

# ETSI TS 128 532 V16.14.0 (2023-04)



## **5G; Management and orchestration; Generic management services (3GPP TS 28.532 version 16.14.0 Release 16)**

[ETSI TS 128 532 V16.14.0 \(2023-04\)](https://standards.iteh.ai/catalog/standards/sist/d883c415-c9b6-4654-8a95-2ce6425f57ea/etsi-ts-128-532-v16-14-0-2023-04)

<https://standards.iteh.ai/catalog/standards/sist/d883c415-c9b6-4654-8a95-2ce6425f57ea/etsi-ts-128-532-v16-14-0-2023-04>



---

**Reference**RTS/TSGS-0528532vge0

---

**Keywords**5G

---

**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 - APE 7112B  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° w061004871

---

**Important notice**

The present document can be downloaded from:

<https://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 prevailing version of an ETSI deliverable is the one made publicly available in PDF format at [www.etsi.org/deliver](http://www.etsi.org/deliver).

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://standards-portal.etsi.org/People/CommitteeSupportStaff.aspx> 4654-8a95-

If you find a security vulnerability in the present document, please report it through our

Coordinated Vulnerability Disclosure Program:

<https://www.etsi.org/standards/coordinated-vulnerability-disclosure>

---

**Notice of disclaimer & limitation of liability**

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

---

**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 2023.

All rights reserved.

---

# Intellectual Property Rights

## Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are 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 Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, 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.

**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 a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

---

# Legal Notice

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. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found under <https://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  |
| Legal Notice .....                                | 2  |
| Modal verbs terminology.....                      | 2  |
| Foreword.....                                     | 14 |
| 1 Scope .....                                     | 15 |
| 2 References .....                                | 15 |
| 3 Definitions and abbreviations.....              | 17 |
| 3.1 Definitions .....                             | 17 |
| 3.2 Abbreviations .....                           | 17 |
| 4 Overview .....                                  | 17 |
| 5 Void.....                                       | 17 |
| 6 Void.....                                       | 17 |
| 7 Void.....                                       | 17 |
| 8 Void.....                                       | 17 |
| 9 Void.....                                       | 17 |
| 10 Void.....                                      | 18 |
| 11 Management services – Stage 2 .....            | 18 |
| 11.1 Generic provisioning management service..... | 18 |
| 11.1.0 Introduction.....                          | 18 |
| 11.1.1 Operations and notifications .....         | 18 |
| 11.1.1.1 createMOI operation .....                | 18 |
| 11.1.1.1.1 Description .....                      | 18 |
| 11.1.1.1.2 Input parameters .....                 | 18 |
| 11.1.1.1.3 Output parameters .....                | 19 |
| 11.1.1.1.4 Results .....                          | 19 |
| 11.1.1.2 getMOIAttributes operation .....         | 20 |
| 11.1.1.2.1 Definition.....                        | 20 |
| 11.1.1.2.2 Input Parameters .....                 | 20 |
| 11.1.1.2.3 Output Parameters .....                | 22 |
| 11.1.1.2.4 Results .....                          | 22 |
| 11.1.1.3 modifyMOIAttributes operation .....      | 22 |
| 11.1.1.3.1 Description .....                      | 22 |
| 11.1.1.3.2 Input parameters .....                 | 23 |
| 11.1.1.3.3 Output parameters .....                | 25 |
| 11.1.1.3.4 Results .....                          | 25 |
| 11.1.1.4 deleteMOI operation .....                | 25 |
| 11.1.1.4.1 Description .....                      | 25 |
| 11.1.1.4.2 Input parameters .....                 | 25 |
| 11.1.1.4.3 Output parameters .....                | 26 |
| 11.1.1.4.4 Results .....                          | 26 |
| 11.1.1.5 Void.....                                | 26 |
| 11.1.1.6 Void.....                                | 26 |
| 11.1.1.7 Notification notifyMOICreation .....     | 26 |
| 11.1.1.7.1 Definition.....                        | 26 |
| 11.1.1.7.2 Input parameters .....                 | 27 |
| 11.1.1.7.3 Triggering event .....                 | 28 |
| 11.1.1.7.3.1 From-state .....                     | 28 |
| 11.1.1.7.3.2 To-state .....                       | 28 |
| 11.1.1.8 Notification notifyMOIDeletion .....     | 28 |

|                |                                                                        |    |
|----------------|------------------------------------------------------------------------|----|
| 11.1.1.8.1     | Definition.....                                                        | 28 |
| 11.1.1.8.2     | Input parameters .....                                                 | 29 |
| 11.1.1.8.3     | Triggering event .....                                                 | 30 |
| 11.1.1.8.3.1   | From-state .....                                                       | 30 |
| 11.1.1.8.3.2   | To-state .....                                                         | 30 |
| 11.1.1.9       | Notification notifyMOIAttributeValueChanges.....                       | 30 |
| 11.1.1.9.1     | Definition.....                                                        | 30 |
| 11.1.1.9.2     | Input parameters .....                                                 | 31 |
| 11.1.1.9.3     | Triggering event .....                                                 | 33 |
| 11.1.1.9.3.1   | From-state .....                                                       | 33 |
| 11.1.1.9.3.2   | To-state .....                                                         | 33 |
| 11.1.1.10      | Notification notifyEvent.....                                          | 33 |
| 11.1.1.10.1    | Definition.....                                                        | 33 |
| 11.1.1.10.2    | Input parameters .....                                                 | 34 |
| 11.1.1.11      | Notification notifyMOIChanges .....                                    | 34 |
| 11.1.1.11.1    | Definition.....                                                        | 34 |
| 11.1.1.11.2    | Input parameters .....                                                 | 35 |
| 11.1.2         | Managed Information .....                                              | 35 |
| 11.1.2.1       | ManagedEntity << ProxyClass>> .....                                    | 35 |
| 11.1.2.1.1     | Definition.....                                                        | 35 |
| 11.2           | Generic fault supervision management service .....                     | 36 |
| 11.2.1         | Operations and notifications .....                                     | 36 |
| 11.2.1.1       | Fault supervision data report .....                                    | 36 |
| 11.2.1.1.1     | subscribe .....                                                        | 36 |
| 11.2.1.1.1.1   | Definition .....                                                       | 36 |
| 11.2.1.1.1.2   | Input parameters .....                                                 | 36 |
| 11.2.1.1.1.3   | Output parameters.....                                                 | 36 |
| 11.2.1.1.1.4   | Pre-condition.....                                                     | 37 |
| 11.2.1.1.1.5   | Post-condition.....                                                    | 37 |
| 11.2.1.1.1.6   | Exceptions.....                                                        | 37 |
| 11.2.1.1.2     | unsubscribe .....                                                      | 38 |
| 11.2.1.1.2.1   | Definition .....                                                       | 38 |
| 11.2.1.1.2.2   | Input parameters .....                                                 | 38 |
| 11.2.1.1.2.3   | Output parameters.....                                                 | 38 |
| 11.2.1.1.2.4   | Pre-condition.....                                                     | 38 |
| 11.2.1.1.2.5   | Post-condition .....                                                   | 38 |
| 11.2.1.1.2.6   | Exceptions.....                                                        | 38 |
| 11.2.1.1.3     | getAlarmList.....                                                      | 39 |
| 11.2.1.1.3.1   | Definition.....                                                        | 39 |
| 11.2.1.1.3.2   | Input parameters .....                                                 | 39 |
| 11.2.1.1.3.3   | Output parameters.....                                                 | 40 |
| 11.2.1.1.3.4   | Exceptions and constraints.....                                        | 43 |
| 11.2.1.1.4     | notifyNewAlarm.....                                                    | 43 |
| 11.2.1.1.4.1   | Definition .....                                                       | 43 |
| 11.2.1.1.4.2   | Input parameters .....                                                 | 43 |
| 11.2.1.1.4.2a  | Input parameters for notifications related to non-security alarms..... | 45 |
| 11.2.1.1.4.3   | Triggering event.....                                                  | 45 |
| 11.2.1.1.4.3.1 | From-state .....                                                       | 45 |
| 11.2.1.1.4.3.2 | To-state.....                                                          | 46 |
| 11.2.1.1.5     | notifyChangedAlarm .....                                               | 46 |
| 11.2.1.1.5.1   | Definition .....                                                       | 46 |
| 11.2.1.1.5.2   | Input parameters .....                                                 | 46 |
| 11.2.1.1.5.3   | Triggering event.....                                                  | 46 |
| 11.2.1.1.5.3.1 | From-state .....                                                       | 46 |
| 11.2.1.1.5.3.2 | To-state.....                                                          | 47 |
| 11.2.1.1.6     | notifyAlarmListRebuilt .....                                           | 47 |
| 11.2.1.1.6.1   | Definition .....                                                       | 47 |
| 11.2.1.1.6.2   | Input parameters .....                                                 | 47 |
| 11.2.1.1.6.3   | Triggering event.....                                                  | 48 |
| 11.2.1.1.6.3.1 | From-state .....                                                       | 48 |
| 11.2.1.1.6.3.2 | To-state.....                                                          | 48 |
| 11.2.1.1.7     | notifyCorrelatedNotificationChanged .....                              | 48 |

|                |                                                                        |    |
|----------------|------------------------------------------------------------------------|----|
| 11.2.1.1.7.1   | Definition .....                                                       | 48 |
| 11.2.1.1.7.2   | Input parameters .....                                                 | 48 |
| 11.2.1.1.7.3   | Triggering event.....                                                  | 48 |
| 11.2.1.1.7.3.1 | From-state .....                                                       | 48 |
| 11.2.1.1.7.3.2 | To-state.....                                                          | 49 |
| 11.2.1.1.8     | getAlarmCount .....                                                    | 49 |
| 11.2.1.1.8.1   | Definition .....                                                       | 49 |
| 11.2.1.1.8.2   | Input parameters .....                                                 | 49 |
| 11.2.1.1.8.3   | Output parameters.....                                                 | 50 |
| 11.2.1.1.8.4   | Pre-condition.....                                                     | 50 |
| 11.2.1.1.8.5   | Post-condition .....                                                   | 50 |
| 11.2.1.1.8.6   | Exceptions.....                                                        | 50 |
| 11.2.1.1.9     | setComment.....                                                        | 50 |
| 11.2.1.1.9.1   | Definition .....                                                       | 50 |
| 11.2.1.1.9.2   | Input parameters .....                                                 | 51 |
| 11.2.1.1.9.3   | Output Parameters.....                                                 | 51 |
| 11.2.1.2       | Fault supervision data control .....                                   | 51 |
| 11.2.1.2.1     | acknowledgeAlarms .....                                                | 51 |
| 11.2.1.2.1.1   | Definition .....                                                       | 51 |
| 11.2.1.2.1.2   | Input parameters .....                                                 | 51 |
| 11.2.1.2.1.3   | Output parameters.....                                                 | 52 |
| 11.2.1.2.1.4   | Exceptions and constraints.....                                        | 52 |
| 11.2.1.2.2     | unacknowledgeAlarms .....                                              | 52 |
| 11.2.1.2.2.1   | Definition .....                                                       | 52 |
| 11.2.1.2.2.2   | Input parameters .....                                                 | 53 |
| 11.2.1.2.2.3   | Output parameters.....                                                 | 53 |
| 11.2.1.2.2.4   | Exceptions and constraints.....                                        | 54 |
| 11.2.1.2.3     | clearAlarms .....                                                      | 54 |
| 11.2.1.2.3.1   | Definition .....                                                       | 54 |
| 11.2.1.2.3.2   | Input parameters .....                                                 | 54 |
| 11.2.1.2.3.3   | Output parameters.....                                                 | 54 |
| 11.2.1.2.3.4   | Exceptions and constraints.....                                        | 54 |
| 11.2.1.2.4     | notifyClearedAlarm.....                                                | 54 |
| 11.2.1.2.4.1   | Definition .....                                                       | 54 |
| 11.2.1.2.4.2   | Input parameters .....                                                 | 55 |
| 11.2.1.2.4.3   | Triggering event.....                                                  | 55 |
| 11.2.1.2.4.3.1 | From-state .....                                                       | 55 |
| 11.2.1.2.4.3.2 | To-state.....                                                          | 55 |
| 11.2.1.2.5     | notifyAckStateChanged.....                                             | 56 |
| 11.2.1.2.5.1   | Definition .....                                                       | 56 |
| 11.2.1.2.5.2   | Input parameters .....                                                 | 56 |
| 11.2.1.2.5.3   | Triggering event.....                                                  | 56 |
| 11.2.1.2.5.3.1 | From-state .....                                                       | 56 |
| 11.2.1.2.5.3.2 | To-state.....                                                          | 56 |
| 11.2.1.2.6     | notifyComments .....                                                   | 56 |
| 11.2.1.2.6.1   | Definition .....                                                       | 56 |
| 11.2.1.2.6.2   | Input parameters .....                                                 | 57 |
| 11.2.1.2.6.3   | Trigger event.....                                                     | 57 |
| 11.2.1.2.6.3.1 | From-state .....                                                       | 57 |
| 11.2.1.2.6.3.2 | To-state.....                                                          | 57 |
| 11.2.1.2.7     | notifyPotentialFaultyAlarmList.....                                    | 57 |
| 11.2.1.2.7.1   | Definition .....                                                       | 57 |
| 11.2.1.2.7.2   | Input parameters .....                                                 | 58 |
| 11.2.1.2.7.3   | Trigger event.....                                                     | 58 |
| 11.2.1.2.7.3.1 | From-state .....                                                       | 58 |
| 11.2.1.2.7.3.2 | To-state.....                                                          | 58 |
| 11.2.1.2.8     | notifyChangedAlarmGeneral.....                                         | 59 |
| 11.2.1.2.8.1   | Definition .....                                                       | 59 |
| 11.2.1.2.8.2   | Input parameters for notifications related to non-security alarms..... | 59 |
| 11.2.1.2.8.3   | Input parameters for notifications related to security alarm.....      | 59 |
| 11.2.1.2.8.4   | Trigger event.....                                                     | 60 |
| 11.2.1.2.8.4.1 | From-state .....                                                       | 60 |

|                |                                                                                  |    |
|----------------|----------------------------------------------------------------------------------|----|
| 11.2.2         | Managed information.....                                                         | 61 |
| 11.2.2.1       | Alarm information, alarm state change and Information Object Classes.....        | 61 |
| 11.2.2.1.1     | Imported information entities and local labels .....                             | 61 |
| 11.2.2.1.2     | Class diagram .....                                                              | 61 |
| 11.2.2.1.2.1   | Introduction.....                                                                | 61 |
| 11.2.2.1.2.2   | Attributes and relationships .....                                               | 62 |
| 11.2.2.1.3     | Information Object Class Definitions .....                                       | 62 |
| 11.2.2.1.3.1   | AlarmInformation .....                                                           | 62 |
| 11.2.2.1.3.1.1 | Definition .....                                                                 | 62 |
| 11.2.2.1.3.1.2 | Attribute .....                                                                  | 63 |
| 11.2.2.1.3.1.3 | State diagram.....                                                               | 63 |
| 11.2.2.1.3.2   | AlarmList .....                                                                  | 65 |
| 11.2.2.1.3.2.1 | Definition .....                                                                 | 65 |
| 11.2.2.1.3.2.2 | Attribute .....                                                                  | 65 |
| 11.2.2.1.3.3   | FSMnSProducer.....                                                               | 66 |
| 11.2.2.1.3.3.1 | Definition .....                                                                 | 66 |
| 11.2.2.1.3.3.2 | Attribute .....                                                                  | 66 |
| 11.2.2.1.3.3.3 | Notification Table .....                                                         | 66 |
| 11.2.2.1.3.4   | Comment .....                                                                    | 66 |
| 11.2.2.1.3.4.1 | Definition .....                                                                 | 66 |
| 11.2.2.1.3.4.2 | Attribute .....                                                                  | 66 |
| 11.2.2.1.3.5   | CorrelatedNotification .....                                                     | 66 |
| 11.2.2.1.3.5.1 | Definition .....                                                                 | 66 |
| 11.2.2.1.3.5.2 | Attribute .....                                                                  | 67 |
| 11.2.2.1.3.6   | MonitoredEntity.....                                                             | 67 |
| 11.2.2.1.3.6.1 | Definition .....                                                                 | 67 |
| 11.2.2.1.3.6.2 | Attribute .....                                                                  | 67 |
| 11.2.2.1.4     | Information relationships definition .....                                       | 68 |
| 11.2.2.1.4.1   | relation-FSMnSProducer-AlarmList (M).....                                        | 68 |
| 11.2.2.1.4.1.1 | Definition .....                                                                 | 68 |
| 11.2.2.1.4.1.2 | Role .....                                                                       | 68 |
| 11.2.2.1.4.1.3 | Constraint .....                                                                 | 68 |
| 11.2.2.1.4.2   | relation-AlarmList-AlarmInformation (M).....                                     | 68 |
| 11.2.2.1.4.2.1 | Definition .....                                                                 | 68 |
| 11.2.2.1.4.2.2 | Role .....                                                                       | 68 |
| 11.2.2.1.4.2.3 | Constraint .....                                                                 | 68 |
| 11.2.2.1.4.3   | relation-AlarmInformation-Comment (M).....                                       | 68 |
| 11.2.2.1.4.3.1 | Definition .....                                                                 | 68 |
| 11.2.2.1.4.3.2 | Role .....                                                                       | 68 |
| 11.2.2.1.4.3.3 | Constraint .....                                                                 | 68 |
| 11.2.2.1.4.4   | relation-AlarmInformation-CorrelatedNotification (M) .....                       | 68 |
| 11.2.2.1.4.4.1 | Definition .....                                                                 | 68 |
| 11.2.2.1.4.4.2 | Role .....                                                                       | 69 |
| 11.2.2.1.4.4.3 | Constraint .....                                                                 | 69 |
| 11.2.2.1.4.5   | relation-AlarmedObject-AlarmInformation (M).....                                 | 69 |
| 11.2.2.1.4.5.1 | Definition .....                                                                 | 69 |
| 11.2.2.1.4.5.2 | Role .....                                                                       | 69 |
| 11.2.2.1.4.5.3 | Constraint .....                                                                 | 69 |
| 11.2.2.1.4.6   | relation-backUpObject-AlarmInformation (O) .....                                 | 69 |
| 11.2.2.1.4.6.1 | Definition .....                                                                 | 69 |
| 11.2.2.1.4.6.2 | Role .....                                                                       | 69 |
| 11.2.2.1.4.6.3 | Constraint .....                                                                 | 69 |
| 11.2.2.1.5     | Information attribute definition .....                                           | 70 |
| 11.2.2.1.5.1   | Definition and legal values .....                                                | 70 |
| 11.2.2.1.5.2   | Constraints .....                                                                | 73 |
| 11.2.2.2       | Subscription information, subscription state and Information Object Classes..... | 74 |
| 11.2.2.2.1     | Imported information entities and local labels .....                             | 74 |
| 11.2.2.2.2     | Class Diagram .....                                                              | 74 |
| 11.2.2.2.2.1   | Attributes and relationships .....                                               | 74 |
| 11.2.2.2.2.2   | Inheritance .....                                                                | 74 |
| 11.2.2.2.3     | Information object classes definition.....                                       | 75 |

|                |                                                  |    |
|----------------|--------------------------------------------------|----|
| 11.2.2.2.3.1   | NtfSubscriber .....                              | 75 |
| 11.2.2.2.3.1.1 | Definition .....                                 | 75 |
| 11.2.2.2.3.1.2 | Attributes .....                                 | 75 |
| 11.2.2.2.3.2   | NtfSubscription .....                            | 75 |
| 11.2.2.2.3.2.1 | Definition .....                                 | 75 |
| 11.2.2.2.3.2.2 | Attributes .....                                 | 75 |
| 11.2.2.2.3.2.3 | Void .....                                       | 75 |
| 11.2.2.2.3.3   | NotificationIRP .....                            | 75 |
| 11.2.2.2.3.3.1 | Definition .....                                 | 75 |
| 11.2.2.2.4     | Information relationship definitions .....       | 76 |
| 11.2.2.2.4.1   | relation-ntfSubscriber-ntfSubscription (M) ..... | 76 |
| 11.2.2.2.4.1.1 | Definition .....                                 | 76 |
| 11.2.2.2.4.1.2 | Roles .....                                      | 76 |
| 11.2.2.2.4.1.3 | Constraints .....                                | 76 |
| 11.2.2.2.4.2   | relation-ntfIRP-ntfSubscriber (M) .....          | 76 |
| 11.2.2.2.4.2.1 | Definition .....                                 | 76 |
| 11.2.2.2.4.2.2 | Roles .....                                      | 76 |
| 11.2.2.2.4.2.3 | Constraints .....                                | 76 |
| 11.2.2.2.5     | Information attribute definitions .....          | 77 |
| 11.2.2.2.5.0   | Introduction .....                               | 77 |
| 11.2.2.2.5.1   | Definitions and legal values .....               | 77 |
| 11.2.2.2.5.2   | Constraints .....                                | 77 |
| 11.3           | Performance assurance .....                      | 77 |
| 11.3.1         | Operations and notifications .....               | 77 |
| 11.3.1.1       | Void .....                                       | 77 |
| 11.3.1.2       | Void .....                                       | 77 |
| 11.3.1.3       | Notification notifyThresholdCrossing .....       | 77 |
| 11.3.1.3.1     | Definition .....                                 | 77 |
| 11.3.1.3.2     | Notification information .....                   | 78 |
| 11.3.2         | Managed information .....                        | 78 |
| 11.3.2.1       | Performance data file .....                      | 78 |
| 11.3.2.1.1     | Void .....                                       | 78 |
| 11.3.2.1.2     | Performance data file content description .....  | 78 |
| 11.3.2.1.3     | Void .....                                       | 80 |
| 11.3.2.1.3.1   | Void .....                                       | 80 |
| 11.3.2.1.3.2   | Void .....                                       | 80 |
| 11.3.2.1.4     | Performance data file naming convention .....    | 80 |
| 11.3.2.1.4     | Void .....                                       | 81 |
| 11.4           | Heartbeat .....                                  | 81 |
| 11.4.1         | Operations and notifications .....               | 81 |
| 11.4.1.1       | Notification notifyHeartbeat .....               | 81 |
| 11.4.1.1.1     | Definition .....                                 | 81 |
| 11.4.1.1.2     | Input parameters .....                           | 82 |
| 11.4.1.1.3     | Triggering event .....                           | 82 |
| 11.4.1.1.3.1   | From-state .....                                 | 82 |
| 11.4.1.1.3.2   | To-state .....                                   | 82 |
| 11.5           | Streaming data reporting service .....           | 82 |
| 11.5.1         | Operations and notifications .....               | 82 |
| 11.5.1.1       | establishStreamingConnection operation (M) ..... | 82 |
| 11.5.1.1.1     | Definition .....                                 | 82 |
| 11.5.1.1.2     | Input parameters .....                           | 83 |
| 11.5.1.1.3     | Output parameters .....                          | 83 |
| 11.5.1.1.4     | Exceptions .....                                 | 84 |
| 11.5.1.2       | terminateStreamingConnection operation (M) ..... | 84 |
| 11.5.1.2.1     | Definition .....                                 | 84 |
| 11.5.1.2.2     | Input parameters .....                           | 84 |
| 11.5.1.2.3     | Output parameters .....                          | 84 |
| 11.5.1.2.4     | Exceptions .....                                 | 84 |
| 11.5.1.3       | reportStreamData operation (M) .....             | 84 |
| 11.5.1.3.1     | Definition .....                                 | 84 |
| 11.5.1.3.2     | Input parameters .....                           | 84 |
| 11.5.1.3.3     | Output parameters .....                          | 85 |

|              |                                              |     |
|--------------|----------------------------------------------|-----|
| 11.5.1.3.4   | Exceptions .....                             | 85  |
| 11.5.1.4     | addStream operation (M) .....                | 85  |
| 11.5.1.4.1   | Definition.....                              | 85  |
| 11.5.1.4.2   | Input parameters .....                       | 86  |
| 11.5.1.4.3   | Output parameters .....                      | 87  |
| 11.5.1.4.4   | Exceptions .....                             | 87  |
| 11.5.1.5     | deleteStream operation (M).....              | 88  |
| 11.5.1.5.1   | Definition.....                              | 88  |
| 11.5.1.5.2   | Input parameters .....                       | 88  |
| 11.5.1.5.3   | Output parameters .....                      | 88  |
| 11.5.1.5.4   | Exceptions .....                             | 88  |
| 11.5.1.6     | getConnectionInfo operation (M).....         | 88  |
| 11.5.1.6.1   | Definition.....                              | 88  |
| 11.5.1.6.2   | Input parameters .....                       | 88  |
| 11.5.1.6.3   | Output parameters .....                      | 89  |
| 11.5.1.6.4   | Exceptions .....                             | 89  |
| 11.5.1.7     | getStreamInfo operation (M).....             | 89  |
| 11.5.1.7.1   | Definition.....                              | 89  |
| 11.5.1.7.2   | Input parameters .....                       | 89  |
| 11.5.1.7.3   | Output parameters .....                      | 90  |
| 11.5.1.7.4   | Exceptions .....                             | 91  |
| 11.6         | File data reporting service .....            | 91  |
| 11.6.1       | Operations and notifications .....           | 91  |
| 11.6.1.1     | Notification notifyFileReady.....            | 91  |
| 11.6.1.1.1   | Definition.....                              | 91  |
| 11.6.1.1.2   | Input parameters .....                       | 92  |
| 11.6.1.2     | Notification notifyFilePreparationError..... | 94  |
| 11.6.1.2.1   | Definition.....                              | 94  |
| 11.6.1.2.2   | Input parameters .....                       | 95  |
| 11.6.1.3     | Operation subscribe.....                     | 95  |
| 11.6.1.3.1   | Definition.....                              | 95  |
| 11.6.1.3.2   | Input parameters .....                       | 95  |
| 11.6.1.3.3   | Output parameters .....                      | 96  |
| 11.6.1.3.4   | Exceptions .....                             | 96  |
| 11.6.1.4     | Operation unsubscribe.....                   | 96  |
| 11.6.1.4.1   | Definition.....                              | 96  |
| 11.6.1.4.2   | Input parameters .....                       | 96  |
| 11.6.1.4.3   | Output parameters .....                      | 96  |
| 11.6.1.4.4   | Exceptions .....                             | 96  |
| 11.6.1.5     | Operation listAvailableFiles.....            | 97  |
| 11.6.1.5.1   | Definition.....                              | 97  |
| 11.6.1.5.2   | Input parameters .....                       | 97  |
| 11.6.1.5.3   | Output parameters .....                      | 97  |
| 11.6.1.5.4   | Exceptions .....                             | 97  |
| 11.6.2       | File transfer protocols .....                | 97  |
| 12           | Management services – Stage 3 .....          | 98  |
| 12.1         | Generic provisioning management service..... | 98  |
| 12.1.1       | RESTful HTTP-based solution set.....         | 98  |
| 12.1.1.1     | Mapping of operations .....                  | 98  |
| 12.1.1.1.1   | Introduction .....                           | 98  |
| 12.1.1.1.2   | Operation createMOI.....                     | 98  |
| 12.1.1.1.3   | Operation getMOIAttributes.....              | 98  |
| 12.1.1.1.4   | Operation modifyMOIAttributes.....           | 99  |
| 12.1.1.1.4.1 | Mapping to HTTP PUT .....                    | 99  |
| 12.1.1.1.4.2 | Mapping to HTTP PATCH.....                   | 100 |
| 12.1.1.1.5   | Operation deleteMOI.....                     | 100 |
| 12.1.1.1.6   | Void .....                                   | 101 |
| 12.1.1.1.7   | Void .....                                   | 101 |
| 12.1.1.2     | Mapping of notifications .....               | 101 |
| 12.1.1.2.1   | Introduction .....                           | 101 |
| 12.1.1.2.2   | Notification notifyMOICreation.....          | 101 |

|                |                                                                        |     |
|----------------|------------------------------------------------------------------------|-----|
| 12.1.1.2.3     | Notification notifyMOIDeletion.....                                    | 102 |
| 12.1.1.2.4     | Notification notifyMOIAttributeValueChanges.....                       | 102 |
| 12.1.1.2.5     | Notification notifyMOIChanges.....                                     | 102 |
| 12.1.1.3       | Resources .....                                                        | 102 |
| 12.1.1.3.1     | Resource structure .....                                               | 102 |
| 12.1.1.3.1.2   | Resource structure on the MnS consumer.....                            | 103 |
| 12.1.1.3.2     | Resource definitions .....                                             | 103 |
| 12.1.1.3.2.1   | Resource ".../{className}={id}" .....                                  | 103 |
| 12.1.1.3.2.1.1 | Description .....                                                      | 103 |
| 12.1.1.3.2.1.2 | URI.....                                                               | 103 |
| 12.1.1.3.2.1.3 | HTTP methods .....                                                     | 104 |
| 12.1.1.3.2.2   | Void .....                                                             | 106 |
| 12.1.1.3.2.3   | Void .....                                                             | 106 |
| 12.1.1.3.2.4   | Resource "{notificationTarget}" .....                                  | 106 |
| 12.1.1.3.2.4.1 | Description .....                                                      | 106 |
| 12.1.1.3.2.4.2 | URI.....                                                               | 106 |
| 12.1.1.3.2.4.3 | HTTP methods .....                                                     | 106 |
| 12.1.1.4       | Data type definitions .....                                            | 107 |
| 12.1.1.4.1     | General .....                                                          | 107 |
| 12.1.1.4.1a    | Structured data types .....                                            | 108 |
| 12.1.1.4.1a.1  | Type Resource .....                                                    | 108 |
| 12.1.1.4.1a.2  | Type Scope .....                                                       | 108 |
| 12.1.1.4.1a.3  | Type CorrelatedNotification .....                                      | 108 |
| 12.1.1.4.1a.4  | Type MoiChange .....                                                   | 109 |
| 12.1.1.4.1a.5  | Type NotifyMoiCreation .....                                           | 110 |
| 12.1.1.4.1a.6  | Type NotifyMoiDeletion .....                                           | 111 |
| 12.1.1.4.1a.7  | Type NotifyMoiAttributeValueChanges.....                               | 112 |
| 12.1.1.4.1a.8  | Type NotifyMoiChanges .....                                            | 113 |
| 12.1.1.4.1a.9  | Type PatchItem .....                                                   | 113 |
| 12.1.1.4.2     | Void.....                                                              | 113 |
| 12.1.1.4.3     | Void.....                                                              | 113 |
| 12.1.1.4.4     | Simple data types and enumerations.....                                | 113 |
| 12.1.1.4.4.6   | Enumeration Operation .....                                            | 114 |
| 12.1.2         | RESTful HTTP-based solution set for integration with ONAP VES API..... | 115 |
| 12.1.2.1       | Mapping of operations .....                                            | 115 |
| 12.1.2.2       | Mapping of notifications .....                                         | 115 |
| 12.1.2.2.1     | Introduction .....                                                     | 115 |
| 12.1.2.2.1.1   | General.....                                                           | 115 |
| 12.1.2.2.1.2   | Void .....                                                             | 115 |
| 12.1.2.2.2     | Notification notifyMOICreation.....                                    | 115 |
| 12.1.2.2.3     | Notification notifyMOIDeletion.....                                    | 115 |
| 12.1.2.2.4     | Notification notifyMOIAttributeValueChange.....                        | 115 |
| 12.1.2.2.5     | Notification notifyMOIChanges.....                                     | 115 |
| 12.1.2.3       | Resources .....                                                        | 115 |
| 12.1.2.3.1     | Resource structure .....                                               | 115 |
| 12.1.2.3.2     | Resource definitions .....                                             | 116 |
| 12.1.2.4       | Data type definitions .....                                            | 116 |
| 12.1.3         | YANG/Netconf-based solution set .....                                  | 116 |
| 12.1.3.1       | Mapping of operations .....                                            | 116 |
| 12.1.3.1.1     | Introduction .....                                                     | 116 |
| 12.1.3.1.2     | Operation createMOI.....                                               | 116 |
| 12.1.3.1.3     | Operation getMOIAttributes.....                                        | 117 |
| 12.1.3.1.4     | Operation modifyMOIAttributes.....                                     | 120 |
| 12.1.3.1.5     | Operation deleteMOI.....                                               | 120 |
| 12.2           | Generic fault supervision management service .....                     | 121 |
| 12.2.1         | RESTful HTTP-based solution set.....                                   | 121 |
| 12.2.1.1       | Mapping of operations .....                                            | 121 |
| 12.2.1.1.1     | Introduction .....                                                     | 121 |
| 12.2.1.1.2     | Operation getAlarmList.....                                            | 121 |
| 12.2.1.1.3     | Operation getAlarmCount .....                                          | 122 |
| 12.2.1.1.4     | Operation setComment.....                                              | 123 |

|                |                                                                  |     |
|----------------|------------------------------------------------------------------|-----|
| 12.2.1.1.5     | Operation acknowledgeAlarms .....                                | 123 |
| 12.2.1.1.6     | Operation unacknowledgeAlarms .....                              | 125 |
| 12.2.1.1.7     | Operation clearAlarms.....                                       | 126 |
| 12.2.1.1.8     | Operation subscribe .....                                        | 127 |
| 12.2.1.1.9     | Operation unsubscribe .....                                      | 128 |
| 12.2.1.2       | Mapping of notifications .....                                   | 128 |
| 12.2.1.2.1     | Introduction .....                                               | 128 |
| 12.2.1.2.2     | Notification notifyNewAlarm (non-security alarm) .....           | 129 |
| 12.2.1.2.3     | Notification notifyNewAlarm (security alarm) .....               | 129 |
| 12.2.1.2.4     | Notification notifyAckStateChanged.....                          | 130 |
| 12.2.1.2.5     | Notification notifyClearedAlarm.....                             | 130 |
| 12.2.1.2.6     | Notification notifyAlarmListRebuilt .....                        | 130 |
| 12.2.1.2.7     | Notification notifyChangedAlarm.....                             | 131 |
| 12.2.1.2.8     | Notification notifyComments .....                                | 131 |
| 12.2.1.2.9     | Notification notifyPotentialFaultyAlarmList.....                 | 131 |
| 12.2.1.2.10    | Notification notifyCorrelatedNotificationChanged .....           | 131 |
| 12.2.1.2.11    | Notification notifyChangedAlarmGeneral (non-security alarm)..... | 132 |
| 12.2.1.2.12    | Notification notifyChangedAlarmGeneral (security alarm) .....    | 132 |
| 12.2.1.3       | Resources .....                                                  | 133 |
| 12.2.1.3.1     | Resource structure .....                                         | 133 |
| 12.2.1.3.1.2   | Resource structure on the MnS consumer.....                      | 133 |
| 12.2.1.3.2     | Resource definitions .....                                       | 134 |
| 12.2.1.3.2.1   | Resource ".../alarms".....                                       | 134 |
| 12.2.1.3.2.1.1 | Description .....                                                | 134 |
| 12.2.1.3.2.1.2 | URI.....                                                         | 134 |
| 12.2.1.3.2.1.3 | HTTP methods .....                                               | 134 |
| 12.2.1.3.2.2   | Resource ".../alarms/{alarmId}" .....                            | 135 |
| 12.2.1.3.2.2.1 | Description .....                                                | 135 |
| 12.2.1.3.2.2.2 | URI.....                                                         | 135 |
| 12.2.1.3.2.2.3 | HTTP methods .....                                               | 135 |
| 12.2.1.3.2.3   | Resource ".../alarms/alarmCount" .....                           | 136 |
| 12.2.1.3.2.3.1 | Definition .....                                                 | 136 |
| 12.2.1.3.2.3.2 | URI.....                                                         | 136 |
| 12.2.1.3.2.3.3 | HTTP methods .....                                               | 136 |
| 12.2.1.3.2.4   | Resource ".../alarms/{alarmId}/comments" .....                   | 137 |
| 12.2.1.3.2.4.1 | Definition .....                                                 | 137 |
| 12.2.1.3.2.4.2 | URI.....                                                         | 137 |
| 12.2.1.3.2.4.3 | HTTP methods .....                                               | 137 |
| 12.2.1.3.2.5   | Resource ".../comments/{commentId}" .....                        | 138 |
| 12.2.1.3.2.5.1 | Definition .....                                                 | 138 |
| 12.2.1.3.2.5.2 | URI.....                                                         | 138 |
| 12.2.1.3.2.5.3 | HTTP methods .....                                               | 138 |
| 12.2.1.3.2.6   | Resource ".../subscriptions" .....                               | 138 |
| 12.2.1.3.2.6.1 | Description .....                                                | 138 |
| 12.2.1.3.2.6.2 | URI.....                                                         | 138 |
| 12.2.1.3.2.6.3 | HTTP methods .....                                               | 138 |
| 12.2.1.3.2.7   | Resource ".../subscriptions/{subscriptionId}" .....              | 139 |
| 12.2.1.3.2.7.1 | Description .....                                                | 139 |
| 12.2.1.3.2.7.2 | URI.....                                                         | 139 |
| 12.2.1.3.2.7.3 | HTTP methods .....                                               | 139 |
| 12.2.1.3.2.8   | Resource "{notificationTarget}" .....                            | 140 |
| 12.2.1.3.2.8.1 | Description .....                                                | 140 |
| 12.2.1.3.2.8.2 | URI.....                                                         | 140 |
| 12.2.1.3.2.8.3 | HTTP methods .....                                               | 140 |
| 12.2.1.4       | Data type definitions .....                                      | 140 |
| 12.2.1.4.1     | General .....                                                    | 140 |
| 12.2.1.4.1a    | Structured data types .....                                      | 142 |
| 12.2.1.4.1a.1  | Type ThresholdHysteresis .....                                   | 142 |
| 12.2.1.4.1a.2  | Type ThresholdLevelInd.....                                      | 142 |
| 12.2.1.4.1a.3  | Type ThresholdInfo .....                                         | 143 |
| 12.2.1.4.1a.4  | Type CorrelatedNotification .....                                | 143 |
| 12.2.1.4.1a.5  | Type AlarmRecord .....                                           | 144 |

|                |                                                                         |     |
|----------------|-------------------------------------------------------------------------|-----|
| 12.2.1.4.1a.6  | Type AlarmCount .....                                                   | 146 |
| 12.2.1.4.1a.7  | Type Comment .....                                                      | 146 |
| 12.2.1.4.1a.8  | Type Subscription .....                                                 | 146 |
| 12.2.1.4.1a.9  | Type MergePatchAcknowledgeAlarm .....                                   | 146 |
| 12.2.1.4.1a.10 | Type MergePatchClearAlarm .....                                         | 146 |
| 12.2.1.4.1a.11 | Type FailedAlarm .....                                                  | 147 |
| 12.2.1.4.1a.12 | Type NotifyNewAlarm .....                                               | 147 |
| 12.2.1.4.1a.13 | Type NotifyNewSecAlarm .....                                            | 148 |
| 12.2.1.4.1a.14 | Type NotifyClearedAlarm .....                                           | 148 |
| 12.2.1.4.1a.15 | Type NotifyChangedAlarm .....                                           | 149 |
| 12.2.1.4.1a.16 | Type NotifyChangedAlarmGeneral .....                                    | 149 |
| 12.2.1.4.1a.17 | Type NotifyChangedSecAlarmGeneral .....                                 | 150 |
| 12.2.1.4.1a.18 | Type NotifyCorrelatedNotificationChanged .....                          | 150 |
| 12.2.1.4.1a.19 | Type NotifyAckStateChanged .....                                        | 151 |
| 12.2.1.4.1a.20 | Type NotifyComments .....                                               | 151 |
| 12.2.1.4.1a.21 | Type NotifyPotentialFaultyAlarmList .....                               | 151 |
| 12.2.1.4.1a.22 | Type NotifyAlarmListRebuilt .....                                       | 152 |
| 12.2.1.4.2     | Void .....                                                              | 152 |
| 12.2.1.4.3     | Void .....                                                              | 152 |
| 12.2.1.4.4     | Simple data types and enumerations .....                                | 152 |
| 12.2.1.4.4.1   | General .....                                                           | 152 |
| 12.2.1.4.4.2   | Simple data types .....                                                 | 152 |
| 12.2.1.4.4.3   | Enumeration AlarmAckState .....                                         | 152 |
| 12.2.1.4.4.4   | Enumeration AckState .....                                              | 153 |
| 12.2.1.4.4.5   | Enumeration AlarmListAlignmentRequirement .....                         | 153 |
| 12.2.1.4.4.6   | Enumeration AlarmType .....                                             | 153 |
| 12.2.1.4.4.7   | Enumeration ProbableCause .....                                         | 154 |
| 12.2.1.4.4.8   | Enumeration AlarmNotificationTypes .....                                | 154 |
| 12.2.1.4.4.9   | Enumeration PerceivedSeverity .....                                     | 154 |
| 12.2.1.4.4.10  | Enumeration TrendIndication .....                                       | 154 |
| 12.2.2         | RESTful HTTP-based solution set for integration with ONAP VES API ..... | 155 |
| 12.2.2.1       | Mapping of operations .....                                             | 155 |
| 12.2.2.2       | Mapping of notifications .....                                          | 155 |
| 12.2.2.2.1     | Introduction .....                                                      | 155 |
| 12.2.2.2.1.1   | General .....                                                           | 155 |
| 12.2.2.2.1.2   | Void .....                                                              | 155 |
| 12.2.2.2.2     | Notification notifyNewAlarm (non-security alarm) .....                  | 155 |
| 12.2.2.2.3     | Notification notifyNewAlarm (security alarm) .....                      | 155 |
| 12.2.2.2.4     | Notification notifyAckStateChanged .....                                | 155 |
| 12.2.2.2.5     | Notification notifyClearedAlarm .....                                   | 155 |
| 12.2.2.2.6     | Notification notifyAlarmListRebuilt .....                               | 155 |
| 12.2.2.2.7     | Notification notifyChangedAlarm .....                                   | 155 |
| 12.2.2.2.8     | Notification notifyComments .....                                       | 155 |
| 12.2.2.2.9     | Notification notifyPotentialFaultyAlarmList .....                       | 156 |
| 12.2.2.2.10    | Notification notifyCorrelatedNotificationChanged .....                  | 156 |
| 12.2.2.2.11    | Notification notifyChangedAlarmGeneral (non-security alarm) .....       | 156 |
| 12.2.2.2.12    | Notification notifyChangedAlarmGeneral (security alarm) .....           | 156 |
| 12.2.2.3       | Resources .....                                                         | 156 |
| 12.2.2.3.1     | Resource structure .....                                                | 156 |
| 12.2.2.3.2     | Resource definitions .....                                              | 156 |
| 12.2.2.4       | Data type definitions .....                                             | 156 |
| 12.3           | Generic performance assurance management service .....                  | 157 |
| 12.3.1         | RESTful HTTP-based solution set .....                                   | 157 |
| 12.3.1.1       | Void .....                                                              | 157 |
| 12.3.1.2       | Performance threshold monitoring service .....                          | 157 |
| 12.3.1.2.1     | Mapping of operations .....                                             | 157 |
| 12.3.1.2.2     | Mapping of notifications .....                                          | 157 |
| 12.3.1.2.2.1   | Introduction .....                                                      | 157 |
| 12.3.1.2.2.2   | Notification notifyThresholdCrossing .....                              | 157 |
| 12.3.1.2.3     | Resources .....                                                         | 157 |
| 12.3.1.2.3.1   | Resource structure .....                                                | 157 |
| 12.3.1.2.3.2   | Resource definitions .....                                              | 158 |

|                |                                                                         |     |
|----------------|-------------------------------------------------------------------------|-----|
| 12.3.1.2.3.2.1 | Resource "/notificationSink" .....                                      | 158 |
| 12.3.1.2.4     | Data type definitions.....                                              | 158 |
| 12.3.1.2.4.1   | General.....                                                            | 158 |
| 12.3.1.2.4.2   | Structured data types.....                                              | 159 |
| 12.3.1.2.4.2.1 | Type NotifyThresholdCrossing .....                                      | 159 |
| 12.3.1.2.4.4   | Void .....                                                              | 159 |
| 12.3.1.2.4.5   | Void .....                                                              | 159 |
| 12.3.1.2.4.6   | Simple data types and enumerations .....                                | 159 |
| 12.3.1.2.4.6.1 | General .....                                                           | 159 |
| 12.3.1.2.4.6.2 | Simple data types .....                                                 | 160 |
| 12.3.1.2.4.6.3 | Enumeration PerfNotificationTypes.....                                  | 160 |
| 12.3.1.2.4.6.4 | Enumeration PerfMetricDirection .....                                   | 160 |
| 12.3.2         | Performance data XML file format definition .....                       | 160 |
| 12.3.2.1       | Introduction.....                                                       | 160 |
| 12.3.2.2       | Mapping table .....                                                     | 160 |
| 12.3.2.3       | Void.....                                                               | 161 |
| 12.3.2.3.1     | Void.....                                                               | 161 |
| 12.3.2.3.2     | Void.....                                                               | 161 |
| 12.3.2.4       | XML schema.....                                                         | 161 |
| 12.4           | Heartbeat .....                                                         | 164 |
| 12.4.1         | RESTful HTTP-based solution set.....                                    | 164 |
| 12.4.1.1       | Mapping of operations .....                                             | 164 |
| 12.4.1.2       | Mapping of notifications .....                                          | 164 |
| 12.4.1.2.1     | Introduction .....                                                      | 164 |
| 12.4.1.2.2     | Notification "notifyHeartbeat" .....                                    | 164 |
| 12.4.1.3       | Usage of HTTP .....                                                     | 164 |
| 12.4.1.4       | Resources .....                                                         | 164 |
| 12.4.1.5       | Data type definitions .....                                             | 164 |
| 12.4.1.5.1     | General .....                                                           | 164 |
| 12.4.1.5.2     | Structured data types .....                                             | 165 |
| 12.4.1.5.3     | Simple data types and enumerations.....                                 | 165 |
| 12.4.1.5.3.1   | General.....                                                            | 165 |
| 12.4.1.5.3.2   | Simple data types .....                                                 | 165 |
| 12.4.1.5.3.3   | Enumeration HeartbeatNotificationTypes .....                            | 165 |
| 12.4.2         | RESTful HTTP-based solution set for integration with ONAP VES API ..... | 165 |
| 12.4.2.1       | Mapping of operations .....                                             | 165 |
| 12.4.2.2       | Mapping of notifications .....                                          | 165 |
| 12.4.2.2.1     | Introduction .....                                                      | 165 |
| 12.4.2.2.1.1   | General.....                                                            | 165 |
| 12.4.2.2.1.2   | Notification parameter mapping principles.....                          | 166 |
| 12.4.2.2.2     | Notification notifyHeartbeat.....                                       | 166 |
| 12.5           | Streaming data reporting service .....                                  | 166 |
| 12.5.1         | RESTful HTTP-based solution set.....                                    | 166 |
| 12.5.1.1       | Mapping of operations .....                                             | 166 |
| 12.5.1.1.1     | Introduction .....                                                      | 166 |
| 12.5.1.1.2     | Operation "establishStreamingConnection" .....                          | 166 |
| 12.5.1.1.3     | Operation "terminateStreamingConnection" .....                          | 169 |
| 12.5.1.1.4     | Operation "reportStreamData" .....                                      | 169 |
| 12.5.1.1.5     | Operation "addStream" .....                                             | 170 |
| 12.5.1.1.6     | Operation "deleteStream" .....                                          | 170 |
| 12.5.1.1.7     | Operation "getConnectionInfo" .....                                     | 171 |
| 12.5.1.1.8     | Operation "getStreamInfo" .....                                         | 171 |
| 12.5.1.2       | Mapping of notifications .....                                          | 172 |
| 12.5.1.3       | Resources .....                                                         | 172 |
| 12.5.1.3.1     | Resources structure.....                                                | 172 |
| 12.5.1.3.2     | Resources definitions.....                                              | 172 |
| 12.5.1.4       | Data type definitions .....                                             | 179 |
| 12.5.1.4.1     | General .....                                                           | 179 |
| 12.5.1.4.2     | Query, message body and resource data types .....                       | 180 |
| 12.5.1.4.3     | Simple data types and enumerations.....                                 | 181 |
| 12.6           | File data reporting service .....                                       | 182 |
| 12.6.1         | RESTful HTTP-based solution set.....                                    | 182 |

|                               |                                                                                     |            |
|-------------------------------|-------------------------------------------------------------------------------------|------------|
| 12.6.1.1                      | Mapping of operations .....                                                         | 182        |
| 12.6.1.1.1                    | Introduction .....                                                                  | 182        |
| 12.6.1.1.2                    | Operation listAvailableFiles .....                                                  | 182        |
| 12.6.1.1.3                    | Operation subscribe .....                                                           | 183        |
| 12.6.1.1.4                    | Operation unsubscribe .....                                                         | 183        |
| 12.6.1.2                      | Mapping of notifications .....                                                      | 183        |
| 12.6.1.2.1                    | Introduction .....                                                                  | 183        |
| 12.6.1.2.2                    | Notification notifyFileReady .....                                                  | 183        |
| 12.6.1.2.3                    | Notification notifyFilePreparationError .....                                       | 183        |
| 12.6.1.3                      | Resources .....                                                                     | 184        |
| 12.6.1.3.1                    | Resource structure .....                                                            | 184        |
| 12.6.1.3.1.1                  | Resource structure on the MnS producer .....                                        | 184        |
| 12.6.1.3.1.2                  | Resource structure on the MnS consumer .....                                        | 184        |
| 12.6.1.3.2                    | Resource definitions .....                                                          | 184        |
| 12.6.1.4                      | Data type definitions .....                                                         | 188        |
| 12.6.1.4.1                    | General .....                                                                       | 188        |
| 12.6.1.4.2                    | Structured data types .....                                                         | 188        |
| 12.6.1.4.3                    | Void .....                                                                          | 189        |
| 12.6.1.4.4                    | Void .....                                                                          | 189        |
| 12.6.1.4.5                    | Void .....                                                                          | 189        |
| 12.6.1.4.6                    | Simple data types and enumerations .....                                            | 189        |
| <b>Annex A (normative):</b>   | <b>OpenAPI specification .....</b>                                                  | <b>191</b> |
| A.0                           | Introduction .....                                                                  | 191        |
| A.1                           | Provisioning management service .....                                               | 191        |
| A.1.0                         | Introduction .....                                                                  | 191        |
| A.1.1                         | OpenAPI document "TS28532_ProvMnS.yaml" .....                                       | 191        |
| A.1.2                         | Integration with ONAP VES .....                                                     | 197        |
| A.2                           | Generic fault supervision management service .....                                  | 197        |
| A.2.0                         | Introduction .....                                                                  | 197        |
| A.2.1                         | OpenAPI document "TS28532_FaultMnS.yaml" .....                                      | 198        |
| A.2.2                         | Integration with ONAP VES .....                                                     | 211        |
| A.3                           | Void .....                                                                          | 211        |
| A.4                           | Generic performance assurance management service .....                              | 212        |
| A.4.1                         | Void .....                                                                          | 212        |
| A.4.2                         | OpenAPI document "TS28532_Pnt "prfMnS.yaml" .....                                   | 212        |
| A.4.3                         | Integration with ONAP VES .....                                                     | 213        |
| A.5                           | Heartbeat .....                                                                     | 213        |
| A.5.0                         | Introduction .....                                                                  | 213        |
| A.5.1                         | OpenAPI document "TS28532_HeartbeatNtf.yaml" .....                                  | 213        |
| A.5.2                         | Integration with ONAP VES .....                                                     | 213        |
| A.6                           | Streaming data reporting management service .....                                   | 214        |
| A.6.1                         | Introduction .....                                                                  | 214        |
| A.6.2                         | OpenAPI document "TS28532_StreamingDataMnS.yaml" .....                              | 214        |
| A.7                           | File data reporting management service .....                                        | 220        |
| A.7.1                         | Introduction .....                                                                  | 220        |
| A.7.2                         | OpenAPI document "TS28532_FileDataReportingMnS.yaml" .....                          | 220        |
| A.7.3                         | Integration with ONAP VES .....                                                     | 223        |
| <b>Annex B (Informative):</b> | <b>Guidelines for the integration of 3GPP MnS notifications with ONAP VES .....</b> | <b>224</b> |
| <b>Annex C (informative):</b> | <b>Change history .....</b>                                                         | <b>225</b> |
| History .....                 |                                                                                     | 229        |

---

# 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.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

ETSI TS 128 532 V16.14.0 (2023-04)

<https://standards.iteh.ai/catalog/standards/sist/d883c415-c9b6-4654-8a95-2ce6425f57ea/etsi-ts-128-532-v16-14-0-2023-04>