TELECOM INFRA PROJECT

OSS Automation Functional Requirements Document

Network as a Service (NaaS) Solutions Group

Date December 2021

Document version: v1.0

Confidentiality Level: GREEN [Public Access

Authors

Dahyr Jose Vergara Suarez

NTT Data

dahyr.jose.vergara.suarez@nttdata.com

Paul Choiseul

American Tower Corp

paul.choiseul@americantower.com

Contributors

Renan Ruiz
Consultant
rruizm@hotmail.com

Philip Liddell
Meta Connectivity
pliddell@fb.com

TIP Document License

By using and/or copying this document, or the TIP document from which this statement is linked, you (the licensee) agree that you have read, understood, and will comply with the following terms and conditions:

Permission to copy, display and distribute the contents of this document, or the TIP document from which this statement is linked, in any medium for any purpose and without fee or royalty is hereby granted under the copyrights of TIP and its Contributors, provided that you include the following on ALL copies of the document, or portions thereof, that you use:

1. A link or URL to the original TIP document.

2. The pre-existing copyright notice of the original author, or if it doesn't exist, a notice (hypertext is preferred, but a textual representation is permitted) of the form: "Copyright © <<year>>, TIP and its Contributors. All rights Reserved"

3. When space permits, inclusion of the full text of this License should be provided. We request that authorship attribution be provided in any software, documents, or other items or products that you create pursuant to the implementation of the contents of this document, or any portion thereof.

No right to create modifications or derivatives of TIP documents is granted pursuant to this License. except as follows: To facilitate implementation of software or specifications that may be the subject of this document, anyone may prepare and distribute derivative works and portions of this document in such implementations, in supporting materials accompanying the implementations, PROVIDED that all such materials include the copyright notice above and this License. HOWEVER, the publication of derivative works of this document for any other purpose is expressly prohibited.

For the avoidance of doubt, Software and Specifications, as those terms are defined in TIP's Organizational Documents (which may be accessed at https://telecominfraproject.com/organizational-documents/), and components thereof incorporated into the Document are licensed in accordance with the applicable Organizational Document(s).

Disclaimers

THIS DOCUMENT IS PROVIDED "AS IS," AND TIP MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, OR TITLE; THAT THE CONTENTS OF THE DOCUMENT ARE SUITABLE FOR ANY PURPOSE; NOR THAT THE IMPLEMENTATION OF SUCH CONTENTS WILL NOT INFRINGE ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADEMARKS OR OTHER RIGHTS.

TIP WILL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF ANY USE OF THE DOCUMENT OR THE PERFORMANCE OR IMPLEMENTATION OF THE CONTENTS THEREOF.

The name or trademarks of TIP may NOT be used in advertising or publicity pertaining to this document or its contents without specific, written prior permission. Title to copyright in this document will at all times remain with TIP and its Contributors.
This TIP Document License is based, with permission from the W3C, on the W3C Document License which may be found at https://www.w3.org/Consortium/Legal/2015/doc-license.html.

Change Tracking

Date	Revision	Author(s)	Comment
05/31/2021	v0.1	Dahyr Vergara, Paul Choiseul	Initial document for requirements
06/15/2021	V0.2	Philip Liddell	General comments
09/06/2021	V0.3	Dahyr Vergara	Document refactoring and detailing functional requirements
09/26/2021	V0.4	Dahyr Vergara	Functional requirements: modified inventory, included configuration, and included data sharing
12/06/2021	V0.5	Philip Liddell	General editing, formatting and updates to functional requirements
12/14/2021	V1.0		

Table of Contents

1

Introduction

1. Introduction

A group of TIP participants seeks the continued development of the innovative Network-as-a-Service (NaaS) business model. NaaS is an emerging business model enabling advanced forms of network/infrastructure-sharing which involves a 3rd party neutral-host (NaaSCo) owning and operating a dedicated wholesale network that is shared by the retail service providers (VNOs) through wholesale agreements. Common NaaS use cases include greenfield rural deployments in hard-to-reach locations, access and distribution network sharing in rugged environments and over very long distances, and brownfield networks in dense urban environments where it is impractical to build multiple networks.

For the purposes of this document, it is expected that the NaaSCo owns and operates the shared Access Network (AN) which interfaces with multiple core networks through transport networks. Core and transport networks can be owned and operated by MNOs or by NaaSCos. To operate such networks, NaaSCos require OSS Automation solutions, such as workforce management, inventory, fault management, configuration management, performance reporting, etc., with robust integration options and automation being key components of the architecture.

This document defines the functional requirements for OSS Automation. The OSS Automation platform is intended to enable NaaSCos to deploy an efficient and scalable OSS architecture that easily and safely integrates to the different networks and network slices (NS) to simplify operation, while enabling clean integration with VNOs to simplify the operational processes between the two organizations.

The OSS Automation platform provides the following benefits for NaaSCos and VNOs:

- Cost reduction through automated operations
- Trust in transactions and information sharing between companies
- Future-proof OSS architecture

1.1 Objectives

Provide the list of functional requirements required for NaaSCos to achieve cost-effective operation.

1.2 Scope

This document covers the requirements from the perspective of both the VNO and the NaaSCo with a specific emphasis on integration between the two companies.

It is not in the scope to discuss requirements regarding vertical industries or specific applications.

1.3 Document structure

The document is structured as follows:

- Chapter 1: Introduction
- Chapter 2: Functional requirements
- Chapter 3: Next Steps

2

Functional Requirements

2. Functional Requirements

These functional requirements are based on the needs of both the NaaSCo and the VNO and are broken down into the following sections:

1. Integration Requirements
2. Feature and Functionality Requirements

2.1 Integration Requirements

Multi-Vendor: Support integration with multiple vendors/solutions.

Multi-Tenant: Support integration with multiple VNOs.

Developer Kits: Support for automation functionalities and developers' kits (SDK).

NaaS Portal: Create a fast-track approach via a simple web interface, which enables smaller VNOs to handle their main processes directly without any integration.

Standards Based: Simplify the integration between NaaSCo and VNO through the implementation of relevant standards and highly proven technologies, such as TMF Open API, 3GPP for Open RAN or Open Broadband and ETSI.

Messaging: Provide a simple, fast interface to make requests such as service orders, trouble tickets, status updates, etc. Provide a communication protocol to handle the partial or end responses.

Marketplace: Make NaaSCo assets available to the VNO through a marketplace to enhance trust, security, and transparency.

Service templates: Enable the use of service-oriented templates so the NaaSCo can expose the kinds of services that could be provided to the VNO, as well as the definition of relevant parameters for proper fulfillment of any service request.

Equipment access: Some VNOs will require access to user equipment operations (i.e., reach HGU through OLT commands or via API).

Operational data: Performance, fault and configuration data must be shared between NaaSCo and VNO to support technical and business operations, SLA reporting and compliance and regulatory reporting and compliance.

2.2 Feature and Functionality Requirements

Service and Resource Orchestration: Solutions that help in the implementation of more automated and fluid processes are required. Catalog-driven solutions can also be considered depending on the level of automation that they provide.

Service and Inventory Catalogs: Service catalogs and inventory catalogs should be granular enough to build composites, so the VNO can make desired requests.

Order Automation: Customer and service orders should be automated, avoiding manual processes whenever possible. Where full automation is not possible, common procedures such as work order creation, job assigning or specific analyses, should be performed automatically.

Inventory Information Sharing: Define protocols to enable transparent sharing of inventory information among companies.

Inventories and Topology: Physical and logical resources must be supported for both wireless and wireline networks. Virtualization components also must be supported, including bare-metal infrastructure, virtualization software, orchestration components and NFV/SDN elements.

Inventory Federation: Provide a single view of all network elements including inside plant, outside plant, network equipment, and related components. With this, NaaSCo and VNO can have access to topology, locations, and geographical data to perform service fulfillment and assurance processes and automation.

Configuration Repository: Provide a repository that contains all network and platform configurations and configuration changes. Access to this data must be simplified for the different automated or manual processes that require it. To make configuration management (CM) related processes more efficient, accessibility to massive amounts of parameters in a single query should be provided and the data must be kept current.

Performance Data Collection and Processing: Generate metrics, PI, KPI and KQI based on network counters, their enrichment, and the ability to filter, group and consolidate the source data.

Performance Analytics: Timeseries analytics are required to perform trend analysis, busy hour calculations, and histograms and support Complex Event Processing (CEP), anomaly detection, and metric forecasting.

Service Quality and Service Level Handling: Processing of metrics and indicators to provide a view about how the network is performing versus SLAs and to provide inputs for capacity management and optimization.

Performance, Quality, and Service Level Data Sharing: Delivery of data and consolidated reports needs to be delivered to internal and external stakeholders, which involves the different VNOs that use the network. The data could be delivered via files or specialized interfaces.

Fault Event Collection and Processing: Capture events generated by infrastructure components representing fails, errors, warnings, or notifications relevant for the operational processes.

Fault Analytics: Events need to be processed, correlated, and stored. Once stored, events can be used to perform a wide series of procedures to find information relevant to operate the network, such as identifying critical fails, determining root causes, or associating problems to external conditions. Even while in transit, events can be mediated and processed to build real-time or near-real-time use cases, which are often useful to predict and prescribe troublesome situations, react quickly to known problems or diagnose based on external data.

Incident and Problem: Faults can become incidents or problems. For NaaSCos it is key to enable the detection and registration of incidents and problems in an automated way, which will make operational processes leaner and cost-effective. Integration with tools for ticket managers or workforce managers must be considered, while maintaining registry and contextual data of the incidents and problems independently for automation purposes.

Fault, Incident, and Problem Data Sharing: Raw and processed events must be delivered to different stakeholders according to operational agreements. NaaSCos must be able to deliver VNO faults, incidents, and problems in a secure and confidential manner.

Network Slicing: NaaSCos must handle virtualization and multi-domain end to end Network Slicing. The solution must provide ways to communicate with network slicing components to aid in the implementation of automation flows. Relevant standards such as TM Forum, 3gpp or ETSI should be considered as pre-built integrations.

Infrastructure: Solutions are required to be implemented in both public or private clouds and applications must be built cloud native. Additionally, it is desired to have a GitOps strategy for infrastructure components deployment. Edge Computing must be considered as part of the architecture to enable real-time or near-real-time use cases.

Security and Administration: OSS Automation solutions must be delivered with high security standards.

Data Sharing: The OSS Automation solution must have simplified and automated capabilities to share information about each transaction.

3

Next steps

3. Next steps

The following next steps will be led by the OSS Automation Subgroup:

- Further refine the functional requirements based on feedback from existing and future group members
- Define concrete and relevant use cases to be used during definition of the architecture
- Further define security requirements
- Define specific technical requirements that can be validated in lab and field trials

Glossary

FM: Fault Management

NaaS: Network as a Service

PM: Performance Management

OSS: Operational Support Systems

SPM: Service Problem Management

SQM: Service Quality Management

VNO: Virtual Network Operator

MNO: Mobile Network Operator