

ETSI TS 129 566 V19.1.0 (2026-03)



TECHNICAL SPECIFICATION

**5G;  
5G System;  
Energy Information Function Services;  
Stage 3  
(3GPP TS 29.566 version 19.1.0 Release 19)**



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**Reference**

RTS/TSGC-0329566vj10

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**Keywords**

5G

**ETSI**

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# Contents

Intellectual Property Rights .....	2
Legal Notice .....	2
Modal verbs terminology.....	2
Foreword.....	5
1 Scope .....	7
2 References .....	7
3 Definitions, symbols and abbreviations .....	8
3.1 Definitions .....	8
3.2 Symbols.....	8
3.3 Abbreviations .....	8
4 Overview .....	8
5 Services offered by the EIF .....	9
5.1 Introduction .....	9
5.2 Neif_EventExposure Service.....	9
5.2.1 Service Description.....	9
5.2.2 Service Operations.....	9
5.2.2.1 Introduction.....	9
5.2.2.2 Neif_EventExposure_Subscribe.....	10
5.2.2.2.1 General .....	10
5.2.2.2.2 Energy Event Exposure Subscription Creation .....	10
5.2.2.2.3 Energy Event Exposure Subscription Update.....	10
5.2.2.2.4 User consent management .....	11
5.2.2.3 Neif_EventExposure_Unsubscribe .....	12
5.2.2.3.1 General .....	12
5.2.2.3.2 Energy Event Exposure Subscription Deletion .....	12
5.2.2.4 Neif_EventExposure_Notify .....	12
5.2.2.4.1 General .....	12
5.2.2.4.2 Energy Event Exposure Notification .....	12
6 API Definitions .....	13
6.1 Neif_EventExposure Service API .....	13
6.1.1 Introduction.....	13
6.1.2 Usage of HTTP.....	14
6.1.2.1 General .....	14
6.1.2.2 HTTP standard headers .....	14
6.1.2.2.1 General .....	14
6.1.2.2.2 Content type .....	14
6.1.2.3 HTTP custom headers .....	14
6.1.3 Resources.....	14
6.1.3.1 Overview.....	14
6.1.3.2 Resource: Energy Event Exposure Subscriptions .....	15
6.1.3.2.1 Description .....	15
6.1.3.2.2 Resource Definition.....	15
6.1.3.2.3 Resource Standard Methods .....	15
6.1.3.2.4 Resource Custom Operations .....	17
6.1.3.3 Resource: Individual Energy Event Exposure Subscription.....	17
6.1.3.3.1 Description .....	17
6.1.3.3.2 Resource Definition.....	18
6.1.3.3.3 Resource Standard Methods .....	18
6.1.3.3.4 Resource Custom Operations .....	22
6.1.4 Custom Operations without associated resources .....	23
6.1.5 Notifications .....	23
6.1.5.1 General .....	23

6.1.5.2	Energy Event Exposure Notification.....	23
6.1.5.2.1	Description .....	23
6.1.5.2.2	Target URI.....	23
6.1.5.2.3	Standard Methods.....	23
6.1.6	Data Model .....	24
6.1.6.1	General .....	24
6.1.6.2	Structured data types .....	25
6.1.6.2.1	Introduction .....	25
6.1.6.2.2	Type: EnergyEeSubsc .....	26
6.1.6.2.3	Type: EnergyEeSubscPatch.....	26
6.1.6.2.4	Type: EnergyEeNotif.....	26
6.1.6.2.5	Type: EnergyEeSubscSet .....	27
6.1.6.2.6	Type: EnergyEeReport .....	29
6.1.6.3	Simple data types and enumerations .....	29
6.1.6.3.1	Introduction .....	29
6.1.6.3.2	Simple data types.....	29
6.1.6.3.3	Enumeration: EnergyEeEvent .....	29
6.1.6.4	Data types describing alternative data types or combinations of data types .....	30
6.1.6.5	Binary data .....	30
6.1.6.5.1	Binary Data Types .....	30
6.1.7	Error Handling .....	30
6.1.7.1	General .....	30
6.1.7.2	Protocol Errors .....	30
6.1.7.3	Application Errors.....	30
6.1.8	Feature negotiation .....	30
6.1.9	Security .....	31
6.1.10	HTTP redirection.....	31
<b>Annex A (normative): OpenAPI specification .....</b>		<b>32</b>
A.1	General .....	32
A.2	Neif_EventExposure API.....	32
<b>Annex B (informative): Withdrawn API versions .....</b>		<b>40</b>
B.1	General .....	40
B.2	Neif_EventExposure API.....	40
<b>Annex C (normative): ABNF grammar for 3GPP SBI HTTP custom headers.....</b>		<b>41</b>
C.1	General .....	41
<b>Annex D (informative): Change history .....</b>		<b>42</b>
History .....		43

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# Foreword

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- 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.

In the present document, modal verbs have the following meanings:

- shall** indicates a mandatory requirement to do something
- shall not** indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

- should** indicates a recommendation to do something
- should not** indicates a recommendation not to do something
- may** indicates permission to do something
- need not** indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

- can** indicates that something is possible
- cannot** indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

- will** indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- will not** indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document
- might** indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

**might not** indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

**is** (or any other verb in the indicative mood) indicates a statement of fact

**is not** (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

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# 1 Scope

The present document specifies the stage 3 protocol and data model for the Neif Service Based Interface. It provides stage 3 protocol definitions and message flows, and specifies the API for each service offered by the EIF.

The 5G System stage 2 architecture and procedures are specified in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.503 [17].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition are specified in 3GPP TS 29.500 [4] and 3GPP TS 29.501 [5].

---

# 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 23.501: "System Architecture for the 5G System; Stage 2".
- [3] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".
- [4] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".
- [5] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".
- [6] OpenAPI: "OpenAPI Specification Version 3.0.0", <https://spec.openapis.org/oas/v3.0.0>.
- [7] 3GPP TR 21.900: "Technical Specification Group working methods".
- [8] 3GPP TS 33.501: "Security architecture and procedures for 5G system".
- [9] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".
- [10] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".
- [11] IETF RFC 9113: "HTTP/2".
- [12] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".
- [13] IETF RFC 9457: "Problem Details for HTTP APIs".
- [14] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces Stage 3".
- [15] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".
- [16] 3GPP TS 29.122: "T8 reference point for northbound Application Programming Interfaces (APIs)".
- [17] 3GPP TS 23.503: "Policy and Charging Control Framework for the 5G System; Stage 2".
- [18] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".

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## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] 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].

### 3.2 Symbols

Void.

### 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] 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].

EIF                      Energy Information Function

---

## 4 Overview

In the frame of Energy Efficiency and Energy Saving functionalities and services, the Energy Information Function (EIF) provides services to NF service consumers (e.g., NEF, AF) via the Neif service-based interface. The EIF supports for this purpose the functionalities defined in 3GPP TS 23.502 [3] to manage Energy information and its exposure.

Figures°4-1 and 4.2 depict the Energy related reference architecture of the EIF respectively in SBI representation and reference point representation.

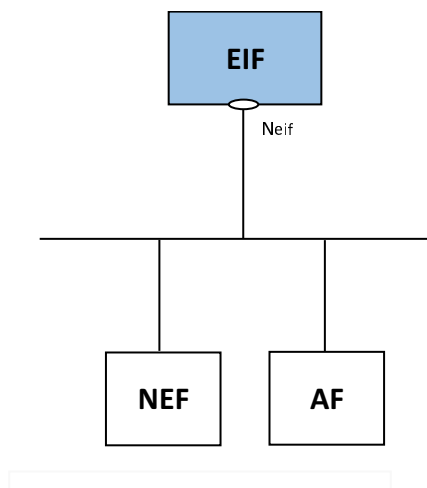


Figure 4-1: Reference model for the EIF Services – SBI representation

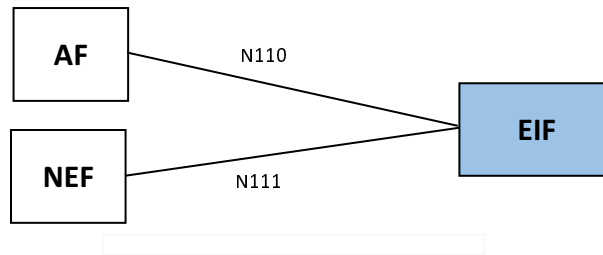


Figure 4-2: Reference Model for the EIF Services – Reference point representation

## 5 Services offered by the EIF

### 5.1 Introduction

The EIF provides the following services:

- Neif\_EventExposure

Table 5.1-1 summarizes the corresponding APIs defined for this specification.

Table 5.1-1: API Descriptions

Service Name	Clause	Description	OpenAPI Specification File	apiName	Annex
Neif_EventExposure	6.1	EIF Event Exposure Service	TS29566_Neif_EventExposure.yaml	neif-ee	A.2

### 5.2 Neif\_EventExposure Service

#### 5.2.1 Service Description

The Neif\_EventExposure service exposed by the EIF enables an NF service consumer to:

- create/update/delete an Energy Event Exposure Subscription at the EIF; and
- receive energy consumption information related event(s) reporting.

#### 5.2.2 Service Operations

##### 5.2.2.1 Introduction

The service operations defined for the Neif\_EventExposure Service are shown in table 5.2.2.1-1.

Table 5.2.2.1-1: Neif\_EventExposure Service Operations

Service Operation Name	Description	Initiated by
Neif_EventExposure_Subscribe	This service operation is used by an NF service consumer to create/update an Energy Event Exposure Subscription.	e.g., NEF, AF
Neif_EventExposure_Unsubscribe	This service operation is used by an NF service consumer to delete an existing Energy Event Exposure Subscription.	e.g., NEF, AF
Neif_EventExposure_Notify	This service operation is used by the EIF to report energy consumption information related event(s).	EIF

## 5.2.2.2 Neif\_EventExposure\_Subscribe

### 5.2.2.2.1 General

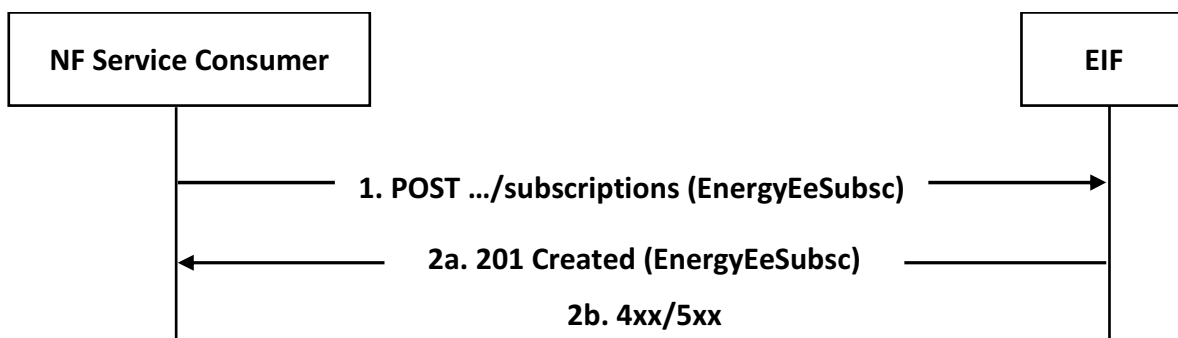
This service operation is used by an NF service consumer to create/update an Energy Event Exposure Subscription.

The following procedures are supported by the "Neif\_EventExposure\_Subscribe" service operation:

- Energy Event Exposure Subscription Creation.
- Energy Event Exposure Subscription Update.

### 5.2.2.2.2 Energy Event Exposure Subscription Creation

Figure 5.2.2.2.2-1 depicts a scenario where an NF service consumer requests to create an Energy Event Exposure Subscription (see also clause 4.29 of 3GPP TS 23.502 [3]).

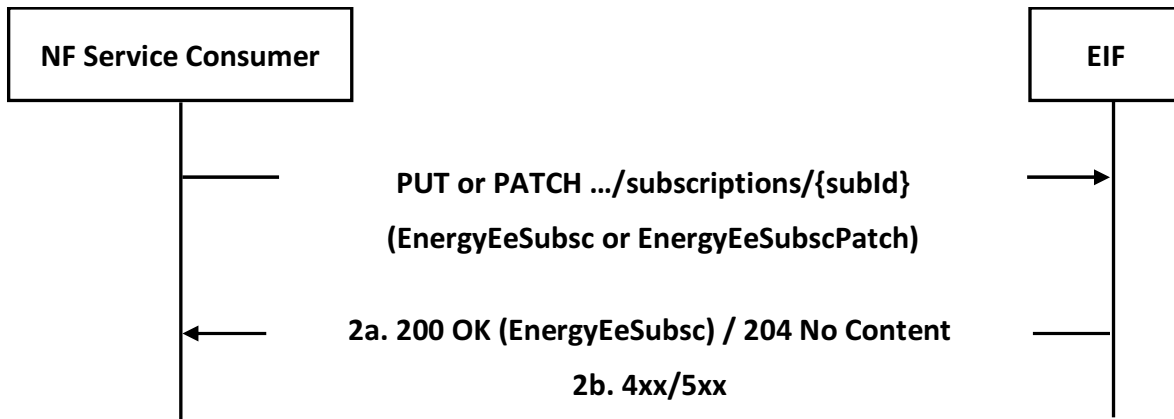


**Figure 5.2.2.2.2-1: Energy Event Exposure Subscription Creation**

1. To subscribe to energy consumption related event(s) reporting, the NF service consumer shall send an HTTP POST request targeting the URI of the "Energy Event Exposure Subscriptions" collection resource, with the request body including the EnergyEeSubsc data structure.
- 2a. Upon success, the EIF shall respond to the NF service consumer with an HTTP "201 Created" status code with the response body containing the representation of the created resource within the EnergyEeSubsc data structure, and an HTTP "Location" header field containing the URI of the created "Individual Energy Event Exposure Subscription" resource.
- 2b. On failure, the EIF shall take proper error handling actions, as specified in clause 6.1.7, and respond to the NF service consumer with an appropriate error status code.

### 5.2.2.2.3 Energy Event Exposure Subscription Update

Figure 5.2.2.2.3-1 depicts a scenario where an NF service consumer requests to update an existing Energy Event Exposure Subscription (see also clause 4.29 of 3GPP TS 23.502 [3]).



**Figure 5.2.2.3-1: Energy Event Exposure Subscription Update**

1. In order to request the update of an existing subscription to energy consumption related event(s) reporting, the NF service consumer shall send an HTTP PUT/PATCH request to the EIF, targeting the URI of the corresponding "Individual Energy Event Exposure Subscription" resource, with the request body including either:
  - the updated representation of the resource within the EnergyEeSubsc data structure, in case the HTTP PUT method is used; or
  - the requested modifications to the resource within the EnergyEeSubscPatch data structure, in case the HTTP PATCH method is used.
- 2a. Upon success, the EIF shall update the targeted "Individual Energy Event Exposure Subscription" resource accordingly and respond with either:
  - an HTTP "200 OK" status code with the response body containing a representation of the updated "Individual Energy Event Exposure Subscription" resource within the EnergyEeSubsc data structure; or
  - an HTTP "204 No Content" status code.
- 2b. On failure, the EIF shall take proper error handling actions, as specified in clause 6.1.7, and respond to the NF service consumer with an appropriate error status code.

#### 5.2.2.2.4 User consent management

Based on local regulations' requirements and/or operator policies, user consent management specified in Annex V of 3GPP TS 33.501 [8] may be required to access the Neif\_EventExposure API for the collection and processing of Energy-related information. When it is the case, then the EIF shall act as the consent enforcement entity, as specified in clause 5.51.2.2 of 3GPP TS 23.501 [2].

If the user consent is required for the collection and processing of energy-related information depending on local policy and regulations, then

- at the reception of a Neif\_EventExposure\_Subscribe request to create an Energy Event Exposure Subscription, the EIF shall check user consent for the targeted UE by retrieving the user consent subscription data from the UDM via the Nudm\_SDM service API, as specified in clause 5.2.2.2.24 of 3GPP TS 29.503 [18], and:
  - if user consent is not granted for the targeted UE, the EIF shall reject the request and respond to the NF service consumer with an HTTP "403 Forbidden" status code with the response body containing the ProblemDetails data structure with the "cause" attribute including the "USER\_CONSENT\_NOT\_GRANTED" application error; and
  - if user consent is granted for the targeted UE, the EIF shall proceed as specified in clause 5.2.2.2.2 and clause 5.2.2.2.3.

### 5.2.2.3 Neif\_EventExposure\_Unsubscribe

#### 5.2.2.3.1 General

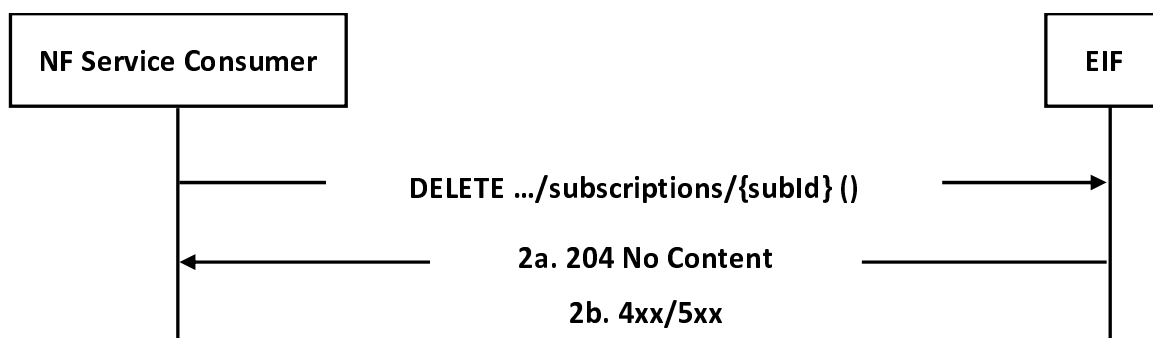
This service operation is used by an NF service consumer to delete an existing Energy Event Exposure Subscription.

The following procedures are supported by the "Neif\_EventExposure\_Unsubscribe" service operation:

- Energy Event Exposure Subscription Deletion.

#### 5.2.2.3.2 Energy Event Exposure Subscription Deletion

Figure 5.2.2.3.2-1 depicts a scenario where an NF service consumer requests to delete an existing Energy Event Exposure Subscription (see also clause 4.29 of 3GPP TS 23.502 [3]).



**Figure 5.2.2.3.2-1: Energy Event Exposure Subscription Deletion**

1. To unsubscribe from energy consumption related event(s) reporting, the NF service consumer shall send an HTTP DELETE request to the EIF targeting the URI of the corresponding "Individual Energy Event Exposure Subscription" resource.
- 2a. Upon success, the EIF shall respond with an HTTP "204 No Content" status code.
- 2b. On failure, the EIF shall take proper error handling actions, as specified in clause 6.1.7, and respond to the NF service consumer with an appropriate error status code.

### 5.2.2.4 Neif\_EventExposure\_Notify

#### 5.2.2.4.1 General

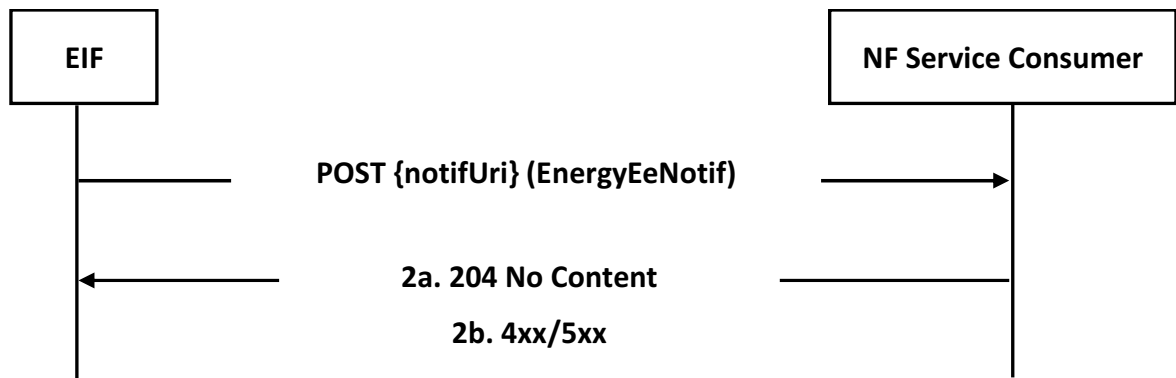
This service operation is used by the EIF to report energy consumption information related event(s).

The following procedures are supported by the "Neif\_EventExposure\_Notify" service operation:

- Energy Event Exposure Notification.

#### 5.2.2.4.2 Energy Event Exposure Notification

Figure 5.2.2.4.2-1 depicts a scenario where the EIF sends a request to notify a previously subscribed NF service consumer on energy consumption information related event(s) (see also clause 4.29 of 3GPP TS 23.502 [3]).



**Figure 5.2.2.4.2-1: Energy Event Exposure Notification**

1. In order to notify a previously subscribed NF service consumer on energy consumption information related event(s), the EIF shall send an HTTP POST request to the NF service consumer with the request URI set to "{notifUri}", where the "notifUri" variable is set to the value received from the NF service consumer during the creation/update of the corresponding Energy Event Exposure Subscription using the procedures defined in clause 5.2.2.2, and the request body including the EnergyEeNotif data structure.
- 2a. Upon success, the NF service consumer shall respond to the EIF with an HTTP "204 No Content" status code to acknowledge the reception of the notification.
- 2b. On failure, the NF service consumer shall take proper error handling actions, as specified in clause 6.1.7, and respond to the EIF with an appropriate error status code.

---

## 6 API Definitions

### 6.1 Neif\_EventExposure Service API

#### 6.1.1 Introduction

The Neif\_EventExposure Service shall use the Neif\_EventExposure API.

The API URI of the Neif\_EventExposure API shall be:

**{apiRoot}/<apiName>/<apiVersion>**

The request URIs used in HTTP requests from the NF service consumer towards the NF service producer shall have the Resource URI structure defined in clause 4.4.1 of 3GPP TS 29.501 [5], i.e.:

**{apiRoot}/<apiName>/<apiVersion>/<apiSpecificResourceUriPart>**

with the following components:

- The {apiRoot} shall be set as described in 3GPP TS 29.501 [5].
- The <apiName> shall be "neif-ee".
- The <apiVersion> shall be "v1".
- The <apiSpecificResourceUriPart> shall be set as described in clauses 6.1.3 and 6.1.4.

## 6.1.2 Usage of HTTP

### 6.1.2.1 General

HTTP/2, IETF RFC 9113 [11], shall be used as specified in clause 5 of 3GPP TS 29.500 [4].

HTTP/2 shall be transported as specified in clause 5.3 of 3GPP TS 29.500 [4].

The OpenAPI [6] specification of HTTP messages and content bodies for the Neif\_EventExposure API is contained in Annex A.

### 6.1.2.2 HTTP standard headers

#### 6.1.2.2.1 General

See clause 5.2.2 of 3GPP TS 29.500 [4] for the usage of HTTP standard headers.

#### 6.1.2.2.2 Content type

JSON, IETF RFC 8259 [12], shall be used as content type of the HTTP bodies specified in the present specification as specified in clause 5.4 of 3GPP TS 29.500 [4]. The use of the JSON format shall be signalled by the content type "application/json".

"Problem Details" JSON object shall be used to indicate additional details of the error in a HTTP response body and shall be signalled by the content type "application/problem+json", as defined in IETF RFC 9457 [13].

### 6.1.2.3 HTTP custom headers

The mandatory HTTP custom header fields specified in clause 5.2.3.2 of 3GPP TS 29.500 [4] shall be supported, and the optional HTTP custom header fields specified in clause 5.2.3.3 of 3GPP TS 29.500 [4] may be supported.

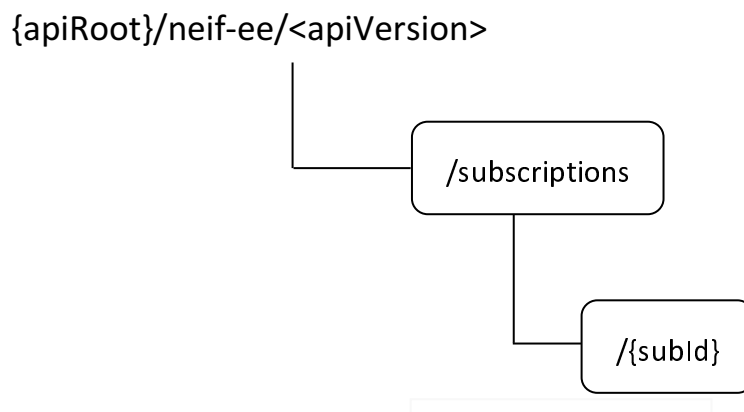
In this Release of the specification, no specific custom headers are defined for the Neif\_EventExposure API.

## 6.1.3 Resources

### 6.1.3.1 Overview

This clause describes the structure for the Resource URIs and the resources and methods used for the service.

Figure 6.1.3.1-1 depicts the resource URIs structure for the Neif\_EventExposure API.



**Figure 6.1.3.1-1: Resource URI structure of the Neif\_EventExposure API**

Table 6.1.3.1-1 provides an overview of the resources and applicable HTTP methods for the Neif\_EventExposure API.

**Table 6.1.3.1-1: Resources and methods overview**

Resource name	Resource URI	HTTP method or custom operation	Description
Energy Event Exposure Subscriptions	/subscriptions	POST	Create a new Energy Event Exposure Subscription.
		GET	Retrieve all the Energy Event Exposure Subscription(s) managed by the EIF.
Individual Energy Event Exposure Subscription	/subscriptions/{subId}	GET	Retrieve an existing "Individual Energy Event Exposure Subscription" resource.
		PUT	Update an existing "Individual Energy Event Exposure Subscription" resource.
		PATCH	Modify an existing "Individual Energy Event Exposure Subscription" resource.
		DELETE	Delete an existing "Individual Energy Event Exposure Subscription" resource.

**6.1.3.2 Resource: Energy Event Exposure Subscriptions**

**6.1.3.2.1 Description**

The "Energy Event Exposure Subscriptions" resource represents the collection of Energy Event Exposure Subscriptions managed by the EIF.

**6.1.3.2.2 Resource Definition**

Resource URI: {apiRoot}/neif-ee/<apiVersion>/subscriptions

This resource shall support the resource URI variables defined in table 6.1.3.2.2-1.

**Table 6.1.3.2.2-1: Resource URI variables for this resource**

Name	Data type	Definition
apiRoot	string	See clause 6.1.1.

**6.1.3.2.3 Resource Standard Methods**

**6.1.3.2.3.1 POST**

The HTTP POST method enables an NF service consumer to request the creation of an Energy Event Exposure Subscription at the EIF.

This method shall support the URI query parameters specified in table 6.1.3.2.3.1-1.

**Table 6.1.3.2.3.1-1: URI query parameters supported by the POST method on this resource**

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.3.2.3.1-2 and the response data structures and response codes specified in table 6.1.3.2.3.2-3.

**Table 6.1.3.2.3.1-2: Data structures supported by the POST Request Body on this resource**

Data type	P	Cardinality	Description
EnergyEeSubsc	M	1	Represents the parameters to request the creation of a new Energy Event Exposure Subscription.

**Table 6.1.3.2.3.1-3: Data structures supported by the POST Response Body on this resource**

Data type	P	Cardinality	Response codes	Description
EnergyEeSubsc	M	1	201 Created	Successful case. The Energy Event Exposure Subscription is successfully created and a representation of the created "Individual Energy Event Exposure Subscription" resource shall be returned.  An HTTP "Location" header that contains the URI of the created resource shall also be included.
ProblemDetails	O	0..1	403 Forbidden	(NOTE 2)
NOTE: The mandatory HTTP error status codes for the HTTP POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] shall also apply.				
NOTE 2: Failure cases are described in clause 6.1.7.3.				

**Table 6.1.3.2.3.1-4: Headers supported by the 201 Response Code on this resource**

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains the URI of the newly created resource, according to the structure: {apiRoot}/neif-ee/<apiVersion>/subscriptions/{subId}

6.1.3.2.3.2 GET

The HTTP GET method enables an NF service consumer to retrieve all the Energy Event Exposure Subscription(s) managed by the EIF.

This method shall support the URI query parameters specified in table 6.1.3.2.3.2-1.

**Table 6.1.3.2.3.2-1: URI query parameters supported by the GET method on this resource**

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.3.2.3.2-2 and the response data structures and response codes specified in table 6.1.3.2.3.2-3.

**Table 6.1.3.2.3.2-2: Data structures supported by the GET Request Body on this resource**

Data type	P	Cardinality	Description
n/a			

**Table 6.1.3.2.3.2-3: Data structures supported by the GET Response Body on this resource**

Data type	P	Cardinality	Response codes	Description
array(EnergyEeSubsc)	M	0..N	200 OK	Successful case. All the active "Individual Energy Event Exposure Subscription" resource(s) managed by the EIF are returned.  If there are no active "Individual Energy Event Exposure Subscription" resource(s) at the EIF, an empty array is returned.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. (NOTE 2)
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. (NOTE 2)
ProblemDetails	O	0..1	403 Forbidden	(NOTE 3)
NOTE 1: The mandatory HTTP error status codes for the HTTP GET method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] shall also apply.				
NOTE 2: The RedirectResponse data structure may be provided by an SCP (cf. clause 6.10.9.1 of 3GPP TS 29.500 [4]).				
NOTE 3: Failure cases are described in clause 6.1.7.3.				

**Table 6.1.3.2.3.2-4: Headers supported by the 307 Response Code on this resource**

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative EIF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4].
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target EIF (service) instance towards which the request is redirected.

**Table 6.1.3.2.3.2-5: Headers supported by the 308 Response Code on this resource**

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative EIF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4].
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Identifier of the target EIF (service) instance towards which the request is redirected.

#### 6.1.3.2.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

### 6.1.3.3 Resource: Individual Energy Event Exposure Subscription

#### 6.1.3.3.1 Description

The "Individual Energy Event Exposure Subscription" resource represents an Energy Event Exposure Subscription managed by the EIF.

## 6.1.3.3.2 Resource Definition

Resource URI: {apiRoot}/neif-ee/<apiVersion>/subscriptions/{subId}

This resource shall support the resource URI variables defined in table 6.1.3.3.2-1.

**Table 6.1.3.3.2-1: Resource URI variables for this resource**

Name	Data type	Definition
apiRoot	string	See clause 6.1.1.
subId	string	Represents the identifier of the "Individual Energy Event Exposure Subscription" resource.

## 6.1.3.3.3 Resource Standard Methods

## 6.1.3.3.3.1 GET

The HTTP GET method enables an NF service consumer to retrieve an existing "Individual Energy Event Exposure Subscription" resource at the EIF.

This method shall support the URI query parameters specified in table 6.1.3.3.3.1-1.

**Table 6.1.3.3.3.1-1: URI query parameters supported by the GET method on this resource**

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.3.3.3.1-2 and the response data structures and response codes specified in table 6.1.3.3.3.1-3.

**Table 6.1.3.3.3.1-2: Data structures supported by the GET Request Body on this resource**

Data type	P	Cardinality	Description
n/a			

**Table 6.1.3.3.3.1-3: Data structures supported by the GET Response Body on this resource**

Data type	P	Cardinality	Response codes	Description
EnergyEeSubsc	M	1	200 OK	Successful case. The requested "Individual Energy Event Exposure Subscription" resource is returned in the response body.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. (NOTE 2)
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. (NOTE 2)
ProblemDetails	O	0..1	403 Forbidden	(NOTE 3)
NOTE 1: The mandatory HTTP error status codes for the HTTP GET method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [4] shall also apply.				
NOTE 2: The RedirectResponse data structure may be provided by an SCP (cf. clause 6.10.9.1 of 3GPP TS 29.500 [4]).				
NOTE 3: Failure cases are described in clause 6.1.7.3.				

**Table 6.1.3.3.3.1-4: Headers supported by the 307 Response Code on this resource**

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative EIF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4].
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Contains the identifier of the target EIF (service) instance towards which the request is redirected

**Table 6.1.3.3.3.1-5: Headers supported by the 308 Response Code on this resource**

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative EIF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4].
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Contains the identifier of the target EIF (service) instance towards which the request is redirected

#### 6.1.3.3.3.2 PUT

The HTTP PUT method enables an NF service consumer to request the update of an existing "Individual Energy Event Exposure Subscription" resource at the EIF.

This method shall support the URI query parameters specified in table 6.1.3.3.3.2-1.

**Table 6.1.3.3.3.2-1: URI query parameters supported by the PUT method on this resource**

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.3.3.3.2-2 and the response data structures and response codes specified in table 6.1.3.3.3.2-3.

**Table 6.1.3.3.3.2-2: Data structures supported by the PUT Request Body on this resource**

Data type	P	Cardinality	Description
EnergyEeSubsc	M	1	Represents the updated "Individual Energy Event Exposure Subscription" resource representation.

**Table 6.1.3.3.3.2-3: Data structures supported by the PUT Response Body on this resource**

Data type	P	Cardinality	Response codes	Description
EnergyEeSubsc	M	1	200 OK	Successful case. The "Individual Energy Event Exposure Subscription" resource is successfully updated and a representation of the updated resource is returned in the response body.
n/a			204 No Content	Successful case. The "Individual Energy Event Exposure Subscription" resource is successfully updated and no content is returned in the response body.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. (NOTE 2)
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. (NOTE 2)
NOTE 1: The mandatory HTTP error status codes for the HTTP PUT method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [4] shall also apply.				
NOTE 2: The RedirectResponse data structure may be provided by an SCP (cf. clause 6.10.9.1 of 3GPP TS 29.500 [4]).				

**Table 6.1.3.3.3.2-4: Headers supported by the 307 Response Code on this resource**

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative EIF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4].
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Contains the identifier of the target EIF (service) instance towards which the request is redirected.

**Table 6.1.3.3.3.2-5: Headers supported by the 308 Response Code on this resource**

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative EIF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4].
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Contains the identifier of the target EIF (service) instance towards which the request is redirected.

### 6.1.3.3.3.3 PATCH

The HTTP PATCH method enables an NF service consumer to request the modification of an existing "Individual Energy Event Exposure Subscription" resource at the EIF.

This method shall support the URI query parameters specified in table 6.1.3.3.3.3-1.

**Table 6.1.3.3.3.3-1: URI query parameters supported by the PATCH method on this resource**

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.3.3.3.3-2 and the response data structures and response codes specified in table 6.1.3.3.3.3-3.

**Table 6.1.3.3.3-2: Data structures supported by the PATCH Request Body on this resource**

Data type	P	Cardinality	Description
EnergyEeSubscPatch	M	1	Contains the parameters to request the modification of the "Individual Energy Event Exposure Subscription" resource.

**Table 6.1.3.3.3-3: Data structures supported by the PATCH Response Body on this resource**

Data type	P	Cardinality	Response codes	Description
EnergyEeSubsc	M	1	200 OK	Successful case. The "Individual Energy Event Exposure Subscription" resource is successfully modified and a representation of the updated resource is returned in the response body.
n/a			204 No Content	Successful case. The "Individual Energy Event Exposure Subscription" resource is successfully modified and no content is returned in the response body.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. (NOTE 2)
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. (NOTE 2)
NOTE 1: The mandatory HTTP error status codes for the HTTP PATCH method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] shall also apply.				
NOTE 2: The RedirectResponse data structure may be provided by an SCP (cf. clause 6.10.9.1 of 3GPP TS 29.500 [4]).				

**Table 6.1.3.3.3-4: Headers supported by the 307 Response Code on this resource**

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative EIF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4].
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Contains the identifier of the target EIF (service) instance towards which the request is redirected.

**Table 6.1.3.3.3-5: Headers supported by the 308 Response Code on this resource**

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative EIF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4].
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Contains the identifier of the target EIF (service) instance towards which the request is redirected.

#### 6.1.3.3.3.4 DELETE

The HTTP DELETE method enables an NF service consumer to request the deletion of an existing "Individual Energy Event Exposure Subscription" resource at the EIF.

This method shall support the URI query parameters specified in table 6.1.3.3.3.4-1.

**Table 6.1.3.3.3.4-1: URI query parameters supported by the DELETE method on this resource**

Name	Data type	P	Cardinality	Description	Applicability
n/a					

This method shall support the request data structures specified in table 6.1.3.3.3.4-2 and the response data structures and response codes specified in table 6.1.3.3.3.4-3.

**Table 6.1.3.3.3.4-2: Data structures supported by the DELETE Request Body on this resource**

Data type	P	Cardinality	Description
n/a			

**Table 6.1.3.3.3.4-3: Data structures supported by the DELETE Response Body on this resource**

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The "Individual Energy Event Exposure Subscription" resource is successfully deleted.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. (NOTE 2)
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. (NOTE 2)
NOTE 1: The mandatory HTTP error status codes for the HTTP DELETE method listed in table 5.2.7.1-1 of 3GPP TS 29.500 [4] shall also apply.				
NOTE 2: The RedirectResponse data structure may be provided by an SCP (cf. clause 6.10.9.1 of 3GPP TS 29.500 [4]).				

**Table 6.1.3.3.3.4-4: Headers supported by the 307 Response Code on this resource**

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative EIF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4].
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Contains the identifier of the target EIF (service) instance towards which the request is redirected.

**Table 6.1.3.3.3.4-5: Headers supported by the 308 Response Code on this resource**

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI of the resource located in an alternative EIF (service) instance towards which the request is redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4].
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Contains the identifier of the target EIF (service) instance towards which the request is redirected.

#### 6.1.3.3.4 Resource Custom Operations

There are no resource custom operations defined for this resource in this release of the specification.

## 6.1.4 Custom Operations without associated resources

There are no custom operations without associated resources defined for this API in this release of the specification.

## 6.1.5 Notifications

### 6.1.5.1 General

Notifications shall comply to clause 6.2 of 3GPP TS 29.500 [4] and clause 4.6.2.3 of 3GPP TS 29.501 [5].

**Table 6.1.5.1-1: Notifications overview**

Notification	Callback URI	HTTP method or custom operation	Description (service operation)
Energy Event Exposure Notification	{notifUri}	POST	Enables the EIF to notify a previously subscribed NF service consumer on energy consumption information related event(s).

### 6.1.5.2 Energy Event Exposure Notification

#### 6.1.5.2.1 Description

The Energy Event Exposure Notification is used by the EIF to notify a previously subscribed NF service consumer on energy consumption information related event(s).

#### 6.1.5.2.2 Target URI

The Callback URI "{**notifUri**}" shall be used with the callback URI variables defined in table 6.1.5.2.2-1.

**Table 6.1.5.2.2-1: Callback URI variables**

Name	Definition
notifUri	Represents the callback URI encoded as a string formatted as a URI.

#### 6.1.5.2.3 Standard Methods

##### 6.1.5.2.3.1 POST

This method shall support the request data structures specified in table 6.1.5.2.3.1-1 and the response data structures and response codes specified in table 6.1.5.2.3.1-2.

**Table 6.1.5.2.3.1-1: Data structures supported by the POST Request Body**

Data type	P	Cardinality	Description
EnergyEeNotif	M	1	Represents the Energy Event Exposure Notification.

**Table 6.1.5.2.3.1-2: Data structures supported by the POST Response Body**

Data type	P	Cardinality	Response codes	Description
n/a			204 No Content	Successful case. The Energy Event Exposure Notification is successfully received and acknowledged.
RedirectResponse	O	0..1	307 Temporary Redirect	Temporary redirection. (NOTE 2)
RedirectResponse	O	0..1	308 Permanent Redirect	Permanent redirection. (NOTE 2)
NOTE 1: The mandatory HTTP error status codes for the HTTP POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] shall also apply.				
NOTE 2: The RedirectResponse data structure may be provided by an SCP (cf. clause 6.10.9.1 of 3GPP TS 29.500 [4]).				

**Table 6.1.5.2.3.1-3: Headers supported by the 307 Response Code on this resource**

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI representing the end point of an alternative NF service consumer (service) instance towards which the notification should be redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4].
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Contains the identifier of the target NF service consumer (service) instance towards which the notification request is redirected.

**Table 6.1.5.2.3.1-4: Headers supported by the 308 Response Code on this resource**

Name	Data type	P	Cardinality	Description
Location	string	M	1	Contains an alternative URI representing the end point of an alternative NF service consumer (service) instance towards which the notification should be redirected.  For the case where the request is redirected to the same target via a different SCP, refer to clause 6.10.9.1 of 3GPP TS 29.500 [4].
3gpp-Sbi-Target-Nf-Id	string	O	0..1	Contains the identifier of the target NF service consumer (service) instance towards which the notification request is redirected.

## 6.1.6 Data Model

### 6.1.6.1 General

This clause specifies the application data model supported by the API.

Table 6.1.6.1-1 specifies the data types defined for the Neif\_EventExposure service-based interface protocol.

**Table 6.1.6.1-1: Neif\_EventExposure specific Data Type**

Data type	Clause defined	Description	Applicability
EnergyEeEvent	6.1.6.3.3	Represents the Energy Exposure event.	
EnergyEeNotif	6.1.6.2.4	Represents the Energy Event Exposure Notification.	
EnergyEeReport	6.1.6.2.6	Represents the Energy Event Exposure report.	
EnergyEeSubsc	6.1.6.2.2	Represents the Energy Event Exposure Subscription.	
EnergyEeSubscPatch	6.1.6.2.3	Represents the requested modifications to an Energy Event Exposure Subscription.	
EnergyEeSubscSet	6.1.6.2.5	Represents the Energy Event Exposure Subscription set.	

Table 6.1.6.1-2 specifies data types re-used by the Neif\_EventExposure service-based interface protocol from other specifications, including a reference to their respective specifications and when needed, a short description of their use within the Neif\_EventExposure service-based interface.

**Table 6.1.6.1-2: Neif\_EventExposure re-used Data Types**

Data type	Reference	Comments	Applicability
ApplicationId	3GPP TS 29.571 [14]	Represents the application identifier.	
DateTime	3GPP TS 29.571 [14]	Represents a date and a time.	
Dnn	3GPP TS 29.571 [14]	Represents a DNN.	
DurationSec	3GPP TS 29.571 [14]	Represents a time duration in units of seconds.	
EnergyInfo	3GPP TS 29.122 [16]	Represents the Energy consumption information.	
FlowDescription	3GPP TS 29.514 [15]	Represents an IP flow description.	
Gpsi	3GPP TS 29.571 [14]	Represents a GPSI.	
ProblemDetails	3GPP TS 29.571 [14]	Represents error related information.	
RedirectResponse	3GPP TS 29.571 [14]	Represents redirection related information.	
Snsai	3GPP TS 29.571 [14]	Represents an S-NSSAI.	
Supi	3GPP TS 29.571 [14]	Represents a SUPI.	
SupportedFeatures	3GPP TS 29.571 [14]	Represents the list of supported feature(s) and is used to negotiate the applicability of optional features.	
TimeWindow	3GPP TS 29.122 [16]	Represents a time window.	
UInteger	3GPP TS 29.571 [14]	Represents an unsigned integer.	
Uri	3GPP TS 29.571 [14]	Represents a URI.	

## 6.1.6.2 Structured data types

### 6.1.6.2.1 Introduction

This clause defines the structures to be used in resource representations.

## 6.1.6.2.2 Type: EnergyEeSubsc

Table 6.1.6.2.2-1: Definition of type EnergyEeSubsc

Attribute name	Data type	P	Cardinality	Description	Applicability
notifUri	Uri	M	1	Contains the URI via which Energy consumption information related event(s) reporting shall be delivered.	
eventsSubscSets	map(EnergyEeSubscSet)	M	1..N	Contains the set(s) of Energy Event Exposure subscription related details.  The key of the map shall be set to the value of the "subscSetId" attribute of the corresponding map value encoded using the EnergyEeSubscSet data structure.	
suppFeat	SupportedFeatures	C	0..1	Contains the list of supported features used as defined in clause 6.1.8.  This attribute shall be present only when feature negotiation is required.	

## 6.1.6.2.3 Type: EnergyEeSubscPatch

Table 6.1.6.2.3-1: Definition of type EnergyEeSubscPatch

Attribute name	Data type	P	Cardinality	Description	Applicability
notifUri	Uri	O	0..1	Contains the updated URI via which Energy consumption information related event(s) reporting shall be delivered.	
eventsSubscSets	map(EnergyEeSubscSet)	O	1..N	Contains the set(s) of Energy Event Exposure subscription related details.  The key of the map shall be set to the value of the "subscSetId" attribute of the corresponding map value encoded using the EnergyEeSubscSet data structure.	

## 6.1.6.2.4 Type: EnergyEeNotif

Table 6.1.6.2.4-1: Definition of type EnergyEeNotif

Attribute name	Data type	P	Cardinality	Description	Applicability
subId	string	M	1	Contains the identifier of the Energy Event Exposure Subscription to which the notification is related.	
reports	array(EnergyEeReport)	M	1..N	Contains the Energy Event Exposure report(s).	

6.1.6.2.5 Type: EnergyEeSubscSet

**Table 6.1.6.2.5-1: Definition of type EnergyEeSubscSet**

Attribute name	Data type	P	Cardinality	Description	Applicability
event	EnergyEeEvent	M	1	Contains the subscribed Energy related event.	
subscSetId	string	M	1	Contains the identifier of the Energy event exposure subscription set.	
supi	Supi	C	0..1	Contains the target SUPI. (NOTE 1)	
gpsi	Gpsi	C	0..1	Contains the target GPSI. (NOTE 1)	
dnn	Dnn	C	0..1	Contains the target DNN. (NOTE 2)	
snssai	Snssai	C	0..1	Contains the target S-NSSAI. (NOTE 2, NOTE 4)	
appld	ApplicationId	C	0..1	Contains the identifier of the target application. (NOTE 3)	
flowDescs	array(FlowDescription)	C	1..N	Contains the service flow description information for the target application. (NOTE 3)	
repPeriod	DurationSec	C	0..1	Contains the reporting time period.  This attribute shall be present only in case periodic reporting of the Energy consumption information is requested. (NOTE 6)	
repTimeWin	TimeWindow	C	0..1	Contains the reporting time window, , i.e., the start time and end time during which data collection for the reporting shall take place.  This attribute shall be present only in case time window based reporting of the Energy consumption information is requested. (NOTE 5, NOTE 6)	
enrgRepThres	EnergyInfo	O	0..1	Contains the reporting thresholds for the Energy consumption information event exposure.  This attribute shall be present in case threshold-based reporting of the Energy consumption information is requested. (NOTE 6)	
repPeriodThres	DurationSec	C	0..1	Contains the reporting period for threshold-based reporting of the Energy consumption information.  This attribute shall be present only in case threshold-based reporting of the Energy consumption information is requested. (NOTE 6)	
maxReportNbr	UInteger	O	0..1	Contains the maximum number of reports.	

NOTE 1: These attributes are mutually exclusive and only one of them shall be present.  
 NOTE 2: If the value of the "event" attribute is set to "PDU\_SESSION\_ENERGY" or "SERVICE\_FLOW\_ENERGY", then at least one of these attributes shall be present.  
 NOTE 3: If the value of the "event" attribute is set to "SERVICE\_FLOW\_ENERGY", then only one of these attributes shall be present.  
 NOTE 4: if the value of the "event" attribute is set to "UE\_SNSSAI\_ENERGY", then this attribute shall be present.  
 NOTE 5: In this Release of the specification, the values of both the start time and end time within the "repTimePeriod" attribute shall be in the future.  
 NOTE 6: If the value of the "event" attribute is set to either "UE\_ENERGY", "UE\_SNSSAI\_ENERGY", "PDU\_SESSION\_ENERGY" or "SERVICE\_FLOW\_ENERGY", then if at least one of the "repPeriod", "enrgRepThres" and "repPeriodThres" attributes are present, the "repTimeWin" attribute shall not be present.

#### 6.1.6.2.6 Type: EnergyEeReport

**Table 6.1.6.2.6-1: Definition of type EnergyEeReport**

Attribute name	Data type	P	Cardinality	Description	Applicability
event	EnergyEeEvent	M	1	Contains the reported Energy related event.	
subscSetId	string	M	1	Contains the identifier of the Energy event exposure subscription set to which this report is related.	
timeStamp	DateTime	M	1	Contains the time at which this report is triggered.	
energyInfo	EnergyInfo	O	0..1	Contains the Energy consumption information report.	

#### 6.1.6.3 Simple data types and enumerations

##### 6.1.6.3.1 Introduction

This clause defines simple data types and enumerations that can be referenced from data structures defined in the previous clauses.

##### 6.1.6.3.2 Simple data types

The simple data types defined in table 6.1.6.3.2-1 shall be supported.

**Table 6.1.6.3.2-1: Simple data types**

Type Name	Type Definition	Description	Applicability

##### 6.1.6.3.3 Enumeration: EnergyEeEvent

The enumeration EnergyEeEvent represents the Energy Exposure event. It shall comply with the provisions defined in table 6.1.6.3.3-1.

**Table 6.1.6.3.3-1: Enumeration EnergyEeEvent**

Enumeration value	Description	Applicability
UE_ENERGY	Indicates that the Energy Exposure event is the energy consumed by a UE.	
PDU_SESSION_ENERGY	Indicates that the Energy Exposure event is the energy consumed by a PDU session of a UE.	
SERVICE_FLOW_ENERGY	Indicates that the Energy Exposure event is the energy consumed by an application or service data flow of an application traffic of a UE.	
UE_SNSSAI_ENERGY	Indicates that the Energy Exposure event is the energy consumed by a UE in an S-NSSAI.	

#### 6.1.6.4 Data types describing alternative data types or combinations of data types

There are no data types describing alternative data types or combinations of data types defined for this API in this release of the specification.

#### 6.1.6.5 Binary data

##### 6.1.6.5.1 Binary Data Types

**Table 6.1.6.5.1-1: Binary Data Types**

Name	Clause defined	Content type

#### 6.1.7 Error Handling

##### 6.1.7.1 General

For the Neif\_EventExposure API, HTTP error responses shall be supported as specified in clause 4.8 of 3GPP TS 29.501 [5]. Protocol errors and application errors specified in table 5.2.7.2-1 of 3GPP TS 29.500 [4] shall be supported for an HTTP method if the corresponding HTTP status codes are specified as mandatory for that HTTP method in table 5.2.7.1-1 of 3GPP TS 29.500 [4].

In addition, the requirements in the following clauses are applicable for the Neif\_EventExposure API.

##### 6.1.7.2 Protocol Errors

No specific procedures for the Neif\_EventExposure service are specified.

##### 6.1.7.3 Application Errors

The application errors defined for the Neif\_EventExposure service are listed in Table 6.1.7.3-1.

**Table 6.1.7.3-1: Application errors**

Application Error	HTTP status code	Description	Applicability
USER_CONSENT_NOT_GRANTED	403 Forbidden	Indicates that the request is rejected because user consent is not granted.	

#### 6.1.8 Feature negotiation

The optional features in table 6.1.8-1 are defined for the Neif\_EventExposure API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [4].

**Table 6.1.8-1: Supported Features**

Feature number	Feature Name	Description

## 6.1.9 Security

As indicated in 3GPP TS 33.501 [8] and 3GPP TS 29.500 [4], the access to the Neif\_EventExposure API may be authorized by means of the OAuth2 protocol (see IETF RFC 6749 [9]), based on local configuration, using the "Client Credentials" authorization grant, where the NRF (see 3GPP TS 29.510 [10]) plays the role of the authorization server.

If OAuth2 is used, an NF Service Consumer, prior to consuming services offered by the Neif\_EventExposure API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in clause 5.4.2.2 of 3GPP TS 29.510 [10].

**NOTE:** When multiple NRFs are deployed in a network, the NRF used as authorization server is the same NRF that the NF Service Consumer used for discovering the Neif\_EventExposure service.

The Neif\_EventExposure API defines a single scope "neif-ee" for the entire service, and it does not define any additional scopes at resource or operation level.

## 6.1.10 HTTP redirection

An HTTP request may be redirected to a different Neif\_EventExposure service instance when using direct or indirect communications (see 3GPP TS 29.500 [4]).

An SCP that reselects a different EIF producer instance will return the NF Instance ID of the new EIF producer instance in the "3gpp-Sbi-Producer-Id" custom header, as specified in clause 6.10.3.4 of 3GPP TS 29.500 [4].

If an EIF redirects a service request to a different EIF using an HTTP "307 Temporary Redirect" or "308 Permanent Redirect" status code, the identity of the new EIF towards which the service request is redirected shall be indicated in the "3gpp-Sbi-Target-Nf-Id" custom header of the HTTP "307 Temporary Redirect" or "308 Permanent Redirect" response as specified in clause 6.10.9.1 of 3GPP TS 29.500 [4].

---

# Annex A (normative): OpenAPI specification

## A.1 General

This Annex specifies the formal definition of the API(s) defined in the present specification. It consists of OpenAPI specifications in YAML format.

This Annex takes precedence when being discrepant to other parts of the specification with respect to the encoding of information elements and methods within the API(s).

**NOTE:** The semantics and procedures, as well as conditions, e.g. for the applicability and allowed combinations of attributes or values, not expressed in the OpenAPI definitions but defined in other parts of the specification also apply.

Informative copies of the OpenAPI specification files contained in this 3GPP Technical Specification are available on a Git-based repository that uses the GitLab software version control system (see clause 5.3.1 of 3GPP TS 29.501 [5] and clause 5B of 3GPP TR 21.900 [7]).

---

## A.2 Neif\_EventExposure API

```
openapi: 3.0.0
```

```
info:
```

```
  title: EIF Event Exposure Service
  version: 1.0.0
  description: |
    API for the Neif_EventExposure Service.
    © 2025, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC).
    All rights reserved.
```

```
externalDocs:
```

```
  description: >
    3GPP TS 29.566 V19.0.0; 5G System; Energy Information Function Services; Stage 3.
  url: http://www.3gpp.org/ftp/Specs/archive/29_series/29.566/
```

```
servers:
```

```
- url: '{apiRoot}/neif-ee/v1'
  variables:
    apiRoot:
      default: https://example.com
      description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501.
```

```
security:
```

```
- {}
- oAuth2ClientCredentials:
  - neif-ee
```

```
paths:
```

```
  /subscriptions:
```

```
    get:
```

```
      summary: Retrieve all the active Energy Event Exposure Subscription(s) managed by the EIF.
      operationId: GetEnergyEESubscs
```

```
      tags:
```

```
        - Energy Event Exposure Subscriptions (Collection)
```

```
      responses:
```

```
        '200':
```

```
          description: >
```

```
            OK. All the active Individual Energy Event Exposure Subscription resource(s) managed by the EIF are returned.
```

```
            If there are no active Individual Energy Event Exposure Subscription resource(s) at the EIF, an empty array is returned.
```

```
          content:
```

```
            application/json:
```

```
              schema:
```

```
                type: array
```

```
                items:
```

```

    $ref: '#/components/schemas/EnergyEeSubsc'
    minItems: 0
  '307':
    $ref: 'TS29571_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29571_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29571_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29571_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29571_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29571_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29571_CommonData.yaml#/components/responses/406'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '502':
    $ref: 'TS29571_CommonData.yaml#/components/responses/502'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

post:
  summary: Request the creation of an Energy Event Exposure Subscription.
  operationId: CreateEnergyEESubsc
  tags:
    - Energy Event Exposure Subscriptions (Collection)
  requestBody:
    required: true
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/EnergyEeSubsc'
  responses:
    '201':
      description: >
        Created. The Energy Event Exposure Subscription is successfully created and a
        representation of the created Individual Energy Event Exposure Subscription resource
        shall be returned.
      content:
        application/json:
          schema:
            $ref: '#/components/schemas/EnergyEeSubsc'
      headers:
        Location:
          description: >
            Contains the URI of the created Individual Energy Event Exposure Subscription
            resource.
          required: true
          schema:
            type: string
    '400':
      $ref: 'TS29571_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29571_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29571_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29571_CommonData.yaml#/components/responses/404'
    '411':
      $ref: 'TS29571_CommonData.yaml#/components/responses/411'
    '413':
      $ref: 'TS29571_CommonData.yaml#/components/responses/413'
    '415':
      $ref: 'TS29571_CommonData.yaml#/components/responses/415'
    '429':
      $ref: 'TS29571_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29571_CommonData.yaml#/components/responses/500'
    '502':
      $ref: 'TS29571_CommonData.yaml#/components/responses/502'
    '503':
      $ref: 'TS29571_CommonData.yaml#/components/responses/503'

```

```

    default:
      $ref: 'TS29571_CommonData.yaml#/components/responses/default'
  callbacks:
    EnergyEENotif:
      '{$request.body#/notifUri}':
        post:
          requestBody:
            required: true
            content:
              application/json:
                schema:
                  $ref: '#/components/schemas/EnergyEeNotif'
          responses:
            '204':
              description: >
                No Content. The Energy Event Exposure Notification is successfully
                received and acknowledged.
            '307':
              $ref: 'TS29571_CommonData.yaml#/components/responses/307'
            '308':
              $ref: 'TS29571_CommonData.yaml#/components/responses/308'
            '400':
              $ref: 'TS29571_CommonData.yaml#/components/responses/400'
            '401':
              $ref: 'TS29571_CommonData.yaml#/components/responses/401'
            '403':
              $ref: 'TS29571_CommonData.yaml#/components/responses/403'
            '404':
              $ref: 'TS29571_CommonData.yaml#/components/responses/404'
            '411':
              $ref: 'TS29571_CommonData.yaml#/components/responses/411'
            '413':
              $ref: 'TS29571_CommonData.yaml#/components/responses/413'
            '415':
              $ref: 'TS29571_CommonData.yaml#/components/responses/415'
            '429':
              $ref: 'TS29571_CommonData.yaml#/components/responses/429'
            '500':
              $ref: 'TS29571_CommonData.yaml#/components/responses/500'
            '502':
              $ref: 'TS29571_CommonData.yaml#/components/responses/502'
            '503':
              $ref: 'TS29571_CommonData.yaml#/components/responses/503'
            default:
              $ref: 'TS29571_CommonData.yaml#/components/responses/default'

/subscriptions/{subId}:
  parameters:
    - name: subId
      in: path
      description: >
        Represents the identifier of the Individual Energy Event Exposure Subscription
        resource.
      required: true
      schema:
        type: string

  get:
    summary: Retrieve an existing Individual Energy Event Exposure Subscription resource.
    operationId: GetIndEnergyEESubsc
    tags:
      - Individual Energy Event Exposure Subscription (Document)
    responses:
      '200':
        description: >
          OK. The requested Individual Energy Event Exposure Subscription resource
          shall be returned.
        content:
          application/json:
            schema:
              $ref: '#/components/schemas/EnergyEeSubsc'
      '307':
        $ref: 'TS29571_CommonData.yaml#/components/responses/307'
      '308':
        $ref: 'TS29571_CommonData.yaml#/components/responses/308'
      '400':
        $ref: 'TS29571_CommonData.yaml#/components/responses/400'
      '401':

```

```

    $ref: 'TS29571_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29571_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29571_CommonData.yaml#/components/responses/404'
  '406':
    $ref: 'TS29571_CommonData.yaml#/components/responses/406'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '502':
    $ref: 'TS29571_CommonData.yaml#/components/responses/502'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

```

put:

summary: Request the update of an existing Individual Energy Event Exposure Subscription resource.

operationId: UpdateIndEnergyEESubsc

tags:

- Individual Energy Event Exposure Subscription (Document)

requestBody:

required: true

content:

application/json:

schema:

\$ref: '#/components/schemas/EnergyEeSubsc'

responses:

'200':

description: >

OK. The Individual Energy Event Exposure Subscription resource is successfully updated and a representation of the updated resource shall be returned in the response body.

content:

application/json:

schema:

\$ref: '#/components/schemas/EnergyEeSubsc'

'204':

description: >

No Content. The Individual Energy Event Exposure Subscription resource is successfully updated and no content is returned in the response body.

'307':

\$ref: 'TS29571\_CommonData.yaml#/components/responses/307'

'308':

\$ref: 'TS29571\_CommonData.yaml#/components/responses/308'

'400':

\$ref: 'TS29571\_CommonData.yaml#/components/responses/400'

'401':

\$ref: 'TS29571\_CommonData.yaml#/components/responses/401'

'403':

\$ref: 'TS29571\_CommonData.yaml#/components/responses/403'

'404':

\$ref: 'TS29571\_CommonData.yaml#/components/responses/404'

'411':

\$ref: 'TS29571\_CommonData.yaml#/components/responses/411'

'413':

\$ref: 'TS29571\_CommonData.yaml#/components/responses/413'

'415':

\$ref: 'TS29571\_CommonData.yaml#/components/responses/415'

'429':

\$ref: 'TS29571\_CommonData.yaml#/components/responses/429'

'500':

\$ref: 'TS29571\_CommonData.yaml#/components/responses/500'

'502':

\$ref: 'TS29571\_CommonData.yaml#/components/responses/502'

'503':

\$ref: 'TS29571\_CommonData.yaml#/components/responses/503'

default:

\$ref: 'TS29571\_CommonData.yaml#/components/responses/default'

patch:

summary: Request the modification of an existing Individual Energy Event Exposure Subscription resource.

operationId: ModifyIndEnergyEESubsc

tags:

- Individual Energy Event Exposure Subscription (Document)

```

requestBody:
  required: true
  content:
    application/merge-patch+json:
      schema:
        $ref: '#/components/schemas/EnergyEeSubscPatch'
responses:
  '200':
    description: >
      OK. The Individual Energy Event Exposure Subscription resource is successfully modified
      and a representation of the updated resource shall be returned in the response body.
    content:
      application/json:
        schema:
          $ref: '#/components/schemas/EnergyEeSubsc'
  '204':
    description: >
      No Content. The Individual Energy Event Exposure Subscription resource is successfully
      modified and no content is returned in the response body.
  '307':
    $ref: 'TS29571_CommonData.yaml#/components/responses/307'
  '308':
    $ref: 'TS29571_CommonData.yaml#/components/responses/308'
  '400':
    $ref: 'TS29571_CommonData.yaml#/components/responses/400'
  '401':
    $ref: 'TS29571_CommonData.yaml#/components/responses/401'
  '403':
    $ref: 'TS29571_CommonData.yaml#/components/responses/403'
  '404':
    $ref: 'TS29571_CommonData.yaml#/components/responses/404'
  '411':
    $ref: 'TS29571_CommonData.yaml#/components/responses/411'
  '413':
    $ref: 'TS29571_CommonData.yaml#/components/responses/413'
  '415':
    $ref: 'TS29571_CommonData.yaml#/components/responses/415'
  '429':
    $ref: 'TS29571_CommonData.yaml#/components/responses/429'
  '500':
    $ref: 'TS29571_CommonData.yaml#/components/responses/500'
  '502':
    $ref: 'TS29571_CommonData.yaml#/components/responses/502'
  '503':
    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

delete:
  summary: Request the deletion of an existing Individual Energy Event Exposure Subscription
resource.
  operationId: DeleteIndEnergyEESubsc
  tags:
  - Individual Energy Event Exposure Subscription (Document)
  responses:
    '204':
      description: >
        No Content. The Individual Energy Event Exposure Subscription resource is
        successfully deleted.
    '307':
      $ref: 'TS29571_CommonData.yaml#/components/responses/307'
    '308':
      $ref: 'TS29571_CommonData.yaml#/components/responses/308'
    '400':
      $ref: 'TS29571_CommonData.yaml#/components/responses/400'
    '401':
      $ref: 'TS29571_CommonData.yaml#/components/responses/401'
    '403':
      $ref: 'TS29571_CommonData.yaml#/components/responses/403'
    '404':
      $ref: 'TS29571_CommonData.yaml#/components/responses/404'
    '429':
      $ref: 'TS29571_CommonData.yaml#/components/responses/429'
    '500':
      $ref: 'TS29571_CommonData.yaml#/components/responses/500'
    '502':
      $ref: 'TS29571_CommonData.yaml#/components/responses/502'
    '503':
      $ref: 'TS29571_CommonData.yaml#/components/responses/502'

```

```

    $ref: 'TS29571_CommonData.yaml#/components/responses/503'
  default:
    $ref: 'TS29571_CommonData.yaml#/components/responses/default'

```

```

components:
  securitySchemes:
    oAuth2ClientCredentials:
      type: oauth2
      flows:
        clientCredentials:
          tokenUrl: '{nrfApiRoot}/oauth2/token'
          scopes:
            neif-ee: >
              Enables to access all the resources and custom operations of the Neif_EventExposure
              API.

```

```

schemas:

```

```

#
# STRUCTURED DATA TYPES
#

```

```

EnergyEeSubsc:
  description: >
    Represents the Energy Event Exposure Subscription.
  type: object
  properties:
    notifUri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    eventsSubscSets:
      type: object
      additionalProperties:
        $ref: '#/components/schemas/EnergyEeSubscSet'
      minProperties: 1
      description: >
        Contains the set(s) of Energy Event Exposure subscription related details.
        The key of the map shall be set to the value of the "subscSetId" attribute of the
        corresponding map value encoded using the EnergyEeSubscSet data structure.
    suppFeat:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/SupportedFeatures'
  required:
    - notifUri
    - eventsSubscSets

```

```

EnergyEeSubscPatch:
  description: >
    Represents the requested modifications to an Energy Event Exposure Subscription.
  type: object
  properties:
    notifUri:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Uri'
    eventsSubscSets:
      type: object
      additionalProperties:
        $ref: '#/components/schemas/EnergyEeSubscSet'
      minProperties: 1
      description: >
        Contains the set(s) of Energy Event Exposure subscription related details.
        The key of the map shall be set to the value of the "subscSetId" attribute of the
        corresponding map value encoded using the EnergyEeSubscSet data structure.

```

```

EnergyEeNotif:
  description: >
    Represents the Energy Event Exposure Notification.
  type: object
  properties:
    subId:
      type: string
    reports:
      type: array
      items:
        $ref: '#/components/schemas/EnergyEeReport'
      minItems: 1
  required:
    - subId
    - reports

```

```

EnergyEeSubscSet:
  description: >
    Represents the Energy Event Exposure Subscription set.
  type: object
  properties:
    event:
      $ref: '#/components/schemas/EnergyEeEvent'
    subscSetId:
      type: string
    supi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Supi'
    gpsi:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Gpsi'
    dnn:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Dnn'
    snssai:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/Snssai'
    appId:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/ApplicationId'
    flowDescs:
      type: array
      items:
        $ref: 'TS29514_Npcf_PolicyAuthorization.yaml#/components/schemas/FlowDescription'
      minItems: 1
    repPeriod:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
    repTimeWin:
      $ref: 'TS29122_CommonData.yaml#/components/schemas/TimeWindow'
    enrgRepThres:
      $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/EnergyInfo'
    repPeriodThres:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DurationSec'
    maxReportNbr:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/UInteger'
  required:
    - event
    - subscSetId
  oneOf:
    - required: [supi]
    - required: [gpsi]
  not:
    required: [appId, flowDescs]

```

```

EnergyEeReport:
  description: >
    Represents the Energy Event Exposure report.
  type: object
  properties:
    event:
      $ref: '#/components/schemas/EnergyEeEvent'
    subscSetId:
      type: string
    timeStamp:
      $ref: 'TS29571_CommonData.yaml#/components/schemas/DateTime'
    energyInfo:
      $ref: 'TS29122_MonitoringEvent.yaml#/components/schemas/EnergyInfo'
  required:
    - event
    - subscSetId
    - timeStamp

```

```
# SIMPLE DATA TYPES
```

```
#
```

```
#
```

```
# ENUMERATIONS
```

```
#
```

```

EnergyEeEvent:
  anyOf:
    - type: string
      enum:
        - UE_ENERGY
        - PDU_SESSION_ENERGY
        - SERVICE_FLOW_ENERGY
        - UE_SNSSAI_ENERGY
    - type: string

```

```
description: >
  This string provides forward-compatibility with future extensions to the enumeration
  and is not used to encode content defined in the present version of this API.
description: |
  Represents the Energy Exposure event.
  Possible values are:
  - UE_ENERGY: Indicates that the Energy Exposure event is the energy consumed by a UE.
  - PDU_SESSION_ENERGY: Indicates that the Energy Exposure event is the energy consumed
    by a PDU session of a UE.
  - SERVICE_FLOW_ENERGY: Indicates that the Energy Exposure event is the energy consumed
    by an application or service data flow of an application traffic of a UE.
  - UE_SNSSAI_ENERGY: Indicates that the Energy Exposure event is the energy consumed by
    a UE in an S-NSSAI.
```

```
# Data types describing alternative data types or combinations of data types:
#
```

---

## Annex B (informative): Withdrawn API versions

### B.1 General

This Annex lists withdrawn API versions of the APIs defined in the present specification. Clause 4.3.1.6 of 3GPP TS 29.501 [5] clause 4.3.1.6 describes the withdrawal of API versions.

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### B.2 Neif\_EventExposure API

The API versions listed in table B.2-1 are withdrawn for the Neif\_EventExposure API.

**Table B.2-1: Withdrawn API versions of the Neif\_EventExposure service**

API version number	Remarks

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# Annex C (normative): ABNF grammar for 3GPP SBI HTTP custom headers

## C.1 General

This Annex contains a self-contained set of ABNF rules, comprising the re-used rules from IETF RFCs, and the rules defined by the 3GPP custom headers defined in this specification (see clause 6.1.2.3).

This grammar may be used as input to existing tools to help implementations to parse 3GPP custom headers.

## Annex D (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2025-04	CT3#140	C3-251540				Skeleton	0.0.0
2025-04	CT3#140	C3-251622				Cleanup of specification to be agreed by CT3	0.1.0
2025-05	CT3#141	C3-252389				Agreed version at CT3#141, implementing: C3-252097, C3-252469, C3-252470, C3-252471, C3-252472	0.2.0
2025-06	CT#108	CP-251139				Presentation to TSG CT for information.	1.0.0
2025-08	CT3#142	C3-253653				Agreed version at CT3#142, implementing: C3-253339, C3-253340, C3-253341, C3-253690	1.1.0
2025-10	CT3#143	C3-254475				Agreed version at CT3#143, implementing: C3-254424, C3-254425, C3-254426	1.2.0
2025-11	CT3#144	C3-255662				Agreed version at CT3#144, implementing: C3-255426, C3-255428, C3-255430, C3-255571, C3-255572, C3- 255575, C3-255576, C3-255614, C3-255651, C3-255653	1.3.0
2025-12	CT#110	CP-253021				Presentation to TSG CT for approval.	2.0.0
2025-12	CT#110	CP-253021				Approved by TSG CT.	19.0.0
2026-03	CT#111	CP-260073	000 1	-	F	Corrections to API Definition	19.1.0

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## History

<b>Version</b>	<b>Date</b>	<b>Status</b>
V19.0.0	February 2026	Publication
V19.1.0	March 2026	Publication