Oracle® Communications

Measurements Data Streaming User Guide

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Oracle Communications Measurements Data Streaming User Guide, Release 9.1.0.0.0

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Contents

What's New in this Guide

This section introduces the documentation updates for release 9.1.0.0.0.

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No updates for the release.

1 Introduction

Oracle's Diameter Signaling Router (DSR) Measurements Data Streaming (MDS) solution provides DSR's statistics to remote servers communicating through Apache Kafka in the 3G core network. It provides real-time data like CPU, memory and disk usage, incoming, and outgoing messages, connections information, and so on. This data is collected for all the DSR components (NOAMs, SOAMs, DAMPs, IPFEs, and so on) and is filtered, parsed, and sent to remote Kafka clusters. This enables the users to access and understand the metrics in their own servers.

1.1 References

- *Oracle Communications Diameter Signaling Router Operations, Administration, and Maintenance Guide*
- *Oracle Communications Diameter Signaling Router Feature Guide*

1.2 Scope and Audience

This manual is intended for anyone responsible for activating and deactivating Measurement Data Streaming. Users of this manual must have a working knowledge of telecommunications and network installations.

2

Understanding MDS Functionality

Oracle's DSR Measurements Data Streaming (MDS) feature provides DSR's statistics to remote servers communicating through Apache Kafka in the 3G core network. It provides real-time data like CPU, memory, and disk usage, incoming and outgoing messages, connections information, and so on. This data is collected for all DSR components (NOAMs, SOAMs, DAMPs, IPFEs) and is filtered, parsed, and sent to remote Kafka clusters. This enables the users to access and understand the metrics in their own servers.

2.1 MDS Overview

Measurement Data Streaming feature enhances the processing of the measurements information obtained from DSR to reduce the time taken to detect problems, reuse the existing functionality on DSR, and introduce a new functionality that reduces the changes that are required in the existing software components of DSR.

The usage of Kafka is introduced to pass the information from DSR to the user's infrastructure.

This feature collects statistics data of user enabled measurements using existing Measqt tool and it parses the collected statistics data. After parsing, it converts the data into JSON format and sends it to the Kafka Broker at user configured interval. It also stores all the pending messages in the disk if the connection with Kafka broker fails.

2.2 Scope of MDS in DSR

When the MDS feature is activated, a process named *mds* comes up on Active NOAM and Active SOAM. By default all measurements are disabled for streaming process.

Following are the steps to enable the measurements from NOAM/SOAM GUI:

1. From the **Main Menu**, select **Measurement Streaming**, click **Streams**.
2. Select the measurement you want to enable from the **Measurement Group**.
3. Click **Enable/Disable streaming**.

The user has to configure Kafka and DSR streaming related properties from NOAM GUI to start the streaming process. For more information about MDS activation, see Activate MDS feature.

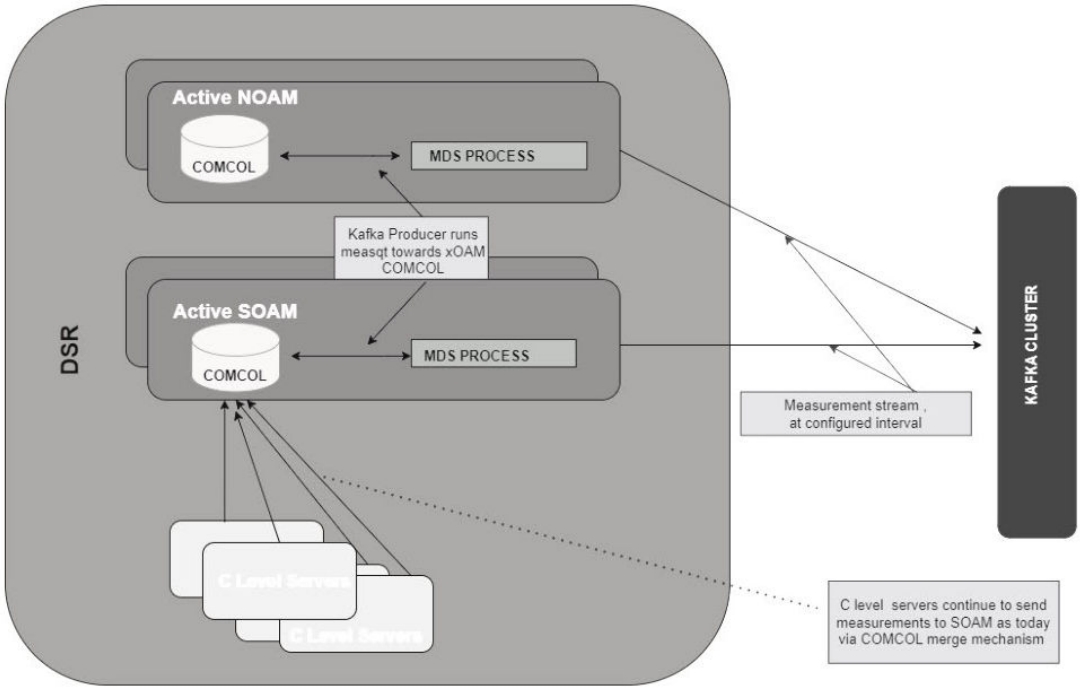
Using NOAM GUI, the user can enable measurements whose scope is *A* and the *mds* process on NOAM can only stream the statistics data of measurements whose scope is *A*.

Using SOAM GUI, the user can enable measurements whose scope is *B* or *C* and the *mds* process on SOAM can only stream the statistics data of measurements whose scope is *B* or *C*.

2.3 DSR Architecture with MDS and Functionalities

DSR Architecture with MDS is shown in the following image:

Figure 2-1 DSR Architecture with MDS



Functionalities of MDS feature:

- Feature Activation or Deactivation mode
- Interface for the user to enable the metrics for streaming
- Interface for the user to configure Kafka and DSR properties
- Handling of failure data
- Standard MEALs

3 MDS Activation and Deactivation

3.1 Activate MDS Feature

1. Log out of any active NOAM or SOAM GUI sessions.
2. Establish the SSH session to the NOAM VIP and login as **admusr**.
3. Navigate to the feature activation directory by running the following command:

   ```
   cd /usr/TKLC/dsr/prod/maint/loaders
   ```

4. Run the feature activation script using the following command:

   ```
   ./featureActivateDeactivate
   ```

   a. Enter 1 at **Enter your choice** to **Activate**.

   Figure 3-1 Activating the feature

   ```
   You want to Activate or Deactivate the Feature :
   1.Activate
   2.Deactivate

   Enter your choice :
   ```

   b. Enter 7 at **Enter your choice** to **Activate**.

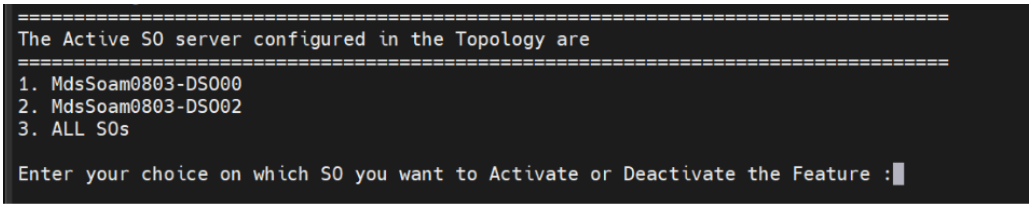
   Figure 3-2 Selecting the MDS feature

   ```
   List of Feature you can Activate :
   1.RBAR
   2.FABR
   3.Mediation
   4.DTLS
   5.DCA Framework
   6.DCA Application
   7.Measurement Data Streaming

   Enter the choice :
   ```

   c. **Enter your choice** to select the active SO server to activate the feature.

Figure 3-3 Activating SO server



Refer to Sample output of Activation on Active NOAM for output example.

5. Establish a GUI session on the active NOAM server by using IP address of the NOAM server.

   Open the web browser and enter the URL https://<Active_NOAM_IP_Address> and log in as the **guiadmin** user.

6. Locate and verify the **Measurements Streaming** folder from the **Main Menu** and subfolders under **Measurements Streaming**.

7. Repeat the steps 5, 6 for Standby NOAM, Active and Standby SOAM (SOAM a site where feature is activated).

> **Note**
>
> **Measurement Streaming tab** or **Measurement Streaming folder** takes 5-10 minutes after activation to be visible on the GUI.

3.1.1 Sample output of Activation on Active NOAM

The following is the sample output for activation on active NOAM.

```
================================================================================
=====
Execution of Activation/Deactivation Process Starts
================================================================================
=====
Starting Activation/Deactivation process....
Executing /usr/TKLC/dsr/prod/maint/loaders/activate/load.mdsActivateAsourced
script on MdsNoam0803-DNO00
================================================================================
==
Add Measurements GUI Configuration Permissions.
================================================================================
==
_appid=17
group_id=3700
group_name=Measurements Streaming Permissions
================================
Set Measurements Streaming entry in the MdsEngOption table
  === changed 1 records ===
  === changed 1 records ===
================================================================================
=====
```

```
Starting to Execute the Loaders on Mate server
================================================================================
=====
Executing /usr/TKLC/dsr/prod/maint/loaders/activate/load.mdsActivateAsourced
script on MdsNoam0803-DNO01
================================================================================
=====
================================================================================
==
Add Measurements GUI Configuration Permissions.
================================================================================
==
_appid=17
group_id=3700
group_name=Measurements Streaming Permissions
================================
  === changed 1 records ===
================================================================================
=====
The Active SO server configured in the Topology are
================================================================================
=====
1. MdsSoam0803-DSO00
2. MdsSoam0803-DSO02
3. ALL SOs

Enter your choice on which SO you want to Activate or Deactivate the
Feature :3
Activate/Deactivate mds on all SOs configured in the Topology

================================================================================
=====
This is a 3 Tier Setup , So run the B sourced loaders on SO server :
MdsSoam0803-DSO00
Executing /usr/TKLC/dsr/prod/maint/loaders/activate/load.mdsActivateBsourced
script on MdsSoam0803-DSO00
================================================================================
==
Current server is HA ACTIVE
================================================================================
==
================================================================================
==
Add Measurements Streaming GUI Configuration Permissions.
================================================================================
==
_appid=17
group_id=3700
group_name=Measurements Streaming Permissions
================================
  === changed 1 records ===
================================================================================
=====
Executing the Loaders and Clearing Cache on Standby SO servers.
================================================================================
=====
```

```
================================================================================
=====
Starting to Execute the Loaders on Mate server
================================================================================
=====
Executing /usr/TKLC/dsr/prod/maint/loaders/activate/load.mdsActivateBsourced
script on MdsSoam0803-DSO01
================================================================================
=====
================================================================================
==
Current server is HA STANDBY
================================================================================
==
================================================================================
==
Add Measurements Streaming GUI Configuration Permissions.
================================================================================
==
_appid=17
group_id=3700
group_name=Measurements Streaming Permissions
================================
  === changed 1 records ===
================================================================================
=====

================================================================================
=====
This is a 3 Tier Setup , So run the B sourced loaders on SO server :
MdsSoam0803-DSO02
Executing /usr/TKLC/dsr/prod/maint/loaders/activate/load.mdsActivateBsourced
script on MdsSoam0803-DSO02
================================================================================
==
Current server is HA ACTIVE
================================================================================
==
================================================================================
==
Add Measurements Streaming GUI Configuration Permissions.
================================================================================
==
_appid=17
group_id=3700
group_name=Measurements Streaming Permissions
================================
  === changed 1 records ===
================================================================================
=====
Executing the Loaders and Clearing Cache on Standby SO servers.
================================================================================
=====
================================================================================
=====
Starting to Execute the Loaders on Mate server
```

```
================================================================================
=====
Executing /usr/TKLC/dsr/prod/maint/loaders/activate/load.mdsActivateBsourced
script on MdsSoam0803-DSO03
================================================================================
=====
================================================================================
==
Current server is HA STANDBY
================================================================================
==
================================================================================
==
Add Measurements Streaming GUI Configuration Permissions.
================================================================================
==
_appid=17
group_id=3700
group_name=Measurements Streaming Permissions
================================
  === changed 1 records ===
================================================================================
=====
```

3.2 Deactivate MDS Feature

1. Log out of any active NOAM or SOAM GUI sessions.
2. Establish the SSH session to the NOAM VIP and login as **admusr**.
3. Navigate to the feature activation directory by running the following command:

   ```
   cd /usr/TKLC/dsr/prod/maint/loaders
   ```

4. Run the feature activation script using the following command:

   ```
   ./featureActivateDeactivate
   ```

   a. Enter 2 at **Enter your choice** to **Deactivate**.

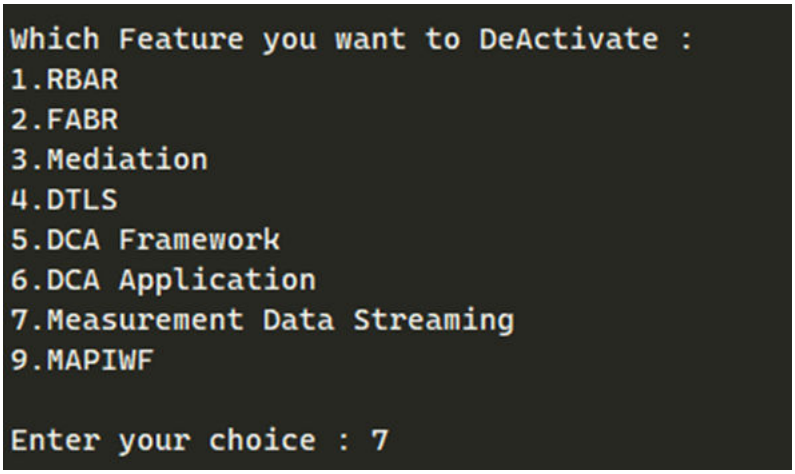
   Figure 3-4 Deactivating the feature

   ```
   You want to Activate or Deactivate the Feature :
   1.Activate
   2.Deactivate

   Enter your choice :
   ```

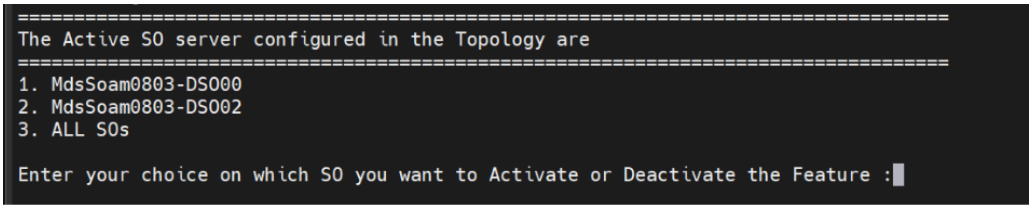
   b. Enter 7 at **Enter your choice** to **Deactivate**.

Figure 3-5 Selecting the MDS feature



c. **Enter your choice** to select the active SO server to deactivate the feature.

Figure 3-6 Deactivating SO server



> **Note**
>
> As an alternative, you can deactivate the feature on all the SOAM sites by entering the choice 3.

Refer to Sample Output of Deactivation Active NOAM for an example.

Perform steps 5 to 7 only if the feature is deactivated on all SOs.

5. Establish a GUI session on the active NOAM server by using IP address of the NOAM server.

   Open the web browser and enter the URL `https://<Active_NOAM_IP_Address>` and log in as the **guiadmin** user.

> **Note**
>
> - Repeat this step for Standby NOAM on all Active and Standby SOAM's.
> - The `Measurement Streaming` folder will not be visible on the GUI under **Main Menu** for 5 to 10 minutes after deactivation.
> - Perform the below steps, if the feature is deactivated on a particular SO.

6. Establish a GUI session of the active SOAM server where the feature is deactivated.

   Open the web browser and enter the URL `https://<Active_NOAM_IP_Address>` and log in as the **guiadmin** user.

7. Verify if the `Measurement Streaming` folder is listed under **Main Menu**.

   Repeat the above 2 steps for the standby SOAM.

3.2.1 Sample Output of Deactivation Active NOAM

```
==========================================================================
=====
Execution of Activation/Deactivation Process Starts
==========================================================================
=====
Starting Activation/Deactivation process....
==========================================================================
=====
The Active SO server configured in the Topology are
==========================================================================
=====
1. MdsSoam0803-DSO00
2. MdsSoam0803-DSO02
3. ALL SOs

Enter your choice on which SO you want to Activate or Deactivate the
Feature :3
Verifying feature is activated or not on MdsSoam0803-DSO00
==============================================
MDS is activated on MdsSoam0803-DSO00
==============================================
Verifying feature is activated or not on MdsSoam0803-DSO02
==============================================
MDS is activated on MdsSoam0803-DSO02
==============================================
Executing /usr/TKLC/dsr/prod/maint/loaders/deactivate/
load.mdsDeactivateAsourced script on MdsNoam0803-DNO00
==========================================================================
==
Removing Measurements Streaming GUI permissions.
==========================================================================
==
  === deleted 1 records ===
  === changed 1 records ===
  === changed 1 records ===
==========================================================================
=====
Starting to Execute the Loaders on Mate server
==========================================================================
=====
Executing /usr/TKLC/dsr/prod/maint/loaders/deactivate/
load.mdsDeactivateAsourced script on MdsNoam0803-DNO01
==========================================================================
=====
==========================================================================
==
```

```
Removing Measurements Streaming GUI permissions.
================================================================================
==
  === deleted 1 records ===
  === changed 1 records ===
Activate/Deactivate mds on all SOs configured in the Topology

================================================================================
=====
This is a 3 Tier Setup , So run the B sourced loaders on SO server :
MdsSoam0803-DSO00
Executing /usr/TKLC/dsr/prod/maint/loaders/deactivate/
load.mdsDeactivateBsourced script on MdsSoam0803-DSO00
================================================================================
==
Current server is HA ACTIVE
================================================================================
==
================================================================================
==
Removing Measurements Streaming GUI permissions.
================================================================================
==
  === deleted 1 records ===
  === changed 1 records ===
================================================================================
=====
Executing the Loaders and Clearing Cache on Standby SO servers.
================================================================================
=====
================================================================================
=====
Starting to Execute the Loaders on Mate server
================================================================================
=====
Executing /usr/TKLC/dsr/prod/maint/loaders/deactivate/
load.mdsDeactivateBsourced script on MdsSoam0803-DSO01
================================================================================
=====
================================================================================
==
Current server is HA STANDBY
================================================================================
==
================================================================================
==
Removing Measurements Streaming GUI permissions.
================================================================================
==
  === deleted 1 records ===
  === changed 1 records ===
================================================================================
=====

================================================================================
=====
```

```
This is a 3 Tier Setup , So run the B sourced loaders on SO server :
MdsSoam0803-DSO02
Executing /usr/TKLC/dsr/prod/maint/loaders/deactivate/
load.mdsDeactivateBsourced script on MdsSoam0803-DSO02
================================================================================
==
Current server is HA ACTIVE
================================================================================
==
================================================================================
==
Removing Measurements Streaming GUI permissions.
================================================================================
==
  === deleted 1 records ===
  === changed 1 records ===
================================================================================
=====
Executing the Loaders and Clearing Cache on Standby SO servers.
================================================================================
=====
================================================================================
=====
Starting to Execute the Loaders on Mate server
================================================================================
=====
Executing /usr/TKLC/dsr/prod/maint/loaders/deactivate/
load.mdsDeactivateBsourced script on MdsSoam0803-DSO03
================================================================================
=====
================================================================================
==
Current server is HA STANDBY
================================================================================
==
================================================================================
==
Removing Measurements Streaming GUI permissions.
================================================================================
==
  === deleted 1 records ===
  === changed 1 records ===
================================================================================
=====
```

4
MDS Properties

The properties of MDS feature is described in this section.

4.1 Interval

Interval is one of the most important properties and defines how often will collect, parse, and send the statistics data of measurements to the remote Kafka server.

The user can configure Interval from NOAM GUI:

1. From the **Main Menu**, select **Measurement Streaming**.
2. Select **Stream Options** click **DSR Properties** .
3. Select the **Interval size** and click **Apply**.

Those operations must be repeated in an infinite loop and monitor if it takes longer, when this happens, MDS reports an Event in DSR System.

The different interval options are mentioned in the following table:

Table 4-1 Supported Intervals

Interval	Default
5 minutes	Yes
15 minutes	No
30 minutes	No

> **Note**
>
> If the DSR system's Kafka Broker connection fails, the Measurement Data Streaming attempts to connect to the Kafka Broker based on the interval time. The alarm will reset only if the Kafka Broker is accessible during measurement data processing.

4.2 Retention

MDS feature ensures that there is no data loss when there is a disconnection or unable to establish a connection to primary Kafka server and backup Kafka server due to network failure. It stores the unsent data in the MdsPendingRecordsA or MdsPendingRecordsB tables.

Data	Table Name
Unsent data of A-level metrics	MdsPendingRecordsA
Unsent data of B, C –level metrics	MdsPendingRecordsB

MDS sends this unsent data to Kafka server, if connection to Kafka reestablishes before the expiry of retention period there is **No Retention** option available in the GUI which disables data retention in case of send failure.

Following are the steps to configure retention time from NOAM GUI:

1. From the **Main Menu**, select **Measurement Streaming**.
2. Select **Stream Options** click **DSR Properties** .
3. Select the **Maximum retention time** and click **Apply**.

4.3 Selection of Measurements

There are large number of measurements for DSR nodes, together they produce a great amount of data. It takes a long time, large amounts of traffic, and a lot of CPU power to process this information. So instead of streaming data for all measurements, MDS feature provides an option to stream only the required measurements by enabling them.

> **Note**
>
> Selection of Measurements supports streaming of statistics data of utmost 50 measurements using NOAM and SOAM GUI:
>
> - From NOAM GUI users can enable *A* scoped measurements.
> - From SOAM GUI the user can enable measurements whose scope is *B*.

4.4 Statistics Data Collection

All the user enabled measurements get stored in the **MeasStrm** table. The Data Collector module in MDS gets the list of user enabled measurements from the **MeasStrmA or MeasStrmB** table and this module also makes use of the MeasDef/MeasRptGroup tables to get measurement information (like Type, Dimension, group, sub-group, and so on).

Statistics Data Collection follows the following mentioned process for each measurement at a time:

1. Get the statistics data of measurement using the **Measqt** tool
2. Parse the statistics data of measurement
3. Generate JSON format
4. Send JSON data to Kafka server using Kafka Producer

Refer Data Size and Data Format for sample JSON data.

4.5 Connecting to a remote Kafka server

MDS feature establishes a connection to remote Kafka server to send statistics data of the all user enabled measurements. To establish a connection to Kafka, it takes user configured primary Kafka server IP address and backup Kafka server IP address from the MeasStrmConfig table. Connectivity with primary and secondary Kafka server is described in the following table:

Table 4-2 Kafka Server Types

Server Type	Description
Primary	This is the main remote server and it is the first option where statistics data will be transferred.
Backup	An additional option is given to connect to an alternative server in case the primary is not available. At each interval, connection with both primary and backup node will be attempted.

The process of connecting to a remote Kafka server:

1. MDS tries connecting to the primary server.
2. It checks if connection is established or not.
3. If connection establishes, send data to the primary server.
4. If connection does not establish, it keeps trying upto three attempts.
5. If connection does not establish to the primary (even after max attempts), it tries connecting with the backup server.
6. It checks if connection is established or not.
7. If connection is established, send messages to the backup server.
8. If connection does not establish, it tries sending messages upto three attempts.
9. If connection does not establish with the backup server (even after max attempts), it raises an alarm in the DSR system.

4.6 Topic Name

Apache Kafka has a dedicated and fundamental unit for event or message organization, called Topics. By using this topic name, remote Kafka server categorizes the messages that are received from DSR. The data is written to the configured topic name over Kafka Server.

4.7 Security Encryption

MDS feature supports user to send statistics data to remote Kafka server securely. It supports the user to configure anyone of the following protocols:

Table 4-3 List of Protocols to connect to Kafka

Protocol Name	Security
PLAINTEXT	No
SSL	Yes
SASL_PLAINTEXT	Yes
SASL_SSL	Yes

If the user configures any protocol other than PLAINTEXT, then the user has to provide additional details which the protocol requires. Detail description of properties which are specific to protocol is available in the MDS Managed Objects section.

4.8 Data Size and Data Format

Data of each measurement represents only one Kafka message, but some measurements that contains arrayed data might be larger in size. MDS provides an option, Max Record Size, in the GUI to configure the maximum size of message size **Max Record Size**. MDS segments the larger data into smaller parts based on the user configured **Max Record Size** value and it adds segment information to the splitted parts.

Based on the value of user configured **Batch Size** kafka property, Kafka producer joins multiple messages until that Batch size is reached and sends it through the network as one.

Each one of the full and sliced messages contains a header with the following characteristics:

Table 4-4 Format of Kafka Message

Name	Description
node	Contains a detailed server type, example: • NETWORK_OAMP • SYSTEM_OAM • MP
hostname	It is the server name defined by client.
date	Indicates when was the measurement taken
interval	Indicates the interval from where the measurements are collected
metric	Name of the Measurement
group	Name of the group which the measurement belongs
type	Indicates the measurement's type, such as: • Single • Average • Max • Min
dim	Indicates the measurement's dimension, such as: • Single • Arrayed
SegmentInfo	Indicates the segment number.
TOTAL	It contains actual statistics data of measurement.
Sets	It contains actual statistics data of measurement. This is only used when the dim is arrayed and contains all elements and their values.

Measurement Statistics data after converting into JSON format

Example of Single dimensioned measurement record

```
[{
   "hostname":"DSRTESTSO-DSO00",
   "node":"SYSTEM_OAM",
   "date":"04/01/2022 20:29",
   "interval":"21:25:00-21:29:59",
   "metric":"System.RAM_UtilPct_Peak",
   "group":"OAM.SYSTEM",
   "type":"max",
```

```
   "dim":"single",
   "SegmentInfo":"L0",
   "TOTAL":"37"
      }]
```

Example of Arrayed measurement record without applying 2KB record size limit:

```
[{
   "hostname":"DSRTESTSO-DMP00",
   "node":"MP",
   "date":"04/01/2022 20:29",
   "interval":"21:25:00-21:29:59",
   "metric":"TxRequestSuccessAllConn",
   "group":"Diameter Egress Transaction",
   "type":"simple",
   "dim":"arrayed",
   "SegmentInfo":"L0",
   "sets":[
       { "id":"Connection_1", "TOTAL":"3" },
        { "id":"Connection_2", "TOTAL":"5" }
        ----------
        { "id":"Connection_20", "TOTAL":"6" },
        { "id":"Connection_21", "TOTAL":"2" }
        ----------
        { "id":"Connection_30", "TOTAL":"1" },
        { "id":"Connection_31", "TOTAL":"51" }
         ----------
           -----------
        { "id":"Connection_n", "TOTAL":"10" }

   ]
}]
```

Example of Arrayed measurement record after applying 2KB record size limit

Record 1

```
[{
   "hostname":"DSRTESTSO-DMP00",
   "node":"MP",
   "date":"04/01/2022 20:29",
   "interval":"21:25:00-21:29:59",
   "metric":"TxRequestSuccessAllConn",
   "group":"Diameter Egress Transaction",
   "type":"simple",
   "dim":"arrayed",
   "SegmentInfo":"F0",
   "sets":[
        { "id":"Connection_1", "TOTAL":"3" },
        { "id":"Connection_2", "TOTAL":"5" }
        ----------
        { "id":"Connection_20", "TOTAL":"6" },
   ]

      }]
```

Record 2

```
[{
   "hostname":"DSRTESTSO-DMP00",
   "node":"MP",
   "date":"04/01/2022 20:29",
   "interval":"21:25:00-21:29:59",
   "metric":"TxRequestSuccessAllConn",
   "group":"Diameter Egress Transaction",
   "type":"simple",
   "dim":"arrayed",
   "SegmentInfo":"I1"
   "sets":[
        { "id":"Connection_21", "TOTAL":"2" }
        ----------
        { "id":"Connection_30", "TOTAL":"1" },
   ]

}]
```

Record n

```
[{
   "hostname":"DSRTESTSO-DMP00",
   "node":"MP",
   "date":"04/01/2022 20:29",
   "interval":"21:25:00-21:29:59",
   "metric":"TxRequestSuccessAllConn",
   "group":"Diameter Egress Transaction",
   "type":"simple",
   "dim":"arrayed",
   "SegmentInfo":"Ln",
   "sets":[
         ----------
           ----------
        { "id":"Connection_n", "TOTAL":"10" }
   ]

}]
```

4.9 Data Compression

To decrease the network's data usage, MDS feature supports data compression. The user can choose any one of the following compression methods. Greater compression values means smaller outputs but larger completion time due to increasingly complex mathematical algorithms.

Table 4-5 Compression Methods with their ranges

Compression Methods	Range
None	-
Gzip	[0-9]

Table 4-5 (Cont.) Compression Methods with their ranges

Compression Methods	Range
Snappy	0
Lz4	[0-12]

4.10 Delivery Timeout

Every time a metric is sent to the remote server, a response is generated and returned to our DSR system indicating that it was successfully delivered. This is very useful as it allows the user to detect which metrics failed to arrive and they are saved as pending and dispatched again when all messages are issued in the next interval. The disadvantage due to this Delivery Timeout parameter is that, the DSR waits until it receives the reply. Based on this situation, the user has the capability to select the level of delivery timeout or none at all. If none is selected, all metrics are considered as delivered even if they never arrive.

4.11 Sending data to Kafka

Using API's of librdkafka (C/C++ Kafka Library) the sender module creates a connection to remote Kafka cluster and sends data to remote Kafka cluster.

Sender module in MDS gets all the user configured Kafka properties from the `MeasStrmConfig` table and it considers all the properties while connecting and sending data to remote Kafka server. If sender module sends all the user enabled measurements data to remote Kafka within the user configured time interval and still if the module has some time left to complete the interval, it tries to send the unsent data to remote Kafka server which is stored in disk.

5 MDS Managed Objects

The following table defines the Measurement Data Streaming objects.

Table 5-1 MDS Managed Objects

Managed Object Name	Description
Measurements for Streaming	On NOAM This Managed Object contains a table of Measurement Groups which are applicable to NOAM level. Each Measurement Group contains a table of Measurements, this table also has **Streaming** field, to enable or disable the Measurement select the Measurement you want to enable or disable in the Measurement group and click **Enable/disable streaming**. On SOAM This Managed Object contains a table of Measurement Groups which are applicable to SOAM level, and each Measurement Group contains a table of Measurements. This table also has **Streaming** field, to enable or disable the Measurement select the Measurement you want to enable or disable in the Measurement group and click **Enable/disable streaming**.
Stream Options	This Managed Object contains two screens which are **Kafka Properties** and **DSR Properties**. These two screens support user to configure both Kafka and DSR properties. For more information on Stream options, refer *DSR Operations, Administration, and Maintenance* guide.

5.1 Measurements of Streaming

The following table describes the attributes of Measurement Streaming.

Table 5-2 Measurements of Streaming

Attribute	Description
Measurement	Name of the measurement
Dimension	Dimension of the measurement For example, Single or Arrayed.
Type	Type of the measurement For example, Simple, Average, Max
Streaming	This is a check box Using this check box , user can enable/disable the particular measurement for streaming process.
Measurement Subgroup	Name of the Sub Group which the measurement belongs to

5.2 Stream Options

The following table describes the Stream options.

Table 5-3 Stream Options

Attribute	Description
Primary IP and port	Bootstrap Server IP and Port of Primary Kafka Cluster A list of host and port pairs to use for establishing the initial connection to the Kafka cluster. Single value of hostIp: port shall be configured. Since these servers are just used for the initial connection to discover the full cluster membership (which may change dynamically), this list need not contain the full set of servers (you may want more than one, though, in case a server is down).
Backup IP and port	Bootstrap Server IP and Port of Backup Kafka Cluster. MDS will create Kafka connections using Backup IP and Port, if Primary IP and port is not reachable.
Topic name	Topic is a fundamental unit for Kafka event or Kafka message. Kafka broker categorizes the messages which are received from DSR based on this Topic parameter only.
Client ID	An ID string to pass to the external Kafka Server when making requests. The purpose of this is to track the source of requests beyond just IP/port by allowing a logical application name to be included in server-side request logging.
Compression codec	Compression codec to use for compressing message sets.
Compression level	Compression level parameter for algorithm selected by configuration property Compression codec. Higher values will result in better compression at the cost of more CPU usage.
Batch size	MDS measures batch size in total bytes instead of the number of messages. It controls how many bytes of data to collect before sending messages to the external Kafka broker.
Linger	Delay in milliseconds to wait for messages in the producer queue to accumulate before constructing message batches (MessageSets) to transmit to Kafka brokers. Default value: 10
Number of acknowledgments	The number of acknowledgments the producer requires the leader to have received before considering a request complete. This controls the durability of records that are sent. Default value: 12
Security protocol	Protocol used to communicate with external Kafka brokers. Default value: SSL
Connection timeout	Indicates how much time (in milliseconds) should wait after a connection to a Kafka cluster has been requested. If the timeout is over, then the connection will be damned unsuccessful. Default value: 1000
SSL Protocol	The SSL protocol used to generate the SSLContext. Default value: "TLSv1.3"
Record Size	This parameter represents the maximum size of single record that can be sent over Kafka Broker. Default value: 2KB

Table 5-3 (Cont.) Stream Options

Attribute	Description
Delivery Timeout	An upper bound on the time to report success or failure after a call to send() returns. This limits the total time that a record will be delayed prior to sending, the time to await acknowledgement from the broker, and the time allowed for retriable send failures. Default value: 120000 Lapse of time: 30 seconds
Request Timeout	This configuration controls the maximum amount of time the MDS will wait for the response of a Kafka request. If the response is not received before the timeout elapses the MDS will resend the request if necessary or fail the request if retries are exhausted. Default value: 30000 Lapse of time: 30 seconds
Retries	The number of retries if MDS (Producer) does not get an acknowledgement from Kafka Broker.
User should configure the below mentioned Additional Parameters if Security Protocol is configured as "SSL":	
SSL CA location	Filename (along with path) of ca file to use in certificate verification
SSL certificate location	Filename (along with path) of file in pem format containing the client certificate as well as any ca certificates needed to establish the certificate's authenticity.
SSL key location	Filename (along with path) containing the client private key.
SSL key password	Password to be used when loading the certificate chain
User should configure the below mentioned Additional Parameters if Security Protocol is configured as "SASL_Plauntext":	
SASL Mechanisms	SASL mechanism to use for authentication. Types of SASL Mechanisms • GSSAPI • PLAIN • SCRAM-SHA-256 • SCRAM-SHA-512 • OAUTHBEARER
SASL Kerberos Service Name	Kerberos principal name that Kafka runs as, not including / hostname@REALM
SASL Kerberos Principal	This client's Kerberos principal name. (Not supported on Windows, will use the logon user's principal).
SASL Kerberos Kinit Cmd	Shell command to refresh or acquire the client's Kerberos ticket. This command is executed on client creation and every sasl.kerberos.min.time.before.relogin (0=disable).
SASL Kerberos Keytab	Path to Kerberos keytab file.
SASL Kerberos Min Time Before Relogin	Minimum time in milliseconds between key refresh attempts. Disable automatic key refresh by setting this property to 0.
SASL Username	SASL username for use with the PLAIN and SASL-SCRAM-.. mechanisms
SASL Password	SASL password for use with the PLAIN and SASL-SCRAM-.. mechanism

Table 5-4 DSR Properties

Fields	Value	Description
Interval size	Default: 5 minutes	Indicates the time it should wait to read and send the metrics. Interval Size should be lesser than the retention time. Range: 5 minutes, 15 minutes, 30 minutes.
Maximum retention time	Default: 30 minutes	It is the maximum amount of time to store metrics that could not be sent to the Kafka cluster. Range: No Retention, 15 minutes, 30 minutes, 1 hour.
Output format	Default: JSON	Output format of Kafka's messages. **Note** **This is a read-only attribute.**

Note

For more information about Stream Options, see *Operations, Administration, and Maintainance (OAM)* Guide.