



Network Functions Virtualisation (NFV) Release 5; Protocols and Data Models; Specification of protocol and data model solutions for CMF - NFV-MANO reference point

[ETSI GS NFV-SOL 023 V5.3.1 \(2025-09\)](https://standards.iteh.ai/catalog/standards/etsi/24757f95-25aa-45ea-96d0-ed96bcd4f44b/etsi-gs-nfv-sol-023-v5-3-1-2025-09)

<https://standards.iteh.ai/catalog/standards/etsi/24757f95-25aa-45ea-96d0-ed96bcd4f44b/etsi-gs-nfv-sol-023-v5-3-1-2025-09>

Disclaimer

The present document has been produced and approved by the Network Functions Virtualisation (NFV) ETSI Industry Specification Group (ISG) and represents the views of those members who participated in this ISG.
It does not necessarily represent the views of the entire ETSI membership.

Reference

DGS/NFV-SOL023

Keywords

data models, MANO, NFV, protocol

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 the
[ETSI Search & Browse Standards](#) application.

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 on [ETSI deliver](#) repository.

Users should be aware that the present document may be revised or have its status changed,
this information is available in the [Milestones listing](#).

If you find errors in the present document, please send your comments to
the relevant service listed under [Committee Support Staff](#).

If you find a security vulnerability in the present document, please report it through our
[Coordinated Vulnerability Disclosure \(CVD\)](#) program.

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 2025.
All rights reserved.

Contents

Intellectual Property Rights	7
Foreword.....	7
Modal verbs terminology.....	7
1 Scope	8
2 References	8
2.1 Normative references	8
2.2 Informative references.....	9
3 Definition of terms, symbols and abbreviations.....	9
3.1 Terms.....	9
3.2 Symbols.....	9
3.3 Abbreviations	9
4 Overview of Certificate Management	10
4.1 Introduction	10
4.2 Overview of protocols and data models	10
4.2.1 Summary of CMPv2	10
4.2.1.1 Introduction.....	10
4.2.1.2 Feature summary.....	10
4.2.1.3 Involved entities.....	11
5 Certificate Management interface	11
5.1 Description	11
5.2 NFV operation mapping to profiled solution	12
5.2.1 Certificate Signing Request	12
5.2.2 Revoke operation	12
5.3 Sequence diagrams	12
5.3.1 Flow of the Registration of the Subject	12
5.3.2 Flow of the Deregistration of the Subject	13
5.3.3 Flow of the CSR Request.....	14
5.3.4 Flow of the Revocation of the certificate	15
5.3.5 Flow of the Query of the subject.....	15
5.3.6 Flow of the Query of the certificate	16
5.4 URI structure and methods	17
5.5 Input/Output parameter mapping between NFV data model and profiled solution data models.....	18
5.5.1 Introduction.....	18
5.5.2 Input parameters to Certificate Management interfaces	19
5.5.2.1 Introduction.....	19
5.5.2.2 CMPv2 PKIMessage structure	19
5.5.2.3 CMPv2 PKIHeader structure	19
5.5.2.4 CMPv2 PKIBody structure	20
5.5.2.5 CMPv2 Certification Request structure	21
5.5.2.6 CMPv2 Revocation Request structure	22
5.5.3 Output parameters to Certificate Management interfaces.....	22
5.5.3.1 Introduction.....	22
5.5.3.2 CMPv2 CertRepMessage structure	22
5.5.3.3 CMPv2 Revocation Response structure	23
5.6 Additional features	24
5.6.1 Description.....	24
5.6.2 Version.....	24
5.6.3 Resources	24
5.6.3.1 Introduction.....	24
5.6.3.1.1 Overview	24
5.6.3.1.2 Task resources that trigger Certificate Management operations.....	24
5.6.3.2 Resource: API versions	24
5.6.3.3 Resource: Subject.....	24
5.6.3.3.1 Description	24

5.6.3.3.2	Resource definition.....	24
5.6.3.3.3	Resource methods.....	25
5.6.3.4	Resource: Individual Subject	27
5.6.3.4.1	Description	27
5.6.3.4.2	Resource definition.....	27
5.6.3.4.3	Resource methods.....	27
5.6.4	Data model.....	29
5.6.4.1	Introduction.....	29
5.6.4.2	Resource and notification data types.....	29
5.6.4.2.1	Introduction	29
5.6.4.2.2	Type: SubjectInstance	29
5.6.4.2.3	Type: RegistrationRequest	30
5.6.4.3	Referenced structured data types.....	30
5.6.4.3.1	Introduction	30
5.6.4.3.2	Type: CertSubjectData	31
5.6.4.4	Referenced simple data types and enumerations.....	31
5.6.4.4.1	Introduction	31
5.6.4.4.2	Simple data types.....	31
5.6.4.4.3	Enumerations.....	31
5.7	OID consideration	31
5.7.1	Introduction.....	31
5.7.2	Conventions for info type attribute	31
5.7.3	Certificate type.....	32
5.7.3.1	Introduction.....	32
5.7.3.2	VNFCI Certificate	32
5.7.3.3	VNF OAM Certificate.....	32
5.7.4	Type of certificate handling	32
5.7.4.1	Introduction.....	32
5.7.4.2	Direct mode.....	32
5.7.4.3	Delegation mode	32
7	Certificate Notification interface.....	33
7.1	Description	33
7.2	Version	33
7.3	Sequence diagrams	34
7.3.1	Flow of managing subscriptions	34
7.3.2	Flow of sending notifications.....	35
7.4	Resource structure and methods.....	36
7.5	Resources	37
7.5.1	Introduction.....	37
7.5.2	Resource: API versions.....	37
7.5.3	Resource: Subscriptions.....	37
7.5.3.1	Description	37
7.5.3.2	Resource definition	37
7.5.3.3	Resource methods	37
7.5.3.3.1	POST	37
7.5.3.3.2	GET	38
7.5.3.3.3	PUT	39
7.5.3.3.4	PATCH.....	40
7.5.3.3.5	DELETE.....	40
7.5.4	Resource: Individual subscription.....	40
7.5.4.1	Description	40
7.5.4.2	Resource definition	40
7.5.4.3	Resource methods	40
7.5.4.3.1	POST	40
7.5.4.3.2	GET	40
7.5.4.3.3	PUT	41
7.5.4.3.4	PATCH.....	41
7.5.4.3.5	DELETE.....	41
7.5.5	Resource: Notification endpoint	42
7.5.5.1	Description	42
7.5.5.2	Resource definition	42

7.5.5.3	Resource methods	42
7.5.5.3.1	POST	42
7.5.5.3.2	GET	42
7.5.4.3.3	PUT	43
7.5.4.3.4	PATCH	43
7.5.4.3.5	DELETE	43
7.6	Data model	43
7.6.1	Introduction	43
7.6.2	Resource and notification data types	43
7.6.2.1	Introduction	43
7.6.2.2	Type: CertificateSubscriptionRequest	43
7.6.2.3	Type: CertificateSubscription	44
7.6.2.4	Type: CertificateLifecycleStateChangeNotification	44
7.6.3	Referenced structured data types	45
7.6.3.1	Introduction	45
7.6.3.2	Type: CertificateChangeNotificationsFilter	45
7.6.3.3	Type: AffectedSubject	46
7.6.3.4	Type: AffectedCertificate	46
7.6.4	Referenced simple data types and enumerations	47
7.6.4.1	Introduction	47
7.6.4.2	Simple data types	47
7.6.4.3	Enumeration: CertificateNotificationVerbosityType	47

Annex A (informative): Analysis on the existing solutions based on the Certificate Management interface requirements48

A.1	CMP	48
A.1.1	Overview	48
A.2	CMPv2	48
A.2.1	Overview	48
A.2.2	Comparison of interface requirements of CMF and CMPv2	49
A.2.3	Comparison of Register operation and End Entity Initialization operation	51
A.2.4	Comparison of Certificate Signing Request operation and initial certification operation	51
A.2.5	Comparison of Revoke operation and Revocation operation	51
A.3	SCEP	52
A.3.1	Overview	52
A.3.2	Comparison of interface requirements of CMF and SCEP	52
A.3.3	Comparison of Certificate Signing Request operation and PKCSreq operation	54
A.4	EST	54
A.4.1	Overview	54
A.4.2	Comparison of interface requirements of CMF and EST	54
A.4.3	Comparison of Certificate Signing Request operation and Enrolment of Clients operation	56
A.5	ACME	56
A.5.1	Overview	56
A.5.2	Comparison of interface requirements of CMF and ACME	57
A.5.3	Comparison of Register operation and Account Creation operation	58
A.5.4	Comparison of Certificate Signing Request operation and Certificate Issuance operation	58
A.5.5	Comparison of Deregister operation and Account Deactivation operation	59
A.5.6	Comparison of Revoke operation and Certificate Revocation operation	59
A.6	Analysis of solutions against the interface requirements of CMF	60
A.6.1	Overview	60
A.6.2	Comparison of interface requirements	60
A.6.3	Comparison of attributes of interface	61
A.6.4	Conclusion	62

Annex B (informative): Mapping operations to protocol elements.....63

B.1	Overview	63
B.2	Certificate Management interface	63

B.3	VNF Lifecycle Management interface	63
B.4	Certificate Notification interface	63
Annex C (normative):	Authorization scope values	64
C.1	Overview	64
C.2	Certificate Management interface	64
C.3	Certificate Notification interface	65
Annex D (informative):	Complementary material for API utilization	66
Annex E (informative):	Change history	67
History		69

i T h S t a n d a r d s
(h t t p s : / / s t a n d a r d s . i t
D o c u m e n t i e P w r

E T S I - G S N F V - S O L 0 2 3 V 5 . 3 . 1 (2 0 2 5 - 0 9)

h t t p s : / / s t a n d a r d s . i t e h . a i / c a t a l o g / s t a n d
0 9

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 IPR online database](https://standards.itec.ai/).

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™**, **LTE™** and **5G™** logo 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.

Foreword

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

ETSI GS NFV-SOL 023 V5.3.1 (2025-09)

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](https://standards.itec.ai/) (Verbal forms for the expression of provisions).

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