

IMSI Manager Overload Control

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Feature Description

The IMSI Manager is the Demux process that selects the Session Manager instance based on the Demux algorithm logic to host a new session for 2G/3G/4G subscribers for SGSN/MME. The IMSI Manager maintains the IMSI-SMGR mapping for SGSN (2G/3G) and MME (4G) subscribers. The mappings maintained for all registered subscribers are synchronous with the Session Managers.

When the incoming attach rate is high at the IMSIMGR in a short span of time, the CPU consumption is very high and affects the normal processing activities of the IMSI Manager. At times this can lead to an IMSI Manager crash. Overload control methods are devised through this feature enhancement to keep the IMSI Manager CPU under control.



Important This feature is enabled by default.

IMSI Manager Overload Control

IMSI Manager Overload control is implemented on both SGSN and MME call flows. Attach rate throttling(network overload protection) is implemented in IMSI Manager to cap the rate at which new requests are accepted by SGSN and MME. This feature helps us process the incoming new subscriber requests (for example ATTACH/ISRAU) at a configured rate, therefore the HLR and other nodes are not overloaded. The SGSN and MME have separate pacing queues in the IMSI Manager to monitor the incoming rate of requests and have a separate network overload configuration as well.

For the SGSN, the following requests are paced using the pacing queues:

- Initial ATTACH (with IMSI , L-PTMSI ,F-PTMSI)
- Inter-SGSN RAU
- Empty-CR requests

In the MME, new connections are setup for the following events:

- UE initiated initial Attach

- All types of attach – IMSI, local GUTI, foreign GUTI, mapped GUTI, emergency and so on.
- UE initiated Inter-CN node TAU request requiring context transfer from old MME/SGSN
- TAU request with foreign GUTI or mapped GUTI
- Peer SGSN/MME initiated forward relocation request via Gn/S10/S3

With this feature enhancement when the incoming attach rate is high, the pacing queue becomes full and the further requests are either dropped or forwarded to Session Manager. The Session Manager in turn sends the reject response based on the configuration. When network overload protection action is set as "reject", the IMSI Manager has to forward overflowing requests from the pacing queue to Session Manager through a messenger call to send back error response. The IMSI Manager spends more time on messenger read and write. The IMSI Manager CPU reaches high values when the incoming call rate is very high (both SGSN/MME) though the network overload protection is configured. To ensure that the IMSI Manager CPU is under control, the IMSI Manager reduces certain messenger activities on reaching the default CPU threshold of 70%. This threshold value is fixed and this feature is enabled by default. This value is currently non-configurable. The IMSI Manager drops the overflowing requests from the pacing queue when the CPU crosses 70% mark instead of rejecting the request. Every IMSI Manager instance monitors its CPU usage independently and actions are taken according to the CPU usage.

Relationships to Other Features

Attach throttling feature will have an impact due to this feature enhancement. Once the CPU reaches the threshold of 70%, the messages will be dropped (irrespective of configured action).

Monitoring and Troubleshooting IMSI Manager Overload Control

New statistics are introduced as a part of feature which can be viewed in the Debug mode. The operator can use these statistics to find the number of requests dropped due to overload.

Show Command(s) and/or Outputs

This section provides information regarding show commands and/or their outputs:

show demuxmgr statistics imsimgr all

These counters are available for both MME and SGSN separately.

- Requests dropped due to pacing queue with High Imsimgr CPU

Apart from the statistics listed above, SGSN Network Overload protection statistics which were only available in the show gmm-sm statistics are now available as a part of show demuxmgr statistics imsimgr all. The show output is realigned for better readability. Debug logs are also provided to display the current CPU usage.