



# ***NFV Quality Accountability Framework and Automated Lifecycle Quality Measurement***

Eric Bauer  
September 9<sup>th</sup> 2015



**Network Functions Virtualization (NFV);  
Assurance;  
Quality Accountability Framework**

**Disclaimer:** This DRAFT is a working document of ETSI ISG NFV. It is provided for information only and is still under development within ETSI ISG NFV. DRAFTS may be updated, deleted, replaced, or obsoleted by other documents at any time.

ETSI and its Members accept no liability for any further use/implementation of the present DRAFT.

**Do not use as reference material.**

Do not cite this document other than as "work in progress".

- ETSI NFV public DRAFTS are available in: <http://docbox.etsi.org/ISG/NFV/Open/Drafts/>
- Report FEEDBACK via the NFV issue tracker: [http://nfwiki.etsi.org/index.php?title=NFV\\_Issue\\_Tracker](http://nfwiki.etsi.org/index.php?title=NFV_Issue_Tracker)
- Approved and PUBLISHED deliverables shall be obtained via the ETSI Standards search page at: <http://www.etsi.org/standards-search>

*Disclaimer*

This document has been produced and approved by the <long techbody> (<short techbody>) ETSI Industry Specification Group (ISG) and represents the views of those members who participated in this ISG. It does not necessarily represent the views of the entire ETSI membership.

**Draft  
NFVREL005v005**

Final version  
should be  
published in  
4Q15

**Quality  
Measurement of  
Automated  
Lifecycle  
Management  
Actions**

**1.0 version  
published 8/15**

**Quality Excellence for Suppliers of  
Telecommunications Forum  
(QuEST Forum)**

**TL 9000  
Quality Management System**

**Quality Measurement of  
Automated Lifecycle Management Actions  
Version 1.0**

For further information,  
see the QuEST Forum Web page at:  
<http://www.questforum.org/>

TL 9000 is a registered trademark  
of the  
Quality for Excellence for Suppliers of Telecommunications Forum.





# Hypothetical Quality Accountabilities (from [Draft NFVREL005v005](#))

(Hypothetical) Voice mail service quality delivered to end user is driven by...

*Customer Supplier*

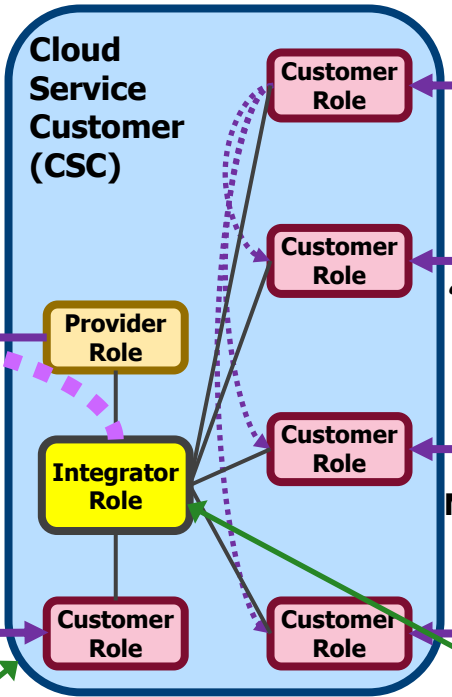
Cloud Service User



Customer Role

CSP: Network Provider

Provider Role



Customer Role

VNF Software

Provider Role

Voice Mail VNF

Customer Role

Database as-a-service

Provider Role

CSP: DBaaS

Customer Role

Automated Lifecycle Management

Provider Role

CSP: NFM and Orchestration

Customer Role

VM+VN Service

Provider Role

CSP: NFV Infrastructure

Quality of voice mail server software delivered by the VNF supplier

Quality of database services (e.g., DB query) by DBaaS provider used for message storage

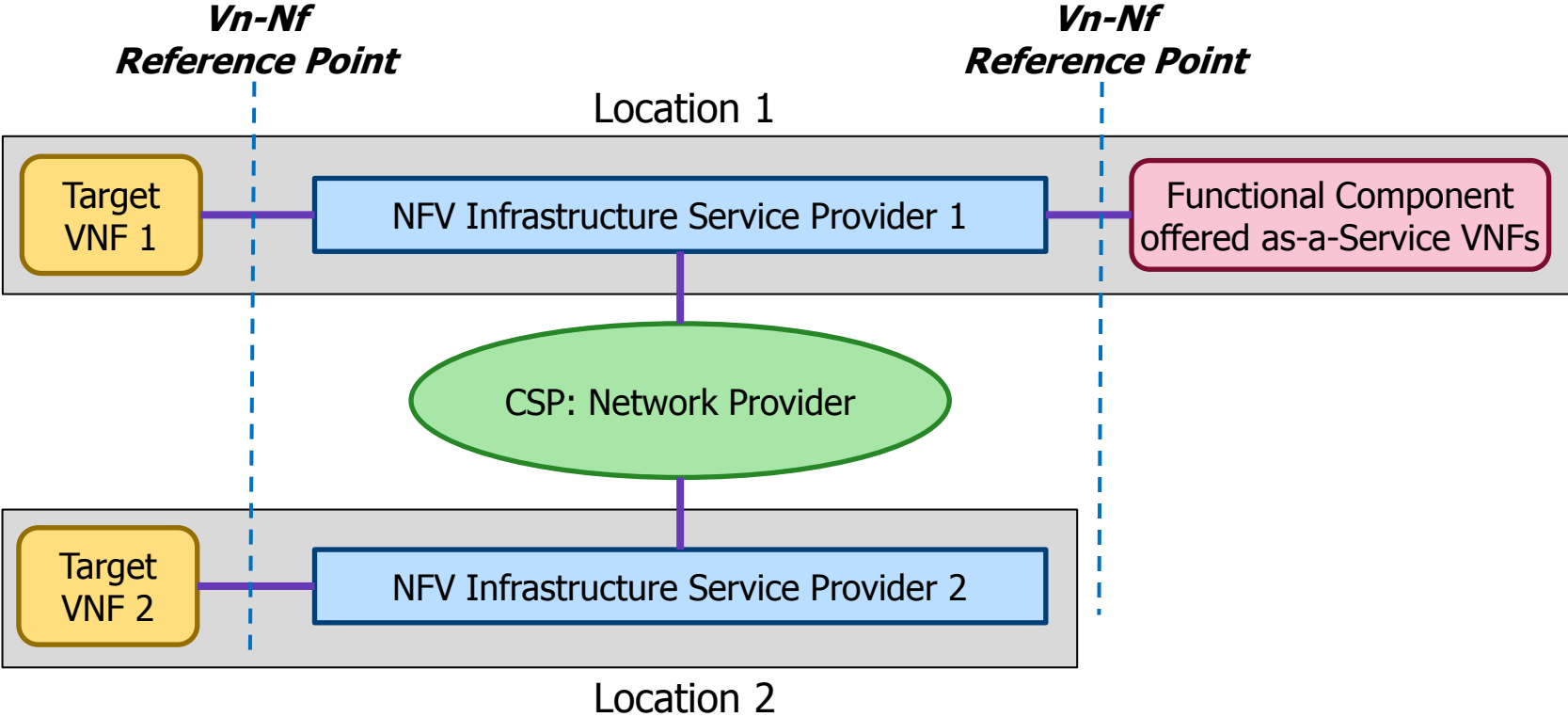
Quality of automated lifecycle management services (e.g., VNF scale, VNF heal) delivered by MANO service provider

Quality of virtual compute, memory, storage and networking resources delivered by NFVI service provider

Quality of cloud service customer's operations and policies

Quality of the service integration

# Accountability Example



# ETSI NFV Quality Accountability Framework (NFVREL005)

## Contents

- Roles in the NFV Ecosystem (section 4)
- Responsibilities by Role (section 5)
- Responsibilities for Key Cloud Characteristics (section 6)
- Quality Measurement Framework (section 7)
- Sample Cloud Service Customer SLAs (Annex A)
- Use Case Scenarios (Annex B)

**Quality Excellence for Suppliers of  
Telecommunications Forum  
(QuEST Forum)**

**TL 9000  
Quality Management System**

**Quality Measurement of  
Automated Lifecycle Management Actions  
Version 1.0**

For further information,  
see the QuEST Forum Web page at:  
<http://www.questforum.org/>

TL 9000 is a registered trademark  
of the  
Quality for Excellence for Suppliers of Telecommunications Forum.

Quality  
Measurement of  
Automated  
Lifecycle  
Management  
Actions

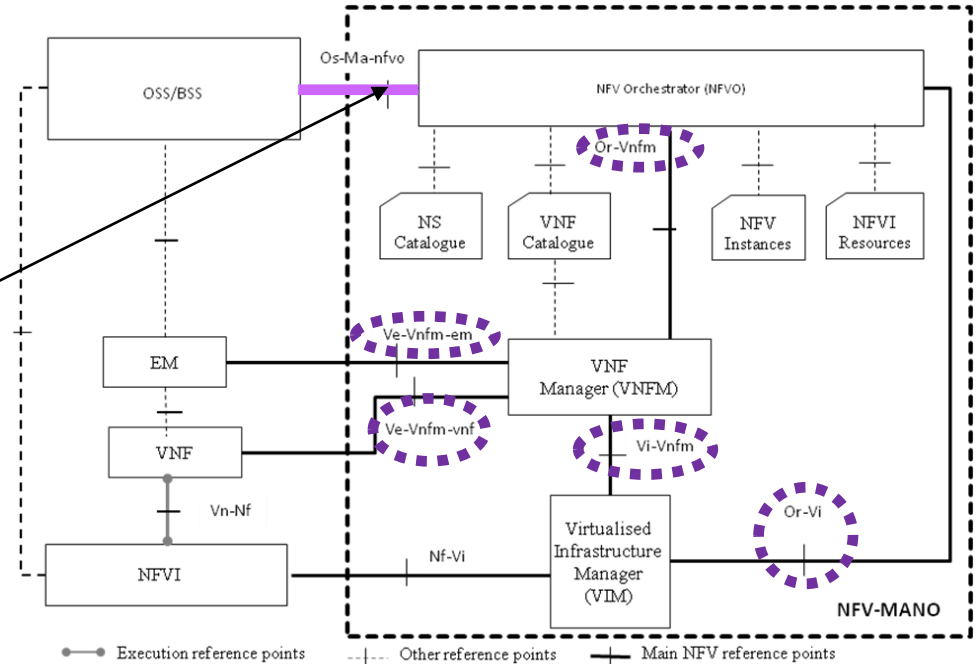
1.0 version  
published 8/15



# Sample Measurement Context

Automated lifecycle management requests pass across main NFV-MANO reference points.

Fulfillment service quality can be measured across those reference points. For example, measuring qualities of **Scale VNF** ["*operation allows scaling (out/in, up/down) a VNF instance*"] across the *Os-Ma-nfvo* reference points



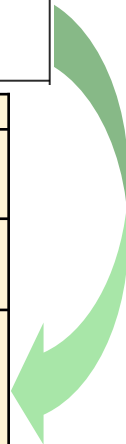
# Lifecycle Management Measurement Categories

**Table A-1 Product Category Definitions**

Category Code	Category Name	Definition	Examples
7.1	<b>Network Installation and Provisioning</b>	<b>Contracted or internal services to install and/or provision equipment within the network or to construct network facilities.</b>	
7.1.1	Installation	Contracted or internal services to position, configure, remove, and/or adjust a hardware/software product within the network.	<ul style="list-style-type: none"> <li>• New equipment installation</li> <li>• Expansion installation</li> <li>• Upgrade installation</li> <li>• Equipment removal</li> </ul>

Code	Name	Definition	Examples
10	<b>Automated Lifecycle Mgmt Service Products</b>	<b>Automated lifecycle management services provided by NFV management and orchestration deployments</b>	
10.1	<b>Network Element Services</b>	<b>Automated lifecycle management services for network elements (a.k.a., virtualized network functions)</b>	
10.1.1	VNF Installation, Interaction and Change	Automated services to position, configure, remove, and/or adjust a VNF product within the network. <i>Analogous to 7.1.1 'Installation' for PNFs</i>	Check VNF instantiation feasibility Instantiate VNF Update VNF software Upgrade VNF software Query VNF Modify VNF Terminate VNF
10.1.2	VNF Scaling	Increase or decrease online application capacity either vertically or horizontally	Scale VNF
10.1.3	VNF Healing	Automated services to maintain VNF in the field or by remote access methods. This excludes warranty and standard maintenance activities performed in support of a particular product by the product OEM. <i>Analogous to 7.3.1 'Network Maintenance' for PNFs</i>	Heal VNF

Automated Lifecycle Management actions are analogous to actions humans have been manually executing for years, so similar measurement categories can be used



# Lifecycle Management Measurements

Table A-2 Measurement Applicability Table (Normalization Units)								
Product Category								
Code	Description	Problem Reports H,S,V	Outage Frequency V	Mean Time to Restore Service V	Basic Return Rate H	Service Quality V		
						SQ		
TL 9000 Measurement Symbols (see Table A-6)		NPR	SSO	MTRS	BRR	Numerator	Denominator	Notes/Comments
<b>7</b>	<b>Service Products</b>							
<b>7.1</b>	<b>Network Installation and Provisioning</b>							
7.1.1	Installation	Job	Job	NA	NA	Non-conforming audits	Audits	Based on audits performed by the organization or on its behalf prior to customer acceptance. Defects shall include organization caused installation engineering defects and installation defects. A nonconforming audit is one that fails to satisfy specified acceptance requirements. These audits may be performed on a sample basis. NOTE: An installation audit performed by the customer is not included unless the organization requested the customer perform the audit

Code	Description	Problem Reports H,S,V	Outage Frequency V	Service Quality V		
				SQ		
TL 9000 Measurement Symbols (see Table A-6)		NPR	SSO	Numerator	Denominator	Notes/Comments
<b>10.1</b>	<b>Network Element Services</b>	ALMA = Automated Lifecycle Management Action				
10.1.1	VNF Installation, Interaction and Change	ALMA (automated job)	ALMA (automated job)	Faulty Actions	Transactions	[1]

Similar lifecycle management measurements can be applied...

# Automated Lifecycle Management Measurements

- **On Time Service Delivery (OTS)** – percentage of actions completed within the Service Provider's (supplier's) **Promise Time**
- **Service Quality (SQ)** ... think 'right first time'
- **Support Service Caused Outages (SSO)** ... think toxic actions...
- **Number of Problem Reports (NPR4)**
- **Fix Response Time (FRT)**
- **Overdue Problem Fix Responsiveness (OFR)**



# Automated Lifecycle Management Categories

<b>Code</b>	<b>Category Name</b>	<b>Definition</b>	<b>Examples</b>
<b>10</b>	<b>Automated Lifecycle Management Service Products</b>	<b>Automated lifecycle management services provided by NFV management and orchestration deployments</b>	
<b>10.1</b>	<b>Network Element Services</b>	<b>Automated lifecycle management services for network elements (a.k.a., virtualized network functions)</b>	
10.1.1	VNF Installation, Interaction and Change	Automated services to position, configure, remove, and/or adjust a VNF product within the network. <i>Analogous to 7.1.1 'Installation' for PNFs</i>	Check VNF instantiation feasibility; Instantiate VNF Update VNF software; Upgrade VNF software Query VNF; Modify VNF; Terminate VNF
10.1.2	VNF Scaling	Increase or decrease online application capacity either vertically or horizontally	Scale VNF
10.1.3	VNF Healing	Automated services to maintain VNF in the field or by remote access methods. This excludes warranty and standard maintenance activities performed in support of a particular product by the product OEM. <i>Analogous to 7.3.1 'Network Maintenance' for PNFs</i>	Heal VNF
<b>10.2</b>	<b>Network Service Services</b>	<b>Automated lifecycle management for service delivery chains of physical and virtualized network functions</b>	
10.2.1	Network Service Installation, Interaction and Change	Automated services to position, configure, remove, and/or adjust a network service.	Instantiate Network Service; Terminate Network Service; Update Network Service; Query Network Service
10.2.2	Network Service Scaling	Increase or decrease online network service capacity	Scale Network Service
<b>10.3</b>	<b>Forwarding Graph Services</b>	<b>Automated lifecycle management for VNF Forwarding Graphs</b>	
10.3.1	Forwarding Graph Installation, Interaction and Change	Automated services to position, configure, remove, and/or adjust a VNF forwarding graph.	Create VNFFG; Delete VNFFG; Update VNFFG; Query VNFFG
<b>10.4</b>	<b>Virtual Link Services</b>	<b>Automated lifecycle management for Virtual Links</b>	
10.4.1	Virtual Link Installation, Interaction and Change	Automated services to position, configure, remove, and/or adjust a virtual link.	Create VL; Delete VL; Update VL; Query VL

...



# Category Specific Measurement Details

Code	Description	Problem Reports H,S,V	Outage Frequency V	Service Quality V		
				SQ		
TL 9000 Measurement Symbols (see Table A-6)		NPR	SSO	Numerator	Denominator	Notes/Comments
<b>10</b>	<b><i>Automated Lifecycle Management Service Products</i></b>					
<b>10.1</b>	<b><i>Network Element Services</i></b>					
10.1.1	VNF Installation, Interaction and Change	ALMA (automated job)	ALMA (automated job)	Faulty Actions	Transactions	[1]
10.1.2	VNF Scaling	ALMA (automated job)	ALMA (automated job)	Defective scaling transactions	Scaling requests	
10.1.3	VNF Healing	Maintenance action	NA	Defective healing actions	Healing requests	
<b>10.2</b>	<b><i>Network Service Services</i></b>					
10.2.1	Network Service Installation, Interaction and Change	ALMA (automated job)	ALMA (automated job)	Faulty Actions	Transactions	[1]
10.2.2	Network Service Scaling	ALMA (automated job)	ALMA (automated job)	Defective scaling transactions	Scaling requests	
<b>10.3</b>	<b><i>Forwarding Graph Services</i></b>					
10.3.1	Forwarding Graph Installation, Interaction and Change	ALMA (automated job)	ALMA (automated job)	Faulty Actions	Transactions	[1]
<b>10.4</b>	<b><i>Virtual Link Services</i></b>					
10.4.1	Virtual Link Installation, Interaction and Change	ALMA (automated job)	ALMA (automated job)	Faulty Actions	Transactions	[1]

# Takeaways

- Clearly **defining roles, responsibilities and demarcations** is a quality management best practice because it clarifies accountabilities which permit any quality impairments to be rapidly localized, root causes can be identified and appropriate corrective actions can be agreed to promptly restore service and drive continuous quality improvement.
- **Objective and quantitative quality measurement** enables better engineering, operation, assurance and management

*What you can't measure you can't manage*





Network Functions Virtualization (NFV);  
Assurance;  
Quality Accountability Framework

**Disclaimer:** This DRAFT is a working document of ETSI ISG NFV. It is provided for information only and is still under development within ETSI ISG NFV. DRAFTS may be updated, deleted, replaced, or obsoleted by other documents at any time.

ETSI and its Members accept no liability for any further use/implementation of the present DRAFT.

**Do not use as reference material.**

Do not cite this document other than as "work in progress".

- ETSI NFV public DRAFTS are available in: <http://docbox.etsi.org/ISG/NFV/Open/Drafts/>
- Report FEEDBACK via the NFV issue tracker: [http://nfvwiki.etsi.org/index.php?title=NFV\\_Issue\\_Tracker](http://nfvwiki.etsi.org/index.php?title=NFV_Issue_Tracker)
- Approved and PUBLISHED deliverables shall be obtained via the ETSI Standards search page at: <http://www.etsi.org/standards-search>

*Disclaimer*

This document has been produced and approved by the <long techbody> (<short techbody>) ETSI Industry Specification Group (ISG) and represents the views of those members who participated in this ISG. It does not necessarily represent the views of the entire ETSI membership.

## Draft NFVREL005v005

Final version  
should be  
published in  
4Q15

## Quality Measurement of Automated Lifecycle Management Actions

1.0 version  
published 8/15

Quality Excellence for Suppliers of  
Telecommunications Forum  
(QuEST Forum)

TL 9000  
Quality Management System

Quality Measurement of  
Automated Lifecycle Management Actions  
Version 1.0

For further information,  
see the QuEST Forum Web page at:  
<http://www.questforum.org/>

TL 9000 is a registered trademark  
of the  
Quality for Excellence for Suppliers of Telecommunications Forum.