



## 第一部分 无线**QoS**业务监测

TMO18416\_V6.0-SG-EN-(T)LA6.0-Ed1 Module 1.1 Edition 6.0

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Document History			
Edition	Date	Author	Remarks
01	YYYY-MM-DD	Last name, first name	First edition
04	2012-01-25	Ikram ANDONIAN Jean-Philippe KINE	Fourth edition
05	2012-11-15	Pascal SCANDOLO	LTE LE5.0 edition
05.1	2013-01-05	Pascal SCANDOLO	Some Slides bug modification.
06	2013-04-05	Pascal SCANDOLO	LTE LE6.0 edition

# 单元目标



通过本单元的学习，你应该能：

- 描述用于**LTE**的服务质量监测工具
- 描述 **NPO**的作用和它如何与 **SAM(操作和维护)**及网络单元进行相互作用，比如 **eNB**和 **MME (移动管理实体)**
- 列举计数器和指标的不同
- 解释触发器什么时候和如何被触发
- 识别不同类型的指标，了解它们是怎样工作的.

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# 目录

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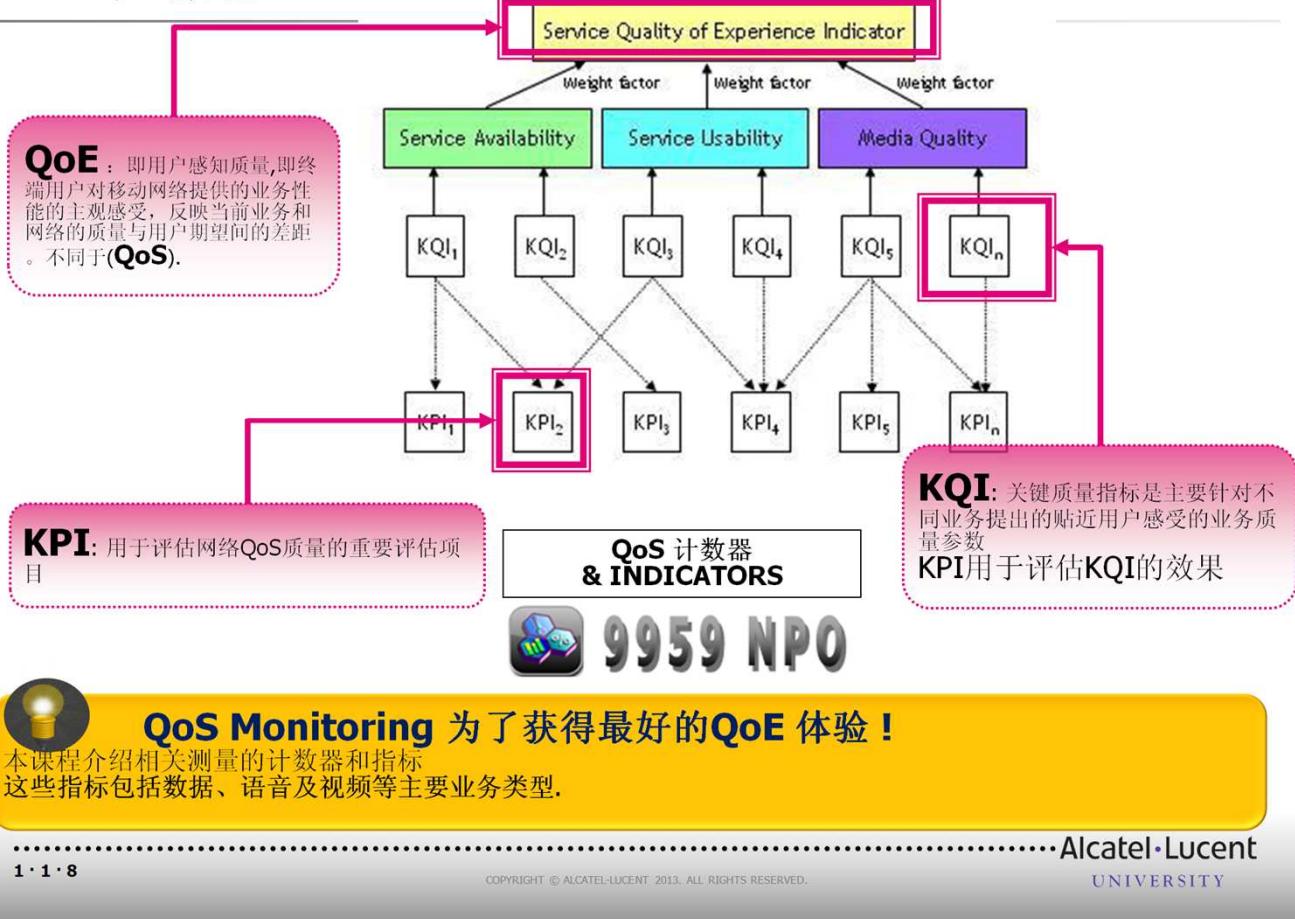
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- 3GPP Counter Summary (Common / FDD / TDD)

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# 1 QoS监测工具介绍

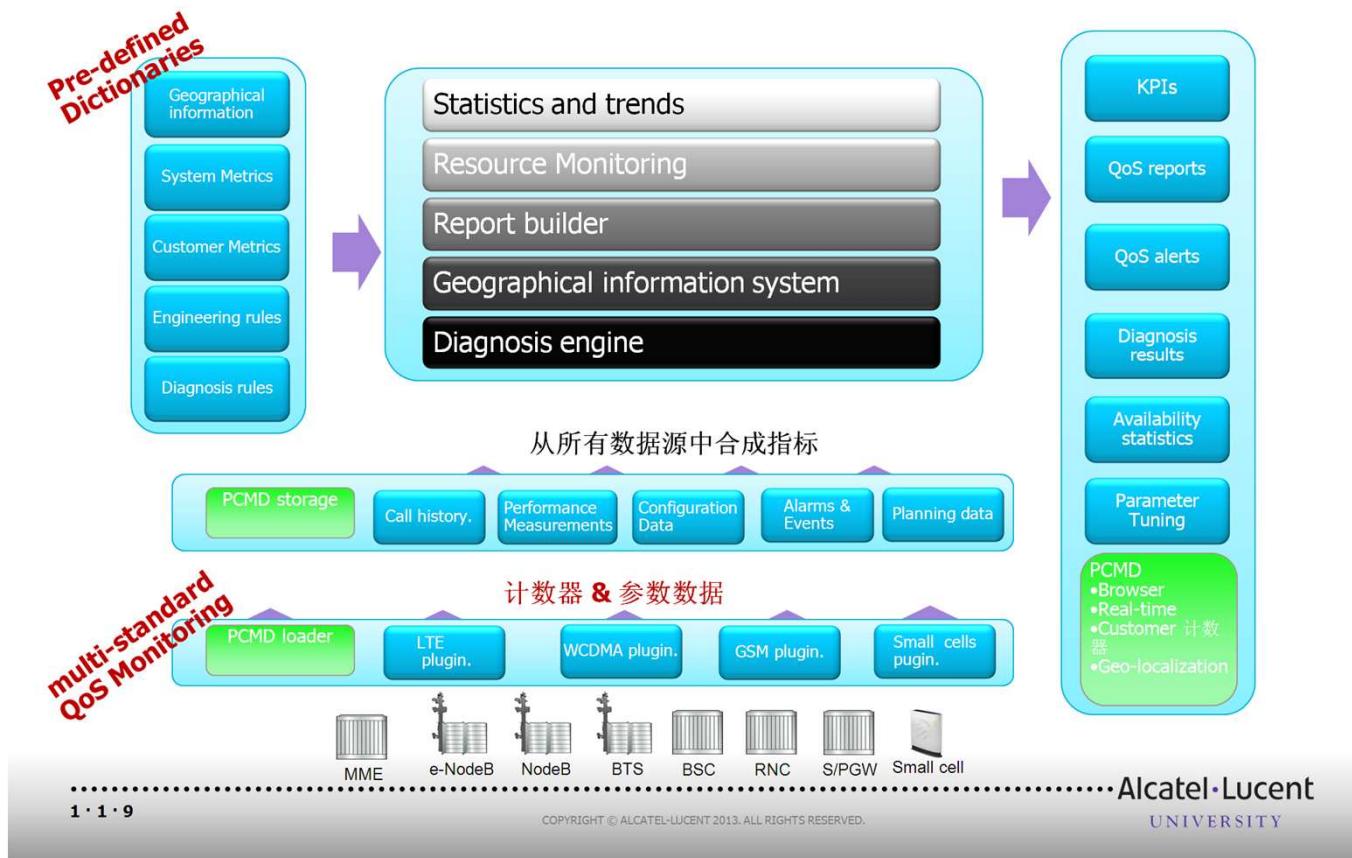
## 1.1 QoS原理



NPO 使用QoS计数器构建ALU的初始指标及定制指标

QoE 和KQI不在本课程中介绍。

## 1.2 网络性能优化工具



NPO 能够提供多系统GSM/WCDMA/LTE的优化支持

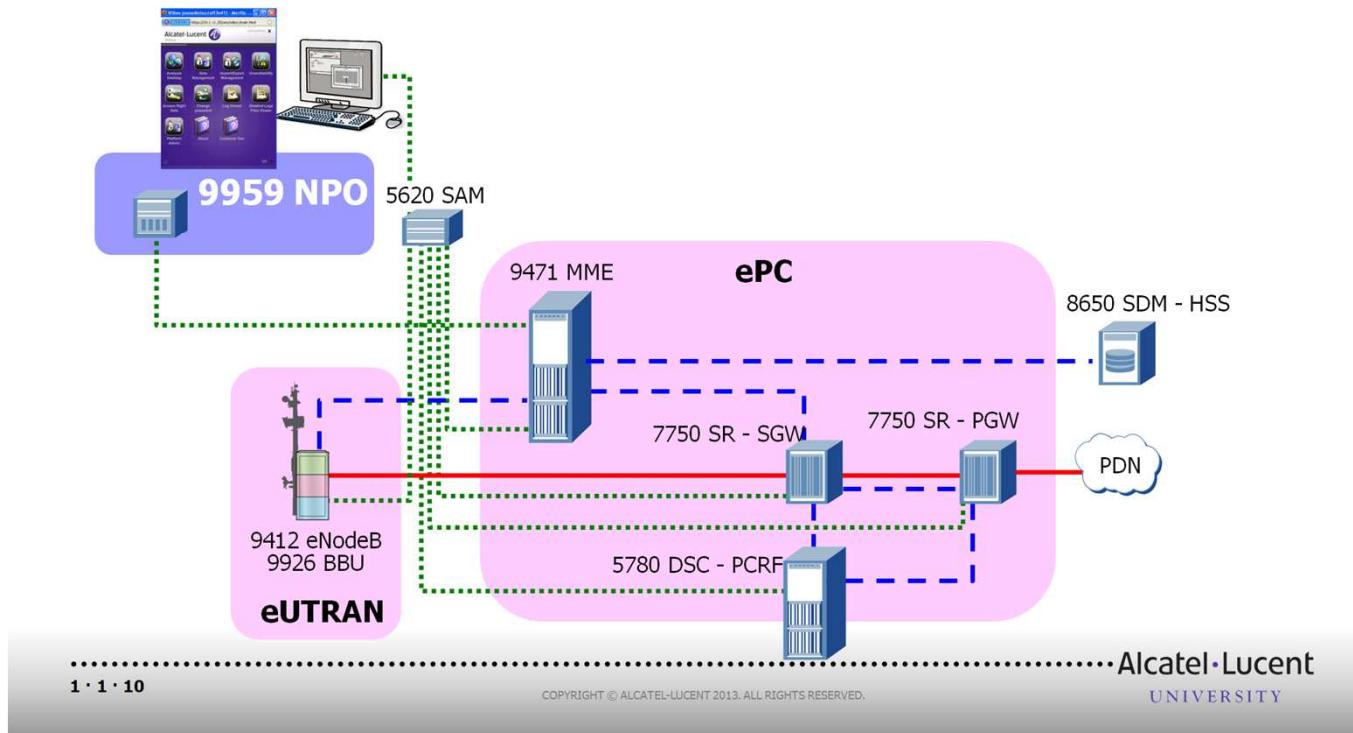


### NPO add-on are available to refine QoS analysis

- ✓ **NPO-PCMD** includes LTE PCMD flexible counter editor allowing counter design at OAM level. NPO PCMD counter are computed at NPO level. It is possible to create a new scalar counter on field that can be exported/imported (to allow sharing counter definitions across teams).
- ✓ **NPO-NUART** (Network Unavailability Analysis and Reporting Tool) for End To End global performance analysis.

## 1.3 网络性能优化工具

- 用集中的方式监测网络的服务质量
- 把所有的QoS数据和QoS服务集成到一个应用中



这些计数器可以作为计算度量值的基准(一个度量值仅仅能在一台给定的电脑上使用).

- 对于每个计数器, 它的产品说明包含:
- 计数器属性 (3GPP 名字, 计数器类型, 位置...),
- 计数器定义 (触发时刻),
- DFD采样来强调话务统计 (DFD在某些情况下被来自同一家庭的所有计数器共享).
- 计数器通过族集合.

在今后, 一些计数器将重复地使用一种方式定义: 筛选过的和没有被筛选过的相似的计数器都会提供. 这就必须有: 度量计算要使用的综合信息, 详细描述将要使用的信息比如故障排查.

另外, 要避免无用的计算来获得例如监测事件的总数, 使管理那些引入额外耗费的情况成为可能 (即使筛选错误的时候, 总数也应该正确).

## 1.3 LTE的 NPO功能

### QoS分析

采集测量值（可保存两年）

生成指标（超过10,000个）

提供一个强大的动态图形用户界面可以让 QoS 报告分析变得更容易

一些特殊功能可以鉴别出与 QoS 指标有关的最好或者最坏的单元

参数的参考值

规则和分析

趋势预测

配置参数



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## 2 计数器

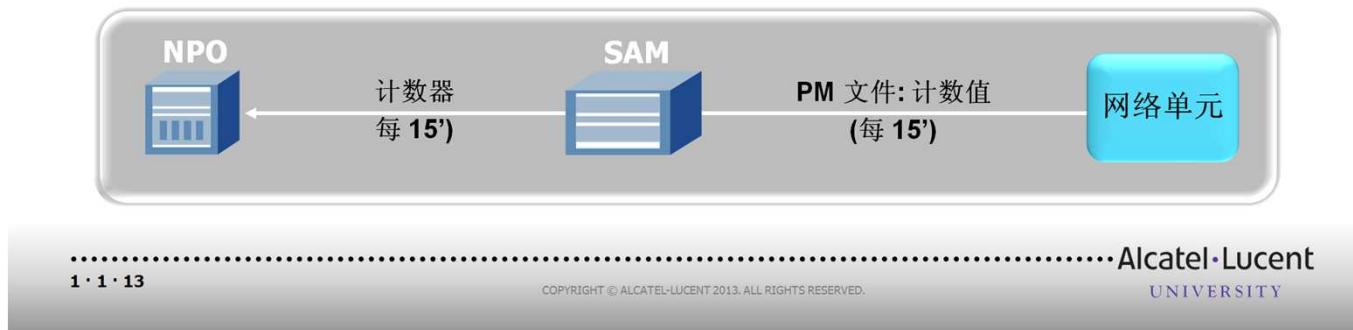
## 2.1 计数器定义

计数器是由 **eNodeB** 产生的，它们检测在给定的一段时间内的一些特定事件的发生（发生在 **eUTRAN** 的实体）

**eNodeB** 提供一个 **PM** 文件，包含了在叫做“粒度周期”的既定时间内的计数器的值，并且每 **5', 10'** 或 **15'** 变化一次。

然后计数器的值储存在 **SAM** 服务器中

**NPO** 收集该 **PM** 文件



文档中使用的措辞计数器和测量术语是为了区别同一个概念。通常，**Alcatel-Lucent** 使用术语计数器来区别来自（无线）测量结果的计数器。计数器以分钟或小时为单位周期性地描述测量结果。例如，**15分钟**。

当一个测量结果以 **500 ms** 为周期来描述测量术语。

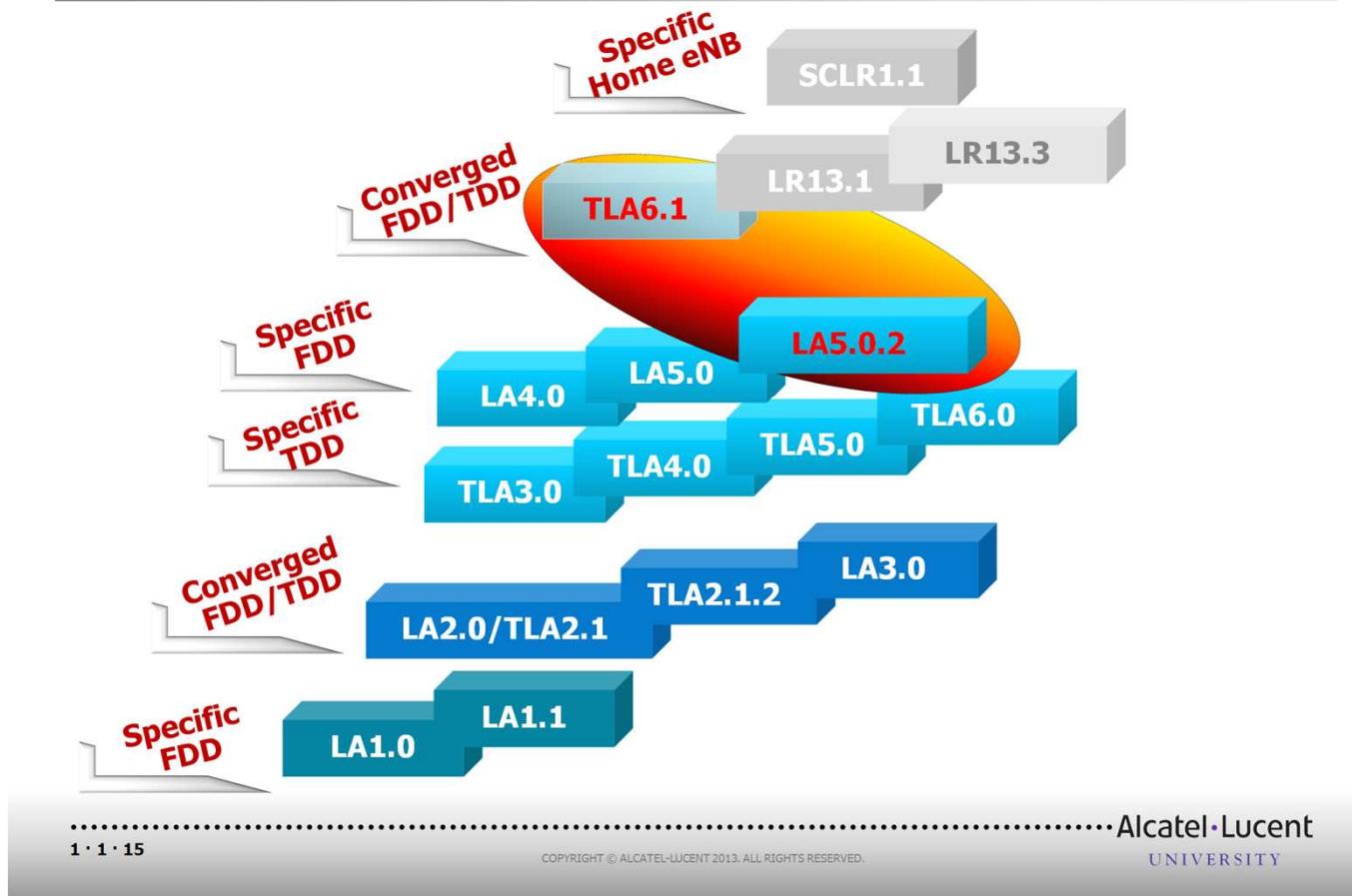
**3GPP** 性能管理规范更适宜使用测量结果。当环境是 **3GPP** 规格时，使用测量术语，尽管在 **Alcatel-Lucent** 特殊部分使用计数器，所有的措辞都是等价的。

## 2.1.1 计数器属性

Counter Information	Counter Value/Description
Counter Code	13204
Counter Type	LOAD
Triggering (Event)	This counter is triggered when a VoIP bearer is setup or released in the cell (successful or with partial failures procedures, EPC-initiated procedures, incoming and outgoing mobility procedures and generally all procedures involved in E-RABs setup and E-RABs release may trigger this counter when performing the CAC).
Subcounters	Not defined
Subfamily	Bearers
3GPP name	VS.NbVoIPBearersPerCell
Object Instance	EutranCell
Range	0 to $2^{31}-1$
Unit	Bearer

- 计数器名字:这部分包括计数器名字.
- 计数器编号:这部分包括计数器编号.
- 计数器类型:这部分包括计数器字段, 它用来在结果文件中确定计数器的类型比如累加的, 负载的或者数值的.
- 触发事件:这部分包括引起将要更新的测量结果的条件: 该条件是通过确定和触发事件有关的协议来定义的, 这些事件要么会启动或停止测量进程, 要么更新当前测量结果.如果不能提供精确条件, 有条件的话将会定期更新.
- 如果 Alcatel-Lucent 实现符合 3GPP 规格, 那么声明就是 "3GPP specified counter".
- 如果 3GPP 规格没有考虑到计数器, 那么声明就是 "Alcatel-Lucent specified counter".
- 对象实例: 这部分包括对象类别和实例. **measObjInstId** 字段确定测量对象类别和它的实例.
- 范围: 这部分包括计数器范围.
- 单元: 这部分包括计数器单元.
- 可用信息 : 这部分阐述了 Alcatel-Lucent LTE RAN 系统在引入计数器的情况下的可用性.

## 2.1.1 eNodeB PM 计数器字典版本



TDD LTE与FDD LTE有少量的计数器不一样

## 2.1.2 计数器聚合规则

Rules	Results	Type
Rtotal	$X.cum = X1.cum + X2.cum + \dots + Xn.cum$	CUM (CC) 计数器
Rload/Rval	$X.cum = X1.cum + \dots + Xn.cum$ $X.nbevt = X1.nbevt + \dots + Xn.nbevt$ $X.avg = (X1.cum + \dots + Xn.cum) / (X1.nbevt + \dots + Xn.nbevt)$ $X.min = \min(X1.min, \dots, Xn.min)$ $X.max = \max(X1.max, \dots, Xn.max)$	Some LOAD and VAL 计数器
Rload*	Same as Rload but resulting X.cum has no physical meaning due to the nature of meaning due to the nature of the measurement (like percents) and is not interpreted but is necessary for intermediate computations.	Some LOAD 计数器

每个 **GP, NPO** 将会处理从 **O&M服务器 (SAM)**获得的 **PM XML**文件

**NPO**有计数器的映射(和关联的参考身份)，它会在对应的消息中的 **PM XML** 文件显示。

**NPO** 不支持“.”所以对于所有的计数器名称 **the “.”** 自动被“\_”所替换。**NPO** 计数器将会显示“\_”而不是“.”

在 **NPO AD** (分析桌面)中，对与对应的对象可以显示计数器。为此，你必须选择对象和“计数器”的标签为了更好的理解，显示通过族/子系列(在计数器定义中规定)

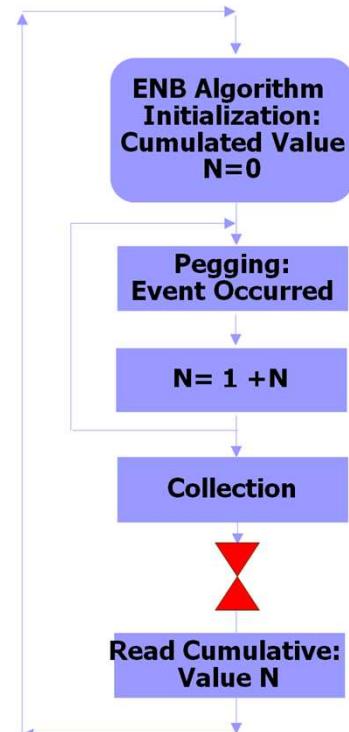
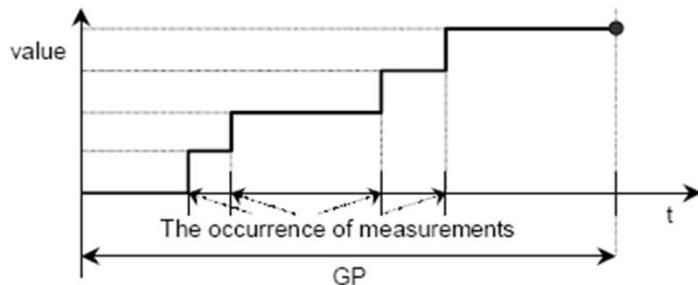
### 2.1.3 累加计数器

累加计数器是最简单的类型.

在粒度周期内，累加计数器通过检测既定事件的捕获数据.

累加计数器所提供的测量数据的方式与实现定义的事件有关.

**结果是单个字段，“计数值”.**



- 累加计数器提供原始的计数. 累加计数器是 CUM(CC)类型的计数器, 在 3GPP TS 32.104规定中有说明. 当计数事件发生时, 计数值将会自加, 它能提供累加值. NE累加计数器在 OAM GUI层面上提供计数值. 累加计数器的类型是最简单的.
- 在粒度周期内，累加计数器通过检测既定事件的捕获数据. 累加计数器所提供的测量数据的方式与实现定义的事件有关. **结果是单个字段，“计数值”.**

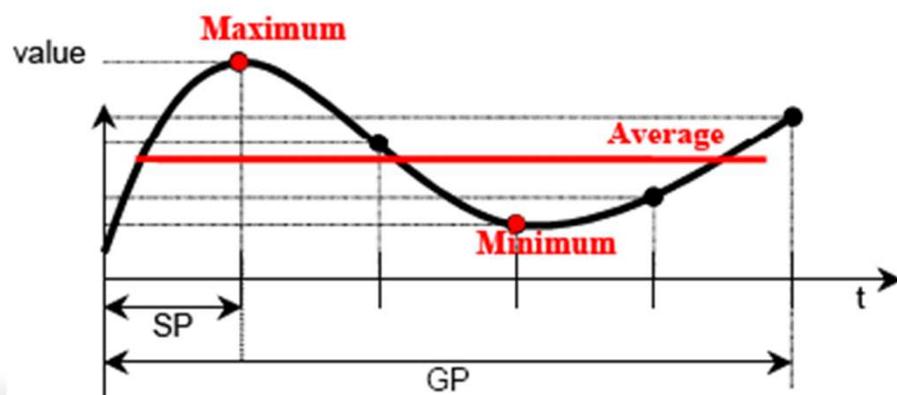
## 2.1.4 值计数器

在粒度周期内，累加计数器通过检测既定事件的捕获数据.

这就是说，每一次事件发生都会提取一个测量数据；然后在对于的粒度周期内，每个测量数据都将会加到累加计数器中.

值计数器被称为 DER – 离散事件计数器.

**值计数器可以提供最小值, 最大值, 事件的数量和累计值.**



值计数器也叫离散事件寄存器 (DER). 值计数器提供最小，最大和平均值.

每次事件提供一个计数值，它都会加上累加值. 平均值是累加值除以事件发生的次数，eNodeB不会报告它，但是在 NPO 层面上会计算它.

在粒度周期内，累加计数器通过检测既定事件的捕获数据. 每一次事件发生都会提取一个测量数据；然后在对于的粒度周期内，每个测量数据都将会加到累加计数器中.

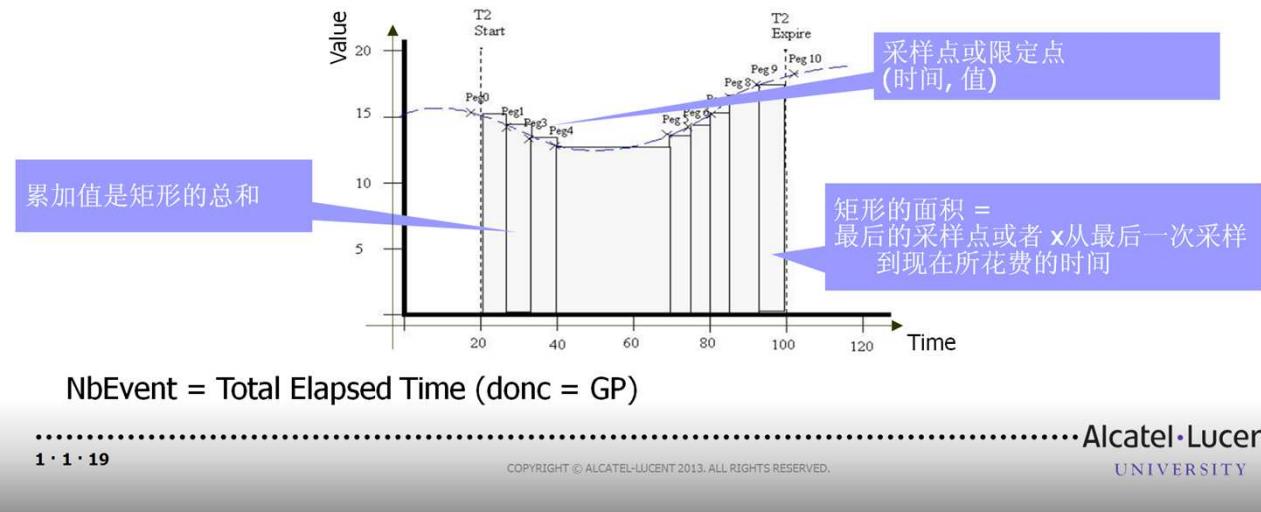
在粒度周期内，每个值计数器都会报告以下的计数值：

- 累加值 (.Cum in XML files)
- 事件发生的次数 (.NbEvt in XML files)
- 最大值 (.Max in XML files)
- 最小值 (.Min in XML files)

## 2.1.5 负载计数器

有2种类型的负载计数器:

- **周期采样的负载计数器 (SI – 状态检测):** 它源于一个特定测量的采样, 在粒度周期内每隔一段时间进行一次.
- **在既定事件发生时进行采样的负载计数器:** 特定测量可能也需要, 不必相同时间隔, 但是在粒度周期内, 由既定事件的发生与否来触发采样.



有2种类型的负载计数器:

1. 周期采样的负载计数器 (SI – 状态检测), 源于一个特定测量的采样, 在粒度周期内每隔一段时间进行一次. 这就是说, 在对应的粒度周期内, 每个采样结果都会加到累加计数器中. 累加计数器用来分析平均值, 趋势, 或者循环. 周期采样的负载计数器也会进行状态检测. 周期采样的负载计数器提供最小值, 最大值和平均值. 计数器的类型是以在一个限定的速度下的自激理论为基础的. 该计数器提供能迅速捕获变化数据的方式.
2. 在既定事件发生时进行采样的负载计数器, 它完成特定测量时不在相同的时间间隔采样, 但是在粒度周期内, 由既定事件的发生与否来触发采样.

在粒度周期内, 每个采样值都会加到累加计数器中. 累加计数器用来分析平均值, 趋势, 或者循环. 这是第2种负载计数器, 但是它没有标准中提到的状态检测. 然而, 这两种类型的负载计数器, 记录相同的数值, 并且使用相同的算法来计算下列数值:

Alcatel-Lucent提供以下数值:

- 累加值 (.Cum in XML files), • 采样的数量 (.NbEvt in XML files)
- 最大的采样值 (.Max in XML files), • 最小的采样值 (.Min in XML files)

## 2.1.6 计数器的参考 ID类型

计数器可以是：

➤ 一个简单的计数器：

参考标示符是 **LCXyyyy**.

例：VS.RrcConnectionSuccessSum, VS.RrcConnectionFailureSum.

➤ 一个筛选计数器：

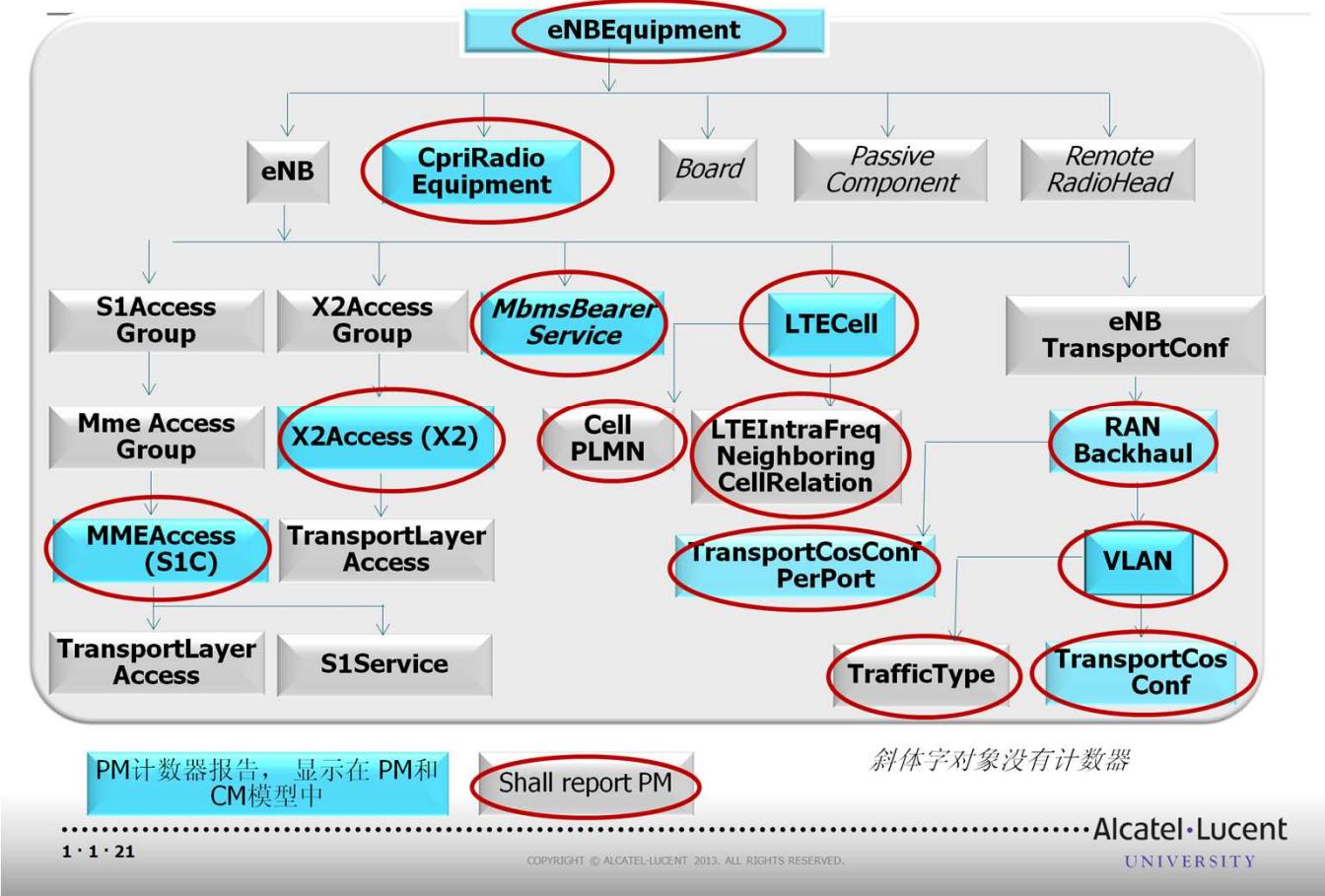
参考标示符是 **LCXyyyy\_zz**.

它是“根”计数器的具体原因的一种。看到这种类型的参考标示符就能知道它有若干原因。

例：

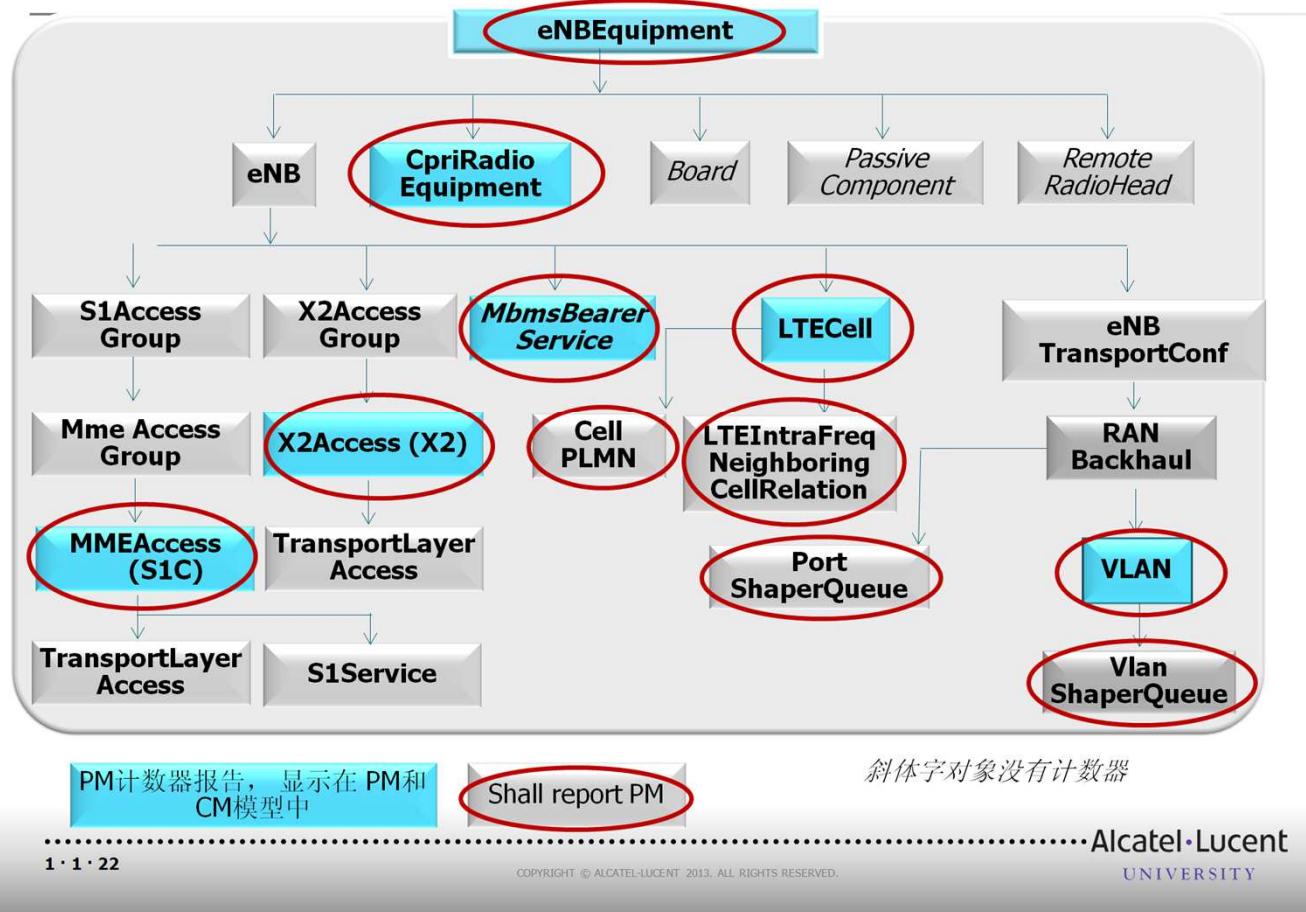
VS.RrcConnectionRequest.EmergencyCallAttempts, VS.RrcConnectionRequest.HighPriorityAccessAttempts, VS.RrcConnectionFailure.CACFailure,  
VS.RrcConnectionFailure.NoResponseFromUE.

## 2.2 对象层次结构-LA6.0



计数器关于对象的报告在层次结构中一一阐述。资源对象是指 eNodeB 的本地管理信息模型(MIM)的管理对象的分支。这个模型在业务经理(SAM)与 eNodeB 的接口中使用。在检测对象模型的性能中, 每个对象类别有该类别所支持的计数器的一个独特的集合。它展现了 eNodeB MIM 的一个分支。这幅图片描述了 eUTRAN 的一个潜在的未来测量对象的树结构。

## 2.3 对象层次结构-TLA6.1



本页是TDLTE的**Release TLA6.1**的软件对象

## 2.1.8 3GPP计数器族



文档中的计数器被分为计数器族。计数器族附属于既定的LTE功能群。例如，**UE环境管理族**把所有的计数器关联到**UE环境管理(建立, 修改, 检测, 释放)**。

Alcatel-Lucent 所定义的计数器族不同于 3GPP TS 32.425所定义的 3GPP测量族。

Alcatel-Lucent对于计数器的规定, 计数器命名 (在下面的部分也叫 “3GPP Name”(p. 1-11)) 以前缀 “VS”开始. 例如, VS.IncomingInterENodeBS1HOFailure.CACFailure.

## 3 指标

## 3 指标定义

- NPO通过处理 PM XML文件来提取计数器的值(也称作原始数据).
- 储存计数器的值是在指标中完成的.
- 一个指标指定了一个名词和参考标示符.
- 从 NPO的角度来看, 有2中类型的指标:

### ➤ 基本(也叫存储)指标:

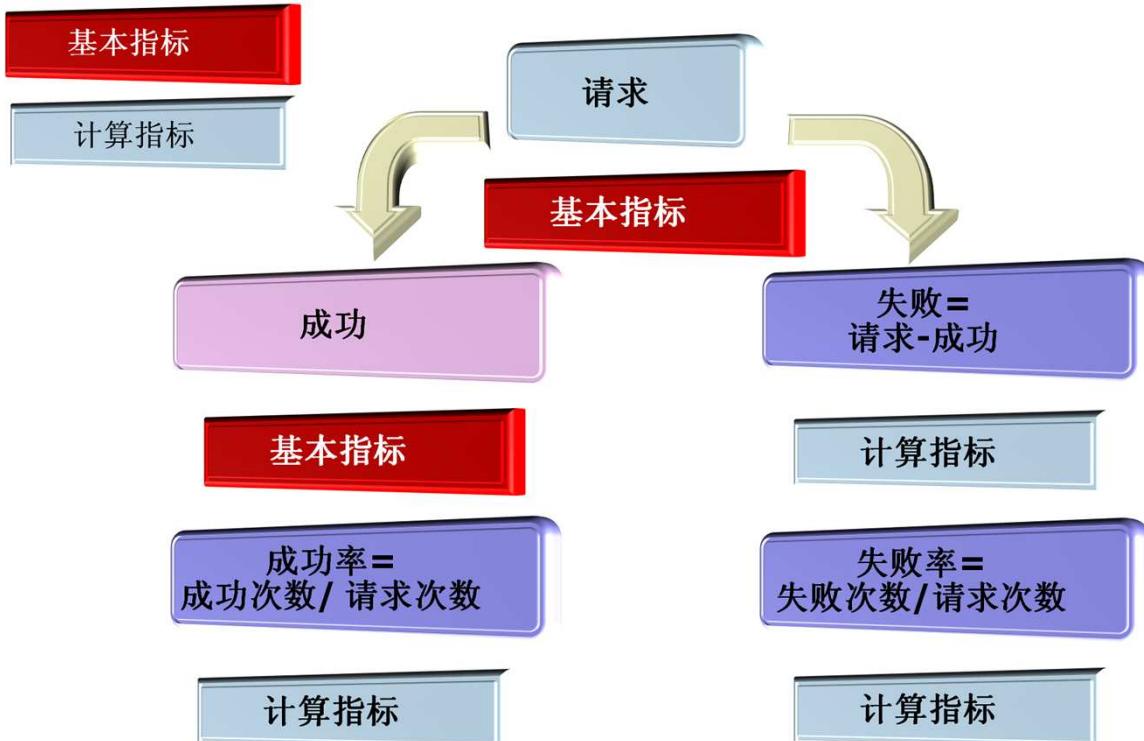
对于这些指标, NPO 存储了数据库中的值. 每当用户拖&放这种类型的指标, NPO 将会读取数据库中的值。

### ➤ 计算指标:

这些指标进行“现场”(从不存储)计算.

每当用户拖&放这种类型的指标, NPO 以基本计数器为基础来计算数值, 然后把它显示。

### 3 指标定义 [续]



## 3.1 指标属性

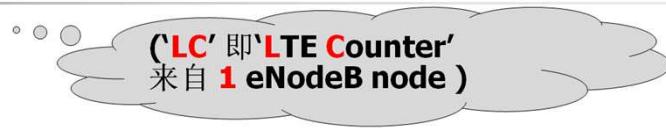
Parameter	Description
<b>Reference Name</b>	The internal short identifier for the indicator.
<b>Long Name</b>	The external identifier for the indicator.
<b>Description</b>	The description of the indicator and the associated subindicators.
<b>Family</b>	The family to which the indicator belongs.
<b>SubFamily</b>	The subfamily to which the indicator belongs.
<b>Family1</b>	The family1 to which the indicator belongs.
<b>SubFamily1</b>	The subfamily1 to which the indicator belongs.
<b>Formula</b>	The formula to calculate the indicator.
<b>Unit</b>	The indicator value measurement unit. It can be packets, kB, event, or percentage.
<b>Trend Supported</b>	The ability to see trends of indicators following the day of week or the hour of day to predict the behavior of the network.
<b>UpperIsFault</b>	The flag that indicates the quality of indicator. If this flag is set to true, it indicates issues in the network.

### 3.1.1 指标配例: VS\_UE\_ctxt\_modif\_eNB\_setup\_fail

Item	According to
Reference Name	L12511_20_CI
Long Name	VS_UE_ctxt_modif_eNB_setup_fail
Description	This indicator provides the number of UE context modification failure. NOTES: The counter and hence the indicator is specific to TDD.
Family	QoS (global indicators)
SubFamily	Bearer session management
Family1	QoS (global indicators)
SubFamily1	UE context management
Indicator Formula	VS_UE_ctxt_modif_eNB_setup_req - VS_UE_ctxt_modif_eNB_setup_succ
Unit	No unit
Trend supported	True
Upper is fault	<p>Severity</p>

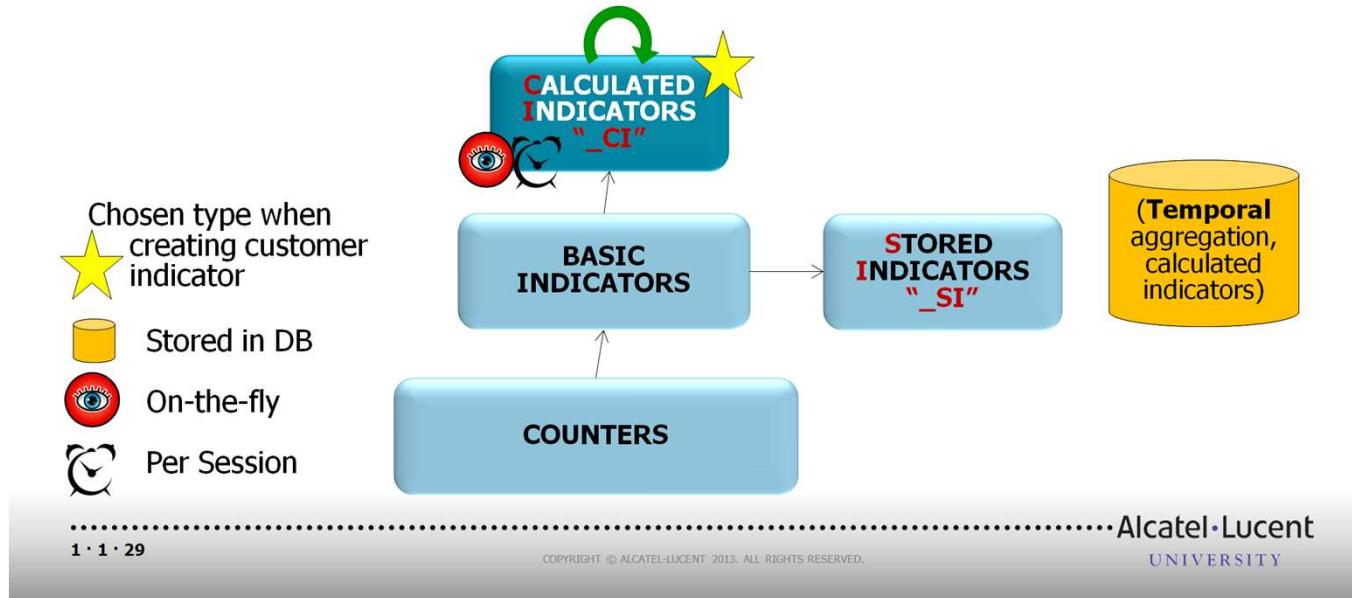
## 3.1.2 NPO 计数器和指标总结

**NPO 计数器名称 : LC12311**



**NPO 指标可能是:**

- 1个计数器构成的 Basic Indicator ( $LC12311 = LI2311$ ) (静态存储类型)
- 由Basic Indicator通过算式计算得到的统计指标

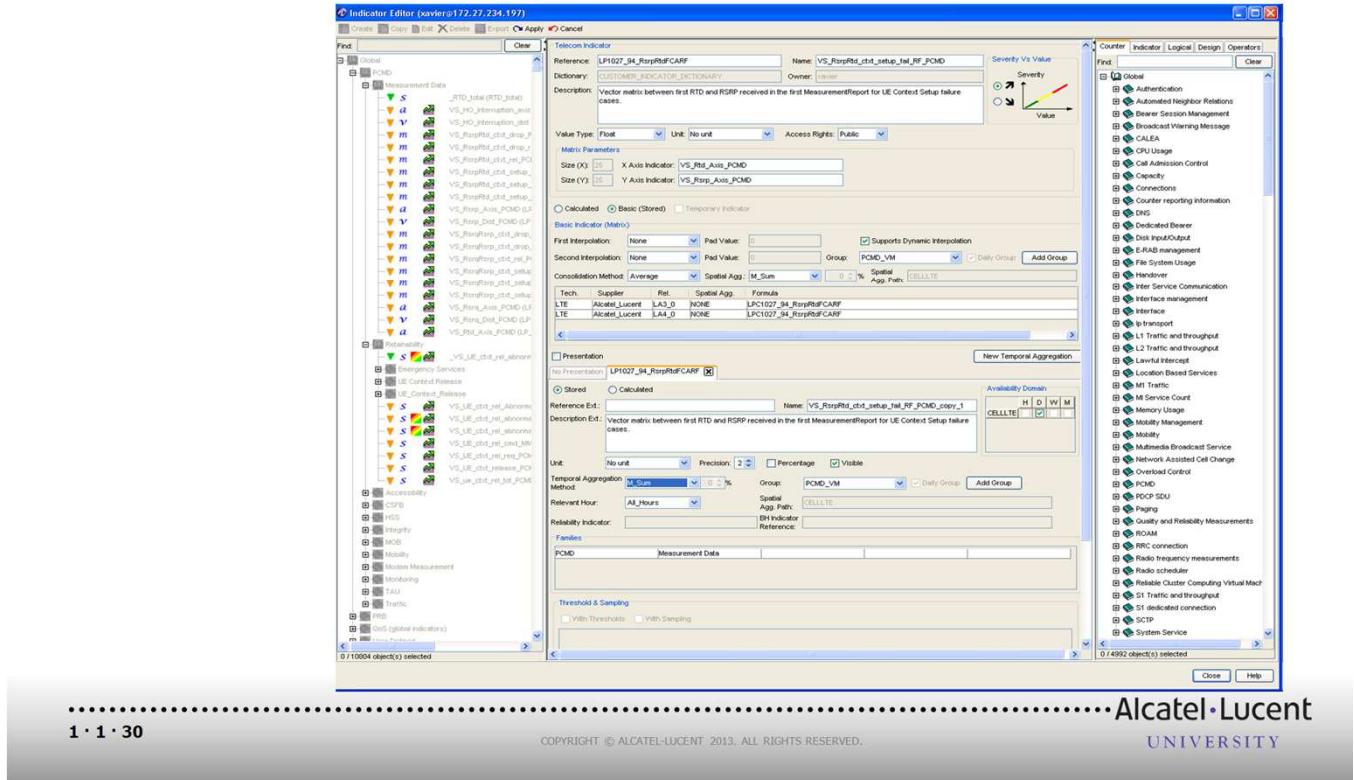


NPO可以基于数据库保存的基础指标，定制需要的指标，保存在用户会话中。

### 3.1 指标定义

#### 3.1.3 多版本共用指标

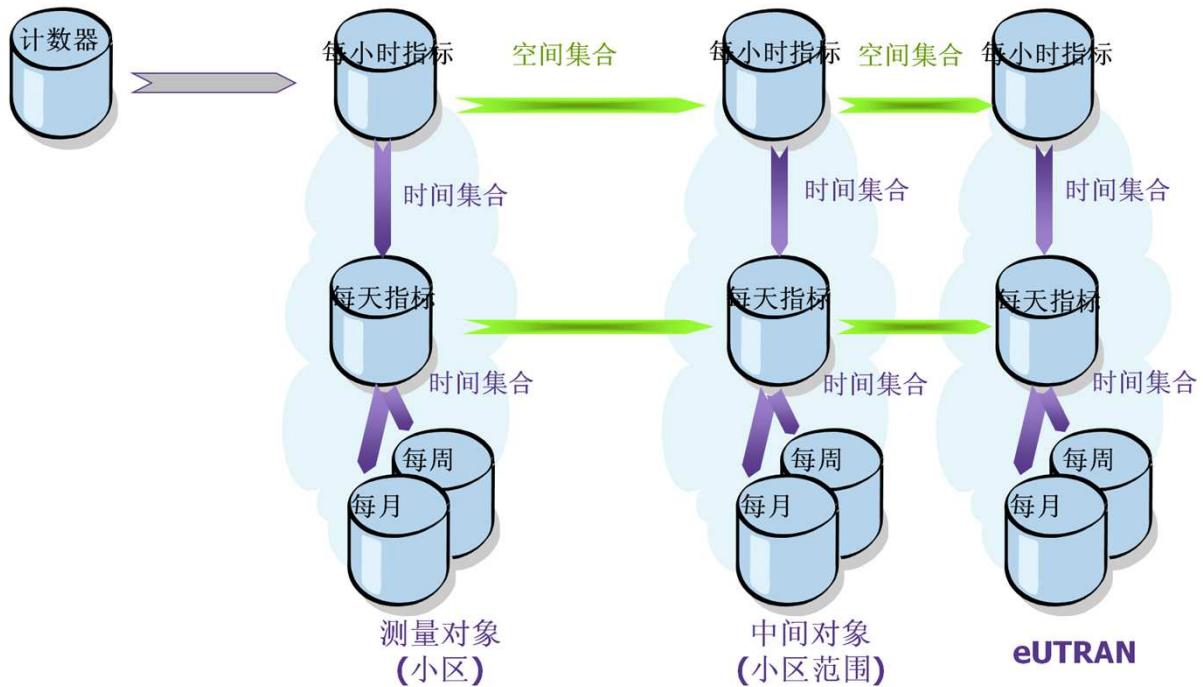
#### NPO 字典中预定义的Multi-release INDICATORS



这些指标在多个版本下均能正常工作，KPI建议使用这些指标定义

## 3.2 合并

- 指标是合并生成的。合并通过集合构成(空间或时间的)。



## 4 课程主要模块简介

## 4.1 LTE 计数器家族和标识范围



### LTE eNodeB Counter 范围由下表定义

接下来本课程按照计数器的“Monitoring groups”来介绍：

#### 2. ☺ Service Accessibility

#### 3. ☺ Retainability

#### 4. ☺ Mobility

#### 5. ● Traffic

#### 6. ☺ Quality

	Counter family	Counters id range
(*)	RRC connection	12302 .. 12321 (19 counters)
(*)	S1 dedicated connection	12401 .. 12405 (4 counters)
(*)	UE context management	12501 .. 12513 (13 counters)
(*)	E-RAB management	12603 .. 12637 (35 counters)
(*)	Mobility	12701 .. 12898 (178 counters)
(*)	PDCP SDU	14201 .. 14206 (6 counters)
(*)	Miscellaneous	14701 .. 14701 (1 counters)

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Counter family	Counters id range
L1 Traffic and throughput	12001 .. 12068 (60 counters)
L2 Traffic and throughput	12101 .. 12129 (22 counters)
Counter reporting information	12200 .. 12202 (3 counters)
X2 Traffic and throughput	12909 .. 12912 (4 counters)
Radio scheduler	13001 .. 13019 (19 counters)
S1 Traffic and throughput	13109 .. 13112 (4 counters)
Capacity	13201 .. 13249 (47 counters)
Ip transport	13301 .. 13342 (38 counters)
eNodeB synchronization	13401 .. 13410 (10 counters)
Paging	13501 .. 13502 (2 counters)
SCTP	13601 .. 13610 (10 counters)
Radio frequency measurements	13701 .. 13705 (5 counters)
Call admission control	13801 .. 13808 (8 counters)
S1-c Ippa Traffic	13901 .. 13906 (6 counters)
Interface management	14101 .. 14102 (2 counters)
M1 Traffic	14301 .. 14316 (16 counters)
UE radio parameter management	14401 .. 14402 (2 counters)
eMBMS signaling	14501 .. 14520 (20 counters)

本课程不涉及PCMD的计数器介绍。



#### On NPO,

One Indicator can be associate in two different family /subFamily/subsub...

It allows to define filtering groups, such as main indicators group for customer KPI purpose or special traffic services follow up.

#### ***KPI family example:***

- FAMILY:** **QoS** (global indicators)
- SUBFAMILY:** **Inter Operability**
- SUBSUBFAMILY:** **Network performance**

## 4.2 KPI相关QoS指标家族



QoS优化常用的指标家族如下

以下属于NPO "subFamily1"

- QoS/RRC Connection*
- QoS/S1 Dedicated Connection*
- QoS/Bearer session management*
- QoS/Capacity*
- QoS/E-RAB management (all, per PLMN, per VLAN)*
- QoS/Handover*
- QoS/L2 Traffic and Throughput*
- QoS/Mobility management*
- QoS/UE context management*
- QoS/Inter Operability (\*)*



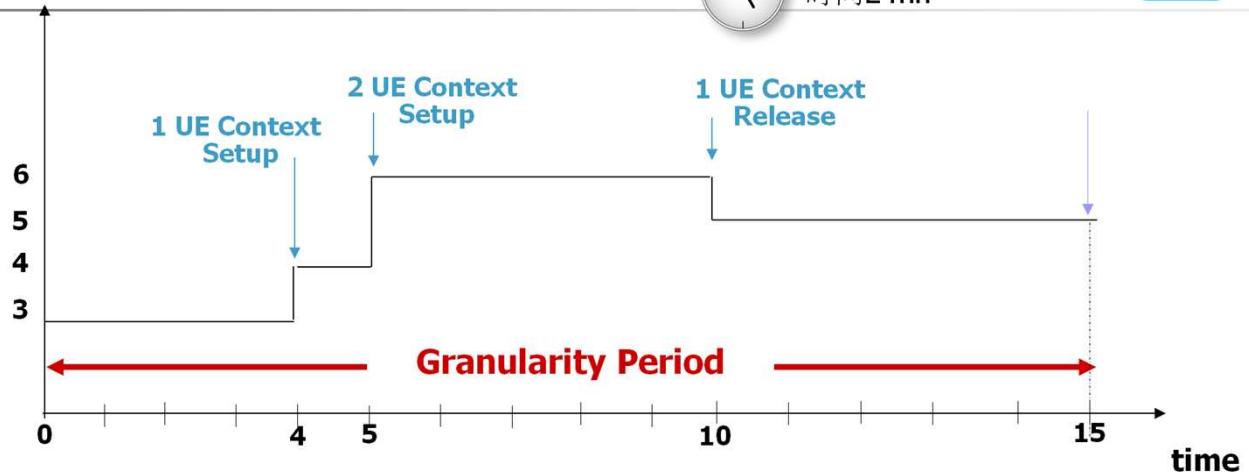
KPI定义需要根据客户需要选择相应指标和算式

## 5 练习

## 5.1 计数器统计



时间2 mn



请给出周期内UE Context计数器值：

**#.Min =**

**#.Max =**

**#.Cum =**

**#.NbEvt =**

.....  
1 · 1 · 36

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**#.NbEvt**指周期内发生的事件总次数

**#.Cum** 即全部事件的**Context**累加值



时间 1 mn



临时指标的时间单位序列是：

1

Hourly / Weekly / Monthly / Yearly periods 

2

Hourly / Daily / Weekly / Monthly periods 

3

Hourly / Daily / Monthly / Yearly periods

## 5.3 回顾：UE测量的内容？



时间5 mn

### LTE measurements from UE:

### UMTS FDD/TDD measurements from UE :

### GSM measurements from UE :

### UE CDMA2000 HRPD measurements from UE :

空闲模式下的测量项目。

# 3GPP Counter Summary (Common / FDD / TDD)

<b>id</b>	<b>counter name3GPP</b>	
2001	VS.VoIPDLFER	12116 VS.TotalCountOfULTransportBlocks
2003	VS.CellDLL1Throughput	12117 VS.TotalCountOfErrorULTransportBlocks
2004	VS.CellULL1Throughput	12118 VS.TotalCountOfDLTransportBlocks
2007	VS.DLResidualMacBLERWithDynamicScheduling	12119 VS.TotalCountOfErrorDLTransportBlocks
2008	VS.DLInitialMacBLERWithDynamicScheduling	12120 VS.NonGBRERABRlcThroughputDILoad
2009	VS.ULResidualMacBLERWithDynamicScheduling	12121 VS.NonGBRERABRlcThroughputUILoad
2010	VS.ULInitialMacBLERWithDynamicScheduling	12124 VS.DLRlcBurstTime
2011	VS.DLDataVolumeWithDynamicSchedulingPerUserCategory	12125 VS.DLRlcLastTTITime
2013	VS.ULDataVolumeWithDynamicSchedulingPerUserCategory	12126 VS.DLRlcBurstSize
2015	VS.DLPRBUsedWithDynamicSchedulingPerUserCategory	12127 VS.DLRlcPduSizeInLastTTI
2017	VS.ULPRBUsedWithDynamicSchedulingPerUserCategory	12200 VS.ENodeBTechnology
2019	VS.PUCCHMessagesPerType	12201 VS.CounterReportingInformation
2023	VS.PUCCHCQIPeriodHistogram	12202 VS.ReportGroupCustomerSelection
2024	VS.PUCCHSRPeriodHistogram	12303 RRC.ConnEstabFail.Sum
2025	VS.PUCCHSRSPeriodHistogram	12304 RRC.ConnEstabFail
2026	VS.CFIUsage	12305 VS.RadioLinkFailureSum
2027	VS.ULNoisePerPRBGroup	12306 VS.RadioLinkFailure
2028	VS.ULTotalPRBUsage	12307 RRC.ConnReEstabAtt.Sum
2029	VS.DLTotlPRBUsage	12308 RRC.ConnReEstabSucc
2030	VS.CellDLL1ThroughputLoad	12309 RRC.ConnReEstabFail.Sum
2031	VS.CellULL1ThroughputLoad	12310 RRC.ConnReEstabFail
2032	VS.DLPRBUsed	12311 RRC.ConnEstabAtt
2033	VS.ULPRBUsed	12312 VS.RrcConnectionReleaseDueToMMEOverload
2035	VS.DLPRBUsagePerTypeService	12314 VS.RrcConnectionReleaseDueToInabilityToPreempt
2037	VS.DLPRBAllocated	12315 VS.RrcConnectionRequestWithoutRepetition
2038	VS.ULPRBAllocated	12320 RRC.ConnEstabSucc
2039	VS.DLPRBUsedPerTypeService	12321 VS.RrcConnectionSetupWithoutRepetition
2040	VS.ULPRBUsedPerTypeService	12401 S1SIG.ConnEstabAtt
2041	VS.DLResidualMacBLERWithSemiPersistentScheduling	12402 VS.FirstDLNasTransport
2042	VS.DLInitialMacBLERWithSemiPersistentScheduling	12403 VS.UEContextSetupRequest
2043	VS.DLDataVolumeWithSemiPersistentScheduling	12405 VS.S1ConnectionEstablishmentFailure
2044	VS.DLPRBUsedWithSemiPersistentScheduling	12501 VS.InitialContextSetupSuccess
2045	VS.ULResidualMacBLERWithSemiPersistentScheduling	12502 VS.InitialContextSetupFailedSum
2046	VS.ULInitialMacBLERWithSemiPersistentScheduling	12503 VS.InitialContextSetupFailed
2047	VS.ULDataVolumeWithSemiPersistentScheduling	12504 VS.UEContextReleaseRequestSum
2048	VS.ULPRBUsedWithSemiPersistentScheduling	12505 VS.UEContextReleaseRequest
2056	VS.DLPDSCHResourceInefficiencyDueToLackPDCCHResource	12506 VS.UEContextReleaseCommandSum
2057	VS.ULPUSCHResourceInefficiencyDueToLackPDCCHResource	12507 VS.UEContextReleaseCommand
2058	VS.PUCCHSoundingReferenceSymbolConfigurationReject	12508 VS.LocalUEContextRelease
2059	VS.PUCCHSoundingReferenceSymbolConfigurationSuccess	12509 VS.LocalUEContextReleaseSum
2060	VS.TTIUsageForPUSCHPerPRBGroup	12510 VS.UEContextModificationAttempt
2061	VS.DLeMbmsTotalPRBUsage	12511 VS.UEContextModificationSuccess
2062	VS.CellDLThroughput	12512 VS.UEContextModificationFailure
2063	VS.DLEICICPercentagePRBUsage	12513 VS.InitialContextSetupResponse
2064	VS.CellBorderDLL1Throughput	12603 VS.ERABSetupFailed
2101	VS.NonGBRERABRlcThroughputDl	12604 SAEB.EstabInitAttNbr
2102	VS.NonGBRERABRlcThroughputUl	12605 SAEB.EstabInitSuccNbr
2105	VS.DLRlcPduKbytes	12606 SAEB.EstabAddAttNbr
2106	VS.ULRlcPduKbytes	12607 SAEB.EstabAddSuccNbr
2112	VS.GBRERABSatisfied	12608 VS.NormalERABRelease
2113	VS.DLRlcPduSent	12609 VS.AbnormalERABReleasePerQCI
2114	VS.ULRlcPduReceived	12610 VS.IncomingERABToBeSetupOnIntraLteHO
2115	VS.DLRlcPduRetransmitted	12611 VS.IncomingERABSetupOnIntraLteHO
		12612 SAEB.ModQoSAttNbr

## Counter Summary (Common / FDD / TDD) [cont.]

12613	SAEB.ModQoSuccNbr	12746	HO.IntraEnbOutSucc.Sum
12614	SAEB.ModQoSFailNbr	12747	VS.RedirectionToInterFrequencySameFrameStructure
12615	VS.ERABReleaseIndicationERABReleasedPerQCI	12748	VS.RedirectionToUtraTdd
12616	VS.ERABReleaseIndicationERABReleasedPerCause	12755	VS.OutgoingPSHOToUtraTddAttempt
12617	VS.ERABReleaseCommandERABRequestedToBeReleasedPerQCI	12756	VS.OutgoingPSHOToUtraTddSuccess
12618	VS.ERABReleaseCommandERABRequestedToBeReleasedPerCause	12757	VS.OutgoingPSHOToUtraTddFailureSum
12619	VS.ERABReleaseResponseERABReleaseSuccess	12758	VS.OutgoingPSHOToUtraTddFailure
12621	VS.IncomingERABToBeSetupOnIRATHO	12759	VS.OutgoingPSHOToUtraTddAbortSum
12622	VS.IncomingERABSetupOnIRATHO	12760	VS.OutgoingPSHOToUtraTddAbort
12630	VS.ERABReleasedDueToReactiveLoadControl	12761	VS EnhancedNonOptimizedRedirectionToHRPD
12631	VS.ERABSetupAttemptOverSPS	12762	VS.CCOToGeranAttempt
12632	VS.ERABSetupSuccessOverSPS	12763	VS.CCOToGeranSuccess
12633	VS.ERABSetupFailureOverSPS	12764	VS.CCOToGeranFailureSum
12634	VS.ERABReleasedDueToRadioLinkFailurePerQCI	12765	VS.CCOToGeranFailure
12635	VS.SAEBAbnormalRelActNbr	12766	HO.IntraEnbOutAtt.Sum
12701	VS.ReportedCellsNotSelected	12767	VS.OutgoingInterENodeBX2HOPreparationSuccess
12702	VS.IncomingIntraENodeBHOAttempt	12768	VS.IncomingInterENodeBX2HOPreparationSuccess
12703	VS.IncomingIntraENodeBHOSuccess	12769	VS.OutgoingInterENodeBS1HOPreparationSuccess
12704	VS.IntraENodeBHOFailureSum	12770	VS.IncomingInterENodeBS1HOPreparationSuccess
12705	VS.IntraENodeBHOFailure	12771	VS.OutgoingGapAssistedHOAttempt
12706	VS.OutgoingInterENodeBX2HOAttempt	12772	HO.InterFreqMeasGapOutSucc
12707	VS.OutgoingInterENodeBX2HOSuccess	12773	VS.OutgoingGapAssistedHOFailureSum
12708	VS.OutgoingInterENodeBX2HOFailureSum	12774	VS.OutgoingGapAssistedHOAbortSum
12709	VS.OutgoingInterENodeBX2HOFailure	12775	VS.X2RLFIIndicationUnpreparedCell
12710	VS.IncomingInterENodeBX2HOAttempt	12776	VS.OutgoingIntraFrequencyHOFailure
12711	VS.IncomingInterENodeBX2HOSuccess	12777	VS.OutgoingIntraFrequencyHOMobilityEvent
12712	VS.IncomingInterENodeBX2HOFailureSum	12778	HO.IntraFreqOutFail
12713	VS.IncomingInterENodeBX2HOFailure	12779	VS.OutgoingIntraFrequencyHOMobilityEventPerRelation
12714	VS.NonOptimizedRedirectionToHRPDViaEventA2	12780	VS.OutgoingCsFallbackPSHOToUtraFddAttempt
12715	VS.RedirectionToUtraFdd	12781	VS.OutgoingCsFallbackPSHOToUtraFddSuccess
12716	VS.RedirectionToGeran	12782	VS.OutgoingCsFallbackPSHOToUtraFddFailureSum
12717	VS.IntraCellHOAttempt	12783	VS.OutgoingCsFallbackPSHOToUtraFddAbortSum
12718	VS.IntraCellHOSuccess	12784	VS.CsFallbackCCOToGeranAttempt
12719	VS.IntraCellHORekeyingFailure	12785	VS.CsFallbackCCOToGeranSuccess
12720	VS.OutgoingInterENodeBS1HOAttempt	12786	VS.CsFallbackCCOToGeranFailureSum
12721	VS.OutgoingInterENodeBS1HOSuccess	12788	VS.OutgoingPSHOToUtraFddSuccess
12722	VS.OutgoingInterENodeBS1HOFailureSum	12789	VS.OutgoingPSHOToUtraFddFailureSum
12723	VS.OutgoingInterENodeBS1HOFailure	12790	VS.OutgoingPSHOToUtraFddFailure
12724	VS.IncomingInterENodeBS1HOAttempt	12791	VS.OutgoingPSHOToUtraFddAbortSum
12725	VS.IncomingInterENodeBS1HOSuccess	12792	VS.OutgoingPSHOToUtraFddAbort
12726	VS.IncomingInterENodeBS1HOFailureSum	12793	VS.OutgoingPSHOToUtraFddPreparationSuccess
12727	VS.IncomingInterENodeBS1HOFailure	12794	VS.EvolvedMultiCarrierTrafficAllocationTrigger
12732	VS.OutgoingInterENodeBX2HOAbortSum	12797	VS.IncomingPSHOFFromUtranAttempt
12733	VS.OutgoingInterENodeBX2HOAbort	12798	VS.IncomingPSHOFFromUtranPreparationSuccess
12734	VS.IncomingInterENodeBX2HOAbortSum	12799	VS.IncomingPSHOFFromUtranSuccess
12735	VS.IncomingInterENodeBX2HOAbort	12801	VS.IncomingPSHOFFromUtranFailureSum
12736	VS.OutgoingInterENodeBS1HOAbortSum	12802	VS.IncomingIntraENodeBHOAttemptScreened
12737	VS.OutgoingInterENodeBS1HOAbort	12803	VS.IncomingIntraENodeBHOSuccessScreened
12738	VS.IntraENodeBHOAbort	12804	VS.IncomingPSHOFFromUtranFailure
12739	VS.IntraCellHOKenodeBRefreshFailure	12805	VS.IncomingPSHOFFromUtranAbortSum
12742	VS.IntraENodeBHOAbortSum	12806	VS.OutgoingInterENodeBX2HOAttemptScreened
12743	VS.IncomingInterENodeBS1HOAbortSum	12807	VS.OutgoingInterENodeBX2HOSuccessScreened
12744	VS.IncomingInterENodeBS1HOAbort	12808	VS.IncomingPSHOFFromUtranAbort
12745	VS.OutgoingIntraENodeBHOAttempt	12810	VS.IncomingInterENodeBX2HOAttemptScreened

## Counter Summary (Common / FDD / TDD) [cont.]

12810	VS.IncomingInterENodeBX2HOAttemptScreened	12878	VS.OutgoingEmergencyCsFallbackPSHOToUtraTddAttempt
12811	VS.IncomingInterENodeBX2HOSuccessScreened	12889	VS.OutgoingPSHOToUtraFddFailurePerHOReason
12812	VS.OutgoingEmergencyCsFallbackPSHOToUtraFddAttempt	12890	VS.OutgoingInterENodeBS1HOAbortPerHOReason
12813	VS.OutgoingEmergencyCsFallbackPSHOToUtraFddSuccess	12891	VS.OffLoadingSuccess
12814	VS.OutgoingEmergencyCsFallbackPSHOToUtraFddFailureSum	12892	VS.OffLoadingFailure
12815	VS.OutgoingEmergencyCsFallbackPSHOToUtraFddAbortSum	12893	VS.OutgoingInterENodeBX2HOAbortPerHOReason
12816	VS.EmergencyCsFallbackCCOToGeranAttempt	12894	VS EnhancedRedirectionToUtraTdd
12817	VS.EmergencyCsFallbackCCOToGeranSuccess	12895	VS.OutgoingCsFallbackPSHOToUtraTddAttempt
12818	VS.EmergencyCsFallbackCCOToGeranFailureSum	12896	VS.OutgoingCsFallbackPSHOToUtraTddSuccess
12819	VS.OutgoingPSHOToUtraTddFailurePerHOReason	12897	VS.OutgoingCsFallbackPSHOToUtraTddFailureSum
12820	VS.OutgoingInterENodeBS1HOAttemptScreened	12898	VS.OutgoingCsFallbackPSHOToUtraTddAbortSum
12821	VS.OutgoingInterENodeBS1HOSuccessScreened	12909	VS.X2ReceivedThroughput
12822	VS.OutgoingIntraENodeBInterPlmnHOAttempt	12910	VS.X2ReceivedPackets
12823	VS.OutgoingInterENodeBInterPlmnX2HOAttempt	12911	VS.X2SentThroughput
12824	VS.IncomingInterENodeBS1HOAttemptScreened	12912	VS.X2SentPackets
12825	VS.IncomingInterENodeBS1HOSuccessScreened	13001	VS.NbUeScheduledPerDLTTI
12826	VS.OutgoingSrvccToUtraFddAttempt	13002	VS.NbUeScheduledPerULTTI
12827	VS.OutgoingSrvccToUtraFddSuccess	13003	VS.ULGrant
12828	VS.OutgoingSrvccToUtraFddFailureSum	13004	VS.ULPairedGrant
12829	VS.OutgoingSrvccToUtraFddFailure	13005	VS.DLGrant
12830	VS.OutgoingSrvccToUtraFddAbortSum	13006	VS.ULPHnormalized
12831	VS.OutgoingSrvccToUtraFddAbort	13007	VS.DLMimoEligibilityDecision
12832	VS.OutgoingInterENodeBX2HOAbortScreenedSum	13008	VS.ContentionBasedRandomAccessPreamble
12833	VS.OutgoingInterENodeBInterPlmnS1HOAttempt	13009	VS.ContentionFreeRandomAccessPreamble
12834	VS.IncomingInterENodeBX2HOAbortScreenedSum	13010	VS.ContentionBasedRandomAccessResponse
12835	VS.OutgoingSrvccToUtraFddFailurePerHOReason	13011	VS.ContentionFreeRandomAccessResponse
12836	VS.OutgoingInterENodeBS1HOAbortScreenedSum	13012	VS.ContentionResolution
12837	VS.OutgoingIntraENodeBInterPlmnHOSuccess	13013	VS.Layer0TxDivWBCqiReported
12838	VS.OutgoingInterENodeBInterPlmnX2HOSuccess	13014	VS.Layer0MimoWBCqiReported
12839	VS.OutgoingInterENodeBInterPlmnS1HOSuccess	13015	VS.Layer1WBCqiReported
12840	VS.OutgoingSrvccToUtraTddFailurePerHOReason	13017	VS.TransmissionMode8UsersDistribution
12841	VS.OutgoingPSHOToUtraTddPreparationSuccess	13019	VS.RRHAreaChanges
12842	VS.IntraENodeBHOAbortScreenedSum	13109	VS.S1DLThroughput
12843	VS.IncomingInterENodeBS1HOAbortScreenedSum	13110	VS.S1DLPackets
12845	VS.OutgoingIntraENodeBHOAttemptScreened	13111	VS.S1ULThroughput
12846	VS.OutgoingIntraENodeBHOSuccessScreened	13112	VS.S1ULPackets
12851	VS.RedirectionTo1xRtt	13201	RRC.Conn
12853	VS.CsFallbackRequest	13204	VS.NbVoIPBearersPerCellPerPlmn
12858	VS.EnhancedRedirectionToUtraFdd	13205	VS.NbGBRBearersPerCellPerPlmn
12859	VS.EnhancedRedirectionToGeran	13206	VS.NbNonGBRBearersPerCellPerPlmn
12860	VS.OutgoingSrvccToUtraTddAttempt	13207	VS.NbBearersPerCell
12861	VS.OutgoingSrvccToUtraTddSuccess	13208	VS.NbVoIPBearersPerENodeB
12862	VS.OutgoingSrvccToUtraTddFailureSum	13209	VS.NbGBRBearersPerENodeB
12863	VS.OutgoingSrvccToUtraTddFailure	13210	VS.NbNonGBRBearersPerENodeB
12864	VS.OutgoingSrvccToUtraTddAbortSum	13211	VS.NbBearersPerENodeB
12865	VS.OutgoingSrvccToUtraTddAbort	13212	VS.NbActiveUsersPerENodeB
12866	VS.IntraENodeBHOPreparationSuccessScreened	13213	VS.DLPRBsPoolOverloadScreened
12867	VS.OutgoingInterENodeBX2HOPreparationSuccessScreened	13214	VS.ULPRBsPoolOverloadScreened
12868	VS.IncomingInterENodeBX2HOPreparationSuccessScreened	13215	VS.NbActiveUEInULPerTypeService
12869	VS.OutgoingInterENodeBS1HOPreparationSuccessScreened	13216	VS.NbActiveUEInDLPerTypeService
12870	VS.IncomingInterENodeBS1HOPreparationSuccessScreened	13217	VS.NbBearersPerCellPerQCIperPlmn
12875	VS.OutgoingEmergencyCsFallbackPSHOToUtraTddSuccess	13218	VS.NbBearersPerENodeBPerQCI
12876	VS.OutgoingEmergencyCsFallbackPSHOToUtraTddFailureSum	13219	VS.NpuCpu1UtilizationHistogram
12877	VS.OutgoingEmergencyCsFallbackPSHOToUtraTddAbortSum	13220	VS.ENodeBControlCpuUtilizationHistogram

## Counter Summary (Common / FDD / TDD) [cont.]

13221 SAEB.ModQoSuccNbr  
 13222 SAEB.ModQoSFailNbr  
**13223 VS.ERABReleaseIndicationERABReleasedPerQCI**  
**13224 VS.ERABReleaseIndicationERABReleasedPerCause**  
**13225 VS.ERABReleaseCommandERABRequestedToBeReleasedPerQCI**  
**13226 VS.ERABReleaseCommandERABRequestedToBeReleasedPerCause**  
**13227 VS.ERABReleaseResponseERABReleaseSuccess**  
 13228 VS.IncomingERABToBeSetupOnIRATHO  
 13229 VS.IncomingERABSetupOnIRATHO  
 13230 VS.ERABReleasedDueToReactiveLoadControl  
**13231 VS.ERABSetupAttemptOverSPS**  
**13232 VS.ERABSetupSuccessOverSPS**  
**13233 VS.ERABSetupFailureOverSPS**  
 13234 VS.ERABReleasedDueToRadioLinkFailurePerQCI  
 13235 VS.SAEBAbnormalRelActNbr  
 13236 VS.ReportedCellsNotSelected  
 13237 VS.IncomingIntraENodeBHOAttempt  
 13238 VS.IncomingIntraENodeBHOSuccess  
 13239 VS.IntraENodeBHOFailureSum  
 13240 VS.IntraENodeBHOFailure  
 13241 VS.OutgoingInterENodeBX2HOAttempt  
 13242 VS.OutgoingInterENodeBX2HOSuccess  
 13243 VS.OutgoingInterENodeBX2HOFailureSum  
 13244 VS.OutgoingInterENodeBX2HOFailure  
 13245 VS.IncomingInterENodeBX2HOAttempt  
 13246 VS.IncomingInterENodeBX2HOSuccess  
 13249 VS.IncomingInterENodeBX2HOFailureSum  
 13301 VS.IncomingInterENodeBX2HOFailure  
 13302 VS.NonOptimizedRedirectionToHRPDViaEventA2  
 13303 VS.RedirectionToUtraFdd  
 13304 VS.RedirectionToGeran  
 13305 VS.IntraCellHOAttempt  
 13306 VS.IntraCellHOSuccess  
 13307 VS.IntraCellHORekeyingFailure  
 13308 VS.OutgoingInterENodeBS1HOAttempt  
 13309 VS.OutgoingInterENodeBS1HOSuccess  
 13310 VS.OutgoingInterENodeBS1HOFailureSum  
 13311 VS.OutgoingInterENodeBS1HOFailure  
 13312 VS.IncomingInterENodeBS1HOAttempt  
 13313 VS.IncomingInterENodeBS1HOSuccess  
 13314 VS.IncomingInterENodeBS1HOFailureSum  
 13315 VS.IncomingInterENodeBS1HOFailure  
 13316 VS.OutgoingInterENodeBX2HOAbortSum  
 13317 VS.OutgoingInterENodeBX2HOAbort  
 13318 VS.IncomingInterENodeBX2HOAbortSum  
 13319 VS.IncomingInterENodeBX2HOAbort  
 13320 VS.OutgoingInterENodeBS1HOAbortSum  
 13321 VS.OutgoingInterENodeBS1HOAbort  
 13326 VS.IntraENodeBHOAbort  
 13327 VS.IntraCellHOKenodeBRefreshFailure  
 13328 VS.IntraENodeBHOAbortSum  
 13329 VS.IncomingInterENodeBS1HOAbortSum  
 13330 VS.IncomingInterENodeBS1HOAbort  
 13331 VS.OutgoingIntraENodeBHOAttempt

13332 HO.IntraEnbOutSucc.Sum  
 13333 VS.RedirectionToIntervFrequencySameFrameStructure  
 13334 VS.RedirectionToUltraTdd  
 13335 VS.OutgoingPSHOToUltraTddAttempt  
 13336 VS.OutgoingPSHOToUltraTddSuccess  
**13337 VS.OutgoingPSHOToUltraTddFailureSum**  
 13401 VS.OutgoingPSHOToUltraTddFailure  
**13402 VS.OutgoingPSHOToUltraTddAbortSum**  
 13403 VS.OutgoingPSHOToUltraTddAbort  
 13404 VS.EnhancedNonOptimizedRedirectionToHRPD  
 13405 VS.CCOToGeranAttempt  
 13406 VS.CCOToGeranSuccess  
 13407 VS.CCOToGeranFailureSum  
 13408 VS.CCOToGeranFailure  
 13409 HO.IntraEnbOutAtt.Sum  
 13410 VS.OutgoingInterENodeBX2HOPreparationSuccess  
 13501 VS.IncomingInterENodeBX2HOPreparationSuccess  
 13502 VS.OutgoingInterENodeBS1HOPreparationSuccess  
 13601 VS.IncomingInterENodeBS1HOPreparationSuccess  
 13602 VS.OutgoingGapAssistedHOAttempt  
 13603 VS.S1SctplnOctets  
 13604 VS.S1SctplnPackets  
 13605 VS.S1SctplnOctets  
 13606 VS.S1SctplnPackets  
 13607 VS.X2SctplnOctets  
 13608 VS.X2SctplnPackets  
 13609 VS.X2SctplnOctets  
 13610 VS.X2SctplnPackets  
 13701 VS.RSSIMeasurement  
 13702 VS.RFMTxPowerMeasurement  
 13703 VS.RFMPProcessorOccupancy  
 13704 VS.CellTxPowerMeasurement  
 13801 VS.CACRequest  
 13802 VS.CACFailure  
 13803 VS.VlanTransportCACFailureOnS1u  
 13804 VS.PortTransportCACFailureOnS1u  
 13805 VS.VlanTransportCACFailureForEmergencyCallOnS1u  
 13806 VS.PortTransportCACFailureForEmergencyCallOnS1u  
 13807 VS.CACRequestForPlmn  
 13808 VS.CACFailureForPlmn  
 13901 VS.OtdoalInformationRequest  
 13902 VS.OtdoalInformationFailure  
 13903 VS.OtdoalInformationResponse  
 13904 VS.EcidMeasurementInitiationRequest  
 13905 VS.EcidMeasurementInitiationFailure  
 13906 VS.EcidMeasurementInitiationResponse  
 14101 VS.S1ErrorIndicationByENodeB  
 14102 VS.S1ErrorIndicationByMME  
 14201 VS.DRBPDcpSduKbytesDL  
 14202 VS.DRBPDcpSduKbytesUL  
 14203 VS.DRBPDcpSduBitRateDL  
 14204 DRB.PdcpSduBitRateUL  
 14205 VS.SRBPDcpSduKbytesDL

## Counter Summary (Common / FDD / TDD) [cont.]

14206 VS.SRBPDcpSduKbytesUL  
14301 VS.M1GtpPayloadKbytesReceived  
14302 VS.M1SyncSequencesReceivedTooEarly  
14303 VS.M1SyncSequencesReceivedTooLate  
14304 VS.M1SyncSequencesDelay  
14305 VS.MbmsUserPacketsExpectedBySyncLayer  
14306 VS.MbmsUserPacketsReceivedBySyncLayer  
14307 VS.MbmsUserPacketsReceivedByRlc  
14308 VS.MbmsUserPacketsDroppedByRlcUponOverflow  
14309 VS.M1GtpPayloadKbytesReceivedPerENodeB  
14310 VS.M1SyncSequencesReceivedTooEarlyPerSessionPerArea  
14311 VS.M1SyncSequencesReceivedTooLatePerSessionPerArea  
14312 VS.M1SyncSequencesDelayPerSessionPerArea  
14313 VS.MbmsUserPacketsExpectedBySyncLayerPerSessionPerArea  
14314 VS.MbmsUserPacketsReceivedBySyncLayerPerSessionPerArea  
14315 VS.MbmsUserPacketsReceivedByRlcPerSessionPerArea  
14316 VS.MbmsUserPacketsDroppedByRlcUponOverflowPerSessionPerArea  
14401 VS.TransmissionModeSwitchRequest  
14402 VS.TransmissionModeSwitchSuccess  
14501 VS.MbmsSessionStartRequest  
14502 VS.MbmsSessionStartResponse  
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14504 VS.MbmsSessionUpdateRequest  
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End of module  
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