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| ***3GPP***  Postal address  3GPP support office address  650 Route des Lucioles - Sophia Antipolis  Valbonne - FRANCE  Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16  Internet  <http://www.3gpp.org> |
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Foreword

This Technical Specification has been produced by the 3rd 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.

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.

# 1 Scope

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

The 5G System stage 2 architecture and procedures are specified in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.548 [14].

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 23.548: "5G System Enhancements for Edge Computing; Stage 2".

[15] IETF RFC 6902: "JavaScript Object Notation (JSON) Patch".

[16] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[17] Void.

[18] IETF RFC 7871: "Client Subnet in DNS Queries".

[19] 3GPP TS 23.003: "Numbering, addressing and identification".

# 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].

**One-Time DNS Rule:** A DNS Rule that applies only once to a specific DNS message earlier buffered in the EASDF and reported to the SMF (see clause 5.2.3.2.4).

## 3.2 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].

BD AIT Baseline DNS Action Information Template

BD MDT Baseline DNS Message Detection Template

EASDF Edge Application Server Discovery Function

ECS EDNS Client Subnet

EDNS Extension mechanisms for DNS

HR-SBO Home Routed Session BreakOut

MDT (DNS Query or DNS Response) Message Detection Template

# 4 Overview

## 4.1 Introduction

Within the 5GC, the EASDF offers services to the SMF via the Neasdf service based interface (see 3GPP TS 23.548 [14], 3GPP TS 23.501 [2] and 3GPP TS 23.502 [3]).

Figure 4.1-1 provides the reference model (in service based interface representation and in reference point representation), with focus on the EASDF and the scope of the present specification.



Figure 4.1-1: Reference model – EASDF

The functionalities supported by the EASDF are listed in clause 5.1.1 of 3GPP TS 23.548 [14].

In roaming scenarios, the V-EASDF offers service to the SMF in the VPLMN in both LBO roaming and HR with Session Breakout (HR-SBO) roaming scenarios (see clause 4.2 of 3GPP TS 23.548 [14]).

# 5 Services offered by the EASDF

## 5.1 Introduction

The EASDF offers to other NFs the following service:

Table 5.1-1: NF Service provided by EASDF

| Service Name | Description | Example Consumer |
| --- | --- | --- |
| Neasdf\_DNSContext | This service enables the consumer to create, update and delete DNS context in EASDF, or subscribe to DNS message reporting from EASDF. | SMF, V-SMF |
| Neasdf\_BaselineDNSPattern | This service enables the consumer to create, update and delete Baseline DNS pattern in EASDF. | SMF, V-SMF |

The Neasdf\_DNSContext service and Neasdf\_BaselineDNSPattern service are specified in 3GPP TS 23.548 [14].

Table 5.1-2 summarizes the corresponding APIs defined for this specification.

Table 5.1-2: API Descriptions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Service Name | Clause | Description | OpenAPI Specification File | apiName | Annex |
| Neasdf\_DNSContext | 6.1 | EASDF DNSContext Service | TS29556\_Neasdf\_DNSContext.yaml | neasdf-dnscontext | A.2 |
| Neasdf\_BaselineDNSPattern | 6.2 | EASDF BaselineDNSPattern Service | TS29556\_Neasdf\_BaselineDNSPattern.yaml | neasdf-baselinednspattern | A.3 |

## 5.2 Neasdf\_DNSContext Service

### 5.2.1 Service Description

The Neasdf\_DNSContext service operates on the DNS contexts. The EASDF is acting as NF Service Producer, while the SMF is the NF Service Consumer.

Following functionalities are provided by the Neasdf\_DNSContext service:

- Create a DNS context in EASDF;

- Update a DNS context in EASDF;

- Delete a DNS context in EASDF;

- Enable the EASDF to report DNS signalling related information to the NF service consumer when receiving DNS Query or DNS Response.

The Neasdf\_DNSContext service supports the following service operations.

Table 5.2.1-1: Service operations supported by the Neasdf\_DNSContext service

|  |  |  |  |
| --- | --- | --- | --- |
| Service Operations | Description | Operation  Semantics | Example Consumer(s) |
| Create | Create a DNS context in EASDF. | Request/Response | SMF, V-SMF |
| Update | Update a DNS context in EASDF. | Request/Response | SMF, V-SMF |
| Delete | Delete a DNS context in EASDF. | Request/Response | SMF, V-SMF |
| Notify | EASDF reports DNS signalling related information to the NF service consumer when receiving DNS Query or DNS Response. | Subscribe/Notify | SMF, V-SMF |

### 5.2.2 Service Operations

#### 5.2.2.1 Introduction

See Table 5.2.1-1 for an overview of the service operations supported by the Neasdf\_DNSContext service.

#### 5.2.2.2 Create

##### 5.2.2.2.1 General

The Create service operation shall be used to create an individual DNS context for a given PDU Session in the EASDF.

It is used in the following procedures:

- EAS Discovery Procedure with EASDF (see clause 6.2.3.2.2 of 3GPP TS 23.548 [14]); and

- EAS Discovery Procedure with V-EASDF for HR-SBO (see clauses 6.7.2.2 and 6.7.2.3) of 3GPP TS 23.548 [14].

There shall be only one individual DNS context created in an EASDF per PDU session.

The NF Service Consumer (e.g. SMF) shall create a DNS context by using the HTTP POST method as shown in Figure 5.2.2.2.1-1.



Figure 5.2.2.2.1-1: DNS context creation

1. The NF Service Consumer shall send a POST request to the resource representing the DNS contexts collection resource of the EASDF. The content of the POST request shall contain:

- the UE IP address, S-NSSAI and the DNN of the related PDU session;

- a notification URI for receiving DNS context related event notifications, if notifications are requested;

- one or more DNS rules.

In addition, for a DNS context creation in the V-EASDF for HR-SBO in VPLMN:

- the UE IP address shall be set to an unspecified address, i.e. to the IPv4 address 0.0.0.0, or the IPv6 address ::/128, if the IP address of the UE's PDU session is not known yet, or to a mapped address (when using UE source IP address mapping at the Local PSA-UPF);

- the S-NSSAI shall correspond to the VPLMN S-NSSAI value; and

- the content of the POST request shall contain the HPLMN ID.

The payload body of the POST request may further contain:

- N6 traffic routing information that may contain the IP address and optional port number of the Local PSA-UPF, for HR-SBO in VPLMN, when using N6 tunneling between the L-PSA and V-EASDF, to disambiguate the DNS traffic using a private UE IP address from a certain HPLMN using a specific L-PSA UPF address of the N6 tunnel between the Local PSA-UPF and the V-EASDF.

2a. On success, a "201 Created" response shall be returned with the "Location" header containing the URI of the created resource.

The POST response body shall include:

- the IP address of the EASDF (to be sent by the SMF to the UE).

2b. On failure, or redirection, one of the HTTP status code listed in Table 6.1.3.2.3.1-3 shall be returned.

#### 5.2.2.3 Update

##### 5.2.2.3.1 General

The Update service operation shall be used to update an individual DNS context previously created in the EASDF. The update operation may apply to the whole DNS context (complete replacement of the data of the existing DNS context by new data), or it may apply to modify a subset of the parameters of the DNS context.

It is used in the following procedures:

- EAS Discovery Procedure with EASDF (see clause 6.2.3.2.2 of 3GPP TS 23.548 [14]); and

- EAS Discovery Procedure with V-EASDF for HR-SBO (see clauses 6.7.2.2 and 6.7.2.3) of 3GPP TS 23.548 [14].

To perform a partial update of the DNS context of a given DNS context Id, the NF Service Consumer shall issue an HTTP PATCH request, as shown in Figure 5.2.2.3.1-1. This partial update shall be used to add, delete and/or replace individual parameters of the DNS context.



Figure 5.2.2.3.1-1: DNS context Partial Update

1. The NF Service Consumer (e.g. SMF) shall send a PATCH request to the resource URI representing the individual DNS context, identified by the {dnsContextId}. The content of the PATCH request shall contain the list of operations (add/delete/replace) to be applied to parameters in the individual DNS context.

2a. On success, if all the modification instructions in the PATCH request have been implemented, "204 No Content" shall be returned.

2b. If some of the modification instructions for unknown attribute(s) in the PATCH request have been ignored, the EASDF shall respond with "200 OK" with the response body containing PatchResult, as specified in clause 5.2.7.2 of 3GPP TS 29.500 [4].

2c. On failure or redirection, one of the HTTP status code listed in Table 6.1.3.3.3.2-3 shall be returned.

To perform a complete replacement of the data of the DNS context of a given DNS context Id, the NF Service Consumer shall issue an HTTP PUT request, as shown in Figure 5.2.2.3.1-2:



Figure 5.2.2.3.1-2: DNS context Complete Replacement

1. The NF service consumer (e.g. SMF) shall send a PUT request to the resource URI representing the individual DNS context, identified by the {dnsContextId}. The content of the PUT request shall contain a representation of the individual DNS context to be completely replaced in the EASDF.

2a. On success, "204 No Content" shall be returned.

2b. On failure or redirection, one of the HTTP status code listed in Table 6.1.3.3.3.3-3 shall be returned.

For HR-SBO in VPLMN, if the V-SMF has created the DNS context with an unspecified UE IP address, the V-SMF shall use either of the procedures above including the UE IP address assigned by the HPLMN to complete the configuration of the context in the V-EASDF.

#### 5.2.2.4 Delete

##### 5.2.2.4.1 General

The Delete Service operation shall be used by the NF service consumer (e.g. SMF) to delete the individual DNS context in the EASDF.



Figure 5.2.2.4.1-1: DNS context deletion

1. The NF Service Consumer (e.g. SMF) shall send a DELETE request to delete the individual DNS context represented by the {dnsContextId}. The request body shall be empty.

2a. On success, "204 No Content" shall be returned. The response body shall be empty.

2b. On failure or redirection, one of the HTTP status code listed in Table 6.1.3.3.3.1-3 shall be returned.

#### 5.2.2.5 Notify

##### 5.2.2.5.1 General

The Notify service operation shall be used to notify the NF Service Consumer (e.g. SMF or V-SMF) about a DNS context related event, e.g. if a received DNS Query message or DNS response message matches a DNS detection template of an DNS rule and the associated action requires to report the message to the NF service producer.

It is used in the following procedures:

- EAS Discovery Procedure with EASDF (see clause 6.2.3.2.2 of 3GPP TS 23.548 [14]); and

- EAS Discovery Procedure with V-EASDF for HR-SBO (see clauses 6.7.2.2 and 6.7.2.3) of 3GPP TS 23.548 [14].

The EASDF shall send an HTTP POST request targeting the DNS context notification URI provided by the NF Service Consumer in the Create or Update service operation (see clause 5.2.2.2.1). See also Figure 5.2.2.5.1-1.



Figure 5.2.2.5.1-1: DNS Context Notify

1. The EASDF shall send a HTTP POST request to the DNS context notification URI, and the content of the POST request shall contain a DnsContextNotification data structure, with the DNS message report that was subscribed by the NF Service Consumer.

2a. On success, "204 No Content" shall be returned and the content of the POST response shall be empty.

2b. On failure or redirection, one of the HTTP status code listed in Table 6.1.5.2.3.1-3 shall be returned.

If the EASDF receives a "404 Not Found" response with the application error "DNS\_CONTEXT\_NOT\_FOUND", the EASDF should consider that the DNS context is no longer valid and delete the DNS context.

The EASDF should not keep on sending notification requests to an NF service consumer and may consider that the DNS context is no longer valid and delete the DNS context, if it receives one or more "404 Not Found" responses without an application error or with other application errors.

### 5.2.3 DNS messages processing by EASDF

#### 5.2.3.1 Introduction

This clause specifies how the EASDF shall process DNS messages according to the instructions received from the SMF.

#### 5.2.3.2 DNS message processing model

##### 5.2.3.2.1 DNS Context

The SMF shall control how the EASDF processes DNS messages received for a particular UE's PDU session by creating one single DNS context per PDU session including the following information:

- the UE IP address, S-NSSAI and DNN of the PDU session;

- the H-PLMN ID for a PDU session supporting HR-SBO in VPLMN; and

- one or more DNS rules.

There shall be at most one DNS context created in the EASDF with the same UE IP address, S-NSSAI and DNN, and for HR-SBO in VPLMN, in addition with the same H-PLMN ID. If the EASDF receives a request to create a DNS context for which another DNS context already exists with the same UE IP address, S-NSSAI and DNN, and for HR-SBO in VPLMN, in addition with the same H-PLMN ID,, the EASDF shall proceed with creating the DNS context and shall delete the earlier existing DNS context with the same UE IP address, S-NSSAI and DNN, and for HR-SBO in VPLMN, in addition with the same H-PLMN ID.

As an exception, for HR-SBO in VPLMN, several DNS contexts may be created in the V-EASDF with an unspecified UE IP address and the same S-NSSAI, DNN and H-PLMN ID (see clause 5.2.2.2.1). The V-EASDF shall support creating such DNS contexts without deleting earlier DNS contexts with the same unspecified UE IP address, S-NSSAI, DNN and H-PLMN ID.

##### 5.2.3.2.2 DNS Rule

A DNS rule shall apply either to DNS Query messages or DNS Response messages. A DNS rule shall contain:

- the DNS Rule ID uniquely identifying the DNS rule within the DNS context, for a DNS rule other than a One-Time DNS rule;

- precedence information, indicating the order in which the EASDF shall attempt to match DNS messages against all the DNS rules provisioned in the DNS context, for a DNS rule other than a One-Time DNS rule;

- for a DNS rule provisioned for DNS Query messages:

- for a DNS rule other than a One-Time DNS rule:

- at least one DNS Query Message Detection Template (MDT) or Baseline DNS Query Message Detection Template (BD MDT) ID referring to a BD MDT provisioned in a baseline DNS pattern; such a DNS rule may contain one or more DNS Query MDTs and/or BD MDT IDs referring to BD MDTs provisioned in one or more baseline DNS patterns; or

- for a One-Time DNS rule:

- the DNS message identifier uniquely identifying the DNS message buffered in the EASDF;

- for a DNS rule provisioned for DNS Response messages:

- for a DNS rule other than a One-Time DNS rule:

- at least one DNS Response MDT or Baseline DNS Response MDT ID referring to a BD MDT provisioned in a baseline DNS pattern; a DNS rule may contain one or more DNS Response MDTs and/or BD MDT IDs referring to BD MDTs provisioned in one or more baseline DNS patterns;

- for a One-Time DNS rule:

- the DNS message identifier uniquely identifying the DNS message buffered in the EASDF;

- a list of actions to apply to all DNS messages matching at least one DNS MDT of the DNS rule or one BD MDT referred by the DNS rule.

See clauses 5.2.3.5 and 5.2.3.2.4 for the description of baseline DNS patterns and One-Time DNS rules respectively.

Figure 5.2.3.2-1 provides an overview of DNS contexts, DNS rules (other than One-Time DNS rules) and baseline DNS patterns, depicting one DNS context created with N DNS rules, some of them referring to baseline DNS patterns.



Figure 5.2.3.2-1: Overview of DNS contexts, DNS rules and Baseline DNS Patterns

##### 5.2.3.2.3 Processing flow for incoming DNS messages

Upon receipt of a DNS message, the EASDF shall first identify the DNS context corresponding to the DNS message as follows:

- for DNS Query message: by using the source IP address of the DNS Query message and by matching it with the UE IP address provisioned in the DNS Query MDTs if any or with the UE IP address provisioned in the DNS context; and

- for a DNS Response message: by matching the DNS response with the DNS Query (either by the EASDF assigning a specific Transaction ID when forwarding the DNS Query message and by matching the Transaction ID in the DNS Query and DNS Response, or by the EASDF using a unique couple of source IP address and UDP port per DNS context when forwarding the DNS Query message and by matching the DNS Response message using the destination IP address and UDP port) and by retrieving the DNS context that is associated with the DNS query.

NOTE 1: The EASDF has direct user plane connectivity (i.e., without any NAT) with the PSA UPF over N6 for the transmission of DNS signalling exchanged with the UE. The deployment of a NAT between EASDF and PSA UPF is not supported.

The following options may be used to support DNS contexts with the same (private) UE IP address from different S-NSSAI and DNNs:

- the EASDF may associate a specific EASDF address with a specific S-NSSAI and DNN and provide this address to the SMF during the creation of a DNS context associated with this S-NSSAI and DNN. If so, the EASDF shall also use the destination IP address of DNS Query messages to identify the DNS context matching an incoming DNS request;

- the SMF may set the UE IP address to a mapped N6 address, when using UE source IP address mapping at the Local PSA-UPF;

- the SMF may provide N6 traffic routing information (in the DNS context information) that may contain the IP address and optional port number of the Local PSA-UPF, for HR-SBO in VPLMN, when using N6 tunneling between the L-PSA and V-EASDF. If so, the V-EASDF shall also use the N6 traffic routing information of DNS Query messages to identify the DNS context matching an incoming DNS request.

To support DNS contexts with the same (private) UE IP address from different PLMNs and from different S-NSSAI and DNNs, the V-EASDF may associate a specific V-EASDF address with a specific HPLMN ID, S-NSSAI and DNN and provide this address to the V-SMF during the creation of a DNS context associated with this HPLMN ID, S-NSSAI and DNN. If so, the V-EASDF shall also use the destination IP address of DNS Query messages to identify the DNS context matching an incoming DNS request.

A DNS context containing an unspecified UE IP address shall be considered to never match any DNS Query message.

If there is no DNS context matching a DNS Query or Response message, the EASDF should forward the DNS Query message towards a preconfigured DNS server and the DNS response towards the UE.

After finding the DNS context, the EASDF shall look up for a DNS rule matching the DNS message, among all DNS rules provisioned in the DNS Context, starting with the DNS rules with the highest precedence and continuing then with DNS rules with a lower precedence, in decreasing order of precedence. If there is no DNS rule matching the DNS message, the EASDF should forward the DNS Query message towards a preconfigured DNS server/resolver for resolution.

NOTE 2: The SMF can provision in the DNS context a DNS rule with the lowest precedence and with a DNS Query MDT or a DNS Response MDT containing a wildcard FQDN, such as to associate a default behavior to all DNS messages not matching any other DNS rule, e.g. forward DNS Query messages to a specific DNS Server.

After having found a matching DNS rule, the EASDF shall stop looking up for other DNS rules and shall apply the list of actions provisioned in the matching DNS rule.

A DNS message matches a DNS rule if it matches at least one MDT of the DNS Rule or one BD MDT referred by the DNS rule.

The DNS message processing models for DNS Query and DNS Response are depicted in Figure 5.2.3.2-2 and 5.2.3.2-3 respectively.



Figure 5.2.3.2-2: DNS Query processing flow in the EASDF



Figure 5.2.3.2-3: DNS Response processing flow in the EASDF

##### 5.2.3.2.4 Processing of a One-Time DNS Rule applicable to a specific DNS message earlier buffered in the EASDF

The SMF may instruct the EASDF to apply certain actions (e.g. forward, drop or respond to a DNS message) to a specific DNS message, that has been earlier buffered in the EASDF and reported to the SMF, by creating a new DNS rule in the DNS context that includes:

- the DNS message identifier uniquely identifying the DNS message within the DNS context, as reported earlier by the EASDF in the DNSContext Notify request; and

- the requested actions to apply to the DNS message.

Such a DNS rule shall not contain any DNS Rule ID, precedence, MBT nor BD MDT.

Upon receipt of an DNSContext Update request that creates such a DNS rule, the EASDF shall apply the requested actions to the specific DNS message identified by the DNS message identifier and then delete the DNS Rule. If there is no buffered DNS message corresponding to the DNS message identifier received in the DNS rule, the EASDF shall reject the request with an error.

NOTE: A DNS rule that includes a DNS message identifier is referred as a "One-Time" DNS rule throughout this specification since the DNS rule is applied only once for the indicated DNS message and the DNS rule is not further stored by the EASDF.

#### 5.2.3.3 DNS Message Detection Template

##### 5.2.3.3.1 General

The contents of a DNS Query MDT or a DNS Response MDT may be provisioned directly in a DNS rule itself or in a BD MDT provisioned in a baseline DNS pattern. In the latter case, a DNS rule may refer to one or more BD MDTs (that are all either DNS Query MDTs or DNS Response MDTs) of one or more baseline DNS patterns by referencing the BD MDT IDs of the BD MDTs of the baseline DNS patterns.

The following clauses define the contents of DNS Query MDTs and DNS Response MDTs, provisioned in a DNS rule or in a BD MDT.

##### 5.2.3.3.2 DNS Query MDT

A DNS Query Message Detection Template may include:

- a UE IP address;

- a list of FQDN ranges or a wildcard FQDN representing "any FQDN" (see clauses 6.1.6.2.5 and 6.1.6.2.6).

A UE IP address may only be provisioned in a DNS Query MDT, i.e. it cannot be provisioned in a Baseline DNS MDT. However, a DNS rule may be provisioned with a reference to one or more Baseline DNS Query MDTs together with a UE IP address (see clause 6.1.6.2.20), in which case the referenced Baseline DNS Query MDTs shall be matched for the specific UE IP address.

When present in a DNS Query MDT, or together with the reference to a Baseline DNS Query MDT, the UE IP address shall be used for matching the DNS Query message with the related DNS rule (see clause 5.2.3.2). Otherwise, the UE IP address provisioned in the DNS context shall be used.

FQDNs shall be matched against the Query Domain Name of DNS Query messages.

##### 5.2.3.3.3 DNS Response MDT

A DNS Response Message Detection Template may include:

- a list of FQDN ranges or a wildcard FQDN representing "any FQDN"; and/or

- a list of EAS IP addresses ranges.

FQDNs shall be matched against the Domain Names in the Answers of DNS Response messages.

EAS IP addresses ranges shall be matched against the IP addresses returned in the Answers of DNS Response messages.

#### 5.2.3.4 Actions applicable to DNS message

##### 5.2.3.4.1 General

Each DNS rule shall be provisioned with the list of actions to apply to all DNS messages matching the DNS rule.

The SMF may request the EASDF to apply one or more of the following actions:

1) REPORT DNS message content to the SMF.

The SMF may further request the EASDF to send a report only once to the SMF, i.e. only when a first DNS message matches any MDT of the DNS rule. If so, the EASDF shall skip this action (i.e. report to SMF) for any subsequent DNS message matching the DNS rule.

The SMF may further request the EASDF to reset the reporting-once indication, in which case the EASDF shall send (only) one more report at the next DNS message that matches the DNS rule.

2) BUFFER DNS message.

3) FORWARD DNS message.

The SMF may further request the EASDF to set the destination IP address of the DNS Query message to a specific DNS Server address. The DNS Server address may either be included in the DNS rule or in a Baseline DNS Action Information Template (BD AIT); in the latter case, the DNS rule shall refer to the corresponding BD AIT ID. If no DNS Server address is provided by the SMF, the EASDF shall forward the DNS message to a locally pre-configured DNS server/resolver.

The SMF may request the EASDF to build an EDNS Client Subnet (ECS) option to be included in the DNS Query message as defined in IETF RFC 7871 [18], or to be used for replacing the ECS option if an ECS option is received in the DNS Query message from the UE. The information for the EASDF to build the ECS option may either be included in the DNS rule or in a Baseline DNS Action Information Template (BD AIT); in the latter case, the DNS rule shall refer to the corresponding BD AIT ID.

When forwarding a DNS Query message, if the SMF did not request the EASDF to build an ECS option, the EASDF shall remove the ECS option received from the UE in the DNS Query, if any.

When forwarding a DNS Response message to the UE, based on configuration, the EASDF shall either remove any received ECS option or, if an ECS option was received in the DNS Query from the UE, replace it with the latter ECS option.

4) DISCARD DNS message.

5) RESPOND to DNS Query message.  
  
If both the SMF and the EASDF support the CEASD feature (see clause 6.1.8), the SMF may instruct the EASDF to build a DNS Response message to a DNS Query message and to send it to the UE by setting the applyAction to the value "RESPOND", e.g. when a set of UEs shall use the same EAS (see clause 6.2.3.2.5 of 3GPP TS 23.548 [14]). When requesting so, the SMF shall indicate to the EASDF the EAS IP address(es) that the DNS response shall contain.  
Upon receipt of such a request, the EASDF shall build a DNS Response message to the DNS Query message, that includes the EAS IP address(es) indicated by the SMF and send it to the UE.

The SMF may change the list of actions associated to a DNS rule (other than a One-Time DNS rule), e.g. to replace the actions to REPORT and BUFFER DNS Query messages to the SMF by the action to FORWARD the DNS messages. In such a case, any earlier buffered DNS message (matching the DNS rule) and any further incoming DNS message shall be processed according to the new instructions received from the SMF, e.g. they shall all be forwarded. The SMF may alternatively request the EASDF to apply certain actions to a specific DNS message by creating a One-Time DNS rule as defined in clause 5.2.3.2.4.

##### 5.2.3.4.2 Event reporting by EASDF

The EASDF shall send a report to the SMF:

- to report the contents of DNS (Query or Response) messages matching a DNS rule provisioned with the action to report the DNS message contents.

The EASDF shall send reports to the SMF as defined in clause 5.2.2.5. The notification request sent to the SMF may contain one or more reports, for DNS Query and/or DNS Response messages matching one or more DNS rules provisioned in the DNS context. For each report, the EASDF may provide a DNS message identifier uniquely identifying the DNS message reported to the SMF within the DNS context (see clause 5.2.3.2.4).

#### 5.2.3.5 Baseline DNS Patterns

##### 5.2.3.5.1 General

The SMF may create, modify or delete baseline DNS patterns in the EASDF using the Neasdf\_BaselineDnsPattern service (see clause 5.3).

A baseline DNS pattern contains baseline DNS information that may apply to multiple PDU sessions, e.g. to all PDU sessions with a certain DNN and S-NSSAI.

A baseline DNS pattern may contain:

- one or several BD MDTs; and/or

- one or several BD AITs.

A baseline DNS pattern may contain BD MDTs for DNS Query messages and BD MDTs for DNS Response messages. One BD MDT shall be either a DNS Query MDT or a DNS Response MDT (see clause 5.2.3.3).

A BD AIT may include:

- one or more local DNS Server IP address(es); and/or

- ECS option information.

NOTE 1: Multiple DNS Server IP addresses can be provided for resiliency.

A BD MDT and a BD AIT shall be uniquely identified in the EASDF by the combination of the following information:

- the URI of the baseline DNS pattern in which the BD MDT or BD AIT is defined; the URI shall be chosen by the SMF when creating the baseline DNS pattern (see clause 6.2.3); and

- an MDT or AIT identifier (string) uniquely identifying the MDT or AIT within the baseline DNS pattern; this identifier shall be chosen by the SMF when creating the BD MDT or BD AIT.

The URI of a baseline DNS pattern shall be unique per SMF set, if an SMF set controls the EASDF, or unique per SMF otherwise.

NOTE 2: The URI of a baseline DNS pattern includes an identifier of the SMF or SMF set (see clause 6.2.3.1) and SMF implementation specific information. This ensures the uniqueness of the URI in the EASDF when several SMFs or SMF sets control the same EASDF. As an example, an SMF can encode the URI of the baseline DNS pattern and the MDT or AIT identifier to include the DNAI or a sequence number. The EASDF is not meant to understand the structure of this information.

When a BD MDT or BD AIT of a baseline DNS pattern is modified by the SMF, the modified BD MDT or BD AIT shall apply to all DNS rules of all DNS contexts referring to that BD MDT or BD AIT.

## 5.3 Neasdf\_BaselineDNSPattern Service

### 5.3.1 Service Description

The Neasdf\_BaselineDNSPattern service operates on the Baseline DNS patterns in EASDF, which contains the DNS base information that may apply to multiple PDU sessions, e.g. DNS Query and Response MDTs applicable to all PDU sessions with a certain DNN and S-NSSAI. The EASDF is acting as NF Service Producer, while the SMF is the NF Service Consumer.

Following functionalities are provided by the Neasdf\_BaselineDNSPattern service:

- Create a Baseline DNS Pattern in EASDF;

- Update the Baseline DNS Pattern in EASDF;

- Delete the Baseline DNS Pattern in EASDF.

The Neasdf\_BaselineDNSPattern service supports the following service operations.

Table 5.3.1-1: Service operations supported by the Neasdf\_BaselineDNSPattern service

|  |  |  |  |
| --- | --- | --- | --- |
| Service Operations | Description | Operation  Semantics | Example Consumer(s) |
| Create | Create a Baseline DNS Pattern in EASDF. | Request/Response | SMF, V-SMF |
| Update | Update the Baseline DNS Pattern in EASDF. | Request/Response | SMF, V-SMF |
| Delete | Delete the Baseline DNS Pattern in EASDF. | Request/Response | SMF, V-SMF |

### 5.3.2 Service Operations

#### 5.3.2.1 Introduction

See Table 5.3.1-1 for an overview of the service operations supported by the Neasdf\_BaselineDNSPattern service.

#### 5.3.2.2 Create

##### 5.3.2.2.1 General

The Create service operation shall be used to create the Baseline DNS Pattern in the EASDF.

It is used in the following procedures:

- BaselineDNSPattern management in the EASDF procedure (see clause 6.2.3.4.4 of 3GPP TS 23.548 [14]).

The NF Service Consumer (e.g. SMF) shall create the Baseline DNS Pattern by using the HTTP PUT method as shown in Figure 5.3.2.2.1-1.



Figure 5.3.2.2.1-1: Baseline DNS Pattern creation

1. The NF Service Consumer shall send a PUT request to create the Baseline DNS Pattern in the EASDF. The content of the PUT request may contain:

- one or more Baseline DNS message detection templates (MDTs);

- one or more Baseline DNS action information templates (AITs).

2a. On success, a "201 Created" response shall be returned with the "Location" header containing the URI of the created resource.

2b. On failure, or redirection, one of the HTTP status code listed in Table 6.2.3.2.3.2-3 shall be returned.

#### 5.3.2.3 Update

##### 5.3.2.3.1 General

The Update service operation shall be used to update an individual Baseline DNS Pattern previously created in the EASDF. The update operation may apply to the whole Baseline DNS Pattern (complete replacement of the data of the existing Baseline DNS Pattern by new data), or it may apply to modify a subset of the parameters of the Baseline DNS Pattern.

It is used in the following procedures:

- BaselineDNSPattern management in the EASDF procedure (see clause 6.2.3.4.4 of 3GPP TS 23.548 [14]).

To perform a partial update of the Baseline DNS Pattern, the NF Service Consumer shall issue an HTTP PATCH request, as shown in Figure 5.3.2.3.1-1. This partial update shall be used to add, delete and/or replace individual parameters of the Baseline DNS Pattern.



Figure 5.3.2.3.1-1: Baseline DNS Pattern Partial Update

1. The NF Service Consumer (e.g. SMF) shall send a PATCH request to the resource URI representing the individual Baseline DNS Pattern. The content of the PATCH request shall contain the list of operations (add/delete/replace) to be applied to parameters in the individual Baseline DNS Pattern.

2a. On success, if all the modification instructions in the PATCH request have been implemented, "204 No Content" shall be returned.

2b. If some of the modification instructions for unknown attribute(s) in the PATCH request have been ignored, the EASDF shall respond with "200 OK" with the response body containing PatchResult, as specified in clause 5.2.7.2 of 3GPP TS 29.500 [4].

2c. On failure or redirection, one of the HTTP status code listed in Table 6.2.3.2.3.1-3 shall be returned.

To perform a complete replacement of the data of the Baseline DNS Pattern, the NF Service Consumer shall issue an HTTP PUT request, as shown in Figure 5.3.2.3.1-2:



Figure 5.3.2.3.1-2: Baseline DNS Pattern Complete Replacement

1. The NF service consumer (e.g. SMF) shall send a PUT request to the resource URI representing the individual Baseline DNS Pattern. The content of the PUT request shall contain a representation of the individual Baseline DNS Pattern to be completely replaced in the EASDF.

2a. On success, "204 No Content" shall be returned.

2b. On failure or redirection, one of the HTTP status code listed in Table 6.2.3.2.3.2-3 shall be returned.

#### 5.3.2.4 Delete

##### 5.3.2.4.1 General

The Delete service operation shall be used to delete an individual Baseline DNS Pattern previously created in the EASDF.

It is used in the following procedures:

- BaselineDNSPattern management in the EASDF procedure (see clause 6.2.3.4.4 of 3GPP TS 23.548 [14]).

To perform a deletion of the Baseline DNS Pattern, the NF Service Consumer shall issue an HTTP DELETE request, as shown in Figure 5.3.2.4.1-1.



Figure 5.3.2.4.1-1: Baseline DNS Pattern Deletion

1. The NF Service Consumer (e.g. SMF) shall send a DELETE request to delete the individual Baseline DNS Pattern. The request body shall be empty.

2a. On success, "204 No Content" shall be returned. The response body shall be empty.

2b. On failure or redirection, one of the HTTP status code listed in Table 6.2.3.2.3.3-3 shall be returned.

# 6 API Definitions

## 6.1 Neasdf\_DNSContext Service API

### 6.1.1 Introduction

The Neasdf\_DNSContext shall use the Neasdf\_DNSContext API.

The API URI of the Neasdf\_DNSContext 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 "neasdf-dnscontext".

- The <apiVersion> shall be "v1".

- The <apiSpecificResourceUriPart> shall be set as described in clause 6.1.3.

### 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 Neasdf\_DNSContext 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

The following content types shall be supported:

- JSON, as defined in 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];

- JSON Patch (IETF RFC 6902 [15]). The use of the JSON Patch format in a HTTP request body shall be signalled by the content type "application/json-patch+json".

#### 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 this specification, no custom headers specific to the Neasdf\_DNSContext service are defined.

### 6.1.3 Resources

#### 6.1.3.1 Overview

Figure 6.1.3.1-1 describes the resource URI structure of the Neasdf\_DNSContext API.



Figure 6.1.3.1-1: Resource URI structure of the Neasdf\_DNSContext API

Table 6.1.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.1.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method | Description  (service operation) |
| DNS contexts collection | /dns-contexts | POST | Create |
| Individual DNS context | /dns-contexts/{dnsContextId} | PATCH | Update (partial update) |
| PUT | Update (complete replacement) |
| DELETE | Delete |

#### 6.1.3.2 Resource: DNS contexts collection

##### 6.1.3.2.1 Description

This resource represents the collection of the individual DNS contexts created in the EASDF.

This resource is modelled with the Collection resource archetype (see clause C.2 of 3GPP TS 29.501 [5]).

##### 6.1.3.2.2 Resource Definition

Resource URI: **{apiRoot}/neasdf-dnscontext/<apiVersion>/dns-contexts**

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 |
| apiVersion | string | See clause 6.1.1 |

##### 6.1.3.2.3 Resource Standard Methods

6.1.3.2.3.1 POST

This method creates an individual DNS context resource in the EASDF.

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 6.1.3.2.3.1-3.

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

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| DnsContextCreateData | M | 1 | Representation of the DNS context to be created in the EASDF |

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 |
| DnsContextCreatedData | M | 1 | 201 Created | Successful creation of a DNS context |
| 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 | 400 Bad Request | The "cause" attribute may be set to one of the following application errors:  - BASELINE\_DNS\_PATTERN\_UNKNOWN  - BASELINE\_DNS\_MDT\_UNKNOWN  - BASELINE\_DNS\_AIT\_UNKNOWN |
| NOTE 1: The mandatory HTTP error status code for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.  NOTE 2: RedirectResponse may be inserted by an SCP, see clause 6.10.9.1 of 3GPP TS 29.500 [4]. | | | | |

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}/neasdf-dnscontext/<apiVersion>/dns-contexts/{dnsContextId} |

Table 6.1.3.2.3.1-5: Headers supported by the 307 response code on this resource

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

Table 6.1.3.2.3.1-6: Headers supported by the 308 response code on this resource

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

##### 6.1.3.2.4 Resource Custom Operations

None.

#### 6.1.3.3 Resource: Individual DNS context

##### 6.1.3.3.1 Description

This resource represents an individual DNS context created in the EASDF.

This resource is modelled with the Document resource archetype (see clause C.1 of 3GPP TS 29.501 [5]).

##### 6.1.3.3.2 Resource Definition

Resource URI: **{apiRoot}/neasdf-dnscontext/<apiVersion>/dns-contexts/{dnsContextId}**

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. |
| apiVersion | string | See clause 6.1.1. |
| dnsContextId | string | DNS context Identifier assigned by the EASDF during the Create service operation. |

##### 6.1.3.3.3 Resource Standard Methods

6.1.3.3.3.1 DELETE

This method deletes an individual DNS context resource in the EASDF.

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 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 6.1.3.3.3.1-2 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 DELETE 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 DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Successful deletion of the DNS context. |
| 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 | 404 Not Found | Indicates that the deletion of the DNS context failed due to an application error.  The "cause" attribute may be used to indicate one of the following application errors:  - DNS\_CONTEXT\_NOT\_FOUND. |
| NOTE 1: The mandatory HTTP error status code for the DELETE method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.  NOTE 2: RedirectResponse may be inserted by an SCP, see clause 6.10.9.1 of 3GPP TS 29.500 [4]. | | | | |

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 | An alternative URI of the resource located on an alternative service instance within the same EASDF or EASDF (service) set. For the case, when a request is redirected to the same target resource via a different SCP, see clause 6.10.9.1 in 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target EASDF (service) instance ID 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 | An alternative URI of the resource located on an alternative service instance within the same EASDF or EASDF (service) set. For the case, when a request is redirected to the same target resource via a different SCP, see clause 6.10.9.1 in 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target EASDF (service) instance ID towards which the request is redirected |

6.1.3.3.3.2 PATCH

This method updates (partial update) an individual DNS context resource in the EASDF.

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 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 6.1.3.3.3.2-2 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 PATCH Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| array(PatchItem) | M | 1..N | It contains the list of changes to be made to the DNS context, according to the JSON PATCH format specified in IETF RFC 6902 [15]. |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| PatchResult | M | 1 | 200 OK | Upon partial success, e.g. some of the requested modifications for unknown attribute(s) are discarded while the rest of the modification instructions are fully accepted, the EASDF shall return the execution report. |
| n/a |  |  | 204 No Content | Successful update of the DNS context. |
| 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 | 404 Not Found | Indicates that the modification of the DNS context failed due to an application error.  The "cause" attribute may be used to indicate one of the following application errors:  - DNS\_CONTEXT\_NOT\_FOUND. |
| NOTE 1: The mandatory HTTP error status code for the PATCH method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.  NOTE 2: RedirectResponse may be inserted by an SCP, see 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 | An alternative URI of the resource located on an alternative service instance within the same EASDF or EASDF (service) set. For the case, when a request is redirected to the same target resource via a different SCP, see clause 6.10.9.1 in 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target EASDF (service) instance ID 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 | An alternative URI of the resource located on an alternative service instance within the same EASDF or EASDF (service) set. For the case, when a request is redirected to the same target resource via a different SCP, see clause 6.10.9.1 in 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target EASDF (service) instance ID towards which the request is redirected |

6.1.3.3.3.3 PUT

This method updates (complete replacement) an individual DNS context resource in the EASDF.

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 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 6.1.3.3.3.3-2 and the response data structures and response codes specified in table 6.1.3.3.3.3-3.

Table 6.1.3.3.3.3-2: Data structures supported by the PUT Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| DnsContextCreateData | M | 1 | DNS Context Data to replace the existing DNS context data |

Table 6.1.3.3.3.3-3: Data structures supported by the PUT Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Successful update of the DNS context. |
| 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 code for the PUT method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.  NOTE 2: RedirectResponse may be inserted by an SCP, see clause 6.10.9.1 of 3GPP TS 29.500 [4]. | | | | |

Table 6.1.3.3.3.3-4: Headers supported by the 307 Response Code on this resource

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

Table 6.1.3.3.3.3-5: Headers supported by the 308 Response Code on this resource

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

##### 6.1.3.3.4 Resource Custom Operations

There are no resource custom operations for the Neasdf\_DNSContext service in this release of the specification.

### 6.1.4 Custom Operations without associated resources

There are no custom operations defined without any associated resources for the Neasdf\_DNSContext service in this release of this specification.

### 6.1.5 Notifications

#### 6.1.5.1 General

This clause specifies the notifications supported by the Neasdf\_DNSContext service.

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) |
| DNS Context Notification | {notifyUri}  (Notification URI provided by NF Service Consumer) | POST | DNS Context Notify |

#### 6.1.5.2 DNS Context Notify

##### 6.1.5.2.1 Description

The Event Notification is used by the EASDF to report one or several observed Events to a NF service consumer(e.g. SMF) that has subscribed to such Notifications.

##### 6.1.5.2.2 Target URI

The Callback URI **"{notifyUri}"** 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 |
| notifyUri | String formatted as URI with the Callback 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 6.1.5.2.3.1-1.

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

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| DnsContextNotification | M | 1 | Representation of the DNS context notification |

Table 6.1.5.2.3.1-3: Data structures supported by the POST Response Body

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response codes | Description |
| n/a |  |  | 204 No Content | Successful notification of the DNS context change |
| 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 | 404 Not Found | Indicates that the notification for the DNS context failed due to an application error.  The "cause" attribute may be used to indicate one of the following application errors:  - DNS\_CONTEXT\_NOT\_FOUND. |
| NOTE 1: The mandatory HTTP error status codes for the POST method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.  NOTE 2: RedirectResponse may be inserted by an SCP, see clause 6.10.9.1 of 3GPP TS 29.500 [4]. | | | | |

Table 6.1.5.2.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 6.1.5.2.3.1-5: Headers supported by the 308 Response Code on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Data type | P | Cardinality | Description |
| Location | string | M | 1 | An alternative URI of the resource located on an alternative service instance. For the case when a request is redirected to the same target resource via a different SCP, see clause 6.10.9.1 in 3GPP TS 29.500 [4]. |
| 3gpp-Sbi-Target-Nf-Id | string | O | 0..1 | Identifier of the target NF (service) instance ID towards which the notification 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 Neasdf\_DNSContext service based interface protocol.

Table 6.1.6.1-1: Neasdf\_DNSContext specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Clause defined | Description | Applicability |
| DnsContextCreateData | 6.1.6.2.2 | Data in DNS Context Create request |  |
| DnsContextCreatedData | 6.1.6.2.3 | Data in DNS Context Create response |  |
| DnsRule | 6.1.6.2.4 | DNS handling rule |  |
| DnsQueryMdt | 6.1.6.2.5 | DNS Query Message Detection Template |  |
| DnsRspMdt | 6.1.6.2.6 | DNS Response Message Detection Template |  |
| Ipv4AddressRange | 6.1.6.2.7 | IPv4 addresses range |  |
| Ipv6PrefixRange | 6.1.6.2.8 | IPv6 addresses range |  |
| Action | 6.1.6.2.9 | Action to apply to DNS messages matching a message detection template |  |
| DnsContextNotification | 6.1.6.2.10 | DNS context notification |  |
| ForwardingParameters | 6.1.6.2.11 | Forwarding instructions |  |
| EcsOption | 6.1.6.2.12 | ECS Option information |  |
| DnsContextEventReport | 6.1.6.2.13 | DNS context Event report |  |
| DnsQueryReport | 6.1.6.2.14 | DNS Query Event Report |  |
| DnsRspReport | 6.1.6.2.15 | DNS Response Event Report |  |
| EcsOptionInfo | 6.1.6.2.16 | ECS option information |  |
| DnsServerAddressInfo | 6.1.6.2.17 | DNS Server address information |  |
| BaselineDnsMdtId | 6.1.6.2.18 | Baseline DNS Message Detection Template Identifier |  |
| BaselineDnsAitId | 6.1.6.2.19 | Baseline DNS Action Information Template Identifier |  |
| BaselineDnsQueryMdtInfo | 6.1.6.2.20 | Baseline DNS Query MDT ID and  optionally associated information |  |
| BaselineDnsRspMdtInfo | 6.1.6.2.21 | Baseline DNS Response MDT ID and  optionally associated information |  |
| RespondParameters | 6.1.6.2.22 | Instructions to apply to build a DNS response message |  |
| N6RoutingInfo | 6.1.6.2.23 | N6 traffic routing information |  |
| ApplyAction | 6.1.6.3.3 | Action to apply to the DNS packet |  |

Table 6.1.6.1-2 specifies data types re-used by the Neasdf 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 Neasdf\_DNSContext service based interface.

Table 6.1.6.1-2: Neasdf\_DNSContext re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| IPv4Addr | 3GPP TS 29.571 [16] | IPv4 address |  |
| IPv6Prefix | 3GPP TS 29.571 [16] | IPv6 prefix |  |
| Dnn | 3GPP TS 29.571 [16] | DNN |  |
| Uri | 3GPP TS 29.571 [16] | URI |  |
| Uint32 | 3GPP TS 29.571 [16] | Unsigned 32-bit integer |  |
| IpAddr | 3GPP TS 29.571 [16] | IP address |  |
| IPv6Addr | 3GPP TS 29.571 [16] | IPv6 address |  |
| SupportedFeatures | 3GPP TS 29.571 [16] | Supported features |  |
| DateTime | 3GPP TS 29.571 [16] | Date and time |  |
| PatchResult | 3GPP TS 29.571 [16] |  |  |
| FqdnPatternMatchingRule | 3GPP TS 29.571 [16] | FQDN Pattern Matching Rule |  |
| Fqdn | 3GPP TS 29.571 [16] |  |  |
| Snssai | 3GPP TS 29.571 [16] |  |  |
| PlmnId | 3GPP TS 29.571 [16] | PLMN Identity |  |

#### 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: DnsContextCreateData

Table 6.1.6.2.2-1: Definition of type DnsContextCreateData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| ueIpv4Addr | Ipv4Addr | C | 0..1 | UE IPv4 address (NOTE 1) |  |
| ueIpv6Prefix | Ipv6Prefix | C | 0..1 | UE IPv6 prefix (NOTE 1) |  |
| dnn | Dnn | M | 1 | DNN of the PDU session (NOTE 2) |  |
| sNssai | Snssai | M | 1 | S-NSSAI of the PDU session (NOTE 2) |  |
| hplmnId | PlmnId | C | 0..1 | This IE shall be included by the V-SMF towards the V-EASDF, for a PDU session supporting HR-SBO. When present, it shall be set to the H-PLMN ID of the PDU session. | HR-SBO |
| n6RoutingInfo | N6RoutingInfo | O | 0..1 | This IE may be present when using N6 tunneling between the L-PSA and V-EASDF, to disambiguate the DNS traffic using a private UE IP address from a certain HPLMN using a specific L-PSA UPF IP address and optional port number of the N6 tunnel between the Local PSA-UPF and V-EASDF | HR-SBO |
| dnsRules | map(DnsRule) | M | 1..N | Map of DNS message handling rules.  The key of the map shall be a (unique) valid JSON string per clause 7 of IETF RFC 8259 [12], with a maximum of 32 characters. |  |
| notifyUri | Uri | C | 0..1 | Callback URI to receive notifications.  This IE shall be present if the NF service consumer subscribes to receive DNS context notifications. |  |
| supportedFeatures | SupportedFeatures | C | 0..1 | This IE shall be present if at least one optional feature defined in clause 6.1.8 is supported. |  |
| NOTE 1: At least one of the ueIpv4Addr and ueIpv6Prefix attributes shall be present. If the EASDF supports the HR-SBO feature (i.e. if it supports acting as a V-EASDF), for a PDU session supporting HR-SBO, the V-SMF shall set the ueIpv4Addr IE and/or ueIpv6Prefix to an unspecified address (see clause 5.2.2.2.1) if the UE IP address is not yet known.  NOTE 2: The UE IP address shall be used together with the DNN and S-NSSAI to uniquely identify the DNS context associated with a PDU session (e.g. in deployments where the same EASDF is used for PDU sessions to DNs with overlapping IP address spaces) and to associate the DNS context with a specific DN (and e.g. related tunnels connecting to the DN). | | | | | |

##### 6.1.6.2.3 Type: DnsContextCreatedData

Table 6.1.6.2.3-1: Definition of type DNSContextCreatedData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| easdfIpv4Addr | IPv4Addr | C | 0..1 | EASDF IPv4 address |  |
| easdfIpv6Addr | IPv6Addr | C | 0..1 | EASDF IPv6 address |  |
| supportedFeatures | SupportedFeatures | C | 0..1 | This IE shall be present if at least one optional feature defined in clause 6.1.8 is supported. |  |
| NOTE: At least one of the easdfIpv4Addr and easdfIpv6Addr attributes shall be present. | | | | | |

##### 6.1.6.2.4 Type: DnsRule

Table 6.1.6.2.4-1: Definition of type DnsRule

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| dnsRuleId | string | C | 0..1 | Unique Identifier of the DNS rule within the DNS context  This IE shall be present for a DNS rule other than a One-Time DNS rule. |  |
| label | string | O | 0..1 | DNS rule's label  (NOTE 5) |  |
| precedence | Uint32 | C | 0..1 | Precedence of the DNS message handling rule.  This IE shall be present for a DNS rule other than a One-Time DNS rule.  The lower precedence values indicate higher precedence of the DNS rule, and the higher precedence values indicate lower precedence of the DNS rule when matching a DNS message. |  |
| dnsQueryMdtList | map(DnsQueryMdt) | C | 1..N | Map of DNS Query message detection templates.  The key of the map shall be a (unique) valid JSON string per clause 7 of IETF RFC 8259 [12], with a maximum of 32 characters.  (NOTE 3) |  |
| baseDnsQueryMdtList | array(BaselineDnsQueryMdtInfo) | C | 1..N | List of Baseline DNS Query Message Detection Template IDs and optionally associated information.  (NOTE 3) |  |
| dnsRspMdtList | map(DnsRspMdt) | C | 1..N | Map of DNS Response message detection templates.  The key of the map shall be a (unique) valid JSON string per clause 7 of IETF RFC 8259 [12], with a maximum of 32 characters.  (NOTE 4) |  |
| baseDnsRspMdtList | array(BaselineDnsRspMdtInfo) | C | 1..N | List of Baseline DNS Response Message Detection Template IDs and optionally associated information. (NOTE 4) |  |
| dnsMsgId | string | C | 0..1 | DNS message identifier  This IE shall be present for a One-Time DNS Rule and it shall be set to the identifier of the DNS message buffered in the EASDF for which the DNS rule shall apply (see clause 5.2.3.2.4).  (NOTE 6) |  |
| actionList | map(Action) | M | 1..N | Map of Actions to apply to DNS messages matching the DNS message detection templates.  The key of the map shall be a (unique) valid JSON string per clause 7 of IETF RFC 8259 [12], with a maximum of 32 characters. |  |
| NOTE 1: A DNS rule shall be provisioned either for DNS Query messages or for DNS Response messages.  NOTE 2: A DNS rule including the dnsMsgId IE shall be considered as a One-Time DNS Rule (see clause 5.2.3.2.4).  NOTE 3: For a DNS rule other than a One-Time DNS rule provisioned for DNS Query messages, at least one of the dnsQueryMdtList and baseDnsQueryMdtList IEs shall be present.  NOTE 4: For a DNS Rule other than a One-Time DNS rule provisioned for DNS Response messages, at least one of the dnsRspMdtList and baseDnsRspMdtList IEs shall be present.  NOTE 5: This attribute may contain free information describing the scope of the DNS rule. It may be used e.g. for trouble-shooting.  NOTE 6: An EASDF can encode the DNS message identifier as the ID field in the header of the DNS message, or as any other string uniquely identifying the DNS message within the DNS context. | | | | | |

##### 6.1.6.2.5 Type: DnsQueryMdt

Table 6.1.6.2.5-1: Definition of type DnsQueryMdt

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| mdtId | string | M | 1 | Identifier of the DNS Query message detection template, with a maximum of 32 characters. |  |
| label | string | O | 0..1 | DNS Query MDT's label  (NOTE 2) |  |
| sourceIpv4Addr | Ipv4Addr | O | 0..1 | UE IPv4 address (NOTE 1) |  |
| sourceIpv6Prefix | Ipv6Prefix | O | 0..1 | UE IPv6 prefix (NOTE 1) |  |
| fqdnPatternList | array(FqdnPatternMatchingRule) | O | 1..N | List of FQDN patterns, where each FQDN pattern is described by a FQDN Pattern Matching Rule.  An FQDN value is considered part of the template if and only if the FQDN in the Queries field in the DNS Query message fully matches at least one FQDN pattern.  (NOTE 3) |  |
| NOTE 1: If neither the sourceIpv4Addr IE nor the sourceIpv6Prefix IE is present, the UE IP address in the DNS Context Data shall be assumed.  NOTE 2: This attribute may contain free information describing the scope of the DNS Query MDT. It may be used e.g. for trouble-shooting.  NOTE 3: The list of FQDN patterns may encode some FQDN patterns with a string matching rule and others with a regular expression (when the FQDN patterns cannot be described by a string matching rule). | | | | | |

##### 6.1.6.2.6 Type: DnsRspMdt

Table 6.1.6.2.6-1: Definition of type DnsRspMdt

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| mdtId | string | M | 1 | Identifier of the DNS Response message detection template, with a maximum of 32 characters. |  |
| label | string | O | 0..1 | DNS Response MDT's label  (NOTE 1) |  |
| fqdnPatternList | array(FqdnPatternMatchingRule) | O | 1..N | List of FQDN patterns, where each FQDN pattern is described by a FQDN Pattern Matching Rule.  An FQDN value is considered part of the template if and only if the FQDN in the Queries field in the DNS Response message fully matches at least one FQDN pattern.  (NOTE 2) |  |
| easIpv4AddrRanges | array(Ipv4AddressRange) | O | 1..N | List of EAS IPv4 addresses ranges |  |
| easIpv6PrefixRanges | array(Ipv6PrefixRange) | O | 1..N | List of EAS IPv6 prefixes ranges |  |
| NOTE 1: This attribute may contain free information describing the scope of the DNS Response MDT. It may be used e.g. for trouble-shooting.  NOTE 2: The list of FQDN patterns may encode some FQDN patterns with a string matching rule and others with a regular expression (when the FQDN patterns cannot be described by a string matching rule). | | | | | |

##### 6.1.6.2.7 Type: Ipv4AddressRange

Table 6.1.6.2.7-1: Definition of type IPv4AddressRange

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| start | Ipv4Addr | M | 1 | First value identifying the start of an IPv4 address range |
| end | Ipv4Addr | M | 1 | Last value identifying the end of an IPv4 address range |

##### 6.1.6.2.8 Type: Ipv6PrefixRange

Table 6.1.6.2.8-1: Definition of type IPv6PrefixRange

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| start | Ipv6Prefix | M | 1 | First value identifying the start of an IPv6 prefix range |
| end | Ipv6Prefix | M | 1 | Last value identifying the end of an IPv6 prefix range |

##### 6.1.6.2.9 Type: Action

Table 6.1.6.2.9-1: Definition of type Action

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| applyAction | ApplyAction | M | 1 | Action to apply to the DNS message |  |
| fwdParas | ForwardingParameters | O | 0..1 | This IE may be present if the applyAction IE is set to " FORWARD".  When present, it shall contain forward instructions to apply to the DNS message before forwarding it. |  |
| reportingOnceInd | boolean | O | 0..1 | Reporting-once Indication  This IE may be present if the applyAction is set to "REPORT".  When present, it shall be set as follows:  - true: only one report shall be sent to the SMF, i.e. one report shall only be sent when a first DNS message matches any Message Detection Template of the DNS rule.  - false (default): a report shall be sent to the SMF for any DNS message matching any Message Detection Template of the DNS rule. |  |
| resetReportingOnceInd | boolean | O | 0..1 | Reset the Reporting-once Indication  This IE may be present in a request modifying a DNS rule, if the applyAction is set to "REPORT" and the reportingOnceInd is set to "true".  When present, it shall be set as follows:  - true: reset the Reporting-once Indication, i.e. send (only) one more report to the SMF when a next first DNS message matches any Message Detection Template of the DNS rule.  - false (default): do not reset the Reporting-once Indication |  |
| respParas | RespondParameters | C | 0..1 | This IE shall be present if the applyAction IE is set to " RESPOND".  When present, it shall contain instructions to apply to build the DNS response message. | CEASD |

##### 6.1.6.2.10 Type: DnsContextNotification

Table 6.1.6.2.10-1: Definition of type DnsContextNotification

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| eventreportList | array(DnsContextEventReport) | O | 1..N | List of event reports |

##### 6.1.6.2.11 Type: ForwardingParameters

Table 6.1.6.2.11-1: Definition of type ForwardingParameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| ecsOptionInfo | EcsOptionInfo | O | 0..1 | Information to build optional EDNS Client Subnet (ECS) option to be included in the DNS Query as defined in IETF RFC 7871 [18], or to be used for replacing the ECS option received in the DNS Query message from the UE. |
| dnsServerAddressInfo | DnsServerAddressInfo | O | 0..1 | DNS Server Address Information to be used as destination address of the outgoing DNS Query |

##### 6.1.6.2.12 Type: EcsOption

Table 6.1.6.2.12-1: Definition of type EcsOption

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| sourcePrefixLength | integer | M | 1 | Leftmost number of significant bits of the IP address as defined for the SOURCE PREFIX-LENGTH in clause 6 of IETF RFC 7871 [18].  Minimum=0. Maximum=128 |
| scopePrefixLength | integer | O | 0..1 | Leftmost number of bits of the IP address that the DNS response covers as defined for the SCOPE PREFIX-LENGTH in clause 6 of IETF RFC 7871 [18]. This attribute shall only be sent in EASDF notification to the SMF.  Minimum=0. Maximum=128 |
| ipAddr | IpAddr | M | 1 | IP address as defined for the ADDRESS in clause 6 of IETF RFC 7871 [18] |

##### 6.1.6.2.13 Type: DnsContextEventReport

Table 6.1.6.2.13-1: Definition of type DnsContextEventReport

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| timestamp | DateTime | M | 1 | Time of detection of the event |
| dnsRuleId | Uint32 | C | 0..1 | Identifies the DNS rule that triggered the report. This IE shall be present if the report is triggered by an event matching a DNS rule. |
| dnsQueryReport | DnsQueryReport | O | 0..1 | DNS Query Report |
| dnsRspReport | DnsRspReport | O | 0..1 | DNS Response Report |
| dnsMsgId | string | O | 0..1 | DNS message identifier  When present, this IE shall be set to a unique identifier of the DNS message for which the event is reported (see clause 5.2.3.2.4) |

##### 6.1.6.2.14 Type: DnsQueryReport

Table 6.1.6.2.14-1: Definition of type DnsQueryReport

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| fqdn | Fqdn | O | 0..1 | FQDN received in the DNS Query |

##### 6.1.6.2.15 Type: DnsRspReport

Table 6.1.6.2.15-1: Definition of type DnsRspReport

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| fqdn | Fqdn | O | 0..1 | FQDN received in the DNS Response |
| easIpv4Addresses | array(Ipv4Addr) | O | 1..N | EAS IPv4 address(es) received in the DNS Response |
| easIpv6Addresses | array(Ipv6Addr) | O | 1..N | EAS IPv6 address(es) received in the DNS Response |
| ecsOption | EcsOption | O | 0..1 | EDNS Client Subnet (ECS) option received in the DNS Response (as defined in IETF RFC 7871 [18]) |

##### 6.1.6.2.16 Type: EcsOptionInfo

Table 6.1.6.2.16-1: Definition of type EcsOptionInfo

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| ecsOption | EcsOption | C | 0..1 | Information to build optional EDNS Client Subnet (ECS) option to be included in the DNS Query as defined in IETF RFC 7871 [18], or to be used for replacing the ECS option received in the DNS Query message from the UE. (NOTE 1) |
| baseDnsAitId | BaselineDnsAitId | C | 0..1 | Identifier of the Baseline DNS Action Information Template that contains information to build optional EDNS Client Subnet (ECS) option to be included in the DNS Query as defined in IETF RFC 7871 [18], or to be used for replacing the ECS option received in the DNS Query message from the UE.  (NOTE 1, NOTE 2) |
| NOTE 1: Either the ecsOption IE or the baseDnsAitId IE shall be present.  NOTE 2: The referenced baseline DNS Action Information Template may contain other information beyond the information to build the ECS option, in which case the EADSF shall only apply the information to build the ECS option. | | | | |

##### 6.1.6.2.17 Type: DnsServerAddressInfo

Table 6.1.6.2.17-1: Definition of type DnsServerAddressInfo

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| dnsServerAddressList | array(IpAddr) | C | 1..N | DNS Server Address to be used as destination address of the outgoing DNS Query. More than one IP address may be provided for resiliency. (NOTE 1) |
| baseDnsAitId | BaselineDnsAitId | C | 0..1 | Identifier of the Baseline DNS Action Information Template that contains DNS Server Address to be used as destination address of the outgoing DNS Query. (NOTE 1, NOTE 2) |
| NOTE 1: Either the dnsServerAddressList IE or the baseDnsAitId IE shall be present.  NOTE 2: The referenced baseline DNS Action Information Template may contain other information beyond the DNS Server Address information, in which case the EADSF shall only apply the DNS Server Address information. | | | | |

##### 6.1.6.2.18 Type: BaselineDnsMdtId

Table 6.1.6.2.18-1: Definition of type BaselineDnsMdtId

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| baseDnsPatternUri | Uri | M | 1 | URI of the baseline DNS pattern returned in the Location header in the baseline DNS pattern creation response |  |
| mdtId | string | M | 1 | Identifier of the baseline DNS Message Detection Template ID within the baseline DNS pattern |  |

##### 6.1.6.2.19 Type: BaselineDnsAitId

Table 6.1.6.2.19-1: Definition of type BaselineDnsAitId

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| baseDnsPatternUri | Uri | M | 1 | URI of the baseline DNS pattern returned in the Location header in the baseline DNS pattern creation response |  |
| aitId | string | M | 1 | Identifier of the baseline DNS Action Information Template ID within the baseline DNS pattern |  |

##### 6.1.6.2.20 Type: BaselineDnsQueryMdtInfo

Table 6.1.6.2.20-1: Definition of type BaselineDnsQueryMdtInfo

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Attribute name | | Data type | P | Cardinality | Description | Applicability |
| sourceIpv4Addr | | Ipv4Addr | O | 0..1 | UE IPv4 address (NOTE) |  |
| sourceIpv6Prefix | | Ipv6Prefix | O | 0..1 | UE IPv6 prefix (NOTE) |  |
| baseDnsMdtList | | array(BaselineDnsMdtId) | M | 1..N | List of Baseline DNS Query Message Detection Template IDs. |  |
| NOTE: If neither the sourceIpv4Addr IE nor the sourceIpv6Prefix IE is present, the UE IP address in the DNS Context Data shall be assumed. | | | | | | |

##### 6.1.6.2.21 Type: BaselineDnsRspMdtInfo

Table 6.1.6.2.21-1: Definition of type BaselineDnsRspMdtInfo

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| baseDnsMdtList | array(BaselineDnsMdtId) | M | 1..N | List of Baseline DNS Response Message Detection Template IDs. |  |

##### 6.1.6.2.22 Type: RespondParameters

Table 6.1.6.2.22-1: Definition of type RespondParameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| easIpv4Addresses | array(Ipv4Addr) | O | 1..N | EAS IPv4 address(es) to be included in the DNS Response |
| easIpv6Addresses | array(Ipv6Addr) | O | 1..N | EAS IPv6 address(es) to be included in the DNS Response |

##### 6.1.6.2.23 Type: N6RoutingInfo

Table 6.1.6.2.23-1: Definition of type N6RoutingInfo

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description |
| ipv4Address | Ipv4Addr | O | 0..1 | IPv4 address of the Local PSA-UPF for the N6 tunnel between the Local PSA-UPF and V-EASDF |
| ipv6Address | Ipv6Addr | O | 0..1 | IPv6 address of the Local PSA-UPF for the N6 tunnel between the Local PSA-UPF and V-EASDF |
| portNumber | Uinteger | O | 0..1 | Port number of the Local PSA-UPF for the N6 tunnel between the Local PSA-UPF and V-EASDF. |

#### 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 |
|  | <one simple data type, i.e. boolean, integer, number, or string> |  |  |

##### 6.1.6.3.3 Enumeration: ApplyAction

The enumeration ApplyAction represents an action to apply to the DNS packet. It shall comply with the provisions defined in table 6.1.6.3.3-1.

Table 6.1.6.3.3-1: Enumeration ApplyAction

|  |  |  |
| --- | --- | --- |
| Enumeration value | Description | Applicability |
| "BUFFER" | Buffer the DNS Query or Response message |  |
| "REPORT" | Report the DNS Query or Response message content to the SMF |  |
| "FORWARD" | Forward the DNS Query or Response message, after applying the instructions indicated in the forwarding parameters if any |  |
| "DISCARD" | Discard DNS messages |  |
| "RESPOND" | Respond to a DNS Query message, i.e. build and send a DNS Response message to the UE, after applying the instructions indicated in the respond parameters. | CEASD |

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

There is no alternative data types or combinations of data types used for the Neasdf\_DNSContext service in this version of the API.

#### 6.1.6.5 Binary data

There is no binary data used for the Neasdf\_DNSContext service in this version of the API.

### 6.1.7 Error Handling

#### 6.1.7.1 General

For the Neasdf\_DNSContext 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 Neasdf\_DNSContext API.

#### 6.1.7.2 Protocol Errors

Protocol errors handling shall be supported as specified in clause 5.2.7 of 3GPP TS 29.500 [4]. No further specific procedures for the Neasdf\_DNSContext service are specified.

#### 6.1.7.3 Application Errors

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

Table 6.1.7.3-1: Application errors

|  |  |  |
| --- | --- | --- |
| Application Error | HTTP status code | Description |
| BASELINE\_DNS\_PATTERN\_UNKNOWN | 400 Bad Request | The request to create or modify a DNS context is rejected due to a baseline DNS pattern being unknown to the EASDF (i.e the URI of the baseline DNS pattern is unknown). |
| BASELINE\_DNS\_MDT\_UNKNOWN | 400 Bad Request | The request to create or modify a DNS context is rejected due to a baseline DNS Message Detection Template being unknown to the EASDF (the baseline DNS pattern is known). |
| BASELINE\_DNS\_AIT\_UNKNOWN | 400 Bad Request | The request to create or modify a DNS context is rejected due to a baseline DNS Action Information Template being unknown to the EASDF (the baseline DNS pattern is known). |
| DNS\_CONTEXT\_NOT\_FOUND | 404 Not Found | The request to modify or delete a DNS context, or the notification about an event of a DNS context, is rejected because the DNS context is not found. |

### 6.1.8 Feature negotiation

The optional features in table 6.1.8-1 are defined for the Neasdf\_DNSContext 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 | M/O | Description |
| 1 | CEASD | O | Support of Common EAS Discovery for a set of UEs  defined as part of EDGE Phase 2 in 3GPP Release 18.  An NF Service Consumer and EASDF which support this feature shall support DNS rules with an applyAction requesting the EASDF to respond to a DNS query with EAS IP addresses provided by the NF Service Consumer, i.e. with the ApplyAction value "RESPOND". See clauses 5.2.3.4.1 and 6.1.6.3.3. |
| 2 | HR-SBO | O | Support of EAS Discovery Procedure with V-EASDF for HR-SBO  An EASDF which supports this feature shall support behaving as a V-EASDF including support of:  - DNS context creation with an unspecified UE IP address and DNS context update with the UE IP address assigned by the H-PLMN; and  - DNS context creation and handling with the H-PLMN ID of the H-PLMN of the HR PDU session. |
| Feature number: The order number of the feature within the supportedFeatures attribute (starting with 1).  Feature: A short name that can be used to refer to the bit and to the feature.  M/O: Defines if the implementation of the feature is mandatory ("M") or optional ("O").  Description: A clear textual description of the feature. | | | |

### 6.1.9 Security

As indicated in 3GPP TS 33.501 [8] and 3GPP TS 29.500 [4], the access to the Neasdf\_DNSContext 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 Neasdf\_DNSContext API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [10], clause 5.4.2.2.

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 Neasdf\_DNSContext service.

The Neasdf\_DNSContext API defines a single scope "neasdf-dnscontext" 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 EASDF service instance within the same EASDF, or to a different EASDF of an EASDF set, when using direct or indirect communications (see 3GPP TS 29.500 [4]).

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

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

## 6.2 Neasdf\_BaselineDNSPattern Service API

### 6.2.1 Introduction

The Neasdf\_BaselineDNSPattern service shall use the Neasdf\_BaselineDNSPattern API.

The API URI of the Neasdf\_BaselineDNSPattern 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 "neasdf-baselinednspattern".

- The <apiVersion> shall be "v1".

- The <apiSpecificResourceUriPart> shall be set as described in clause 6.2.3.

### 6.2.2 Usage of HTTP

#### 6.2.2.1 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 Neasdf\_BaselineDNSPattern API is contained in Annex A.

#### 6.2.2.2 HTTP standard headers

##### 6.2.2.2.1 General

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

##### 6.2.2.2.2 Content type

The following content types shall be supported:

- JSON, as defined in 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].

- JSON Patch (IETF RFC 6902 [15]). The use of the JSON Patch format in a HTTP request body shall be signalled by the content type "application/json-patch+json".

#### 6.2.2.3 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.

### 6.2.3 Resources

#### 6.2.3.1 Overview

Figure 6.2.3.1-1 describes the resource URI structure of the Neasdf\_BaselineDNSPattern API.



Figure 6.2.3.1-1: Resource URI structure of the Neasdf\_BaselineDNSPattern API

Table 6.2.3.1-1 provides an overview of the resources and applicable HTTP methods.

Table 6.2.3.1-1: Resources and methods overview

|  |  |  |  |
| --- | --- | --- | --- |
| Resource name | Resource URI | HTTP method | Description  (service operation) |
| Individual Baseline DNS Pattern | /base-dns-patterns/{smfId}/{smfImplementationSegmentPaths} | PUT | Create a new Baseline DNS pattern, or replace the existing Baseline DNS pattern, by providing an Baseline DNS pattern |
| PATCH | Update (partial update) |
| DELETE | Delete |

#### 6.2.3.2 Resource: Individual Baseline DNS Pattern

##### 6.2.3.2.1 Description

This resource represents an individual Baseline DNS Pattern created in the EASDF.

This resource is modelled with the Document resource archetype (see clause C.1 of 3GPP TS 29.501 [5]).

##### 6.2.3.2.2 Resource Definition

Resource URI: **{apiRoot}/neasdf-baselinednspattern/<apiVersion>/base-dns-patterns/{smfId}/{smfImplementationSegmentPaths}**

This resource shall support the resource URI variables defined in table 6.2.3.2.2-1.

Table 6.2.3.2.2-1: Resource URI variables for this resource

|  |  |  |
| --- | --- | --- |
| Name | Data type | Definition |
| apiRoot | string | See clause 6.2.1. |
| apiVersion | string | See clause 6.2.1. |
| smfId | VarNfId | Represents the SMF Set Identifier (see NF Set Identifier in clause 28.12 of 3GPP TS 23.003 [19]) or the Set ID part within the SMF Set Identifier (see <Set Id> within the NF Set Identifier in clause 28.12 of 3GPP TS 23.003 [19]) or NF Instance Id of the SMF.  The SMF Set Identifier or the Set ID part within the SMF Set ID shall be included if the EASDF is controlled by the SMF set, or the NF Instance Id of the SMF shall be included if the EASDF is controlled by a SMF. |

EXAMPLE 1: .../base-dns-patterns/smfInstanceId=4947a69a-f61b-4bc1-b9da-47c9c5d14b64/{smfImplementationSegmentPaths}

EXAMPLE 2: .../base-dns-patterns/smfSetId=set1.smfset.5gc.mnc012.mcc345/{smfImplementationSegmentPaths}

EXAMPLE 3: .../base-dns-patterns/setId=set1/{smfImplementationSegmentPaths}

##### 6.2.3.2.3 Resource Standard Methods

6.2.3.2.3.1 PATCH

This method updates (partial update) an individual Baseline DNS Pattern resource in the EASDF.

This method shall support the URI query parameters specified in table 6.2.3.2.3.1-1.

Table 6.2.3.3.3.1-1: 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 6.2.3.2.3.1-2 and the response data structures and response codes specified in table 6.2.3.2.3.1-3.

Table 6.2.3.2.3.1-2: Data structures supported by the PATCH Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| array(PatchItem) | M | 1..N | It contains the list of changes to be made to the Baseline DNS pattern, according to the JSON PATCH format specified in IETF RFC 6902 [15]. |

Table 6.2.3.2.3.1-3: Data structures supported by the PATCH Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| PatchResult | M | 1 | 200 OK | Upon partial success, e.g. some of the requested modifications for unknown attribute(s) are discarded while the rest of the modification instructions are fully accepted, the EASDF shall return the execution report. |
| n/a |  |  | 204 No Content | Successful update of the Baseline DNS Pattern. |
| 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 | 404 Not Found | Indicates that the modification of the baseline DNS pattern failed due to an application error.  The "cause" attribute may be used to indicate one of the following application errors:  - BASELINE\_DNS\_PATTERN\_NOT\_FOUND. |
| NOTE 1: The mandatory HTTP error status code for the PATCH method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.  NOTE 2: RedirectResponse may be inserted by an SCP, see clause 6.10.9.1 of 3GPP TS 29.500 [4]. | | | | |

Table 6.2.3.2.3.1-4: Headers supported by the 307 Response Code on this resource

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

Table 6.2.3.2.3.1-5: Headers supported by the 308 Response Code on this resource

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

6.2.3.2.3.2 PUT

This method creates or updates (complete replacement) an individual Baseline DNS Pattern resource in the EASDF.

This method shall support the URI query parameters specified in table 6.2.3.2.3.2-1.

Table 6.2.3.2.3.2-1: 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 6.2.3.2.3.2-2 and the response data structures and response codes specified in table 6.2.3.2.3.2-3.

Table 6.2.3.2.3.2-2: Data structures supported by the PUT Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| BaseDnsPatternCreateData | M | 1 | Baseline DNS Pattern Data to be created or to replace the existing Baseline DNS Pattern data |

Table 6.2.3.2.3.2-3: Data structures supported by the PUT Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| DnsBasePatternCreatedData | M | 1 | 201 Created | Successful creation of a Baseline DNS Pattern |
| n/a |  |  | 204 No Content | Successful update of the Baseline DNS Pattern. |
| 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 code for the PUT method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.  NOTE 2: RedirectResponse may be inserted by an SCP, see clause 6.10.9.1 of 3GPP TS 29.500 [4]. | | | | |

Table 6.2.3.2.3.2-4: Headers supported by the 307 Response Code on this resource

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

Table 6.2.3.2.3.2-5: Headers supported by the 308 Response Code on this resource

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

6.2.3.2.3.3 DELETE

This method deletes an individual Baseline DNS Pattern resource in the EASDF.

This method shall support the URI query parameters specified in table 6.2.3.2.3.3-1.

Table 6.2.3.2.3.3-1: 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 6.2.3.3.3.3-2 and the response data structures and response codes specified in table 6.2.3.2.3.3-3.

Table 6.2.3.2.3.3-2: Data structures supported by the DELETE Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| n/a |  |  |  |

Table 6.2.3.2.3.3-3: Data structures supported by the DELETE Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| n/a |  |  | 204 No Content | Successful deletion of the Baseline DNS Pattern. |
| 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 | 404 Not Found | Indicates that the deletion of the baseline DNS pattern failed due to an application error.  The "cause" attribute may be used to indicate one of the following application errors:  - BASELINE\_DNS\_PATTERN\_NOT\_FOUND. |
| NOTE 1: The mandatory HTTP error status code for the DELETE method listed in Table 5.2.7.1-1 of 3GPP TS 29.500 [4] also apply.  NOTE 2: RedirectResponse may be inserted by an SCP, see clause 6.10.9.1 of 3GPP TS 29.500 [4]. | | | | |

Table 6.2.3.2.3.3-4: Headers supported by the 307 Response Code on this resource

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

Table 6.2.3.2.3.3-5: Headers supported by the 308 Response Code on this resource

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

##### 6.2.3.3.4 Resource Custom Operations

6.2.3.3.4.1 Overview

Table 6.2.3.3.4.1-1: Custom operations

|  |  |  |  |
| --- | --- | --- | --- |
| Operation Name | Custom operation URI | Mapped HTTP method | Description  (Service operation) |
|  |  |  |  |

### 6.2.4 Custom Operations without associated resources

There are no custom operations defined without any associated resources for the Neasdf\_BaselineDNSPattern service in this release of this specification.

### 6.2.5 Notifications

There are no notifications defined for the Neasdf\_BaselineDNSPattern service in this release of the specification.

### 6.2.6 Data Model

#### 6.2.6.1 General

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

Table 6.2.6.1-1 specifies the data types defined for the Neasdf\_BaselineDNSPattern service based interface protocol.

Table 6.2.6.1-1: Neasdf\_BaselineDNSPattern specific Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Clause defined | Description | Applicability |
| BaseDnsPatternCreateData | 6.2.6.2.2 | Data in Baseline DNS Pattern Create request |  |
| BaseDnsPatternCreatedData | 6.2.6.2.3 | Data in Baseline DNS Pattern Create response |  |
| BaselineDnsMdt | 6.2.6.2.4 | Baseline DNS message detection template |  |
| BaselineDnsAit | 6.2.6.2.5 | Baseline DNS action information Template |  |
| VarNfId | 6.2.6.2.6 | SMF or SMF Set Id or Set Id part in SMF set identifier |  |

Table 6.2.6.1-2 specifies data types re-used by the Neasdf 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 Neasdf\_BaselineDNSPattern service based interface.

Table 6.2.6.1-2: Neasdf\_BaselineDNSPattern re-used Data Types

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | Reference | Comments | Applicability |
| DnsQueryMdt | 6.1.6.2.5 | DNS Query Message Detection Template |  |
| DnsRspMdt | 6.1.6.2.6 | DNS Response Message Detection Template |  |
| EcsOption | 6.1.6.2.12 | ECS Option information |  |
| IpAddr | 3GPP TS 29.571 [16] | IP address |  |
| NfSetId | 3GPP TS 29.571 [16] | NF Set Id |  |
| NfInstanceId | 3GPP TS 29.571 [16] | NF Instance Id |  |
| PatchResult | 3GPP TS 29.571 [16] |  |  |

#### 6.2.6.2 Structured data types

##### 6.2.6.2.1 Introduction

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

##### 6.2.6.2.2 Type: BaseDnsPatternCreateData

Table 6.2.6.2.2-1: Definition of type BaseDnsPatternCreateData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| label | string | O | 0..1 | Baseline DNS pattern's label  (NOTE) |  |
| baseDnsMdtList | map(BaselineDnsMdt) | O | 1..N | When present, this IE contains the map of DNS message detection templates.  The key of the map shall be a (unique) valid JSON string per clause 7 of IETF RFC 8259 [12], carrying the identifier of the baseline DNS Message Detection Template, with a maximum of 32 characters. |  |
| baseDnsAitList | map(BaselineDnsAit) | O | 1..N | When present, this IE contains the map of Baseline DNS action information Templates.  The key of the map shall be a (unique) valid JSON string per clause 7 of IETF RFC 8259 [12], carrying the identifier of the baseline DNS Message Detection Template, with a maximum of 32 characters. |  |
| supportedFeatures | SupportedFeatures | C | 0..1 | This IE shall be present if at least one optional feature defined in clause 6.2.8 is supported. |  |
| NOTE: This attribute may contain free information describing the scope of the baseline DNS pattern. It may be used e.g. for trouble-shooting. | | | | | |

##### 6.2.6.2.3 Type: BaseDnsPatternCreatedData

Table 6.2.6.2.3-1: Definition of type BaseDnsPatternCreatedData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| supportedFeatures | SupportedFeatures | C | 0..1 | This IE shall be present if at least one optional feature defined in clause 6.2.8 is supported. |  |

##### 6.2.6.2.4 Type: BaselineDnsMdt

Table 6.2.6.2.4-1: Definition of type BaselineDnsMdt

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| mdtId | string | M | 1 | Identifier of the DNS message detection template within the baseline DNS pattern, with a maximum of 32 characters. |  |
| label | string | O | 0..1 | Baseline DNS MDT's label  (NOTE 2) |  |
| dnsQueryMdtList | map(DnsQueryMdt) | C | 1..N | Map of DNS Query message detection templates.  The key of the map shall be a (unique) valid JSON string per clause 7 of IETF RFC 8259 [12], carrying the identifier of the DNS Query message detection template, with a maximum of 32 characters.  If present, only fqdnList attribute shall be included in the DNS Query message detection template.  (NOTE 1) |  |
| dnsRspMdtList | map(DnsRspMdt) | C | 1..N | Map of DNS Response message detection templates.  The key of the map shall be a (unique) valid JSON string per clause 7 of IETF RFC 8259 [12], carrying the identifier of the DNS Response message detection template, with a maximum of 32 characters.  (NOTE 1) |  |
| NOTE 1: Either the dnsQueryMdtList IE or the dnsRspMdtList IE shall be present.  NOTE 2: This attribute may contain free information describing the scope of the baseline DNS MDT. It may be used e.g. for trouble-shooting. | | | | | |

##### 6.2.6.2.5 Type: BaselineDnsAit

Table 6.2.6.2.5-1: Definition of type BaselineDnsAit

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| aitId | string | M | 1 | Identifier of the DNS message handling action within the baseline DNS pattern |  |
| label | string | O | 0..1 | Baseline DNS AIT's label  (NOTE) |  |
| ecsOption | EcsOption | C | 0..1 | Information to build optional EDNS Client Subnet (ECS) option to be included in the DNS Query as defined in IETF RFC 7871 [18], or to be used for replacing the ECS option received in the DNS Query message from the UE. |  |
| dnsServerAddressList | array(IpAddr) | C | 1..N | DNS Server Address to be used as destination address of the outgoing DNS Query More than one IP address may be provided for resiliency. |  |
| NOTE: This attribute may contain free information describing the scope of the baseline DNS AIT. It may be used e.g. for trouble-shooting. | | | | | |

##### 6.2.6.2.6 Type: VarNfId

Table 6.2.6.2.6-1: Definition of type VarNfId

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| smfSetId | NfSetId | C | 0..1 | This IE shall be present if available.  When present, this IE includes the SMF Set Id (NOTE) |  |
| setId | string | C | 0..1 | This IE shall be present if available.  When present, this IE includes Set Id part in NF Set Identifier (see clause 28.12 of 3GPP TS 23.003 [7]), formatted as the following string:  "set<Set ID>"  with  <Set ID> encoded as a string of characters consisting of alphabetic characters (A-Z and a-z), digits (0-9) and/or the hyphen (-) and that shall end with either an alphabetic character or a digit.  Pattern: '^([A-Za-z0-9\-]\*[A-Za-z0-9])$'  Examples:  "setxyz"  "set12"  (NOTE) |  |
| smfInstanceId | NfInstanceId | C | 0..1 | This IE shall be present if available.  When present, this IE includes SMF Instance Id (NOTE) |  |
| NOTE: Either smfSetId attribute or setId or smfInstanceId attribute shall be included. | | | | | |

### 6.2.7 Error Handling

#### 6.2.7.1 General

For the Neasdf\_BaselineDNSPattern 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 Neasdf\_BaselineDNSPattern API.

#### 6.2.7.2 Protocol Errors

No specific procedures for the Neasdf\_BaselineDNSPattern API service are specified.

#### 6.2.7.3 Application Errors

The application errors defined for the Neasdf\_BaselineDNSPattern service are listed in Table 6.2.7.3-1.

Table 6.2.7.3-1: Application errors

|  |  |  |
| --- | --- | --- |
| Application Error | HTTP status code | Description |
| BASELINE\_DNS\_PATTERN\_NOT\_FOUND | 404 Not Found | The request to modify or delete a baseline DNS pattern is rejected because the baseline DNS pattern is not found (i.e. the URI of the baseline DNS pattern is not found). |

### 6.2.8 Feature negotiation

The optional features in table 6.2.8-1 are defined for the Neasdf\_BaselineDNSPattern API. They shall be negotiated using the extensibility mechanism defined in clause 6.6 of 3GPP TS 29.500 [4].

Table 6.2.8-1: Supported Features

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
|  |  |  |

### 6.2.9 Security

As indicated in 3GPP TS 33.501 [8] and 3GPP TS 29.500 [4], the access to the Neasdf\_BaselineDNSPattern 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 Neasdf\_BaselineDNSPattern API, shall obtain a "token" from the authorization server, by invoking the Access Token Request service, as described in 3GPP TS 29.510 [10], clause 5.4.2.2.

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 Neasdf\_BaselineDNSPattern service.

The Neasdf\_BaselineDNSPattern API defines a single scope "neasdf-baselinednspattern" for the entire service, and it does not define any additional scopes at resource or operation level.

### 6.2.10 HTTP redirection

An HTTP request may be redirected to a different EASDFF service instance within the same EASDF, or to a different EASDF of an EASDF set, when using direct or indirect communications (see 3GPP TS 29.500 [4]).

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

If an EASDF redirects a service request to a different EASDF using an 307 Temporary Redirect or 308 Permanent Redirect status code, the identity of the new EASDF towards which the service request is redirected shall be indicated in the 3gpp-Sbi-Target-Nf-Id header of the 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 1: 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 3GPP TS 29.501 [5] clause 5.3.1 and 3GPP TR 21.900 [7] clause 5B).

# A.2 Neasdf\_DNSContext API

openapi: 3.0.0

info:

version: '1.1.0-alpha.4'

title: 'Neasdf\_DNSContext'

description: |

EASDF DNS Context Service.

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externalDocs:

description: 3GPP TS 29.556 V18.4.0; 5G System; Edge Application Server Discovery Services; Stage3

url: https://www.3gpp.org/ftp/Specs/archive/29\_series/29.556/

servers:

- url: '{apiRoot}/neasdf-dnscontext/v1'

variables:

apiRoot:

default: https://example.com

description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501.

security:

- {}

- oAuth2ClientCredentials:

- neasdf-dnscontext

paths:

/dns-contexts:

post:

summary: Create

tags:

- DNS contexts collection

operationId: CreateDnsContext

requestBody:

description: representation of the DNS context to be created in the EASDF

required: true

content:

application/json:

schema:

$ref: '#/components/schemas/DnsContextCreateData'

callbacks:

dnsContextNotification:

'{$request.body#/notifyUri}':

post:

requestBody: # contents of the DNS context Notify request

required: true

content:

application/json:

schema:

$ref: '#/components/schemas/DnsContextNotification'

responses:

'204':

description: successful notification

'307':

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

'308':

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

'400':

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

'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'

responses:

'201':

description: successful creation of a DNS context

content:

application/json:

schema:

$ref: '#/components/schemas/DnsContextCreatedData'

headers:

Location:

description: 'Contains the URI of the newly created resource, according to the structure: {apiRoot}/neasdf-dnscontext/<apiVersion>/dns-contexts/{dnsContextId}'

required: true

schema:

type: string

'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'

/dns-contexts/{dnsContextId}:

delete:

summary: Delete the DNS Context

tags:

- Individual DNS context

operationId: DeleteDnsContext

parameters:

- name: dnsContextId

in: path

description: DNS context Identifier

required: true

schema:

type: string

responses:

'204':

description: successful deletion of an SM context

'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: Updates the DNS context

operationId: UpdateDnsContext

tags:

- Individual DNS context

parameters:

- name: dnsContextId

in: path

description: DNS context Identifier

required: true

schema:

type: string

- name: Content-Encoding

in: header

description: Content-Encoding, described in IETF RFC 7231

schema:

type: string

requestBody:

content:

application/json-patch+json:

schema:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/PatchItem'

required: true

responses:

'200':

description: Partial update of the DNS context

content:

application/json:

schema:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/PatchResult'

'204':

description: Successful update of the DNS context

headers:

Accept-Encoding:

description: Accept-Encoding, described in IETF RFC 7694

schema:

type: string

'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'

'501':

$ref: 'TS29571\_CommonData.yaml#/components/responses/501'

'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: Updates the DNS context (complete replacement)

operationId: ReplaceDnsContext

tags:

- Individual DNS context

parameters:

- name: dnsContextId

in: path

description: DNS context Identifier

required: true

schema:

type: string

- name: Content-Encoding

in: header

description: Content-Encoding, described in IETF RFC 7231

schema:

type: string

requestBody:

required: true

content:

application/json:

schema:

$ref: '#/components/schemas/DnsContextCreateData'

responses:

'204':

description: Successful update of the DNS context

headers:

Accept-Encoding:

description: Accept-Encoding, described in IETF RFC 7694

schema:

type: string

'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'

'501':

$ref: 'TS29571\_CommonData.yaml#/components/responses/501'

'502':

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

'503':

$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:

neasdf-dnscontext: Access to the neasdf-dnscontext API

schemas:

#

# STRUCTURED DATA TYPES

#

DnsContextCreateData:

description: Data within Create request

type: object

properties:

ueIpv4Addr:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv4Addr'

ueIpv6Prefix:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv6Prefix'

dnn:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Dnn'

sNssai:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Snssai'

hplmnId:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/PlmnId'

n6RoutingInfo:

$ref: '#/components/schemas/N6RoutingInfo'

dnsRules:

description: map of DNS message handling rules where a valid JSON string serves as key

type: object

additionalProperties:

$ref: '#/components/schemas/DnsRule'

minProperties: 1

notifyUri:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'

supportedFeatures:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/SupportedFeatures'

required:

- dnn

- sNssai

- dnsRules

anyOf:

- required: [ ueIpv4Addr ]

- required: [ ueIpv6Prefix ]

DnsContextCreatedData:

description: Data within Create response

type: object

properties:

easdfIpv4Addr:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv4Addr'

easdfIpv6Addr:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv6Addr'

supportedFeatures:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/SupportedFeatures'

anyOf:

- required: [ easdfIpv4Addr ]

- required: [ easdfIpv6Addr ]

DnsRule:

description: DNS message handling rule

type: object

properties:

dnsRuleId:

type: string

label:

type: string

precedence:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uint32'

dnsQueryMdtList:

description: map of DNS query message detection templates where a valid JSON string serves as key

type: object

additionalProperties:

$ref: '#/components/schemas/DnsQueryMdt'

minProperties: 1

baseDnsQueryMdtList:

type: array

items:

$ref: '#/components/schemas/BaselineDnsQueryMdtInfo'

minItems: 1

dnsRspMdtList:

description: map of DNS response message detection templates where a valid JSON string serves as key

type: object

additionalProperties:

$ref: '#/components/schemas/DnsRspMdt'

minProperties: 1

baseDnsRspMdtList:

type: array

items:

$ref: '#/components/schemas/BaselineDnsRspMdtInfo'

minItems: 1

dnsMsgId:

type: string

actionList:

description: map of actions where a valid JSON string serves as key

type: object

additionalProperties:

$ref: '#/components/schemas/Action'

minProperties: 1

required:

- actionList

allOf:

- not:

required: [ dnsQueryMdtList, dnsRspMdtList ]

- not:

required: [ dnsQueryMdtList, baseDnsRspMdtList ]

- not:

required: [ baseDnsQueryMdtList, dnsRspMdtList ]

- not:

required: [ baseDnsQueryMdtList, baseDnsRspMdtList ]

DnsQueryMdt:

description: DNS Query message detection template

type: object

properties:

mdtId:

type: string

label:

type: string

sourceIpv4Addr:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv4Addr'

sourceIpv6Prefix:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv6Prefix'

fqdnPatternList:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/FqdnPatternMatchingRule'

minItems: 1

required:

- mdtId

DnsRspMdt:

description: DNS Response message detection template

type: object

properties:

mdtId:

type: string

label:

type: string

fqdnPatternList:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/FqdnPatternMatchingRule'

minItems: 1

easIpv4AddrRanges:

type: array

items:

$ref: '#/components/schemas/Ipv4AddressRange'

minItems: 1

easIpv6PrefixRanges:

type: array

items:

$ref: '#/components/schemas/Ipv6PrefixRange'

minItems: 1

required:

- mdtId

Ipv4AddressRange:

description: Range of IPv4 addresses

type: object

properties:

start:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv4Addr'

end:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv4Addr'

required:

- start

- end

Ipv6PrefixRange:

description: Range of IPv6 prefixes

type: object

properties:

start:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv6Prefix'

end:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv6Prefix'

required:

- start

- end

Action:

description: Action to apply to DNS messages matching a message detection template

type: object

properties:

applyAction:

$ref: '#/components/schemas/ApplyAction'

fwdParas:

$ref: '#/components/schemas/ForwardingParameters'

reportingOnceInd:

type: boolean

default: false

resetReportingOnceInd:

type: boolean

default: false

respParas:

$ref: '#/components/schemas/RespondParameters'

required:

- applyAction

DnsContextNotification:

description: Data within DNS Context Notify

type: object

properties:

eventreportList:

type: array

items:

$ref: '#/components/schemas/DnsContextEventReport'

minItems: 1

ForwardingParameters:

description: Forwarding instructions

type: object

properties:

ecsOptionInfo:

$ref: '#/components/schemas/EcsOptionInfo'

dnsServerAddressInfo:

$ref: '#/components/schemas/DnsServerAddressInfo'

EcsOptionInfo:

description: ECS Option Information

type: object

properties:

ecsOption:

$ref: '#/components/schemas/EcsOption'

baseDnsAitId:

$ref: '#/components/schemas/BaselineDnsAitId'

oneOf:

- required: [ ecsOption ]

- required: [ baseDnsAitId ]

DnsServerAddressInfo:

description: DNS Server Address Information

type: object

properties:

dnsServerAddressList:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/IpAddr'

minItems: 1

baseDnsAitId:

$ref: '#/components/schemas/BaselineDnsAitId'

oneOf:

- required: [ dnsServerAddressList ]

- required: [ baseDnsAitId ]

BaselineDnsMdtId:

description: Baseline DNS Message Detection Template Identifier

type: object

properties:

baseDnsPatternUri:

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'

mdtId:

type: string

required:

- baseDnsPatternUri

- mdtId

BaselineDnsAitId:

description: Baseline DNS Action Information Template Identifier

type: object

properties:

baseDnsPatternUri:

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uri'

aitId:

type: string

required:

- baseDnsPatternUri

- aitId

EcsOption:

description: ECS Option Information

type: object

properties:

sourcePrefixLength:

type: integer

minimum: 0

maximum: 128

scopePrefixLength:

type: integer

minimum: 0

maximum: 128

ipAddr:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/IpAddr'

required:

- sourcePrefixLength

- ipAddr

DnsContextEventReport:

description: DNS context event report

type: object

properties:

timestamp:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/DateTime'

dnsRuleId:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uint32'

dnsQueryReport:

$ref: '#/components/schemas/DnsQueryReport'

dnsRspReport:

$ref: '#/components/schemas/DnsRspReport'

dnsMsgId:

type: string

required:

- timestamp

DnsQueryReport:

description: DNS Query Event Report

type: object

properties:

fqdn:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Fqdn'

DnsRspReport:

description: DNS Response Event Report

type: object

properties:

fqdn:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Fqdn'

easIpv4Addresses:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv4Addr'

minItems: 1

easIpv6Addresses:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv6Addr'

minItems: 1

ecsOption:

$ref: '#/components/schemas/EcsOption'

BaselineDnsQueryMdtInfo:

description: Baseline DNS Query MDT Information

type: object

properties:

sourceIpv4Addr:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv4Addr'

sourceIpv6Prefix:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv6Prefix'

baseDnsMdtList:

type: array

items:

$ref: '#/components/schemas/BaselineDnsMdtId'

minItems: 1

required:

- baseDnsMdtList

BaselineDnsRspMdtInfo:

description: Baseline DNS Response MDT Information

type: object

properties:

baseDnsMdtList:

type: array

items:

$ref: '#/components/schemas/BaselineDnsMdtId'

minItems: 1

required:

- baseDnsMdtList

RespondParameters:

description: Respond instructions

type: object

properties:

easIpv4Addresses:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv4Addr'

minItems: 1

easIpv6Addresses:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv6Addr'

minItems: 1

N6RoutingInfo:

description: N6 traffic routing information

type: object

properties:

ipv4Address:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv4Addr'

ipv6Address:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Ipv6Addr'

portNumber:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Uinteger'

#

# SIMPLE DATA TYPES

#

#

# ENUMERATIONS

#

ApplyAction:

anyOf:

- type: string

enum:

- BUFFER

- REPORT

- FORWARD

- DISCARD

- RESPOND

- type: string

description: >

This string provides forward-compatibility with future

extensions to the enumeration but is not used to encode

content defined in the present version of this API.

description: >

Action to apply to the DNS packet

# A.3 Neasdf\_BaselineDNSPattern API

openapi: 3.0.0

info:

version: '1.1.0-alpha.2'

title: 'Neasdf\_BaselineDNSPattern'

description: |

EASDF Baseline DNS Pattern Service.

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externalDocs:

description: 3GPP TS 29.556 V18.1.0; 5G System; Edge Application Server Discovery Services; Stage 3

url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.556/'

servers:

- url: '{apiRoot}/neasdf-baselinednspattern/v1'

variables:

apiRoot:

default: https://example.com

description: apiRoot as defined in clause 4.4 of 3GPP TS 29.501.

security:

- {}

- oAuth2ClientCredentials:

- neasdf-baselinednspattern

paths:

/base-dns-patterns/{smfId}/{smfImplementationSegmentPaths}:

patch:

summary: Updates the Baseline DNS Pattern

operationId: UpdateBaseDNSPattern

tags:

- Individual Baseline DNS Pattern

parameters:

- name: smfId

in: path

description: SMF or SMF set identifier or Set Id part in SMF set identifier

required: true

schema:

$ref: '#/components/schemas/VarNfId'

style: simple

explode: true

- name: smfImplementationSegmentPaths

in: path

description: SMF Implementation Dependent Segment Paths

required: true

schema:

type: string

- name: Content-Encoding

in: header

description: Content-Encoding, described in IETF RFC 7231

schema:

type: string

requestBody:

content:

application/json-patch+json:

schema:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/PatchItem'

required: true

responses:

'200':

description: Partial update of the Baseline DNS Pattern

content:

application/json:

schema:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/PatchResult'

'204':

description: Successful update of the Baseline DNS Pattern

headers:

Accept-Encoding:

description: Accept-Encoding, described in IETF RFC 7694

schema:

type: string

'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'

'501':

$ref: 'TS29571\_CommonData.yaml#/components/responses/501'

'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: Creates or Updates the Baseline DNS Pattern (complete replacement)

operationId: CreateOrReplaceBaseDnsPattern

tags:

- Individual Baseline DNS Pattern

parameters:

- name: smfId

in: path

description: SMF or SMF set identifier or Set Id part in SMF set identifier

required: true

schema:

$ref: '#/components/schemas/VarNfId'

style: simple

explode: true

- name: smfImplementationSegmentPaths

in: path

description: SMF Implementation Dependent Segment Paths

required: true

schema:

type: string

- name: Content-Encoding

in: header

description: Content-Encoding, described in IETF RFC 7231

schema:

type: string

requestBody:

required: true

content:

application/json:

schema:

$ref: '#/components/schemas/BaseDnsPatternCreateData'

responses:

'201':

description: successful creation of a Baseline DNS pattern

content:

application/json:

schema:

$ref: '#/components/schemas/BaseDnsPatternCreatedData'

headers:

Location:

description: 'Contains the URI of the newly created resource, according to the structure: {apiRoot}/neasdf-baselinednspattern/<apiVersion>/base-dns-patterns/{smfId}/{smfImplementationSegmentPaths}'

required: true

schema:

type: string

'204':

description: Successful update of the Baseline DNS Pattern

headers:

Accept-Encoding:

description: Accept-Encoding, described in IETF RFC 7694

schema:

type: string

'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'

'501':

$ref: 'TS29571\_CommonData.yaml#/components/responses/501'

'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: Deletes a Baseline DNS Pattern

tags:

- Individual Baseline DNS Pattern

operationId: DeleteBaseDnsPattern

parameters:

- name: smfId

in: path

description: SMF or SMF set identifier or Set Id part in SMF set identifier

required: true

schema:

$ref: '#/components/schemas/VarNfId'

style: simple

explode: true

- name: smfImplementationSegmentPaths

in: path

description: SMF Implementation Dependent Segment Paths

required: true

schema:

type: string

responses:

'204':

description: successful deletion of a Baseline DNS Pattern

'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'

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{nrfApiRoot}/oauth2/token'

scopes:

neasdf-baselinednspattern: Access to the neasdf-baselinednspattern API

schemas:

#

# STRUCTURED DATA TYPES

#

BaseDnsPatternCreateData:

description: Data in Baseline DNS Pattern Create request

type: object

properties:

label:

type: string

baseDnsMdtList:

description: map of baseline DNS message detection templates where a valid JSON string serves as key

type: object

additionalProperties:

$ref: '#/components/schemas/BaselineDnsMdt'

minProperties: 1

baseDnsAitList:

description: map of Baseline DNS action information Template where a valid JSON string serves as key

type: object

additionalProperties:

$ref: '#/components/schemas/BaselineDnsAit'

minProperties: 1

supportedFeatures:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/SupportedFeatures'

BaseDnsPatternCreatedData:

description: Data in Baseline DNS Pattern Create response

type: object

properties:

supportedFeatures:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/SupportedFeatures'

BaselineDnsMdt:

description: Baseline DNS message detection template

type: object

properties:

mdtId:

type: string

label:

type: string

dnsQueryMdtList:

description: map of DNS query message detection templates where a valid JSON string serves as key

type: object

additionalProperties:

$ref: 'TS29556\_Neasdf\_DNSContext.yaml#/components/schemas/DnsQueryMdt'

minProperties: 1

dnsRspMdtList:

description: map of DNS response message detection templates where a valid JSON string serves as key

type: object

additionalProperties:

$ref: 'TS29556\_Neasdf\_DNSContext.yaml#/components/schemas/DnsRspMdt'

minProperties: 1

required:

- mdtId

oneOf:

- required: [ dnsQueryMdtList ]

- required: [ dnsRspMdtList ]

BaselineDnsAit:

description: Baseline DNS action information Template

type: object

properties:

aitId:

type: string

label:

type: string

ecsOption:

$ref: 'TS29556\_Neasdf\_DNSContext.yaml#/components/schemas/EcsOption'

dnsServerAddressList:

type: array

items:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/IpAddr'

minItems: 1

required:

- aitId

VarNfId:

description: SMF or SMF Set Id or Set Id part in NF Set Id

type: object

properties:

smfSetId:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/NfSetId'

setId:

type: string

pattern: '^([A-Za-z0-9\-]\*[A-Za-z0-9])$'

smfInstanceId:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/NfInstanceId'

#

# SIMPLE DATA TYPES

#

#

# ENUMERATIONS

#

Annex B (informative):  
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2021-04 | CT4#103e | C4-212440 |  |  |  | TS skeleton | 0.0.0 |
| 2021-04 | CT4#103e | C4-212441  C4-212442 |  |  |  | Implementation of pCRs agreed in CT4#103E | 0.1.0 |
| 2021-06 | CT4#104e | C4-213092  C4-213093  C4-213094  C4-213095  C4-213096  C4-213182  C4-213184  C4-213185  C4-213429  C4-213430  C4-213479 |  |  |  | Implementation of pCRs agreed in CT4#104E | 0.2.0 |
| 2021-09 | CT4#105e | C4-214676 |  |  |  | Implementation of pCRs agreed in CT4#105E | 0.3.0 |
| 2021-10 | CT4#106e | C4-215049  C4-215365  C4-215366  C4-215488  C4-215489  C4-215246  C4-215429  C4-215430  C4-215431  C4-215432  C4-215433  C4-215434 |  |  |  | Implementation of pCRs agreed in CT4#106E | 0.4.0 |
| 2021-11 | CT4#107e | C4-216189  C4-216551  C4-216303  C4-216304  C4-216305  C4-216306  C4-216307 |  |  |  | Implementation of pCRs agreed in CT4#107E | 0.5.0 |
| 2021-12 | CT#94 | CP-213156 |  |  |  | V1.0.0 presented for information | 1.0.0 |
| 2022-01 | CT4#107bise | C4-220101  C4-220103  C4-220239  C4-220399  C4-220419  C4-220452 |  |  |  | Implementation of pCRs agreed in CT4#107bisE | 1.1.0 |
| 2022-03 | CT4#108e | C4-221136  C4-221296  C4-221482 |  |  |  | Implementation of pCRs agreed in CT4#108E | 1.2.0 |
| 2022-03 | CT#95e | CP-220105 |  |  |  | TS send for approval | 2.0.0 |
| 2022-03 | CT#95e |  |  |  |  | TS approved | 17.0.0 |
| 2022-06 | CT#96 | CP-221034 | 0001 | 2 | F | Key of Map in Data Structure for Baseline DNS Pattern | 17.1.0 |
| 2022-06 | CT#96 | CP-221034 | 0002 |  | F | Reference point between SMF and EASDF | 17.1.0 |
| 2022-06 | CT#96 | CP-221034 | 0003 | 1 | B | Using FQDN Pattern Matching Rule for fqdnPatternList | 17.1.0 |
| 2022-06 | CT#96 | CP-221034 | 0004 |  | F | Reuse of type Fqdn from 29.571 | 17.1.0 |
| 2022-06 | CT#96 | CP-221034 | 0005 |  | F | S-NSSAI in Create DNS context | 17.1.0 |
| 2022-06 | CT#96 | CP-221051 | 0006 |  | F | 29.556 Rel-17 API version and External doc update | 17.1.0 |
| 2022-12 | CT#98e | CP-223045 | 0009 | 1 | F | Handling of EDNS Client Subnet option by EASDF | 17.2.0 |
| 2022-12 | CT#98e | CP-223045 | 0010 |  | F | Corrections on DnsServerAddressInfo | 17.2.0 |
| 2022-12 | CT#98e | CP-223029 | 0008 | 1 | F | Missing mandatory status codes in OpenAPI | 18.0.0 |
| 2022-12 | CT#98e | CP-223033 | 0012 |  | F | 29.556 Rel-18 API version and External doc update | 18.0.0 |
| 2023-03 | CT#99 | CP-230033 | 0013 | 2 | B | Common EAS discovery for a set of UEs | 18.1.0 |
| 2023-03 | CT#99 | CP-230060 | 0014 | 1 | F | Application errors of Neasdf\_DNSContext API | 18.1.0 |
| 2023-03 | CT#99 | CP-230075 | 0016 | 1 | A | Misalignments between OpenAPI definitions and normative tables | 18.1.0 |
| 2023-03 | CT#99 | CP-230033 | 0019 | 1 | B | Support of edge computing in roaming | 18.1.0 |
| 2023-03 | CT#99 | CP-230071 | 0023 |  | F | 29.556 Rel-18 API version and External doc update | 18.1.0 |
| 2023-06 | CT#100 | [CP-231027](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-231027) | 0022 | 4 | F | Location header and missing Redirection clause | 18.2.0 |
| 2023-06 | CT#100 | [CP-231033](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-231033) | 0025 | 3 | B | HR-SBO impacts on Neasdf\_DNSContext service | 18.2.0 |
| 2023-06 | CT#100 | [CP-231070](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=CP-231070) | 0026 |  | F | 29.556 Rel-18 API version and External doc update | 18.2.0 |
| 2023-09 | CT#101 | CP-232036 | 0027 |  | B | BaselineDNSPattern for HR-SBO roaming | 18.3.0 |
| 2023-12 | CT#102 | CP-233027 | 0028 |  | F | HTTP RFC obsoleted by IETF RFC 9113 | 18.4.0 |
| 2023-12 | CT#102 | CP-233038 | 0030 | 1 | B | DNS traffic routing between UE and V-EASDF where multiple DNN networks with the same IP address range are deployed | 18.4.0 |
| 2023-12 | CT#102 | CP-233038 | 0031 |  | B | Remove editor note for unspecified IPv6 Prefix | 18.4.0 |
| 2023-12 | CT#102 | CP-233030 | 0032 |  | F | ProblemDetails RFC 7807 obsoleted by 9457 | 18.4.0 |
| 2023-12 | CT#102 | CP-233060 | 0033 |  | F | 29.556 Rel-18 API version and External doc update | 18.4.0 |