**3GPP TSG-SA5 Meeting #156 *S5-244209***

Maastricht, Netherlands, 18 Aug - 23 Aug 2024

**Source: Samsung**

**Title: NRM to support regenerative mode.**

**Document for: Approval**

**Agenda Item: 6.19.15**

# 1 Decision/action requested

***Discuss and Agree.***

# 2 References

None

# 3 Rationale

This provides the UC and solution to enhance existing NTNFunction NRM fragment to support regenerative mode of satellite operation.

# 4 Detailed proposal

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| **First Change** |

### 5.1.x Use case #3: NRM extension to support re-generative mode of operations.

#### 5.1.x.1 Description

The current NR-NRM definitions do not support NTN function in regenerative mode. It only support transparent mode of operation. In case of regenerative mode of operation the attribute nTNpLMNInfoList (in NTNFunction IOC) will overlap with the attribute pLMNId (in GNBCUCPFunction IOC).

#### 5.1.x.2 Potential requirements

**REQ-NTN-FUN-0X:** The MnS Producer should have the capability to manage re-generative mode of satellite operation.

#### 5.1.x.3 Potential solutions

##### 5.1.x.3.1 Potential solution #1: Basic NRM extensions to support re-generative mode of operations.

This solution proposes the following options to update NTNFunction NRM fragment to support re-generative mode of satellite operations.

1. Option 1

The GNBCUCPFunction should have direct association (represented by an attribute nTNFunctionRef) with the NTNFunction with 1..0..1 relation. That imply that a gNB will have a single NTNFunction configuration available to it. In other words, it will show that a particular gNB is supporting NR NTN. The attribute nTNpLMNInfoList attribute in NTNFunction IOC is to be made CM (condition mandatory) with the condition of “transparent mode of satellite communication is used.” That would imply that the attribute nTNpLMNInfoList shall only be present in case of transparent mode. In this case the attribute pLMNId (in GNBCUCPFunction IOC) will indicate non-NTN PLMN and the attribute nTNpLMNInfoList attribute (in NTNFunction IOC) will indicate NTN PLMN. This is due to the fact that in case of regenerative mode of operation the NTN specific PLMN information provided by the attribute pLMNId in GNBCUCPFunction IOC applies.

A new IOC (SatelliteInfo) is to be introduced to contain all the satellite related configuration. This IOC will be in composition relation with NTNFunction IOC with 1…\* relation. The existing EphemerisInfos attribute (part of SatelliteInfo information related with generic configuration for the satellite IOC) is added directly to the SatelliteInfo IOC making the existing EphemerisInfoSet IOC obsolete.



1. Option 2

The GNBCUCPFunction should have direct association (represented by an attribute nTNFunctionRef) with the NTNFunction with 1..0..1 relation. That imply that a gNB will have a single NTNFunction configuration available to it. In other words, it will show that a particular gNB is supporting NR NTN. The attribute nTNpLMNInfoList attribute in NTNFunction IOC is to be made CM (condition mandatory) with the condition of “transparent mode of satellite communication is used.” In other words the attribute nTNpLMNInfoList shall only be present in case of transparent mode. In this case the attribute pLMNId (in GNBCUCPFunction IOC) will indicate non-NTN PLMN and the attribute nTNpLMNInfoList attribute (in NTNFunction IOC) will indicate NTN PLMN. This is due to the fact that in case of regenerative mode of operation the NTN specific PLMN information provided by the attribute pLMNId in GNBCUCPFunction IOC applies.

The existing EphemerisInfoSet IOC stays and will have direct association with SatelliteInfo IOC. A new IOC (SatelliteInfo) is to be introduced to contain all the satellite related configuration except Ephemeris information. This IOC will be in composition relation with NTNFunction IOC with 1…\* relation.



1. Option 3

The attribute nTNpLMNInfoList attribute in NTNFunction IOC is to be made CM (condition mandatory) with the condition of “transparent mode of satellite communication is used.” In other words the attribute nTNpLMNInfoList shall only be present in case of transparent mode. In this case the attribute pLMNId (in GNBCUCPFunction IOC) will indicate non-NTN PLMN and the attribute nTNpLMNInfoList attribute (in NTNFunction IOC) will indicate NTN PLMN. This is due to the fact that in case of regenerative mode of operation the NTN specific PLMN information provided by the attribute pLMNId in GNBCUCPFunction IOC applies.

The GNBCUCPFunction should also have direct association (represented by an attribute satelliteInfoRef) with the SatelliteInfo with 1..1 relation.

A new IOC (SatelliteInfo) is to be introduced to contain all the satellite related configuration except Ephemeris information. This IOC will be in composition relation with NTNFunction IOC with 1…\* relation. The solution proposes new S&FConfigInfo to contain information related with generic configuration for the satellite.



#### 5.1.x.4 Evaluation of potential solutions

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| **Next Change** |