P-GW Handoff KPIs for VoWiFi

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Feature Changes

Currently, there are no statistics to determine the number of new sessions started on a particular RAT technology and to monitor any inter-technology handovers per APN.

This feature introduces new session/handoff KPIs and P-GW VoWifi specific KPIs to monitor the following:

- the number of new sessions started on a particular RAT technology
- the inter-technology handover per APN from and to all access technologies
- subscriber activity for network planning

The statistical information is maintained per APN and per P-GW/SAEGW service type. CLIs are applicable only for P-GW and SAEGW product. If eHRPD/PMIP/GGSN services are associated with a P-GW/SAEGW service, then counters related to these services will be reflected under P-GW/SAEGW service statistics CLI output.

Benefits

With the introduction of this feature, operators can have KPIs to monitor per RAT Initiated Sessions and Inter-technology handovers so that they can gauge 2G/3G/4G/WiFi/eHRPD coverage.

Operators can also:

- get statistics that report on:
  - new access technologies such as Wi-Fi that uses the ePDG
  - how a session has been initiated
  - how many handoffs have been done
- track subscriber activity in the network
- plan network accordingly

Limitations

- Initiated session statistics and handover statistics at APN-level are not maintained or incremented at demux due to memory and CPU constraints. During congestion scenarios, for example, some of the calls are rejected at the demux and so this count will not show up in the APN-level initiated session counter.
- Bulkstats for eHRPD and S2b-PMIP are not supported under SAEGW schema.

Monitoring and Troubleshooting P-GW Handoff KPIs for VoWiFi

The following section describes commands available to monitor P-GW Handoff KPIs for VoWiFi.

HandOff KPIS for VoWiFi Show Commands

The following section describes commands available to monitor Handoff KPIs for VoWiFi.

show apn statistics [all | name *apn_name* | verbose]

This command displays the following output.

```
Initiated Sessions per RAT Type:
    EUTRAN:    0    UTRAN:       0
    GERAN:     0    EHRPD:       0
    S2A GTP:   0    S2B GTP:     0
    S2B PMIP:  0

Inter Technology handover:
  GNGP-to-LTE handover:         LTE-to-GNGP handover:
    Attempted:        0         Attempted:         0
    Succeeded:        0         Succeeded:         0
    Failed:           0         Failed:            0

GNGP-to-S4SGSN handover:       S4SGSN-to-GNGP handover:
    Attempted:       0         Attempted:          0
    Succeeded:       0         Succeeded:          0
    Failed:          0         Failed:             0

S4SGSN-to-LTE handover:        LTE-to-S4SGSN handover:
    Attempted:       0         Attempted:          0
    Succeeded:       0         Succeeded:          0
    Failed:          0         Failed:             0

LTE-to-eHRPD handover:         eHRPD-to-LTE handover:
    Attempted:       0         Attempted:          0
    Succeeded:       0         Succeeded:          0
    Failed:          0         Failed:             0

LTE-to-S2bPMIP handover:       S2bPMIP-to-LTE handover:
    Attempted:       0         Attempted:          0
    Succeeded:       0         Succeeded:          0
    Failed:          0         Failed:             0

eHRPD-to-S2bPMIP handover:     S2bPMIP-to-eHRPD handover:
    Attempted:       0         Attempted:          0
    Succeeded:       0         Succeeded:          0
    Failed:          0         Failed:             0

S2bGTP-to-LTE handover:        LTE-to-S2bGTP handover:
    Attempted:       0         Attempted:          0
```

```
    Succeeded:       0          Succeeded:          0
    Failed:          0          Failed:             0

S2bGTP-to-eHRPD handover:       eHRPD-to-S2bGTP handover:
    Attempted:       0          Attempted:          0
    Succeeded:       0          Succeeded:          0
    Failed:          0          Failed:             0

S2aGTP-to-LTE handover:         LTE-to-S2aGTP handover:
    Attempted:       0          Attempted:           0
    Succeeded:       0          Succeeded:           0
    Failed:          0          Failed:              0
```

show pgw-service statistics { all | name *service_name* }

The command displays the following output:

```
Initiated PDNs By RAT-Type:
    EUTRAN:            0          UTRAN:       0
    GERAN:             0          EHRPD:       0
    S2A GTP:           0          S2B GTP:     0
    S2B PMIP:          0
```

show saegw-service statistics { all | name *service_name* } function pgw

The command displays the following output:

```
Initiated PDNs By RAT-Type:
  EUTRAN:                    0       UTRAN:                    0
  GERAN:                     0       EHRPD:                    0
  S2A GTP:                   0       S2B GTP:                  0
  S2B PMIP:                  0
```

Schema for P-GW Handoff KPIs for VoWifi

This section lists the schemas added in for the P-GW Handoff KPIs for VoWifi Feature.

APN Schema

Initiated Sessions Statistics Information based on RAT Technology:

The following new counters have been added to display the number of Initiated Sessions per RAT type, per Service/APN in this enhancement:

- initiated-eutran-sessions
- initiated-utran-sessions
- initiated-geran-sessions
- initiated-ehrpd-sessions
- initiated-s2a-gtp-sessions
- initiated-s2b-gtp-sessions
- initiated-s2b-pmip-sessions

Inter-Technology Handover Statistics:

The following new counters have been added to display the number of inter-technology handover statistics per APN/Service have been added in this enhancement:

- apn-handoverstat-gngptolteatt
- apn-handoverstat-gngptoltesucc
- apn-handoverstat-gngptoltefail
- apn-handoverstat-ltetogngpatt
- apn-handoverstat-ltetogngpsucc
- apn-handoverstat-ltetogngpfail
- apn-handoverstat-gngptos4sgsnatt
- apn-handoverstat-gngptos4sgsnsucc
- apn-handoverstat-gngptos4sgsnfail
- apn-handoverstat-s4sgsntogngpatt
- apn-handoverstat-s4sgsntogngpsucc
- apn-handoverstat-s4sgsntogngpfail
- apn-handoverstat-s4sgsntolteatt
- apn-handoverstat-s4sgsntoltesucc
- apn-handoverstat-s4sgsntoltefail
- apn-handoverstat-ltetos4sgsnatt
- apn-handoverstat-ltetos4sgsnsucc
- apn-handoverstat-ltetos4sgsnfail
- apn-handoverstat-ltetoehrpdatt
- apn-handoverstat-ltetoehrpdsucc
- apn-handoverstat-ltetoehrpdfail
- apn-handoverstat-ehrpdtolteatt
- apn-handoverstat-ehrpdtoltesucc
- apn-handoverstat-ehrpdtoltefail
- apn-handoverstat-ltetos2bpmipatt
- apn-handoverstat-ltetos2bpmipsucc
- apn-handoverstat-ltetos2bpmipfail
- apn-handoverstat-s2bpmiptolteatt
- apn-handoverstat-s2bpmiptoltesucc
- apn-handoverstat-s2bpmiptoltefail

- apn-handoverstat-ehrpdtos2bpmipatt
- apn-handoverstat-ehrpdtos2bpmipsucc
- apn-handoverstat-ehrpdtos2bpmipfail
- apn-handoverstat-s2bpmiptoehrpdatt
- apn-handoverstat-s2bpmiptoehrpdsucc
- apn-handoverstat-s2bpmiptoehrpdfail
- apn-handoverstat-s2bgtptolteatt
- apn-handoverstat-s2bgtptoltesucc
- apn-handoverstat-s2bgtptoltefail
- apn-handoverstat-ltetos2bgtpatt
- apn-handoverstat-ltetos2bgtpsucc
- apn-handoverstat-ltetos2bgtpfail
- apn-handoverstat-s2bgtptoehrpdatt
- apn-handoverstat-s2bgtptoehrpdsucc
- apn-handoverstat-s2bgtptoehrpdfail
- apn-handoverstat-ehrpdtos2bgtpatt
- apn-handoverstat-ehrpdtos2bgtpsucc
- apn-handoverstat-ehrpdtos2bgtpfail
- apn-handoverstat-s2agtptolteatt
- apn-handoverstat-s2agtptoltesucc
- apn-handoverstat-s2agtptoltefail
- apn-handoverstat-ltetos2agtpatt
- apn-handoverstat-ltetos2agtpsucc
- apn-handoverstat-ltetos2agtpfail

P-GW Schema

Initiated Sessions Statistics Information based on RAT Technology: The following counters have been added to display the number of Initiated Sessions per RAT type, per Service /APN in this enhancement:

- sessstat-rat-init-eutran
- sessstat-rat-init-utran
- sessstat-rat-init-geran
- sessstat-rat-init-ehrpd
- sessstat-rat-init-s2a-gtp

- sessstat-rat-init-s2b-gtp
- sessstat-rat-init-s2b-pmip

SAEGW Schema

Initiated Sessions Statistics Information based on RAT Technology: The following counters have been added to display the number of Initiated Sessions per RAT type, per Service/APN in this enhancement:

- pgw-sessstat-pdn-rat-init-eutran
- pgw-sessstat-pdn-rat-init-utran
- pgw-sessstat-pdn-rat-init-geran
- pgw-sessstat-pdn-rat-init-s2a-gtp
- pgw-sessstat-pdn-rat-init-s2b-gtp