**3GPP TSG-WG SA4 Meeting #116E  *S4-211450***

**E-meeting, November 10 – 19, 2021**

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| *CR-Form-v12.1* |
| **draft CHANGE REQUEST** |
|  |
|  | **26.501** | **CR** | **XXXX** | **rev** | **-**  | **Current version:** | **16.8.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  | Support of per-slice based metrics reporting |
|  |  |
| ***Source to WG:*** | Huawei Technologies Co.,Ltd. |
| ***Source to TSG:*** | SA4 |
|  |  |
| ***Work item code:*** | 5GMSA |  | ***Date:*** | 2021-11-02 |
|  |  |  |  |  |
| ***Category:*** | **C** |  | ***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 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:*** | In the previous LS S4-211225 exchanges between SA4, SA2 and RAN3, the per-slice based metrics reporting is to be supported by SA4.  |
|  |  |
| ***Summary of change:*** | Add support of slice based metrics reporting  |
|  |  |
| ***Consequences if not approved:*** | Slice based metrics reporting cannot be supported.  |
|  |  |
| ***Clauses affected:*** | 4.2.3, 5.3.2, 5.5 |
|  |  |
|  | **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 \* \* \* \*

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.501: "System architecture for the 5G System (5GS)".

[3] 3GPP TS 23.502: "Procedures for the 5G System (5GS)".

[4] 3GPP TS 23.503: "Policy and charging control framework for the 5G System (5GS); Stage 2".

[5] 3GPP TS 26.238: "Uplink streaming".

[6] 3GPP TS 26.307: "Presentation layer for 3GPP services".

[7] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[8] 3GPP TS 26.234: "Transparent end-to-end Packet-switched Streaming Service (PSS); Protocols and codecs".

[9] 3GPP TS 23.003: "Technical Specification Group Core Network and Terminals; Numbering, addressing and identification".

[10] 3GPP TS 28.530: "Management and orchestration; Concepts, use cases and requirements".

[11] 3GPP TS 28.531: "Management and orchestration; Provisioning".

[12] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3".

[13] 3GPP TS 23.222: "Common API Framework for 3GPP Northbound APIs".

[14] IETF RFC 1034: "Domain names – concepts and facilities".

[X] 3GPP TS 27.007: "AT command set for User Equipment (UE)".

\* \* \* \* Second change \* \* \* \*

### 4.2.3 Service Access Information for Downlink Media Streaming

The Service Access Information is the set of parameters and addresses which are needed by the 5GMSd Client to activate and control the reception of a downlink streaming session, and to report service/content consumption and/or QoE metrics.

The Service Access Information may be provided together with other service announcement information using M8d. Alternatively, the 5GMSd Client fetches the Service Access Information from the 5GMSd AF. Regardless of how it is provided, the Service Access Information contains different information, depending on the collaboration model between the 5GMS System and the 5GMSd Application Provider, and also depending on offered features. Baseline parameters are listed in Table 4.2.3‑1 below:

Table 4.2.3-1: Parameters of baseline service access information

|  |  |
| --- | --- |
| Parameters | Description |
| Provisioning Session identifier | Unique identification of the M1d Provisioning Session. |

When the content hosting feature is activated for a downlink streaming session, the parameters from Table 4.2.3-1a below can additionally be present.

Table 4.2.3-1a: Streaming Access parameters

|  |  |
| --- | --- |
| Parameters | Description |
| Media Player Entry | A document or a pointer to a document that defines a media presentation e.g. MPD for DASH content or URL to a video clip file. |

When the consumption reporting feature is activated for a downlink streaming session, the parameters from Table 4.2.3‑2 below are additionally present.

Table 4.2.3-2: Parameters for consumption reporting configuration

|  |  |
| --- | --- |
| Parameters | Description |
| Reporting interval | Identifies the interval between consumption reports being sent by the Media Session Handler. |
| Server address  | A list of 5GMSd AF addresses where the consumption reports are sent by the Media Session Handler. |
| Sample percentage | The proportion of clients that shall report media consumption.If not specified, all clients shall send reports. |
| Location reporting | Identify whether the Media Session Handler provides location data to the 5GMSd AF (in case of MNO or trusted third parties) |

When the dynamic policy invocation feature is activated for a downlink streaming session the parameters from Table 4.2.3‑3 below are additionally present.

Table 4.2.3-3: Parameters for dynamic policy invocation configuration

|  |  |
| --- | --- |
| Parameters | Description |
| Server address | A list of 5GMSd AF addresses (in the form of opaque URLs) which offer the APIs for dynamic policy invocation sent by the 5GMS Media Session Handler. |
| Valid Policy Template Ids | A list of Policy Template identifiers which the 5GMSd Client is authorized to use. |
| Service Data Flow Methods | A list of recommended Service Data Flow description methods (descriptors), e.g. 5-Tuple, ToS, 2-Tuple, etc, which should be used by the Media Session Handler to describe the Service Data Flows for the traffic to be policed. |
| External reference | Additional identifier for this Policy Template, unique within the scope of its Provisioning Session, that can be cross-referenced with external metadata about the streaming session. |

When the metrics collection and reporting feature is activated for a downlink streaming session, one or more parameter sets for metrics configuration, according to Table 4.2.3‑4, are additionally present. Each metrics configuration set contains specific settings valid for that configuration, which is typically metric scheme dependent, and collection and reporting shall be done separately for each set.

Table 4.2.3-4: Parameters for each metrics configuration set

|  |  |
| --- | --- |
| Parameters | Description |
| Scheme | The scheme associated with this metrics configuration set. A scheme may be associated with 3GPP or with a non-3GPP entity. If not specified, a default 3GPP metrics scheme shall apply.Metrics schemes shall be uniquely identified by URIs. |
| Server address | A list of 5GMSd AF addresses to which metric reports shall be sent for this metrics configuration set. |
| DNN | The Data Network Name (DNN) which shall be used when sending metrics report for this metrics configuration set.If not specified, the default DNN shall be used. |
| Slice filter | The network slice(s) for which metrics collection and reporting shall be done for this metrics configuration set.If not specified, the metrics collection and reporting shall be done for all network slices. |
| Reporting interval | The sending interval between metrics reports for this metrics configuration set.If not specified, a single final report shall be sent after the streaming session has ended. |
| Sample percentage | The proportion of streaming sessions that shall report metrics for this metrics configuration set.If not specified, reports shall be sent for all sessions. |
| Streaming source filter | A list of content URL patterns for which metrics reporting shall be done for this metrics configuration set.If not specified, reporting shall be done for all URLs. |
| Metrics | A list of metrics which shall be collected and reported for this metrics configuration set.For progressive download and DASH streaming services, the listed metrics are associated with the 3GPP metrics scheme and shall correspond to one or more of the metrics as specified in clauses 10.3 and 10.4, respectively, of TS 26.247 [7].In addition, for the 3GPP metrics scheme as applied to DASH streaming, the quality reporting scheme and quality reporting protocol as defined in clauses 10.5 and 10.6, respectively, of [7] shall be used.If not specified, a complete (or default if applicable) set of metrics will be collected and reported. |

When 5GMSd AF-based Network Assistance is activated for a downlink streaming session the parameters from Table 4.2.3‑5 below shall be additionally present.

Table 4.2.3-5: Parameters for 5GMSd AF-based Network Assistance configuration

|  |  |
| --- | --- |
| Parameters | Description |
| Server address | 5GMSd AF address that offers the APIs for 5GMSd AF-based Network Assistance, accessed by the 5GMSd Media Session Handler. The server address shall be an opaque URL, following the 5GMS URL format. |

\* \* \* \* Third change \* \* \* \*

### 5.3.2 Baseline provisioning procedure

The present clause describes the baseline procedure to provision the features using the 5GMS System.

NOTE 1: SLA negotiations between the 5GMSd Application Provider and the 5GMS System provider are outside the scope of the present specification and are included in the figure below for illustrative purposes only.



Figure 5.3.2-1: High Level Procedure for provisioning the 5GMS System for downlink streaming sessions

Steps:

1. The 5GMSd Application Provider discovers the address (URL) of the 5GMSd AF (M1d) for Session Provisioning.

2. The 5GMSd Application Provider authenticates itself with the system. This procedure reuses existing authentication/authorization procedures, e.g. as defined for CAPIF [13].

3. The 5GMSd Application Provider creates a Provisioning Session, providing its 5GMSd Application Provider identifier as input. 5GMSd Application Provider queries the capabilities and authorized features.

4. The 5GMSd Application Provider specifies one or more 5GMSd features in the Provisioning Session. A set of authorized features is activated, such as content consumption measurement, logging, collection and reporting; QoE metrics measurement, logging, collection and reporting; dynamic policy; network assistance; and content hosting (including ingest).

When the content hosting feature is offered and selected, the 5GMS Application Provider configures the content hosting behaviour of the 5GMSd AS. This Content Hosting Configuration is specified in clause 5.4 and includes selecting the ingest protocol and format, caching and proxying of media objects, content preparation, access protection (e.g. URL signing) and indicating a target distribution area (e.g. through geofencing).

When the dynamic policy feature is offered and selected, the 5GMSd Application Provider specifies a set of policies which can be invoked for the unicast downlink streaming session. The UE becomes aware of the selected policies in the form of a list of valid Policy Template Ids.

When the content consumption measurement, logging, collection and reporting feature is offered and selected, the 5GMSd Application Provider indicates the desired reporting interval. When the 5GMSd Application Provider has delegated Service Access Information handling to the 5GMS System, then location reporting is also selected or de-selected.

When the QoE metrics measurement, logging, collection and reporting feature is offered and selected, the 5GMSd Application Provider provides configuration input on the QoE post processing. When the 5GMSd Application Provider has delegated Service Access Information handling to the 5GMS System, then more detailed metrics reporting is configured.

5. When content hosting is desired, the 5GMSd AF interacts with the 5GMSd AS to allocate M2d resources and configure the ingest format. Then the 5GMSd AS responds with the M2d address. The 5GMSd AF selects the desired ingest format.

6. The 5GMSd AF compiles the Service Access Information. The Service Access Information contains access details and options such as the Provisioning Session identifier, M5d (Media Session Handling) addresses for content consumption reporting, QoE metrics reporting, dynamic policy, network assistance, etc. When content hosting is offered and has been selected in step 4, then also M4d (Media Streaming) information such as the DASH MPD is included. If per-slice metrics collection and reporting is supported, 5GMSd AF may include the slice filter in the QoE metrics configuration set in the Service Access Information in order to collect QoE metrics for the specific slice (s).

7. The 5GMSd AF provides the results to the 5GMSd Application Provider.

a. When the 5GMSd Application Provider has selected full Service Access Information, then the results are provided in the form of addresses and configurations for M2d (Ingest), M5d (Media Session Handling) and M4d (Media Streaming).

b. When the 5GMSd Application Provider delegated the service access information handling to the 5GMS System, then a reference to the Service Access Information (e.g. an URL) is provided. The Media Session Handler fetches the full Service Access Information later from the 5GMSd AF.

8. When content hosting is offered and has been selected in step 4, the 5GMSd Application Provider can start supplying content at the M2d ingest interface. In the case of progressive download or on-demand DASH sessions, the 5GMSd Application Provider makes the content assets available. In the case of Live DASH streaming sessions, the 5GMSd Application Provider starts supplying the live content.

9. The 5GMSd Application Provider executes Service Announcement and updates the UEs (during the lifetime of the Provisioning Session).

Optional:

10. The 5GMSd Application Provider may update the Provisioning Session.

Depending on the parameters of the Provisioning Session:

11. The 5GMSd AF may send event-related or periodic notifications to the 5GMSd Application Provider.

According to schedule, or upon request:

12. The 5GMSd Application Provider may manually terminate the Provisioning Session (at any time). All associated resources are released. Content may be removed from the 5GMSd AS. The 5GMSd Application Provider may configure a schedule for Provisioning Session termination.

13. The 5GMSd AF sends a notification upon Provisioning Session termination.

The 5GMSd AF may request the creation or reuse of one or more network slices for distributing the content of the provisioned session. If more than one network slice is provisioned for the distribution of the content of a session, the list of allowed S‑NSSAIs shall be conveyed to the target UEs (e.g. through URSP or through M5d or M8d).

NOTE 2: The 5GMSd AS(s) serving the content are only accessible through the DNN(s) used by the network slice(s) provisioned for the distribution of that content.

\* \* \* \* Forth change \* \* \* \*

## 5.5 Metrics collection and reporting

### 5.5.1 General

Metrics collection and reporting can be done in different ways, depending on the relationship between the Application Provider and the 5GMS System operator. The following clauses show simplified signalling examples for two different use-cases.

### 5.5.2 RAN-based reporting procedure

In the first use-case, shown in Figure 5.5.2-1 below, the 5GMS System operator controls the metrics collection and reporting using the RAN-based configuration method. In this case the metrics are configured via the RAN and the control plane, independent of 5GMS functional support.



Figure 5.5.2-1: Metrics collection and reporting via RAN-based configuration

The different steps are explained below:

1: Overall metrics configuration is done on the network level, for instance defining which geographical areas that shall have metrics collection active, which metrics to collect, and how metrics shall be reported. If per-slice metrics collection and reporting is supported, a slice filter shall be present in the metrics configuration, indicating the specific slice instance(s) for metrics collection and reporting.

2: The metrics configuration(s) is/are sent from the OAM to the RAN, which does not forward that information to the UE at this stage.

3: Time passes, and it is assumed that the UE moves around during that period.

4: The UE enters an area (cell, location area, etc.,) which is inside the geographical constraint. This is discovered by the RAN, and it now needs to activate metrics collection and reporting for the UE.

5: The actual metrics configuration is sent from the RAN to the Media Session Handler, via the control plane.

6: Additional time passes, and the UE has a metrics configuration, but no streaming session has started.

7: A streaming session is started.

8: The session setup is done in conjunction with signalling transactions (not shown here).

8a: If a slice filter is included in the metrics configuration set, the Media Session Handler shall check the running slice which is carrying the current media streaming (e.g. via the AT Command +CGDCONT [X]) and the specific traffic mapping with URSP [4]. If the running slice is within the slice filter, the metrics collection and reporting shall be done. Besides, the running slice shall also be included into the metrics reports.

9: A new metrics collection job is created in the Media Player.

10: A reference to the new metrics collection job is returned.

11: The configuration for the metrics collection job is sent to the Media Player (i.e. which metrics should be measured) along with the measurement resolution interval). The metrics reporting interval timer is activated in the Media Session Handler.

12: Media is delivered and rendered, and...

13: ...more media is delivered...

14: The configured metrics reporting interval has elapsed, and the Media Session Handler now requests the collected metrics from the Media Player.

15: The Media Player returns the collected metrics.

16: The metrics are reported via the control plane.

17: The session continues...

18: more media is delivered, and then the session is finished.

19: The Media Session Handler requests the final metrics collected.

20: The Media Player returns the final collected metrics.

21: The metrics are reported to the OAM via the control plane.

21a: The OAM may determine the per-slice QoE metrics based on the metrics reports and the slice filter.

22: The metrics collection job is deleted.

23: Time passes, the UE moves around.

24: The UE leaves the geographical area specified by the metrics configuration.

25: The RAN sends metrics (de)configuration to the UE, to stop future metrics collection.

### 5.5.3 5GMSd AF-based reporting procedure

The second use-case, shown in figure 5.5.3-1 below, illustrates a scenario where the metrics collection and reporting is configured by the 5GMSd AF. In this example, it is assumed that the metrics configuration provided by the 5GMSd AF comprises instructions/rules regarding metrics collection (i.e. measurement and logging) and reporting for two different schemes – one that is non-3GPP-defined and initially sourced from the 5GMSd AS, and the other scheme that is defined by 3GPP and initially sourced from an OAM Server belonging to the 5GMS System operator. Each metrics scheme requires the 5GMSd Client to perform metrics collection and subsequent metrics reporting to the 5GMSd AF according to the configuration rules of that scheme. Furthermore, it is assumed that the 5GMSd AF is required to deliver metrics reports obtained from the 5GMSd Client to separate destination entities, upon optionally having performed post-processing of the original report information, according to the configuration rules of each metrics scheme. The 5GMSd AF and 5GMSd AS functions can be either trusted or untrusted.



Figure 5.5.3-1: Metrics collection and reporting via 5GMSd AF-based configuration

The message sequence steps are described below:

1: The 5GMSd AF is provisioned with two separate sets of metrics reporting configuration information – metrics scheme\_1 as defined by the 5GMSd Application Provider and metrics scheme\_2 as defined by 3GPP, each pertaining to metrics collection by the Media Player, retrieval of those collected metrics from the Media Player by the Media Session Handler, and the generation and delivery of metrics reports from the Media Session Handler to the 5GMSd AF. The 5GMSd AF is similarly provisioned with two separate sets of metrics reporting configuration information, associated with the metrics schemes 1 and 2, regarding required post-processing functionality and subsequent and separate delivery of processed metrics reports to the 5GMSd Application Provider and to the OAM Server.

2: The 5GMSd-Aware Application triggers the Service Announcement and Content Discovery procedure. The Service Announcement includes the whole Service Access Information that contains metric configuration info for metrics schemes 1 and 2, with their associated metrics collection configurations acquired by the Media Player and metrics collection configurations acquired by the Media Session Handler.

3: Time passes until the 5GMSd UE initiates session establishment and media playback.

4: The 5GMSd-Aware Application informs the Media Player of impending media playback.

5a: The Media Player requests the establishment of a streaming session with the Media Session Handler which acknowledges the request.

5b: The Media Session Handler requests the establishment of a streaming session with the 5GMSd AF which confirms the streaming session establishment.

5c: The Media Session Handler informs the Media Player the successful set-up of the streaming session.

6: Media playback pipeline is set up between the Media Player, the 5GMSd AS and the 5GMSd Application Provider.

6a: If a slice filter is included in the metrics configuration set, the Media Session Handler shall check the running slice which is carrying the current media streaming session (e.g. via the AT Command +CGDCONT [X]) and the specific traffic mapping with URSP [4]. If the running slice is within the slice filter, metrics collection and reporting shall be done. Besides, the running slice shall also be included into the metrics reports.

7: The Media Session Handler queries the Media Player on its capability to perform metrics collection (measurement and logging function) in accordance with both schemes 1 and 2 as defined by its metrics configuration.

8: The Media Player acknowledges its support for the collection of the required metrics of all configured schemes. If the request cannot be supported by the Media Player (e.g., inability to measure metrics according to one of the configured schemes), an error message shall be sent by the Media Session Handler to the appropriate network entity, indicating that metrics reporting for the indicated metrics scheme cannot be supported for this streaming service.

During the course of media playback, steps 9-18 below may be repeated, depending on the duration of the playback and the frequency of metrics reporting as set by the metrics configuration for each of the two schemes.

9: Assuming a live streaming service, media content is delivered via push ingest from the 5GMSd Application Provider to the 5GMSd AS.

10: The Media Player fetches media content from the 5GMSd AS and begins media playback.

11: The Media Player notifies the Media Session Handler of the start of media playback, causing the Media Session Handler to initialize and begin countdown of separate metrics reporting interval timers for schemes 1 and 2.

12: Upon expiration of timer\_1 (associated with scheme\_1), the Media Session Handler retrieves the logged metrics measurements from the Media Player according to scheme\_1.

13: In accordance with its metrics reporting configuration as provisioned in step 2, a metrics report for scheme\_1 is sent from the Media Session Handler to the 5GMSd AF.

14: Upon expiration of timer\_2 (associated with scheme\_2), the Media Session Handler retrieves the logged metrics measurements from the Media Player according to scheme\_2.

15: In accordance with its metrics reporting configuration as provisioned in step 2, a metrics report for scheme\_2 is sent from the Media Session Handler to the 5GMSd AF.

16: In accordance with its metrics reporting configuration as provisioned in step 1, the 5GMSd AF performs separate post-processing in accordance with schemes 1 and 2 (e.g. filtering, aggregation, reformatting) of the received types of metrics reports.

Furthermore, in accordance with its metrics reporting configuration as provisioned in step 1:

17: The 5GMSd AF sends a processed metrics report in accordance with scheme\_1 to the 5GMSd Application Provider.

18: The 5GMSd AF sends a processed metrics report in accordance with scheme\_2 to the OAM Server.

Upon the termination of media playback (as notified by the 5GMSd-Aware Application to the Media Player) a final round of metrics collection and reporting is performed:

19: The Media Session Handler obtains the latest metrics measurements from the Media Player in accordance with schemes 1 and 2. These procedures might occur prior to the nominal expiration of the metrics reporting interval timers.

20: Final metrics reports, in accordance with schemes 1 and 2 are sent by the Media Session Handler to the 5GMSd AF. These procedures might occur prior to the expiration of the nominal metrics reporting intervals.

21: The 5GMSd AF performs post-processing of the received final metrics reports in accordance with schemes 1 and 2, e.g. determining the per-slice QoE metrics based on the slice filter and the metrics reports.

22: Same as step 17.

23: Same as step 18.

NOTE: Although not explicitly shown or described in Figure 5.3.3-1, should the 5GMSd AF represent an untrusted network entity and the OAM Server represent a trusted network entity, the delivery of processed metrics reports from the 5GMSd AF to the OAM Server, as depicted in steps 18 and 23, must be mediated by the NEF (Network Exposure Function).

### 5.5.4 Metrics reporting configuration parameters

Table 4.2.3-4 in clause 4.2.3 describes the metrics reporting configuration parameters used in step 5 of Figure 5.5.2-1 and step 3a of Figure 5.5.3-1. Note that some of the parameters are only relevant for a specific reporting option, as shown in Table 5.5.4-1 below.

Table 5.5.4-1: Metrics reporting configuration parameters and options

|  |  |  |
| --- | --- | --- |
| **Parameters** | **Relevance in RAN-based reporting?** | **Relevance in 5GMSd AF-based reporting?** |
| Server address | No | Yes |
| Scheme | No (default 3GPP) | Yes |
| DNN | No | Yes |
| Reporting interval | Yes | Yes |
| Sample percentage | Yes | Yes |
| Streaming source filter | Yes | Yes |
| Slice filter  | Yes | Yes |
| Metrics | Yes (3GPP-defined) | Yes (3GPP-defined or non-3GPP defined) |

\* \* \* \* End of changes \* \* \* \*