains a radio distribution network (RDN) and an antenna array. The RDN is a linear passive network which distributes the RF power generated by the transceiver unit array to the antenna array, and/or distributes the radio signals collected by the antenna array to the transceiver unit array, in an implementation specific way.

How a conducted requirement is applied to the *transceiver array boundary* is detailed in the respective requirement clause.

### 4.3.2 *SAN type 1-O*

For *SAN type 1-O* the radiated characteristics are defined over the air (OTA), where the *operating band* specific radiated interface is referred to as the *Radiated Interface Boundary* (RIB). Radiated requirements are also referred to as OTA requirements. The (spatial) characteristics in which the OTA requirements apply are detailed for each requirement.



Figure 4.3.2-1: Radiated reference points for *SAN type 1-O*

[For *SAN* *type 1-O* the transceiver unit array must contain at least 8 transmitter units and at least 8 receiver units. Transmitter units and receiver units may be combined into transceiver units. The transmitter/receiver units have the ability to transmit/receive parallel independent modulated symbol streams.]

## 4.4 Satellite Access Node classes

The requirements in this specification apply to GEO SAN, LEO-600 SAN, and LEO-1200 SAN unless otherwise stated. The associated deployment scenarios for each class are exactly the same for SAN with and without connectors.

SAN classes are defined as indicated below:

* GEO SAN is characterised by using the g*eostationary earth orbit*.
* LEO-600 is characterised by using *non-geostationary satellites* at altitude around 600 km.
* LEO-1200 is characterised by using *non-geostationary satellites* at altitude around 1200 km

## 4.5 Regional requirements

## 4.6 Applicability of minimum requirements

In table 4.6-1, the requirement applicability for each *requirement set* is defined. For each requirement, the applicable requirement clause in the specification is identified. Requirements not included in a *requirement set* is marked not applicable (NA).

Table 4.6-1: *Requirement set* applicability

|  |  |
| --- | --- |
| Requirement | Requirement set |
|  | *SAN type 1-H* | *SAN type 1-O* |
| SAN output power | 6.2 |  |
| Output power dynamics  | 6.3 |  |
| Transmit ON/OFF power  | 6.4 (NA) |  |
| Frequency error | 6.5.1 |  |
| Modulation quality | 6.5.2 |  |
| TAE | 6.5.3 (NA) |  |
| Occupied bandwidth | 6.6.2 |  |
| ACLR | 6.6.3 |  |
| Operating band unwantedemissions | 6.6.4 |  |
| Transmitter spurious emissions | 6.6.5 |  |
| Transmitter intermodulation  | 6.7 | NA |
| Reference sensitivity level | 7.2 |  |
| Dynamic range  | TBD 7.3 |  |
| In-band selectivity and blocking  | 7.4 |  |
| Out-of-band blocking  | 7.5 |  |
| Receiver spurious emissions  | 7.6 |  |
| Receiver intermodulation | 7.7 (NA) |  |
| In-channel selectivity  | 7.8 |  |
| Performance requirements | 8 |  |
| Radiated transmit power | 9.2 | 9.2 |
| OTA SAN output power |  | 9.3 |
| OTA output power dynamics |  | 9.4 |
| OTA transmit ON/OFF power |  | 9.5 (NA) |
| OTA frequency error |  | 9.6.1 |
| OTA modulation quality |  | 9.6.2 |
| OTA time alignment error |  | 9.6.3 (NA) |
| OTA occupied bandwidth |  | 9.7.2 |
| OTA ACLR | NA | 9.7.3 |
| OTA out-of-band emission |  | 9.7.4 |
| OTA transmitter spurious emission  |  | 9.7.5 |
| OTA transmitter intermodulation  |  | 9.8 (NA) |
| OTA sensitivity | 10.2 | 10.2 |
| OTA reference sensitivity level |  | TBD 10.3 |
| OTA dynamic range |  | TBD 10.4 |
| OTA in-band selectivity and blocking |  | 10.5 |
| OTA out-of-band blocking | NA | 10.6 |
| OTA receiver spurious emission  |  | 10.7 |
| OTA receiver intermodulation |  | 10.8 (NA) |
| OTA in-channel selectivity |  | 10.9 |
| Radiated performance requirements |  | 11 |

*------------------------------ End of modified section ------------------------------*