



**LTE;  
Telecommunication management;  
Configuration Management (CM) for mobile networks  
that include virtualized network functions;  
Procedures  
(3GPP TS 28.511 version 15.0.0 Release 15)**



---

Reference

RTS/TSGS-0528511vf00

---

Keywords

LTE

**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

---

**Copyright Notification**

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2018.

All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

**3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

**oneM2M** logo is protected for the benefit of its Members.

**GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

---

# Intellectual Property Rights

## Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

## Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

---

# Foreword

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

---

# 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).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

---

# Contents

Intellectual Property Rights .....	2
Foreword.....	2
Modal verbs terminology.....	2
Foreword.....	4
Introduction .....	4
1     Scope .....	5
2     References .....	5
3     Definitions and abbreviations.....	5
3.1     Definitions .....	5
3.2     Abbreviations .....	5
4     Configuration Management procedures .....	6
4.1     Introduction .....	6
4.2     MO configuration procedure .....	6
4.3     Procedure of updating MOI(s) after a VNF is scaled .....	6
4.4     MO creation.....	8
4.4.1     MO creation after VNF instantiation (triggered by EM) .....	8
4.4.2     MO creation for a specified VNF instance .....	8
4.5     VNF termination triggers MO attribute value change.....	9
4.6     Enabling/disabling the auto-scaling initiated through Itf-N .....	10
4.7     VNF instance information synchronization.....	10
<b>Annex A (informative):     Change history .....</b>	<b>12</b>
History .....	13

---

# Foreword

This Technical Specification has been produced by the 3<sup>rd</sup> Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

---

# Introduction

The present document is part of a TS-family covering the 3<sup>rd</sup> Generation Partnership Project Technical Specification Group Services and System Aspects, Telecommunication Management; as identified below:

TS 28.510: Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Requirements.

**TS 28.511: Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Procedures.**

TS 28.512: Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Stage 2.

TS 28.513: Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Stage 3.

---

# 1 Scope

The present document specifies the Configuration Management (CM) procedures for mobile networks that include virtualized network functions.

---

## 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
  - [2] 3GPP TS 28.510: "Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Requirements"
  - [3] GS NFV-IFA 008 (V2.1.1) (2016-10): "Network Functions Virtualisation (NFV); Management and Orchestration; Ve-Vnfm Reference Point – Interface and Information Model Specification".
  - [4] 3GPP TS 28.526: "Telecommunication management; Life Cycle Management (LCM) for mobile networks that include virtualized network functions; Procedures".
  - [5] 3GPP TS 32.602: "Telecommunication management; Configuration Management (CM); Basic CM Integration Reference Point (IRP); Information Service (IS)".
  - [6] 3GPP TS 32.662: "Telecommunication management; Configuration Management (CM); Kernel CM Information Service (IS)".
  - [7] 3GPP TS 28.500: "Telecommunication management; Management concept,, architecture and requirements for mobile networks that include virtualized network functions".
- 

## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and in 3GPP TS 28.500 [7] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1] or in 3GPP TS 28.500 [7].

### 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and in 3GPP TS 28.500 [7] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1] or in 3GPP TS 28.500 [7].

## 4 Configuration Management procedures

### 4.1 Introduction

The procedures listed in clause 4, as some of all the possibilities, are not exhaustive.

### 4.2 MO configuration procedure

This procedure shows how to configure the attributes of the existing MO corresponding to a VNF instance.

Main steps for MO configuration:

- 1) NM sends a request of configuring the attributes of the existing MO corresponding to a VNF instance to EM, this request includes relevant parameters for the MO configuration.
- 2) When EM receives the MO configuration request, it configures the attributes of the existing MO.
- 3) EM responds the result of the MO configuration to NM.

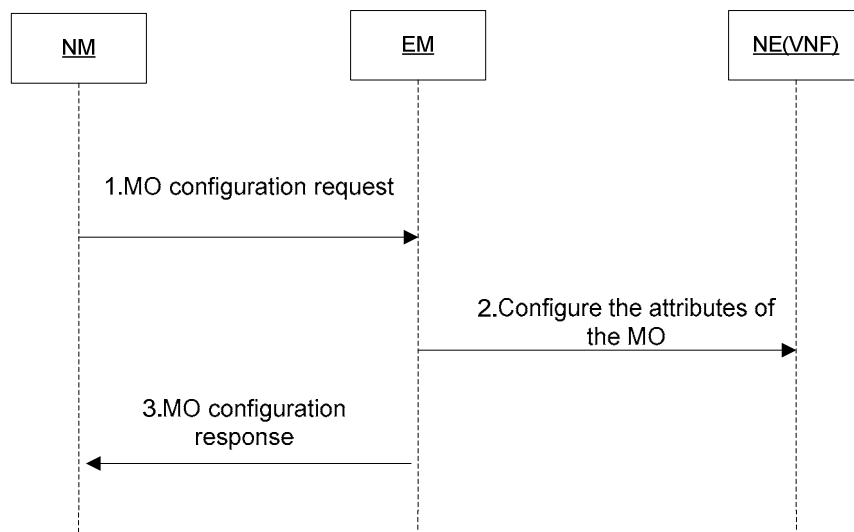


Figure 4.2-1: MO configuration procedure

### 4.3 Procedure of updating MOI(s) after a VNF is scaled

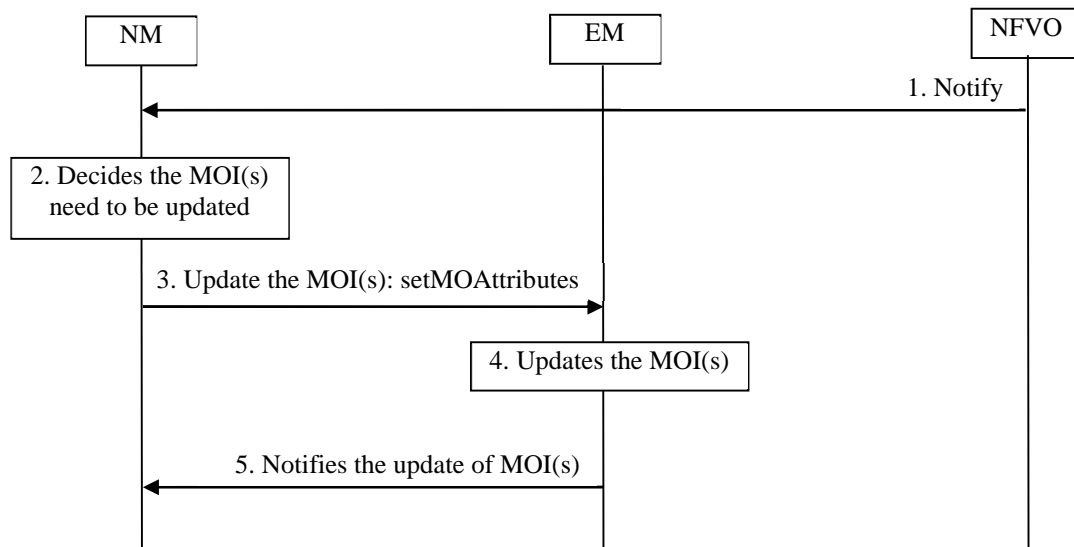
This procedure shows how to update corresponding MOI(s) after a VNF is scaled. The procedure can be triggered by NM or EM.

#### Scenario 1: Triggered by NM

The use case for scenario 1 is in clause 6.4.5 of [2]. In this case, the main steps of the procedure are:

- 1) NM receives the message indicating the VNF instance has been scaled from NFVO (refer to step 3 of procedure in clause 4.2.3.3 of TS 28.526 [4]).
- 2) NM decides the MOI(s) corresponding to the subject VNF instance need to be updated.
- 3) NM sends a request to EM to update the MOI(s) corresponding to the subject VNF instance.
- 4) EM updates the attributes of the MOI(s) corresponding to the subject VNF instance.
- 5) EM sends the notification to NM about the update of the MOI(s).

NOTE: The assumption of this scenario is that NM can know the relationship between VNF instance and corresponding MOI(s).

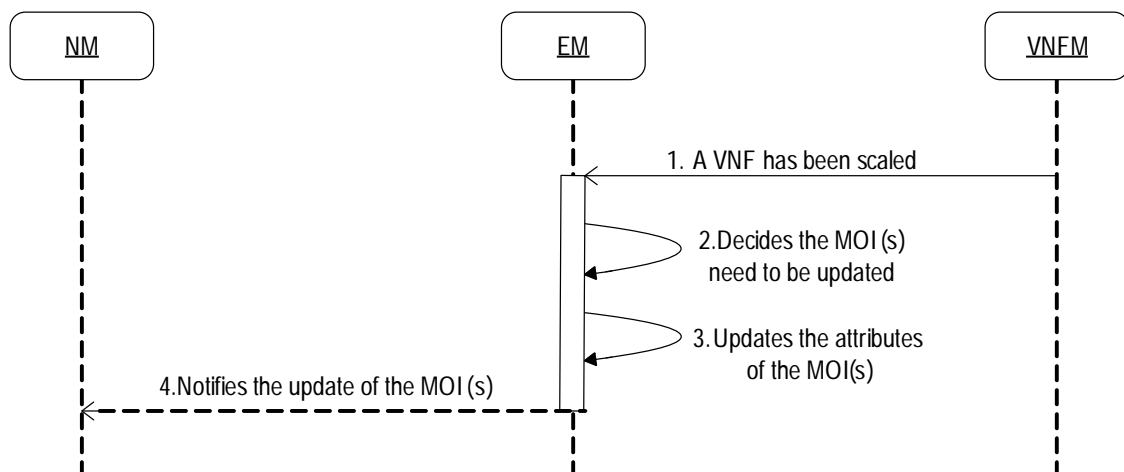


**Figure 4.3-1: Procedure of updating MOI(s) after a VNF is scaled (Triggered by NM)**

#### Scenario 2: Triggered by EM

The use case for scenario 2 is in clause 6.4.6 of [2]. In this case, the main steps of the procedure are:

- 1) EM receives the message indicating the subject VNF has been scaled from VNFM.
- 2) EM decides the MOI(s) corresponding to the subject VNF instance need to be updated.
- 3) EM updates the attributes of the MOI(s) corresponding to the subject VNF instance.
- 4) EM sends the notification to NM about the update of the MOI(s) plus the related information abstained in step 1.



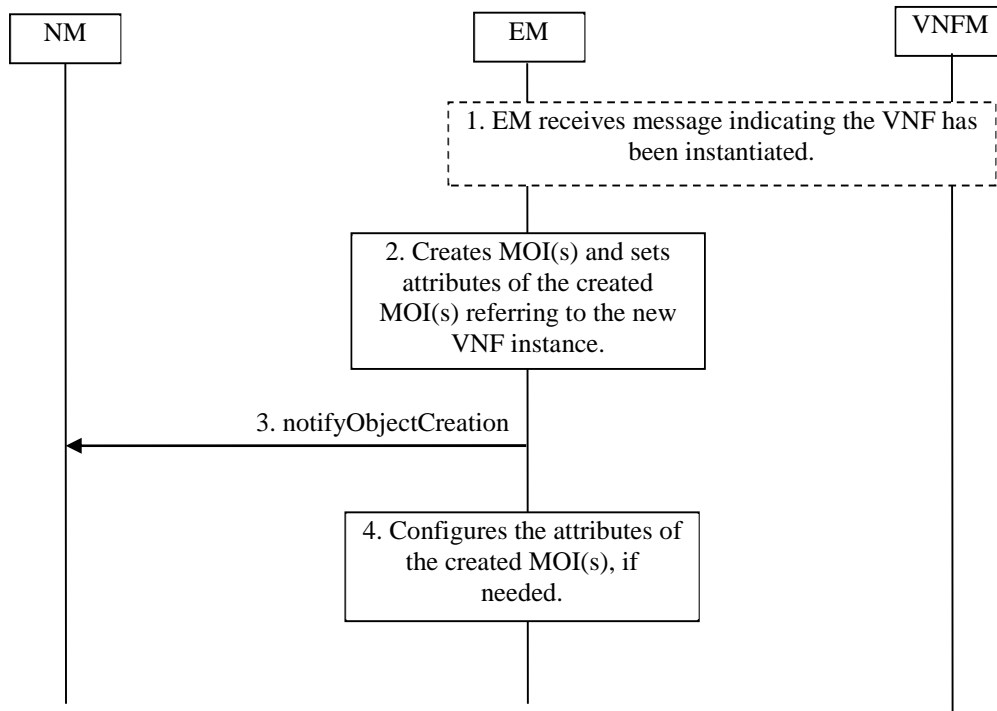
**Figure 4.3-2: Procedure of updating MOI(s) after a VNF is scaled (Triggered by EM)**



## 4.4 MO creation

### 4.4.1 MO creation after VNF instantiation (triggered by EM)

The figure 4.4.1-1 illustrates the procedure of creating MO after the corresponding VNF instantiation is triggered by EM.



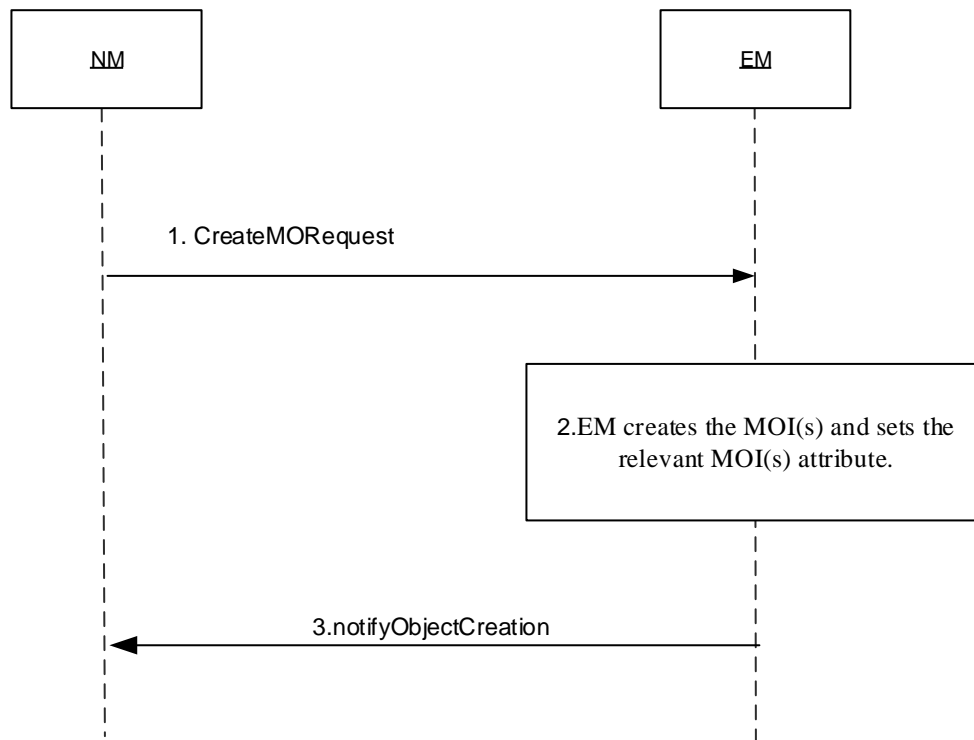
**Figure 4.4.1-1: MO creation after VNF instantiation (triggered by EM)**

- 1) When the new VNF instance is allocated with virtualized resources and configured with non-application parameters successfully, VNFM sends a *Notify* (see clause 7.3.3 [3]), carrying *VnfLifecycleChangeNotification* information element to EM with attributes *vnfInstanceId*, *status = "result"*, *operation = "instantiation"*, *lifecycleOperationOccurrenceId*, *affectedVnfc*, *affectedVl*, and *affectedVirtualStorage* (see clause 9.5.2 [3]) to indicate the end and the successful result of VNF instantiation, the parameter see clause 4.5 of [4].
- 2) EM creates the MOI(s) and sets attributes of the created MOI(s) (i.e. VNF Instance Id) referring to the new VNF instance.
- 3) EM sends a *notifyObjectCreation* [6] to NM to indicate the result of the MO creation to NM.
- 4) EM may configure the attributes of the created MOI(s) if needed and send NM the *attributeValueChange* [6] notifications if NM has subscribed to the *attributeValueChange* notification.

### 4.4.2 MO creation for a specified VNF instance

Operator wants to create MOI(s) corresponding to a specified VNF instance. Operator, via NM, knows the identifier of the specific VNF instance via NM reception of the VNF instance instantiated notification.

The figure 4.4.2-1 illustrates the procedure of creating MOI(s) for a specified VNF instance.



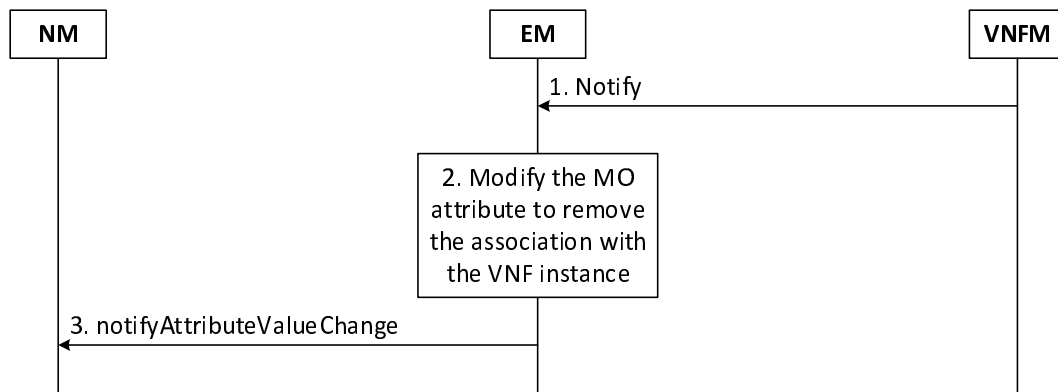
**Figure 4.4.2-1: Creating MO with VNF instance identifier specified**

- 1) NM sends a *createMO* (see clause 7.6.1 in [5]) to EM to create MOI(s) corresponding to the specified VNF instance with VNF instance identifier included. The other configuration parameters are also included in the request if needed.
- 2) EM creates the MOI(s) and sets the relevant MOI(s) attribute with the VNF Instance identifier referring to the specified VNF instance. EM may configure other attributes of the created MOI(s) if needed.
- 3) EM sends a *notifyObjectCreation* [6] to NM to indicate the result of the MO creation to NM.

## 4.5 VNF termination triggers MO attribute value change

This procedure shows the action of EM when it receives the VNF lifecycle change notification indicating a VNF instance has been terminated. It is assumed that a MO has been created to represent a VNF instance, and EM has subscribed to receive the VNF lifecycle change notification from VNFM:

- 1) VNFM sends a *Notify* (see clause 7.3.3 [3]), carrying *VnfLifecycleChangeNotification* to EM (see clause 9.5.2 [3]) to indicate the result of VNF termination, when the VNF termination operation is completed.
- 2) EM detects that a VNF instance has been terminated by checking the attributes *status* = "result" and *operation* = "termination", and decides to modify the MO attribute to remove the association with the VNF instance identified by *vnfInstanceId*.
- 3) EM sends a *notifyAttributeValueChange* [6] to NM to indicate the MO attribute value has been changed.

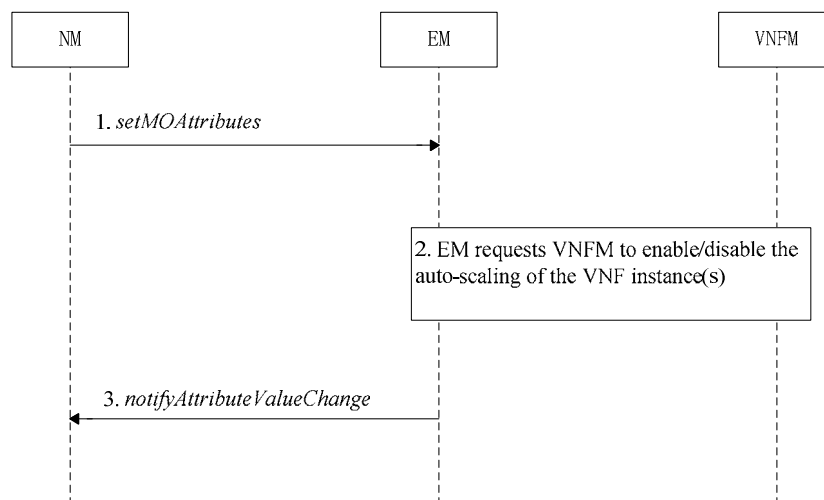


**Figure 4.5-1: VNF termination triggers MO attribute value change**

## 4.6 Enabling/disabling the auto-scaling initiated through Itf-N

Figure 4.6-1 depicts the procedure of enabling/disabling the auto-scaling of the VNF instance(s) corresponding to an NE through Itf-N.

1. NM sends to EM a *setMOAttributes* (see clause 7.6.3 in [5]) to EM with the item *<vnfInfoList.isAutoScalingEnabled, TRUE/FALSE, replace>* in the attribute *modificationList* for enabling/disabling the auto-scaling.
2. EM requests VNFM to enable/disable the auto-scaling of the VNF instance(s) (see procedure in clause 4.2.6.1 of [4]).
3. EM sends a *notifyAttributeValueChange* [6] to NM to indicate the MO attribute(s) value has been changed..



**Figure 4.6-1: Enabling/disabling the auto-scaling initiated through Itf-N**

## 4.7 VNF instance information synchronization

Figure 4.7-1 depicts the procedure of VNF instance information synchronization from MANO side to 3GPP side.

1. VNFM notifies EM with *VnfLifecycleChangeNotification* or *VnfInfoAttributeValueChangeNotification* (see clause 7.3.3 of [3]).

2. EM sends *QueryVnfRequest* to VNFM with *filter* and *attributeSelector* to query the VNF instance information (see clause 7.2.9 [3]).
3. VNFM sends *QueryVnfResponse* to EM with *vnfInfo* (see clause 9.4.2 of [3]).
4. If the attribute values on EM do not match those of the current *VnfInfo*, EM updates these values.
5. IPRAgent notifies IPRManager about the attribute value changes.

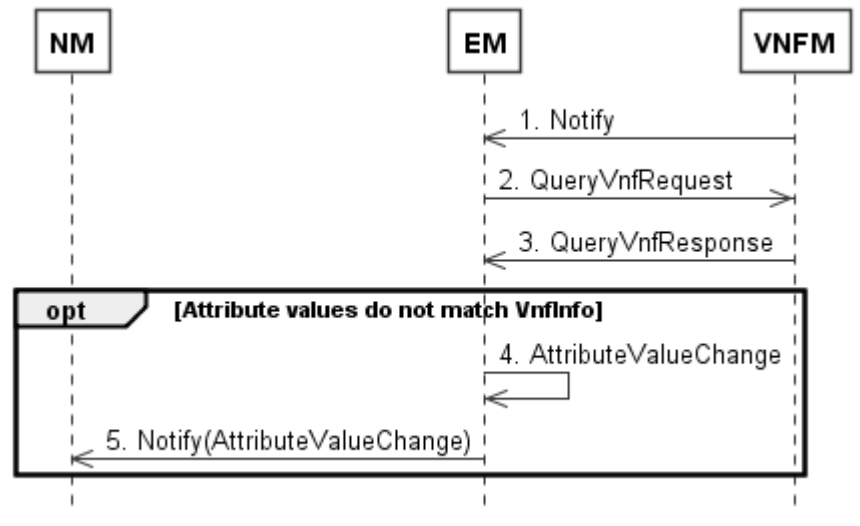


Figure 4.7-1: VNF instance information synchronization

---

## Annex A (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-06	SA#76	SP-170473				Presented for approval	2.0.0
2017-06	SA#76					Upgrade to change control version	14.0.0
2018-03	SA#79	SP-180058	0002	1	F	Scope extension	14.1.0
2018-06	-	-	-	-	-	Update to Rel-15 version (MCC)	<b>15.0.0</b>

---

# History

Document history		
V15.0.0	July 2018	Publication