SA5 Rel-19 23Q3 moderated discussion – Effectiveness of Zero-touch Orchestration and Management - Version 0.0.3

SA5

https://nwm-trial.etsi.org/#/documents/8699

1 References

[1] S5-236126 “SA5 Collection of Rel-19 potential topics”.

[2] ETSI GS ZSM 001 “Zero-touch network and Service Management (ZSM); Requirements based on documented scenarios”.

[3] ETSI GS ZSM 002 “Zero-touch network and Service Management (ZSM); Reference Architecture”.

[4] ETSI GS ZSM 003: ”Zero-touch network and Service Management (ZSM); End to end

management and orchestration of network slicing”.

[5] ETSI GS ZSM 012: ”Zero-touch network and Service Management (ZSM); Enablers for Artificial Intelligence-based Network and Service Automation”.

[6] TM Forum “A white paper on autonomous networks; Empowering digital transformation – from strategy to implementation”.

[7] TM Forum IG1256 “Autonomous Network Effectiveness Indicators”.

[8] 3GPP Draft TR 28.909 V0.3.0 ”Study on evaluation of autonomous network levels”.

2 Proposal in SA5#150

Topic # and name in [1]: 4. Effectiveness of Zero-touch Orchestration and Management (EZTO)

Potential scope includes:

(1) Coordinate with other SDOs or industry parties on zero-touch orchestration and management. Including but not limited to smart slicing management, close-loop autonomous services, and intent-driven services.

(2) Identify potential alignment issues in requirements of smart slicing management, close-loop autonomous services, and intent-driven services, and propose solutions.

(3) Study the concept of the effectiveness of zero-touch orchestration and management

(4) Study the methods for the effectiveness monitoring.

(5) Define measurements and indicators for the effectiveness monitoring.

Potential collaboration groups and related topics:

3 Discussion

3.1 Justification

In ETSI ISG ZSM, the concept of zero-touch network and service management is introduced. Requirements based on documented scenarios are specified in ETSI GS ZSM 001 [2], and the reference architecture for the end-to-end Zero-touch network and Service Management (ZSM) framework based on ETSI GS ZSM 001 [2] is defined and described in ETSI GS ZSM 002 [3]. The E2E network slicing management solutions and related management interfaces are specified in ETSI GS ZSM 003 [4]. The scenarios and requirements for AI-enabled zero-touch automated network and service management are provided in [5].

In TM Forum, the vision of autonomous network is described in the white paper [6] as "Autonomous Networks aim to provide zero-wait, zero-touch and zero-trouble customer experience for vertical industry users and consumers through intelligent infrastructure, agile operations and all-inclusive services of fully automated networks and ICT." And with this vision, autonomous networks are expected to support self-service, self-fulfilling and self-assuring in TM Forum. To reflect the effect of an autonomous network and help CSPs identify what benefits they could receive by upgrading their telecommunications system with more autonomy capabilities, Key Effectiveness Indicators (KEIs) are introduced in TM Forum IG1256 [7].

In Linux Foundation, to achieve the zero-touch deployment of network slicing, E2E network slicing design and installation, including RAN and core sub-net slicing design and installation is demonstrated in the project ONAP.

Similar with the concept and idea of zero-touch network and service management studied in the SDOs or industry parties above, 3GPP also defined many intelligence and automation related management features e.g. SON, MDA, AI/ML management, IDMS, CCL with the aims of achieving self-configuration, self-monitoring, self-healing, and self-optimization.

Similar with KEIs introduced in TM Forum, in 3GPP SA5, the Rel-18 SI (FS_ANLEVA) starts to study the concept of KEI and use case specific KEIs, the latest study output is captured in Draft TR 28.909 [8]. As described in clause 4.1.4 in Draft TR 28.909 [8], after introducing autonomy capabilities to the 3GPP management system, less human intervention is needed in a management workflow. With the help of less or even no human intervention (zero-touch), some technical effects can be acquired which are beneficial to the NOPs, such as:

- Reducing OPEX spend on human effort in the management workflow.

- Reducing loss or increasing profits by speed up the E2E management workflow (e.g. speed up the workflow of cell failure identification and recovery can reduce cost from customer complaints and increase profits by carrying more UE traffic).

- Improving network and service performance by achieving more refined network management and control with limited human resources.

Existing KPIs defined in 3GPP SA5 can be used to reflect the effect of introducing intelligence and automation related management features from performance improving perspective. However, KPIs can not reflect the effect from zero-touch orchestration and management perspective which aims to self-configuration, self-monitoring, self-healing, and self-optimization. For example, no existing KPI can reflect the automation

ratio (degree of self-X) in a management workflow, and no existing KPI can reflect the duration of a management workflow.

Similar as KPIs can help NOPs to evaluate the performance of their network and thus to tell them when (KPI deteriorates to certain value) to trigger the network optimization, KEIs can help NOPs to evaluate the effect after introducing autonomy capabilities to their network, and thus to tell them when (KEI value does not meet expectations) to trigger autonomy capability upgrading. Take fault management use case as an example, with a KEI specified to reflect the duration cost on RCA, if the KEI does not meet expectations in some scenario or in some specific area, this KEI can be used to trigger the RCA related AI/ML model retraining. NOTE: there could be other indicators that can be used to trigger AI/ML model retraining from other perspective (e.g. accuracy indicators from perspective accurate analysis).

Therefore, to understand how to define the KEIs to reflect the effectiveness of zero-touch orchestration and management for 3GPP network, measurements and indicators for the effectiveness monitoring, management capabilities and potential requirements to support the effectiveness monitoring need to be studied in 3GPP SA5.

AI/ML is one of the key technologies to enable zero-touch orchestration and management (ZTO). SA5 has defined many capabilities for AI/ML management. However, to achieve end-to-end automation and zero-touch, the collaboration of individual AI/ML capabilities is necessary to be considered. The orchestration and management of AI/ML flows needs to be investigated.

Similar with the vision of autonomous networks defined in TM Forum, ZTO is also expected to support self-service, self-fulfilling and self-assuring, especially in the scenario of E2E network slicing management. And sometimes, the customer's requirements on E2E network slice are dynamic, which may impact multiple network domains such as RAN, CN. Therefore, interaction and assurance for customer-centric dynamic requirements need to be studied, including but not limited to dynamic requirements identification, decomposition, updates, and feedback.

Feedback Form 1: Comments on justification

1 – Nokia

This is not a justification to study anything specific. It is simply a statement that ZTO is necessary as it is being studied by many SDOs. And yet as noted therein SA5 has and is also specifying features that contribute to ZTO. as such motivating ZTO as a collection of features is motivating something that is already happening. Meanwhile, effectiveness itself is has not been motivated and it is not even clear what that means.

2 – Ericsson LM

Agree fully with Nokia about the fact that the text gives a background of where zero-touch, SON, Closed loop etc have been in focus or worked with. From that how to you come to conclusion of that effectiveness of zero-touch "has" to be investigated in SA5?

3 – TELEFONICA S.A.

This is a survey (SoTA) ather than a justification (motivation to start working on sth).

4 – Samsung R&D Institute UK

As i understand, this is about defining network KEIs. We need to understand how a KEI will be different than KPI. Please provide an example.

5 – China Mobile Com. Corporation

Thanks for your comments, and sorry for my late reply.

Reply to comments #1,2,3:

Justification and motivation for effectiveness of zero-touch is added in paragraph 5 to 8 above in version 0.0.3. Please find and review.

Reply to comments #4:

Yes, it proposes to define KEIs. Some examples are provided above in paragraph 5 to 7 in version 0.0.3. Please find and review.

3.2 Objective

This study item aims to investigate and study the following objectives from the effectiveness of zero-touch orchestration and management perspective:

~~1) Investigate zero-touch orchestration & management (ZTO) and the effectiveness of ZTO related works in other SDOs or industry parties (including but not limited to TM Forum, ETSI ISG ZSM, LFN ONAP).~~

Feedback Form 2: Comments on objective 1)

1 – Nokia

As written above in the description, there are so many features that contribute to ZTO. so what exactly shall be evaluated? And there are so many approaches that have been taken by the different SDO. How shall we evaluate all those approaches. What specific issues do we need to study?

2 – Ericsson LM

Actually we need an argument first for why we want to do this evaluation? Please describe a problem or use case that trigger this investigation.

3 – China Mobile Com. Corporation

Since ZTO related work in other SDOs is just for background information and reference, not the main objective of this study, I suggest to remove this objective.

~~2) Identify which of SA5 defined intelligence and automation related management features could be used to support ZTO, potential features may include SON, MDA, AI/ML management, IDMS, CCL.~~

Feedback Form 3:

1 – Nokia

Is this really necessary? don't we already those features - the grouping is called intelligence and automation! And how does that help? what does it imply for specifications?

2 – Ericsson LM

I guess we are back to valuate autonomy of features. Why this is needed?

3 – China Mobile Com. Corporation

It is ok to remove this objective from this study.

3) Measurements and indicators for the effectiveness of ZTO for the scenarios, including but not limited to:

- E2E network slicing management
- Radio network coverage optimization
- RAN UE throughput optimization
- Fault management

Feedback Form 4: Comments on objective 3)

1 – Nokia

What does it mean to have methods for monitoring? and shall we then define methods for each and every feature as listed above? if we have metrics for measuring a feature - say coverage which metrics we use for optimization, do we need really need a separate method for measuring effectiveness of coverage optimization?

2 – Ericsson LM

there are KPIs and metrics for monitoring performance of a feature. Here you want to compare a more intelligent function. Compared to what? To manual support? Is it within a single vendor or in a multivendor scenario? I guess we are back to ANL discussions.

3 – China Mobile Com. Corporation

Reply to comments#1:

Revised the ”Methods for monitoring” to ”Measurements and indicators for” in this objective.

And regarding to comments#1, due to lack of justification and examples in version 0.0.2, there is a misunderstanding from Nokia, sorry for that.

The measurements and indicators is not to reflect the effectiveness of coverage optimization, but to reflect the effectiveness of zero-touch (self-) coverage optimization. The difference is that the former is measured from the perspective of optimizing performance, while the latter is measured from the perspective of automation or degree of zero-touch. Some examples and clarification is added in the justification clause.

Reply to comments #2:

The proposed measurements and indicators for effectiveness is not for comparison. It is for NOPs to evaluate the effect after introducing autonomy capabilities to see whether it meets NOPs expections and whether there is a need of upgrading or update.

It is a little similar with our discussions in Rel-18 FS_ANLEVA, but it is not for AN level evaluation. It is for effectiveness evaluation. Please review the justification clause in version 0.0.3, it may help for clarifications.

~~4) Measurements and indicators for the effectiveness monitoring.~~

Feedback Form 5: Comments on objective 4)

1 – Nokia Measurements and indicators for the effectiveness monitoring **of what**? How are these different from all the KPIs and counters we have already defined in SA5?
2 – Ericsson LM See my comments on previous (3)
3 – China Mobile Com. Corporation Suggest to merge this objective to objective 3). And please refer to my reply in objective 3).

5) Management ~~and orchestration~~ capabilities and potential requirements to support the effectiveness ~~monitoring~~measurement.

Feedback Form 6: Comments on objective 5)

1 – Nokia This is orchestration of **what**? what is effective monitoring?
2 – Ericsson LM to achieve what? you monitor a feature and it shows bad results, what do you do then? What is the target role for this monitoring an how it is related to SA5? Again what problem do you want to solve?
3 – China Mobile Com. Corporation Reply to comments#1: Revised in version 0.0.3 as above. Reply to comments #2: Please refer to the paragraph#7 in the justification clause in version 0.0.3.

6) Use cases, potential requirements, and possible solutions for E2E AI flow management and orchestration capabilities to improve the effectiveness of ZTO.

- Definition of AI flow management and orchestration.
- Methods for orchestrating and managing AI flows to support ZTO.

Feedback Form 7: Comments on objective 6)

1 – Nokia what is AI flow management? I can see one target is to provide a definition, so how are we going to study something that is not even defined? we could as well use any term and open a study on it. How is managing

AI flows different wat we are already doing on management of ML?

2 – Ericsson LM

I cannot add new comments on this other than I cannot understand and identify this as a use case for SA5

3 – China Mobile Com. Corporation

Please wait for reply from China Telecom.

7) Capabilities for customer-centric dynamic requirements interaction and assurance to support ZTO.

- Customer-centric dynamic requirements identification, decomposition, and updates.
- E2E QoE assurance through ZTO.

Feedback Form 8: Comments on objective 7)

1 – Nokia

Should SA5 specify customer interactions? What anyway are customer-centric dynamic requirements? How do these differ from customer intents - given the inclusion of decomposition? How is ”E2E QoE assurance through ZTO” different from other on going work on ”E2E QoE assurance”?

2 – Ericsson LM

same thinking as Nokia

3 – China Mobile Com. Corporation

Please wait for reply from China Telecom.

Feedback Form 9: Which of the above Objectives should be in scope of Rel-19?

1 – Nokia

None of the objectives is adequately defined or justified. Noe of them should be in scope.

2 – Ericsson LM

If you identify a single use case or problem to justify such activity then we can discuss

3 – China Mobile Com. Corporation

Please check the justification and revised objectives in version 0.0.3.

Feedback Form 10: Can any of the Objectives above be combined/merged?

1 – Ericsson LM

Lack of justification make it difficult for further comments.

2 – China Mobile Com. Corporation

Please check the justification in version 0.0.3.

Feedback Form 11: Should any of the Objectives above be reworded? If so, propose the required rewording.

1 – Ericsson LM

As a general feedback, I cannot improve a text that I do not agree with. Sorry.

2 – China Mobile Com. Corporation

Please check the justification and revised objectives in version 0.0.3.

Feedback Form 12: Are there any additional Objectives that should be part of Rel-19?

Feedback Form 13: If there are any additional Objectives required, describe them

The study will coordinate with other SDOs or industry parties (e.g. TM Forum, ETSI ISG ZSM, LFN-ONAP) on zero-touch orchestration and management when needed.

Feedback Form 14: Comments on coordination between SDOs

3.3 Dependencies

These feedback forms will help define the dependencies between Objectives, dependencies of Objectives on other Working Groups (SA, RAN or CT), and dependencies on other potential SA5 Rel-19 SIDs and WIDs. The Objectives can be from the list in section 3.2 or any additional Objectives identified in the feedback in section 3.2.

Feedback Form 15: Describe the dependencies that any of the Objectives have on other 3GPP Working Groups or between the Objectives

3.4 Partitioning

These questions will help determine whether there is one, or more than one, Study Item, Work Item or TEI-19 item to be created from these Objectives.

Feedback Form 16: Should there be more than one SID, WID or TEI-19 item created based on the Objectives?

Feedback Form 17: If the answer to the above question is yes, describe how the Objectives should be partitioned into different items.

4 Summary

This chapter is to analyze and make synthetic proposals regarding the feedbacks on Objectives based on input to and outcome of the Objectives (section 2.2).