**3GPP TSG-SA5 Meeting #156S5-243538**

**19 - 23 August 2024, Maastricht, Netherlands**

**Source: Nokia**

**Title: Rel-19 pCR TR28.867 CCL scope management solution**

**Document for: Approval**

**Agenda Item: 6.19.4**

# 1 Decision/action requested

***The group is asked to discuss and agree on the proposal.***

# 2 References

[1] 3GPP TR 28.867: “Closed control loop management” v0.3.0

# 3 Rationale

The use cases on CCL conflicts management describes scope conflicts as one of the conflicts that need to be managed. This pCR is to add a solution for managing scope conflicts through coordination interactions

# 4 Detailed proposal

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| **First Change** |

5.8 Use case 8: CCL scope management

5.8.1 Description

Each CCL should have specific scopes for which it is responsible.

The network may be assumed to be a p-dimensional space *Sp* from which subregions d*p* Є D maybe created. Accordingly, *Sp* is the full scope space whose dimension may include time, geography, etc. as showed in Table 1 while d*p* Є D can be CCL’s scope. In that respect, scope assignment is the mapping of CCLs to regions dЄD that are part of the network’s full scope S. There may be 2 types of scopes – the measurement scope where related measurements are collected and the impact or control scope which is the scope to which the CCL’s actions may have impact. The scopes for the different CCLs can be managed by the MnS consumer.

Table 5.8.1-1: Example scope-space map from which the scope of CCL may be derived.

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| Scope dimension | Granularity | Example values to be assigned |
| Time | Seconds, minutes, days | * Every hour, * Every Saturday at 2:00 hours |
| Network domains |  | * Radio, * Core, |
| Geography | Region/City (as polygon) | * City x * Street y in City x |
| Network Elements | gNB | * gNB X |
| Cells | * Cell A on gNB X |
| Terminals, e.g., types of users | * users |
| Resources | slices |  |
| Network Function | * Virtual Network Function A * Physical Network Function B |
| Transport containers (links, flows, …) | * an identifiable link, * a specific flow |
| Target Purpose | The purpose of the CCL target | * Coverage Targets, Performance Targets, Energy Efficiency Targets, Fault Management Targets, UE specific Targets |

Note: the table 5.8.1-1 is not complete and can be improved and/or extended as needed.

5.8.2 Potential Requirements

REQ-CCL-COORD-1: The 3GPP management system should support a capability enabling the MnS consumer to configure the scopes of a CCL, including the measurement scope, the control scope, and the impact scope.

Note: measurement scope is where the related measurements are collected, the control scope is where the CCL acts and the impact scope is where the CLL actions causes effects

REQ-CCL-COORD-2: The 3GPP management system should support a capability to detect, avoid and resolve conflicts among the scopes of multiple CCLs, including the measurement scope, the control scope and the impact scope.

5.8.3 Potential Solutions

5.8.3.1 Required capabilities and interactions.

To coordinate scope assignments, a CCL coordination functionality, say in Coordination CCL, needs a capability to coordinate the scope assignment across multiple CCLs, say called the scope assignment coordination capability. The scope assignment coordination capability considers a defined full scope space *Sp* and a set of scope rules to define the best scope to be assigned to each CCL. An example rule may be that the defined CCL scope should not overlap. The rules may for example be defined by an operator or can be implementation specific depending on the types of CCLs that are to be configured.

To support detection and avoidance of potential scope conflicts

* Each CCL has a scope, e.g. the assuranceScope for the ACCL. The CCL may register its scopes with the coordinationCCL which triggers an evaluation of potential conflict, i.e., whether those scopes are likely to conflict with the scopes of another CCL
* Applying the rules, the scope assignment coordination capability divides the scope space into regions such that each region is matched to a CCL in a way that maximizes fulfilment of the assignment rules defined in the scope assignment coordination capability. The For example, if the benefit is to avoid overlaps, the subregions are assigned to the different CCLs in a way that ensures no overlaps and that all the scope space has been assigned.
* A CCL may have three scopes – the measurement scope, control scope and impact scope with different rules applied for each scope. The selection of subregions of the scope space should consider the different rules for each type of scope.
* In case of a potential conflict, the new optimized subregions are selected and assigned to the individual CCLs. The scope assignment coordination capability should be enabled to configure the scopes of the CCLs.

Scope conflicts are only considered actual if their use results in negative outcomes. To support detection and resolution of actual scope conflicts

* The CCLs should monitor changes in their scope and if the scope is changed, the CCL should be able to inform the scope assignment coordination capability of any observedchanges in the scope.
* The CCL should notify differences between what was configured and the actual scopes e.g. if the considered scope for taking measurement data are affected by the actions of another CCL.
* The scope assignment coordination capability may subsequently trigger scope conflcit evaluation based on the actual scope that is notified by the CCL

5.8.3.2 Information objects to realize required capabilities and interactions

* Introduce on the CoordinationCCL the capabilities to coordinate different scopes across multiple CCLs.
  + It collects all the functionality and capabilities related to coordinating scopes among multiple CCLs to detect, avoid or resolve potential and real conflicts. So, it can be an IOC say called CCLScopeCoordination, name contained on the CoordinationCCL.
  + Introduce a datatype and corresponding attribute on the CCLScopeCoordination to represent the scope space which is to be considered by the CCLScopeCoordination to select allocations to different CCL instances.
* Introduce a dataType and corresponding attribute on the CCL to represent the scope of the CCL. The datatype may be called CCLScope. A CCL instance can have 3 scopes, which may be called measurementScope, controlScope and impactScope. The cCLScope should be configurable by the MnS consumer.
  + The CCLScope may include an indication as to whether the assigned scope is exclusive or not. An exclusive scope implies that not other function or CCL should have impacts in that scope apart from the CCL to which it has been assigned.
  + The scope should be an extension of the assuranceScope of the ACCL
* Introduce a dataType and corresponding attribute on the CCL to represent misalignments in any of the scopes of the CCL. The datatype may be called ScopeMissalignmentInfo. The ScopeMissalignmentInfo allows the CCL to indicate mis alignments in its scope and adjust the scope to remove conflicts.
  + The ScopeMissalignmentInfo includes information on the type of scope in which there are misalignments and an indication of which one is smaller – the assigned or the required scope.
  + The ScopeMissalignmentInfo may include information on scope conflicts, e.g. indication that the CCL has observed that its allocated scope being changed by another CCL or function

5.8.4 Evaluation of solutions

The potential solution described in clause 5.8.3 is a fully NRM-based approach that extends the existing NRM to realise coordination of scope assignment to CCLs. The solution allows the MnS consumer to directly configure the scope of a CCL. In addition, it allows a scope coordination functionality to interactively negotiate with the CCL on the best scope assignments based on the feedback form the CCL about the observation on the assigned scopes. The scope coordination may be accomplished by a CCLScopeCoordination as standalone functionality or as a functionality integrated into a general coordination CCL.

Therefore, the solution described in clause 5.8.3 is a feasible solution for coordination of scope assignment to CCLs.

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| **Next Change** |

# 6. Conclusions and Recommendations

* It is recommended to move on to the normative specification development phase for the use case on coordination of CCL scope assignment, the normative specification development should follow the solution outlined in clause 5.8.3.