**SA WG2 Meeting #145eS2-2104872**

**May 17 – May 28, 2021 (was S2-2104167, revision of S2-2103284)**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **23.288** | **CR** | **0308** | **rev** | **4** | **Current version:** | **17.0.0** |  |
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| *For* [***HELP***](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)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:***  | DCCF services definition |
|  |  |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell, China Mobile |
| ***Source to TSG:*** | S2 |
|  |  |
| ***Work item code:*** | eNA\_Ph2 |  | ***Date:*** | 2021-04-06 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-17 |
|  | *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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | Definitions are needed for the DCCF services and DCCF Service Operations shown in call flows adopted in SA2 #143eThe definition of Ndccf\_ContextManagement Service operations had added in TS23.288 during SA2 #144e, but the name of Ndccf\_ContextManagement Service operations in clause 8.1 are not align with the definitions of Ndccf\_ContextManagement service in clause 8.3 and other call flows in TS23.288. |
|  |  |
| ***Summary of change:*** | Addition of services and service operation definition for DCCFChange the “Create” of Ndccf\_ContextManagement Service operations to “Register” and “Delete” to “Deregister” in clause 8.1. |
|  |  |
| ***Consequences if not approved:*** |  Services are not defined.The name of Ndccf\_ContextManagement Service operations are inconsistent in TS23.288. |
|  |  |
| ***Clauses affected:*** | 6.1.4.3, 6.2.6.3.2, 6.2.6.3.3, 6.2.6.3.4, 6.2.6.3.5, (NEW) 8, (NEW) 8.1, (NEW) 8.2, (NEW) 8.2.1, (NEW) 8.2.2, (NEW) 8.2.3, (NEW) 8.2.4, (NEW) 8.2.5, (NEW) 8.3, (NEW) 8.3.1, (NEW) 8.3.2, (NEW) 8.3.3, (NEW) 8.3.4 |
|  |  |
|  | **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's revision history:*** |  |

*FIRST CHANGE*

1. 6.1.4.3 Historical Analytics Exposure via DCCF

The procedure as depicted in Figure 6.1.4.3-1 is used by an analytics consumer (e.g. NFs/OAM) to obtain historical analytics via the DCCF. Historical analytics may be previously computed statistics or predictions stored in an NWDAF or ADRF. Statistics may have been previously computed and stored in the ADRF or NWDAF and can be identified by a "target period" in the past (see clause 6.1.3). Requests for previously computed predictions have a "Time Window", which specifies an allowable span for when the predictions may have been computed. This allows the Analytics Consumer to request previously computed predictions for a target period.

The analytics consumer requests analytics via the DCCF, using Ndccf\_DataManagement\_Subscribe service operation. Whether the NWDAF service consumer directly contacts the NWDAF / ADRF, or goes via the DCCF is based on configuration.

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**Figure 6.1.4.3-1: Historical Analytics Exposure via DCCF**

1. The analytics consumer requests analytics via DCCF by invoking the Ndccf\_DataManagement\_Subscribe(Nnwdaf service operation, Analytics Specification, Time Window, Formatting Instructions, Processing Instructions, ADRF ID or NWDAF ID (or ADRF Set ID or NWDAF Set ID) service operation as specified in clause 8.2.2. The analytics consumer may specify one or more notification endpoints to receive the analytics.

Parameter "Nnwdaf service operation" is the service operation used to originally acquire the analytics and identifies this as a request for analytics, "Analytics Specification" provides Nnwdaf service operation specific parameters, e.g. Analytics IDs, target of analytics reporting, and optional parameters used to retrieve the analytics. "Time Window" specifies a past time period and comprises a start and stop time indicating when predictions were computed, and "Formatting and Processing Instructions" are as defined in clause 5A.4. The analytics consumer may optionally include the ADRF or NWDAF instance (or ADRF Set or NWDAF Set) ID where the stored analytics resides.

2. If an ADRF or NWDAF instance or ADRF or NWDAF Set ID is not provided by the analytics consumer, the DCCF determines if any ADRF or NWDAF instances might provide the analytics as described in clause 5A.

Editor's note: Clause 5B is to provide an ADRF functional description. ADRF or NWDAF selection by the DCCF may be based on the ADRF or NWDAF profile in the NRF (e.g.: ADRF or NWDAF that stores analytics for a specific Analytics ID in a geographic area).

3. (conditional) If the DCCF determines that an ADRF instance might provide the analytics, or an ADRF instance or Set was supplied by the analytics consumer, the DCCF sends a request to the ADRF, using Nadrf\_DataRetrieval\_Subscribe(Analytics Specification, Notification Target Address=DCCF) service operation. The ADRF responds to the DCCF with an Nadrf\_DataRetrieval\_Subscribe response indicating if the ADRF can supply the analytics. If the analytics can be provided, the procedure continues with step 5.

Editor's note: Appropriate reference to service operation specification clause will be added when available.

4. (conditional) If the DCCF determines that an NWDAF instance might provide the analytics or an NWDAF instance or Set was supplied by the Analytics Consumer, the DCCF sends a request to the NWDAF using Nnwdaf\_DataManagement\_Subscribe(Analytics Specification, Notification Target Address=DCCF).

Editor's note: Appropriate reference to service operation specification clause will be added when available.

5. The ADRF or the NWDAF sends the requested analytics (e.g. one or more stored notifications archived from an NWDAF) to the DCCF. The analytics may be sent in one or more notification messages.

6. The DCCF uses Ndccf\_DataManagement\_Notify to send analytics to all notification endpoints indicated in step 1. Notifications are sent to the Notification Target Address(es) using the Analytics Consumer Notification Correlation ID(s) received in step 1. Analytics sent to notification endpoints may be processed and formatted by the DCCF, so they conform to delivery requirements specified by the analytics consumer.

NOTE: According to Formatting Instructions provided by the analytics consumer, multiple notifications from an ADRF or NWDAF can be combined in a single Ndccf\_DataManagement\_Notify so many notifications from the ADRF or NWDAF results in fewer notifications (or one notification) to the Analytics Consumer. Alternatively, a Ndccf\_DataManagement\_Notify can instruct the analytics notification endpoint to fetch the analytics from the DCCF before an expiry time.

7. If a notification contains a fetch instruction, the notification endpoint sends a Ndccf\_DataManagement\_Fetch request to fetch the analytics from the DCCF.

8. The DCCF delivers the analytics to the notification endpoint.

9. When the analytics consumer no longer wants analytics to be collected or has received all the analytics it needs, it invokes Ndccf\_DataManagement\_Unsubscribe(Subscription Correlation ID), using the Subscription Correlation Id received in response to its subscription in step 1.

10. If the analytics are being provided by an ADRF and there are no other analytics consumers subscribed to the analytics, the DCCF unsubscribes with the ADRF.

11. If the analytics are being provided by an NWDAF and there are no other analytics consumers subscribed to the analytics, the DCCF unsubscribes with the NWDAF.

*NEXT CHANGE*

1. 6.2.6.3.2 Data Collection via DCCF

The procedure depicted in Figure 6.2.6.3.2-1 is used by a data consumer (e.g. NWDAF) to obtain data and be notified of events via the DCCF using Ndccf\_DataManagement\_Subscribe service operation. Whether the data consumer directly contacts the Data Source or goes via the DCCF is based on configuration of the data consumer.

**Figure 6.2.6.3.2-1: Data Collection via DCCF**

1. The data consumer subscribes to data via the DCCF by invoking the Ndccf\_DataManagement\_Subscribe(Service\_Operation, Data Specification, Formatting Instructions, Processing Instructions, NF (or NF-Set) ID, ADRF Information) service operation as specified in clause 8.2.2. The data consumer may specify one or more notification endpoints.

 Service\_Operation is the service operation to be used by the DCCF to request data (e.g.: Namf\_EventExposure\_Subscribe or OAM Subscribe). Data Specification provides Service Operation-specific parameters (e.g. event IDs, UE-ID(s), target of event reporting) used to retrieve the data. Formatting and Processing Instructions are as defined in clause 5A.4. The data consumer may include the Data Source, e.g. NF Instance (or NF Set) ID from which the data needs to be collected. The data consumer may include ADRF information indicating whether the data are to be stored in an ADRF, and optionally an ADRF ID.

2. The DCCF determine the NF type(s) and/or OAM to retrieve the data based on the Service Operation requested in step 1. If the NF instance or NF Set ID is not provided by the data consumer. the DCCF determines the NF instances that can provide data as described in clause 5A.2 and clause 6.2.2.2. If the consumer requested storage of data in an ADRF but the ADRF ID is not provided by the data consumer, or the collected data is to be stored in an ADRF according to configuration on the DCCF, the DCCF selects an ADRF to store the collected data.

3. The DCCF determines whether the data requested in step 1 are already being collected, as described in clause 5A.2.

 If the data requested are already being collected by a data consumer, the DCCF adds the data consumer to the list of data consumers that are subscribed for these data.

4. If the data subscribed in step 1 partially matches data that are already being collected by the DCCF from a Data Source, and a modification of this subscription to the Data Source would satisfy both the existing data subscriptions as well as the newly requested data, the DCCF invokes Nnf\_EventExposure\_Subscribe(Subscription Correlation ID) with parameters indicating how to modify the previous subscription (as specified in clause 5A.2). The DCCF adds the data consumer to the list of data consumers that are subscribed for these data.

 If the data requested at step 1 are not already available or not being collected yet, the DCCF subscribes to data from the NF using the Nnf\_EventExposureSubscribe service operation as specified in clause 5A.2 and clause 6.2.2.2, with DCCF indicated as Notification Target Address. The DCCF adds the data consumer to the list of data consumers that are subscribed for these data.

5. When new output data are available, the Data Source uses Nnf\_EventExposure\_Notify to send the data to the DCCF.

6. The DCCF uses Ndccf\_DataManagement\_Notify to send the data to all notification endpoints indicated in step 1. Data sent to notification endpoints may be processed and formatted by the DCCF so they conform to delivery requirements for each data consumer or notification endpoint as specified in clause 5A.4. The DCCF may store the information in ADRF if requested by the consumer or if required by DCCF configuration.

NOTE: according to Formatting Instructions provided by the data consumer, multiple notifications from a Data Source can be combined in a single Ndccf\_DataManagement\_Notify so many notifications from the Data Source result in fewer notifications (or one notification) to the data consumer. Alternatively, a notification can instruct the data notification endpoint to fetch the data from the DCCF before an expiry time.

7. If DCCF needs to retrieve data from OAM, procedure for data collection from OAM as per steps 1-4 from clause 6.2.3.2 is used. The DCCF then uses Ndccf\_DataManagement\_Notify to send the data to all notification endpoints indicated in step 1. Data sent to notification endpoints may be processed and formatted by the DCCF so they conform to delivery requirements for each data consumer or notification endpoint as specified in clause 5A.4. The DCCF may store the information in ADRF if requested by the consumer or if required by DCCF configuration.

8. If a NdccfDataManagement\_Notify contains a fetch instruction, the notification endpoint sends a Ndccf\_DataManagement\_Fetch request to fetch the data from the DCCF.

9. The DCCF delivers the data to the notification endpoint

10. When the data consumer no longer wants data to be collected it invokes Ndccf\_DataManagement\_Unsubscribe(Subscription Correlation ID), using the Subscription Correlation Id received in response to its subscription in step 1.

11. If there are no other data consumers subscribed to the data, the DCCF unsubscribes with the Data Source.

*NEXT CHANGE*

1. 6.2.6.3.3 Historical Data Collection via DCCF

The procedure depicted in figure 6.2.6.3.3-1 is used by data consumers (e.g. NWDAF) to obtain historical data, i.e. data related to past time period. The data consumer requests data using Ndccf\_DataManagement\_Subscribe service operation. Whether the data consumer uses this procedure or directly contacts the ADRF or NWDAF is based on configuration.



**Figure 6.2.6.3.3-1: Historical Data Collection via DCCF**

1. The data consumer requests data via DCCF by invoking the Ndccf\_DataManagement\_Subscribe(Service\_Operation, Data Specification, Time Window, Formatting Instructions, Processing Instructions, ADRF ID or NWDAF ID (or ADRF Set ID or NWDAF Set ID) service operation as specified in clause 8.2.2. The data consumer may specify one or more notification endpoints to receive the data.

 "Service\_Operation" is the service operation used to acquire the data from a data source. "Data Specification" provides Service\_Operation-specific parameters (e.g. event IDs, UE-ID(s)) used to retrieve the data. "Time Window" specifies a past time period and comprises a start and stop time. "Formatting and Processing Instructions" are as defined in clause 5A4. The data consumer may optionally include the ADRF or NWDAF instance (or ADRF Set or NWDAF Set) ID where the stored data resides.

2. If an ADRF or NWDAF instance or ADRF Set ID or NWDAF Set ID is not provided by the data consumer, the DCCF determines if any ADRF or NWDAF instances might provide the data as described in clause 5B and 5A.2.

NOTE: An ADRF or NWDAF may have previously registered data it is collecting with the DCCF.

Editor's note: Clause 5B is to provide an ADRF functional description. ADRF or NWDAF selection by the DCCF may be based on the ADRF or NWDAF profile in the NRF (e.g.: ADRF or NWDAF that stores data for a specific NF Type in a geographic area) in addition to registrations by the ADRF or NWDAF to the DCCF of data the ADRF or NWDAF is collecting.

3. (conditional) If the DCCF determines that an ADRF instance might provide the data, or an ADRF instance or Set was supplied by the data consumer, the DCCF sends a request to the ADRF, using Nadrf\_DataRetrieval\_Subscribe(Data Specification, Notification Target Address=DCCF) service operation. The ADRF responds to the DCCF with an Nadrf\_DataRetrieval\_Subscribe response indicating if the ADRF can supply the data. If the data can be provided, the procedure continues with step 5.

Editor's note: Appropriate reference to service operation specification clause will be added when available.

4. (conditional) If the DCCF determines that an NWDAF instance might provide the data or an NWDAF instance or Set was supplied by the data consumer, the DCCF sends a request to the NWDAF using Nnwdaf\_DataManagement\_Request(Data Specification, Notification Target Address=DCCF).

Editor's note: Appropriate reference to service operation specification clause will be added when available.

5. The ADRF or the NWDAF sends the requested data (e.g. one or more stored notifications archived from a data source) to the DCCF. The data may be sent in one or more notification messages.

6. The DCCF uses Ndccf\_DataManagement\_Notify to send data to all notification endpoints indicated in step 1. Notifications are sent to the Notification Target Address(es) using the data consumer Notification Correlation ID(s) received in step 1. Data sent to notification endpoints may be processed and formatted by the DCCF, so they conform to delivery requirements specified by the data consumer.

NOTE: According to Formatting Instructions provided by the data consumer, multiple notifications from an ADRF or NWDAF can be combined in a single Ndccf\_DataManagement\_Notify so many notifications from the ADRF or NWDAF results in fewer notifications (or one notification) to the data consumer. Alternatively, a Ndccf\_DataManagement\_Notify can instruct the data notification endpoint to fetch the data from the DCCF before an expiry time.

7. If a notification contains a fetch instruction, the notification endpoint sends a Ndccf\_DataManagement\_Fetch request to fetch the data from the DCCF.

8. The DCCF delivers the data to the notification endpoint.

9. When the data consumer no longer wants data to be collected or has received all the data it needs, it invokes Ndccf\_DataManagement\_Unsubscribe(Subscription Correlation ID), using the Subscription Correlation Id received in response to its subscription in step 1.

10. If the data are being provided by an ADRF and there are no other data consumers subscribed to the data, the DCCF unsubscribes with the ADRF.

11. If the data are being provided by an NWDAF and there are no other data consumers subscribed to the data, the DCCF unsubscribes with the NWDAF.

*NEXT CHANGE*

1. 6.2.6.3.4 Data Collection via Messaging Framework

This procedure depicted in figure 6.2.6.3.4-1 is used by a data consumer (e.g. NWDAF) to obtain data and be notified of events using the DCCF and a Messaging Framework. The 3GPP DCCF Adaptor (3da) Data Management service and 3GPP Consumer Adaptor (3ca) Data Management service of the Messaging Framework Adaptor Function (MFAF) are used to interact with the 3GPP Network and the Messaging Framework. Whether the data consumer directly contacts the Data Source or goes via the DCCF is based on configuration.

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**Figure 6.2.6.3.4-1: Data Collection via Messaging Framework**

1. The data consumer subscribes to data via the DCCF by invoking the Ndccf\_DataManagement\_Subscribe(Service\_Operation, Data Specification, Formatting Instructions, Processing Instructions, NF (or NF-Set) ID, ADRF Information) service operation as specified in clause 8.2.2. The data consumer may specify one or more notification endpoints and the NF or NF set to collect data from.

Service\_Operation is the service operation to be used by the DCCF to request data (e.g.: Namf\_EventExposure\_Subscribe or OAM Subscribe). Data Specification provides Service\_Operation-specific required parameters (e.g. event IDs, UE-ID(s), target of event reporting) and optional input parameters used to retrieve the data. Formatting and Processing Instructions are as defined in clause 5A.4. The data consumer may optionally include the Data Source NF Instance (or NF Set) ID and ADRF information indicating whether the data are to be stored in an ADRF and, optionally, an ADRF ID.

2. If the NF instance or NF Set ID is not provided by the data consumer, the DCCF determines the NF instances that can provide data as described in clause 5A.2 and clause 6.2.2.2. If the consumer requested storage of data in an ADRF, but the ADRF ID is not provided by the data consumer, or the collected data is to be stored in an ADRF according to configuration on the DCCF, the DCCF selects an ADRF to store the collected data.

3. The DCCF determines whether the data requested in step 1 are already being collected, as described in clause 5A.2.

 If the data requested are already being collected by a data consumer, the DCCF adds the data consumer to the list of data consumers that are subscribed for these data.

4. The DCCF sends an Nmfaf\_3daDataManagement\_Configure(Data Consumer Information, Notification Information, Formatting Conditions, Processing Instructions) to configure the MFAF to map notifications received from the Data Source to outgoing notifications sent to endpoints, and to instruct the MFAF how to format and process the outgoing notifications.

 Consumer Information contains for each notification endpoint, the data consumer provided Notification Target Address (+ Data Consumer Notification Correlation ID to be used by the MFAF when sending notifications in step 7. Notification Information identifies Event Notifications received from the Data Sources and contains the MFAF Notification Target Address (+ MFAF Notification Correlation ID).

Editor's note: It is FFS how the DCCF learns/chooses the MFAF Notification Target Address and MFAF Notification Correlation ID (e.g.: the Target Address may be obtained from the NRF when discovering the MFAF or via a request/response from the MFAF, and Correlation IDs may be selected by the DCCF or obtained via request/response from the MFAF).

5. If the data subscribed in step 1 partially matches data that are already being collected by the DCCF from a Data Source, and a modification of this subscription to the Data Source would satisfy both the existing data subscriptions as well as the newly requested data, the DCCF invokes Nnf\_EventExposure\_Subscribe(Subscription Correlation ID) with parameters indicating how to modify the previous subscription (as specified in clause 5A.2). The DCCF adds the data consumer to the list of data consumers that are subscribed for these data.

 If the data requested at step 1 are not already available or not being collected yet, the DCCF subscribes to data from the NF using the Nnf\_EventExposureSubscribe(Data Specification, Notification Target Address=MFAF (+ MFAF Notification Correlation ID)) service operation as specified in clause 5A.2 and clause 6.2.2.2. The DCCF adds the data consumer to the list of data consumers that are subscribed for these data.

6. When new output data are available, the Data Source uses Nnf\_EventExposure\_Notify to send the data to the MFAF. The Notification includes the MFAF Notification Correlation ID.

7. The MFAF uses Nmfaf\_3caDataManagement\_Notify to send the data to all notification endpoints indicated in step 4. Notifications are sent to the Notification Target Address(es) using the Data Consumer Notification Correlation ID(s) received in step 4. Data sent to notification endpoints may be processed and formatted by the MFAF, so they conform to delivery requirements specified by the data consumer. The MFAF may store the information in ADRF if requested by consumer or if required by DCCF configuration

NOTE: According to Formatting Instructions provided by the data consumer, multiple notifications from a Data Source can be combined in a single Nmfaf\_3caDataManagement\_Notify, so many notifications from the Data Source results in fewer notifications (or one notification) to the data consumer. Alternatively, a notification can instruct the data notification endpoint to fetch the data from the MFAF before an expiry time.

8. If a Nmfaf\_3caDataManagement\_Notify contains a fetch instruction, the notification endpoint sends a Nmfaf\_3caDataManagement\_Fetch request to fetch the data from the MFAF.

9. The MFAF delivers the data to the notification endpoint.

10. When the data consumer no longer wants data to be collected, it invokes Ndccf\_DataManagement\_Unsubscribe(Subscription Correlation ID), using the Subscription Correlation Id received in response to its subscription in step 1.

11. If there are no other data consumers subscribed to the data, the DCCF unsubscribes with the Data Source.

12. The DCCF de-configures the MFAF so it no longer maps notifications received from the Data Source to the notification endpoints configured in step 4.

*NEXT CHANGE*

1. 6.2.6.3.5 Historical Data Collection via Messaging Framework

The procedure depicted in figure 6.2.6.3.5-1 is used by data consumers (e.g. NWDAF) to obtain historical data, i.e. data related to past time period. The data consumer obtains data using Ndccf\_DataManagement\_Subscribe service operation, where the subscription results in one or more notifications depending on how the data is retrieved from the ADRF or NWDAF and how the data is formatted. Whether the data consumer uses this procedure or directly contacts the ADRF or NWDAF is based on configuration.

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**Figure 6.2.6.3.5-1: Historical Data Collection via Messaging Framework**

1. The data consumer requests data via DCCF by invoking the Ndccf\_DataManagement\_Subscribe(Service Operation, Data Specification, Time Window, Formatting Instructions, Processing Instructions, ADRF ID or NWDAF ID (or ADRF Set ID or NWDAF Set ID) service operation as specified in clause 8.2.2. The data consumer may specify one or more notification endpoints to receive the data.

 Service\_Operation is the service operation used to acquire the data from a data source, Data Specification provides Service\_Operation-specific required parameters (e.g. event IDs, UE-ID(s) and optional input parameters used to retrieve the data. Time Window specifies a past time period and comprises a start and stop time, and Formatting and Processing Instructions are as defined in clause 5A4. The data consumer may optionally include the ADRF or NWDAF instance (or ADRF Set or NWDAF Set) ID where the stored data resides.

2. If an ADRF or NWDAF instance or ADRF Set ID or NWDAF Set ID is not provided by the data consumer, the DCCF determines if any ADRF or NWDAF instances might provide the data as described in clause 5B and 5A.2.

NOTE: An ADRF or NWDAF may have previously registered data it is collecting with the DCCF.

Editor's note: Clause 5B is to provide an ADRF functional description. ADRF or NWDAF selection by the DCCF may be based on the ADRF or NWDAF profile in the NRF (e.g.: ADRF or NWDAF that stores data for a specific NF Type in a geographic area) in addition to registrations by the ADRF or NWDAF to the DCCF of data the ADRF or NWDAF is collecting.

3. The DCCF sends an Nmfaf\_3daDataManagement\_Configure(Data Consumer Information, Notification Information, Formatting Conditions, Processing Instructions) to configure the MFAF to map notifications received from the ADRF or NWDAF to outgoing notifications sent to endpoints, and to instruct the MFAF how to format and process the outgoing notifications.

 "Data Consumer Information" contains for each notification endpoint, the data consumer provided Notification Target Address (+ Data Consumer Notification Correlation ID) to be used by the MFAF when sending notifications. "Notification Information" identifies Event Notifications received from the ADRF or NWDAF, and contains the MFAF Notification Target Address (+ MFAF Notification Correlation ID)

Editor's note: It is FFS how the DCCF learns/chooses the MFAF Notification Target Address and MFAF Notification Correlation ID (e.g.: the Target Address may be obtained from the NRF when discovering the MFAF or via a request/response from the MFAF, and Correlation IDs may be selected by the DCCF or obtained via request/response from the MFAF)

4. (conditional) If the DCCF determines that an ADRF instance might provide the data, or an ADRF instance or Set was supplied by the data consumer, the DCCF sends a request to the ADRF, using Nadrf\_DataRetrieval\_Subscribe(Data Specification, Notification Target Address=MFAF).

Editor's note: Appropriate reference to service operation specification clause will be added when available.

5. The ADRF responds to the DCCF with an Nadrf\_DataRetrieval\_Subscribe response indicating if the ADRF can supply the data. If the data can be provided, the procedure continues with step 8.

6. (conditional) If the DCCF determines that an NWDAF instance might provide the data, or an NWDAF instance or NWDAF Set was supplied by the data consumer, the DCCF sends a request to the NWDAF, using Nnwdaf\_DataManagement\_Subscribe(Data Specification, Notification Target Address=MFAF) service operation.

Editor's note: Appropriate reference to service operation specification clause will be added when available.

7. The NWDAF responds to the DCCF with an Nnwdaf\_DataManagement\_Subscribe response indicating if the NWDAF can supply the data.

8. The ADRF or the NWDAF sends the requested data (e.g. one or more stored notifications archived from a data source) to the MFAF. The data may be sent in one or more notification messages.

9. The MFAF uses Nmfaf\_3caDataManagement\_Notify to send data to all notification endpoints indicated in step 3. Notifications are sent to the Notification Target Address(es) using the Data Consumer Notification Correlation ID(s) received in step 3. Data sent to notification endpoints may be processed and formatted by the MFAF, so they conform to delivery requirements specified by the data consumer.

NOTE: According to Formatting Instructions provided by the data consumer, multiple notifications from an ADRF or NWDAF can be combined in a single Nmfaf\_3caDataManagement\_Notify so many notifications from the ADRF or NWDAF results in fewer notifications (or one notification) to the data consumer. Alternatively, a Nmfaf\_3caDataManagement\_Notify can instruct the data notification endpoint to fetch the data from the MFAF before an expiry time.

10. If a notification contains a fetch instruction, the notification endpoint sends a Nmfaf\_3caDataManagement\_Fetch request to fetch the data from the MFAF.

11. The MFAF delivers the data to the notification endpoint.

12. When the data consumer no longer wants data to be collected or has received all the data it needs, it invokes Ndccf\_DataManagement\_Unsubscribe(Subscription Correlation ID), using the Subscription Correlation Id received in response to its subscription in step 1.

13. If the data are being provided by an ADRF and there are no other data consumers subscribed to the data, the DCCF unsubscribes with the ADRF.

14. If the data are being provided by an NWDAF and there are no other data consumers subscribed to the data, the DCCF unsubscribes with the NWDAF.

15. The DCCF de-configures the MFAF so it no longer maps notifications received from the ADRF or NWDAF to the notification endpoints configured in step 3.

*NEXT CHANGE (ALL NEW TEXT)*

# 8 DCCF Services

## 8.1 General

Table 8.1-1 shows the DCCF services and DCCF service operations.

Table 8.1-1: NF services provided by DCCF

|  |  |  |  |
| --- | --- | --- | --- |
| Service Name | Service Operations | OperationSemantics | Example Consumer(s) |
| Ndccf\_DataManagement | Subscribe | Subscribe / Notify | NWDAF, PCF, NSSF, AMF, SMF, NEF, AF |
|  | Unsubscribe |  | NWDAF, PCF, NSSF, AMF, SMF, NEF, AF |
|  | Notify |  | NWDAF, PCF, NSSF, AMF, SMF, NEF, AF |
|  | Fetch | Request / Response | NWDAF, PCF, NSSF, AMF, SMF, NEF, AF |
| Ndccf\_ContextManagement | Register | Request / Response | NWDAF, ADRF |
|  | Update | Request / Response | NWDAF, ADRF |
|  | Deregister | Request / Response | NWDAF, ADRF |

## 8.2 Ndccf\_DataManagement service

### 8.2.1 General

**Service Description**: This service enables the consumer to subscribe/unsubscribe for data or analytics via the DCCF and have data delivered via the DCCF or via a messaging framework. Historical data, or runtime data may be obtained using this service.

When the subscription is accepted by the DCCF, the consumer NF receives from the DCCF an identifier (Subscription Correlation ID) allowing it to further manage (modify, delete) the subscription.

### 8.2.2 Ndccf\_DataManagement\_Subscribe service operation

**Service operation name:** Ndccf\_DataManagement\_Subscribe.

**Description:** The consumer NF uses this service operation to subscribe to the DCCF for data or analytics. The subscription includes service operation specific parameters that identify the data or analytics to be provided, and may include formatting and processing instructions that specify how the data is to be delivered to the consumer. The consumer may also request that data shall be stored in an ADRF or an NWDAF hosting ADRF functionality.

**Inputs, Required:** Service operation, Analytics Specification or Data Specification, Notification Target Address(es) (+ Notification Correlation ID (s)).

**Inputs, Optional:** Time Window, NF (or NF-Set) ID, ADRF or NWDAF hosting ADRF information, Formatting Instructions, Processing Instructions.

"Service Operation" identifies the service used by the DCCF to request data or analytics from a Data Source (eg: Namf\_EventExposure\_Subscribe or Nnwdaf\_AnalyticsSubscription\_Subscribe)

"Analytics Specification or Data Specification" is the "Service Operation" specific required and optional input parameters that identify the data to be collected (e.g.: Analytics ID(s) / Event ID (s), Target of Event Reporting, Event Filter, etc.). Service Operations and input parameters are defined in clause 7 for NWDAF and in TS 23.502, clause 5.2 for the other NFs.

"Time Window" is the start and stop time when the requested data or analytics was or will be collected. If the Time Window includes a period in the past, then the data or analytics collection is "historical". If the Time Window includes a period in the future, the data or analytics collection is "runtime".

NOTE: Time Window parameter is different from the "Analytics target period" defined in clause 6.1.3.

NF (or NF-Set) ID specifies a data source that may provide the data

ADRF Information specifies that collected data or analytics is to be stored in an ADRF, and optionally an ADRF or NWDAF ID.

Formatting Instructions and Processing Instructions are as defined in clause 5A.4

**Outputs Required:** When the subscription is accepted: Subscription Correlation ID (required for management of this subscription).

**Outputs, Optional:** First corresponding event report is included, if available (see clause 4.15.1, TS 23.502), Requested data.

### 8.2.3 Ndccf\_DataManagement\_Unsubscribe service operation

**Service operation name:** Ndccf\_DataManagement\_Unsubscribe.

**Description:** The consumer unsubscribes to DCCF for data or analytics.

**Inputs, Required:** Subscription Correlation ID.

**Inputs, Optional:** None.

**Outputs, Required:** Operation execution result indication.

**Outputs, Optional:** None.

### 8.2.4 Ndccf\_DataManagement\_Notify service operation

**Service operation name:** Ndccf\_DataManagement\_Notify.

**Description:** Provides the previously subscribed Data or Analytics, or notification of availability of previously subscribed Data or Analytics to the NF Consumer when data delivery is via the DCCF.

**Inputs, Required:** Notification Correlation Information.

**Inputs, Optional:** Data or Analytics, Fetch Instructions

Fetch Instructions indicate whether the data or analytics are to be fetched by the Consumer. If the data or analytics are to be fetched, the fetch instructions include an address from which the data may be fetched and one or more Fetch Correlation IDs.

NOTE 1: Data or Analytics provided in notifications are processed and formatted according to the Processing and Formatting Instructions provided by the Consumer in Ndccf\_DataManagement\_Subscribe.

**Outputs, Required:** Operation execution result indication.

**Outputs, Optional:** None.

### 8.2.5 Ndccf\_DataManagement\_Fetch service operation

**Service operation name:** Ndccf\_DataManagement\_Fetch.

**Description:** Consumer retrieves from the DCCF data previously subscribed to by the Consumer, as indicated by Fetch Instructions received in Ndccf\_DataManagement\_Notify.

**Inputs, Required:** Set of Fetch Correlation ID(s).

**Inputs, Optional:** None.

**Outputs, Required:** Operation execution result indication.

**Outputs, Optional:** Formatted /Processed Events or Analytics

## 8.3 Ndccf\_ContextManagement service

### 8.3.1 General

**Service Description**: This service enables the consumer to register collected data or analytics with the DCCF.

When the DCCF is configured by the consumer NF, the DCCF supplies a Transaction Reference Id. The Consumer NF may use the Transaction Reference Id in subsequent transactions to update or delate the context in the DCCF.

### 8.3.2 Ndccf\_ContextManagement\_Register service operation

**Service operation name:** Ndccf\_ContentManagement\_Register

**Description:** The consumer NF uses this service operation to register data or analytics it is collecting to the DCCF. The registration includes a service operation specific Analytics/Data Specification that identifies the data or analytics that are being collected or has been collected.

**Inputs, Required:** Service Operation, Analytics/Data Specification, NWDAF ID or ADRF ID.

**Inputs, Optional:** None

NOTE: The input parameters are defined as:

* "Service Operation" identifies the service used to collect the data or analytics from a Data Source (e.g.: Namf\_EventExposure\_Subscribe or Nnwdaf\_AnalyticsSubscription\_Subscribe)
* "Analytics/Data Specification" is the "Service Operation" specific required and optional input parameters that identify the collected data (i.e.: Analytics ID(s) / Event ID (s), Target of Event Reporting, Event Filter, etc.). NF Service Operations and input parameters are defined in clause 7 and clause 5.2, TS 23.502.
* NWDAF ID or ADRF ID specify the ADRF or NWDAF with the stored data.

**Outputs Required:** Transaction Reference ID(s), Operation execution result indication.

**Outputs, Optional:** None.

### 8.3.3 Ndccf\_ContextManagement\_Update service operation

**Service operation name:** Ndccf\_ContentManagement\_Update.

**Description:** The consumer NF uses this service operation to update a registration of data or analytics to the DCCF. The registration update includes a service operation specific Analytics/Data Specification that identifies the data or analytics that is being collected or has been collected.

**Inputs, Required:** Transaction Reference ID(s), Service Operation, Analytics/Data Specification

**Inputs, Optional:** None

NOTE: The input parameters are defined in clause 8.3.2.

**Outputs Required:** Transaction Reference ID(s), Operation execution result indication.

### 8.3.4 Ndccf\_ContextManagement\_Deregister service operation

**Service operation name:** Ndccf\_ContentManagement\_Deregister.

**Description:** The consumer NF uses this service operation to delete a registration of data or analytics to the DCCF.

**Inputs, Required:** Transaction Reference ID(s)

**Inputs, Optional:** None

**Outputs Required:** Transaction Reference ID(s), Operation execution result indication.

**Outputs, Optional:** None.

*END OF CHANGES*