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GROUP SPECIFICATION

Network Functions Virtualisation (NFV) Release 6; Architecture; Part 2: Functional and Non-Functional Requirements for Telco Cloud

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Foreword

This Group Specification (GS) has been produced by ETSI Industry Specification Group (ISG) Network Functions Virtualisation (NFV).

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Introduction

The evolution of Network Functions Virtualisation (NFV) towards Cloud-native and AI-Native technologies has led to the emergence of Telco Cloud platforms as the foundation for deploying, operating, and managing network functions and applications deployments across heterogeneous and distributed cloud environments.

The Telco Cloud, defined in NFV Release 6 in ETSI GS NFV 008-1 [1], provides a common architectural framework that enables leveraging multi-cloud and multi-site infrastructures while meeting stringent telecom-grade requirements.

Functional and non-functional requirements of the Telco Cloud architectural framework establish a common baseline for the capabilities, behaviours, and quality attributes expected from Telco Cloud functions and their interactions, ensuring consistency, interoperability, and alignment across implementations:

- The functional requirements define the mandatory capabilities that the Telco Cloud functions can provide to support the automated and coordinated lifecycle management of Telco Cloud Applications (TCAs) and Telco Cloud Infrastructure (TCI) resources. This includes orchestration, intent management, lifecycle management, telemetry, configuration, repository management, and security-related functions spanning platform and infrastructure domains.

- The non-functional requirements define the qualitative attributes of the Telco Cloud, such as reliability, scalability, availability, security, and interoperability. These requirements ensure that the Telco Cloud can support mission-critical telecom workloads, operate efficiently at scale, and integrate seamlessly with existing OSS/BSS systems and external cloud environments.

The requirements specified in the present document are intended to be technology-agnostic and implementation-independent. They provide guidance to standards developers, system architects, vendors, and operators on the design, development, and deployment of Telco Cloud solutions that are aligned with Telco Cloud architectural principles and capable of supporting current and future telecom service requirements.

1 Scope

The present document specifies the functional and non-functional requirements of the Telco Cloud architectural framework. The scope covers the architectural capabilities and behaviours necessary to manage the lifecycle and observability of both Telco Cloud Applications (TCAs) and Telco Cloud infrastructure resources across multi-domain and multi-cloud computing environments.

In particular, the present document specifies:

- Functional Requirements of the Telco Cloud architectural framework, which define the capabilities that the architecture and its constituent components provide to enable the automated, and coordinated management of Telco Cloud Applications, services, and resources.
- Non-Functional Requirements of the Telco Cloud architectural framework, which define the qualitative attributes - such as scalability, reliability, security, and interoperability - that the architecture's components support to ensure efficient and dependable operation in diverse deployment environments.

NOTE: In this version of the present document, non-functional requirements are not specified.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found in the ETSI docbox.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long-term validity.

The following referenced documents are necessary for the application of the present document.

[1] ETSI GS NFV 008-1: "Network Functions Virtualisation (NFV) Release 6; Architecture; Part 1: Architectural framework for Telco Cloud".

[2] ETSI GS NFV-IFA 027: "Network Functions Virtualisation (NFV) Release 5; Management and Orchestration; Performance Measurements Specification".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents may be useful in implementing an ETSI deliverable or add to the reader's understanding, but are not required for conformance to the present document.

[i.1] ETSI GR NFV 003: "Network Functions Virtualisation (NFV); Terminology for Main Concepts in NFV".

[i.2] ETSI GS NFV-IFA 049: "Network Functions Virtualisation (NFV) Release 5; Architectural Framework; VNF generic OAM functions and other PaaS Services specification".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI GR NFV 003 [i.1] apply.

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI GR NFV 003 [i.1] and the following apply.

NOTE: An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in ETSI GR NFV 003 [i.1].

TCAD: Telco Cloud Application Descriptor

4 Telco Cloud Functional Requirements

4.1 General functional requirements

NOTE: In the present document, there are no general functional requirements described.

4.2 Functional requirements for Telco Cloud functions

4.2.1 Telco Cloud Orchestration Functions

4.2.1.1 Functional requirements for TC Management Data Analytics (TC-MDA) function

4.2.1.1.1 Functional requirements for data analytics

Table 4.2.1.1.1-1: Functional requirements for data analytics

Numbering	Functional requirements description
Mda.001	The TC-MDA function shall support the capability to perform data analytics on a certain type. See note.
Mda.002	The TC-MDA function shall support the capability to manage subscriptions to notifications about events related to data analytics processing.
Mda.003	The TC-MDA function shall support the capability to provide notifications about events related to data analytics processing.
Mda.004	The TC-MDA function shall support the capability to collect alarm notifications about objects managed by Telco Cloud functions.
Mda.005	The TC-MDA function shall support the capability to collect performance measurements about objects managed by Telco Cloud components and services.
Mda.006	The TC-MDA function shall support the capability to collect runtime information about objects managed by Telco Cloud functions.
Mda.007	The TC-MDA function shall support the capability to collect metrics (and their analysis), logs (and their analysis) and runtime information exposed by TCI-TM about the infrastructure resources and/or by TCA-TM for TCAs to which these resources are associated.
Mda.008	The TC-MDA function shall support the capability to provide the analytics output to MDA consumers per request on a certain analytics subject.
NOTE: The TC-MDA function may be assisted by AI/ML models to perform data analytics.	

4.2.1.2 Functional requirements for TC Intent Management (TC-IntM) function

4.2.1.2.1 General considerations

The following statement on the scope of the Telco Cloud Intent Management (TC-IntM) function applies to all intent management-related requirements:

- The Intent Management is responsible for fulfilling the Telco Cloud intent request.

4.2.1.2.2 Functional requirements for Intent Management service

Table 4.2.1.2.2-1: Functional requirements for Intent Management service

Numbering	Functional requirements description
Im.001	The TC-IntM function shall support the capability to translate the received expectation of the intent to corresponding Telco Cloud operation(s).
Im.002	The TC-IntM function shall support the capability to interact with Telco Cloud functions to execute the intent.
Im.003	The TC-IntM function shall support the capability to monitor intent fulfilment status to evaluate whether the intent expectation is fulfilled and to notify the fulfilment information via intent report to the OSS/BSS.
Im.004	The TC-IntM function shall support the capability to collect metrics (and their analysis), logs (and their analysis) and runtime information exposed by the TCI-TM about the infrastructure resources and/or TCA-TM for TCAs to which they are associated.
Im.005	The TC-IntM function shall support the capability to interact with Telco Cloud Platform and Telco Cloud Infrastructure functions to execute the intent.
Im.006	The TC-IntM function shall support the capability to provide an intent report to the intent owner (e.g. OSS/BSS).

4.2.2 Telco Cloud Platform Functions

4.2.2.1 Functional requirements for TC Application Lifecycle Management (TCA-LCM) function

4.2.2.1.1 Functional requirements for TCA lifecycle management

NOTE 1: Not all TCAs support all the TCA lifecycle operations associated with the capabilities defined in the present document. For any given TCA, the TCA-LCM function will only be able to perform those operations that are supported by that TCA.

Table 4.2.2.1.1-1: Functional requirements for TCA lifecycle management

Numbering	Functional requirements description
TcaLcm.Lcm.001	The TCA-LCM function shall support the capability to report on the latest LCM status and the TCA instance information. See note 1.
TcaLcm.Lcm.002	The TCA-LCM function shall support the capability to validate the lifecycle operation requests it processes.
TcaLcm.Lcm.003	The TCA-LCM function shall support the capability to change the desired state of a TCA instance/TCAC instance(s). See notes 2, 3 and 9.
TcaLcm.Lcm.004	The TCA-LCM function shall support the capability to use the deployment information from the TCAD for the TCA LCM.
TcaLcm.Lcm.005	The TCA-LCM function shall support the capability to perform continuous reconciliation of the TCA current state to the desired state. See note 4.
TcaLcm.Lcm.006	The TCA-LCM function shall support the capability to interact with TCI-LCM, for the purpose of TCA resource and other infrastructure object management, considering resource, capacity, redundancy requirements, etc., with appropriate constraints and policies.
TcaLcm.Lcm.007	The TCA-LCM function shall support the capability to switch to a specific TCA instance supporting specific KPIs (such as capacity and performance).
TcaLcm.Lcm.008	The TCA-LCM function shall support the capability to create and delete the identifier of the TCA instance which it manages.
TcaLcm.Lcm.009	The TCA-LCM function shall support the capability to conduct TCA life cycle error handling operation(s) after the TCA life cycle operation occurrence fails (see note 5).
TcaLcm.Lcm.010	The TCA-LCM function shall support the capability to manage the expansion of the capacity of a TCA instance (see note 6).
TcaLcm.Lcm.011	The TCA-LCM function shall support the capability to manage the contraction of the capacity of a TCA instance (see note 7).
TcaLcm.Lcm.012	The TCA-LCM function shall support the capability to terminate a TCA instance.
TcaLcm.Lcm.013	The TCA-LCM function shall support the capability to modify information (e.g. metadata, extensions) about a TCA instance.
TcaLcm.Lcm.014	The TCA-LCM function shall support the capability to determine the dependency and requirements of a TCA and its constituents related to Telco Cloud Platform Services. See note 8.
TcaLcm.Lcm.015	The TCA-LCM function shall support the capability to perform multi-TCI-PoP TCA deployment.
TcaLcm.Lcm.016	The TCA-LCM function shall support the capability to receive the constraints and policies applicable to virtualized resources allocated to the TCA.

NOTE 1: TCA instance information includes information about resources (e.g. virtualized resources, external connectivity, etc.) associated with TCAC(s).
NOTE 2: Changing the state also includes changing the external connectivity. Changing the external connectivity may imply connecting the TCA to an additional network or network segment, or disconnecting the TCA from a network or network segment to which it was previously connected.
NOTE 3: Changing the state also includes changing the set of instantiated TCACs of a TCA (e.g. adding TCACs that were not instantiated or removing TCACs).
NOTE 4: For example, the TCA-LCM can determine, based on the TCAD information, the resources needed to overcome the impact on currently allocated containerized workloads in response to events received, e.g. from Telco Cloud Infrastructure.
NOTE 5: It is up to the protocol design stage to design the detailed TCA life cycle error handling operation(s).
NOTE 6: Expansion can either be performed by scaling out or scaling up.
NOTE 7: Contraction can either be performed by scaling in or scaling down.
NOTE 8: The source for determining dependencies and requirements could be through processing the TCAD, which describes the necessary Telco Cloud Platform Services.
NOTE 9: Changing the state also includes changing the power state of the TCA. For example, power state changes can be performed by expanding/contracting the TCA instance.

NOTE 2: In this version of the present document, aspects related to notification management, policy management and requirements related to TCA Package management related to the TCA-LCM function are not considered.

4.2.2.1.2 Functional requirements for TCA instantiation

Table 4.2.2.1.2-1: Functional requirements for TCA instantiation

Numbering	Functional requirements description
TcaLcm.Inst.001	The TCA-LCM function shall support the capability to manage the instantiation of a TCA instance.
TcaLcm.Inst.002	The TCA-LCM function shall support the capability to request TCI-LCM to allocate resources for the TCA instance being instantiated.
TcaLcm.Inst.003	The TCA-LCM function shall support the capability to configure deployment specific parameters for the TCA instance being instantiated. See note.
TcaLcm.Inst.004	The TCA-LCM function shall support the capability to store the information about the allocated resources and configured deployment-specific parameters for the instantiated TCA.
NOTE: The TCA-LCM function shall support the capability to interact with other Telco Cloud Platform services to provide and retrieve configuration data for a TCA/TCAC instance.	

4.2.2.1.3 Functional requirements for multi-tenancy

Table 4.2.2.1.3-1: Functional requirements for multi-tenancy

Numbering	Functional requirements description
TcaLcm.Mtm.001	The TCA-LCM function shall support the capability to handle TCA tenants' identification within the TCI.
TcaLcm.Mtm.002	The TCA-LCM function shall support the capability to limit the scope of operations only to the service resource groups assigned to the requesting TCA tenant.

NOTE: In the present document, tenancy management is a responsibility of the TCA-LCM. In future versions, the tenancy feature needs to be evaluated to make it potentially generic at the Platform and Infrastructure levels.

4.2.2.1.4 Functional requirements for healing

Table 4.2.2.1.4-1 specifies functional requirements applicable to TCA healing capabilities.

Table 4.2.2.1.4-1: Functional requirements for TCA healing

Numbering	Functional requirements description
TcaLcm.Heal.001	The TCA-LCM function shall support the capability to perform on-demand TCA healing on the TCA(s) it manages.
TcaLcm.Heal.002	The TCA-LCM function shall support the capability to perform automated TCA healing on the TCA(s) it manages.

4.2.2.2 Functional requirements for TC Application Telemetry Management (TCA-TM) function

4.2.2.2.1 General considerations

The TCA-TM function is responsible for performing TCA logs management for logs generated by the TCA instances, TCA faults management, and TCA metrics management (e.g. performance metrics). TCA fault management includes the management of TCA-related alarms.

NOTE: In the present document, the TCA-TM function is not responsible for telemetry management for entities other than TCAs.

4.2.2.2.2 Functional requirements for TCA Logs Management

Table 4.2.2.2.2-1 specifies functional requirements applicable to logs aggregation and exposure.

Table 4.2.2.2.2-1: Functional requirements for logs aggregation and exposure

Numbering	Requirement
TcaTm.LogAgr.001	The TCA-TM function shall support the capability to collect different types of logs from TCA instances.
TcaTm.LogAgr.002	The TCA-TM function shall support the capability to pre-process the logs (see note 2).
TcaTm.LogAgr.003	The TCA-TM function shall support the capability to aggregate the logs in a configurable manner (see note 3).
TcaTm.LogAgr.004	The TCA-TM function shall support the capability to store historical log records (see note 4).
TcaTm.LogAgr.005	The TCA-TM function shall support the capability to expose (filtered) logs to authorized consumers.
NOTE 1: As an example for the case of TCA instances, the filter shall support filtering of logs from TCA instances by type of the TCA/TCAC, vendor, host, zone, TCA instance identifier, etc. Also, it shall be able to filter by log attributes metric/log type, severity level, etc. NOTE 2: One form of pre-processing is to harmonize the format of the logs. NOTE 3: Examples of configurable forms of aggregation are to aggregate all logs based on criteria of log level, different instances belonging to the same TCA, TCA instances managed by the same TCA-LCM function, etc. NOTE 4: A use case to store historical log records is about using such records for further root-cause analysis.	

Table 4.2.2.2.2-2 specifies functional requirements applicable to logs analysis and exposure.

Table 4.2.2.2.2-2: Functional requirements for logs analysis and exposure

Numbering	Requirement
TcaTm.LogAn.001	The TCA-TM function shall support the capability to analyze and process different types of logs (see note 1).
TcaTm.LogAn.002	The TCA-TM function shall support configuration of the analytics/processing to be applied (see note 2).
TcaTm.LogAn.003	The TCA-TM function shall support the capability to send notifications based on findings from the analysis of the logs.
TcaTm.LogAn.004	The TCA-TM function shall support the capability to expose analytics results to authorized consumers.
NOTE 1: Log analysis can be driven by various needs such as detection of abnormal behaviors, thresholds, correlation and statistical processing, etc. NOTE 2: Examples of configuration forms of the analytics are set threshold, defining the composition of the analytic function from a set of basic analytic functions, etc.	

4.2.2.2.3 Functional requirements for TCA Fault Management

Table 4.2.2.2.3-1 specifies functional requirements applicable to TCA fault management.

Table 4.2.2.2.3-1: Functional requirements for TCA fault management

Numbering	Functional requirements description
TcaTm.Fm.001	The TCA-TM function shall support the capability to provide notifications related to fault information for the TCAs it manages (see notes 1 and 2).
TcaTm.Fm.002	The TCA-TM function shall support the capability to keep the alarm record(s) in the alarm list unless some criteria are met (see note 3).
NOTE 1: Resource-related fault information on a given TCA results from a collected resource fault impacting the corresponding TCA instance. NOTE 2: Resource-related fault information on a given TCA instance can include the information related to the alarm (e.g. alarm created, alarm cleared, etc.), alarm causes and identification of this TCA instance and fault details related to the resources allocated to this TCA instance.	

Numbering	Functional requirements description
NOTE 3: The criteria to be met before an alarm record can be removed from the alarm list include, for example, the alarm acknowledgement state is "acknowledged" and the perceived severity is "cleared".	

4.2.2.2.4 Functional requirements for TCA Metrics Management

Table 4.2.2.2.4-1 specifies functional requirements applicable to metrics aggregation and exposure.

Table 4.2.2.2.4-1: Functional requirements for metrics aggregation and exposure

Numbering	Requirement
TcaTm.MetricAgr.001	The TCA-TM function shall support the capability to collect different types of metrics from TCA instances, as determined by a filter (see notes 1 and 2).
TcaTm.MetricAgr.002	The TCA-TM function shall support the capability to pre-process the metrics (see note 3).
TcaTm.MetricAgr.003	The TCA-TM function shall support the capability to aggregate the metrics in a configurable manner (see note 4).
TcaTm.MetricAgr.004	The TCA-TM function shall support the capability to store time series metrics for records (see note 5).
TcaTm.MetricAgr.005	The TCA-TM function shall support the capability to expose (filtered) metrics to authorized consumers.
NOTE 1: The filter shall support operations such as filtering TCA instances by type of the TCA, vendor, host, zone, TCA instance identifier, etc. Also, it shall be able to filter by metric/log type, severity level, etc. NOTE 2: VNF performance metrics specified in ETSI GS NFV-IFA 027 [2] can be mapped to TCA performance metrics, see Table A-1 of ETSI GS NFV 008-1 [1]. The metrics include e.g. TCA's network performance metrics, other virtualisation-dependent (e.g. TCAs connectivity) as well as virtualisation-independent metrics like TCA's application metrics. NOTE 3: One form of pre-processing is to harmonize the format of the metrics. NOTE 4: Examples of configurable forms of aggregations are to aggregate all metrics related to performance, aggregate metrics from different instances belonging to the same TCA, aggregate metrics of TCA instances managed by the same TCA-LCM, etc. NOTE 5: Use cases for storing time series of metrics include, for instance, using the stored metrics for further root-cause analysis, abnormal behaviour detection, etc.	

Table 4.2.2.2.4-2 specifies functional requirements applicable to metrics analysis and exposure.

Table 4.2.2.2.4-2: Functional requirements for metrics analysis and exposure

Numbering	Requirement
TcaTm.MetricAn.001	The TCA-TM function shall support the capability to analyze and process different types of metrics based on a set of analysis functions (see note 1 and note 2).
TcaTm.MetricAn.002	The TCA-TM function shall support the capability to provide configuration of the analytics/processing of the metrics to be applied (see note 3).
TcaTm.MetricAn.003	The TCA-TM function shall support the capability to send notifications based on findings from the analysis of the metrics.
TcaTm.MetricAn.004	The TCA-TM function shall support the capability to expose the metrics analytics results to authorized consumers.
NOTE 1: Examples of analysis functions are abnormal behavior detection, threshold crossing, statistical processing, etc. NOTE 2: The type of data analytics process corresponds to the subject of analysis (i.e. TCA-related incidents). Control attributes associated with the data analytics process may be used to influence and guide the resulting output . NOTE 3: Examples of configuration forms of the analytics include thresholds, defining the composition of the analytic function from a set of basic analytic functions.	

4.2.2.3 Functional requirements for TC Application Configuration Management (TCA-CM) function

4.2.2.3.1 General considerations

The TCA-CM function is used to support the configuration of TCA instances. The following statements are related to TCA configuration management performed by the TCA-CM function.

- TCA configuration data includes TCA instance-dependent configurations (e.g. network configuration information related to one or more TCA instances) and TCA instance-independent configurations (i.e. TCA's application configuration), such as thresholds related to the application load.
- The TCA-CM does not understand the semantics of the TCA configuration data.
- The TCA-CM can support day 1/2 configuration operations. For day zero TCA instance configuration, operations are performed directly by the TCA-LCM function, see clause 4.2.2.1.2 of the present document.

4.2.2.3.2 Functional requirements for TCA Configuration Management

Table 4.2.2.3.2-1: Functional requirements for TCA Configuration Management

Numbering	Functional requirements description
TcaCm.Cm.001	The TCA-CM function shall support the capability to transfer (create or update) or delete configuration data of one or more TCA instances.
TcaCm.Cm.002	The TCA-CM function shall support the capability to query configuration data from one or more TCA instances. See note 1.
TcaCm.Cm.003	The TCA-CM function shall support the capability to manage configuration data for one or more TCA instances. See note 2.
TcaCm.Cm.004	The TCA-CM shall support the capability to request management operations via the TCI-LCM service interface for resource configuration management purposes. See note 3 and note 4.
TcaCm.Cm.005	The TCA-CM function shall support the capability to interact with another function to store, retrieve and query configuration data related to TCA instances.
TcaCm.Cm.006	The TCA-CM function shall support the capability to interact with another function to trigger configuration data management operations for configuration data related to TCA instances.
NOTE 1: A query can be related to the fetching of the value of a specific configuration parameter. NOTE 2: Examples of configuration management operations performed by the TCA-CM function include preparation actions (e.g. create configuration backup) and postprocessing actions (e.g. rollback running configuration). NOTE 3: TCI resource configurations concern TCI-resources within the scope of a TCA instance NOTE 4: Management operations examples include create, modify, replace, delete, and query TCI resource configurations.	

4.2.2.4 Functional requirements for TC Platform Repository Management (TCP-RM) function

4.2.2.4.1 General considerations

The following statements on the scope of the TC Platform Repository Management (TCP-RM) function, part of the Telco Cloud Platform, apply to repository management requirements related to the Telco Cloud Platform.

4.2.2.4.2 TCA package management requirements

Table 4.2.2.4.2-1: TCA package management requirements

Numbering	Functional requirements description
TcpRm.Pckm.001	The TCP-RM function shall support the capability of management of TCA packages (see note).
TcpRm.Pckm.002	The TCP-RM function shall support the capability to validate the integrity and authenticity of the TCA Package.
TcpRm.Pckm.003	The TCP-RM function shall support the capability to validate the information in the TCA Package to compile with the standard for this information.
TcpRm.Pckm.004	The TCP-RM function shall support the capability to notify about the onboarding of the TCA Package.
NOTE: The TCA Packages management can include onboarding, enabling/disabling, querying, fetching and deleting TCA Packages.	

4.2.2.4.3 TCA descriptor management requirements

Table 4.2.2.4.3-1: TCA descriptor management requirements

Numbering	Functional requirements description
TcpRm.Dscm.001	The TCP-RM function shall support the capability of management of the TCA Descriptor (see note 1).
TcpRm.Dscm.002	The TCP-RM function shall support the capability to validate the integrity and authenticity of the TCA Descriptor.
TcpRm.Dscm.003	The TCP-RM function shall support the capability to validate the information in the TCA Descriptor to compile with the standard for this information.
TcpRm.Dscm.004	The TCP-RM function shall support the capability to perform version control of onboarded TCA Descriptor.
TcpRm.Dscm.005	The TCP-RM function shall support the capability to notify about events and changes of the TCA Descriptor (see note 2).
NOTE 1: The TCA descriptor management can include onboarding, updating, enabling/disabling, querying, fetching and deleting of the TCA Descriptor. NOTE 2: The events and changes of the TCA Descriptor include: onboarding a TCA Descriptor, changing the state of a TCA Descriptor, and deleting a TCA Descriptor.	

4.2.2.4.4 TCA configuration artefacts management requirements

Table 4.2.2.4.4-1: TCA configuration artefacts management requirements

Numbering	Functional requirements description
Tcprm.Conf.001	The TCP-RM shall support the capability of storing configuration data. See note 1.
Tcprm.Conf.002	The TCP-RM shall support the capability of converting configuration data between different formats. See note 1.
Tcprm.Conf.003	The TCP-RM should support the capability to validate configuration data based on data schemas. See note 1 and note 2.
Tcprm.Conf.004	The TCP-RM shall support the capability of version control for configuration data. See note 1.
Tcprm.Conf.005	The TCP-RM shall support the capability to provide configuration data to consumers that request to fetch such configuration data. See note 1.
Tcprm.Conf.006	The TCP-RM shall support the capability to keep information about the stored configuration data. See note 1 and note 3.
Tcprm.Conf.007	The TCP-RM shall support the capability to notify about events and changes of configuration data. See note 1.
NOTE 1: Requirements Tcprm.Conf.001, 002, 003, 004, 005, 006, 007 are related to the functionalities provided by the PaaS Service Config Server as defined in ETSI GS NFV-IFA 049 [i.2] for the purpose of configuring TCA instances and /or managing TCA configuration data. NOTE 2: Data schemas can be onboarded to the TCP-RM or provided during operations issued by a consumer. NOTE 3: Metadata information about the stored configuration data includes, but is not limited to format of the data, the last modification date of the data, and the version of the stored data.	

4.2.2.5 Functional requirements for TC Certificate Management (TC-CertM) function

4.2.2.5.1 General considerations

Certificates issued by a certificate authority shall be used for verifying the identity of TCAs and other components in the Telco Cloud. The Telco Cloud, in conjunction with the TC Certificate Management (TC-CertM) function, shall support automated certificate management for the Telco Cloud functions and TCAs in order to secure communication between TCA(C)s and between TCA(C)s and Telco Cloud functions.

4.2.3 Telco Cloud Infrastructure Functions

4.2.3.1 Functional requirements for TC Infrastructure Lifecycle Management (TCI-LCM) function

4.2.3.1.1 General considerations

The following statements on the scope of the TC Infrastructure Lifecycle Management function, part of the Telco Cloud Infrastructure, apply to lifecycle management requirements related to the Telco Cloud Infrastructure resources. The Telco Cloud Infrastructure resources include virtualized resources, physical resources, OS container infrastructure resources and CIS clusters.

4.2.3.1.2 Functional requirements for virtualised resources using TC Infrastructure Lifecycle Management (TCI-LCM) function

Table 4.2.3.1.2-1: Functional requirements for TC Infrastructure LCM function

Numbering	Functional requirements description
TciLcm.001	The TCI-LCM function shall support creation, query, upgrade, update and termination of TCI virtualized compute resources within its area of responsibility (see note 1).
TciLcm.002	The TCI-LCM function shall support creation, query and termination of virtualized storage resources within TCI (see note 2)
TciLcm.003	The TCI-LCM function shall support creation, query and termination of TCI virtualized intra-TCI-PoP network resources within its area of responsibility.
TciLcm.004	The TCI-LCM function shall support creation, query and termination of inter-TCI-PoP network resources within its area of responsibility.
TciLcm.005	The TCI-LCM function shall enable multi-tenancy across its resource domain.
TciLcm.006	The TCI-LCM function shall support creation, upgrade, update and deletion of CIS cluster resources.
TciLcm.007	The TCI-LCM function shall support maintenance of underlying hardware resources while virtualized resources are running.
TciLcm.008	The TCI-LCM function shall support partitioning/sharing of NFV acceleration resources across virtualized resources.
TciLcm.009	The TCI-LCM function shall support the capability to schedule and allocate virtualised resources considering power/energy requirements.
NOTE 1: Virtualized compute resources could be of various forms, such as VMs, containers, etc. NOTE 2: Available virtualized storage resources could be exposed via TCI services. NOTE 3: Hardware maintenance activities could include the upgrade of firmware for server and its components. It can also include occasional reboots to handle unresponsive server scenarios.	

NOTE: In the present document, physical infrastructure management-related LCM requirements and resource requirements to deploy intra-TCI PoP and inter-TCI PoP networks have not been considered.

4.2.3.2 Functional requirements for TC Infrastructure Telemetry Management (TCI-TM) function

4.2.3.2.1 General considerations

The following statements on the scope of the TC Infrastructure Telemetry Management function, part of the Telco Cloud Infrastructure, apply to telemetry management requirements related to Telco Cloud infrastructure resources. Telco Cloud infrastructure resources are either virtualised resources or physical resources.

4.2.3.2.2 TCI performance management requirements

Table 4.2.3.2.2-1: TCI performance management requirements

Numbering	Functional requirements description
TciTm.Pm.001	The TCI-TM function shall support the capability to collect performance information related to Telco Cloud infrastructure resources (see note).
TciTm.Pm.002	The TCI-TM function shall support the capability to manage the subscription to notifications related to performance information on the Telco Cloud infrastructure resources.
TciTm.Pm.003	The TCI-TM function shall support the capability to notify performance information of the Telco Cloud infrastructure resources.
NOTE: The collection of performance information can include the creation, update, query and deletion of PM job or thresholds.	

4.2.3.2.3 TCI fault management requirements

Table 4.2.3.2.3-1: TCI fault management requirements

Numbering	Functional requirements description
TciTm.Fm.001	The TCI-TM function shall support the capability to collect fault information related to Telco Cloud infrastructure resources.
TciTm.Fm.002	The TCI-TM function shall support the capability to manage the subscription to notifications related to fault events on Telco Cloud infrastructure resources.
TciTm.Fm.003	The TCI-TM function shall support the capability to notify fault information of Telco Cloud infrastructure resources that are allocated (see note).
TciTm.Fm.004	The TCI-TM function shall support the capability to notify changes in fault information on Telco Cloud infrastructure resources (see note).
TciTm.Fm.005	The TCI-TM function shall support the capability to query fault information of Telco Cloud infrastructure resources that are allocated (see note).
NOTE: The fault information related to Telco Cloud infrastructure resources can include the information related to the alarm (e.g. alarm created, alarm cleared, etc.), alarm causes and identification of the Telco Cloud infrastructure resources causing the alarm, and so on.	

4.2.3.2.4 TCI log management requirements

Table 4.2.3.2.4-1: TCI log management requirements

Numbering	Functional requirements description
TciTm.Lm.001	The TCI-TM function shall support the capability to capture, maintain and provide logs related to Telco Cloud infrastructure resources. (See note 1 and note 2).
TciTm.Lm.002	The TCI-TM function shall support the capability to manage the subscriptions to notifications related to log management.
TciTm.Lm.003	The TCI-TM function shall support the capability to notify about the events related to log management on Telco Cloud Infrastructure resources.
NOTE 1: In this version of the present document, Telco Cloud infrastructure resources applicable for log management are physical resources. NOTE 2: The log management includes controlling logging jobs, i.e. their creation, update, query and deletion of logging jobs. Logging jobs can be used for configuring log levels, configuring criteria of what information related to Telco Cloud infrastructure resources to log, starting and stopping the log collection, etc.	

4.2.3.3 Functional requirements for TC Infrastructure Repository Management (TCI-RM) function

4.2.3.3.1 General considerations

The following statements on the scope of the TC Infrastructure Repository Management function, part of the Telco Cloud Infrastructure, apply to repository management requirements related to the Telco Cloud Infrastructure. Software images related to the Telco Cloud Infrastructure include virtual machine software images and OS container images.

4.2.3.3.2 TCI software image management requirements

Table 4.2.3.3.2-1: TCI software image management requirements

Numbering	Functional requirements description
TciRm.Sim.001	The TCI-RM function shall support the capability of management of software images related to the Telco Cloud Infrastructure as requested (see note).
TciRm.Sim.002	The TCI-RM function shall support the capability to verify the integrity and authenticity of the software images related to the Telco Cloud Infrastructure.
TciRm.Sim.003	The TCI-RM function shall support the capability to manage multiple versions of software images related to the Telco Cloud Infrastructure.
TciRm.Sim.004	The TCI-RM function shall support the capability to provide information on the software images related to the Telco Cloud Infrastructure which it manages.
NOTE: Management of software images includes adding, deleting or querying information of software images.	

Annex A (informative): Change history

Date	Version	Information about changes
Oct 2025	0.1.0	Baseline based on approved contributions - NFVIFA(25)000264_Requirements specification skeleton - NFVIFA(25)000265r1_NFV-00xed611_Telco_Cloud_requirements_specification_scope
Dec 2025	0.2.0	Early draft based on approved contributions: NFVIFA(25)000306r1_FEAT39_NFV008-2_TC-MDAF_functional_requirements_ NFVIFA(25)000307r1_FEAT39_NFV008-2_TC_Intent_management_function_functional_req NFVIFA(25)000308_FEAT39_NFV008-2_CMF_functional_requirements_ Rapporteur action: add missing reference for IFA026
Dec 2025	0.3.0	Early draft based on approved contributions: NFVIFA(25)000303r1_NFV008-2_TCA_Configuration_management_functional_requirement NFVIFA(25)000304r1_NFV008-2_TCA_Telemetry_management_function_functional_requir NFVIFA(25)000305r1_NFV008-2_TC_Platform_repository_management_function_function NFVIFA(25)000310r2_FEAT39_NFV008-2_TCI_Telemetry_management_function_functional NFVIFA(25)000311r1_FEAT39_NFV008-2_TCI_repository_management_function_functiona NFVIFA(25)000368r2_FEAT39_NFV008-2_TCI_lifecycle_management_function_functional NFVIFA(25)000371r1_FEAT39_NFV008-2_TCI_lifecycle_management_functional_requirem NFVIFA(25)000378r1_NFV008-2_TCALCM_Functional_requirements_for_TCA_lifecycle_ma NFVIFA(25)000374r1_NFV008-2_TCALCM_Functional_requirements_additional_aspects NFVIFA(25)000388r1_NFV008-2_functional_requirements_Introduction NFVIFA(25)000390r1_NFV008-2_TCALCM_Functional_requirements_for_TCA_Healing NFVIFA(25)000392_NFV008-2_functional_requirements_addressing_ENs Rapporteur actions: removed note 2 according to Vnfm.VnfLcm.008 as described in NFV-IFA010, added note m in TcaLcm.lcm.003, removed 'VNFM' from TcaLcm.lcm.016
Jan 2026	0.4.0	Stable draft based on approved contributions: NFVIFA(26)000002r1_NFV008-2 review comments NFVIFA(26)000007r1_FEAT39 NFV008-2 Addressing ENs NFVIFA(26)000008r1_FEAT39 NFV008-2ed611 Final review on references to legacy NFV functionality NFVIFA(26)000012r2_NFV008-2_ed611_stable_draft_review_comments
Jan 2026	0.5.0	Stable draft based on approved contributions NFVIFA(26)000018r1_Minor updates to NFV008-2
Mar 2026	0.6.0	Final draft based on NFV(26)000057r1 (EditHelp proposed updates)

History

Version	Date	Status
V6.1.1	April 2026	Publication