**3GPP TSG-SA5 Meeting #138-e *S5-214193***

**e-meeting, 23 - 31 August 2021**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **28.532** | **CR** | **0180** | **rev** | **1** | **Current version:** | **16.8.1** |  |
|  | | | | | | | | |
| *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 | **X** | Core Network | **X** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Rel-16 CR TS 28.532 Alignment the description for streaming data reporting MnS producer | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI16 | | | | |  | ***Date:*** | | | 2021-08-05 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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 can be 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:*** | | In clause 11.5 and clause 12.5.1.1.2 , the term “streaming data reporting producer/consumer”, “treaming data reporting service producer/consumer”, “producer/consumer”,“performance data streaming service producer/consumer” and “streaming data reporting MnS producer/consuemr” are mixedly used, which represents the same thing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Proposed to use the term “MnS producer/consuemr” | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | It is confuse to use different terms reprsenting the same thing | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 11.5.1.1.1, 11.5.1.1.2,11.5.1.2.1,11.5.1.3.1,11.5.1.4.1,11.5.1.5.1,11.5.1.6.1,11.5.1.7.1,12.5.1.1.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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's revision history:*** | |  | | | | | | | | |

|  |
| --- |
| **1st Change** |

## 11.5 Streaming data reporting service

### 11.5.1 Operations and notifications

#### 11.5.1.1 establishStreamingConnection operation (M)

##### 11.5.1.1.1 Definition

This operation enables the MnS producer to establish a connection to the MnS consumer (i.e. streaming target). The connection establishement includes the exchange of meta-data (producer informs consumer about its own identity and the nature of the data to be reported via streaming) phase and the actual connection (a data pipe for streaming) establishment.

Established connection supports stream multiplexing (one connection supports one or more reporting streams simultaneously).

Upon successful connection establishment, the MnS consumer is aware of the MnS producer's identity, the list of reporting streams and the nature of data being reported on each of the streams.

The established connection may be kept "alive" either by built-in functionality of the solution set or by periodic reporting of empty stream data.

##### 11.5.1.1.2 Input parameters

| Parameter Name | S | Information type | Comment |
| --- | --- | --- | --- |
| producerId | M | The identity of the producer requesting the connection establishment. | DN of the MnS producer. If the MnS producer is not modeled as 3GPP NRM MOI, an alternative identifer other than DN may be used. |
| streamInfoList | M | List of StreamInfo | This parameter contains the list of meta-data about each reporting stream.  For streaming trace reporting each StreamInfo includes:  - StreamType carrying the value "TRACE";  - SerializationFormat carrying the value "GPB" or "ASN1";  - Trace Reference (see clause 5.6 of TS 32.422 [38]) as stream identifier;  - TraceJob (see clause 4.3.30 of TS 28.622 [11]) providing the details about the configuration of the trace job for which the data is being reported.  For streaming performance data reporting each StreamInfo includes:  - StreamType carrying the value "PERFORMANCE";  - SerializationFormat carrying the value "GPB" or "ASN1";  - streamId globally unique stream identifier;  - measObjDn: the DN of the measured object instance;  - performanceMetrics: a list of performance metric names whose values are to be reported by the Performance Data Stream Units (see Annex C of TS 28.550 [42]) via this stream. Performance metrics include measurement and KPI;  - either:  - jobId defined in the PerfMetricJob MOI (see clause 4.3.31 of TS 28.622 [11]) for which the data is being reported;  - or:  - jobId globally unique identifier of a measurement job (see TS 28.550 [42]).  For streaming analytics reporting each StreamInfo includes:  - StreamType carrying the value "ANALYTICS";  - SerializationFormat carrying the value "GPB" or "ASN1";  - streamId globally unique stream identifier;  - AnalyticsInfo providing the details about the analytics activity for which the data is being reported.  For proprietary data streaming reporting each StreamInfo includes:  - StreamType carrying the value "PROPRIETARY";  - streamId globally unique stream identifier;  - VsDataContainer (see clause 4.3.9 of TS 28.622 [11]) providing the details about the data being reported. |

##### 11.5.1.1.3 Output parameters

| Parameter Name | S | Matching Information | Comment |
| --- | --- | --- | --- |
| connectionId | M | Identifier of the established streaming connection. | It identifies the established streaming connection. The format may have dependency on the solution set. |
| status | M | ENUM (Success, Failure) | An operation may fail because of a specified or unspecified reason. |

##### 11.5.1.1.4 Exceptions

| Exception Name | Definition |
| --- | --- |
| unexpectedStreams | **Condition:** Some information in the list of streamInfo was unexpected by the MnS consumer.  **Returned Information:** Name of the exception; status is set to "Failure". |

#### 11.5.1.2 terminateStreamingConnection operation (M)

##### 11.5.1.2.1 Definition

This operation enables the MnS producer to terminate the connection to theMnS consumer (i.e. streaming target).

Upon successful termination of the streaming connection, the MnS producer stops reporting data to the MnS consumer on this connection.

##### 11.5.1.2.2 Input parameters

| Parameter Name | S | Information type | Comment |
| --- | --- | --- | --- |
| connectionId | M | See clause 11.5.1.1.3 | It identifies the streaming connection being terminated. The format may have dependency on the solution set. |

##### 11.5.1.2.3 Output parameters

| Parameter Name | S | Matching Information | Comment |
| --- | --- | --- | --- |
| status | M | ENUM (Success, Failure) | An operation may fail because of a specified or unspecified reason. |

##### 11.5.1.2.4 Exceptions

| Exception Name | Definition |
| --- | --- |
| unknownConnection | **Condition:** the connectionId is invalid.  **Returned Information:** Name of the exception; status is set to "Failure". |

#### 11.5.1.3 reportStreamData operation (M)

##### 11.5.1.3.1 Definition

This operation enables the MnS producer to send a unit of streaming data to the MnS consumer.

##### 11.5.1.3.2 Input parameters

| Parameter Name | S | Information type | Comment |
| --- | --- | --- | --- |
| connectionId | M | See clause 11.5.1.1.3 | It identifies the streaming connection on which the reported data are being sent. The format may have dependency on the solution set. |
| streamingData | M | Unit of streaming data | This parameter contains the actual data (payload) being reported via stream.  For streaming trace reporting each streamingData is encoded according to the format specified in the clause 5 of 3GPP TS 32.423 [39].  For streaming performance data reporting each streamingData is encoded according to the format specified in the Annex C of 3GPP TS 28.550 [42].  For proprietary data streaming reporting each streamingData is encoded according to the format specified in the product documentation. |

##### 11.5.1.3.3 Output parameters

| Parameter Name | S | Matching Information | Comment |
| --- | --- | --- | --- |
| status | M | ENUM (Success, Failure) | An operation may fail because of a specified or unspecified reason. |

##### 11.5.1.3.4 Exceptions

| Exception Name | Definition |
| --- | --- |
|  |  |

#### 11.5.1.4 addStream operation (M)

##### 11.5.1.4.1 Definition

This operation allows the MnS producer to add one or more reporting streams to an already established streaming connection.

##### 11.5.1.4.2 Input parameters

| Parameter Name | S | Information type | Comment |
| --- | --- | --- | --- |
| connectionId | M | See clause 11.5.1.1.3 | It identifies the streaming connection to which new reporting streams are being added. The format may have dependency on the solution set. |
| streamInfoList | M | List of StreamInfo | This parameter contains the list of meta-data about each reporting stream being added to the already established connection.  For streaming trace reporting each StreamInfo includes:  - StreamType carrying the value "TRACE";  - SerializationFormat carrying the value "GPB" or "ASN1";  - Trace Reference (see clause 5.6 of TS 32.422 [38]) as stream identifier;  - TraceJob (see clause 4.3.30 of TS 28.622 [11]) providing the details about the configuration of the trace job for which the data is being reported.  For streaming performance data reporting each StreamInfo includes:  - StreamType carrying the value "PERFORMANCE";  - SerializationFormat carrying the value "GPB" or "ASN1";  - streamId globally unique stream identifier;  - measObjDn: the DN of the measured object instance;  - performanceMetrics: a list of performance metric (i.e. measurement or KPI) names whose values are to be reported by the Performance Data Stream Units (see Annex C of TS 28.550 [42]) via this stream;  - either:  - jobId defined in the PerfMetricJob MOI (see clause 4.3.31 of TS 28.622 [11]) for which the data is being reported;  - or:  - jobId globally unique identifier of a measurement job (see TS 28.550 [42]).  For streaming analytics reporting each StreamInfo includes:  - StreamType carrying the value "ANALYTICS";  - SerializationFormat carrying the value "GPB" or "ASN1";  - streamId globally unique stream identifier;  - AnalyticsInfo providing the details about the analytics activity for which the data is being reported.  For proprietary data streaming reporting each StreamInfo includes:  - StreamType carrying the value "PROPRIETARY";  - streamId globally unique stream identifier;  - VsDataContainer (see clause 4.3.9 of TS 28.622 [11]) providing the details about the data being reported. |

##### 11.5.1.4.3 Output parameters

| Parameter Name | S | Matching Information | Comment |
| --- | --- | --- | --- |
| streamInfoList | M | List of StreamInfo | This parameter contains the list of meta-data about each reporting stream that has been successfully added as a result of this operation.  For streaming trace reporting each StreamInfo includes:  - StreamType carrying the value "TRACE";  - SerializationFormat carrying the value "GPB" or "ASN1";  - Trace Reference (see clause 5.6 of 3GPP TS 32.422 [38]) as stream identifier;  - TraceJob (see clause 4.3.30 of 3GPP TS 28.622 [11]) providing the details about the configuration of the trace job for which the data is being reported.  For streaming performance data reporting each StreamInfo includes:  - StreamType carrying the value "PERFORMANCE";  - SerializationFormat carrying the value "GPB" or "ASN1";  - streamId globally unique stream identifier;  - measObjDn: the DN of the measured object instance;  - performanceMetrics: a list of performance metric names whose values are to be reported by the Performance Data Stream Units (see Annex C of TS 28.550 [42]) via this stream. Performance metrics include measurement and KPI;  - either:  - jobId defined in the PerfMetricJob MOI (see clause 4.3.31 of 3GPP TS 28.622 [11]) for which the data is being reported;  - or:  - jobId globally unique identifier of a measurement job (see TS 28.550 [42]).  For streaming analytics reporting each StreamInfo includes:  - StreamType carrying the value "ANALYTICS";  - SerializationFormat carrying the value "GPB" or "ASN1";  - streamId globally unique stream identifier;  - AnalyticsInfo providing the details about the analytics activity for which the data is being reported.  For proprietary data streaming reporting each StreamInfo includes:  - StreamType carrying the value "PROPRIETARY";  - streamId globally unique stream identifier;  - VsDataContainer (see clause 4.3.9 of 3GPP TS 28.622 [11]) providing the details about the data being reported. |
| status | M | ENUM (Success, Failure, PartialSuccess) | An operation may fail because of a specified or unspecified reason. |

##### 11.5.1.4.4 Exceptions

| Exception Name | Definition |
| --- | --- |
| duplicateStream | **Condition:** One or more of stream identifiers in the streamInfoList already exist on this connection.  **Returned Information:** Name of the exception; status is set to "Failure" or "PartialSuccess". |
| unexpectedStreams | **Condition:** Some information in the list of streamInfo was unexpected by the MnS consumer.  **Returned Information:** Name of the exception; status is set to "Failure". |
| unknownConnection | **Condition:** the connectionId is invalid.  **Returned Information:** Name of the exception; status is set to "Failure". |

#### 11.5.1.5 deleteStream operation (M)

##### 11.5.1.5.1 Definition

This operation allows the MnS producer to remove one or more reporting streams from an already established streaming connection.

##### 11.5.1.5.2 Input parameters

| Parameter Name | S | Information type | Comment |
| --- | --- | --- | --- |
| connectionId | M | See clause 11.5.1.1.3 | It identifies the streaming connection from which the reporting streams are being removed. The format may have dependency on the solution set. |
| streamIdList | M | List of stream identifiers | This parameter contains the list of identifiers for streams being removed from the already established connection.  For streaming trace reporting Trace Reference (see clause 5.6 of 3GPP TS 32.422 [38]) is used as stream identifier.  For streaming performance data reporting streamId globally unique stream identifier.  For streaming analytics reporting streamId globally unique stream identifier.  For proprietary data streaming reporting streamId globally unique stream identifier. |

##### 11.5.1.5.3 Output parameters

| Parameter Name | S | Matching Information | Comment |
| --- | --- | --- | --- |
| status | M | ENUM (Success, Failure, PartialSuccess) | An operation may fail because of a specified or unspecified reason. |

##### 11.5.1.5.4 Exceptions

| Exception Name | Definition |
| --- | --- |
| unknownStreamId | **Condition:** One or more of stream identifiers in the streamIdList does not exist on this connection.  **Returned Information:** Name of the exception; status is set to "Failure" or "PartialSuccess". |
| unknownConnection | **Condition:** the connectionId is invalid.  **Returned Information:** Name of the exception; status is set to "Failure". |

#### 11.5.1.6 getConnectionInfo operation (M)

##### 11.5.1.6.1 Definition

This operation enables the MnS producer to obtain information about one or more streaming connections from the MnS consumer.

##### 11.5.1.6.2 Input parameters

| Parameter Name | S | Information type | Comment |
| --- | --- | --- | --- |
| connectionIdList | M | List of streaming connection identifiers | This parameter contains the list of streaming connection identifiers for which the stream information is to be returned.  The empty list indicates the stream information for all connections are to be returned. |

##### 11.5.1.6.3 Output parameters

| Parameter Name | S | Matching Information | Comment |
| --- | --- | --- | --- |
| connectionInfoList | M | List of <connectionId, streamReporter, streamIdList> tuples | This parameter contains the list of meta-data about each streaming connection requested by this operation. Each entry in this list is a tuple of connectionId, streamReporter and streamIdList.  For streaming trace reporting:  - streamReporter is the identity of the streaming data reporting MnS producer reporting data for this connectionId;  - streamIdList is the list of Trace References (see clause 5.6 of 3GPP TS 32.422 [38]) used as stream identifiers.  For streaming performance data reporting:  - streamReporter is the identity of the streaming data reporting MnS producer reporting data for this connectionId;  - streamIdList is the list of streamId globally unique stream identifiers.  For streaming analytics reporting:  - streamReporter is the identity of the streaming data reporting MnS producer reporting data for this connectionId;  - streamIdList is the list of streamId globally unique stream identifiers.  For streaming proprietary data reporting:  - streamReporter is the identity of the streaming data reporting MnS producer reporting data for this connectionId;  - streamIdList is the list of streamId globally unique stream identifiers. |
| status | M | ENUM (Success, Failure, PartialSuccess) | An operation may fail because of a specified or unspecified reason. |

##### 11.5.1.6.4 Exceptions

| Exception Name | Definition |
| --- | --- |
| unknownConnectionId | **Condition:** One or more of connection identifiers in the connectionIdList is not known to this MnS consumer.  **Returned Information:** Name of the exception; status is set to "Failure" or "PartialSuccess". |

#### 11.5.1.7 getStreamInfo operation (M)

##### 11.5.1.7.1 Definition

This operation enables theMnS producer to obtain information about one or more reporting streams the MnS consumer.

##### 11.5.1.7.2 Input parameters

| Parameter Name | S | Information type | Comment |
| --- | --- | --- | --- |
| streamIdList | M | List of stream identifiers | This parameter contains the list of stream identifiers for which the stream information is to be returned.  The empty list indicates the stream information for all streams are to be returned.  For streaming trace reporting Trace Reference (see clause 5.6 of 3GPP TS 32.422 [38]) is used as stream identifier.  For streaming performance data reporting streamId globally unique stream identifier.  For streaming analytics reporting streamId globally unique stream identifier.  For proprietary data streaming reporting streamId globally unique stream identifier. |

##### 11.5.1.7.3 Output parameters

| Parameter Name | S | Matching Information | Comment |
| --- | --- | --- | --- |
| streamInfoSumList | M | List of <StreamInfo, StreamReporters> tuples | This parameter contains the list of meta-data about each reporting stream requested by this operation. Each entry in this list is a tuple of StreamInfo and StreamReporters.  For streaming trace reporting each StreamInfo includes:  - StreamType carrying the value "TRACE";  - SerializationFormat carrying the value "GPB" or "ASN1";  - Trace Reference (see clause 5.6 of TS 32.422 [38]) as stream identifier;  - TraceJob (see clause 4.3.30 of TS 28.622 [11]) providing the details about the configuration of the trace job for which the data is being reported.  For streaming trace the StreamReporters is a list of the identities of the streaming data reporting MnS producer(s) reporting data for this Trace Reference to this MnS consumer.  For streaming PM reporting each StreamInfo includes:  - StreamType carrying the value "PERFORMANCE";  - SerializationFormat carrying the value "GPB" or "ASN1";  - streamId globally unique stream identifier;  - measObjDn: the DN of the measured object instance;  - performanceMetrics: a list of performance metric names whose values are to be reported by the Performance Data Stream Units (see Annex C of TS 28.550 [42]) via this stream. Performance metrics include measurement and KPI;  - either:  - jobId defined in the PerfMetricJob MOI (see clause 4.3.31 of TS 28.622 [11]) for which the data is being reported;  - or:  - jobId globally unique identifier of a measurement job (see TS 28.550 [42]).  For streaming performance data the StreamReporters is a list of the identities of the streaming data reporting MnS producer(s) reporting data for this streamId to this MnS consumer.  For streaming analytics reporting each StreamInfo includes:  - StreamType carrying the value "ANALYTICS";  - SerializationFormat carrying the value "GPB" or "ASN1";  - streamId globally unique stream identifier;  - AnalyticsInfo providing the details about the analytics activity for which the data is being reported.  For streaming analytics the StreamReporters is a list of the identities of the streaming data reporting MnS producer(s) reporting data for this streamId to this MnS consumer.  For proprietary data streaming reporting each StreamInfo includes:  - StreamType carrying the value "PROPRIETARY";  - streamId globally unique stream identifier;  - VsDataContainer (see clause 4.3.9 of TS 28.622 [11]) providing the details about the data being reported.  For proprietary data streaming the StreamReporters is a list of the identities of the streaming data reporting MnS producer(s) reporting data for this streamId to this MnS consumer. |
| status | M | ENUM (Success, Failure, PartialSuccess) | An operation may fail because of a specified or unspecified reason. |

##### 11.5.1.7.4 Exceptions

| Exception Name | Definition |
| --- | --- |
| unknownStreamId | **Condition:** One or more of stream identifiers in the streamIdList is not known to this MnS consumer.  **Returned Information:** Name of the exception; status is set to "Failure" or "PartialSuccess". |

|  |
| --- |
| **2nd Change** |

##### 12.5.1.1.2 Operation "establishStreamingConnection"

The IS operation parameters are mapped to SS equivalents according to the tables 12.5.1.1.2-1 through 12.5.1.1.2-4.

Table 12.5.1.1.2-1: Mapping of IS operation input parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS operation parameter name | SS parameter location | SS parameter name | SS parameter type | S |
| producerId | request body | producerId | String | M |
| streamInfoList | request body | streamInfoList | array(streamInfo-Type) | M |

Table 12.5.1.1.2-2: Mapping of IS operation output parameters to SS equivalents (HTTP POST)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IS operation parameter name | SS parameter location | SS parameter name | SS parameter type | S |
| connectionId | location header | n/a | uri-Type | M |
| status | response status codes  response body | n/a  error | n/a  error-ResponseType | M |

Table 12.5.1.1.2-3: Mapping of IS operation input parameters to SS equivalents (HTTP GET (Upgrade))

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **S** |
| connectionId | Headers | Request-URI | String | n/a |
| -- | HTTP-Version (Request-Line) | -- | String (see Note 1) | M |
| -- | Upgrade Header | -- | Constant string: websocket | M |
| -- | Connection Header | -- | Constant string: Upgrade | M |
| -- | Sec-WebSocket-Key Header | -- | String (see Note 2) | M |
| -- | Sec-WebSocket-Version Header | -- | String (see Note 3) | M |
| -- | See Note 4. | | | |
| NOTE 1: The HTTP version shall be not earlier than HTTP/1.1.  NOTE 2: The valid value needs to be assigned according to WebSocket protocol (see IETF RFC 6455 [40]).  NOTE 3: The valid value needs to be assigned according to WebSocket protocol (see IETF RFC 6455 [40]).  NOTE 4: Other SS parameters (not listed in this table) independent from the Stage 2 may be used, according to the WebSocket protocol (see IETF RFC 6455 [40]). | | | | |

Table 12.5.1.1.2-4: Mapping of IS operation output parameters to SS euivalents (HTTP GET (Upgrade))

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IS operation parameter name** | **SS parameter location** | **SS parameter name** | **SS parameter type** | **S** |
| connectionId | n/a | -- | n/a | n/a |
| status | HTTP-Version (Response-Line) | -- | String (see Note 1) | M |
| Status-Code | -- | String |
| response body | error | error-ResponseType |
| -- | Upgrade Header |  | Constant string: websocket | M |
| -- | Connection Header | -- | Constant string: Upgrade | M |
|  | Sec-WebSocket-Accept Header | -- | String (see Note 2) | M |
| -- | See Note 3. | | | |
| NOTE 1: The HTTP version shall be not earlier than HTTP/1.1.  NOTE 2: The valid value needs to be assigned according to WebSocket protocol (see IETF RFC 6455 [40]).  NOTE 3: Other SS parameters (not listed in this table) independent from the Stage 2 may be used, according to the WebSocket protocol (see IETF RFC 6455 [40]). | | | | |



Figure 12.5.1.1.2-1: Message flow for establishing a streaming connection

The message flow for establishing a streaming connection illustrated on Figure 12.5.1.1.2-1 is as follows:

1. The MnS producer sends a HTTP POST request to the MnS consumer.

- The URI identifies the "…/connections" collection resource.

- The request message body carries the information about the connecting producer identity via parameter "producerId" and about streams supported by the new connection via parameter "StreamInfoList".

2. The MnS consumer sends a HTTP POST response to the MnS producer.

- On success "201 Posted" shall be returned with the identifier of a newly created ".../connections/{connectionId}" resource.

- On failure, an appropriate error code shall be returned. The response message body may carry an error object.

3. If step 2 is successful, the MnS producer sends a HTTP GET (upgrade) request to the MnS consumer to establish the WebSocket connection.

- The URI identifies the ".../connections/{connectionId}" resource with the /secure/flag;

- The HTTP-version in the Request-line indicates the HTTP version which is no earlier than HTTP/1.1;

- The Upgrade header is with value "websocket";

- The Connection header is with value "Upgrade";

- The Sec-WebSocket-Key header is with a valid value according to IETF RFC 6455 [40].

- The Sec-WebSocket-Version header is with a valid according to IETF RFC 6455 [40].

4. The MnS consumer sends a HTTP GET (Upgrade) response to the MnS producer.

- On success, "101 Switching Protocols" shall be returned;

- On failure, an appropriate error code shall be returned. The response message body may carry an error object.

- The HTTP-version in the Response-line indicates the HTTP version which is no earlier than HTTP/1.1;

- The Upgrade header is with value "websocket";

- The Connection header is with value "Upgrade";

- The Sec-WebSocket-Accept header is with a valid value according to IETF RFC 6455 [40].

|  |
| --- |
| **End of Change** |