

Closed Control Loop Management

Variant of SA5 Rel-19 23Q3 moderated discussion – closed control loop management Version 0.0.4

SA5

<https://nwm-trial.etsi.org/#/documents/8714>

Justification

Closed loop automation is the integral part of advanced network automation. This calls for zero-touch network management. The network can monitor, analyze and adapt itself. Rel-17 work on closed control loop lacks in several functionalities and can be further enhanced to develop a more agile automation technique.

The CCL can be composed by the management system implicitly (without explicit request i.e createMOI for AssuranceClosedControlLoop) based on some network events (e.g performance degradation, threshold crossing, intent creation)

The CCL can be decomposed into four parts each coming from different vendor implying the standardized interaction between them. It is to be studied where the opportunities are for multi-vendor scenarios and why. This may also include determining which SA5 defined management service can support individual steps (Monitor, Analyze, Decide and Execute) of a CCL

Several CCLs can target the same Managed Function as part of its Execute step. This conflict should be avoided and if happens should be dealt with appropriately and automatically.

The Rel-16 COSLA and Rel-17 eCOSLA defined the CCL only used for communication service assurance scenarios (including network slice and network slice subnet). It is to be studied if the CCL scope can be extended to cover other scenarios.

Several work items (e.g SON) in SA5 target network automation, the relationship between CCL and all those work items should be studied. The outcomes may include among others means to enable Closed loops to rely on or use SON functions, MDA services, etc. for the required closed loop execution. The SON functions, MDA services may also rely on or use closed loops for accomplishing their executions

Enhanced CCL Monitoring: study advanced monitoring functionalities that provide real-time insights into the performance and outcomes of CCLs. This enables operators to track the effectiveness of closed loop automation, identify areas for improvement, and make informed adjustments to CCL strategies. This may require defining new performance measurement and/or KPI.

In fully automated control loops, the Network Slice Management System operates autonomously based on predefined goals and policies, and it continually adjusts the controlled entities to meet these objectives. However, the challenge faced relates to the absence of a mechanism for consumers of the CCL system to express their satisfaction or feedback concerning a specific CCL's performance and outcomes. In many cases, consumer satisfaction is a vital metric in assessing the effectiveness and efficiency of automated CCL. It serves as a critical indicator of whether the CCLs are meeting their intended objectives and whether they align

with the expectations and requirements. Without a reliable means to gauge consumer satisfaction, we lack the necessary feedback to fine-tune and optimize CCL algorithms and parameters, ultimately unable to improve the overall performance of the automation technique.

The existing CCL mechanism has no means to enable historical CCL information that can be used to predict potential network issues and take proactive measures to prevent them. In addition, historical CCL information serves as a valuable data source for machine learning models and predictive analytics within the CCL system. It enables the system to move from a reactive mode, where it responds to current issues, to a proactive mode, where it anticipates and prevents problems based on historical trends and patterns. This proactive approach enhances network reliability, minimizes downtime, and improves the overall efficiency of network operations. The absence of historical CCL information can be a significant limitation in network automation

Objective

The objective of the study includes studying the following functionalities:

WT-1: Dynamic CCL composition: The CCL for communication service assurance (including network slice and network slice subnet) can be instantiated by the management system implicitly based on some network events (e.g performance degradation, threshold crossing, creating for slice Intent).

Feedback Form 1: Feedback for Dynamic CCL composition

<p>1 – Huawei Tech.(UK) Co.. Ltd</p> <p>Question: Does this objective focus on the existing scenario: CCL for communication service assurance? Following is the concrete wording suggestion for this objective: Dynamic CCL creation: The CCL for communication service assurance (including network slice and network slice subnet) can be created by the management system implicitly based on some network events (e.g performance degradation, threshold crossing, creating for slice Intent).</p>
<p>2 – ZTE Corporation</p> <p>Discussion should be based on S5-236126. Note that several potential scope lost without discussion</p>
<p>3 – Samsung R&D Institute UK</p> <p>@ZTE....I'm not sure what you think have lost from S5-236126. In 3B.1 is covered by "CCL Scope". 3B.2 is already covered by Rel-17 eCOSLA, what more to be done? 3B.3 is a wrong Objective. 3B.4 is covered by "Monitoring"</p>

4 – ZTE Corporation

@Samsung

Please clarify: 3B.3 is a wrong Objective. I will be all ears.

Look at Rel-18 SIDs/WIDs, “Study the potential solutions to ...” is commonly seen. also in WID eECM, there is an objective: Specify solutions to support ...

Other comments please see following objectives below.

WT-2: Multi-vendor CCL management: The CCL for communication service assurance can be disintegrated into four parts each coming from different vendor implying the standardized interaction between them. It is to be studied where the opportunities are for multi-vendor scenarios and why. This may also include determining which SA5 defined management service can support individual steps (Monitor, Analyze, Decide and Execute) of a CCL.

Feedback Form 2: Feedback for Multi-vendor CCL management

1 – Huawei Tech.(UK) Co.. Ltd

1. The comments for objective 1 also applied here. Suggest to focus on the existing CCL for communication service assurance. Without concrete scenario, it is not possible to studied where the opportunities are for multi-vendor scenarios and why.

Following is the concrete wording suggestion:

Multi-vendor CCL for management: The CCL for communication service assurance can be coming from different vendor implying the standardized interaction between them. It is to be studied where the opportunities are for multi-vendor scenarios and why. This may also include determining which SA5 defined management service can support Multi-vendor CCL for communication service assurance.

WT-3: Conflict Detection and Resolution: Several CCL can target the same Managed Function as part of its Execute step. This conflict should be avoided and if happens should be dealt with appropriately and automatically.

Feedback Form 3: Feedback for Conflict Resolution

1 – Huawei Tech.(UK) Co.. Ltd

Suggest to change the title to Conflict Detection and Resolution

WT-4: CCL scope: The Rel-16 COSLA and Rel-17 eCOSLA defined the CCL only used for communication service assurance scenarios (including network slice and network slice subnet). It is to be studied if the CCL scope can be extended to cover other scenarios e.g RAN UE throughput optimization, fault management, network optimization.

Feedback Form 4: Feedback for CCL Scope

1 – Huawei Tech.(UK) Co.. Ltd

I would suggest to give concrete CCL scenarios in this objective. For example, there are some CCL scenarios described in TS 28.100 for autonomous network, we can use those scenarios as input.

Following is the concrete wording suggestion:

CCL scope: The Rel-16 COSLA and Rel-17 eCOSLA defined the CCL only used for communication service assurance scenarios (including network slice and network slice subnet). It is to be studied if the CCL scope can be extended to cover following scenarios: RAN UE throughput optimization, fault management.

2 – ZTE Corporation

I agree with Huawei’s comments. Another suggestion:

this objective should be No.1 or No.2 objective of this topic. Fault management/Network optimization ever-lasting headache for operators. now CCL only for communication service assurance scenario, for this trendy tech, we’d better put it before fancy/look-beautiful objectives to study from the operator’s most emergent and important issues.

WT-5: Management Coordination: Study the relation between closed loops and other management features e.g. SON functions, MDA.

Feedback Form 5: Feedback for ”Management Coordination”

1 – Huawei Tech.(UK) Co.. Ltd

What’s the expected outcome for this objective? Does this depend on the outcome of objective 4? If the intention is to generally describe the concept of relation between closed loops and SON function, this is already covered by existing TS 28.313. Suggest to remove this objective.

2 – Nokia

The outcomes would be services that enable the closed loop to rely on/use SON functions in their execution or vice-versa. Accordingly, we can add these statements: ”The outcomes may include among others means to enable Closed loops to rely on or use SON functions, MDA services, etc. for the required closed loop execution. The SON functions, MDA services may also rely on or use closed loops for accomplishing their executions.”

3 – ZTE Corporation

In order not trapped into chaos and make CCL clearer, suggest putting this objective forward to top3, because we have several loops:

MDA(Observation->Analytics->Decision->Execution)

SON(Monitoring->Analysis-Decision->Execution->Evaluation)

ANL(Awareness->Analysis->Decision->Execution)

<p>CCL for assurance(Monitor->Analytics->Decide->Execute) Intent(Monitor->Analytic->Decide->Execute) Look at these loops, even the most similar loops have tiny difference. This is very important to study whether enhanced CCL have a generalized loop.</p>
<p>4 – Samsung R&D Institute UK IS it really necessary to move this to Top 3? I think last Objective as as important as the 1st</p>
<p>5 – Samsung R&D Institute UK @Nokia: thanks for the text. I have added it to the justification where i think it belongs</p>

Monitoring: Study the advanced monitoring functionalities that provide real-time insights into the performance and outcomes of CCLs. This will enable ascertaining the effectiveness of the CCL.

Feedback Form 6: Feedback for "Monitoring"

WT-7: Other Enhancements: Study other probable measures (e.g CCL feedback, historical learning) to enhance the capabilities of a CCL for better and efficient networks.

Feedback Form 7: Feedback for Other Enhancements

<p>1 – TELEFONICA S.A. what do you mean with feedback loop? how different is collaborative learning from federating learning, or are both the same?</p>

TU estimates and dependencies

Table 1: TU estimates and dependencies

Work Task ID	TU Estimate (Study)	TU Estimate (Normative)	RAN Dependency (Yes/No/Maybe)	Inter Work Tasks Dependency
WT-1	0.6	0.4	No	No
WT-2	0.6	0.4	No	No

WT-3	0.6	0.4	No	No
WT-4	0.6	0.4	No	No
WT-5	0.3	0.2	No	No
WT-6	0.3	0.2	No	No
WT-7	0.6	0.4	No	No

Summary: Commenst received from Huawei, Nokia, ZTE. All comments are taken care of. It is recommended to agree on the submitted SID.