

# ETSI TS 132 410 V9.0.0 (2010-01)

Technical Specification

**Digital cellular telecommunications system (Phase 2+);  
Universal Mobile Telecommunications System (UMTS);  
LTE;  
Telecommunication management;  
Key Performance Indicators (KPI) for UMTS and GSM  
(3GPP TS 32.410 version 9.0.0 Release 9)**



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# Contents

Intellectual Property Rights .....	2
Foreword.....	2
Foreword.....	5
Introduction .....	5
1 Scope .....	6
2 References .....	6
3 Abbreviations .....	7
4 KPI Overview.....	7
5 KPI definitions and template .....	8
6 Header: KPI name .....	9
7 Accessibility KPI.....	10
7.1 RAB Establishment Success Rate .....	10
7.1.1 RAB Establishment Success Rate for Speech .....	11
7.1.2 RAB Establishment Success Rate for Videotelephony .....	12
7.2 RRC Connection Establishment Success Rate .....	12
7.3 UTRAN Service Access Success Rate .....	13
7.4 GERAN Service Access Success Rate for CS Domain .....	13
7.5 GSM PDP Context Activation Success Rate .....	14
7.6 UMTS PDP Context Activation Success Rate .....	14
7.7 UMTS Switched Call Success Rate .....	15
8 Retainability KPI.....	15
8.1 RAB Abnormal Release Rate .....	15
8.2 GERAN Service Abnormal Release Rate .....	16
8.3 Combined 2G 3G Call Drop Ratio .....	17
9 Mobility KPI .....	18
9.1 Soft Handover Success Rate .....	18
9.2 Outgoing Intra-system Hard Handover Success Rate .....	18
9.3 Outgoing Inter RAT Handover Success Rate for CS Domain.....	19
9.4 Outgoing Inter RAT Handover Success Rate for PS Domain .....	19
9.5 Handover Success Rate (BSC and Cell).....	19
10 Utilization KPI .....	20
10.1 Percentage of Established RABs, CS Speech.....	20
10.2 Percentage of Established RABs, CS 64kbps (Videotelephony).....	21
10.3 Percentage of Established RABs, TotalPS .....	22
11 Availability KPI .....	23
11.1 UTRAN Cell Availability.....	23
<b>Annex A (informative): Use case for KPI.....</b>	<b>24</b>
A.1 Use Case for RAB Establishment Success Rate.....	24
A.1.1 Use Case for RAB Establishment Success Rate for SPEECH .....	24
A.1.2 Use Case for RAB Establishment Success Rate for Videotelephony.....	24
A.2 Use Case for RRC Connection Establishment Success Rate.....	24
A.3 Use Case for UTRAN Service Access Success Rate.....	24
A.4 Use Case for Soft Handover Success Rate .....	24
A.5 Use Case for Outgoing Intra-system Hard Handover Success Rate .....	24
A.6 Use Case for Outgoing Inter RAT Handover Success Rate for CS Domain .....	25
A.7 Use Case for Outgoing Inter RAT Handover Success Rate for PS Domain.....	25
A.8 Use Case GERAN Service Access Success Rate for CS Domain .....	25
A.9 Use Case for GSM PDP Context Activation Success Rate .....	25

A.10 Use Case for RAB Abnormal Release Rate .....25

A.11 GERAN Service Abnormal Release Rate .....25

A.12 Handover Success Rate (BSC and Cell).....25

A.13 UMTS PDP Context Activation Success Rate .....25

A.14 UMTS Switched Call Success Rate .....25

A.15 UTRAN Cell Availability .....26

A.16 Percentage of Established RABs .....26

A.17 Combined 2G 3G Call Drop Ratio Ratio.....26

**Annex B (informative): Change history.....27**

History .....28

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## Introduction

Key Performance Indicators (KPI) emanate from strategic goals of enterprise, and cascade through the entire organization.

KPIs are specified through definition and measurement of key parameters of input/output of internal network system and/or maintenance & operation progress of an enterprise.

KPIs are primary metrics to evaluate process performance as indicators of quantitative management, and to measure progress towards the enterprise's goals.

Competition in the liberalized telecommunications markets and customer requirements for more complex services are leading to a greater emphasis on the provision of efficient customer service.

To achieve this goal, telecommunication operators have found the Service Level Agreement (SLA) solution.

In the Performance Management hierarchy, SLA is supported by KQI; KQI is supported by KPI; and KPI is supported by network performance data from Network Elements.

Performance measurements are specified in 3GPP TS 32.404 [1], TS 32.405 [2], TS 32.406 [3], TS 32.407 [4], TS 32.408 [5], TS 32.409 [6] and TS 52.402 [7].

KPI definitions include high level KPIs that are common across GSM and UMTS etc and KPIs that are related to specific network techniques.

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# 1 Scope

The present document specifies Key Performance Indicators (KPIs) for GSM, UMTS, etc. KPI definitions include high level KPIs that are:

- a) **common** across GSM and UMTS networks; and
- b) **specific** to network techniques such as GSM and UMTS networks.

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# 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 TS 32.404: "Telecommunication management; Performance Management (PM); Performance measurements - Definitions and template".
- [2] 3GPP TS 32.405: "Telecommunication management; Performance Management (PM); Performance measurements Universal Terrestrial Radio Access Network (UTRAN) ".
- [3] 3GPP TS 32.406: "Telecommunication management; Performance Management (PM); Performance measurements Core Network (CN) Packet Switched (PS) domain".
- [4] 3GPP TS 32.407: "Telecommunication management; Performance Management (PM); Performance measurements Core Network (CN) Circuit Switched (CS) domain".
- [5] 3GPP TS 32.408: "Telecommunication management; Performance Management (PM); Performance measurements Teleservice".
- [6] 3GPP TS 32.409: "Telecommunication management; Performance Management (PM); Performance measurements IP Multimedia Subsystem (IMS) ".
- [7] 3GPP TS 52.402: "Telecommunication management; Performance Management (PM); Performance measurements - GSM".
- [8] 3GPP TR 32.814: "Telecommunication management; UTRAN and GERAN Key Performance Indicators (KPI)".
- [9] ITU-T Recommendation E.800: "Terms and definitions related to quality of service and network performance including dependability".
- [10] TMF GB917: "SLA management handbook, release 2.5", July 2005.
- [11] TMF GB923: "Wireless service measurements handbook", version 3.0, March 2004.
- [12] 3GPP TS 25.331: "Radio Resource Control (RRC); Protocol specification".

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## 3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

BLER	Block Error Rate
CN	Core Network
CS	Circuit Switched
GERAN	GSM EDGE Radio Access Network
GSM	Global System for Mobile Communications
IMS	IP Multimedia Subsystem
KPI	Key Performance Indicator
KQI	Key Quality Indicator
PS	Packet Switched
RAB	Radio Access Bearer
SLA	Service Level Agreement
TMF	TeleManagement Forum
UMTS	Universal Mobile Telecommunications System
UTRAN	UMTS Radio Access Network

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## 4 KPI Overview

Key performance indicators (KPI) must emanate from the strategy goals of enterprise and cascade through the organization. KPIs are defined through the definition and measurement of key parameters of input and output of internal network system and/or maintenance & operation progress of enterprise. KPIs are considered to be primary metrics to evaluate process performance as indicators of quantitative management, and to measure progress toward enterprise goals.

For operators, competition in the liberalized telecommunications markets and the requirements of customers for more complex services are leading to a greater emphasis on the provision of efficient customer service. The efficiency of customer service is embodied by customer perception and good customer relations.

According to TMF (TeleManagement Forum) contributions, SLAs (Service Level Agreement, See in TMF GB917 [10]) can contribute to determining how customer care is perceived and aiding service providers in attracting customers and maintaining customer loyalty. A SLA is an element of a formal, negotiated contract between two parties, viz., a service provider and a customer. It documents the common understanding of all aspects of the service and the roles and responsibilities of both parties from service ordering to service termination. SLAs can include many aspects of a service, such as performance objectives, customer care procedures, billing arrangements, service provisioning requirements, etc.

SLAs are supported by service or product KQIs. Service KQIs are the key indicators of the service element performance, and used as the primary input for management of internal or supplier/partner SLAs that calculate actual service delivery quality against design targets or in the case of supplier/partner contractual agreements. Service KQIs provide the main source of data for the product KQIs that are required to manage product quality and support the contractual SLAs with the customer. (See in TMF GB923 [11])

KQIs are supported by KPIs that are an indication of service resource performance.

KPI is proved by aggregation of network performance data from network elements.

Performance hierarchy is shown as figure 1.



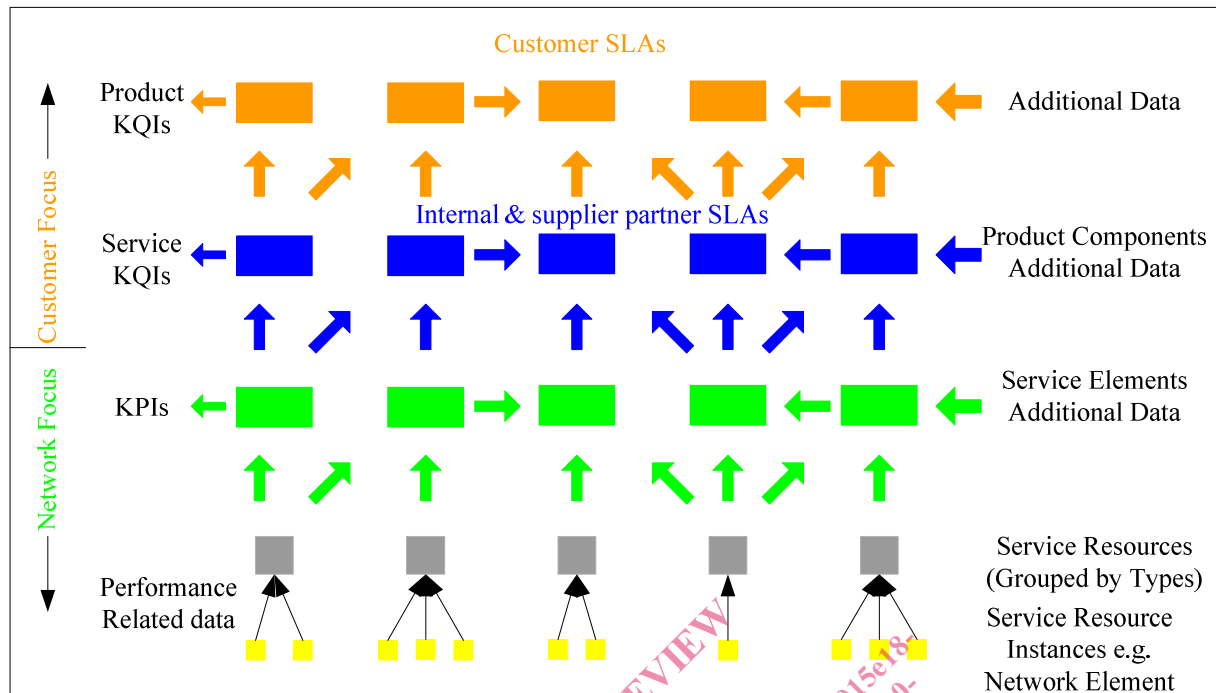


Figure 1: Key Indicator Hierarchy (see in TMF GB917 [10])

In detail to support customer SLAs, KPI should be used to evaluate user's degree of satisfaction with the service provided. The user's degree of satisfaction depends on quality of service that is on the user's perception of the service performance: the support, the operability, the serveability and the security (See in ITU-T Recommendation E.800 [9]). In the present document, KPI is only used to evaluate the service serveability performance. The service serveability performance is further subdivided into three terms: service accessibility, retainability and integrity performance.

From network performance point of view, serveability performance depends on trafficability performance that is the combined aspects of availability, reliability, maintainability and maintenance support performance. So that KPIs defined in the present document are widely used for network performance monitoring and quality benchmarking, such as hand-off success rate, call drop-rate, hold time, and congestion are continuously monitored to provide indicators of areas that might require tuning.

KPI is only valid when performance related data is non-zero or non-null.

## 5 KPI definitions and template

When defining KPIs the following information needs to be considered:

**Type of the KPI:** The different KPI types are already define in 3GPP TR 32.814 [8] (RATIO, MEAN, CUM). When a KPI is defined the KPI should be classified as one of the KPI types defined in TR 32.814 [8].

**KPI Category:** The following KPI categories should be defined:

- serveability: See the definition in ITU-T Recommendation E.800 [9].
  - Accessibility: See the definition in ITU-T Recommendation E.800 [9].
  - Retainability: See the definition in ITU-T Recommendation E.800 [9].
  - Integrity: See the definition in ITU-T Recommendation E.800 [9].
- Availability: See the definition in ITU-T Recommendation E.800 [9].
  - Reliability: See the definition in ITU-T Recommendation E.800 [9].

- Maintainability: See the definition in ITU-T Recommendation E.800 [9].
- Utilization: it indicates the utilization of network resource, such as throughput on specific interface.
- Mobility: it contains the Handover related KPIs.

When a KPI is defined, the KPI should be classified into one of the above defined KPI category.

**Object of the KPI:** The KPI can be calculated on network level (GSM network or UMTS network.). This field of the template should indicate whether the KPI is applicable for which types of network. The field can have one or more of the following network types:

- UTRAN.
- GERAN.
- CS core.
- PS core.
- IMS.

It is important that the KPI defined should be calculated always on network level and not on Network Element level.

If a KPI uses a term that is not clearly defined, that term shall be added to the terms section of present document.

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## 6 Header: KPI name

- a) Long name (Mandatory): This field shall contain the long and descriptive name of the KPI.
- b) Description (Mandatory): This field shall contain the description of the KPI. Within this field it should be given if the KPI is focusing on network or user view.
- c) Logical formula definition (Mandatory):  
The logical formula should describe what the KPI formula is in logical way. The description of the formula is given in a written textual format without any measurement or counter names. E.g. a success rate KPI's logical formula is the successful event divided by all event.
- d) Physical formula definition (Optional):  
This field should contain the KPI formula description using the 3GPP defined counter names.  
This field can be used only if the counters needed for the KPI formula is defined in any of the 3GPP TS for performance measurements (TS 32.404 [1], TS 32.405 [2], TS 32.406 [3], TS 32.407 [4], TS 32.408 [5], TS 32.409 [6], TS 52.402 [7])
- e) Measurement names used for the KPI (Optional):  
This section should list the measurement names used for the KPI.  
This section can be filled out only when the underlying measurements for the KPI formula can be defined, i.e. physical formula definition is available.
- f) KPI Object (mandatory)  
This section shall describe the object of the KPI. The object of the KPI is one or some of the following:
  - UTRAN,
  - GERAN,
  - CS core,
  - PS core,
  - IMS.