

Key Performance Indicators

Ericsson Service-Aware Policy Controller

DESCRIPTION

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1 Key Performance Indicators Introduction

Key Performance Indicators (KPIs) are parameters of the performance of the node or network. They provide the operator with information and indicators of problems found in the node and in surrounding nodes. KPIs are calculated at node level.

KPIs are indicators that have a major impact on the end-user perception of quality. KPIs are used for the following:

- Detection of performance issues
- Initial troubleshooting
- Fault analysis

Since different KPIs are applicable to different protocols, each KPI is marked with the appropriate protocol type.

The equations in the coming sections need be multiplied by 100 to have the formulas in percentage format.

This document covers the following issues:

- Traffic KPIs
- Capacity KPIs





2 Traffic Key Performance Indicators

This section describes the traffic-related KPIs in the SAPC.

2.1 Gx CCR Failure Ratio

The Gx CCR Failure Ratio denotes the proportion of failed attempts to create, update, or terminate a Gx session.

$$\left(1 - \frac{\text{gxCcasSuccess}}{(\text{gxCcrsInit} + \text{gxCcrsUpdate} + \text{gxCcrsTerminate})} \right)$$

Figure 1 Gx CCR Failure Ratio

2.2 Gx CCR Establishment Failure Ratio

The Gx CCR Establishment Failure Ratio denotes the proportion of failed attempts to establish a Gx session.

$$\left(1 - \frac{\text{gxCcasInitSuccess}}{\text{gxCcrsInit}} \right)$$

Figure 2 Gx CCR Establishment Failure Ratio

2.3 Gx CCR Failure owing to Congestion Ratio

The Gx CCR Failure owing to Congestion Ratio denotes the proportion of failed attempts to create, update, or terminate a Gx session because of congestion in the SAPC.

$$\frac{(\text{gxCcasInitTooBusy} + \text{gxCcasUpdateTooBusy} + \text{gxCcasTerminateTooBusy})}{(\text{gxCcrsInit} + \text{gxCcrsUpdate} + \text{gxCcrsTerminate})}$$

Figure 3 Gx CCR Failure owing to Congestion Ratio



2.4 Gx CCR Failure owing to Unable to Comply Ratio

The Gx CCR Failure owing to Unable to Comply Ratio denotes the proportion of failed attempts to create, update, or terminate a Gx session because the SAPC is unable to handle the request.

$$\frac{\text{gxCcasUnableToComply}}{(\text{gxCcrsInit} + \text{gxCcrsUpdate} + \text{gxCcrsTerminate})}$$

Figure 4 Gx CCR Failure owing to Unable to Comply Ratio

2.5 Gx CCR Failure owing to Unknown Session Ratio

The Gx CCR Failure owing to Unknown Session Ratio denotes the proportion of failed attempts to update or terminate a Gx session because the request belongs to an unknown session.

$$\frac{\text{gxCcasUnknownSession}}{(\text{gxCcrsUpdate} + \text{gxCcrsTerminate})}$$

Figure 5 Gx CCR Failure owing to Unknown Session Ratio

2.6 Gx CCR Failure owing to Authorization Rejected

The Gx CCR Failure owing to Authorization Rejected denotes the proportion of failed attempts to create or update a Gx session because the request authorization was rejected.

$$\frac{\text{gxCcasRejected}}{(\text{gxCcrsInit} + \text{gxCcrsUpdate})}$$

Figure 6 Gx CCR Failure owing to Authorization Rejected



2.7 Gx CCR Failure owing to Invalid Information Ratio

The Gx CCR Failure owing to Invalid Information Ratio denotes the proportion of failed attempts to create, update, or terminate a Gx Session because a mandatory Attribute Value Par (AVP) is missing or an AVP has a wrong value in the request.

$$\frac{\text{gxCcasInvalidInfo}}{(\text{gxCcrsInit} + \text{gxCcrsUpdate} + \text{gxCcrsTerminate})}$$

Figure 7 Gx CCR Failure owing to Invalid Information Ratio

2.8 Gx RAR Failure Ratio

The Gx RAR Failure Ratio denotes the proportion of failed attempts to reauthorize a Gx session.

$$\frac{(\text{gxRars} - \text{gxRaasSuccess})}{\text{gxRars}}$$

Figure 8 Gx RAR Failure Ratio

2.9 Gx RAR Time-out Ratio

The Gx RAR Time-out Ratio denotes the proportion of time-outs during reauthorization of a Gx session.

$$\frac{\text{gxRarsTimeout}}{\text{gxRars}}$$

Figure 9 Gx RAR Time-out Ratio



2.10 Rx AAR/STR Failure Ratio

The Rx AAR/STR Failure Ratio denotes the proportion of failed attempts to create, update, or terminate an AF session.

$$\left(1 - \frac{\text{rxAasSuccess} + \text{rxStasSuccess}}{\text{rxAarsInit} + \text{rxAarsUpdate} + \text{rxStrs}} \right)$$

Figure 10 Rx AAR/STR Failure Ratio

2.11 Rx AAR/STR Failure owing to Congestion Ratio

The Rx AAR/STR Failure Ratio owing to Congestion Ratio denotes the proportion of failed attempts to create, update or terminate an AF session owing to congestion in the SAPC.

$$\frac{\text{rxAasInitTooBusy} + \text{rxAasUpdateTooBusy} + \text{rxStasTooBusy}}{\text{rxAarsInit} + \text{rxAarsUpdate} + \text{rxStrs}}$$

Figure 11 Rx AAR/STR Failure owing to Congestion Ratio

2.12 Rx AAR Failure owing to Unable to Comply Ratio

The Rx AAR Failure owing to Unable to Comply Ratio denotes the proportion of failed attempts to create or update an AF session because the SAPC is unable to handle the request.

$$\frac{\text{rxAasUnableToComply}}{\text{rxAarsInit} + \text{rxAarsUpdate}}$$

Figure 12 Rx AAR Failure owing to Unable to Comply Ratio



2.13 Rx AAR Failure owing to Service Not Authorized Ratio

The Rx AAR Failure owing to Service Not Authorized Ratio denotes the proportion of failed attempts to create or update an AF session because a service cannot be authorized.

$$\frac{\text{rxAaasServiceNotAuthorized}}{\text{rxAarsInit} + \text{rxAarsUpdate}}$$

Figure 13 Rx AAR Failure owing to Service Not Authorized Ratio

2.14 Rx AAR Failure owing to Invalid Information Ratio

The Rx AAR Failure owing to Invalid Information Ratio denotes the proportion of failed attempts to create or update an AF session because the request does not contain a mandatory AVP or it contains an AVP with a wrong value.

$$\frac{\text{rxAaasInvalidInfo}}{\text{rxAarsInit} + \text{rxAarsUpdate}}$$

Figure 14 Rx AAR Failure owing to Invalid Information Ratio

2.15 Rx AAR Failure owing to Unknown Session Ratio

The Rx AAR Failure owing to Unknown Session Ratio denotes the proportion of failed attempts to update an AF session because the SAPC cannot find the session.

$$\frac{\text{rxAaasUnknownSessionId}}{\text{rxAarsUpdate}}$$

Figure 15 Rx AAR Failure owing to Unknown Session Ratio



2.16 Rx RAR Failure Ratio

The Rx RAR Failure Ratio denotes the proportion of failed attempts to reauthorize an AF session.

$$\frac{(\text{rxRars} - \text{rxRaasSuccess})}{\text{rxRars}}$$

Figure 16 Rx RAR Failure Ratio

2.17 Rx RAR Time-out Ratio

The Rx RAR Time-out Ratio denotes the proportion of not answered attempts to reauthorize an AF session.

$$\frac{\text{rxRarsTimeout}}{\text{rxRars}}$$

Figure 17 Rx RAR Time-out Ratio

2.18 Rx ASR Time-out Ratio

The Rx ASR Time-out Ratio denotes the proportion of not answered attempts to abort an AF session.

$$\frac{\text{rxAsrsTimeout}}{\text{rxAsrs}}$$

Figure 18 Rx ASR Time-out Ratio



2.19 Sy SLR/STR Failure Ratio

The Sy SLR/STR Failure Ratio denotes the proportion of failed attempts to create or terminate an Sy session.

$$\frac{(\text{sySlrs} + \text{syStrs} - \text{sySlasSuccess} - \text{syStasSuccess})}{(\text{sySlrs} + \text{syStrs})}$$

Figure 19 Sy SLR/STR Failure Ratio

2.20 Sy SNR Failure owing to Congestion Ratio

The Sy SNR Failure owing to Congestion Ratio denotes the proportion of failed attempts to update a Sy session owing to congestion in the SAPC.

$$\frac{\text{sySnasTooBusy}}{\text{sySnrs}}$$

Figure 20 Sy SNR Failure owing to Congestion Ratio

2.21 Sy SLR/STR Answered with Error Ratio

The Sy SLR/STR Answered with Error Ratio denotes the proportion of errors when attempting to create or terminate an Sy session.

$$\frac{\text{sySlasFailed} + \text{syStasFailed}}{\text{sySlrs} + \text{syStrs}}$$

Figure 21 Sy SLR/STR Answered with Error Ratio

2.22 Sy SNR Failure Ratio

The Sy SNR Failure Ratio denotes the proportion of failed attempts to update an Sy Session.



$$\frac{(\text{sySnrs} - \text{sySnasSuccess})}{\text{sySnrs}}$$

Figure 22 Sy SNR Failure Ratio

2.23 Sy SNR Answered with Error Ratio

The Sy SNR Answered with Error Ratio denotes the proportion of errors when attempting to update an Sy session.

$$\frac{\text{sySnasFailed}}{\text{sySnrs}}$$

Figure 23 Sy SNR Answered with Error Ratio

2.24 Sy SLR Time-out Ratio

The Sy SLR Time-out Ratio denotes the proportion of not answered SLRs.

$$\frac{\text{sySlrsTimeout}}{\text{sySlrs}}$$

Figure 24 Sy SLR Time-out Ratio

2.25 Sy STR Time-out Ratio

The Sy STR Time-out Ratio denotes the proportion of not answered STRs.



$$\frac{\text{syStrsTimeout}}{\text{syStrs}}$$

Figure 25 Sy STR Time-out Ratio

2.26 Smp CCR Failure Ratio

The Smp CCR Failure Ratio denotes the proportion of failed attempts to create, update, or terminate an Smp session.

$$\left(1 - \frac{\text{sxCcasInitSuccess} + \text{sxCcasUpdateSuccess} + \text{sxCcasTerminateSuccess}}{(\text{sxCcrsInit} + \text{sxCcrsUpdate} + \text{sxCcrsTerminate})} \right)$$

Figure 26 Smp CCR Failure Ratio

2.27 Smp CCR Establishment Failure Ratio

The Smp CCR Establishment Failure Ratio denotes the proportion of failed attempts to establish an Smp session.

$$\left(1 - \frac{\text{sxCcasInitSuccess}}{\text{sxCcrsInit}} \right)$$

Figure 27 Smp CCR Establishment Failure Ratio

2.28 Smp CCR Establishment Failure owing to Congestion Ratio

The Smp CCR Establishment Failure owing to Congestion Ratio denotes the proportion of failed attempts to create an Smp session because of congestion in the SAPC.



$$\frac{\text{sxCcasInitTooBusy}}{\text{sxCcrsInit}}$$

Figure 28 Smp CCR Establishment Failure owing to Congestion Ratio

2.29 Sd TSR Failure Ratio

The Sd TSR Failure Ratio denotes the proportion of failed attempts to establish an Sd session.

$$\frac{\text{sdTsrs} - \text{sdTsasSuccess}}{\text{sdTsrs}}$$

Figure 29 Sd TSR Failure Ratio

2.30 Sd TSR Answered with Error Ratio

The Sd TSR Answered with Error Ratio denotes the proportion of errors when attempting to create an Sd session.

$$\frac{\text{sdTsasFailed}}{\text{sdTsrs}}$$

Figure 30 Sd TSR Answered with Error Ratio

2.31 Sd TSR Time-out Ratio

The Sd TSR Time-out Ratio denotes the proportion of not answered TSRs.



$$\frac{\text{sdTsrsTimeout}}{\text{sdTsrs}}$$

Figure 31 Sd TSR Time-out Ratio

2.32 Sd RAR Failure Ratio

The Sd RAR Failure Ratio denotes the proportion of failed attempts to reauthorize an Sd session.

$$\frac{\text{sdRars} - \text{sdRarsSuccess}}{\text{sdRars}}$$

Figure 32 Sd RAR Failure Ratio

2.33 Sd RAR Time-out Ratio

The Sd RAR Time-out Ratio denotes the proportion of time-outs during reauthorization of an Sd session.

$$\frac{\text{sdRarsTimeout}}{\text{sdRars}}$$

Figure 33 Sd RAR Time-out Ratio

2.34 Sd CCR Failure Ratio

The Sd CCR Failure Ratio denotes the proportion of failed attempts to update or terminate an Sd session.



$$1 - \frac{\text{sdCcasSuccess}}{\text{sdCcrsUpdate} + \text{sdCcrsTerminate}}$$

Figure 34 Sd CCR Failure Ratio

2.35 LDAP Search Request Failure Ratio

The LDAP search request Failure Ratio denotes the proportion of failed attempts to read a subscriber profile information from an LDAP version 3 (LDAPv3) External Database.

$$\frac{\text{ldapSearchResponsesFailed}}{\text{ldapSearchRequests}}$$

Figure 35 LDAP Search Request Failure Ratio

2.36 LDAP Modify Requests Failure Ratio

The LDAP modify request Failure Ratio denotes the proportion of failed attempts to write a subscriber profile information in an LDAP version 3 (LDAPv3) External Database.

$$\frac{\text{ldapModifyResponsesFailed}}{\text{ldapModifyRequests}}$$

Figure 36 LDAP Modify Request Failure Ratio



2.37 External Database SOAP Notification Request Failure Ratio

The External Database SOAP notification request Failure Ratio denotes the proportion of failed attempts to notify to the SAPC, a change in an External Database subscriber profile information.

$$\frac{\text{soapExtDbNotificationResponsesFailed}}{\text{soapExtDbNotificationsReceived}}$$

Figure 37 External Database SOAP Notification Request Failure Ratio

2.38 External Database SOAP Notification Request Failure owing to Congestion Ratio

The External Database SOAP notification request Failure owing to Congestion Ratio denotes the proportion of failed attempts to notify to the SAPC, a change in an External Database subscriber profile information owing to congestion in the SAPC.

$$\frac{\text{soapExtDbNotificationsReceivedTooBusy}}{\text{soapExtDbNotificationsReceived}}$$

Figure 38 External Database SOAP Notification Request Failure owing to Congestion Ratio

2.39 EBM Server Congestion Ratio

The EBM Server Congestion Ratio denotes the probability of events not sent towards an Event-Based Monitoring (EBM) server due to congestion in the communication.



$$\frac{\text{ebmBusinessEventsNotSent}}{\text{ebmBusinessEvents}}$$

Figure 39 EBM Server Congestion Ratio



3 Capacity Key Performance Indicators

This section describes the capacity-related KPIs in the SAPC.

3.1 CPU Load

For information about this KPI, refer to the `CPUload.Total` measure in `Measurements`.

3.2 Memory Use

For information about this KPI, refer to the `Mem.PercentUsed` measure in `Measurements`.

3.3 Subscribers

For information about this KPI, refer to the `subscribers` measure in `Measurements`.

3.4 IP-CAN Mobile Sessions

For information about this KPI, refer to the `mobileActiveSessions` measure in `Measurements`.

3.5 IP-CAN Fixed Sessions

For information about this KPI, refer to the `fixedActiveSessions` measure in `Measurements`.

3.6 AF Sessions

For information about this KPI, refer to the `afActiveSessions` measure in `Measurements`.

3.7 Gx Transactions per Second

Number of transactions per second in the Gx protocol.



$$\frac{(\text{gxCcrsInit} + \text{gxCcrsUpdate} + \text{gxCcrsTerminate} + \text{gxRars})}{\text{interval in seconds}}$$

Figure 40 Gx Transactions per Second

3.8 Rx Transactions per Second

Number of transactions per second in the Rx protocol.

$$\frac{(\text{rxAarsInit} + \text{rxAarsUpdate} + \text{rxAsrs} + \text{rxStrs} + \text{rxRars})}{\text{interval in seconds}}$$

Figure 41 Rx Transactions per Second

3.9 Sy Transactions per Second

Number of transactions per second in the Sy protocol.

$$\frac{(\text{sySlrs} + \text{sySnrs} + \text{syStrs})}{\text{interval in seconds}}$$

Figure 42 Sy Transactions per Second

3.10 Smp Transactions per Second

Number of transactions per second in the Smp protocol.

$$\frac{(\text{sxCcrsInit} + \text{sxCcrsUpdate} + \text{sxCcrsTerminate})}{\text{interval in seconds}}$$

Figure 43 Smp Transactions per Second



3.11 Sd Transactions per Second

Number of transactions per second in the Sd protocol.

$$\frac{(\text{sdTsrs} + \text{sdCcrsUpdate} + \text{sdCcrsTerminate} + \text{SdRars})}{\text{interval in seconds}}$$

Figure 44 Sd Transactions per Second