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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present specification provides the stage 3 definition of the Network Data Analytics Function Services of the 5G System.

The 5G System Architecture is defined in 3GPP TS 23.501 [2]. The stage 2 definition and related procedures for Network Data Analytics Function Services are specified in 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4].

The 5G System stage 3 call flows are provided in 3GPP TS 29.513 [5].

The Technical Realization of the Service Based Architecture and the Principles and Guidelines for Services Definition are specified in 3GPP TS 29.500 [6] and 3GPP TS 29.501 [7].

The Network Data Analytics Function Services are provided by the Network Data Analytics Function (NWDAF). These services provide NWDAF slice congestion events notification and NWDAF specific analytics.

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 23.503: "Policy and Charging Control Framework for the 5G System; Stage 2".

[5] 3GPP TS 29.513: "5G System; Policy and Charging Control signalling flows and QoS parameter mapping; Stage 3".

[6] 3GPP TS 29.500: "5G System; Technical Realization of Service Based Architecture; Stage 3".

[7] 3GPP TS 29.501: "5G System; Principles and Guidelines for Services Definition; Stage 3".

[8] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[9] IETF RFC 7540: "Hypertext Transfer Protocol Version 2 (HTTP/2)".

[10] IETF RFC 8259: "The JavaScript Object Notation (JSON) Data Interchange Format".

[11] OpenAPI, "OpenAPI 3.0.0 Specification", https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md.

[12] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

[13] 3GPP TS 33.501: "Security architecture and procedures for 5G system".

[14] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".

[15] IETF RFC 7807: "Problem Details for HTTP APIs".

[16] 3GPP TR 21.900: "Technical Specification Group working methods".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

3.2 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].

API	Application Programming Interface
JSON	JavaScript Object Notation
HTTP	Hypertext Transfer Protocol
NF	Network Function
NRF	Network Repository Function
NWDAF	Network Data Analytics Function
NSSF	Network Slice Selection Function
PCF	Policy Control Function

4 Services offered by the NWDAF

4.1 Introduction

The Nnwdaf services are used for the NWDAF to provide network data analytics (i.e. load level information). These services provide NWDAF slice congestion events notification and NWDAF specific analytics.

The following services are specified for NWDAF:

Table 4.1-1: Services provided by NWDAF

Service Name	Description	Service Operations	Operation Semantics	Example Consumer(s)
Nnwdaf_EventsSubscription	This service enables the NF service consumers to subscribe/unsubscribe for network slice specific congestion events notification from the NWDAF.	Subscribe Unsubscribe Notify	Subscribe / Notify	PCF, NSSF
Nnwdaf_AnalyticsInfo	This service enables the NF service consumers to request and get specific analytics from NWDAF.	Request	Request / Response	PCF, NSSF

4.2 Nnwdaf_EventsSubscription Service

4.2.1 Service Description

4.2.1.1 Overview

The Nnwdaf_EventsSubscription Service as defined in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4], is provided by the Network Data Analytics Function (NWDAF).

This service:

- allows NF consumers to subscribe to and unsubscribe from load events of network slice instance; and
- notifies NF consumers with a corresponding subscription about observed events.

The types of observed events include:

- Load level of network slice instance.

4.2.1.2 Service Architecture

The 5G System Architecture is defined in 3GPP TS 23.501 [2]. The Policy and Charging related 5G architecture is also described in 3GPP TS 23.503 [4] and 3GPP TS 29.513 [5].

The Nnwdaf_EventsSubscription service is part of the Nnwdaf service-based interface exhibited by the Network Data Analytics Function (NWDAF).

Known consumers of the Nnwdaf_EventsSubscription service are:

- Policy Control Function (PCF)
- Network Slice Selection Function (NSSF)

The PCF accesses the Nnwdaf_EventsSubscription service at the NWDAF via the N23 Reference point. The NSSF accesses the Nnwdaf_EventsSubscription service at the NWDAF via the N34 Reference point.

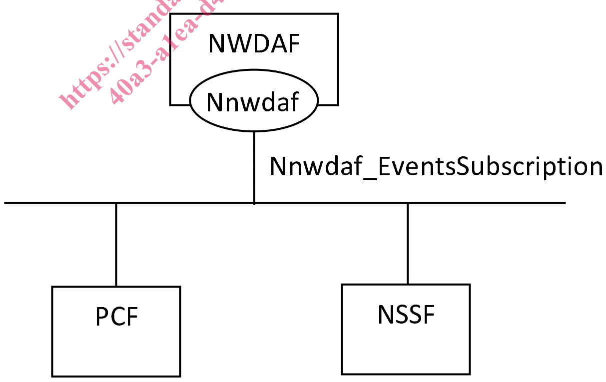

Figure 4.2.1.2-1: Reference Architecture for the Nnwdaf_EventsSubscription Service; SBI representation

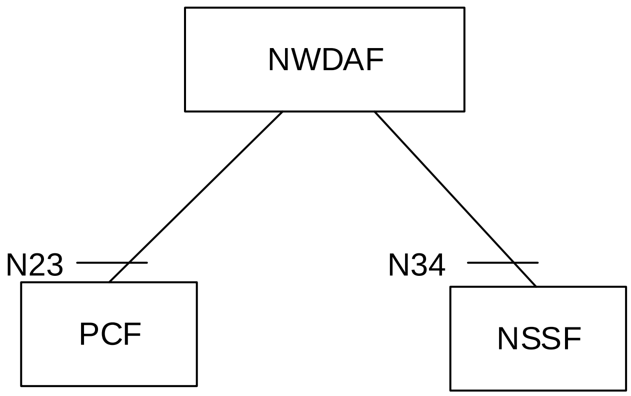

Figure 4.2.1.2-2: Reference Architecture for the Nnwdaf_EventsSubscription Service: reference point representation

4.2.1.3 Network Functions

4.2.1.3.1 Network Data Analytics Function (NWDAF)

The Network Data Analytics Function (NWDAF) provides:

- Identifier of network slice instance; and
- load level information for that network slice instance.

The Network Data Analytics Function (NWDAF) allows NF consumers to subscribe to and unsubscribe from periodic notification and/or notification when a threshold is exceeded.

4.2.1.3.2 NF Service Consumers

The Policy Control Function (PCF):

- Supports taking input from Network Data Analytics Function (NWDAF) into consideration for policies on assignment of network resources and for traffic steering policies.

NOTE: How this information is used by the PCF is not standardized in this release of the specification.

The Network Slice Selection Function (NSSF):

- supports taking load level information from Network Data Analytics Function (NWDAF) into consideration for slice selection.

4.2.2 Service Operations

4.2.2.1 Introduction

Table 4.2.2.1-1: Operations of the Nnwdaf_EventsSubscription Service

Service operation name	Description	Initiated by
Nnwdaf_EventsSubscription_Subscribe	This service operation is used by an NF to subscribe or update subscription for event notifications for a specified network slice instance. Periodic notification and notification upon threshold exceeded can be subscribed.	NF consumer (PCF, NSSF)
Nnwdaf_EventsSubscription_UnSubscribe	This service operation is used by an NF to unsubscribe from event notifications.	NF consumer (PCF, NSSF)
Nnwdaf_EventsSubscription_Notify	This service operation is used by an NWDAF to notify NF consumers about subscribed events.	NWDAF

4.2.2.2 Nnwdaf_EventsSubscription_Subscribe service operation

4.2.2.2.1 General

The Nnwdaf_EventsSubscription_Subscribe service operation is used by an NF service consumer to subscribe or update subscription for event notifications. The following are the types of events for which a subscription may be made:

- Load level of network slice instance.

4.2.2.2.2 Subscription for event notifications

Figure 4.2.2.2.2-1 shows a scenario where the NF service consumer sends a request to the NWDAF to subscribe for event notifications (see also 3GPP TS 23.502 [3] figure 4.19.1-1 step 1).

Figure 4.2.2.2.2-1: NF service consumer subscribes to notifications

The NF service consumer shall invoke the Nnwdaf_EventsSubscription_Subscribe service operation to subscribe to event notification(s). The NF service consumer shall send an HTTP POST request with "{apiRoot}/nnwdaf-eventssubscription/v1/subscriptions" as Resource URI representing the "NWDAF Events Subscriptions", as shown in figure 4.2.2.2.2-1, step 1, to create a subscription for an "Individual NWDAF Event Subscription" according to the information in message body. The NnwdafEventsSubscription data structure provided in the request body shall include:

- a description of the subscribed events as "eventSubscriptions" attribute that for each event shall include
  - a) an event identifier as "event" attribute;
  - b) identification of network slice(s) to which the subscription applies via:
    - 1) identification of network slice(s) by "snssais" attribute; or
    - 2) any slices indication via the "anySlice" attribute;

  and that may include:
  - a) event notification method (periodic, upon threshold exceeded) as "notificationMethod" attribute;

NOTE: If the event notification method is not supplied, the default value "upon threshold exceed" applies.

- an URI where to receive the requested notifications as "notificationURI" attribute; and
- a list of supported features by the service consumer as "supportedFeatures" attribute.

Upon the reception of an HTTP POST request with: "{apiRoot}/nnwdaf-eventssubscription/v1/subscriptions" as Resource URI and NnwdafEventsSubscription data structure as request body, the NWDAF shall:

- create a new subscription;
- assign an event subscriptionId;
- store the subscription.

If the NWDAF created an "Individual NWDAF Event Subscription" resource, the NWDAF shall respond with "201 Created" with the message body containing a representation of the created subscription, as shown in figure 4.2.2.2.2-1,