**3GPP TSG-CT WG3 Meeting #135 *C3-243552***

**Hyderabad, IN, 27 - 31 May, 2024 (Revision of C3-243296)**

|  |
| --- |
| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **29.551** | **CR** | **0129** | **rev** | **1** | **Current version:** | **18.4.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

|  |
| --- |
|  |
| ***Title:***  | Updates to support PFD Determination |
|  |  |
| ***Source to WG:*** | Ericsson, Nokia, ZTE |
| ***Source to TSG:*** | CT3 |
|  |  |
| ***Work item code:*** | eNA\_Ph3 |  | ***Date:*** | 2024-05-09 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** |  Rel-18 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | TS 23.288 clause 6.16.4 has been updated in step 2 with the NWDAF sending Nnef\_PFDManagement\_Subscribe message instead of initial Nnef\_PFDManagement\_Fetch message. The NEF(PFDF) sends the PFD(s) that are currently stored for the Application ID in the notify message and will send further notify messages whenever the PFD(s) for this Application ID change. Hence the related implementation needs to be updated in this specification. |
|  |  |
| ***Summary of change:*** | Update the NWDAF (un)subscribe for PFD(s) of the known Application Id and the NEF(PFDF) notify with currently stored for the Application ID and whenever further change of PFD(s). Remove the related descriptions in Fetch operation. |
|  |  |
| ***Consequences if not approved:*** | Not aligned with stage 2 requirement on supporting PFD Determination. |
|  |  |
| ***Clauses affected:*** | 4.1.1, 4.1.3.2, 4.2.1, 4.2.2.1.2, 4.2.2.2, 4.2.3.2, 4.2.3.3, 4.2.4.2, 4.2.5.2, 5.6.2.3, A.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | This CR introduces backwards compatible feature in the OpenAPI file of Nnef\_PFDmanagement API. |
|  |  |
| ***This CR's revision history:*** |  |

**Additional discussion(if needed):**

**Proposed changes:**

\*\*\* 1st Change \*\*\*

### 4.1.1 Overview

The PFD Management Service, as defined in 3GPP TS 23.501 [2], 3GPP TS 23.502 [3] and 3GPP TS 23.503 [4], and the NWDAF subscribe to PFD notifications from the NEF(PFDF) as described in 3GPP TS 23.288 [19], is provided by the Packet Flow Description Function (PFDF).

The known NF service consumers are:

- Session Management Function (SMF);

- Network Data Analytics Function (NWDAF).

This service:

- allows a NF service consumer (e.g. SMF, NWDAF) to subscribe to and unsubscribe from PFD changes;

- notifies a NF service consumer (e.g.SMF, NWDAF) about changes of PFDs;

- notifies a NF service consumer (e.g.SMF) to retrieve the PFDs; and

- allows a NF service consumer (e.g. SMF) to retrieve PFDs.

\*\*\* 2nd Change \*\*\*

#### 4.1.3.2 NF Service Consumers

The SMF shall support:

- requesting and receiving the PFD(s) for one or more Application Identifiers.

The NWDAF shall support:

- (un)subscription of the PFD(s) notifications for the known Application Identifier.

\*\*\* 3rd Change \*\*\*

### 4.2.1 Introduction

Service operations defined for the Nnef\_PFDmanagement Service are shown in table 4.2.1-1.

Table 4.2.1-1: Nnef\_PFDmanagement Service Operations

|  |  |  |
| --- | --- | --- |
| Service Operation Name | Description | Initiated by |
| Nnef\_PFDmanagement\_Fetch | Provides the PFDs for application identifier(s) to the NF service consumer by the full pull or partial pull. | NF service consumer (e.g. SMF) |
| Nnef\_PFDmanagement\_Subscribe | Allows NF service consumers to subscribe to notifications on events when the PFDs for application identifier(s) change. | NF service consumer (e.g. SMF, NWDAF) |
| Nnef\_PFDmanagement\_Notify | Notifies NF service consumer to update and/or delete the PFDs for application identifier(s) or notifies NF service consumer to retrieve the PFDs for application identifier(s). | PFDF |
| Nnef\_PFDmanagement\_Unsubscribe | Allows NF service consumers to unsubscribe from notifications on PFDs change events. | NF service consumer (e.g. SMF, NWDAF) |

\*\*\* 4th Change \*\*\*

##### 4.2.2.1.2 Void

\*\*\* 5th Change \*\*\*

#### 4.2.2.2 Retrieval of PFDs by the full pull

This procedure, as shown in Figure 4.2.2.2-1, is used to retrieve PFDs from the PFDF by the full pull for requested application identifier(s).



Figure 4.2.2.2-1: Retrieval of PFDs by the full pull

1. The NF service consumer (e.g. SMF) shall send a GET request to the resource representing the PFDs for the requested application identifier(s):

- for PFDs of an individual application identifier, the request URI shall be set to "{apiRoot}/nnef‑pfdmanagement/v1/applications/{appId}" (as shown in figure 4.2.2.2-1, step 1a); and

- for PFD of a collection of application identifiers, the request URI shall be set to "{apiRoot}/nnef‑pfdmanagement/v1/applications" (as shown in figure 4.2.2.2-1, step 1b) with query parameters indicating the requested application identifier(s).

2. On success, an HTTP "200 OK" response shall be returned, with the content containing a representation of an "Individual application PFD" resource or a "PFD of applications" resource for the requested application identifier(s). When the NF service consumer is SMF, it shall replace the stored PFD(s) retrieved from the PFDF with the new received PFD(s) for the requested application identifier(s). If the PFD(s) of one or more requested application identifier(s) are not provided in the response, the NF service consumer shall remove the PFD(s) of these requested application identifier(s) and re-apply the pre-configured PFDs.

If errors occur when processing the HTTP GET request, the PFDF shall send an HTTP error response as specified in clause 5.7. For "404 Not Found", when the NF service consumer is SMF, it shall remove the PFD(s) of the requested application identifier(s) in the NF service consumer and re-apply the pre-configured PFDs.

If the feature "ES3XX" is supported, and the PFDF determines the received HTTP GET request needs to be redirected, the PFDF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [5].

\*\*\* 6th Change \*\*\*

#### 4.2.3.2 Subscription for event notifications on PFDs change

This procedure, as shown in Figure 4.2.3.2-1, is used to subscribe to notifications on events when the PFDs for application identifier(s) change.



Figure 4.2.3.2-1: Creation of a subscription for event notifications on PFDs change

1. The NF service consumer (e.g. SMF, NWDAF) shall send a POST request to the request URI representing the collection of PFD subscriptions resource "{apiRoot}/nnef‑pfdmanagement/v1/subscriptions". The NF service consumer shall include the PfdSubscription data type in the request content. Within the PfdSubscription data type, the NF service consumer shall include:

- an URI where to receive the requested notifications as "notifyUri" attribute;

and may include:

- subscribed application identifier(s) within the "applicationIds" attribute.

2. If the request is accepted, the PFDF shall:

- create a new subscription;

- assign a subscriptionId;

- store the subscription; and

- send an HTTP "201 Created" response, with the content containing a representation of the created subscription, and the Location header containing the resource URI of the created subscription "{apiRoot}/nnef-pfdmanagement/v1/subscriptions/{subscriptionId}".

- if the "PfdDetermination" feature is supported and the "immRep" attribute value is set to "true", the PFDF shall immediately notify the NF service consumer with the current PFDs for the subscribed application identifier(s) within the HTTP "201 Created" response. The "PfdSubscription" data type shall include the current PFDs within the "pfds" attribute.

 Otherwise, one of the HTTP status codes listed in table 5.3.4.3.1-3 shall be returned.

NOTE: The PFDs that have been provisioned to the PFDF before the NF service consumer performs the subscription are not notified to the NF service consumer as a result of this subscription when the PfdDetermination feature is not supported, but the NF service consumer can retrieve them before performing the subscription by invoking Nnef\_PFDmanagement\_Fetch Service Operation.

\*\*\* 7th Change \*\*\*

#### 4.2.3.3 Subscription update for event notifications on PFDs change

This procedure, as shown in Figure 4.2.3.3-1, is used to update an existing subscription to notifications on events when the PFDs for application identifier(s) change.



Figure 4.2.3.3-1: Update of a subscription for event notifications on PFDs change

1. If the feature PfdChgSubsUpdate is supported, the NF service consumer (e.g. SMF) shall send a PUT request to the resource URI representing the targeted PFD subscription resource "{apiRoot}/nnef‑pfdmanagement/v1/subscriptions/{subscriptionId}". The NF service consumer shall include the PfdSubscription data type in the request content. Within the PfdSubscription data type, the NF service consumer shall include:

- an URI where to receive the requested notifications as "notifyUri" attribute;

and may include:

- subscribed application identifier(s) within the "applicationIds" attribute.

NOTE 1: The "notifyUri" attribute within the PfdSubscription data structure can be modified to request that subsequent notifications are sent to a new NF service consumer.

2. If the feature PfdChgSubsUpdate is supported and the request is accepted, the PFDF shall:

- update the subscription; and

- send an HTTP "200 OK" response with the content containing a representation of the updated subscription.

- if the "PfdDetermination" feature is supported and the "immRep" attribute value is set to "true", the PFDF shall immediately notify the NF service consumer with the current PFDs for the subscribed application identifier(s) within the HTTP "200 OK" response. The "PfdSubscription" data type shall include the current PFDs within the "pfds" attribute.

 Otherwise, if errors occur when processing the HTTP PUT request, the PFDF shall send an HTTP error response as specified in clause 5.7. If the feature "ES3XX" is supported, and the PFDF determines the received HTTP PUT request needs to be redirected, the PFDF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [5].

NOTE 2: The PFDs that have been provisioned to the PFDF before the NF service consumer performs the subscription are not notified to the NF service consumer as a result of this subscription when the PfdDetermination feature is not supported, but the NF service consumer can retrieve them before performing the subscription by invoking Nnef\_PFDmanagement\_Fetch Service Operation.

\*\*\* 8th Change \*\*\*

#### 4.2.4.2 Notification of PFD change



Figure 4.2.4.2-1: Notification of PFD change

1. The PFDF shall send a POST request to the NF service consumer (e.g. SMF, NWDAF) targeting the URI "{notifyUri}, where {notifyUri} is the notification URI provided during the creation or modification of the subscription resource as specified in clause 4.2.3. The content of the POST request shall contain one or more PfdChangeNotification data structure(s).

2 If the notification is accepted, the NF service consumer shall reply with:

- "204 No Content" indicating the successful provisioning of all PFDs; or

- "200 OK" and the content of the response shall contain "PfdChangeReport" data structure with detailed information of failed application(s).

 Otherwise, if errors occur when processing the HTTP POST request, the NF service consumer shall send an HTTP error response as specified in clause 5.7. If the feature "ES3XX" is supported, and the NF service consumer determines the received HTTP POST request needs to be redirected, the NF service consumer shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [5].

\*\*\* 9th Change \*\*\*

#### 4.2.5.2 Unsubscribe from event notifications on PFDs change



Figure 4.2.5.2-1: Unsubscribe from event notifications on PFDs change

1. The NF service consumer (e.g. SMF, NWDAF) shall send a DELETE request to the resource URI representing the individual PFD subscription. The request body shall be empty.

2. If the request is accepted, an HTTP "204 No Content" response shall be returned. The response body shall be empty.

Otherwise, if errors occur when processing the HTTP DELETE request, the PFDF consumer shall send an HTTP error response as specified in clause 5.7. If the feature "ES3XX" is supported, and the PFDF determines the received HTTP DELETE request needs to be redirected, the PFDF shall send an HTTP redirect response as specified in clause 6.10.9 of 3GPP TS 29.500 [5].

\*\*\* 10th Change \*\*\*

#### 5.6.2.3 Type: PfdSubscription

Table 5.6.2.3-1: Definition of type PfdSubscription

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| applicationIds | array(ApplicationId) | O | 1..N | Identifiers of applications with PFDs change. |  |
| immRep | boolean | O | 0..1 | Indication of immediate reporting.- Set to "true" indicates immediate reporting of current stored PFDs of the subscription, if available.- Set to "false" indicates no immediate reporting of current stored PFS of the subscriptions.- Default value is "false" if omitted. | PfdDetermination |
| notifyUri | Uri | M | 1 | Identifies the recipient of notifications sent by PFDF for this subscription. |  |
| pfds | array(PfdContent) | C | 1..N | Identifies the currently stored PFDs for the known application identifier.Shall be included in the subscription response, when the PfdDetermination feature is supported. | PfdDetermination |
| supportedFeatures | SupportedFeatures | M | 1 | List of supported features used as described in clause 5.8. |  |

\*\*\* 11th Change \*\*\*

# A.2 Nnef\_PFDmanagement API

openapi: 3.0.0

info:

 title: Nnef\_PFDmanagement Service API

 version: 1.3.0-alpha.3

 description: |

 Packet Flow Description Management Service.

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#

externalDocs:

 description: 3GPP TS 29.551 v18.4.0, 5G System; Packet Flow Description Management Service

 url: 'https://www.3gpp.org/ftp/Specs/archive/29\_series/29.551/'

#

servers:

 - url: '{apiRoot}/nnef-pfdmanagement/v1'

 variables:

 apiRoot:

 default: https://example.com

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

security:

 - {}

 - oAuth2ClientCredentials:

 - nnef-pfdmanagement

paths:

 /applications:

 get:

 summary: Retrieve PFDs for all applications or for one or multiple applications with query parameter.

 tags:

 - PFD of applications

 operationId: Nnef\_PFDmanagement\_AllFetch

 parameters:

 - name: application-ids

 description: The required application identifier(s) for the returned PFDs.

 in: query

 required: true

 schema:

 type: array

 items:

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

 minItems: 1

 - name: supported-features

 in: query

 description: To filter irrelevant responses related to unsupported features

 schema:

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

 responses:

 '200':

 description: >

 The PFDs for one or more application identifier(s) in the request URI are returned.

 content:

 application/json:

 schema:

 type: array

 items:

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

 minItems: 0

 '400':

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

 '401':

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

 '403':

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

 '404':

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

 '406':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/406'

 '414':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/414'

 '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'

 /applications/partialpull:

 post:

 summary: retrieve the PFD(s) by partial update

 operationId: Nnef\_PFDmanagement\_AppFetchPartialUpdate

 tags:

 - PFD of applications by partial update

 requestBody:

 required: true

 content:

 application/json:

 schema:

 type: array

 items:

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

 minItems: 1

 responses:

 '200':

 description: OK. Changed PFD(s) is returned

 content:

 application/json:

 schema:

 type: array

 items:

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

 minItems: 1

 '204':

 description: The PFD(s) is not changed

 '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'

 /applications/{appId}:

 get:

 summary: Retrieve the PFD for an application.

 tags:

 - Individual application PFD

 operationId: Nnef\_PFDmanagement\_IndAppFetch

 parameters:

 - name: appId

 description: The required application identifier(s) for the returned PFDs.

 in: path

 required: true

 schema:

 type: string

 - name: supported-features

 in: query

 description: To filter irrelevant responses related to unsupported features

 schema:

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

 responses:

 '200':

 description: A representation of PFDs for an application in the request URI is returned.

 content:

 application/json:

 schema:

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

 '307':

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

 '308':

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

 '400':

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

 '401':

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

 '403':

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

 '404':

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

 '406':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/406'

 '429':

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

 '414':

 $ref: 'TS29571\_CommonData.yaml#/components/responses/414'

 '500':

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

 '502':

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

 '503':

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

 default:

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

 /subscriptions:

 post:

 summary: Subscribe the notification of PFD changes.

 tags:

 - PFD subscriptions

 operationId: Nnef\_PFDmanagement\_CreateSubscr

 requestBody:

 description: a PfdSubscription resource to be created.

 required: true

 content:

 application/json:

 schema:

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

 callbacks:

 PfdChangeNotification:

 '{request.body#/notifyUri}':

 post:

 summary: Notification of PFD change.

 tags:

 - PfdChangeNotification data

 operationId: Nnef\_PFDmanagement\_Notify

 requestBody:

 required: true

 content:

 application/json:

 schema:

 type: array

 items:

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

 minItems: 1

 responses:

 '200':

 description: >

 The PFD operation in the notification is performed and the

 PfdChangeReport indicates failure reason.

 content:

 application/json:

 schema:

 type: array

 items:

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

 minItems: 1

 '204':

 description: The PFD operation in the notification is performed successfully.

 '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'

 NotificationPush:

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

 post:

 summary: Notification Push.

 tags:

 - NotificationPush data

 operationId: Nnef\_PFDmanagement\_PushNotify

 requestBody:

 required: true

 content:

 application/json:

 schema:

 type: array

 items:

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

 minItems: 1

 responses:

 '204':

 description: Notificaiton PUSH is accepted.

 '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'

 responses:

 '201':

 description: >

 The creation of a PfdSubscription resource is confirmed and a representation of

 that resource is returned.

 content:

 application/json:

 schema:

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

 headers:

 Location:

 description: >

 Contains the URI of the newly created resource, according to the structure

 {apiRoot}/nnef-pfdmanagement/v1/subscriptions/{subscriptionId}

 required: true

 schema:

 type: string

 '400':

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

 '401':

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

 '403':

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

 '404':

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

 '411':

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

 '413':

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

 '415':

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 '429':

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

 '500':

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

 '502':

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

 '503':

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

 default:

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

 /subscriptions/{subscriptionId}:

 put:

 summary: Updates/replaces an existing subscription resource

 tags:

 - Individual PFD subscription

 operationId: Nnef\_PFDmanagement\_ModifySubscr

 parameters:

 - name: subscriptionId

 description: Identify the subscription.

 in: path

 required: true

 schema:

 type: string

 requestBody:

 description: Parameters to update/replace the existing subscription

 required: true

 content:

 application/json:

 schema:

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

 responses:

 '200':

 description: OK (Successful update of the subscription)

 content:

 application/json:

 schema:

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

 '307':

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

 '308':

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

 '400':

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

 '401':

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

 '403':

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

 '404':

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

 '411':

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

 '413':

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

 '415':

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

 '429':

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

 '500':

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

 '502':

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

 '503':

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

 default:

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

 delete:

 summary: Delete a subscription of PFD change notification.

 tags:

 - Individual PFD subscription

 operationId: Nnef\_PFDmanagement\_Unsubscribe

 parameters:

 - name: subscriptionId

 description: Identify the subscription.

 in: path

 required: true

 schema:

 type: string

 responses:

 '204':

 description: >

 The PfdSubscription resource matching the subscriptionId was deleted successfully.

 '307':

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

 '308':

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

 '400':

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

 '401':

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

 '403':

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

 '404':

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

 '429':

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

 '500':

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

 '502':

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

 '503':

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

 default:

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

components:

 securitySchemes:

 oAuth2ClientCredentials:

 type: oauth2

 flows:

 clientCredentials:

 tokenUrl: '{nrfApiRoot}/oauth2/token'

 scopes:

 nnef-pfdmanagement: Access to the Nnef\_PFDmanagement API

 schemas:

#

# STRUCTURED DATA TYPES

#

 PfdContent:

 description: Represents the content of a PFD for an application identifier.

 type: object

 properties:

 pfdId:

 type: string

 description: Identifies a PDF of an application identifier.

 flowDescriptions:

 type: array

 items:

 type: string

 minItems: 1

 description: >

 Represents a 3-tuple with protocol, server ip and server port for UL/DL

 application traffic.

 urls:

 type: array

 items:

 type: string

 minItems: 1

 description: >

 Indicates a URL or a regular expression which is used to match the significant parts

 of the URL.

 domainNames:

 type: array

 items:

 type: string

 minItems: 1

 description: Indicates an FQDN or a regular expression as a domain name matching criteria.

 dnProtocol:

 $ref: 'TS29122\_PfdManagement.yaml#/components/schemas/DomainNameProtocol'

 sourceNfType:

 $ref: 'TS29510\_Nnrf\_NFManagement.yaml#/components/schemas/NFType'

 PfdDataForApp:

 description: Represents the PFDs for an application identifier.

 type: object

 properties:

 applicationId:

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

 pfds:

 type: array

 items:

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

 minItems: 1

 cachingTime:

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

 cachingTimer:

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

 pfdTimestamp:

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

 partialFlag:

 type: boolean

 description: >

 Indication of partial update of PFDs for an existing application identifier if it is

 included and set to true. Otherwise set to false indicates not supporting partial

 update of PFDs for an existing application identifier. The default value false

 applies if the attribute is not present.

 default: false

 supportedFeatures:

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

 required:

 - applicationId

 PfdSubscription:

 description: Represents a PFD subscription.

 type: object

 properties:

 applicationIds:

 type: array

 items:

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

 minItems: 1

 immRep:

 type: boolean

 notifyUri:

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

 pfds:

 type: array

 items:

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

 minItems: 1

 supportedFeatures:

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

 required:

 - notifyUri

 - supportedFeatures

 PfdChangeNotification:

 description: Represents information related to a notification of PFD change.

 type: object

 properties:

 applicationId:

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

 removalFlag:

 type: boolean

 description: >

 Indication of removal of PFDs for an existing application identifier.

 Set to true indicates the PFDs are removed.

 Set to false indicates the PFDs are not removed.

 Default value is false if omitted.

 default: false

 partialFlag:

 type: boolean

 description: >

 Indication of partial update of PFDs for an existing application identifier

 if this operation is supported according to feature negotiation.

 Set to true indicates partial update PFDs for the included application identifier.

 Set to false indicates not partial update PFDs for the included application identifier.

 Default value is "false" if omitted.

 default: false

 pfds:

 type: array

 items:

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

 minItems: 1

 required:

 - applicationId

 NotificationPush:

 description: >

 Represents the information to be used by the NF service consumer to retrieve the

 PFDs and/or remove the PFDs of the applicable application identifier(s).

 type: object

 properties:

 appIds:

 type: array

 items:

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

 minItems: 1

 allowedDelay:

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

 pfdOp:

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

 required:

 - appIds

 PfdChangeReport:

 description: Represents an error report on PFD change.

 type: object

 properties:

 pfdError:

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

 applicationId:

 type: array

 items:

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

 minItems: 1

 required:

 - pfdError

 - applicationId

 ApplicationForPfdRequest:

 description: Contains the application identifier(s) for the PFD(s) request.

 type: object

 properties:

 applicationId:

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

 pfdTimestamp:

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

 required:

 - applicationId

#

# ENUMERATIONS

#

 PfdOperation:

 description: Indicates the operation to be applied on PFD(s).

 anyOf:

 - type: string

 enum:

 - RETRIEVE

 - FULLPULL

 - PARTIALPULL

 - REMOVE

 - type: string

 description: >

 This string provides forward-compatibility with future extensions to the enumeration

 and is not used to encode content defined in the present version of this API.

\*\*\* End of Changes \*\*\*