

# **Customer Experience Management**

*CXM Service Metrics*

**GB962 Addendum A**  
**Version 1.1**



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## 1. Introduction

This document is intended to give an overview on the standard Customer Experience Management standardized Service Modeling proposal and the related concepts being introduced in an effort to enable a standardized approach to the CEM measures.

### 1.1. Content and Navigation

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This document is intended to be used in conjunction with the Excel worksheet which contains detailed descriptions of each of the Services, Dimensions and Measures.

### 1.2. Uses

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The CXM Metrics proposal is intended to be a reference for implementers of Customer Experience Management (CXM) solutions. Solutions that expose the standardized Services with defined Measures and Dimensions and described in the document will enable standardized reports and data presentation on top of the CXM data as well as a starting point for farther analysis of CXM data.

## 2. CXM Metrics Structure

This section describes the structure and hierarchy of the proposed CXM metrics.

### 2.1. CXM Metrics Structure

The Customer Experience Management Metrics are grouped into a series of Logical Services. Each Service represents a Customer-specific construct providing information on the Customer's interaction with that Service.

Each Service Entity (Figure 1 below) provides one or more CEIs and one or more Dimensions. Dimensions may provide additional provisioned attributes allowed Grouping, Filtering and Segmentation of the data.

By allowing additional attributes of dimensions then common attributes like "Billing type" for example can be provisioned for all Subscribers which allows us to Segment the data by "Billing type" or aggregate the results by "Billing type".

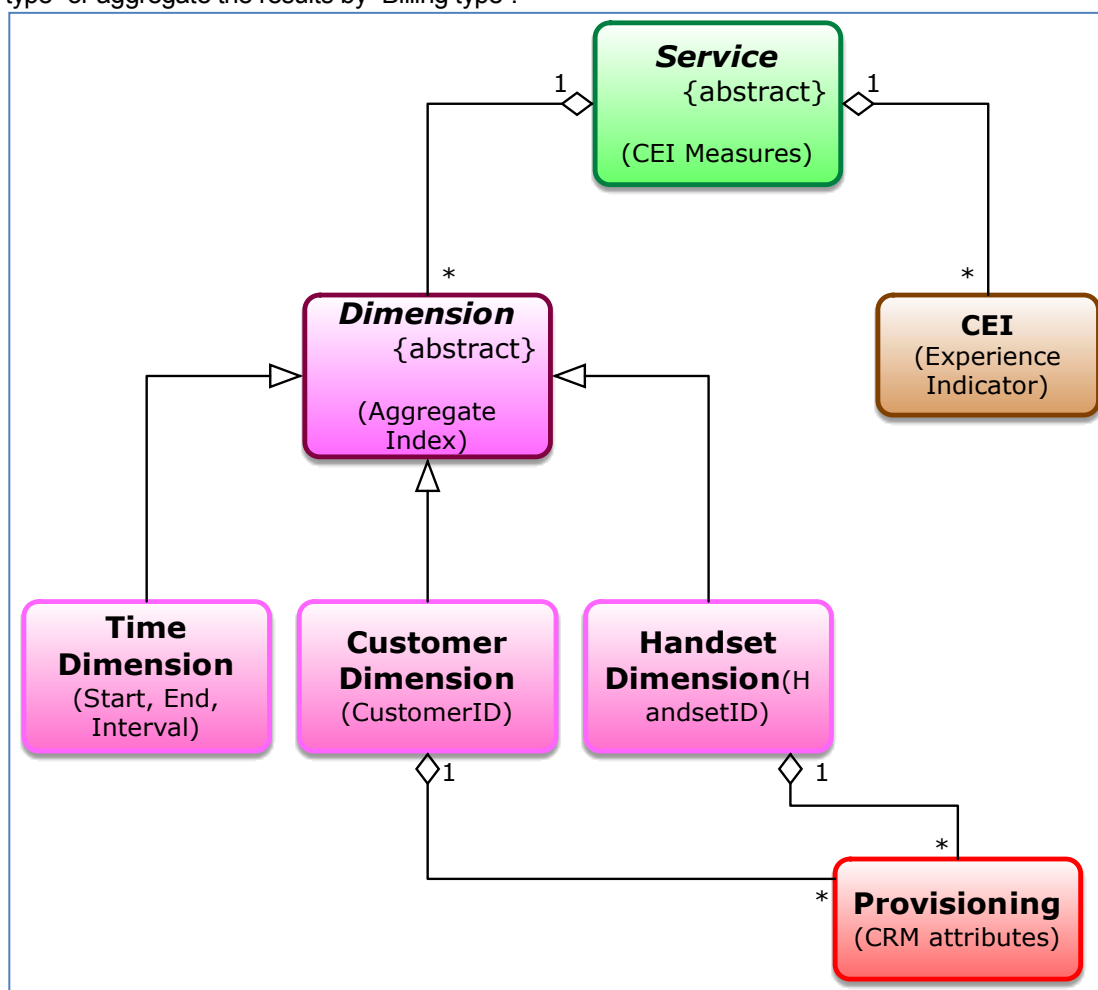


Figure 1 – Service Entities

To simplify the definition of Services in a CXM system we have opted for two common root service types (see Figure 2 below):

- Sessionised Services – Where the Service interaction is long-running or stateful (from a Customer perspective)
- Transactional Services – Where the Service consists of standalone short interactions.

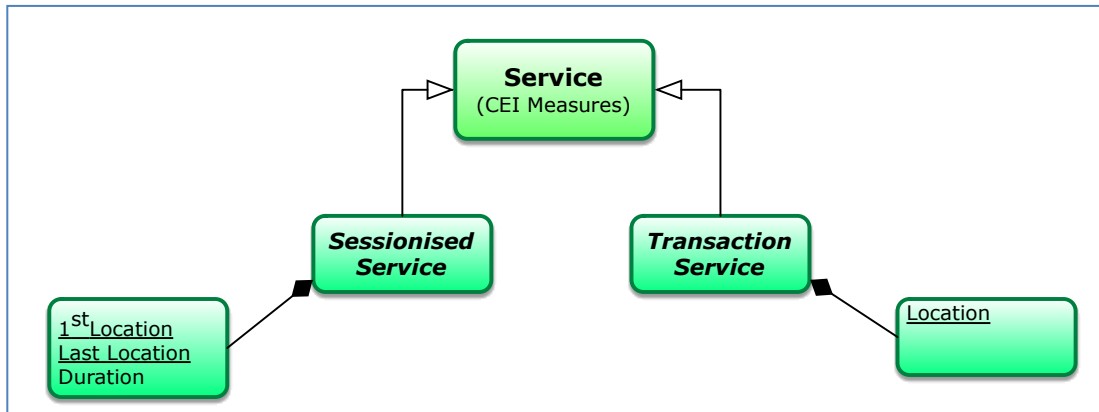


Figure 2 – Service Types

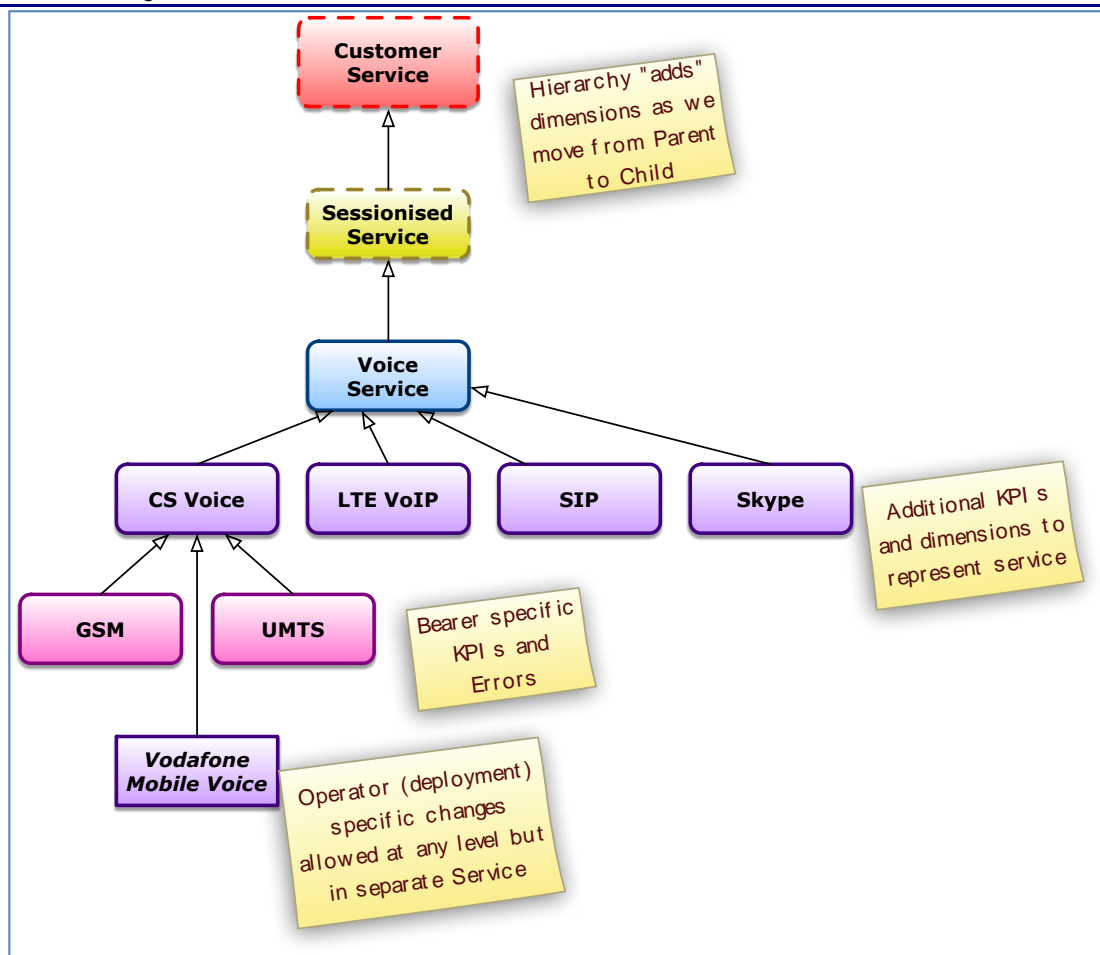
## 2.2. Inheritance / Site Extensions

It is possible to extend from an existing Service and specify the additional dimensions or measures to be used.

In order to allow this an inheritance model is proposed where Services extend a parent service. Each child service exposes all of the dimensions and measures in the base (existing) service as well as any additional measures or dimensions required.

The extended service may allow different definitions for the available measures.





**Figure 3 – Service Inheritance Example**

In this example (Figure 3) a Generic Voice service is expanded (inherited from) to provide Bearer specific servers (Circuit Switched vs. VoIP) and furthermore to allow for OpCo specific extensions.

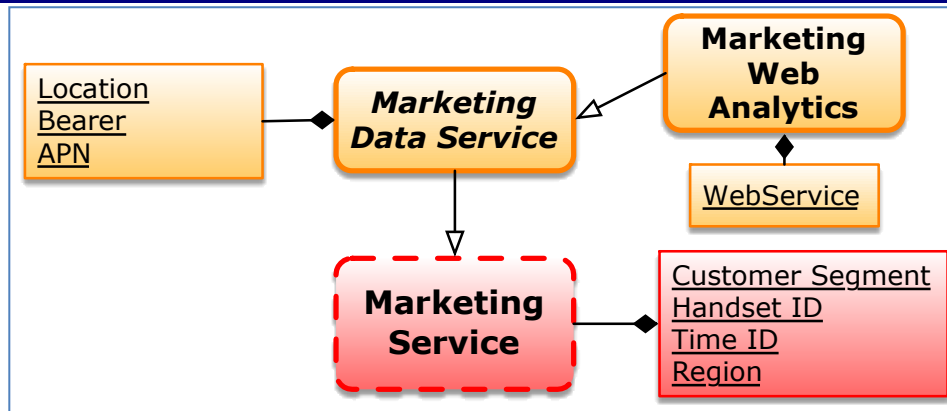
## 2.3. Data Protection

Normally the root Service for all of the CXM Services is "Customer" which records a Customer ID that can be used to uniquely identify a single Subscriber.

In many legal jurisdictions there are restrictions on the persistence of per-Customer CXM metrics. The most common example of this would be storing Subscriber identifiers along with Web URLs for marketing purposes.

In order to represent this in the CXM metrics proposal an alternative parent Service is used in this called "Marketing Service".

In-lieu of a Subscriber identifier this instead records a customer segment, which ensures that the direct link between subscriber and service, is not maintained.



Note the same approach may be used in any other cases where it is not permitted to record metrics against individual subscribers directly.

Service Name	Service Description
Sessionised Service	Subclass of the Service Entity to represent all Customer Services that are Session-based. Adds 1st (Setup) and Last (Tear-down) location Dimensions to base Service.
CS Voice Service	Subclass of Voice Service to represent two-way Voice (and Video) Circuit-switched calls on a Fixed or Mobile network. Includes Video, Emergency, USSD, Fax and Data over CS Voice (PPP) Services. Adds dimension for Call type.
VoIP Service	Subclass of VoiceService to represent two-way Voice (and Video) Packet-switched calls on a Fixed or Mobile network. Adds dimension for Call type.
PS Access Service	Subclass of SessionisedService to represent a complete user Data session, from Authentication and address allocation to detach. Commonly used to represent Mobile data CEM CEs for 2G and 3G data bearer services but may also be used for fixed line data bearer (e.g. PPPoE) Adds dimensions for Bearer (indicate underlying Network type), Direction (user or network), Serving Network Element and Error
PS Data Service	Subclass of SessionizedService to represent an aggregation of experience for Packet data service over a time period. Adds dimension for NE (Primary Core Network Element User is connected to) and Server (Server providing the IP Data Service).

Browsing Service	Adds dimension for Call type. Extension to the Packet Data Service to cover Web Browsing CEM experience (WAP, HTTP)
Streaming Service	Extension to the Packet Data Service to cover Streaming CEM experience (RTSP)
IP Data Service	Extension to Packet Data Service to cover generic IP Data Service
Transactional Service	Transactional Services are defined as Services where the Customer interacts with the service through discrete short events where each event does not require context.
MMS Service	Extension to the Messaging Service to cover Multi-Media Messages (Picture Messages)
SMS Service	Extension to the SMSCs to cover Short Message Service (SMS) messages.

## 3. CXM Metric Classification

### 3.1. Organization

The following diagram shows how the metrics are broken out and organized.

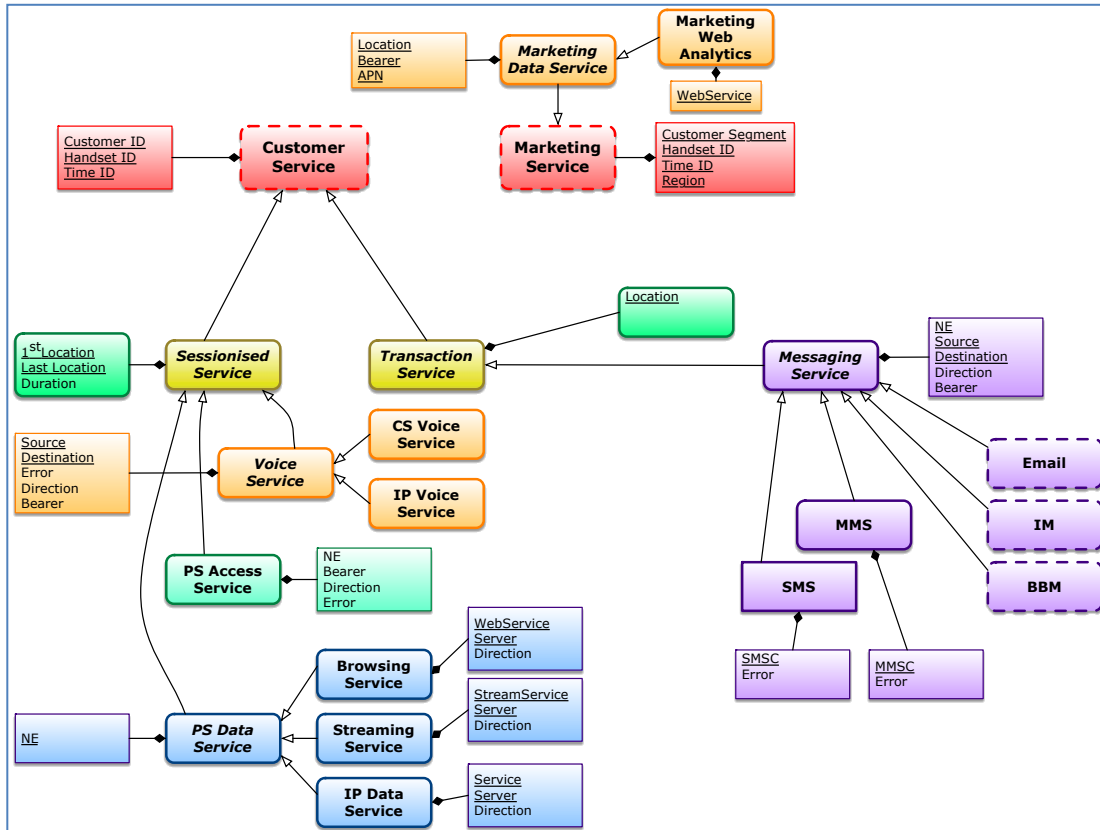


Figure 5 – CXM Metric Classification

### 3.2. CXM Services

The following Services are being proposed as being part of the default CXM Metrics proposal.

### 3.2. Measure Summary

The following table provides a list of the proposed CXM dimensions and measures organized by Service.

**Table 2 – Summary of CXM Measures**

CEM - Customer Service	Customer ID	Customer Service	3gPP Gb, IuPS, S1-MME	Unique customer identifier. Typically should be the Customer's IMSI No.	Dimension
CEM - Customer Service	Handset ID	Customer Service	3gPP Gb, IuPS, S1-MME	Handset Type identifier. Typically should either be the IMEI-TAC or IMEI-TAC-SV value	Dimension
CEM - Customer Service	Time ID	Customer Service	3gPP Gb, IuPS, S1-MME	Timestamp of the Data Access request	Dimension
CEM - Sessionized Service	First Location	Customer Service : Sessionized Service	3gPP Gb, IuPS, S1-MME	Cell Identifier (GSM, UMTS or LTE) recorded at the beginning of the Session	Dimension
CEM - Sessionized Service	Last Location	Customer Service : Sessionized Service	3gPP Gb, IuPS, S1-MME	Cell Identifier (GSM, UMTS or LTE) recorded at the end of the Session	Dimension
CEM - Sessionized Service	Total Duration	Customer Service : Sessionized Service	3gPP Gb, IuPS, S1-MME	Total Duration in ms of all Data Access Messages during observed	Measure (Sum)

				period	
CEM - Sessionized Service	Max Duration	Customer Service : Sessionized Service	3gPP Gb, IuPS, S1-MME	Maximum Duration in ms of a single Data Access Message during observed period	Measure (Max)
CEM - Sessionized Service	Session Count	Customer Service : Sessionized Service	3gPP Gb, IuPS, S1-MME	Number of sessions observed during observation period.	Measure (Sum)
CEM - Sessionized Service	Average Duration	Customer Service : Sessionized Service	3gPP Gb, IuPS, S1-MME	Average session duration (ms) during observation period:  = Total Duration / Average Duration	KPI (Mean)
CEM - Voice	NE	Customer Service : Sessionized Service : Voice	3GPP A, IUCS	Serving Network Element Identifier (MSC, SIP NE ...)	Dimension
CEM - Voice	Bearer	Customer Service : Sessionized Service : Voice	3GPP A, IUCS	Voice Bearer Type (GSM, UMTS, CDMA, VoIP ...)	Dimension
CEM - Voice	Direction	Customer Service : Sessionized	3GPP A, IUCS	MS->NW or NW->MS	Dimension

		Service : Voice			
CEM - Voice	Type	Customer Service : Sessionized Service : Voice	3GPP A, IUCS	Call Type (Voice, Video, FAX, Emergency, USSD ...)	Dimension
CEM - Voice	Partial Number	Customer Service : Sessionized Service : Voice	3GPP A, IUCS	Dialed digits / MSISDN match	Dimension
CEM - Voice	Call Attempts	Customer Service : Sessionized Service : Voice	3GPP A, IUCS	Total number of attempted calls	Measure (Sum)
CEM - Voice	Call Success	Customer Service : Sessionized Service : Voice	3GPP A, IUCS	Total number of successfully terminated calls	Measure (Sum)
CEM - Voice	Setup Failures	Customer Service : Sessionized Service : Voice	3GPP A, IUCS	Failures during Setup	Measure (Sum)
CEM - Voice	Dropped Calls	Customer Service : Sessionized Service :	3GPP A, IUCS	Failures during Conversation	Measure (Sum)

		Voice			
CEM - Voice	Call Success Rate	Customer Service : Sessionized Service : Voice	3GPP A, IUCS	Percentage of Successful Calls  = Call Successes / Call Attempts	KPI (Mean)
CEM - Voice	Dropped Call Rate	Customer Service : Sessionized Service : Voice	3GPP A, IUCS	Percentage of Dropped Calls  = Dropped Calls / Call Attempts	KPI (Mean)
CEM - Voice	Setup Failure Rate	Customer Service : Sessionized Service : Voice	3GPP A, IUCS	Percentage of Setup Fail Calls  = Setup Failures / Call Attempts	KPI (Mean)
CEM - CS Voice	Error	Customer Service : Sessionized Service : Voice : CS Voice	3GPP A, IUCS	Error Identifier (Error Type + Cause Code)	Dimension
CEM - CS Voice	Handover Attempts	Customer Service : Sessionized Service : Voice : CS Voice	3GPP A, IUCS	Total number of InterCell Handovers	Measure (Sum)
CEM - CS Voice	Handover Success	Customer Service :	3GPP A, IUCS	Total number of Successful	Measure (Sum)



		Sessionized Service : Voice : CS Voice		Handovers	
CEM - CS Voice	Inter RAT Handover Attempts	Customer Service : Sessionized Service : Voice : CS Voice	3GPP A, IUCS	Number of Inter RAT Handover attempted	Measure (Sum)
CEM - CS Voice	Inter RAT Handover Successes	Customer Service : Sessionized Service : Voice : CS Voice	3GPP A, IUCS	Total Number of Successful InterRAT Handovers	Measure (Sum)
CEM - CS Voice	Handover Success Rate	Customer Service : Sessionized Service : Voice : CS Voice	3GPP A, IUCS	Percentage of Successful Call Handovers  = (Handover Success / Handover Attempts) * 100	KPI (Mean)
CEM - CS Voice	Inter RAT Handover Success Rate	Customer Service : Sessionized Service : Voice : CS Voice	3GPP A, IUCS	Percentage of Successful Inter-technology Call Handovers  = (Inter-RAT Handover Success / Inter-RAT Handover	KPI (Mean)

				Attempts) * 100	
CEM - VoIP Voice	Error	Customer Service : Sessionized Service : Voice : VoIP Voice	SIP, RTP, H.323	Error specific to VoIP (SIP, RTP, H.323)	Dimension
CEM - VoIP Voice	Bytes Sent	Customer Service : Sessionized Service : Voice : VoIP Voice	SIP, RTP, H.323	Number of bytes sent	Measure (Sum)
CEM - VoIP Voice	Bytes Received	Customer Service : Sessionized Service : Voice : VoIP Voice	SIP, RTP, H.323	Number of bytes received	Measure (Sum)
CEM - VoIP Voice	Total Packets	Customer Service : Sessionized Service : Voice : VoIP Voice	SIP, RTP, H.323	Number of Packets	Measure (Sum)
CEM - VoIP Voice	Lost Packets	Customer Service : Sessionized Service : Voice : VoIP	SIP, RTP, H.323	Number of Packets Lost	Measure (Sum)

		Voice			
CEM - VoIP Voice	Max Packet Loss Burst	Customer Service : Sessionized Service : Voice : VoIP Voice	SIP, RTP, H.323	Number of Packets Lost in Sequence	Measure (Sum)
CEM - VoIP Voice	Out of Sequence Packets	Customer Service : Sessionized Service : Voice : VoIP Voice	SIP, RTP, H.323	Number of OOS Packets	Measure (Sum)
CEM - VoIP Voice	Duplicate Packets	Customer Service : Sessionized Service : Voice : VoIP Voice	SIP, RTP, H.323	Number of Duplicate Packets	Measure (Sum)
CEM - VoIP Voice	Inter Packet Time	Customer Service : Sessionized Service : Voice : VoIP Voice	SIP, RTP, H.323	Total Time between Packets (ms)	Measure (Sum)
CEM - VoIP Voice	Max Inter Packet Time	Customer Service : Sessionized Service : Voice : VoIP Voice	SIP, RTP, H.323	Maximum Time between Packets (ms)	Measure (Max)

CEM - VoIP Voice	Jitter Bias	Customer Service : Sessionized Service : Voice : VoIP Voice	SIP, RTP, H.323	Sum of the delay-expected inter-arrival times	Measure (Sum)
CEM - VoIP Voice	Lost Packet Rate	Customer Service : Sessionized Service : Voice : VoIP Voice	SIP, RTP, H.323	Percentage of Lost Packets  = (Lost Packets / Total Packets) * 100.0	KPI (Mean)
CEM - VoIP Voice	Duplicate Packet Rate	Customer Service : Sessionized Service : Voice : VoIP Voice	SIP, RTP, H.323	Percentage of Duplicate Packets  = (Duplicate Packets / Total Packets) * 100.0	KPI (Mean)
CEM - VoIP Voice	Out of Sequence Packet Rate	Customer Service : Sessionized Service : Voice : VoIP Voice	SIP, RTP, H.323	Percentage of OOS Packets  = (Out of Sequence Packets / Total Packets) * 100.0	KPI (Mean)
CEM - VoIP Voice	Average Inter packet Time	Customer Service : Sessionized Service : Voice : VoIP Voice	SIP, RTP, H.323	Average Inter-packet time (ms)  = Inter Packet Time / Total Packets	KPI (Mean)

CEM - Data Access	Network Element	Customer Service : Sessionized Service : Data Access	3gPP Gb, IuPS, S1-MME	Serving Network Element Identifier (SGSN for GPRS and UMTS, MME for LTE)	Dimension
CEM - Data Access	Bearer	Customer Service : Sessionized Service : Data Access	3gPP Gb, IuPS, S1-MME	Bearer Indication (GPRS, UMTS or LTE)	Dimension
CEM - Data Access	Direction	Customer Service : Sessionized Service : Data Access	3gPP Gb, IuPS, S1-MME	Indicate if the Request was initiated by the UE or Network	Dimension
CEM - Data Access	Access Request	Customer Service : Sessionized Service : Data Access	3gPP Gb, IuPS, S1-MME	Number of Message Requests during observed period	Measure (Sum)
CEM - Data Authentication	Mobility Error	Customer Service : Sessionized Service : Data Access : Authentication	3gPP Gb, IuPS, S1-MME	Response Cause code associated with the Authentication Request	Dimension
CEM - Data Authentication	Attach Attempt	Customer Service : Sessionized	3gPP Gb, IuPS, S1-MME	Number of Attach Attempts Recorded during the	Measure (Sum)

		Service : Data Access : Authenticatio n		observed period	
CEM - Data Authenticat ion	Total Attach Duration	Customer Service : Sessionized Service : Data Access : Authenticatio n	3gPP Gb, IuPS, S1- MME	Total Duration of Attach Attempts Recorded during the observed period in ms	Measure (Sum)
CEM - Data Authenticat ion	Max Attach Duration	Customer Service : Sessionized Service : Data Access : Authenticatio n	3gPP Gb, IuPS, S1- MME	Maximum single Duration of Attach Attempts Recorded during the observed period in ms	Measure (Max)
CEM - Data Authenticat ion	Attach Fail	Customer Service : Sessionized Service : Data Access : Authenticatio n	3gPP Gb, IuPS, S1- MME	Number of Attach Attempts Recorded during the observed period which were unsuccessful (Error Cause or Timeout)	Measure (Sum)
CEM - Data Authenticat ion	Average Attach Duration	Customer Service : Sessionized Service : Data Access : Authenticatio	3gPP Gb, IuPS, S1- MME	Average time for attach (excluding timeouts) in ms:  = Total Attach Duration / Attach	KPI (Mean)

		n		Attempt	
CEM - Data Authentication	Attach Success Percentage	Customer Service : Sessionized Service : Data Access : Authentication	3gPP Gb, IuPS, S1-MME	Percentage of successful attach operations:  = ( Attach Attempt - Attach Fail / Attach Attempt ) * 100.0	KPI (Mean)
CEM - Data Session	Session Error	Customer Service : Sessionized Service : Data Access : Data Session	3gPP Gb, IuPS, S1-MME	Response Cause code associated with the PDP Session	Dimension
CEM - Data Session	Access Point Name	Customer Service : Sessionized Service : Data Access : Data Session	3gPP Gb, IuPS, S1-MME	APN used as part of the PDP Session request	Dimension
CEM - Data Session	Total Session Duration	Customer Service : Sessionized Service : Data Access : Data Session	3gPP Gb, IuPS, S1-MME	Total Duration of all Data Sessions observed during period in ms	Measure (Sum)
CEM - Data Session	Max Session Duration	Customer Service : Sessionized	3gPP Gb, IuPS, S1-MME	Maximum Duration of a single Data Session observed	Measure (Max)

		Service : Data Access : Data Session		during period in ms	
CEM - Data Session	Data Session Attempt	Customer Service : Sessionized Service : Data Access : Data Session	3gPP Gb, IuPS, S1- MME	Number of Data Sessions attempted during observed period	Measure (Sum)
CEM - Data Session	Data Session Setup Fail	Customer Service : Sessionized Service : Data Access : Data Session	3gPP Gb, IuPS, S1- MME	Number of Data Sessions that failed (error response or timeout) before user data was transmitted	Measure (Sum)
CEM - Data Session	Data Session Abnormal Termination	Customer Service : Sessionized Service : Data Access : Data Session	3gPP Gb, IuPS, S1- MME	Number of Data Sessions that failed (error response or timeout) after user data was transmitted	Measure (Sum)
CEM - Data Session	Bytes Transmitted	Customer Service : Sessionized Service : Data Access : Data Session	3gPP Gb, IuPS, S1- MME	Total number of bytes transmitted for Data Sessions during observed period.	Measure (Sum)
CEM - Data Session	Bytes Received	Customer Service : Sessionized Service :	3gPP Gb, IuPS, S1- MME	Total number of bytes received for Data Sessions during observed	Measure (Sum)



		Data Access : Data Session		period.	
CEM - Data Session	Average Session Duration	Customer Service : Sessionized Service : Data Access : Data Session	3gPP Gb, IuPS, S1-MME	Average time for Data Session in ms:  = Total Session Duration / Data Session Attempt	KPI (Mean)
CEM - Data Session	Session Success Percentage	Customer Service : Sessionized Service : Data Access : Data Session	3gPP Gb, IuPS, S1-MME	Percentage of successful data sessions operations:  = ( Data Session Attempt - Data Session Fail / Data Session Attempt ) * 100.0	KPI (Mean)
CEM - Data Usage	Server	Customer Service : Sessionized Service : Data Usage	Gn, Gi, Gp	Network Element Identifier (HTTP, RTP etc Server)	Dimension
CEM - Data Usage	Bearer	Customer Service : Sessionized Service : Data Usage	Gn, Gi, Gp	Bearer (GPRS, UMTS, LTE)	Dimension
CEM - Data Usage	Direction	Customer Service : Sessionized	Gn, Gi, Gp	MS->NW or NW->MS	Dimension

		Service : Data Usage			
CEM - Data Usage	APN	Customer Service : Sessionized Service : Data Usage	Gn, Gi, Gp	Access Point Name for APN associated with Session	Dimension
CEM - Data Usage	Bytes Sent	Customer Service : Sessionized Service : Data Usage	Gn, Gi, Gp	Total number of bytes sent for all Data Usage in recorded period.	Measure (Sum)
CEM - Data Usage	Bytes Received	Customer Service : Sessionized Service : Data Usage	Gn, Gi, Gp	Total number of bytes received for all Data Usage in recorded period.	Measure (Sum)
CEM - Data Usage	Active Usage Time	Customer Service : Sessionized Service : Data Usage	Gn, Gi, Gp	Active time is ms where data is being received or transmitted for all data usage in recorded period.	Measure (Sum)
CEM - Data Usage	Average Throughput	Customer Service : Sessionized Service : Data Usage	Gn, Gi, Gp	Average throughput (bytes/second) for all data usage in recorded period.  = ( Bytes Received + Bytes Sent /	KPI (Mean)

				Active Usage Time * 1000 )	
CEM - Web Service	Protocol	Customer Service : Sessionized Service : Data Usage : Web Service	Gn, Gi, Gp	Protocol Type (HTTP, WAP, FTP)	Dimension
CEM - Web Service	Web Service ID	Customer Service : Sessionized Service : Data Usage : Web Service	Gn, Gi, Gp	Normalized URL Full URI normalized according to Operator rules and standard processing. e.g. from RFC 1738 <Protocol>://<Prefix>.<Host>.<TLD>: <Port>/<Path1>/<Path2>/... We could take: <HOST>.<TLD>/PATH1 as a default normalization  OPTIONAL	Dimension [Optional]
CEM - Web Service	User Agent	Customer Service : Sessionized Service :	Gn, Gi, Gp	Normalized User Agent. User Agent reduced into an enumeration of	Dimension [Optional]

		Data Usage : Web Service		common Browser/Client User Agent fields if known.  OPTIONAL	
CEM - Web Service	Total Get Time	Customer Service : Sessionized Service : Data Usage : Web Service	Gn, Gi, Gp	Total time (ms) servicing GET Requests	Measure (Sum)
CEM - Web Service	Get End To End Time	Customer Service : Sessionized Service : Data Usage : Web Service	Gn, Gi, Gp	Total time (ms) to service initial GET Requests including setup Time	Measure (Sum)
CEM - Web Service	Server Setup Time	Customer Service : Sessionized Service : Data Usage : Web Service	Gn, Gi, Gp	Total Server Setup time (ms) for the GET requests	Measure (Sum)
CEM - Web Service	TTFB	Customer Service : Sessionized Service : Data Usage : Web Service	Gn, Gi, Gp	Sum of the Times to First Byte (ms) from each request in observed period.	Measure (Sum)
CEM - Web	Maximum	Customer	Gn, Gi, Gp	Largest TTFB (ms)	Measure

Service	TTFB	Service : Sessionized Service : Data Usage : Web Service		recorded from requests observed during period.	(Max)
CEM - Web Service	Post Attempts	Customer Service : Sessionized Service : Data Usage : Web Service	Gn, Gi, Gp	Number of Post Attempts	Measure (Sum)
CEM - Web Service	Post Successes	Customer Service : Sessionized Service : Data Usage : Web Service	Gn, Gi, Gp	Number of Successful Post Requests	Measure (Sum)
CEM - Web Service	Total Post Time	Customer Service : Sessionized Service : Data Usage : Web Service	Gn, Gi, Gp	Total time (ms) servicing POST Requests	Measure (Sum)
CEM - Web Service	Total Get Time	Customer Service : Sessionized Service : Data Usage : Web Service	Gn, Gi, Gp	Total time (ms) servicing GET Requests	Measure (Sum)
CEM - Web Service	Get Attempts	Customer Service :	Gn, Gi, Gp	Number of HTTP Get Requests	Measure (Sum)

		Sessionized Service : Data Usage : Web Service			
CEM - Web Service	Get Successes	Customer Service : Sessionized Service : Data Usage : Web Service	Gn, Gi, Gp	Number of Successful HTTP Get Requests	Measure (Sum)
CEM - Web Service	Get Success Rate	Customer Service : Sessionized Service : Data Usage : Web Service	Gn, Gi, Gp	Average HTTP GET success percentage  = ( Get Successes / Get Attempts ) * 100	KPI (Mean)
CEM - Web Service	Post Success Rate	Customer Service : Sessionized Service : Data Usage : Web Service	Gn, Gi, Gp	Average HTTP POST success percentage  = ( Post Successes / Post Attempts ) * 100	KPI (Mean)
CEM - Web Service	Average Download Rate	Customer Service : Sessionized Service : Data Usage : Web Service	Gn, Gi, Gp	Average HTTP download rate (bytes/sec)  = ( Bytes Received / Total Get Time * 1000 )	KPI (Mean)
CEM - Web	Average	Customer	Gn, Gi, Gp	Average HTTP	KPI

Service	Upload Rate	Service : Sessionized Service : Data Usage : Web Service		upload rate (bytes/sec)  = ( Bytes Transmitted / Total Post Time * 1000 )	(Mean)
CEM - Streaming Service	Protocol	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Protocol Type (RTSP ...)	Dimension
CEM - Streaming Service	Server	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Server ID (IP address or FDN) of serving node.	Dimension
CEM - Streaming Service	Total Content Duration	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Total time (ms) of Content Streaming	Measure (Sum)
CEM - Streaming Service	Max Content Duration	Customer Service : Sessionized	Gn, Gi, Gp	Max time (ms) of Content Streaming	Measure (Max)

		Service : Data Usage : Streaming Service			
CEM - Streaming Service	Min Content Duration	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Min time (ms) of Content Streaming	Measure (Min)
CEM - Streaming Service	Quality Score	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Aggregation of the RTCP Quality Scores	Measure (Sum)
CEM - Streaming Service	Total Session Time	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Total Duration (ms) of Streaming Session	Measure (Sum)
CEM - Streaming Service	Total TTFB	Customer Service : Sessionized Service : Data Usage : Streaming	Gn, Gi, Gp	Sum of the Times to First Byte	Measure (Sum)



		Service			
CEM - Streaming Service	Error	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Final recorded error (Error Type plus cause code)	Dimension
CEM - Streaming Service	Bytes	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Total number of Bytes streamed	Measure (Sum)
CEM - Streaming Service	Packets	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Total number of Packets streamed	Measure (Sum)
CEM - Streaming Service	Failures	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Number of Streaming Failures	Measure (Sum)
CEM - Streaming	Time Jitter Bad	Customer Service :	Gn, Gi, Gp	Time of Session (ms) where Jitter	Measure (Sum)

Service		Sessionized Service : Data Usage : Streaming Service		was outside acceptable quality	
CEM - Streaming Service	Time Packet Loss Low	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Time of Session (ms) where Packet loss is low (L1/L2)	Measure (Sum)
CEM - Streaming Service	Time Packet Loss Medium	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Time of Session (ms) where Packet loss is moderate (L3/L4/L5)	Measure (Sum)
CEM - Streaming Service	Time Packet Loss High	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Time of Session (ms) where Packet loss is moderate (L6/L7)	Measure (Sum)
CEM - Streaming Service	Setup Attempts	Customer Service : Sessionized Service : Data Usage :	Gn, Gi, Gp	Number of RTSP Streams attempted to be Initiated	Measure (Sum)

		Streaming Service			
CEM - Streaming Service	Setup Success	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Number of Streams successfully Initiated	Measure (Sum)
CEM - Streaming Service	Teardown Attempts	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Number of Stream Teardown requests	Measure (Sum)
CEM - Streaming Service	Teardown Successes	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Number of Stream Teardown successes	Measure (Sum)
CEM - Streaming Service	Play Attempts	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Number of Play Requests	Measure (Sum)
CEM -	Play	Customer	Gn, Gi, Gp	Number of	Measure

Streaming Service	Successes	Service : Sessionized Service : Data Usage : Streaming Service		Successful Play requests	(Sum)
CEM - Streaming Service	Play Duration	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Time where Session is Playing (ms)	Measure (Sum)
CEM - Streaming Service	Average Play Duration	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Average duration of Play (ms)  = ( Play Duration / Play Attempts )	KPI (Mean)
CEM - Streaming Service	Play Success Rate	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Success percentage for play requests  = ( Play Successes / Play Attempts ) * 100.0	KPI (Mean)
CEM - Streaming Service	Setup Success Rate	Customer Service : Sessionized Service :	Gn, Gi, Gp	Success percentage for setup requests  = ( Setup	KPI (Mean)

		Data Usage : Streaming Service		Successes / Setup Attempts ) * 100.0	
CEM - Streaming Service	Average Quality Score	Customer Service : Sessionized Service : Data Usage : Streaming Service	Gn, Gi, Gp	Average Quality score value  = ( Quality Score / Play Attempts )	KPI (Mean)
CEM - Customer Data Utilization Service	Service ID	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Service Identifier	Dimension
CEM - Customer Data Utilization Service	Protocol ID	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Protocol Identifier	Dimension
CEM - Customer Data Utilization	Classificati on	Customer Service : Sessionized Service :	Gn, Gi, Gp	Optional additional Service grouping	Dimension [Optional]

Service		Data Usage : Data Utilization Service			
CEM - Customer Data Utilization Service	Effective Bytes Down	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Effective bytes downloaded	Measure (Sum)
CEM - Customer Data Utilization Service	Effective Bytes Up	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Effective bytes uploaded	Measure (Sum)
CEM - Customer Data Utilization Service	TCP Flow Attempt	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	The cumulative number of TCP connection establishment attempts in the aggregation period	Measure (Sum)
CEM - Customer Data	TCP Flow Success	Customer Service : Sessionized	Gn, Gi, Gp	Number of Successful Flows for TCP traffic only	Measure (Sum)

Utilization Service		Service : Data Usage : Data Utilization Service			
CEM - Customer Data Utilization Service	TCP Flow Success Rate	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Successful Percentage of Flows for TCP traffic only  = ( TCP Flow Success / TCP Flow Attempt ) * 100.0	KPI (Mean)
CEM - Customer Data Utilization Service	TCP Bytes Down	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Number of Bytes Received for TCP traffic only	Measure (Sum)
CEM - Customer Data Utilization Service	TCP Bytes Up	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Number of Bytes Transmitted for TCP traffic only	Measure (Sum)
CEM - Customer	TCP Volume	Customer Service :	Gn, Gi, Gp	Total number of TCP bytes	Measure (Sum)

Data Utilization Service	Throughput Bytes Down	Sessionized Service : Data Usage : Data Utilization Service		downloaded that exceed 10ms in duration	
CEM - Customer Data Utilization Service	TCP Volume Throughput Bytes Up	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Total number of TCP bytes uploaded that exceed 10ms in duration	Measure (Sum)
CEM - Customer Data Utilization Service	Total Bytes Down	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Total number of bytes downloaded that exceed 10ms in duration	Measure (Sum)
CEM - Customer Data Utilization Service	Total Bytes Up	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Total number of bytes uploaded that exceed 10ms in duration	Measure (Sum)
CEM -	Total	Customer	Gn, Gi, Gp	Total number of	KPI (SUM)



Customer Data Utilization Service	Bytes	Service : Sessionized Service : Data Usage : Data Utilization Service		bytes uploaded and downloaded that exceed 10ms in duration  = Total Bytes Down + Total Bytes Up	
CEM - Customer Data Utilization Service	Average Throughput	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Average Effective Throughput (bytes/sec)  = ( TotalBytesDown + TotalBytesUp - TunnelBytesUp - TunnelBytesDown ) / FlowDuration * 1000	KPI (SUM)
CEM - Customer Data Utilization Service	Flow Duration	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Total duration for events with bytes up or downloaded	Measure (Sum)
CEM - Customer Data Utilization Service	Flow Attempts	Customer Service : Sessionized Service : Data Usage : Data	Gn, Gi, Gp	Total number of flow attempts	Measure (Sum)

		Utilization Service			
CEM - Customer Data Utilization Service	Average Latency	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Average Latency (ms) recorded for TCP traffic  = TotalSetupTime / TCPFlowSuccess	KPI (Mean)
CEM - Customer Data Utilization Service	Flow Successes	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Total number of successful flow attempts	Measure (Sum)
CEM - Customer Data Utilization Service	Flow Success Rate	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Flow success percentage  = Flow Success / Flow Attempt	KPI (Mean)
CEM - Customer Data Utilization Service	Average Flow Duration	Customer Service : Sessionized Service : Data Usage :	Gn, Gi, Gp	Flow average duration (ms)  = Flow Duration / Flow Attempt	KPI (Mean)

		Data Utilization Service			
CEM - Customer Data Utilization Service	Total Setup Time	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Sum of Client and Server setup Time (ms)	Measure (Sum)
CEM - Customer Data Utilization Service	Retransmit Bytes Down	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Total number of bytes retransmitted on download of Service	Measure (Sum)
CEM - Customer Data Utilization Service	Retransmit Bytes Up	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Total number of bytes retransmitted on upload of Service	Measure (Sum)
CEM - Customer Data Utilization	Retransmit Rate	Customer Service : Sessionized Service :	Gn, Gi, Gp	Average retransmission percentage	KPI (Mean)

Service		Data Usage : Data Utilization Service		= ( Retransmit Bytes Up+ Retransmit Bytes Down ) / ( Total Bytes Up+ Total Bytes Down - Tunnel Bytes Up - Tunnel Bytes Down ) * 100.0	
CEM - Customer Data Utilization Service	Tunnel Bytes Down	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Total number of bytes on download	Measure (Sum)
CEM - Customer Data Utilization Service	Tunnel Bytes Up	Customer Service : Sessionized Service : Data Usage : Data Utilization Service	Gn, Gi, Gp	Total number of bytes on upload	Measure (Sum)
CEM - Transaction al Service	Location	Customer Service : Transactional Service	3gPP Gb, IuPS, S1- MME	Network Location Identifier (ID+Type) where Session started	Dimension

CEM - Messaging Service	NE	Customer Service : Transactional Service : Messaging Service	Gn, Gi, Gp	Network Element ID (SMSC, MMC)	Dimension
CEM - Messaging Service	Error	Customer Service : Transactional Service : Messaging Service	Gn, Gi, Gp	Messaging Error (Cause Code + Type)	Dimension
CEM - Messaging Service	Type	Customer Service : Transactional Service : Messaging Service	Gn, Gi, Gp	Messaging Type (MMS, SMS, ...)	Dimension
CEM - Messaging Service	Direction	Customer Service : Transactional Service : Messaging Service	Gn, Gi, Gp	MS->NW or NW->MS	Dimension
CEM - Messaging Service	Service	Customer Service : Transactional Service : Messaging Service	Gn, Gi, Gp	Service ID for SMS/MMS short code	Dimension [Optional]
CEM -	Total	Customer	Gn, Gi, Gp	Total Duration in	Measure

Messaging Service	Duration	Service : Transactional Service : Messaging Service		ms for Message send / receive operations	(Sum)
CEM - Messaging Service	Max Duration	Customer Service : Transactional Service : Messaging Service	Gn, Gi, Gp	Max Duration in ms for longest Message send / receive operations	Measure (Max)
CEM - Messaging Service	Attempt	Customer Service : Transactional Service : Messaging Service	Gn, Gi, Gp	Number of Message Attempts	Measure (Sum)
CEM - Messaging Service	Success	Customer Service : Transactional Service : Messaging Service	Gn, Gi, Gp	Number of Message Successes	Measure (Sum)
CEM - Messaging Service	Total Size	Customer Service : Transactional Service : Messaging Service	Gn, Gi, Gp	Total Message Size (bytes)	Measure (Sum)
CEM - Messaging	Success Rate	Customer Service :	Gn, Gi, Gp	Message Success Percentage	KPI (Mean)

Service		Transactional Service : Messaging Service		= ( Attempt / Success ) * 100.0	

## 4. Administrative Appendix

This Appendix provides additional background material about the TM Forum and this document. In general, sections may be included or omitted as desired, however a Document History must always be included.

### 4.1. About this document

*This document is Addendum A to the GB962 Customer Experience Guide Book.*

### 4.2. Document History

#### 4.2.1. Document Version History

Version Number	Date Modified	Modified by:	Description of changes
0.1	13-Aug-12	Colm Costelloe Wei Dong	First Draft
1.0	4-Oct-2012	Mary Amalfitano	Submitted for Final Team Review.
1.1	8-Nov-12	Alicja Kawecki	Minor cosmetic corrections prior to web posting and Member Evaluation

#### 4.2.2. Release History

Release Number	Date Modified	Modified by:	Description of changes
1.0	4-Oct-2012	Mary Amalfitano	First Release

### 4.3. Acknowledgments

This document was prepared by the members of the TM Forum Customer Experience team. The TM Forum would like to thank the following people for contributing their time and expertise to the production of this document.

*Shai Shamir, Team leader, Amdocs*