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Procedures
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Foreword

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Introduction

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

- TS 28.520: Telecommunication management; Performance Management (PM) for mobile networks that include virtualized network functions; Requirements.
- TS 28.521: Telecommunication management; Performance Management (PM) for mobile networks that include virtualized network functions; Procedures.**
- TS 28.522: Telecommunication management; Performance Management (PM) for mobile networks that include virtualized network functions; Stage 2.
- TS 28.523: Telecommunication management; Performance Management (PM) for mobile networks that include virtualized network functions; Stage 3.

1 Scope

The present document specifies the Performance Management procedures for mobile networks that include virtualized network functions which can be part of EPC or IMS.

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 32.412: "Telecommunication management; Performance Management (PM) Integration Reference Point (IRP); Information Service (IS)".
- [3] ETSI GS NFV-IFA008 V2.1.1 (2016-10): "Network Function Virtualization (NFV); Management and Orchestration; Ve-Vnfm Reference Point - Interface and Information Model Specification".
- [4] 3GPP TS 32.302: "Telecommunication management; Configuration Management (CM) Notification Integration Reference Point (IRP); Information Service (IS)".
- [5] 3GPP TS 32.342: "Telecommunication management; File Transfer (FT) Integration Reference Point (IRP); Information Service (IS)".
- [6] 3GPP TS 32.426: "Telecommunication management; Performance Management (PM); Performance measurements Evolved Packet Core (EPC) network".
- [7] 3GPP TS 28.500: "Telecommunication 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], 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], in 3GPP TS 28.500 [3] 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 Performance Management procedures

4.1 Introduction

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

4.2 Threshold creation for monitoring the 3GPP NF performance measurements related to VR

Figure 4.2-1 depicts a procedure that describes how the 3GPP NF performance measurements related VR threshold crossing notification is generated. If the threshold is created to monitor a performance measurement directly without association with a PM job, then step 1 to 4 are not needed:

1. NM sends a request to EM to create a measurement job (see clause 7.3.1 of [2]) to collect the 3GPP NF performance measurements related VR. The job is defined by the parameters, such as `iOCName` and `iOCInstanceList` ... etc. as listed in clause 7.3.1.2 of [2].
2. EM sends a request with `sourceSelector`, `performanceMetric`, `performanceMetricGroup`, `collectionPeriod`, `reportingPeriod`, `reportingBoundary` (see clause 7.6.2.2 of [3]), to VNFM to create a PM job to collect VNF/VNFC PM data related to VR.
3. VNFM sends a response with `pmJobId` (see clause 7.6.2.3 of [3]) to EM to indicate the PM job that has been created.
4. EM sends a response to NM with `jobId` that is mapped from `pmJobId`, and `status = Success` (see clause 7.3.1.3 of [2]).
5. NM sends a request to EM to create thresholds (see clause 7.4.1 of [2]) that are defined by parameters, such as `iOCName`, `iOCInstanceList`, and `thresholdInfoList` (see clause 7.4.1.2 of [2]) to monitor the 3GPP NF performance measurements related VR.
6. EM sends a request to VNFM with `sourceSelector`, `performanceMetric`, `thresholdType`, `thresholdDetails` (see clause 7.6.7.2 of [3]), to create the thresholds for monitoring the measurement types specified in `sourceSelector`.
7. VNFM sends a response to EM with `thresholdId` (see clause 7.6.7.3 of [3]) to indicate the identifiers of thresholds that have been created.
8. EM sends a response to NM with `monitorId`, and `status = Success` (see clause 7.4.1.3 of [2]).
9. NM sends a request to EM to subscribe the 3GPP NF performance measurements related VR threshold crossing notification (see clause 6.3.1 of [4]).
10. EM sends a request with `filter` (see clause 7.6.4.2 of [3]) to VNFM to subscribe the VNF/VNFC performance information related VR threshold crossing notification.
11. VNFM sends a response with `subscriptionId` (see clause 7.6.4.3 of [3]) to EM to indicate the notification subscription that has been subscribed.
12. EM sends a response to NM to indicate that the 3GPP NF performance measurements related VR threshold crossing notification has been subscribed (see clause 6.3.1 of [4]).

13. VNFM sends a notification with `thresholdId`, `crossingDirection`, `objectInstanceId`, `performanceMetric`, `performanceValue` (see clause 9.7.9.3 of [3]) to EM to indicate the threshold identified by `objectInstanceId` has been crossed.
14. EM sends a notification with the object instance ID to NM to indicate that the threshold identified by object instance has been crossed.

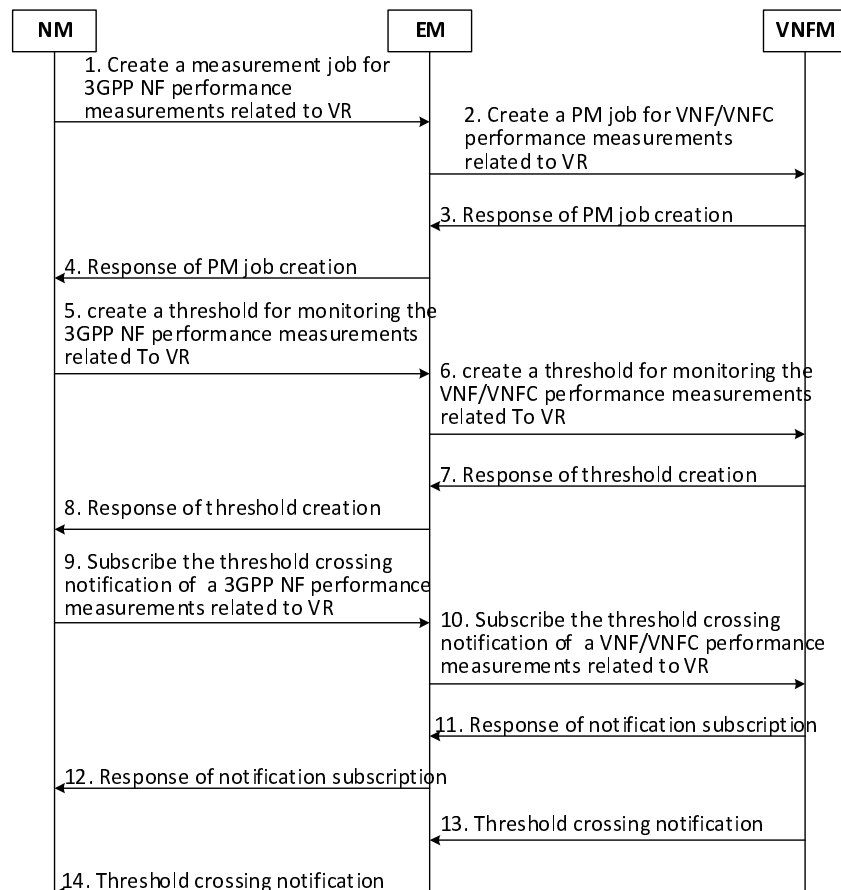


Figure 4.2-1: 3GPP NF performance measurements related VR threshold crossing notification procedure

4.3 VNF PM data related to VR job creation procedure

Figure 4.3-1 depicts a procedure that describes how VNF PM data related to VR job is created:

- EM sends a *CreatePmJobRequest* to VNFM with the following parameters (see clause 7.6.2.2 of [3]) to create a PM job:
 - `sourceSelector`: It identifies the VNF/VNFC for which the PM data is to be collected.
 - `performanceMetric` or `performanceMetricGroup`: It defines the type of performance metric(s), or the group of performance metric(s). Only one of the two is present.
 - `collectionPeriod`: it specifies the periodicity at which the VNFM will collect performance information.
 - `reportingPeriod`: It specifies the periodicity at which the VNFM will report to the EM about performance information,
 - `reportingBoundary`: It identifies a boundary after which the reporting will stop, and is optional.

2. VNFM sends a *CreatePmJobResponse* to EM with `pmJobId` (see clause 7.6.2.3 of [3]) to indicate the PM job that has been created.

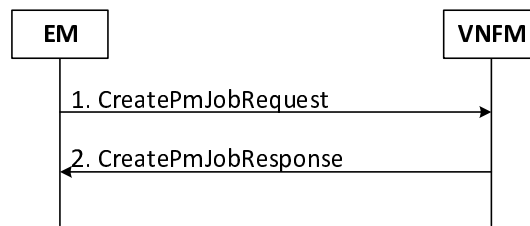


Figure 4.3-1: VNF PM data related to VR job creation procedure

4.4 VNF PM data related to VR subscription procedure

Figure 4.4-1 depicts a procedure that describes how to create a subscription to monitor VNF PM data related to VR:

1. EM sends a *SubscribeRequest* to VNFM with `filter` (see clause 7.6.4.2 of [3]) to subscribe the VNF PM data related to VR available notification.
2. VNFM sends a *SubscribeResponse* to EM with `subscriptionId` (see clause 7.6.4.3 of [3]) to indicate the notification subscription that has been subscribed.

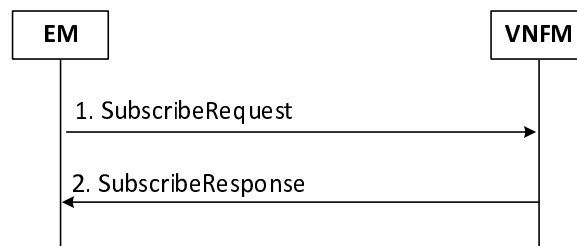


Figure 4.4-1: subscription for VNF PM data related to VR procedure

4.5 VNF PM data related to VR available notification procedure

Figure 4.5-1 depicts a procedure that describes how VNF PM data related to VR available notification is generated. EM has subscribed to receive the notification from VNFM. NM has subscribed to receive the notification from EM:

1. VNFM invokes an operation called *Notify* (see clause 7.6.5 of [3]) to send a *PerformanceInformationAvailableNotification* to EM (see clause 9.7.8 of [3]) with `objectInstanceId`, the identifier of the VNF or VNFC instances (see clause 9.7.8.3 of [3]), to indicate the VNF PM data related to VR identified by `objectInstanceId` is available.
2. EM invokes a notification called *notifyFileReady* (see clause 6.5.1 of [5]) to NM with `object instance IDs` to indicate that the VNF PM data related to VR identified by object instance ID is available.

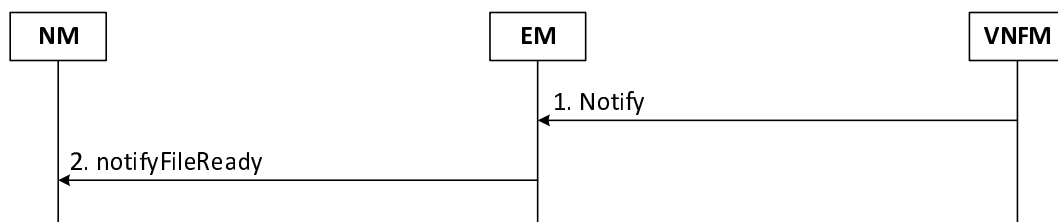


Figure 4.5-1: VNF PM data related to VR available notification procedure

4.6 PM job deletion for VNF/VNFC performance measurements related to VR

Figure 4.6-1 depicts a procedure PM job deletion for VNF/VNFC performance measurements related to VR.

1. EM sends a *DeletePmJobRequest* to VNFM with the `pmJobId` (see clause 7.4.3.2 of [3]) to identify the PM jobs to be deleted.
2. VNFM sends a *DeletePmJobResponse* to EM with `deletedPmJobId` (see clause 7.4.3.3 of [3]) to identify the PM jobs that have been deleted.

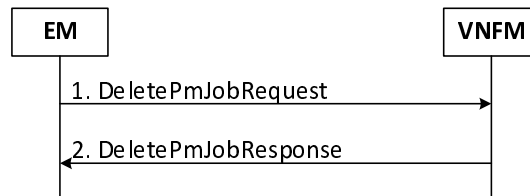


Figure 4.6-1: PM job deletion for VNF/VNFC performance measurements related to VR

4.7 Measurement job suspension for 3GPP NF performance measurements related to VR

Figure 4.7-1 depicts a procedure on measurement job suspension for 3GPP NF performance measurements related to VR:

1. NM invokes the `suspendMeasurementJob` operation (see clause 7.3.3 of [2]) with `jobId` to request EM to suspend the measurement job for 3GPP NF performance measurements related to VR.
2. EM stops the reporting of the measurement result data for the measurement job identified by the `jobId`.
3. EM responds the `suspendMeasurementJob` operation (see clause 7.3.1 of [2]) to NM with the result of the measurement job suspension.

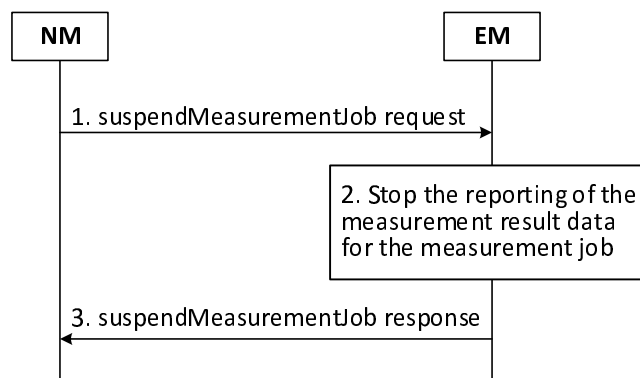


Figure 4.7-1: Measurement job suspension for 3GPP NF performance measurements related to VR

4.8 Measurement job resumption for 3GPP NF performance measurements related to VR

Figure 4.8-1 depicts a procedure on measurement job resumption for 3GPP NF performance measurements related to VR:

1. NM invokes the `resumeMeasurementJob` operation (see clause 7.3.3 of [2]) with `jobId` to request EM to resume the measurement job for 3GPP NF performance measurements related to VR.

2. If the PM jobs used to support the measurement job identified by the `jobId` do not exist anymore, EM requests VNFM to create the PM job(s), according to the procedure defined in clause 4.3.
3. EM resumes the reporting of the measurement result data for the measurement job identified by the `jobId`.
4. EM responds the `resumeMeasurementJob` operation (see clause 7.3.1 of [2]) to NM with the result of the measurement job resumption.

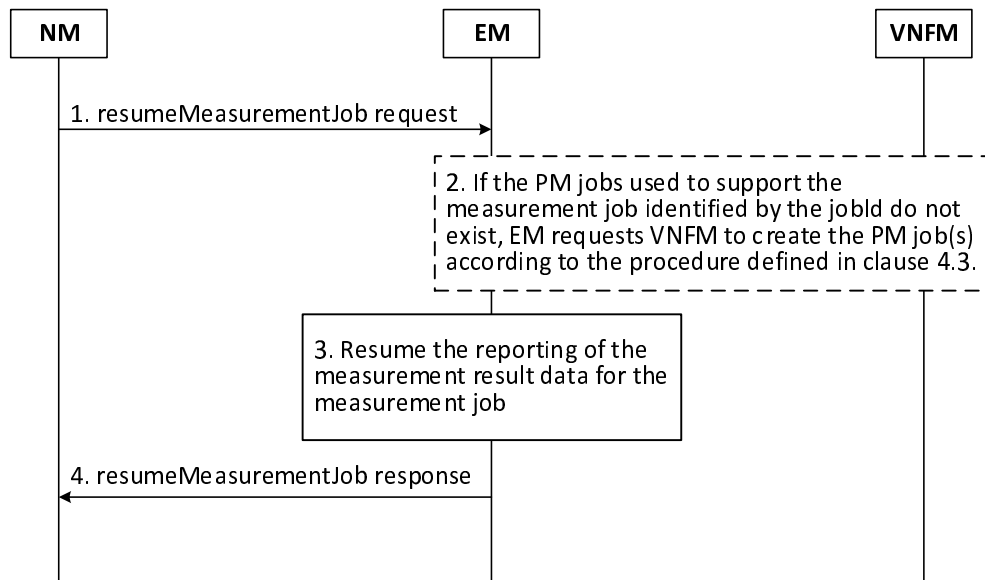


Figure 4.8-1: Measurement job resumption for 3GPP NF performance measurements related to VR

4.9 Performance alarm notification procedure for NF performance measurements related to VR

Figure 4.9-1 depicts a procedure that describes how EM can generate a performance alarm when threshold crossing notifications are received from VNFM. It is assumed that EM has subscribed to receive the threshold crossing notification from VNFM:

1. VNFM sends a *ThresholdCrossedNotification* with the following parameters (see clause 9.7.9.3 of [3]) to EM to indicate the threshold that has been crossed:
 - `thresholdId`: identifies the threshold which has been crossed.
 - `crossingDirection`: indicates whether the threshold was crossed in upward or downward direction.
 - `objectInstanceId`: identifies the VNF or VNFC instance for which the threshold has been crossed.
 - `performanceMetric`: indicates the performance metric associated with the threshold.
 - `performanceValue`: indicates the value of the metric that resulted in threshold crossing.
2. EM maps the `performanceValue` to the performance measurements for 3GPP NF related to VR, and determines whether or which alarm notification (i.e., `notifyNewAlarm`, `notifyChangedAlarm` or `notifyClearedAlarm` for the measurements defined in TS 32.426 [6]) should be sent to NM (see Annex B in [2]), based on the `ThresholdMonitor` created by NM (see clause 7.4.1.1 in [2]).

Note: How EM to perform mapping depends on the definition/specification of "performance measurements for 3GPP NF related to VR" and of `performanceMetric`, which are not defined in the present specification.

3. If an alarm needs to be generated:
 - 3.1. EM saves the performance alarm to the `AlarmList`.

- 3.2.a. If the performance alarm is a new alarm, then EM sends a *notifyNewAlarm* notification to NM.
- 3.2.b. If the performance alarm is a changed alarm, then EM sends to NM either a *notifyChangedAlarm* notification, or *notifyClearedAlarm* follow by a *notifyNewAlarm* notifications if *notifyChangedAlarm* is not supported.
- 3.2.c. If the performance alarm is a cleared alarm, then EM sends a *notifyClearedAlarm* notification to NM.

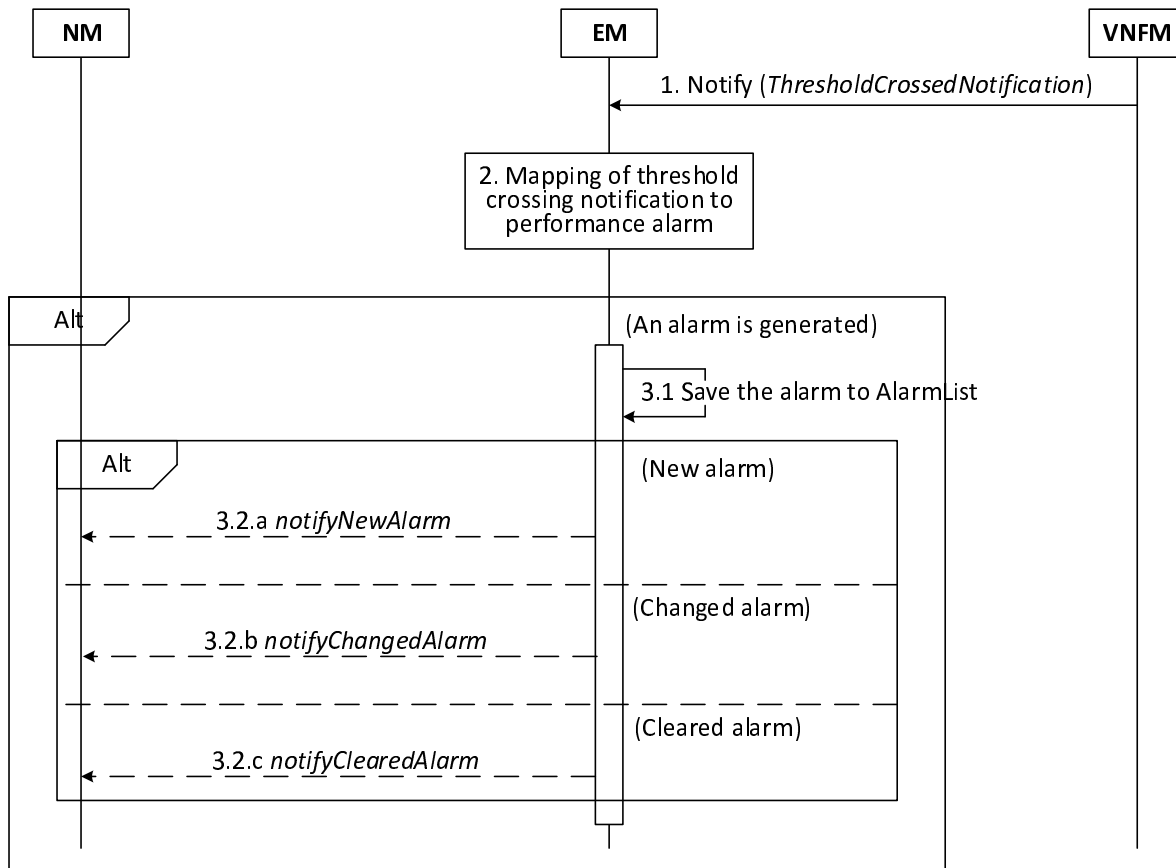


Figure 4.9-1: Performance alarm notification procedure for NF performance measurements related to VR

Annex A (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
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2017-06	SA#76					Upgraded to change control version	14.0.0

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