**3GPP TSG-SA5 Meeting #140-e *S5-216627***

**e-meeting, 15 - 24 November 2021**

**Source:** **ZTE, China Unicom**

**Title:** **Add analysis and comparison of potential solutions**

**Document for: Approval**

**Agenda Item: 6.5.7**

# 1 Decision/action requested

***The group is asked to discuss and approve the proposals.***

# 2 References

[1] 3GPP TR 28.825: “Management and orchestration; Study on Management Aspects of 5G Network Sharing”

# 3 Rationale

For the enhancement of NR NRM to support MOCN NG-RAN sharing, several solutions have been proposed and discussed for several meetings, but no consensus has been reached.

This contribution proposes to add the analysis and comparison of the proposed potential solutions as the basis of the recommendation and conclusion of the TR.

# 4 Detailed proposal

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| **1st Change** |

# X Analysis and comparison of potential solutions

## X.1 Analysis and comparison of potential solutions of enhancement of NR NRM to support NG-RAN sharing

For the enhancement of NR NRM to support NG-RAN sharing, several potential solutions have been discussed, which can be mainly classified into the following types:

**Potential solution 1**: Add new IOCs (i.e. DUCommonPart, CellCommonPart) to represent the common part and use the existing IOCs (i.e. GNBDUFunciton and NRCellDU) to represent the operator specific part, see clause 5.4.

**Potential solution 2**: Add new IOCs (i.e. OperatorDU, NROperatorCellDU) to represent the operator specific part and use the existing IOCs (i.e. GNBDUFunciton and NRCellDU) to represent the common part, the new added IOCs are name contained by GNBDUFunction; see clause 5.2.

**Potential solution 3**: Add new IOCs (i.e. LogicalDU, NRLogicalCellDU) to represent the operator specific part and use the existing IOCs (i.e. GNBDUFunciton and NRCellDU) to represent the common part, the new added IOCs are name contained by ManagedElement; see clause 5.3.

Based on the detail description of potential solutions listed above, the analysis and comparison is collected in the table below. In the table, the potential solution 2 and potential solution 3 are merged in one column because there are only small differences between these two solutions.

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|  | Scenarios/Issues | Potential solution 1 | Potential solution 2/3 |
| 1 | 1. Non-sharing scenario;
2. RAN sharing without multi-CellIds scenario
 | NRM: no changeF1: no change | NRM: no changeF1: no change |
| 2 | RAN sharing with multi- CellIds – change on NRM(s) | 1. Add new IOCs: DUCommonPart, CellCommonPart;
2. Change support qualifier of existing IOC (NRCellDU: 18 attributes)
 | 1. Add new IOCs:

Solution 2: OperatorDU, NROperatorCellDU;Solution 3: LogicalDU, NRLogicalCellDU;1. Change support qualifier of existing IOC (NRCellDU: 3 attributes, GNBDUFunction: 2 attributes)
 |
| 3 | RAN sharing with multi- CellIds – change on F1 interface（F1-C and F1-U） | No change | 2 new F1 interfaces will be added.Will be complex in the mixed network, i.e. some gNBs are shared with multi-CellIds, and the other gNBs are not. In this case, the gNBs not shared with multi-CellIds will use the F1 bewteen GNBDUFunction and GNBCUCPFuntion/ GNBCUUPFunction, and the gNBs shared with multi-CellIds will use the F1 between OperatorDU/LogicalDU and GNBCUCPFuntion/ GNBCUUPFunction or both. |
| 4 | The relationship between GNBDUFunction and RAN defined gNB and gNB-DU | No change, still follow the relationships described in clause 4.2.1.1 of TS 28.541 | Will be complex in the mixed network, i.e. some gNBs are shared with multi-CellIds, and the other gNBs are not. In this case, the gNBs not shared with multi-CellIds will still follow the relationships described in clause 4.2.1.1 of TS 28.541, and the gNBs shared with multi-CellIds will be represented by OperatorDU/LogicalDU and GNBCUCPFuntion/ GNBCUUPFunction. |
| 5 | The relationship between GNBDUFunction/NRCellDU and BWP/NRSectorCarrier | Will be complex in the mixed network, i.e. some gNBs are shared with multi-CellIds, and the other gNBs are not. In this case, the BWP/NRSectorCarrier will be name-contained by DUCommonPart, and referred by CellCommonPart. | No change. |
| 6 | The relationship between GNBDUFunction and GNBCUCPFunction/GNBCUUPFunction | No change, still follow the relationships described in clause 4.2.1.1 of TS 28.541 | Will be complex in the mixed network, i.e. some gNBs are shared with multi-CellIds, and the other gNBs are not. In this case, the gNBs not shared with multi-CellIds will still follow the relationships described in clause 4.2.1.1 of TS 28.541, and the gNBs shared with multi-CellIds will be represented by OperatorDU/LogicalDU and GNBCUCPFuntion/ GNBCUUPFunction. |
| 7 | The relationship between NRCellDU and NRCellCU | No change，the NRCellDU and NRCellCU with the same NCGI ID represent CU and DU parts of a cell | Will be complex in the mixed network, i.e. some gNBs are shared with multi-CellIds, and the other gNBs are not. In this case, the gNBs not shared with multi-CellIds will still follow the existing relationships, and the cell of gNBs shared with multi-CellIds will be represented by NROperatorCellDU/NRLogicalCellDU and NRCellCU. |
| 8 | management granularity on cell level | Have the capability to perform administrative management operation on operator specific cell level (e.g. block/unblock using administrativeState attribute)  | impossible to perform administrative management operation on NROperatorCellDU/NRLogicalCellDU level (e.g. cannot block/unblock without administrativeState attribute)  |
| 9 | Name of new added IOCs | DUCommonPart and CellCommonPart, which are not operator specific, more flexible to support both scenarios that gNB is shared by different operators and gNB is shared by different slices of same operator. | Solution 2: OperatorDU and NROperatorCellDU, which are operator specific, only applicable for the scenario gNB shared by different operatorsSolution 3: LogicalDU and NRLogicalCellDU, which are not operator specific, more flexible to support both scenarios that gNB is shared by different operators and gNB is shared by different slices of same operator. |
| 10 | Relationship of new added IOCs | Name-contianed by ManagedElementPros: 1. Provide the possibility for POPs to focus on what they concern easily and directly.
2. It is more flexible for the management of the POP specific part based on the reference approach, e.g. In hot backup scenario, the POP specific part can be switched to the standby gNB (the common part) smoothly and quickly , re-creation of the POP specific part is not needed.

Cons:1. Cannot get the relationship of the operator specific part and common part directly, the references need to be used.
 | Solution 2: OperatorDU is name-contained by GNBDUFunctionPros: 1. The relationship of the operator specific part and common part can be got directly

Cons:1. POPs cannot focus on what they concern directly.
2. It is complex to manage the POP specific part. E.g., In hot backup scenario, all the OperatorDUs need to be deleted and re-created when the switch from active gNB to standby gNB is neede.

Solution 3: LogicalDU is name-contained by ManagedElementPros: 1. Provide the possibility for POPs to focus on what they concern easily and directly.
2. It is more flexible for the management of the POP specific part based on the reference approach, e.g. In hot backup scenario, the LogicalDUs can be switched to the standby gNB (GNBDUFunction) smoothly and quickly, re-creation of LogicalDUs is not needed.

Cons:Cannot get the relationship of the LogicalDU and GNBDUFunction directly, the references need to be used. |

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| **End of Changes** |