

IPWorks Measurement List

LIST

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Contents

1	Introduction	1
1.1	Related Information	1
2	Term Definitions	3
3	Measurements for DNS	5
3.1	DnsQueryStatisticsGroup	5
3.2	DnsForwardStatisticsGroup	9
3.3	DnsUpdateStatisticsGroup	11
3.4	DnsTSIGStatisticsGroup	14
3.5	DnsDNSSECStatisticsGroup	15
3.6	DnsASDNSStatisticsGroup	17
3.7	DnsNotifyStatisticsGroup	19
3.8	DnsPerBladeStatisticsGroup	21
4	Measurements for ENUM	27
4.1	EnumServerIdentityGroup	27
4.2	EnumMessageGroup	28
4.3	EnumTPSAlarmGroup	39
4.4	EnumPerBladeStatisticsGroup	42
5	Measurements for ERH	45
5.1	ERHGroup	45
5.2	ERHTPSAlarmGroup	53
6	Measuerments for Element Manager	57
6.1	SsGroup	57
7	Measurements for Radius AAA	59
7.1	AAARadiusAuthGroup	61
7.2	AAARadiusAuthProxyGroup	65
7.3	AAARadiusAccGroup	71
7.4	AAARadiusAccProxyGroup	75
7.5	AAARadiusIPallocGroup	79
7.6	AAARadiusDynAuthzGroup	82
7.7	AAARadiusDynAuthzProxyGroup	85



7.8	AAARadiusFrontEndGroup	88
7.9	AAARadiusOtherGroup	91
8	Measurements for EPC AAA	93
8.1	AAASTaGroup	95
8.2	AAASTaPlusGroup	102
8.3	AAASWmGroup	109
8.4	AAASWmPlusGroup	117
8.5	AAAS6bGroup	123
8.6	AAASWxGroup	128
8.7	AAADiaOtherGroup	135
8.8	AAAS13Group	137
8.9	AAADiaFrontEndGroup	138
9	Measurements for DHCPv4	143
9.1	DHCPv4MessageGroup	143
9.2	DHCPv4FormatErrorGroup	149
9.3	DHCPv4DDNSMessageGroup	153
9.4	DHCPv4LeaseInfoGroup	158
10	Measurements for OS	161
10.1	OSProcessingUnit	163
	Reference List	165



1 Introduction

This document describes the Performance Measurements for IPWorks.

1.1 Related Information

Typographic conventions, definition, and explanation of abbreviations and terminology can be found in the following documents:

- Trademark Information
- Typographic Conventions
- Glossary of Terms and Acronyms





2 Term Definitions

The terms used in the following sections are defined as follows:

Measurement Name

The name of the measurement being described.

Measurement Type

The four types of 3GPP standard measurements (counter, gauge, status inspection, and discrete event registration) used to report data.

Counter

A counter is a measurement type that is used to report cumulative, incremental integer variables. An occurrence of an event increases the counter.

For the details about the measurement type **Collection Method** and **Aggregation**, refer to the section **Measurement Parameters in IPWorks Performance Measurements**.

Performance Measurement Group

Represents a logical grouping of Measurement Type objects so that these objects can be referred to as a group instead of individual objects.

Cluster level

The whole cluster uses the same measured instance name. For example, AAA-DIA.

Node level

Each node uses the specific node name and uuid as the measured instance name. For example, PL-3_5D9F7212-20FA-4D40-A7DF-F91214E54534.





3 Measurements for DNS

This section provides the performance measurement data regarding DNS. In addition, the default PM job is described for each performance measurement group.

3.1 DnsQueryStatisticsGroup

This performance measurement group, called `DnsQueryStatisticsGroup`, contains measurements for events which are related to DNS query. The directory of the MO is as follows:

`ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DnsQueryStatisticsGroup`

The default PM job, which is a measurement collection job, is `DnsQueryDefaultJob`. The directory of this default job MO is as follows:

`ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DnsQueryDefaultJob`.

The default job with the default value is as follows:

```
PmJob=DnsQueryDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="DnsQueryDefaultJob"
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE
MeasurementReader=mr_1
  measurementReaderId="mr_1"
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,
      PmGroup=DnsQueryStatisticsGroup"
    measurementTypeRef=[] <empty>
```

This performance measurement group includes following measurements:

- ipworksDnsServQuerySuccess
- ipworksDnsServQueryReferral
- ipworksDnsServQueryNxrrset
- ipworksDnsServQueryNxdomain
- ipworksDnsServQueryRecursion



- ipworksDnsServQueryFailure
- ipworksDnsServEnumQueryRecursion
- ipworksDnsServQueryXfr
- ipworksDnsServQueryXfrFailure
- ipworksDnsServQueryTotal

3.1.1 ipworksDnsServQuerySuccess

Attribute	Value
Description	The number of successful DNS query in the current GP.
Condition	The value is incremented for every successful processing of DNS query.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsQueryStatisticsGroup

3.1.2 ipworksDnsServQueryReferral

Attribute	Value
Description	The number of query that DNS server responds a referral in the current GP.
Condition	The value is incremented when DNS server responds to a query with a referral.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsQueryStatisticsGroup



3.1.3 ipworksDnsServQueryNxrrset

Attribute	Value
Description	The number of DNS query with the return result "NXRRSET" in the current GP.
Condition	The value is incremented for every DNS query with the return result "NXRRSET".
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsQueryStatisticsGroup

3.1.4 ipworksDnsServQueryNxdomain

Attribute	Value
Description	The number of DNS query with the return result "NXDOMAIN" in the current GP.
Condition	The value is incremented for every DNS query with the return result "NXDOMAIN".
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsQueryStatisticsGroup

3.1.5 ipworksDnsServQueryRecursion

Attribute	Value
Description	The number of DNS recursion query in the current GP.
Condition	The value is incremented for every DNS recursion query.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Node level
Measurement Object Class	DnsQueryStatisticsGroup

3.1.6 ipworksDnsServQueryFailure

Attribute	Value
Description	The number of failed DNS query in the current GP.
Condition	The value is incremented for every failed DNS query.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsQueryStatisticsGroup

3.1.7 ipworksDnsServEnumQueryRecursion

Attribute	Value
Description	The number of ENUM recursion query to a specific DNS server in the current GP.
Condition	The value is incremented for every ENUM recursion query.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsQueryStatisticsGroup

3.1.8 ipworksDnsServQueryXfr

Attribute	Value
Description	The number of successful transfer of DNS query in the current GP.
Condition	The value is incremented when successfully update DNS server with transferring functionality.



Attribute	Value
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsQueryStatisticsGroup

3.1.9 ipworksDnsServQueryXfrFailure

Attribute	Value
Description	The number of failed transfer of DNS query in the current GP.
Condition	The value is incremented when update DNS server with transferring none functionality.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsQueryStatisticsGroup

3.1.10 ipworksDnsServQueryTotal

Attribute	Value
Description	The number of all DNS queries in the current GP.
Condition	The value is incremented for every DNS query.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsQueryStatisticsGroup

3.2 DnsForwardStatisticsGroup

This performance measurement group, called `DnsForwardStatisticsGroup`, contains measurements related to the queries that DNS forwards to another DNS for recursive query. The directory of the performance measurement group MO is as follows:



ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DnsForwardStatisticsGroup

The default PM job, which is a measurement collection job, is DnsForwardDefaultJob . The directory of the default job MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DnsForwardDefaultJob.

The default job with the default value is as follows:

```
PmJob=DnsForwardDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="DnsForwardDefaultJob"
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE
MeasurementReader=mr_1
  measurementReaderId="mr_1"
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,
      PmGroup=DnsForwardStatisticsGroup"
    measurementTypeRef=[] <empty>
```

This performance measurement group includes following measurements:

- ipworksDnsServForwardFailure
- ipworksDnsServForwardTotal

3.2.1 ipworksDnsServForwardFailure

Attribute	Value
Description	The number of total unsuccessful queries that DNS forwards to another DNS for recursive query in the current GP.
Condition	The value is incremented for every unsuccessful query which DNS forwards to another DNS for recursive query.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsForwardStatisticsGroup



3.2.2 ipworksDnsServForwardTotal

Attribute	Value
Description	The number of total recursive queries that DNS forwards to another DNS for recursive query in the current GP.
Condition	The value is incremented for every query which DNS forwards to another DNS for recursive query.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsForwardStatisticsGroup

3.3 DnsUpdateStatisticsGroup

This performance measurement group, called `DnsUpdateStatisticsGroup`, contains measurements for events which are related to DNS update requests. The directory of the performance measurement group MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DnsUpdateStatisticsGroup
```

The default PM job, which is a measurement collection job, is `DnsUpdateDefaultJob`. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DnsUpdateDefaultJob
```

The default PM job with the default value is as follows:

```
PmJob=DnsUpdateDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="DnsUpdateDefaultJob"
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE
MeasurementReader=mr_1
  measurementReaderId="mr_1"
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,
      PmGroup=DnsUpdateStatisticsGroup"
    measurementTypeRef=[] <empty>
```

This performance measurement group includes following measurements:



- ipworksDnsServUpdateSuccess
- ipworksDnsServUpdateFailure
- ipworksDnsServUpdateForward
- ipworksDnsServUpdateRefused
- ipworksDnsServUpdateTotal

3.3.1 ipworksDnsServUpdateSuccess

Attribute	Value
Description	The number of successful processing of DNS update requests in the current GP.
Condition	The value is incremented when a DNS update request is processed successfully.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsUpdateStatisticsGroup

3.3.2 ipworksDnsServUpdateFailure

Attribute	Value
Description	The number of failed DNS update requests in the current GP.
Condition	The value is incremented when a DNS update is processed but failed.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsUpdateStatisticsGroup



3.3.3 ipworksDnsServUpdateForward

Attribute	Value
Description	The number of DNS updates that were forwarded to other DNS servers in the current GP.
Condition	The value is incremented when a DNS update is forwarded to other DNS servers.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsUpdateStatisticsGroup

3.3.4 ipworksDnsServUpdateRefused

Attribute	Value
Description	The number of DNS updates refused for security reasons in the current GP.
Condition	The value is incremented when a DNS update is refused due to security reasons.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsUpdateStatisticsGroup

3.3.5 ipworksDnsServUpdateTotal

Attribute	Value
Description	The number of total DNS updates in the current GP.
Condition	The value is incremented when a DNS update is received.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsUpdateStatisticsGroup



3.4 DnsTSIGStatisticsGroup

This performance measurement group, called `DnsTSIGStatisticsGroup`, contains measurements for events which are related to DNS packets with TSIG signatures. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DnsTSIGStatisticsGroup
```

The default PM job, which is a measurement collection job, is `DnsTSIGDefaultJob`. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DnsTSIGDefaultJob
```

The default PM job with the default value is as follows:

```
PmJob=DnsTSIGDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="DnsTSIGDefaultJob"
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE
MeasurementReader=mr_1
  measurementReaderId="mr_1"
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,
      PmGroup=DnsTSIGStatisticsGroup"
    measurementTypeRef=[] <empty>
```

This performance measurement group includes following measurements:

- `ipworksDnsServTSIGSuccess`
- `ipworksDnsServTSIGFailure`

3.4.1 ipworksDnsServTSIGSuccess

Attribute	Value
Description	The number of DNS packets with valid TSIG signatures in the current GP.
Condition	The value is incremented for every successful processing of a packet due to valid TSIG key.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Node level
Measurement Object Class	DnsTSIGStatisticsGroup

3.4.2 ipworksDnsServTSIGFailure

Attribute	Value
Description	The number of DNS packets with invalid TSIG signatures in the current GP.
Condition	The value is incremented for every processing of a DNS packet which resulted in failure due to invalid TSIG keys.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsTSIGStatisticsGroup

3.5 DnsDNSSECStatisticsGroup

This performance measurement group, called `DnsDNSSECStatisticsGroup`, contains measurements for events which are related to DNSSEC signatures processed. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DnsDNSSECStatisticsGroup
```

The default PM job, which is a measurement collection job, is `DnsSECDefaultJob`. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DnsSECDefaultJob
```

The default PM job with the default value is as follows:



```
PmJob=DnsSECDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="DnsSECDefaultJob"
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE
MeasurementReader=mr_1
measurementReaderId="mr_1"
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
  groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,
  PmGroup=DnsDNSSECStatisticsGroup"
  measurementTypeRef=[] <empty>
```

This performance measurement group includes following measurements:

- ipworksDnsServDNSSECSuccess
- ipworksDnsServDNSSECFailure

3.5.1 ipworksDnsServDNSSECSuccess

Attribute	Value
Description	The number of DNSSEC valid signatures processed in the current GP.
Condition	The value is incremented for every successfully processed DNSSEC valid signature.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsDNSSECStatisticsGroup

3.5.2 ipworksDnsServDNSSECFailure

Attribute	Value
Description	The number of invalid DNSSEC signatures processed in the current GP.
Condition	The value is incremented for every unsuccessfully processed DNSSEC invalid signature.
Collection Method	CC
Aggregation	SUM



Attribute	Value
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsDNSSECStatisticsGroup

3.6 DnsASDNSStatisticsGroup

This performance measurement group, called `DnsASDNSStatisticsGroup`, contains measurements for events which are related to ActiveSelect DNS monitor packets. The directory of the MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DnsASDNSStatisticsGroup

The default PM job, which is a measurement collection job, is `DnsASDNSDefaultJob`. The directory of the MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DnsASDNSDefaultJob

The default PM job with the default value is as follows:

```
PmJob=DnsASDNSDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="DnsASDNSDefaultJob"
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE
MeasurementReader=mr_1
  measurementReaderId="mr_1"
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,
      PmGroup=DnsASDNSStatisticsGroup"
    measurementTypeRef=[] <empty>
```

This performance measurement group includes following measurements:

- ipworksDnsServASDNSSuccess
- ipworksDnsServASDNSFailure
- ipworksDnsServASDNSRefused
- ipworksDnsServASDNSTotal



3.6.1 ipworksDnsServASDNSSuccess

Attribute	Value
Description	The number of ActiveSelect DNS monitor information packets in the current GP.
Condition	The value is incremented for every successful processing of packets received from ASDNS monitor.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsASDNSSStatisticsGroup

3.6.2 ipworksDnsServASDNSFailure

Attribute	Value
Description	The number of ActiveSelect DNS monitor packets that had errors in the current GP.
Condition	The value is incremented for every processing of a packet received from an ASDNS monitor, which resulted in a failure due to invalid format or other problems.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsASDNSStatisticsGroup

3.6.3 ipworksDnsServASDNSRefused

Attribute	Value
Description	The number of ActiveSelect DNS monitor packets that were refused for security reasons in the current GP.
Condition	The value is incremented for every processing of a packet received from an ASDNS monitor which resulted in a failure due to mismatch of TSIG Keys.
Collection Method	CC



Attribute	Value
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsASDNSStatisticsGroup

3.6.4 ipworksDnsServASDNSTotal

Attribute	Value
Description	The number of total ActiveSelect DNS monitor packets in the current GP.
Condition	The value is incremented for every processing of a packet received from an ASDNS monitor.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsASDNSStatisticsGroup

3.7 DnsNotifyStatisticsGroup

This performance measurement group, called `DnsNotifyStatisticsGroup`, contains measurements related to DNS notify events. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DnsNotifyStatisticsGroup
```

The default PM job, which is a measurement collection job, is `DnsNotifyDefaultJob`. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DnsNotifyDefaultJob
```

The default PM job with the default value is as follows:



```
PmJob=DnsNotifyDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="DnsNotifyDefaultJob"
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE
MeasurementReader=mr_1
  measurementReaderId="mr_1"
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,
      PmGroup=DnsNotifyStatisticsGroup"
    measurementTypeRef=[] <empty>
```

This performance measurement group includes following measurements:

- ipworksDnsServNotifyFailure
- ipworksDnsServNotifyTotal

3.7.1 ipworksDnsServNotifyFailure

Attribute	Value
Description	The number of failed notifies.
Condition	The value is incremented when a notify message is failed to process in the current GP.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsNotifyStatisticsGroup

3.7.2 ipworksDnsServNotifyTotal

Attribute	Value
Description	The number of total notifies.
Condition	The value is incremented when a notify message is received in the current GP.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Node level
Measurement Object Class	DnsNotifyStatisticsGroup

3.8 DnsPerBladeStatisticsGroup

This performance measurement group, called `DnsPerBladeStatisticsGroup`, contains measurements for events which are related to DNS in node level. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DnsPerBladeStatisticsGroup
```

This performance measurement group contains two types of PM jobs, measurement collection job and threshold monitoring job.

The default measurement collection job for this performance measurement group is `DnsPerBladeDefaultJob`. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DnsPerBladeDefaultJob
```

The default PM job with the default value is as follows:

```
PmJob=DnsPerBladeDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="DnsPerBladeDefaultJob"
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE
MeasurementReader=mr_1
  measurementReaderId="mr_1"
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,
      PmGroup=DnsPerBladeStatisticsGroup"
    measurementTypeRef=[] <empty>
```

In addition to the default measurement collection job, the performance measurement group includes the following default threshold monitoring jobs:

- `DnsForwardFailureRateDefaultJob`, see Section 3.8.2 on page 22
- `DnsQueryFailureRateDefaultJob`, see Section 3.8.3 on page 23
- `DnsTPSDefaultJob`, see Section 3.8.4 on page 24

This performance measurement group includes following measurements:



- ipworksDnsServConfigUpTime
- ipworksDnsServForwardFailureRate
- ipworksDnsServQueryFailureRate
- ipworksDnsServTransactionPerSecond

3.8.1 ipworksDnsServConfigUpTime

Attribute	Value
Description	The number of seconds elapse since the DNS service starts.
Condition	The value is incremented every second since the DNS service process starts in the current node.
Collection Method	Gauge
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsPerBladeStatisticsGroup

3.8.2 ipworksDnsServForwardFailureRate

The default PM job, which is a threshold monitoring job, for this measurement is DnsForwardFailureRateDefaultJob. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DnsForwardFailureRateDefaultJob
```

The default PM job with the default value is follows:



```

PmJob=DnsForwardFailureRateDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=ONE_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=THRESHOLDJOB
pmJobId="DnsForwardFailureRateDefaultJob"
reportingPeriod=ONE_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=mr_1
  measurementReaderId="mr_1"
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef=[] <empty>
    measurementTypeRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,
      PmGroup=DnsPerBladeStatisticsGroup,
      MeasurementType=ipworksDnsServForwardFailureRate"
    PmThresholdMonitoring=Thres-ForwardFailureRate-WARNING
    pmThresholdMonitoringId="Thres-ForwardFailureRate-WARNING"
    thresholdHigh=30
    thresholdLow=25
    thresholdSeverity=WARNING

```

Attribute	Value
Description	The failure rate of unsuccessful queries that DNS forwards to another DNS for recursive query in the current GP. ⁽¹⁾
Condition	The average value of the failure rates (which are sampled and calculated every 10 seconds) of unsuccessful queries that DNS forwards to another DNS in the current GP.
Collection Method	Gauge
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsPerBladeStatisticsGroup

(1) The value might be inaccurate when the traffic is not stable or the total traffic is extremely low.

3.8.3 ipworksDnsServQueryFailureRate

The default PM job, which is a threshold monitoring job, for this measurement is DnsQueryFailureRateDefaultJob. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DnsQueryFailureRateDefaultJob
```

The default PM job with the default value is as follows:



```
PmJob=DnsQueryFailureRateDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=ONE_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=THRESHOLDJOB
pmJobId="DnsQueryFailureRateDefaultJob"
reportingPeriod=ONE_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=mr_1
  measurementReaderId="mr_1"
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef=[] <empty>
    measurementTypeRef="ManagedElement=<Node Name>,SystemFunctions=1,
      Pm=1,PmGroup=DnsPerBladeStatisticsGroup,
      MeasurementType=ipworksDnsServQueryFailureRate"
  PmThresholdMonitoring=Thres-QueryFailureRate-WARNING
  pmThresholdMonitoringId="Thres-QueryFailureRate-WARNING"
  thresholdHigh=30
  thresholdLow=25
  thresholdSeverity=WARNING
```

Attribute	Value
Description	<p>The failure rate of failed DNS query in the current GP.⁽¹⁾</p> <p>In IPWorks, the following cases are counted as DNS query failure:</p> <ul style="list-style-type: none">• Referral query• NXRRSET• NXDOMAIN• Timeout• Servfail• Transfer failure
Condition	The average value of the failure rates (which are sampled and calculated every 10 seconds) of failed DNS query in the current GP.
Collection Method	Gauge
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsPerBladeStatisticsGroup

(1) The value might be inaccurate when the traffic is not stable or the total traffic is extremely low.



3.8.4 ipworksDnsServTransactionPerSecond

The default PM job, which is a threshold job, for this measurement is DnsTPSDefaultJob. The directory of the MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DnsTPSDefaultJob

The default PM job with the default value is as follows:

```
PmJob=DnsTPSDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=ONE_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=THRESHOLDJOB
pmJobId="DnsTPSDefaultJob"
reportingPeriod=ONE_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=mr_1
  measurementReaderId="mr_1"
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef=[] <empty>
    measurementTypeRef="ManagedElement=<Node Name>,SystemFunctions=1,
      Pm=1,PmGroup=DnsPerBladeStatisticsGroup,
      MeasurementType=ipworksDnsServTransactionPerSecond"
    PmThresholdMonitoring=Thres-TPS-MAJOR
    pmThresholdMonitoringId="Thres-TPS-MAJOR"
    thresholdHigh=90000
    thresholdLow=89000
    thresholdSeverity=MAJOR
    PmThresholdMonitoring=Thres-TPS-MINOR
    pmThresholdMonitoringId="Thres-TPS-MINOR"
    thresholdHigh=80000
    thresholdLow=79000
    thresholdSeverity=MINOR <default>
```

Attribute	Value
Description	The average number of DNS query received by the DNS server in every second in the current GP.
Condition	The average value of DNS query received by the DNS server every second in the current GP.
Collection Method	Gauge
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	DnsPerBladeStatisticsGroup





4 Measurements for ENUM

This section provides the performance measurement data regarding ENUM. In addition, the default PM job is described for each performance measurement group.

4.1 EnumServerIdentityGroup

This performance measurement group, called `EnumServerIdentityGroup`, contains a counter for event which is related to ENUM server running. The directory of the MO is as follows:

`ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=EnumServerIdentityGroup`

The default PM job, which is a measurement collection job, is `ENUMQueryDefaultJob`. The directory of this default job MO is as follows:

`ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=ENUMQueryDefaultJob`.

The default job with the default value is as follows:

```
PmJob=ENUMQueryDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="ENUMQueryDefaultJob"
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=mr_1
MeasurementReader=mr_2

(Pm=1)>show all PmJob=ENUMQueryDefaultJob
PmJob=ENUMQueryDefaultJob
currentJobState=ACTIVE
MeasurementReader=mr_1
measurementSpecification
groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=EnumMessageGroup"
MeasurementReader=mr_2
measurementSpecification
groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=EnumServerIdentity
```

This performance measurement group includes following measurement:

— `ipworksEnumProcessUpTime`



4.1.1 ipworksEnumProcessUpTime

Attribute	Value
Description	The number of seconds since the server was started.
Condition	The value is incremented for every second when the ENUM server is running.
Collection Method	Gauge
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Node level
Measurement Object Class	EnumServerIdentityGroup

4.2 EnumMessageGroup

This performance measurement group, called EnumMessageGroup, contains measurements for events which are related to ENUM queries. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=EnumMessageGroup
```

The default PM job, which is a measurement collection job, is ENUMQueryDefaultJob. The directory of this default job MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=ENUMQueryDefaultJob.
```

The default job with the default value is as follows:



```

PmJob=ENUMQueryDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="ENUMQueryDefaultJob"
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=mr_1
MeasurementReader=mr_2

(Pm=1)>show all PmJob=ENUMQueryDefaultJob
PmJob=ENUMQueryDefaultJob
currentJobState=ACTIVE
MeasurementReader=mr_1
measurementSpecification
  groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=EnumMessageGroup"
MeasurementReader=mr_2
measurementSpecification
  groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=EnumServerIdentity

```

This performance measurement group includes following measurements:

- ipworksEnumCounterSuccessfulRequests
- ipworksEnumCounterInvalidFormat
- ipworksEnumCounterServerFailed
- ipworksEnumCounterNameError
- ipworksEnumCounterNotImplemented
- ipworksEnumCounterRefused
- ipworksEnumCounterSingleDN
- ipworksEnumCounterInsufficientDigits
- ipworksEnumCounterNoDn
- ipworksEnumCounterRequestErrors
- ipworksEnumCounterTruncatedResponses
- ipworksEnumCounterForwardedRequests
- ipworksEnumCounterRequestsFailed
- ipworksEnumCounterDBFailed
- ipworksEnumCounterDBSearch
- ipworksEnumCounterTotalFailed
- ipworksEnumCounterTotalRequest



- ipworksEnumCounterRCSeOtherOPRequests
- LDAPRequestForDNSCHED
- LDAPResponseForDNSCHED
- TargetHitIncacheForDNSCHED
- SOAPRequestReceivedForDNSCHED
- SOAPRequestReceivedForDNRANGE
- ENUMDNSCHEDCachedNumber
- ENUMDNRANGECachedNumber

4.2.1 ipworksEnumCounterSuccessfulRequests

Attribute	Value
Description	The number of successful queries and status requests made to the ENUM server. A successful query is defined as an ENUM request in a zone, for which the server is authoritative, which results in a NOERROR response.
Condition	The value is incremented for every ENUM request received that results in a success.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.2 ipworksEnumCounterInvalidFormat

Attribute	Value
Description	The number of queries made to the ENUM server that have an invalid DNS format within the DNS header or QNAME field of the question section.
Condition	The value is incremented for every ENUM request received that is in invalid format.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.3 ipworksEnumCounterServerFailed

Attribute	Value
Description	The number of queries made to the ENUM server, for which the server is authoritative, while the NDB database cluster is temporarily unavailable. These queries result in a SERVFAIL response.
Condition	The value is incremented for every ENUM request received results in a SERVFAIL response.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.4 ipworksEnumCounterNameError

Attribute	Value
Description	The number of unsuccessful queries made to the ENUM server. An unsuccessful query is defined as an ENUM request in a zone for which the server is authoritative, but where no DN or DNRANGE exists.
Condition	The value is incremented for every ENUM request that results in 'a Name Error' response.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup



4.2.5 ipworksEnumCounterNotImplemented

Attribute	Value
Description	The number of ENUM requests made to the ENUM Server which resulted in 'Not Implemented' response.
Condition	The value is incremented for every ENUM request received that results in a 'Not Implemented' response.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.6 ipworksEnumCounterRefused

Attribute	Value
Description	The number of ENUM queries received which resulted in refusal.
Condition	The value is incremented for every ENUM request received that results in a 'refusal' response.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.7 ipworksEnumCounterSingleDN

Attribute	Value
Description	The number of ENUM requests that encounter an entry in the ENUMDNSCHED Table.
Condition	The value is incremented for every ENUM query made to a single DN.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.8 ipworksEnumCounterInsufficientDigits

Attribute	Value
Description	The number of ENUM requests that encounter an ambiguous result from the ENUMDN RANGE Decode Tree due to insufficient digits.
Condition	The value is incremented on receipt of an ENUM request with Insufficient Digits.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.9 ipworksEnumCounterNoDn

Attribute	Value
Description	The number of ENUM requests whose DDS does not encounter an entry in either the ENUMDN RANGE or ENUMDNSCHED Tables.
Condition	The value is incremented for every ENUM request received that results in a NoDn response.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.10 ipworksEnumCounterRequestErrors

Attribute	Value
Description	The number of ENUM requests which resulted in errors while processing the request.



Attribute	Value
Condition	The value is incremented for every ENUM request received that resulted in errors.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.11 ipworksEnumCounterTruncatedResponses

Attribute	Value
Description	The number of ENUM requests which resulted in truncated responses.
Condition	The value is incremented for every ENUM request received that results in a truncated response.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.12 ipworksEnumCounterForwardedRequests

Attribute	Value
Description	The number of ENUM requests that have been forwarded to a resolver due to the results of a destnode.
Condition	The value is incremented for every ENUM request that has been forwarded to a resolver due to the results of a destnode.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup



4.2.13 ipworksEnumCounterRequestsFailed

Attribute	Value
Description	The number of ENUM requests that have resulted in error responses irrespective of error type.
Condition	The value is incremented for every ENUM request received that results in a failure.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.14 ipworksEnumCounterDBFailed

Attribute	Value
Description	Number of total failed requests caused by NDB malfunctioning except Cluster Down, including: 1) unable to generate and construct the search condition of the transaction; 2) unable to do the lock operation; 3) the result of the executing transaction is unsuccessful.
Condition	The value is incremented for every received ENUM request that resulted in a failure caused by NDB malfunctioning except Cluster Down.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.15 ipworksEnumCounterDBSearch

Attribute	Value
Description	Number of total requests that ENUM sends to do the DB search.
Condition	The value is incremented when every ENUM sends the query to NDB cluster.
Collection Method	CC



Attribute	Value
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.16 ipworksEnumCounterTotalFailed

Attribute	Value
Description	The number of total query failures of ENUM, ERH and DNS. This measurement will be used to determine whether the ENUM, Total Query Failure Error alarm needs to be raised.
Condition	The value is incremented for every received ENUM request that resulted in a failure.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.17 ipworksEnumCounterTotalRequest

Attribute	Value
Description	The number of total ENUM, ERH and DNS request, ENUM server has received.
Condition	The value is incremented for every received ENUM request.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup



4.2.18 ipworksEnumCounterRCSeOtherOPRequests

Attribute	Value
Description	The total number of ENUM, ERH, and DNS requests that the ENUM server receives from external operator nodes.
Condition	The value is incremented as soon as the ENUM server receives an ENUM, ERH, or DNS request from external operator nodes.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.19 LDAPRequestForDNSCHED

Attribute	Value
Description	The number of total LDAP requests
Condition	The value is incremented for every LDAP request
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.20 LDAPResponseForDNSCHED

Attribute	Value
Description	The number of total LDAP responses
Condition	The value is incremented for every LDAP response
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

**4.2.21 TargetHitIncacheForDNSCHED**

Attribute	Value
Description	The number of total target hits in cache
Condition	The value is incremented for every target
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.22 SOAPRequestReceivedForDNSCHED

Attribute	Value
Description	The number of total SOAP requests received
Condition	The value is incremented for every EN
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.23 SOAPRequestReceivedForDNRANGE

Attribute	Value
Description	The number of total SOAP requests received
Condition	The value is incremented for every EN
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup



4.2.24 ENUMDNSCHEDCachedNumber

Attribute	Value
Description	The number of total ENUM DNSCH
Condition	The value is incremented for every
Collection Method	Gauge
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.2.25 ENUMDNRANGECachedNumber

Attribute	Value
Description	The number of total ENUM DNRAN
Condition	The value is incremented for every
Collection Method	Gauge
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	EnumMessageGroup

4.3 EnumTPSAlarmGroup

This performance measurement group, called EnumTPSAlarmGroup, contains measurements for events which are related to ENUM TPS alarms. The directory of the MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=EnumTPSAlarmGroup

The default PM job, which is a threshold monitoring job, is ENUMTPSDefaultJob. The directory of this default job MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=ENUMTPSDefaultJob.

The default job with the default value is as follows:



```
(Pm=1)>show -v PmJob=ENUMTPSDefaultJob
PmJob=ENUMTPSDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=ONE_MIN
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=THRESHOLDJOB
pmJobId="ENUMTPSDefaultJob"
reportingPeriod=ONE_MIN
requestedJobState=ACTIVE <default>
MeasurementReader=mr_1
MeasurementReader=mr_2
(Pm=1)>
(Pm=1)>show all PmJob=ENUMTPSDefaultJob
PmJob=ENUMTPSDefaultJob
currentJobState=ACTIVE
granularityPeriod=ONE_MIN
jobType=THRESHOLDJOB
reportingPeriod=ONE_MIN
MeasurementReader=mr_1
measurementSpecification
measurementTypeRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=EnumTPSAlar
PmThresholdMonitoring=Thres-QueryFailureError-Warning
thresholdHigh=30
thresholdLow=25
thresholdSeverity=WARNING
MeasurementReader=mr_2
measurementSpecification
measurementTypeRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=EnumTPSAlar
PmThresholdMonitoring=Thres-TotalQueryFailureError-Warning
thresholdHigh=30
thresholdLow=25
thresholdSeverity=WARNING
```

This performance measurement group includes following measurements:

- ipworksEnumQueryFailureErrorRate
- ipworksEnumTotalQueryFailureErrorRate

4.3.1 ipworksEnumQueryFailureErrorRate

The measurement result determines whether the alarm ENUM, Query Failure Error is issued.

Attribute	Value
Description	The failure rate of failed ENUM query.



Attribute	Value
Condition	<p>The average value of the failure rates (which are sampled and calculated every 10 seconds) of failed ENUM query in the current GP.</p> <p>In IPWorks, the following cases are counted as ENUM query failure:</p> <ul style="list-style-type: none"> • FORMERR • SERVFAIL • NXDOMAIN • NOTIMP • NOTIMP
Collection Method	Gauge
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	EnumTPSAlarmGroup

4.3.2

ipworksEnumTotalQueryFailureErrorRate

The measurement result determines whether the alarm ENUM, Total Query Failure Error is issued.

Attribute	Value
Description	The failure rate of total failed ENUM query (including DNS, ENUM, and ERH query failures).
Condition	The average value of the failure rates (which are sampled and calculated every 10 seconds) of failed ENUM query in the current GP.
Collection Method	Gauge
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	EnumTPSAlarmGroup



4.4 EnumPerBladeStatisticsGroup

This performance measurement group, called EnumPerBladeStatisticsGroup, contains measurements for events which are related to ENUM in node level. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=EnumPerBladeStatisticsGroup
```

The default PM job is ENUMServTPSDefaultJob. The directory of this default job MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=ENUMServTPSDefaultJob
```

The default job with the default value is as follows:

```
(Pm=1)>show -v PmJob=ENUMServTPSDefaultJob
PmJob=ENUMServTPSDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="ENUMServTPSDefaultJob"
reportContentGeneration=CHANGED_ONLY <default>
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=mr_1
(Pm=1)>show all PmJob=ENUMServTPSDefaultJob
PmJob=ENUMServTPSDefaultJob
currentJobState=ACTIVE
MeasurementReader=mr_1
measurementSpecification

groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=EnumPerBladeStatisticsGroup"
(Pm=1)>
```

This performance measurement group includes following measurement:

— ipworksEnumServTransactionPerSecond

4.4.1 ipworksEnumServTransactionPerSecond

Attribute	Value
Description	The average number of ENUM query received by the ENUM server in every second in the current GP.
Condition	The average value of ENUM query received by the ENUM server every second in the current GP.
Collection Method	Gauge
Aggregation	AVG



Attribute	Value
Result Type	Integer
Application Level	Node level
Measurement Object Class	EnumPerBladeStatisticsGroup





5 Measurements for ERH

This section provides the performance measurement data regarding ERH. In addition, the default PM job is described for each performance measurement group.

5.1 ERHGroup

This performance measurement group, called **ERHGroup**, contains a measurement for events which are related to ERH query. The directory of the MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=ERHGroup

The default PM job, which is a measurement collection job, is **ERHQueryDefaultJob**. The directory of this default job MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=ERHQueryDefaultJob.

The default job with the default value is as follows:

```
PmJob=ERHQueryDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=ONE_MIN
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="ERHQueryDefaultJob"
reportingPeriod=ONE_MIN
requestedJobState=ACTIVE <default>
MeasurementReader=mr_1
(Pm=1)>show all PmJob=ERHQueryDefaultJob
PmJob=ERHQueryDefaultJob
currentJobState=ACTIVE
granularityPeriod=ONE_MIN
reportingPeriod=ONE_MIN
MeasurementReader=mr_1
measurementSpecification
groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=ERHGroup"
```

This performance measurement group includes following measurements:

- ERHLNPQ
- ERHFailedLNPQ
- ERHLNPQWithNPDI
- ERHTollFreeQ
- ERHFailedTollFreeQ



- ERHTollFreeQWithCic
- ERHNPQusingINAP
- ERHNPfailedQusingINAP
- ERHNPQusingINAPwithPorted
- ERHNPQusingMAP
- ERHNPfailedQusingMAP
- ERHNPQusingMAPwithPorted
- ERHTotalQuery
- ERHTotalFailedQuery
- ERHNPQusingLDAP
- ERHNPfailedQusingLDAP
- ERHTollFreeQWithGEO
- ERHTollFreeQWithGEOandCic
- ERHNPQusingLDAPwithPorted

5.1.1

ERHLNPQ

Attribute	Value
Description	The total number of LNP queries.
Condition	The value is incremented for every LNP query.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.2

ERHFailedLNPQ

Attribute	Value
Description	The number of all kinds of failed LNP queries.
Condition	The value is incremented for every failure of a LNP query (failed to send ERH or received by ERH which error code).



Attribute	Value
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.3

ERHLNPQWithNPDI

Attribute	Value
Description	The total number of LNP queries that resulted in number ported indication.
Condition	The value is incremented for every successful LNP query sent by ERH and received by ENUM with routing number.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.4

ERHTollFreeQ

Attribute	Value
Description	The total number of the toll-free queries.
Condition	The value is incremented for every TOLLFREE query.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.5 ERHFailedTollFreeQ

Attribute	Value
Description	The total number of failed toll-free queries.
Condition	The value is incremented for every failure of a TOLLFREE query (failed to send ERH or received by ERH which error code).
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.6 ERHTollFreeQWithCic

Attribute	Value
Description	The total number of toll-free queries that got a cic as answer.
Condition	The value is incremented for every successful query that got a cic as answer, sent by ERH and received by ENUM with routing number.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.7 ERHNPQusingINAP

Attribute	Value
Description	The total number of INAP queries.
Condition	The value is incremented for every INAP query.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup



5.1.8 ERHNPFailedQusingINAP

Attribute	Value
Description	The total number of failed INAP queries.
Condition	The value is incremented for every failure of an INAP query (failed to send ERH or received by ERH which error code).
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.9 ERHNPPQusingINAPwithPorted

Attribute	Value
Description	The total number of toll-free queries that got a called party ID and cic as answer.
Condition	The value is incremented for every successful query that got a called party ID and cic as answer, sent by ERH and received by ENUM with routing number.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.10 ERHNPPQusingMAP

Attribute	Value
Description	The total number of MAP queries.
Condition	The value is incremented for every MAP query.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.11 ERHNPfailedQusingMAP

Attribute	Value
Description	The total number of failed MAP queries.
Condition	The value is incremented for every failure of a MAP query (failed to send ERH or received by ERH which error code).
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.12 ERHNPQusingMAPwithPorted

Attribute	Value
Description	The total number of MAP queries that resulted in number ported indication.
Condition	The value is incremented for every successful MAP query sent by ERH and received by ENUM with routing number.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.13 ERHTotalQuery

Attribute	Value
Description	The total number of NP queries that ERH sends.
Condition	Incremented when ERH sends an NP query.



Attribute	Value
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.14 ERHTotalFailedQuery

Attribute	Value
Description	The total number of NP queries that either ERH fails to send or ERH fails to get a correct response according to.
Condition	The value is incremented as long as either ERH fails to send an NP query or ERH receives a response with error code.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.15 ERHNPQusingLDAP

Attribute	Value
Description	The number of NP queries via LDAP protocol.
Condition	The value is incremented for every query via LDAP protocol.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

**5.1.16 ERHNPfailedQusingLDAP**

Attribute	Value
Description	The number of NP queries using LDAP that failed to get a response from the external npdb.
Condition	The value is incremented for every failure of a query via LDAP (Failed to send to CUDB or the return code from CUDB is 51,52,53 or 80).
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.17 ERHTollFreeQWithGEO

Attribute	Value
Description	Total number of toll-free queries that got an geographic number.
Condition	The value is incremented for every successful query that got an geographic number as answer, sent by ERH and received by ENUM with routing number.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.18 ERHTollFreeQWithGEOandCic

Attribute	Value
Description	Total number of toll-free queries that got cic and geographic number.
Condition	The value is incremented for every successful query that got cic and geographic number as answer, sent by ERH and received by ENUM with routing number.
Collection Method	CC
Aggregation	SUM



Attribute	Value
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.1.19 ERHNPQusingLDAPwithPorted

Attribute	Value
Description	The number of NP queries using LDAP that got a reply indicating that the number was ported.
Condition	The value is incremented for every successful query sent to LDAP and received by ENUM with routing number.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	ERHGroup

5.2 ERHTPSAlarmGroup

This performance measurement group, called ERHTPSAlarmGroup, contains a measurement for events which are related to ERH TPS alarm. The directory of the MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=ERHTPSAlarmGroup

The default PM job, which is a threshold monitoring job, is ERHTPSDefaultJob. The directory of this default job MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=ERHTPSDefaultJob.

The default job with the default value is as follows:



```

(Pm=1)>show -v PmJob=ERHTPSDefaultJob
PmJob=ERHTPSDefaultJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=THRESHOLDJOB
pmJobId="ERHTPSDefaultJob"
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=mr_1
MeasurementReader=mr_2
MeasurementReader=mr_3
MeasurementReader=mr_4
(Pm=1)>show all PmJob=ERHTPSDefaultJob
PmJob=ERHTPSDefaultJob
currentJobState=ACTIVE
jobType=THRESHOLDJOB
MeasurementReader=mr_1
  measurementSpecification
    measurementTypeRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=ERHTPSAlarm
PmThresholdMonitoring=Thres-TransPerSecond-MAJOR
  thresholdHigh=8000
  thresholdLow=7900
  thresholdSeverity=MAJOR
PmThresholdMonitoring=Thres-TransPerSecond-MINOR
  thresholdHigh=7200
  thresholdLow=7100
PmThresholdMonitoring=Thres-TransPerSecond-WARNING
  thresholdHigh=6400
  thresholdLow=6300
  thresholdSeverity=WARNING
MeasurementReader=mr_2
  measurementSpecification
    measurementTypeRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=ERHTPSAlarm
PmThresholdMonitoring=Thres-FailedNPQuery-WARING
  thresholdHigh=5
  thresholdLow=4
  thresholdSeverity=WARNING
MeasurementReader=mr_3
  measurementSpecification
    measurementTypeRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=ERHTPSAlarm
PmThresholdMonitoring=Thres-FailedTollFreeQuery-WARING
  thresholdHigh=5
  thresholdLow=4
  thresholdSeverity=WARNING
MeasurementReader=mr_4
  measurementSpecification
    measurementTypeRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=ERHTPSAlarm
PmThresholdMonitoring=Thres-FailedErhQuery-WARING
  thresholdHigh=5
  thresholdLow=4
  thresholdSeverity=WARNING

```

This performance measurement group includes following measurements:

- ERHTransactionPerSecond
- FailedNPThreshold
- FailedTollFreeThreshold
- FailedERHQueryThreshold



5.2.1 ERHTransactionPerSecond

The measurement result determines whether the alarm ERH, TPS Exceed Threshold is issued.

Attribute	Value
Description	The average number of ERH query received by the ENUM server in every second.
Condition	The average number of ERH query received by the ENUM server every second in the current GP.
Collection Method	Gauge
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	ERHTPSAlarmGroup

5.2.2 FailedNPThreshold

The measurement result determines whether the alarm ERH, NP Query Error is issued.

Attribute	Value
Description	The failure rate of failed NP query.
Condition	The average value of the failure rates (which are sampled and calculated every 10 seconds) of failed NP query in the current GP.
Collection Method	Gauge
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	ERHTPSAlarmGroup

5.2.3 FailedTollFreeThreshold

The measurement result determines whether the alarm ERH, Toll-free Query Error is issued.

Attribute	Value
Description	The failure rate of failed Toll-free query.



Attribute	Value
Condition	The average value of the failure rates (which are sampled and calculated every 10 seconds) of failed Toll-free query in the current GP.
Collection Method	Gauge
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	ERHTTPSAlarmGroup

5.2.4 FailedERHQueryThreshold

The measurement result determines whether the alarm ERH, Total Query Error is issued.

Attribute	Value
Description	The failure rate of failed query (including NP and Toll-free query).
Condition	The average value of the failure rates (which are sampled and calculated every 10 seconds) of failed query in the current GP.
Collection Method	Gauge
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	ERHTTPSAlarmGroup



6 Measurements for Element Manager

This section describes the performance measurement data regarding Element Manager. In addition, the default PM job is described for each performance measurement group.

6.1 SsGroup

This performance measurement group, called SsGroup, contains measurements for events related to the Element Manager. The directory of the MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=SsGroup

The default measurement collection job for this performance measurement group is ssdefaultjob. The directory of the MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=ssdefaultjob

The default PM job with the default value is as follows:

```
(PmJob=ssdefaultjob)>show -v all
PmJob=ssdefaultjob
  compressionType=[] <empty>
  currentJobState=STOPPED <read-only>
  granularityPeriod=FIFTEEN_MIN <default>
  jobControl=FULL <default> <read-only>
  jobGroup=[] <empty>
  jobPriority=MEDIUM <default>
  jobType=MEASUREMENTJOB <default>
  pmJobId="ssdefaultjob"
  reportContentGeneration=CHANGED_ONLY <default>
  reportingPeriod=FIFTEEN_MIN <default>
  requestedJobState=STOPPED
  MeasurementReader=mr_1
    measurementReaderId="mr_1"
    moInstances=[] <empty>
    thresholdDirection=[] <empty>
    thresholdRateOfVariation=PER_SECOND <default>
    measurementReaderNameValue=[] <empty> <read-only>
    measurementSpecification
      groupRef="ManagedElement=6-2, SystemFunctions=1, Pm=1, PmGroup=SsGroup"
      measurementTypeRef=[] <empty>
```

This performance measurement group includes following measurements:

- SsEnumDnRangeNumberGauge
- SsEnumDnSchedNumberGauge



6.1.1 SsEnumDnRangeNumberGauge

Attribute	Value
Description	The total number of EnumDnRange for the ENUM server.
Condition	The value is changed once an EnumDnRange is created or deleted.
Collection Method	Gauge
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	SsGroup

6.1.2 SsEnumDnSchedNumberGauge

Attribute	Value
Description	The total number of EnumDnSched for the ENUM server.
Condition	The value is changed once an EnumDnSched is created or deleted.
Collection Method	Gauge
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	SsGroup



7 Measurements for Radius AAA

This section provides the performance measurement data regarding Radius AAA.

For all the performance measurement groups of Radius AAA, the default PM job is AAARadiusDefaultPmJob. The default PM job is a measurement collection job. The directory of this default job MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=AAARadiusDefaultPmJob.
```

The default job with the default value is as follows:



```
(PmJob=AAARadiusDefaultPmJob)>show -v all
PmJob=AAARadiusDefaultPmJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="AAARadiusDefaultPmJob"
reportContentGeneration=CHANGED_ONLY <default>
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=AAARadiusOtherMr
measurementReaderId="AAARadiusOtherMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
groupRef="ManagedElement=1, SystemFunctions=1, Pm=1, PmGroup=AAARadiusOtherGroup"
measurementTypeRef=[] <empty>
MeasurementReader=AAARadiusAuthMr
measurementReaderId="AAARadiusAuthMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
groupRef="ManagedElement=1, SystemFunctions=1, Pm=1, PmGroup=AAARadiusAuthGroup"
measurementTypeRef=[] <empty>
MeasurementReader=AAARadiusAuthProxyMr
measurementReaderId="AAARadiusAuthProxyMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
groupRef="ManagedElement=1, SystemFunctions=1, Pm=1, PmGroup=AAARadiusAuthProxyGroup"
measurementTypeRef=[] <empty>
MeasurementReader=AAARadiusDynamicAuthzProxyMr
measurementReaderId="AAARadiusDynamicAuthzProxyMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
groupRef="ManagedElement=1, SystemFunctions=1, Pm=1, PmGroup=AAARadiusDynAuthzProxyGroup"
measurementTypeRef=[] <empty>
MeasurementReader=AAARadiusAccProxyMr
measurementReaderId="AAARadiusAccProxyMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
groupRef="ManagedElement=1, SystemFunctions=1, Pm=1, PmGroup=AAARadiusAccProxyGroup"
measurementTypeRef=[] <empty>
MeasurementReader=AAARadiusAccMr
measurementReaderId="AAARadiusAccMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
groupRef="ManagedElement=1, SystemFunctions=1, Pm=1, PmGroup=AAARadiusAccGroup"
measurementTypeRef=[] <empty>
MeasurementReader=AAARadiusDynamicAuthzMr
measurementReaderId="AAARadiusDynamicAuthzMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
groupRef="ManagedElement=1, SystemFunctions=1, Pm=1, PmGroup=AAARadiusDynAuthzGroup"
measurementTypeRef=[] <empty>
MeasurementReader=AAARadiusFrontEndMr
measurementReaderId="AAARadiusFrontEndMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
groupRef="ManagedElement=1, SystemFunctions=1, Pm=1, PmGroup=AAARadiusFrontEndGroup"
measurementTypeRef=[] <empty>
MeasurementReader=AAARadiusIPAllocMr
measurementReaderId="AAARadiusIPAllocMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
```




7.1 AAARadiusAuthGroup

This performance measurement group, called AAARadiusAuthGroup, contains the measurements of events which are related to Radius authentication.

```
>ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAARadiusAuthGroup
```

This performance measurement group includes following measurements:

- ipworksRadiusAuthServTotalAccessRequests
- ipworksRadiusAuthServTotalInvalidRequests
- ipworksRadiusAuthServTotalDupAccessRequests
- ipworksRadiusAuthServTotalAccessAccepts
- ipworksRadiusAuthServTotalAccessRejects
- ipworksRadiusAuthServTotalAccessChallenges
- ipworksRadiusAuthServTotalMalformedAccessRequests
- ipworksRadiusAuthServTotalBadAuthenticators
- ipworksRadiusAuthServTotalPacketsDropped
- ipworksRadiusAuthServTotalUnknownTypes

7.1.1 ipworksRadiusAuthServTotalAccessRequests

Attribute	Value
Description	The number of packets received on the authentication port in the current GP.
Condition	Incremented for every successful receiving of packets on the authentication port.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthGroup



7.1.2 ipworksRadiusAuthServTotalInvalidRequests

Attribute	Value
Description	The number of RADIUS Access-Request packets received from unknown addresses in the current GP.
Condition	Incremented for every receiving of packets from unknown addresses.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthGroup

7.1.3 ipworksRadiusAuthServTotalDupAccessRequests

Attribute	Value
Description	The number of duplicate RADIUS Access-Request packets received in the current GP.
Condition	Incremented for every receiving of duplicate Access-Requests.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthGroup

7.1.4 ipworksRadiusAuthServTotalAccessAccepts

Attribute	Value
Description	The number of RADIUS Access-Accept packets sent in the current GP.
Condition	Incremented for every successful sending of Access-Accepts.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Node level
Measurement Object Class	AAARadiusAuthGroup

7.1.5 ipworksRadiusAuthServTotalAccessRejects

Attribute	Value
Description	The number of RADIUS Access-Reject packets sent in the current GP.
Condition	Incremented for every successful sending of Access-Rejects.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthGroup

7.1.6 ipworksRadiusAuthServTotalAccessChallenges

Attribute	Value
Description	The number of RADIUS Access-Challenge packets sent in the current GP.
Condition	Incremented for every successful sending of Access-Challenges.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthGroup

7.1.7 ipworksRadiusAuthServTotalMalformedAccessRequests

Attribute	Value
Description	The number of malformed RADIUS Access-Request packets received. Bad authenticators and unknown types are not included as malformed Access-Requests in the current GP.



Attribute	Value
Condition	Incremented for every receiving of malformed Access-Requests excluding packets with bad authenticators or of unknown types.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthGroup

7.1.8 ipworksRadiusAuthServTotalBadAuthenticators

Attribute	Value
Description	The number of RADIUS Authentication-Request packets that contain invalid Message Authenticator attributes received in the current GP.
Condition	Incremented for every receiving of Authentication-Request packets with invalid Message Authenticator.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthGroup

7.1.9 ipworksRadiusAuthServTotalPacketsDropped

Attribute	Value
Description	The number of incoming packets silently discarded for some reason other than malformed, bad authenticators or unknown types in the current GP.
Condition	Incremented for every receiving of packets excluded those of malformation, with bad authenticators or of unknown types.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Node level
Measurement Object Class	AAARadiusAuthGroup

7.1.10

ipworksRadiusAuthServTotalUnknownTypes

Attribute	Value
Description	The number of RADIUS packets of unknown type that were received in the current GP.
Condition	Incremented for every receiving of packets of unknown type.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthGroup

7.2

AAARadiusAuthProxyGroup

This performance measurement group, called AAARadiusAuthProxyGroup, contains the measurements of events which are related to Radius proxy authentication.

```
>ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAARadiusAuthProxyGroup
```

This performance measurement group includes following measurements:

- ipworksRadiusAuthClientInvalidServerAddresses
- ipworksRadiusAuthClientTotalAccessRequests
- ipworksRadiusAuthClientTotalAccessRetransmissions
- ipworksRadiusAuthClientTotalAccessAccepts
- ipworksRadiusAuthClientTotalAccessRejects
- ipworksRadiusAuthClientTotalAccessChallenges
- ipworksRadiusAuthClientTotalMalformedAccessResponses
- ipworksRadiusAuthClientTotalBadAuthenticators
- ipworksRadiusAuthClientTotalPendingRequests



- ipworksRadiusAuthClientTotalTimeouts
- ipworksRadiusAuthClientTotalUnknownTypes
- ipworksRadiusAuthClientTotalPacketsDropped

7.2.1 ipworksRadiusAuthClientInvalidServerAddresses

Attribute	Value
Description	The number of RADIUS Access-Response packets received from unknown addresses in the current GP.
Condition	Incremented for every receiving of Access-Responses from unknown addresses.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthProxyGroup

7.2.2 ipworksRadiusAuthClientTotalAccessRequests

Attribute	Value
Description	The number of RADIUS Access-Request packets sent to server. This does not include retransmissions in the current GP.
Condition	Incremented for every sending of Access-Requests excluding retransmissions.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthProxyGroup

7.2.3 ipworksRadiusAuthClientTotalAccessRetransmissions

Attribute	Value
Description	The number of RADIUS Access-Request packets retransmitted to RADIUS authentication server in the current GP.



Attribute	Value
Condition	Incremented for every retransmitting of Access-Requests.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthProxyGroup

7.2.4 ipworksRadiusAuthClientTotalAccessAccepts

Attribute	Value
Description	The number of RADIUS Access-Accept packets (valid or invalid) received from server in the current GP.
Condition	Incremented for every receiving of Access-Accepts.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthProxyGroup

7.2.5 ipworksRadiusAuthClientTotalAccessRejects

Attribute	Value
Description	The number of RADIUS Access-Reject packets (valid or invalid) received from server in the current GP.
Condition	Incremented for every receiving of Access-Rejects.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthProxyGroup



7.2.6 ipworksRadiusAuthClientTotalAccessChallenges

Attribute	Value
Description	The number of RADIUS Access-Challenge packets(valid or invalid)received from server in the current GP.
Condition	Incremented for every successful receiving of Access-Challenges.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthProxyGroup

7.2.7 ipworksRadiusAuthClientTotalMalformedAccessResponses

Attribute	Value
Description	The number of malformed RADIUS Access-Response packets received from server. Malformed packets include packets with an invalid length. Bad authenticators or Message Authenticator attributes or unknown types are not included as malformed access responses in the current GP.
Condition	Incremented for every receiving of malformed Access-Responses excluding packets with bad authenticators, with message authenticator attributes or of unknown types.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthProxyGroup



7.2.8 ipworksRadiusAuthClientTotalBadAuthenticators

Attribute	Value
Description	The number of RADIUS Access-Response packets containing invalid authenticators or Message Authenticator attributes received from server in the current GP.
Condition	Incremented for every receiving of Access-Response with invalid authenticators or message authenticator attributes.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthProxyGroup

7.2.9 ipworksRadiusAuthClientTotalPendingRequests

Attribute	Value
Description	The number of RADIUS Access-Request packets destined for the server that have not yet timed out or received a response.
Condition	Incremented when an Access-Request is sent and decremented due to timeout, retransmission, or receipt of an Access-Accept, Access-Reject, and Access-Challenge.
Collection Method	GAUGE
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthProxyGroup

7.2.10 ipworksRadiusAuthClientTotalTimeouts

Attribute	Value
Description	The number of authentication timeouts to server in the current GP.
Condition	Incremented for every authentication timeout.
Collection Method	CC



Attribute	Value
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthProxyGroup

7.2.11 ipworksRadiusAuthClientTotalUnknownTypes

Attribute	Value
Description	The number of RADIUS packets of unknown type that were received from the server on the authentication port in the current GP.
Condition	Incremented for every receiving of packets of unknown type.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthProxyGroup

7.2.12 ipworksRadiusAuthClientTotalPacketsDropped

Attribute	Value
Description	The number of RADIUS packets that were received from the server on the authentication port and dropped for some other reason in the current GP.
Condition	Incremented for every received but dropped packets.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAuthProxyGroup



7.3 AAARadiusAccGroup

This performance measurement group, called AAARadiusAccGroup, contains the measurements of events which are related to Radius accounting for AAA.

```
>ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAARadiusAccGroup
```

This performance measurement group includes following measurements:

- ipworksRadiusAccServTotalRequests
- ipworksRadiusAccServTotalInvalidRequests
- ipworksRadiusAccServTotalDupRequests
- ipworksRadiusAccServTotalResponses
- ipworksRadiusAccServTotalMalformedRequests
- ipworksRadiusAccServTotalBadAuthenticators
- ipworksRadiusAccServTotalPacketsDropped
- ipworksRadiusAccServTotalNoRecords
- ipworksRadiusAccServTotalUnknownTypes

7.3.1 ipworksRadiusAccServTotalRequests

Attribute	Value
Description	The number of packets received on the accounting port in the current GP.
Condition	Incremented for every successful receiving of packets on accounting port.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccGroup

7.3.2 ipworksRadiusAccServTotalInvalidRequests

Attribute	Value
Description	The number of RADIUS Accounting-Request packets received from unknown addresses in the current GP.
Condition	Incremented for every receiving of Accounting-Requests from unknown addresses.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccGroup

7.3.3 ipworksRadiusAccServTotalDupRequests

Attribute	Value
Description	The number of duplicate RADIUS Accounting-Request packets received in the current GP.
Condition	Incremented for every receiving of duplicate Accounting-Requests.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccGroup

7.3.4 ipworksRadiusAccServTotalResponses

Attribute	Value
Description	The number of RADIUS Accounting-Response packets sent in the current GP.
Condition	Incremented for every successful sending of Accounting-Responses.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Node level
Measurement Object Class	AAARadiusAccGroup

7.3.5 ipworksRadiusAccServTotalMalformedRequests

Attribute	Value
Description	The number of malformed RADIUS Accounting-Request packets received. Bad authenticators or unknown types are not included as malformed Access-Requests in the current GP.
Condition	Incremented for every receiving of malformed Accounting-Requests excluding packets with bad authenticators or of unknown types.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccGroup

7.3.6 ipworksRadiusAccServTotalBadAuthenticators

Attribute	Value
Description	The number of RADIUS Accounting-Request packets that contains an invalid authenticator in the current GP.
Condition	Incremented for every receiving of Accounting-Requests with invalid authenticators.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccGroup



7.3.7 ipworksRadiusAccServTotalPacketsDropped

Attribute	Value
Description	The number of incoming packets silently discarded for a reason other than malformed, bad authenticators, or unknown types in the current GP.
Condition	Incremented for every receiving of packets excluding those of malformation, with bad authenticators or of unknown types.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccGroup

7.3.8 ipworksRadiusAccServTotalNoRecords

Attribute	Value
Description	The number of RADIUS Accounting-Request packets that were received and responded to but not recorded in the current GP.
Condition	Incremented for every not recorded Accounting-Requests.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccGroup

7.3.9 ipworksRadiusAccServTotalUnknownTypes

Attribute	Value
Description	The number of RADIUS packets of unknown type that were received in the current GP.
Condition	Incremented for every receiving of packets of unknown type.
Collection Method	CC
Aggregation	SUM



Attribute	Value
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccGroup

7.4 AAARadiusAccProxyGroup

This performance measurement group, called `AAARadiusAccProxyGroup`, contains the measurements of events which are related to Radius accounting proxy for AAA.

```
>ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAARadiusAccProxyGroup
```

This performance measurement group includes following measurements:

- `ipworksRadiusAccClientInvalidServerAddresses`
- `ipworksRadiusAccClientTotalRequests`
- `ipworksRadiusAccClientTotalRetransmissions`
- `ipworksRadiusAccClientTotalResponses`
- `ipworksRadiusAccClientTotalMalformedResponses`
- `ipworksRadiusAccClientTotalBadAuthenticators`
- `ipworksRadiusAccClientTotalPendingRequests`
- `ipworksRadiusAccClientTotalTimeouts`
- `ipworksRadiusAccClientTotalUnknownTypes`
- `ipworksRadiusAccClientTotalPacketsDropped`

7.4.1 ipworksRadiusAccClientInvalidServerAddresses

Attribute	Value
Description	The number of RADIUS Accounting-Response packets received from unknown addresses in the current GP.
Condition	Incremented for every receiving of Accounting-Responses from unknown addresses.
Collection Method	CC
Aggregation	SUM



Attribute	Value
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccProxyGroup

7.4.2 ipworksRadiusAccClientTotalRequests

Attribute	Value
Description	The number of RADIUS Accounting-Request packets sent. This does not include retransmissions in the current GP.
Condition	Incremented for every sending of Accounting-Requests excluding retransmissions.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccProxyGroup

7.4.3 ipworksRadiusAccClientTotalRetransmissions

Attribute	Value
Description	The number of RADIUS Accounting-Request packets retransmitted to the RADIUS accounting server. Retransmissions include retries where the Identifier and Acct-Delay have been updated, as well as those in which they remain the same in the current GP.
Condition	Incremented for every retransmissions of Accounting-Requests.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccProxyGroup



7.4.4 ipworksRadiusAccClientTotalResponses

Attribute	Value
Description	The number of RADIUS packets received on the accounting port from the server in the current GP.
Condition	Incremented for every successful receiving of packets on the accounting port.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccProxyGroup

7.4.5 ipworksRadiusAccClientTotalMalformedResponses

Attribute	Value
Description	The number of malformed RADIUS Accounting-Response packets received from the server. Malformed packets include packets with an invalid length. Bad authenticators and unknown types are not included as malformed accounting responses in the current GP.
Condition	Incremented for every receiving of malformed Accounting Responses.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccProxyGroup

7.4.6 ipworksRadiusAccClientTotalBadAuthenticators

Attribute	Value
Description	The number of RADIUS Accounting-Response packets that contained invalid authenticators received from the server in the current GP.
Condition	Incremented for every receiving of Accounting-Responses with invalid authenticators.
Collection Method	CC



Attribute	Value
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccProxyGroup

7.4.7 ipworksRadiusAccClientTotalPendingRequests

Attribute	Value
Description	The number of RADIUS Accounting-Request packets sent to the server that have not yet timed out or received a response.
Condition	Incremented when an Accounting-Request is sent and decremented due to a timeout, a retransmission or receipt of an Accounting-Response.
Collection Method	GAUGE
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccProxyGroup

7.4.8 ipworksRadiusAccClientTotalTimeouts

Attribute	Value
Description	The number of accounting timeouts to the server in the current GP.
Condition	Incremented for every accounting timeout.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccProxyGroup



7.4.9 ipworksRadiusAccClientTotalUnknownTypes

Attribute	Value
Description	The number of RADIUS packets of unknown type that were received from the server on the accounting port in the current GP.
Condition	Incremented for every receiving of packets of unknown type.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccProxyGroup

7.4.10 ipworksRadiusAccClientTotalPacketsDropped

Attribute	Value
Description	The number of RADIUS packets that were received from the server on the accounting port and dropped for some other reason in the current GP.
Condition	Incremented for every received but dropped packets.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusAccProxyGroup

7.5 AAARadiusIPallocGroup

This performance measurement group, called AAARadiusIPallocGroup, contains the measurements of events which are related to Radius Server IP Allocation.

```
>ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAARadiusIPallocGroup
```

This performance measurement group includes following measurements:

- ipworksRadiusServActiveIPv4LeaseNum
- ipworksRadiusServActiveIPv4LeasePercentage



- ipworksRadiusServConfiguredIPv4LeaseNum
- ipworksRadiusServActiveIPv6PrefixNum
- ipworksRadiusServActiveIPv6PrefixPercentage
- ipworksRadiusServConfiguredIPv6PrefixNum

7.5.1 ipworksRadiusServActiveIPv4LeaseNum

Attribute	Value
Description	The number of the active IPv4 leases.
Condition	Incremented for every new active IPv4 lease and decremented for every active IPv4 lease that becomes free.
Collection Method	GAUGE
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	AAARadiusIPAllocGroup

7.5.2 ipworksRadiusServActiveIPv4LeasePercentage

Attribute	Value
Description	The percentage of the active IPv4 leases.
Condition	Incremented for every increased percentage of active IPv4 leases and decremented for every decreased percentage of active leases.
Collection Method	GAUGE
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	AAARadiusIPAllocGroup

7.5.3 ipworksRadiusServConfiguredIPv4LeaseNum

Attribute	Value
Description	The number of the configured IPv4 leases.



Attribute	Value
Condition	Changed whenever the operator changes the pool configuration for this server.
Collection Method	GAUGE
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	AAARadiusIPAllocGroup

7.5.4 ipworksRadiusServActiveIPv6PrefixNum

Attribute	Value
Description	The number of the active IPv6 prefix leases.
Condition	Incremented for every new active lease and decremented for every active lease that becomes free.
Collection Method	GAUGE
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	AAARadiusIPAllocGroup

7.5.5 ipworksRadiusServActiveIPv6PrefixPercentage

Attribute	Value
Description	The percentage of the active IPv6 prefix leases.
Condition	Incremented for every increased percentage of active IPv6 prefix leases and decremented for every decreased percentage of active IPv6 prefix leases.
Collection Method	GAUGE
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	AAARadiusIPAllocGroup



7.5.6 ipworksRadiusServConfiguredIPv6PrefixNum

Attribute	Value
Description	The number of the configured IPv6 prefix leases.
Condition	Changed whenever the operator changes the pool configuration for this server.
Collection Method	GAUGE
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	AAARadiusIPAllocGroup

7.6 AAARadiusDynAuthzGroup

This performance measurement group, called AAARadiusDynAuthzGroup, contains the measurements of events which are related to Radius Dynamic Authorization.

```
>ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAARadiusDynAuthzGroup
```

This performance measurement group includes following measurements:

- ipworksRadiusServTotalDisconnectRequests
- ipworksRadiusServTotalFailedDisconnectRequests
- ipworksRadiusServTotalSuccessDisconnectRequests
- ipworksRadiusServTotalCoARequests
- ipworksRadiusServTotalFailedCoARequests
- ipworksRadiusServTotalSuccessCoARequests

7.6.1 ipworksRadiusServTotalDisconnectRequests

Attribute	Value
Description	The number of Disconnect-Request packets sent to NAS by AAA server in the current GP.
Condition	Incremented for every Disconnect-Request packet sent.
Collection Method	CC



Attribute	Value
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusDynAuthzGroup

7.6.2 ipworksRadiusServTotalFailedDisconnectRequests

Attribute	Value
Description	The number of Disconnect-Request packets sending to NAS by AAA server but not receiving valid corresponding ACK messages, that is, time-out, NAK messages or invalid ACK messages in the current GP.
Condition	Incremented for every Disconnect-Request sending but not valid corresponding ACK message receiving, that is, time-out, NAK message or invalid ACK message.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusDynAuthzGroup

7.6.3 ipworksRadiusServTotalSuccessDisconnectRequests

Attribute	Value
Description	The number of Disconnect-Request packets sending to NAS by AAA server and successfully receiving corresponding ACK messages in the current GP.
Condition	Incremented for ACK messages receiving for corresponding Disconnect-Request.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusDynAuthzGroup



7.6.4 ipworksRadiusServTotalCoARequests

Attribute	Value
Description	The number of CoA packets sent to NAS by AAA server in the current GP.
Condition	Incremented for every CoA packet sending.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusDynAuthzGroup

7.6.5 ipworksRadiusServTotalFailedCoARequests

Attribute	Value
Description	The number of CoA packets sending to NAS by AAA Server but not receiving valid corresponding ACK messages, that is, timeout, NAK messages or invalid ACK messages in the current GP.
Condition	Incremented for every CoA packet sending but not valid corresponding ACK message receiving, that is, timeout, NAK message or invalid ACK message.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusDynAuthzGroup

7.6.6 ipworksRadiusServTotalSuccessCoARequests

Attribute	Value
Description	The number of CoA packets sending to NAS by AAA server and successfully receiving corresponding ACK messages in the current GP.
Condition	Incremented for every CoA packet sending and corresponding ACK messages receiving.
Collection Method	CC
Aggregation	SUM



Attribute	Value
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusDynAuthzGroup

7.7 AAARadiusDynAuthzProxyGroup

This performance measurement group, called `AAARadiusDynAuthzProxyGroup`, contains the measurements of events which are related to Radius Dynamic Authorization Proxy .

>ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAARadiusDynAuthzProxyGroup

This performance measurement group includes following measurements:

- `ipworksRadiusServProxyTotalDisconnectRequests`
- `ipworksRadiusServProxyTotalFailedDisconnectRequests`
- `ipworksRadiusServProxyTotalSuccessDisconnectRequests`
- `ipworksRadiusServProxyTotalCoARequests`
- `ipworksRadiusServProxyTotalFailedCoARequests`
- `ipworksRadiusServProxyTotalSuccessCoARequests`

7.7.1 ipworksRadiusServProxyTotalDisconnectRequests

Attribute	Value
Description	The number of Disconnect-Request packets forwarded to AAA Client by AAA Server in the current GP.
Condition	Incremented for every Disconnect-Request packets forwarded.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusDynAuthzProxyGroup



7.7.2 ipworksRadiusServProxyTotalFailedDisconnectRequests

Attribute	Value
Description	The number of Disconnect-Request packets forwarded to AAA Client by AAA Server but not receiving valid corresponding ACK messages, that is, timeout, NAK messages or invalid ACK messages in the current GP.
Condition	Incremented for every Disconnect-Request packet forwarded but not receiving valid corresponding ACK message.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusDynAuthzProxyGroup

7.7.3 ipworksRadiusServProxyTotalSuccessDisconnectRequests

Attribute	Value
Description	The number of Disconnect-Request packets forwarded to AAA Client by AAA Server and successfully receiving corresponding ACK messages in the current GP.
Condition	Incremented for receiving ACK message for the corresponding Disconnect-Request packet.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusDynAuthzProxyGroup

7.7.4 ipworksRadiusServProxyTotalCoARequests

Attribute	Value
Description	The number of CoA packets forwarded to AAA Client by AAA Server in the current GP.
Condition	Incremented for every CoA packet forwarded.
Collection Method	CC



Attribute	Value
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusDynAuthzProxyGroup

7.7.5 ipworksRadiusServProxyTotalFailedCoARequests

Attribute	Value
Description	The number of CoA packets forwarded to AAA client by AAA server but not receiving valid corresponding ACK messages, that is, timeout, NAK messages or invalid ACK messages in the current GP.
Condition	Incremented for every CoA packet forwarded but not receiving valid corresponding ACK message.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusDynAuthzProxyGroup

7.7.6 ipworksRadiusServProxyTotalSuccessCoARequests

Attribute	Value
Description	The number of CoA packets forwarded to AAA client by AAA server and successfully receiving corresponding ACK messages in the current GP.
Condition	Incremented for receiving ACK message for the corresponding CoA packet.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusDynAuthzProxyGroup



7.8 AAARadiusFrontEndGroup

This performance measurement group, called `AAARadiusFrontEndGroup`, contains the measurements of events which are related to Radius Front End.

```
>ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAARadiusFrontEndGroup
```

This performance measurement group includes following measurements:

- `ipworksRadiusServTotalDiscardedCUDBQueryRequests`
- `ipworksRadiusServTotalCUDBQueryRequests`
- `ipworksRadiusServTotalSuccessCUDBQueryRequests`
- `ipworksRadiusServTotalFailedCUDBQueryRequests`
- `ipworksRadiusServTotalDiscardedLoadRegulationRequests`
- `ipworksRadiusServTotalCUDBErrorCodeBusyResponses`
- `ipworksRadiusServTotalCUDBErrorCodeUnavailableResponses`
- `ipworksRadiusServTotalCUDBErrorCodeOtherResponses`

7.8.1 `ipworksRadiusServTotalDiscardedCUDBQueryRequests`

Attribute	Value
Description	The number of LDAP queries discarded by AAA-FE because AAA-FE cooperative load regulation is triggered in the current GP.
Condition	AAA server has received LDAP error code 51 (LDAP Busy).
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	<code>AAARadiusFrontEndGroup</code>

7.8.2 `ipworksRadiusServTotalCUDBQueryRequests`

Attribute	Value
Description	The number of LDAP query packets sending to CUDB by AAA server in the current GP.



Attribute	Value
Condition	Incremented when AAA server has sent an LDAP query to CUDB.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusFrontEndGroup

7.8.3 ipworksRadiusServTotalSuccessCUDBQueryRequests

Attribute	Value
Description	The number of LDAP query packets sending to CUDB by AAA server and successfully receiving a corresponding response in the current GP.
Condition	Incremented for successfully receiving a response when AAA server sends a LDAP query to CUDB.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusFrontEndGroup

7.8.4 ipworksRadiusServTotalFailedCUDBQueryRequests

Attribute	Value
Description	The number of LDAP query packets sending to CUDB by AAA server but receiving no corresponding response or not receiving a valid response in the current GP.
Condition	Incremented for receiving invalid response or no response at all when AAA server sends a LDAP query to CUDB.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusFrontEndGroup



7.8.5 ipworksRadiusServTotalDiscardedLoadRegulationRequests

Attribute	Value
Description	The number of RADIUS packets discarded by AAA-FE because AAA-FE cooperative load regulation is triggered in the current GP. This counter focuses on calculating load regulation in traffic side.
Condition	Incremented for every request discarded by AAA-FE load regulation.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusFrontEndGroup

7.8.6 ipworksRadiusServTotalCUDBErrorCodeBusyResponses

Attribute	Value
Description	The number of response with error code 51 from CUDB after sending LDAP query in the current GP.
Condition	Incremented for every receiving of CUDB error code 51 (LDAP Busy).
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusFrontEndGroup

7.8.7 ipworksRadiusServTotalCUDBErrorCodeUnavailableResponses

Attribute	Value
Description	The number of response with error code 52 from CUDB after sending LDAP query in the current GP.
Condition	Incremented for every receiving of CUDB error code 52.
Collection Method	CC
Aggregation	SUM



Attribute	Value
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusFrontEndGroup

7.8.8 ipworksRadiusServTotalCUDBErrorCodeOtherResponses

Attribute	Value
Description	The number of response with error code 80 from CUDB after sending LDAP query in the current GP.
Condition	Incremented for every receiving of CUDB error code 80.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAARadiusFrontEndGroup

7.9 AAARadiusOtherGroup

This performance measurement group, called AAARadiusOtherGroup, contains the measurements of events which are related to Radius AAA session.

>ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAARadiusOtherGroup

7.9.1 ipworksRadiusServTotalOverloadProtectionDiscardNumber

Attribute	Value
Description	The number of Radius request discarded by AAA because AAA overload protection is triggered in the current GP.
Condition	Incremented for every request discarded by overload protection.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Node level
Measurement Object Class	AAARadiusOtherGroup

7.9.2

ipworksRadiusServActiveSessionNumber

Attribute	Value
Description	The total number of the active AAA sessions that the radius AAA server is handling.
Condition	Changed once a new AAA session is created or terminated.
Collection Method	GAUGE
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster Level
Measurement Object Class	AAARadiusOtherGroup



8 Measurements for EPC AAA

This section provides the performance measurement data regarding EPC AAA.

For all the performance measurement groups of EPC AAA, the default PM job is AAADiaDefaultPmJob. The default PM job is a measurement collection job. The directory of this default job MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=AAADiaDefaultPmJob.

The default job with the default value is as follows:



```
(PmJob=AAADiaDefaultPmJob)>show -v all
PmJob=AAADiaDefaultPmJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="AAADiaDefaultPmJob"
reportContentGeneration=CHANGED_ONLY <default>
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=AAASWmMr
measurementReaderId="AAASWmMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
  groupRef="ManagedElement=1, SystemFunctions=1, Pm=1, PmGroup=AAASWmGroup"
  measurementTypeRef=[] <empty>
MeasurementReader=AAASWxMr
measurementReaderId="AAASWxMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
  groupRef="ManagedElement=1, SystemFunctions=1, Pm=1, PmGroup=AAASWxGroup"
  measurementTypeRef=[] <empty>
MeasurementReader=AAADiaOtherMr
measurementReaderId="AAADiaOtherMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
  groupRef="ManagedElement=1, SystemFunctions=1, Pm=1, PmGroup=AAADiaOtherGroup"
  measurementTypeRef=[] <empty>
MeasurementReader=AAAS6bMr
measurementReaderId="AAAS6bMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
  groupRef="ManagedElement=1, SystemFunctions=1, Pm=1, PmGroup=AAAS6bGroup"
  measurementTypeRef=[] <empty>
MeasurementReader=AAASTaMr
measurementReaderId="AAASTaMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
  groupRef="ManagedElement=1, SystemFunctions=1, Pm=1, PmGroup=AAASTaGroup"
  measurementTypeRef=[] <empty>
MeasurementReader=AAASTaPlusMr
measurementReaderId="AAASTaPlusMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
  groupRef="ManagedElement=1, SystemFunctions=1, Pm=1, PmGroup=AAASTaPlusGroup"
  measurementTypeRef=[] <empty>
MeasurementReader=AAASWmPlusMr
measurementReaderId="AAASWmPlusMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
  groupRef="ManagedElement=1, SystemFunctions=1, Pm=1, PmGroup=AAASWmPlusGroup"
  measurementTypeRef=[] <empty>
```



8.1 AASTaGroup

This performance measurement group, called AASTaGroup, contains the measurements of events which are related to STa interface. The directory of the MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAASTaGroup

This performance measurement group includes following measurements:

- ipworksDiameterAAAActiveSTaSessionNumber
- ipworksDiameterAAASTaDER
- ipworksDiameterAAASTaDEA
- ipworksDiameterAAASTaAAR
- ipworksDiameterAAASTaAAA
- ipworksDiameterAAASTaASR
- ipworksDiameterAAASTaASA
- ipworksDiameterAAASTaSTR
- ipworksDiameterAAASTaSTA
- ipworksDiameterAAASTaRAR
- ipworksDiameterAAASTaRAA
- ipworksDiameterAAASTaInitialAuthRequests
- ipworksDiameterAAASTaReAuthRequests
- ipworksDiameterAAASTaAAAInitialAbortSessionRequests
- ipworksDiameterAAASTaEAPAKAPrimeAuthSuccessNumber
- ipworksDiameterAAASTaEAPAKAPrimeAuthFailedNumber
- ipworksDiameterAAASTaTPS

8.1.1 ipworksDiameterAAAActiveSTaSessionNumber

Attribute	Value
Description	The number of active Diameter sessions for STa application.



Attribute	Value
Condition	Incremented when the initial authentication and authorization request from Trusted Non-3GPP Access Network is handled successfully; decremented when the session termination request from Trusted Non-3GPP Access Network is handled successfully.
Collection Method	Gauge
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	AAASTaGroup

8.1.2 ipworksDiameterAAASTaDER

Attribute	Value
Description	The number of DER messages for STa application in the current GP.
Condition	Incremented when DER messages are received from the Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaGroup

8.1.3 ipworksDiameterAAASTaDEA

Attribute	Value
Description	The number of DEA messages for STa application in the current GP.
Condition	Incremented when the AAA server sends DEA messages to the Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Node level
Measurement Object Class	AAASTaGroup

8.1.4 ipworksDiameterAAASTaAAR

Attribute	Value
Description	The number of AAR messages for STa application in the current GP.
Condition	Incremented when AAR messages are received from the Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaGroup

8.1.5 ipworksDiameterAAASTaAAA

Attribute	Value
Description	The number of AAA messages for STa application in the current GP.
Condition	Incremented when the AAA server sends AAA messages to the Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaGroup

8.1.6 ipworksDiameterAAASTaASR

Attribute	Value
Description	The number of ASR messages for STa application in the current GP.



Attribute	Value
Condition	Incremented when ASR messages are received from the Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaGroup

8.1.7 ipworksDiameterAAASTaASA

Attribute	Value
Description	The number of ASA messages for STa application in the current GP.
Condition	Incremented when ASA messages are received from the Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaGroup

8.1.8 ipworksDiameterAAASTaSTR

Attribute	Value
Description	The number of STR messages for STa application in the current GP.
Condition	Incremented when STR messages are received from the Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaGroup



8.1.9 ipworksDiameterAAASTaSTA

Attribute	Value
Description	The number of STA messages for STa application.
Condition	Incremented when the AAA server sends STA messages to the Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaGroup

8.1.10 ipworksDiameterAAASTaRAR

Attribute	Value
Description	The number of RAR messages for STa application.
Condition	Incremented when the AAA server sends RAR messages to the Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaGroup

8.1.11 ipworksDiameterAAASTaRAA

Attribute	Value
Description	The number of RAA messages for STa application in the current GP.
Condition	Incremented when RAA messages are received from Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaGroup

**8.1.12 ipworksDiameterAAASTaInitialAuthRequests**

Attribute	Value
Description	The number of initial authentication and authorization requests for STa application in the current GP.
Condition	Incremented when the initial authentication and authorization request is received from Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaGroup

8.1.13 ipworksDiameterAAASTaReAuthRequests

Attribute	Value
Description	The number of re-authentication and re-authorization requests for STa application in the current GP.
Condition	Incremented when the re-authentication and re-authorization request is received from Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaGroup

8.1.14 ipworksDiameterAAASTaAAASessionInitialAbortSessionRequests

Attribute	Value
Description	The number of AAA initiated session termination requests for STa application in the current GP.
Condition	Incremented when the AAA server initiated the session termination request to the Trusted Non-3GPP Access Network.
Collection Method	CC



Attribute	Value
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaGroup

8.1.15 ipworksDiameterAAASTaEAPAKAPrimeAuthSuccessNumber

Attribute	Value
Description	The number of success EAP-AKA' authentication (including initial auth and re-auth using IMSI, Pseudonym, Fast) for STa application in current GP.
Condition	Incremented when the EAP-AKA' authentication is successful.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaGroup

8.1.16 ipworksDiameterAAASTaEAPAKAPrimeAuthFailedNumber

Attribute	Value
Description	The number of failed EAP-AKA' authentication (including initial auth and re-auth using IMSI, Pseudonym, Fast) for STa application in the current GP.
Condition	Incremented when the EAP-AKA' authentication is failed.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaGroup



8.1.17 ipworksDiameterAAASTaTPS

Attribute	Value
Description	The average value of the TPS for STa application (which are sampled and calculated every 10 seconds) in the current GP.
Condition	Incremented when DER(EAP/Identity) are received from Trusted Non-3GPP Access Network.
Collection Method	Gauge
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaGroup

8.2 AASTaPlusGroup

This performance measurement group, called AASTaPlusGroup, contains the measurements of events which are related to STaPlus interface.

Note: This group is reserved for the future development.

The directory of the MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAASTaPlusGroup

This performance measurement group includes the following measurements:

- ipworksDiameterAAAActiveSTaPlusSessionNumber
- ipworksDiameterAAASTaPlusDER
- ipworksDiameterAAASTaPlusDEA
- ipworksDiameterAAASTaPlusASR
- ipworksDiameterAAASTaPlusASA
- ipworksDiameterAAASTaPlusSTR
- ipworksDiameterAAASTaPlusSTA
- ipworksDiameterAAASTaPlusEAPAKAAuthSuccessNumber
- ipworksDiameterAAASTaPlusEAPAKAAuthFailedNumber
- ipworksDiameterAAASTaPlusFastEAPAKAReAuthSuccessNumber



- ipworksDiameterAAASTaPlusFastEAPAKAReAuthFailedNumber
- ipworksDiameterAAASTaPlusEAPAKAPrimeAuthSuccessNumber
- ipworksDiameterAAASTaPlusEAPAKAPrimeAuthFailedNumber
- ipworksDiameterAAASTaPlusFastEAPAKAPrimeReAuthSuccessNumber
- ipworksDiameterAAASTaPlusFastEAPAKAPrimeReAuthFailedNumber
- ipworksDiameterAAASTaPlusTPS

8.2.1

ipworksDiameterAAAActiveSTaPlusSessionNumber

Attribute	Value
Description	The number of active Diameter sessions for STaPlus application.
Condition	Incremented when the requests of initial authentication and authorization from the Trusted Non-3GPP Access Network are processed successfully; Decrementd when the requests of session termination from the Trusted Non-3GPP Access Network are processed successfully.
Collection Method	Gauge
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	AAASTaPlusGroup

8.2.2

ipworksDiameterAAASTaPlusDER

Attribute	Value
Description	The number of DER messages for STaPlus application in the current GP.
Condition	Incremented when DER messages are received from the Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaPlusGroup



8.2.3 ipworksDiameterAAASTaPlusDEA

Attribute	Value
Description	The number of DEA messages for STaPlus application in the current GP.
Condition	Incremented when the AAA server sends DEA messages to the Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaPlusGroup

8.2.4 ipworksDiameterAAASTaPlusASR

Attribute	Value
Description	The number of ASR messages for STaPlus application in the current GP.
Condition	Incremented when ASR messages are received from the Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaPlusGroup

8.2.5 ipworksDiameterAAASTaPlusASA

Attribute	Value
Description	The number of ASA messages for STaPlus application in the current GP.
Condition	Incremented when ASA messages are received from the Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Node level
Measurement Object Class	AAASTaPlusGroup

8.2.6 ipworksDiameterAAASTaPlusSTR

Attribute	Value
Description	The number of STR messages for STaPlus application in the current GP.
Condition	Incremented when STR messages are received from the Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaPlusGroup

8.2.7 ipworksDiameterAAASTaPlusSTA

Attribute	Value
Description	The number of STA messages for STaPlus application in the current GP.
Condition	Incremented when the AAA server sends STA messages to the Trusted Non-3GPP Access Network.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaPlusGroup

8.2.8 ipworksDiameterAAASTaPlusEAPAKAAuthSuccessNumber

Attribute	Value
Description	The number of success EAP-AKA authentication (including initial auth and re-auth using IMSI, Pseudonym) for STaPlus application in the current GP.

Attribute	Value
Condition	Incremented when the full EAP-AKA authentication is successful.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaPlusGroup

8.2.9 ipworksDiameterAAASTaPlusEAPAKAAuthFailedNumber

Attribute	Value
Description	The number of failed EAP-AKA authentication (including initial auth and re-auth using IMSI, Pseudonym) for STaPlus application in the current GP.
Condition	Incremented when the full EAP-AKA authentication fails.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaPlusGroup

8.2.10 ipworksDiameterAAASTaPlusFastEAPAKAReAuthSuccessNumber

Attribute	Value
Description	The number of success EAP-AKA fast re-authentication for STaPlus application in the current GP.
Condition	Incremented when the EAP-AKA fast re-authentication is successful.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaPlusGroup



8.2.11 ipworksDiameterAAASTaPlusFastEAPAKAReAuthFailedNumber

Attribute	Value
Description	The number of failed EAP-AKA fast re-authentication for STaPlus application in the current GP.
Condition	Incremented when the EAP-AKA fast re-authentication is failed.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaPlusGroup

8.2.12 ipworksDiameterAAASTaPlusEAPAKAPrimeAuthSuccessNumber

Attribute	Value
Description	The number of success EAP-AKAPrime authentication (including initial auth and re-auth using IMSI, Pseudonym) for STaPlus application in the current GP.
Condition	Incremented when the EAP-AKA' authentication is successful.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaPlusGroup

8.2.13 ipworksDiameterAAASTaPlusEAPAKAPrimeAuthFailedNumber

Attribute	Value
Description	The number of failed EAP-AKAPrime authentication (including initial auth and re-auth using IMSI, Pseudonym) for STaPlus application in the current GP.
Condition	Incremented when the EAP-AKA' authentication is failed.
Collection Method	CC



Attribute	Value
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaPlusGroup

8.2.14 ipworksDiameterAAASTaPlusFastEAPAKAPrimeReAuthSuccessNumber

Attribute	Value
Description	The number of success EAP-AKAPrime fast re-authentication for STaPlus application in the current GP.
Condition	Incremented when the EAP-AKA' fast re-authentication is successful.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaPlusGroup

8.2.15 ipworksDiameterAAASTaPlusFastEAPAKAPrimeReAuthFailedNumber

Attribute	Value
Description	The number of failed EAP-AKAPrime fast re-authentication for STaPlus application in the current GP.
Condition	Incremented when the EAP-AKA' fast re-authentication is failed.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaPlusGroup



8.2.16 ipworksDiameterAAASTaPlusTPS

Attribute	Value
Description	The average value of the TPS for STaPlus application (which are sampled and calculated every 10 seconds) in the current GP.
Condition	Incremented when DER (EAP/Identity) are received from Trusted Non-3GPP Access Network.
Collection Method	Gauge
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASTaPlusGroup

8.3 AAASWmGroup

This performance measurement group, called AAASWmGroup, contains the measurements for events which are related to EPC AAA SWm interface. The directory of the MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAASWmGroup

This performance measurement group includes following measurements:

- ipworksDiameterAAAAActiveSWmSessionNumber
- ipworksDiameterAAASWmDER
- ipworksDiameterAAASWmDEA
- ipworksDiameterAAASWmAAR
- ipworksDiameterAAASWmAAA
- ipworksDiameterAAASWmASR
- ipworksDiameterAAASWmASA
- ipworksDiameterAAASWmDERForEC
- ipworksDiameterAAASWmDEAForEC
- ipworksDiameterAAASWmSTR
- ipworksDiameterAAASWmSTA
- ipworksDiameterAAASWmRAR



- ipworksDiameterAAASWmRAA
- ipworksDiameterAAASWmEAPAKAAuthSuccessNumber
- ipworksDiameterAAASWmEAPAKAAuthFailedNumber
- ipworksDiameterAAASWmFastEAPAKAAuthSuccessNumber
- ipworksDiameterAAASWmFastEAPAKAAuthFailedNumber
- ipworksDiameterAAASWmTPS

8.3.1 ipworksDiameterAAAActiveSWmSessionNumber

Attribute	Value
Description	The number of active Diameter sessions for SWm application.
Condition	Incremented when the requests of initial authentication and authorization from the Untrusted Non-3GPP Access Network are processed successfully; Decrement when the requests of session termination from the Untrusted Non-3GPP Access Network are processed successfully.
Collection Method	Gauge
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	AAASWmGroup

8.3.2 ipworksDiameterAAASWmDER

Attribute	Value
Description	The number of DER messages for SWm application in the current GP.
Condition	Incremented when DER messages are received from the Untrusted Non-3GPP Access Network during EAP-AKA authentication.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Node level
Measurement Object Class	AAASWmGroup

8.3.3 ipworksDiameterAAASWmDEA

Attribute	Value
Description	The number of DEA messages for SWm application in the current GP.
Condition	Incremented when the AAA server sends DEA messages to the Untrusted Non-3GPP Access Network during EAP-AKA authentication.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmGroup

8.3.4 ipworksDiameterAAASWmAAR

Attribute	Value
Description	The number of AAR messages for SWm application in the current GP.
Condition	Incremented when AAR messages are received from the Untrusted Non-3GPP Access Network during EAP-AKA authentication.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmGroup

8.3.5 ipworksDiameterAAASWmAAA

Attribute	Value
Description	The number of AAA messages for SWm application in the current GP.



Attribute	Value
Condition	Incremented when the AAA server sends AAA messages to the Untrusted Non-3GPP Access Network during EAP-AKA authentication.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmGroup

8.3.6 ipworksDiameterAAASWmASR

Attribute	Value
Description	The number of ASR messages for SWm application in the current GP.
Condition	Incremented when ASR messages are received from the Untrusted Non-3GPP Access Network during EAP-AKA authentication.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmGroup

8.3.7 ipworksDiameterAAASWmASA

Attribute	Value
Description	The number of ASA messages for SWm application in the current GP.
Condition	Incremented when ASA messages are received from the Untrusted Non-3GPP Access Network during EAP-AKA authentication.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmGroup



8.3.8 ipworksDiameterAAASWmDERForEC

Attribute	Value
Description	The number of emergency DER messages for SWm application in the current GP.
Condition	Incremented when emergency DER messages are received from the Untrusted Non-3GPP Access Network during EAP-AKA authentication.
Collection Method	CC
Aggregation	SUM
Result Type	SaUInt32T
Application Level	Node level
Measurement Object Class	AAASWmGroup

8.3.9 ipworksDiameterAAASWmDEAForEC

Attribute	Value
Description	The number of emergency DEA messages for SWm application in the current GP.
Condition	Incremented when the AAA server sends emergency DEA messages to the Untrusted Non-3GPP Access Network during EAP-AKA authentication.
Collection Method	CC
Aggregation	SUM
Result Type	SaUInt32T
Application Level	Node level
Measurement Object Class	AAASWmGroup

8.3.10 ipworksDiameterAAASWmSTR

Attribute	Value
Description	The number of STR messages for SWm application in the current GP.
Condition	Incremented when STR messages are received from the Untrusted Non-3GPP Access Network during EAP-AKA authentication.
Collection Method	CC
Aggregation	SUM



Attribute	Value
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmGroup

8.3.11 ipworksDiameterAAASWmSTA

Attribute	Value
Description	The number of STA messages for SWm application in the current GP.
Condition	Incremented when the AAA server sends STA messages to the Untrusted Non-3GPP Access Network during EAP-AKA authentication.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmGroup

8.3.12 ipworksDiameterAAASWmRAR

Attribute	Value
Description	The number of RAR messages for SWm application in the current GP.
Condition	Incremented when the AAA server sends RAR messages to the Untrusted Non-3GPP Access Network during EAP-AKA authentication.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmGroup



8.3.13 ipworksDiameterAAASWmRAA

Attribute	Value
Description	The number of RAA messages for SWm application in the current GP.
Condition	Incremented when RAA messages are received from the Untrusted Non-3GPP Access Network during EAP-AKA authentication.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmGroup

8.3.14 ipworksDiameterAAASWmEAPAKAAuthSuccessNumber

Attribute	Value
Description	The number of success EAP-AKA authentication (including initial auth and re-auth using IMSI, Pseudonym) for SWm application in the current GP.
Condition	Incremented when the full EAP-AKA authentication is successful.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmGroup

8.3.15 ipworksDiameterAAASWmEAPAKAAuthFailedNumber

Attribute	Value
Description	The number of failed EAP-AKA authentication (including initial auth and re-auth using IMSI, Pseudonym) for SWm application in the current GP.
Condition	Incremented when the full EAP-AKA authentication fails.
Collection Method	CC



Attribute	Value
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmGroup

8.3.16 ipworksDiameterAAASWmFastEAPAKARAuthSuccessNumber

Attribute	Value
Description	The number of success fast EAP-AKA re-authentication for SWm application in the current GP.
Condition	Incremented when the fast EAP-AKA re-authentication is successful.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmGroup

8.3.17 ipworksDiameterAAASWmFastEAPAKARAuthFailedNumber

Attribute	Value
Description	The number of failed fast EAP-AKA re-authentication for SWm application in the current GP.
Condition	Incremented when the fast EAP-AKA re-authentication is failed.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmGroup



8.3.18 ipworksDiameterAAASWmTPS

Attribute	Value
Description	The average value of the TPS for SWm application (which are sampled and calculated every 10 seconds) in the current GP.
Condition	Incremented when DER (EAP/Identity) messages are received from Untrusted Non-3GPP Access Network during EAP-AKA authentication.
Collection Method	Gauge
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmGroup

8.4 AAASWmPlusGroup

This performance measurement group, called AAASWmPlusGroup, contains the measurements for events which are related to EPC AAA SWmPlus interface. The directory of the MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAASWmPlusGroup

This performance measurement group includes following measurements:

- ipworksDiameterAAAAActiveSWmPlusSessionNumber
- ipworksDiameterAAASWmPlusDER
- ipworksDiameterAAASWmPlusDERForEC
- ipworksDiameterAAASWmPlusDEAForEC
- ipworksDiameterAAASWmPlusDEA
- ipworksDiameterAAASWmPlusAAR
- ipworksDiameterAAASWmPlusAAA
- ipworksDiameterAAASWmPlusASR
- ipworksDiameterAAASWmPlusASA
- ipworksDiameterAAASWmPlusSTR
- ipworksDiameterAAASWmPlusSTA



- ipworksDiameterAAASWmPlusEAPTLSAuthSuccessNumber
- ipworksDiameterAAASWmPlusEAPTLSAuthFailedNumber
- ipworksDiameterAAASWmPlusTPS

8.4.1 ipworksDiameterAAAActiveSWmPlusSessionNumber

Attribute	Value
Description	The number of active Diameter sessions for SWmPlus application.
Condition	Incremented when the requests of initial authentication and authorization from the Untrusted Non-3GPP Access Network are processed successfully; Decremented when the requests of session termination from the Untrusted Non-3GPP Access Network are processed successfully.
Collection Method	Gauge
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	AAASWmPlusGroup

8.4.2 ipworksDiameterAAASWmPlusDER

Attribute	Value
Description	The number of DER messages for SWmPlus application in the current GP.
Condition	Incremented when DER messages are received from the Untrusted Non-3GPP Access Network during EAP-TLS authentication.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmPlusGroup



8.4.3 ipworksDiameterAAASWmPlusDERForEC

Attribute	Value
Description	The number of emergency DER messages for SWmPlus application in the current GP.
Condition	Incremented when emergency DER messages are received from the Untrusted Non-3GPP Access Network during EAP-TLS authentication.
Collection Method	CC
Aggregation	SUM
Result Type	SaUInt32T
Application Level	Node level
Measurement Object Class	AAASWmPlusGroup

8.4.4 ipworksDiameterAAASWmPlusDEAForEC

Attribute	Value
Description	The number of emergency DEA messages for SWmPlus application in the current GP.
Condition	Incremented when the AAA server sends emergency DEA messages to the Untrusted Non-3GPP Access Network during EAP-TLS authentication.
Collection Method	CC
Aggregation	SUM
Result Type	SaUInt32T
Application Level	Node level
Measurement Object Class	AAASWmPlusGroup

8.4.5 ipworksDiameterAAASWmPlusDEA

Attribute	Value
Description	The number of DEA messages for SWmPlus application in the current GP.
Condition	Incremented when the AAA server sends DEA messages to the Untrusted Non-3GPP Access Network during EAP-TLS authentication.
Collection Method	CC
Aggregation	SUM



Attribute	Value
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmPlusGroup

8.4.6 ipworksDiameterAAASWmPlusAAR

Attribute	Value
Description	The number of AAR messages for SWmPlus application in the current GP.
Condition	Incremented when AAR messages are received from the Untrusted Non-3GPP Access Network during EAP-TLS authentication.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmPlusGroup

8.4.7 ipworksDiameterAAASWmPlusAAA

Attribute	Value
Description	The number of AAA messages for SWmPlus application in the current GP.
Condition	Incremented when the AAA server sends AAA messages to the Untrusted Non-3GPP Access Network during EAP-TLS authentication.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmPlusGroup



8.4.8 ipworksDiameterAAASWmPlusASR

Attribute	Value
Description	The number of ASR messages for SWmPlus application in the current GP.
Condition	Incremented when ASR messages are received from the Untrusted Non-3GPP Access Network during EAP-TLS authentication.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmPlusGroup

8.4.9 ipworksDiameterAAASWmPlusASA

Attribute	Value
Description	The number of ASA messages for SWmPlus application in the current GP.
Condition	Incremented when ASA messages are received from the Untrusted Non-3GPP Access Network during EAP-TLS authentication.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmPlusGroup

8.4.10 ipworksDiameterAAASWmPlusSTR

Attribute	Value
Description	The number of STR messages for SWmPlus application in the current GP.
Condition	Incremented when STR messages are received from the Untrusted Non-3GPP Access Network during EAP-TLS authentication.
Collection Method	CC
Aggregation	SUM



Attribute	Value
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmPlusGroup

8.4.11 ipworksDiameterAAASWmPlusSTA

Attribute	Value
Description	The number of STA messages for SWm application in the current GP.
Condition	Incremented when the AAA server sends STA messages to the Untrusted Non-3GPP Access Network during EAP-TLS authentication.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmPlusGroup

8.4.12 ipworksDiameterAAASWmPlusEAPTLSAuthSuccessNumber

Attribute	Value
Description	The number of success EAP-TLS authentication for SWmPlus application in the current GP.
Condition	Incremented when the EAP-TLS authentication is successful.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmPlusGroup

8.4.13 ipworksDiameterAAASWmPlusEAPTLSAuthFailedNumber

Attribute	Value
Description	The number of failed EAP-TLS authentication for SWmPlus application in the current GP.



Attribute	Value
Condition	Incremented when the EAP-TLS authentication is failed.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmPlusGroup

8.4.14 ipworksDiameterAAASWmPlusTPS

Attribute	Value
Description	The average value of the TPS for SWmPlus application (which are sampled and calculated every 10 seconds) in the current GP.
Condition	Incremented when DER (EAP/Identity) are received from Untrusted Non-3GPP Access Network during EAP-TLS authentication.
Collection Method	Gauge
Aggregation	MAX
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmPlusGroup

8.5 AAAS6bGroup

This performance measurement group, called AAAS6bGroup, contains the measurements for events which are related to S6b interface. The directory of the MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAAS6bGroup

This performance measurement group includes the following measurements:

- ipworksDiameterAAAActiveS6bSessionNumber
- ipworksDiameterAAAS6bAAR
- ipworksDiameterAAAS6bAAA
- ipworksDiameterAAAS6bSTR



- ipworksDiameterAAAS6bSTA
- ipworksDiameterAAAS6bRAR
- ipworksDiameterAAAS6bRAA
- ipworksDiameterAAAS6bAARInitialAuthorizationRequests
- ipworksDiameterAAAS6bAARReAuthorizationRequests
- ipworksDiameterAAAS6bTPS

8.5.1 ipworksDiameterAAAActiveS6bSessionNumber

Attribute	Value
Description	The number of active Diameter sessions for S6b application.
Condition	Incremented when the initial authorization request from the PDN-GW is handled successfully; decremented when the session termination request from the PDN-GW is handled successfully.
Collection Method	Gauge
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Cluster level
Measurement Object Class	AAAS6bGroup

8.5.2 ipworksDiameterAAAS6bAAR

Attribute	Value
Description	The number of AAR messages for S6b application in the current GP.
Condition	Incremented when AAR messages are received from the PDN-GW.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAAS6bGroup



8.5.3 ipworksDiameterAAAS6bAAA

Attribute	Value
Description	The number of AAA messages for S6b application in the current GP.
Condition	Incremented when the AAA server sends AAA messages to the PDN-GW.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAAS6bGroup

8.5.4 ipworksDiameterAAAS6bSTR

Attribute	Value
Description	The number of STR messages for S6b application in the current GP.
Condition	Incremented when STR messages are received from the PDN-GW.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAAS6bGroup

8.5.5 ipworksDiameterAAAS6bSTA

Attribute	Value
Description	The number of STA messages for S6b application in the current GP.
Condition	Incremented when the AAA server sends STA messages to the PDN-GW.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Node level
Measurement Object Class	AAAS6bGroup

8.5.6 ipworksDiameterAAAS6bRAR

Attribute	Value
Description	The number of RAR messages for S6b application in the current GP.
Condition	Incremented when the AAA server sends RAR messages to the PDN-GW.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAAS6bGroup

8.5.7 ipworksDiameterAAAS6bRAA

Attribute	Value
Description	The number of RAA messages for S6b application in the current GP.
Condition	Incremented when RAA messages are received from the PDG-GW.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAAS6bGroup

8.5.8 ipworksDiameterAAAS6bAARInitialAuthorizationRequests

Attribute	Value
Description	The number of initial authorization requests for S6b application in the current GP.



Attribute	Value
Condition	Incremented when the initial authorization request is received from PDN-GW.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAAS6bGroup

8.5.9 ipworksDiameterAAAS6bAARReAuthorizationRequests

Attribute	Value
Description	The number of re-authorization requests for S6b application in the current GP.
Condition	Incremented when the re-authorization request is received from PDN-GW.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAAS6bGroup

8.5.10 ipworksDiameterAAAS6bTPS

Attribute	Value
Description	The average value of the TPS for S6b application (which are sampled and calculated every 10 seconds) in the current GP.
Condition	Incremented when Requests are received from the PDN-GW.
Collection Method	Gauge
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAAS6bGroup



8.6 AAASWxGroup

This performance measurement group, called AAASWxGroup, contains a measurement for events which are related to SWx interface. The directory of the MO is as follows:

ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAASWxGroup

This performance measurement group includes following measurements:

- ipworksDiameterAAASWxMAR
- ipworksDiameterAAASWxMAA
- ipworksDiameterAAASWxSAR
- ipworksDiameterAAASWxSAA
- ipworksDiameterAAASWxPPR
- ipworksDiameterAAASWxPPA
- ipworksDiameterAAASWxRTR
- ipworksDiameterAAASWxRTA
- ipworksDiameterAAASWxMARFetchAuthVecRequests
- ipworksDiameterAAASWxSARFetchUserProfileRequests
- ipworksDiameterAAASWxSARRegistrationRequests
- ipworksDiameterAAASWxSARDeRegistrationRequest
- ipworksDiameterAAASWxSARUpdatePGWInfoRequest
- ipworksDiameterAAASWxRoamingNotAllowed
- ipworksDiameterAAASWxTPS
- ipworksDiameterAAASARThrottled
- ipworksDiameterAAAMARThrottled

8.6.1 ipworksDiameterAAASWxMAR

Attribute	Value
Description	The number of MAR messages for SWx application in the current GP.



Attribute	Value
Condition	Incremented when the AAA server sends MAR messages to HSS.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWxGroup

8.6.2 ipworksDiameterAAASWxMAA

Attribute	Value
Description	The number of MAA messages for SWx application in the current GP.
Condition	Incremented when the AAA server receives MAA messages from HSS.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWxGroup

8.6.3 ipworksDiameterAAASWxSAR

Attribute	Value
Description	The number of SAR messages for SWx application in the current GP.
Condition	Incremented when the AAA server sends SAR messages to HSS.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWxGroup



8.6.4 ipworksDiameterAAASWxSAA

Attribute	Value
Description	The number of SAA messages for SWx application in the current GP.
Condition	Incremented when the AAA server receives SAA messages from HSS.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWxGroup

8.6.5 ipworksDiameterAAASWxPPR

Attribute	Value
Description	The number of PPR messages for SWx application in the current GP.
Condition	Incremented when the AAA server sends PPR messages to HSS.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWxGroup

8.6.6 ipworksDiameterAAASWxPPA

Attribute	Value
Description	The number of PPA messages for SWx application in the current GP.
Condition	Incremented when the AAA server receives PPA messages from HSS.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWmGroup



8.6.7 ipworksDiameterAAASWxRTR

Attribute	Value
Description	The number of RTR messages for SWx application in the current GP.
Condition	Incremented when the AAA server sends RTR messages to HSS.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWxGroup

8.6.8 ipworksDiameterAAASWxRTA

Attribute	Value
Description	The number of RTA messages for SWx application in the current GP.
Condition	Incremented when the AAA server receives RTA messages from HSS.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWxGroup

8.6.9 ipworksDiameterAAASWxMARFetchAuthVecRequests

Attribute	Value
Description	The number of requests that fetch authentication vectors from HSS for SWx application in the current GP.
Condition	Incremented when the AAA server fetches the authentication vector from HSS.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Node level
Measurement Object Class	AAASWmGroup

8.6.10 ipworksDiameterAAASWxSARFetchUserProfileRequests

Attribute	Value
Description	The number of requests that fetch user profile from HSS for SWx application in the current GP.
Condition	Incremented when the AAA server fetches the user profile from HSS.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWxGroup

8.6.11 ipworksDiameterAAASWxSARRegistrationRequests

Attribute	Value
Description	The number of requests that register Non-3GPP user to HSS for SWx application in the current GP.
Condition	Incremented when the user authentication and authorization is success and the AAA server register the user in HSS.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWxGroup

8.6.12 ipworksDiameterAAASWxSARDeRegistrationRequest

Attribute	Value
Description	The number of requests that deregister Non-3GPP user from HSS for SWx application in the current GP.



Attribute	Value
Condition	Incremented when the STa Session is terminated and the AAA server deregister the user in HSS.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWxGroup

8.6.13 ipworksDiameterAAASWxSARUpdatePGWInfoRequest

Attribute	Value
Description	The number of requests that update PDN-GW info in HSS for SWx application in the current GP.
Condition	Incremented when the AAA server update the PDN-GW information in HSS successfully.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWxGroup

8.6.14 ipworksDiameterAAASWxRoamingNotAllowed

Attribute	Value
Description	The total number of Roaming Not Allowed messages for SWx application in the current GP.
Condition	Incremented when an MAA message with Experimental-Result-Code indicating DIAMETER_ERROR_ROAMING_NOT_ALLOWED is received.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWxGroup

8.6.15 ipworksDiameterAAASWxTPS

Attribute	Value
Description	The average value of the TPS for SWx application (which are sampled and calculated every 10 seconds) in the current GP.
Condition	Incremented when Requests are sent to HSS.
Collection Method	Gauge
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWxGroup

8.6.16 ipworksDiameterAAASARThrottled

Attribute	Value
Description	The number of throttled SAR messages for SWx application when EPC SWx throttling function is enabled.
Condition	Incremented when the AAA server throttles SAR messages and meanwhile EPC SWx throttling function is enabled.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWxGroup

8.6.17 ipworksDiameterAAAMARThrottled

Attribute	Value
Description	The number of throttled MAR messages for SWx application when EPC SWx throttling function is enabled.
Condition	Incremented when the AAA server throttles MAR messages and meanwhile EPC SWx throttling function is enabled.
Collection Method	CC
Aggregation	SUM



Attribute	Value
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAASWxGroup

8.7 AAADiaOtherGroup

This performance measurement group, called `AAADiaOtherGroup`, contains the measurements of other events which are related to EPC AAA. The directory of the MO is as follows:

ManagedElement=<Node Name>, SystemFunctions=1, Pm=1, PmGroup=AAADiaOtherGroup

This performance measurement group includes the following measurements:

- `ipworksDiameterAAAMAPATIRequests`
- `ipworksDiameterAAAMAPATIResponses`
- `ipworksDiameterAAAOCSPRequests`
- `ipworksDiameterAAAOCSPResponses`
- `ipworksDiameterAAAProcessUpTime`
- `ipworksDiameterAAAHealthStatus`

8.7.1 ipworksDiameterAAAMAPATIRequests

Attribute	Value
Description	The number of MAP ATI Request messages for Diameter AAA application in the current GP.
Condition	Incremented when Diameter AAA server sends an MAP ATI request message to HLR.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAADiaOtherGroup



8.7.2 ipworksDiameterAAAMAPATIResponses

Attribute	Value
Description	The number of MAP ATI Response messages for AAA Diameter application in the current GP.
Condition	Incremented when Diameter AAA server receives a MAP ATI response message from HLR.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAADiaOtherGroup

8.7.3 ipworksDiameterAAAOCSRequests

Attribute	Value
Description	The number of OCS Request messages to CA server in the current GP.
Condition	Incremented when Diameter AAA server sends an OCS request message to CA server.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAADiaOtherGroup

8.7.4 ipworksDiameterAAAOCSResponses

Attribute	Value
Description	The number of OCS Response messages received from CA server in the current GP.
Condition	Incremented when Diameter AAA server receives an OCS response message from CA server.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAADiaOtherGroup



8.7.5 ipworksDiameterAAAProcessUpTime

Attribute	Value
Description	The number of seconds since the server was started.
Condition	The value is incremented for every second the AAA Diameter server is running.
Collection Method	Gauge
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAADiaOtherGroup

8.7.6 ipworksDiameterAAAHealthStatus

Attribute	Value
Description	<p>The Diameter AAA service health status. It shows the current Diameter AAA traffic level, the value range is 1-10.</p> <p>The value "1" means that the current Diameter AAA traffic is less than 10% of its max traffic; the value 10 means that Diameter AAA reaches its max traffic.</p>
Condition	Level value will be changed when the result of (current TPS)/(MAX TPS) change.
Collection Method	Status Inspection
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAADiaOtherGroup

8.8 AAAS13Group

This performance measurement group, called AAAS13Group, contains a measurement for events which are related to S13 interface. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAAS13Group
```



This performance measurement group includes following measurements:

- ipworksDiameterAAAS13ECR
- ipworksDiameterAAAS13ECA

8.8.1 ipworksDiameterAAAS13ECR

Attribute	Value
Description	The number of ECR messages for S13 application in the current GP.
Condition	Incremented when the AAA server sends ECR messages to EIR.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAAS13Group

8.8.2 ipworksDiameterAAAS13ECA

Attribute	Value
Description	The number of ECA messages for S13 application in the current GP.
Condition	Incremented when the AAA server receives ECA messages from EIR.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAAS13Group

8.9 AAADiaFrontEndGroup

This performance measurement group, called AAADiaFrontEndGroup, contains the measurements of events which are related to AAA Front End (PKI), also named PKI-FE.

```
>ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=AAADiaFrontEndGroup
```



This performance measurement group includes following measurements:

- Section 8.9.1 ipworksDiameterServTotalDiscardedCUDBQueryRequests on page 139
- Section 8.9.2 ipworksDiameterServTotalCUDBQueryRequests on page 139
- Section 8.9.3 ipworksDiameterServTotalSuccessCUDBQueryRequests on page 140
- Section 8.9.4 ipworksDiameterServTotalFailedCUDBQueryRequests on page 140
- Section 8.9.5 ipworksDiameterServTotalDiscardedLoadRegulationRequests on page 141
- Section 8.9.6 ipworksDiameterServTotalCUDBErrorCodeBusyResponses on page 141
- Section 8.9.7 ipworksDiameterServTotalCUDBErrorCodeUnavailableResponses on page 141
- Section 8.9.8 ipworksDiameterServTotalCUDBErrorCodeOtherResponses on page 142

8.9.1 ipworksDiameterServTotalDiscardedCUDBQueryRequests

Attribute	Value
Description	The number of LDAP queries discarded by PKI-FE because PKI-FE cooperative load regulation is triggered in the current GP.
Condition	AAA server has received LDAP error code 51 (LDAP Busy).
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAADiaFrontEndGroup

8.9.2 ipworksDiameterServTotalCUDBQueryRequests

Attribute	Value
Description	The number of LDAP query packets sending to CUDB by AAA server in the current GP.



Attribute	Value
Condition	Incremented when AAA server has sent an LDAP query to CUDB.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAADiaFrontEndGroup

8.9.3 ipworksDiameterServTotalSuccessCUDBQueryRequests

Attribute	Value
Description	The number of LDAP query packets sending to CUDB by AAA server and successfully receiving a corresponding response in the current GP.
Condition	Incremented for receiving a successful response when AAA server sends a LDAP query to CUDB.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAADiaFrontEndGroup

8.9.4 ipworksDiameterServTotalFailedCUDBQueryRequests

Attribute	Value
Description	The number of LDAP query packets sending to CUDB by AAA server but receiving no corresponding response or not receiving a valid response in the current GP.
Condition	Incremented for receiving invalid response or no response at all when AAA server sends a LDAP query to CUDB.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAADiaFrontEndGroup



8.9.5 ipworksDiameterServTotalDiscardedLoadRegulationRequests

Attribute	Value
Description	The number of Diameter packets discarded by PKI-FE because PKI-FE cooperative load regulation is triggered in the current GP. This counter focuses on calculating load regulation in traffic side.
Condition	Incremented for every request discarded by PKI-FE load regulation.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAADiaFrontEndGroup

8.9.6 ipworksDiameterServTotalCUDBErrorCodeBusyResponses

Attribute	Value
Description	The number of response with error code 51 from CUDB after sending LDAP query in the current GP.
Condition	Incremented for every receiving of CUDB error code 51 (LDAP Busy).
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAADiaFrontEndGroup

8.9.7 ipworksDiameterServTotalCUDBErrorCodeUnavailableResponses

Attribute	Value
Description	The number of response with error code 52 from CUDB after sending LDAP query in the current GP.
Condition	Incremented for every receiving of CUDB error code 52.
Collection Method	CC
Aggregation	SUM



Attribute	Value
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAADiaFrontEndGroup

8.9.8**ipworksDiameterServTotalCUDBErrorCodeOtherResponses**

Attribute	Value
Description	The number of response with error code 80 from CUDB after sending LDAP query in the current GP.
Condition	Incremented for every receiving of CUDB error code 80.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	AAADiaFrontEndGroup



9 Measurements for DHCPv4

This section provides the performance measurement data regarding DHCPv4. In addition, the default PM job is described for each performance measurement group.

9.1 DHCPv4MessageGroup

This performance measurement group, called DHCPv4MessageGroup, contains measurements for events which are related to DHCPv4 messages. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DHCPv4MessageGroup
```

Most of the measurements (excluding ipworksDhcpv4TransactionPerSecond) are in a measurement collection job, the default PM job is DHCPv4DefaultPmJob. The directory of this default job MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DHCPv4DefaultPmJob
```

The default job with the default value is as follows:

```
PmJob=DHCPv4DefaultPmJob
compressionType=[] <empty>
currentJobState=[] <empty> <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="DHCPv4DefaultPmJob"
reportContentGeneration=CHANGED_ONLY <default>
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=DHCPv4MessageMr
measurementReaderId="DHCPv4MessageMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
measurementReaderNameValue=[] <empty> <read-only>
measurementSpecification
  groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DHCPv4MessageGroup"
  measurementTypeRef=[] <empty>
```

ipworksDhcpv4TransactionPerSecond is in a threshold monitoring job. The default PM job is DHCPv4DefaultPmThresholdJob. The directory of this default job MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DHCPv4DefaultPmThresholdJob
```

The default job with the default value is as follows:



```
PmJob=DHCPv4DefaultPmThresholdJob
compressionType=[] <empty>
currentJobState=[] <empty> <read-only>
granularityPeriod=ONE_MIN
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=THRESHOLDJOB
pmJobId="DHCPv4DefaultPmThresholdJob"
reportContentGeneration=CHANGED_ONLY <default>
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=TransactionPerSecondMr
  measurementReaderId="TransactionPerSecondMr"
  moInstances=[] <empty>
  thresholdDirection=[] <empty>
  thresholdRateOfVariation=PER_SECOND <default>
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef=[] <empty>
    measurementTypeRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DHCPv4Messa
PmThresholdMonitoring=TPSExceedThresholdLevel2
  pmThresholdMonitoringId="TPSExceedThresholdLevel2"
  thresholdHigh=9200
  thresholdLow=8800
  thresholdSeverity=MAJOR
PmThresholdMonitoring=TPSExceedThresholdLevel1
  pmThresholdMonitoringId="TPSExceedThresholdLevel1"
  thresholdHigh=8200
  thresholdLow=7800
  thresholdSeverity=MINOR <default>
```

This performance measurement group includes following measurements:

- ipworksDhcpv4CountBOOTPRequests
- ipworksDhcpv4CountBOOTPReplies
- ipworksDhcpv4CountBOOTPTotal
- ipworksDhcpv4CountDHCPDiscovers
- ipworksDhcpv4CountDHCPOffers
- ipworksDhcpv4CountDHCPRequests
- ipworksDhcpv4CountDHCPAcks
- ipworksDhcpv4CountDHCPNacks
- ipworksDhcpv4CountDHCPInforms
- ipworksDhcpv4CountDHCPDeclines
- ipworksDhcpv4CountDHCPReleases
- ipworksDhcpv4CountDHCPTotal
- ipworksDhcpv4TransactionPerSecond



9.1.1 ipworksDhcpv4CountBOOTPRequests

Attribute	Value
Description	Count of BOOTP request messages received by the server. If the server does not process BOOTP messages, this value will be zero.
Condition	Successful receive of a BOOTP request message.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4MessageGroup

9.1.2 ipworksDhcpv4CountBOOTPReplies

Attribute	Value
Description	Count of BOOTP replies sent by the server. If the server does not process BOOTP messages, this value will be zero.
Condition	Successful BOOTP reply by the server.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4MessageGroup

9.1.3 ipworksDhcpv4CountBOOTPTotal

Attribute	Value
Description	Count of total BOOTP messages (BOOTP requests + BOOTP replies + unknown clients).
Condition	Upon receive of a BOOTP message.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4MessageGroup

9.1.4 ipworksDhcpv4CountDHCPDiscovers

Attribute	Value
Description	The number of DHCPDISCOVER messages received by the server.
Condition	Reception of a DHCPDISCOVER message by the server.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4MessageGroup

9.1.5 ipworksDhcpv4CountDHCPOffers

Attribute	Value
Description	The number of DHCPOFFER messages sent by the server.
Condition	The counter is incremented for every DHCPOFFER message received by the server.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4MessageGroup

9.1.6 ipworksDhcpv4CountDHCPRequests

Attribute	Value
Description	The number of DHCPREQUEST messages received by the server.
Condition	The counter is incremented whenever a DHCP server receives a DHCPREQUEST message.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Node level
Measurement Object Class	DHCPv4MessageGroup

9.1.7 ipworksDhcpv4CountDHCPacks

Attribute	Value
Description	The number of DHCPACK messages sent by the server.
Condition	The counter is incremented for every DHCPACK message received by the server.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4MessageGroup

9.1.8 ipworksDhcpv4CountDHCPNacks

Attribute	Value
Description	The number of DHCPNACK messages sent by the server.
Condition	The counter is incremented for every DHCPNACK message received by the server.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4MessageGroup

9.1.9 ipworksDhcpv4CountDHCPInforms

Attribute	Value
Description	The number of DHCPINFORM messages received by the server.

Attribute	Value
Condition	The counter is incremented for every DHCPINFORM message received by the server.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4MessageGroup

9.1.10 ipworksDhcpv4CountDHCPDeclines

Attribute	Value
Description	The number of DHCPDECLINE messages received by the server.
Condition	The counter is incremented for every DHCPDECLINE message received by the server.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4MessageGroup

9.1.11 ipworksDhcpv4CountDHCPReleases

Attribute	Value
Description	The number of DHCPRELEASE messages received by the server.
Condition	The counter is incremented for every DHCPRELEASE message received by the server.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4MessageGroup



9.1.12 ipworksDhcpv4CountDHCPTotal

Attribute	Value
Description	The number of total DHCP transactions (total of all DHCP message types + unknown + failures).
Condition	Every DHCP transaction.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4MessageGroup

9.1.13 ipworksDhcpv4TransactionPerSecond

Attribute	Value
Description	The number of successfully received DHCPv4 query per second.
Condition	The value is incremented for every successful processing of DHCPv4 query.
Collection Method	GAUGE
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4MessageGroup

9.2 DHCPv4FormatErrorGroup

This performance measurement group, called `DHCPv4FormatErrorGroup`, contains measurements for events which are related to the errors of DHCPv4 query. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DHCPv4FormatErrorGroup
```

Most of the measurements (exclude `ipworksDhcpv4UnknownMsgType` and `ipworksDhcpv4ParsingOption82Fail`) are in a measurement collection job, the default PM job is `DHCPv4DefaultPmJob`. The directory of this default job MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DHCPv4DefaultPmJob
```



The default job with the default value is as follows:

```
PmJob=DHCPv4DefaultPmJob
compressionType=[] <empty>
currentJobState=[] <empty> <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="DHCPv4DefaultPmJob"
reportContentGeneration=CHANGED_ONLY <default>
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=DHCPv4FormatErrorMr
  measurementReaderId="DHCPv4FormatErrorMr"
  moInstances=[] <empty>
  thresholdDirection=[] <empty>
  thresholdRateOfVariation=PER_SECOND <default>
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DHCPv4FormatErrorGroup"
    measurementTypeRef=[] <empty>
```

ipworksDhcpv4UnknownMsgType and ipworksDhcpv4ParsingOption82Fail are in a threshold monitoring job, the default PM job is DHCPv4DefaultPmThresholdJob. The directory of this default job MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DHCPv4DefaultPmThresholdJob
```

The default job with the default value is as follows:



```

PmJob=DHCPv4DefaultPmThresholdJob
compressionType=[] <empty>
currentJobState=[] <empty> <read-only>
granularityPeriod=ONE_MIN
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=THRESHOLDJOB
pmJobId="DHCPv4DefaultPmThresholdJob"
reportContentGeneration=CHANGED_ONLY <default>
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=ParsingOption82FailMr
  measurementReaderId="ParsingOption82FailMr"
  moInstances=[] <empty>
  thresholdDirection=[] <empty>
  thresholdRateOfVariation=PER_GP
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef=[] <empty>
    measurementTypeRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DHCPv4Fo
  PmThresholdMonitoring=Option82ParsingFailureCrossThresholdMonitor
    pmThresholdMonitoringId="Option82ParsingFailureCrossThresholdMonitor"
    thresholdHigh=100
    thresholdLow=80
    thresholdSeverity=WARNING
MeasurementReader=UnknownMsgTypeMr
  measurementReaderId="UnknownMsgTypeMr"
  moInstances=[] <empty>
  thresholdDirection=[] <empty>
  thresholdRateOfVariation=PER_GP
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef=[] <empty>
    measurementTypeRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DHCPv4Fo
  PmThresholdMonitoring=UnknownMsgTypeMonitor
    pmThresholdMonitoringId="UnknownMsgTypeMonitor"
    thresholdHigh=100
    thresholdLow=80
    thresholdSeverity=WARNING

```

This performance measurement group includes following measurements:

- ipworksDhcpv4GarbledCHADDR
- ipworksDhcpv4ParsingOption82Fail
- ipworksDhcpv4UnknownHardware
- ipworksDhcpv4UnknownMsgType

9.2.1

ipworksDhcpv4GarbledCHADDR

Attribute	Value
Description	The number of messages received by server with 'chaddr' field garbled (length does not match HLEN, for example).
Condition	The counter is incremented for every 'chaddr' field garbled (length does not match HLEN, for example).



Attribute	Value
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4FormatErrorGroup

9.2.2 ipworksDhcpv4ParsingOption82Fail

Attribute	Value
Description	The number of unknown option82 format message received by server.
Condition	The counter is incremented for every unknown option82 format message type received by the server.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4FormatErrorGroup

9.2.3 ipworksDhcpv4UnknownHardware

Attribute	Value
Description	The number of messages received where HTYPE is not a type processed by the server or HTYPE does not match with HTYPE supported by server.
Condition	The counter is incremented for every message received for which HTYPE is not a type processed by the server.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4FormatErrorGroup



9.2.4 ipworksDhcpv4UnknownMsgType

Attribute	Value
Description	The number of unknown message types received by server.
Condition	The counter is incremented for every unknown message type received by the server.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4FormatErrorGroup

9.3 DHCPv4DDNSMessageGroup

This performance measurement group, called DHCPv4DDNSMessageGroup, contains measurements for events which are related to DHCPv4 DDNS query. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DHCPv4DDNSMessageGroup
```

Most of the measurements (exclude ipworksDhcpv4DDNSFailedError and ipworksDhcpv4DDNSRetryFail) are in a measurement collection job, the default PM job is DHCPv4DefaultPmJob. The directory of this default job MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DHCPv4DefaultPmJob
```

The default job with the default value is as follows:



```

PmJob=DHCPv4DefaultPmJob
compressionType=[] <empty>
currentJobState=[] <empty> <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="DHCPv4DefaultPmJob"
reportContentGeneration=CHANGED_ONLY <default>
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=DHCPv4DDNSMessageMr
  measurementReaderId="DHCPv4DDNSMessageMr"
  moInstances=[] <empty>
  thresholdDirection=[] <empty>
  thresholdRateOfVariation=PER_SECOND <default>
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DHCPv4DDNSMessageGrou
    measurementTypeRef=[] <empty>
MeasurementReader=DHCPv4FormatErrorMr
  measurementReaderId="DHCPv4FormatErrorMr"
  moInstances=[] <empty>
  thresholdDirection=[] <empty>
  thresholdRateOfVariation=PER_SECOND <default>
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DHCPv4FormatErrorGrou
    measurementTypeRef=[] <empty>

```

ipworksDhcpv4DDNSFailedError and ipworksDhcpv4DDNSRetryFail are in a threshold monitoring job, the default PM job is DHCPv4DefaultPmThresholdJob. The directory of this default job MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DHCPv4DefaultPmThresholdJob
```

The default job with the default value is as follows:



```

PmJob=DHCPv4DefaultPmThresholdJob
compressionType=[] <empty>
currentJobState=[] <empty> <read-only>
granularityPeriod=ONE_MIN
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=THRESHOLDJOB
pmJobId="DHCPv4DefaultPmThresholdJob"
reportContentGeneration=CHANGED_ONLY <default>
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=DDNSFailedErrorMr
  measurementReaderId="DDNSFailedErrorMr"
  moInstances=[] <empty>
  thresholdDirection=[] <empty>
  thresholdRateOfVariation=PER_GP
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef=[] <empty>
    measurementTypeRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DHCPv4DD
PmThresholdMonitoring=DDNSUpdateFailMonitor
  pmThresholdMonitoringId="DDNSUpdateFailMonitor"
  thresholdHigh=100
  thresholdLow=80
  thresholdSeverity=WARNING
MeasurementReader=DDNSRetryFailMr
  measurementReaderId="DDNSRetryFailMr"
  moInstances=[] <empty>
  thresholdDirection=[] <empty>
  thresholdRateOfVariation=PER_GP
  measurementReaderNameValue=[] <empty> <read-only>
  measurementSpecification
    groupRef=[] <empty>
    measurementTypeRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DHCPv4DD
PmThresholdMonitoring=DDNSUpdateRetryMonitor
  pmThresholdMonitoringId="DDNSUpdateRetryMonitor"
  thresholdHigh=100
  thresholdLow=80
  thresholdSeverity=WARNING

```

This performance measurement group includes following measurements:

- ipworksDhcpv4DDNSRecv
- ipworksDhcpv4DDNSSent
- ipworksDhcpv4DDNSUpdateTotal
- ipworksDhcpv4DDNSFailedError
- ipworksDhcpv4DDNSRetryFail
- ipworksDhcpv4DDNSSuccess

9.3.1

ipworksDhcpv4DDNSRecv

Attribute	Value
Description	The total number of DDNS update responses received by the DHCP server. This includes successes and failures.



Attribute	Value
Condition	The counter is incremented for every DDNS update response received by the DHCP server.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4DDNSMessageGroup

9.3.2 ipworksDhcpv4DDNSSent

Attribute	Value
Description	The total number of DDNS update requests sent for A and PTR resources records.
Condition	The counter is incremented for every DDNS update request sent to DNS server for A and PTR resources records.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4DDNSMessageGroup

9.3.3 ipworksDhcpv4DDNSUpdateTotal

Attribute	Value
Description	The total number of DDNS update transactions sent and received while attempting to add and delete A and PTR resource records.
Condition	The counter is incremented for every of DDNS update transaction sent and received.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4DDNSMessageGroup



9.3.4 ipworksDhcpv4DDNSFailedError

Attribute	Value
Description	The total number of DDNS updates that failed. This includes A and PTR resources records.
Condition	The counter is incremented for every DDNS update request failure.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4DDNSMessageGroup

9.3.5 ipworksDhcpv4DDNSRetryFail

Attribute	Value
Description	The total number of DDNS updates that failed because it exceeded the maximum number of retries. This includes A and PTR resources records.
Condition	The counter is incremented for every DDNS retry failure.
Collection Method	CC
Aggregation	SUM
Result Type	Integer
Application Level	Node level
Measurement Object Class	DHCPv4DDNSMessageGroup

9.3.6 ipworksDhcpv4DDNSSuccess

Attribute	Value
Description	The total number of successful ipworksDhcpv4DDNSRecv received by the server. This includes A and PTR resources records.
Condition	The counter is incremented for every successful ipworksDhcpv4DDNSRecv received by the server.
Collection Method	CC
Aggregation	SUM
Result Type	Integer



Attribute	Value
Application Level	Node level
Measurement Object Class	DHCPv4DDNSMessageGroup

9.4 DHCPv4LeaseInfoGroup

This performance measurement group, called DHCPv4LeaseInfoGroup, contains measurements for events which are related to DHCPv4 lease query. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DHCPv4LeaseInfoGroup
```

The default PM job, which is a measurement collection job, is DHCPv4DefaultPmJob. The directory of this default job MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=DHCPv4DefaultPmJob
```

The default job with the default value is as follows:

```
PmJob=DHCPv4DefaultPmJob
  compressionType=[] <empty>
  currentJobState=[] <empty> <read-only>
  granularityPeriod=FIFTEEN_MIN <default>
  jobControl=FULL <default> <read-only>
  jobGroup=[] <empty>
  jobPriority=MEDIUM <default>
  jobType=MEASUREMENTJOB <default>
  pmJobId="DHCPv4DefaultPmJob"
  reportContentGeneration=CHANGED_ONLY <default>
  reportingPeriod=FIFTEEN_MIN <default>
  requestedJobState=ACTIVE <default>
  MeasurementReader=DHCPv4LeaseInfoMr
    measurementReaderId="DHCPv4LeaseInfoMr"
    moInstances=[] <empty>
    thresholdDirection=[] <empty>
    thresholdRateOfVariation=PER_SECOND <default>
    measurementReaderNameValue=[] <empty> <read-only>
    measurementSpecification
      groupRef="ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=DHCPv4LeaseInfoGroup"
      measurementTypeRef=[] <empty>
```

This performance measurement group includes following measurements:

- ipworksDhcpv4ActiveLeaseNum
- ipworksDhcpv4ActiveLeasePercentage



— ipworksDhcpv4ConfiguredLeaseNum

9.4.1 ipworksDhcpv4ActiveLeaseNum

Attribute	Value
Description	The counter keeps the count for the number of active leases.
Condition	The counter is incremented for every new active lease and decremented for every active lease that becomes free.
Collection Method	GAUGE
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Node level ⁽¹⁾
Measurement Object Class	DHCPv4LeaseInfoGroup

(1) When IPWorks DHCP is deployed as failover mode, each server has all the lease information. That is the counter reported by each node reflects the Cluster level information. Operator should use the counter of either node.

9.4.2 ipworksDhcpv4ActiveLeasePercentage

Attribute	Value
Description	The counter keeps the percentage of active leases in the configured leases.
Condition	The counter is incremented for every increased percentage of active leases and decremented for every decreased percentage point active leases that becomes free.
Collection Method	GAUGE
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Node level ⁽¹⁾
Measurement Object Class	DHCPv4LeaseInfoGroup

9.4.3 ipworksDhcpv4ConfiguredLeaseNum

Attribute	Value
Description	The counter keeps the count for the number of configured leases.



Attribute	Value
Condition	The counter changes whenever the operator changes the pool configuration.
Collection Method	GAUGE
Aggregation	LAST_UPDATE
Result Type	Integer
Application Level	Node level ⁽¹⁾
Measurement Object Class	DHCPv4LeaseInfoGroup



10 Measurements for OS

This section provides the PM group and measurements regarding OS.

For the measurement `CPUload.Total` under PM group `OSProcessingUnit` of OS, there are two PM jobs:

— Default measurement PM job `OSDefaultPmJob`

It is used to generate the PM report for `CPUload.Total`.

— Default threshold PM job `OSDefaultPmThresholdJob`

It is used to raise and cease the System Load Threshold Reached, Load Average too High alarm:

- Raise the alarm when the value of `CPUload.Total` is higher than the `thresholdHigh`.
- Cease the alarm when the value of `CPUload.Total` is lower than the `thresholdLow`.

For the alarm detail, refer to the document [System Load Threshold Reached, Load Average too High](#).

The directory of default PM job `OSDefaultPmJob` is:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=OSDefaultPmJob
```

The default PM job with the default value is as follows:

```
(PmJob=OSDefaultPmJob)>show -v all
PmJob=OSDefaultPmJob
compressionType=[] <empty>
currentJobState=ACTIVE <read-only>
granularityPeriod=FIFTEEN_MIN <default>
jobControl=FULL <default> <read-only>
jobGroup=[] <empty>
jobPriority=MEDIUM <default>
jobType=MEASUREMENTJOB <default>
pmJobId="OSDefaultPmJob"
reportContentGeneration=CHANGED_ONLY <default>
reportingPeriod=FIFTEEN_MIN <default>
requestedJobState=ACTIVE <default>
MeasurementReader=OSDefaultPmMr
measurementReaderId="OSDefaultPmMr"
moInstances=[] <empty>
thresholdDirection=[] <empty>
thresholdRateOfVariation=PER_SECOND <default>
```



```

        measurementReaderNameValue=[] <empty> <read-only>
        measurementSpecification
            groupRef=[] <empty>
            measurementTypeRef="ManagedElement=1,SystemFunctions=1,Pm=1,
PmGroup=OSProcessingUnit,MeasurementType=CPULoad.Total"

```

The directory of the default threshold PM job OSDefaultPmThresholdJob is:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmJob=OSDefault
PmThresholdJob
```

The default threshold job with the default value is as follows:

```

(PmJob=OSDefaultPmThresholdJob)>show -v all
PmJob=OSDefaultPmThresholdJob
    compressionType=[] <empty>
    currentJobState=ACTIVE <read-only>
    granularityPeriod=ONE_MIN
    jobControl=FULL <default> <read-only>
    jobGroup=[] <empty>
    jobPriority=MEDIUM <default>
jobType=THRESHOLDJOB
    pmJobId="OSDefaultPmThresholdJob"
    reportContentGeneration=CHANGED_ONLY <default>
reportingPeriod=ONE_MIN
    requestedJobState=ACTIVE <default>
    MeasurementReader=OSDefaultPmThresholdMr
        measurementReaderId="OSDefaultPmThresholdMr"
        moInstances=[] <empty>
        thresholdDirection=INCREASING <default>
        thresholdRateOfVariation=PER_SECOND <default>
        measurementReaderNameValue=[] <empty> <read-only>
        measurementSpecification
            groupRef=[] <empty>
            measurementTypeRef="ManagedElement=1,SystemFunctions=1,Pm=1,
PmGroup=OSProcessingUnit,MeasurementType=CPULoad.Total"
        PmThresholdMonitoring=CPULoadExceedThresholdMonitor
            pmThresholdMonitoringId="CPULoadExceedThresholdMonitor"
thresholdHigh=80
thresholdLow=70
        thresholdSeverity=CRITICAL

```

If you create a new customized threshold PM job for CPULoad.Total, the following procedures must be done:

1. List the LDE PMCounter producers.

```
# amf-find su | grep PMCounter
```

```
safSu=SC-1,safSg=NWA,safApp=ERIC-ldews.pmcounters.sc
```



```
safSu=SC-2,safSg=NWA,safApp=ERIC-ldews.pmcounters.sc
safSu=PL-3,safSg=NWA,safApp=ERIC-ldews.pmcounters.pl
safSu=PL-4,safSg=NWA,safApp=ERIC-ldews.pmcounters.pl
```

2. Restart the LDE PMCounter producers for each node (including both SCs and PLs). Take the ones on PL-3 as an example:

```
amf-adm lock safSu=PL-3,safSg=NWA,safApp=ERIC-ldews.pmcounters.pl
amf-adm lock-in safSu=PL-3,safSg=NWA,safApp=ERIC-ldews.pmcounters.pl
amf-adm unlock-in safSu=PL-3,safSg=NWA,safApp=ERIC-ldews.pmcounters.pl
amf-adm unlock safSu=PL-3,safSg=NWA,safApp=ERIC-ldews.pmcounters.pl
```

10.1 OSProcessingUnit

This PM group, called `OSProcessingUnit`, contains the measurements of events which are related to OS level. The directory of the MO is as follows:

```
ManagedElement=<Node Name>,SystemFunctions=1,Pm=1,PmGroup=OSProcessingUnit
```

This PM group includes OS related measurements. For more detail, refer to LDE PM Counters Interface. IPWorks only uses the measurement `CPUload.Total`.

10.1.1

CPUload.Total

Attribute	Value
Description	Total CPU usage (percentage)
	Computed as User + System + IOWait + Nice + IRQ + SoftIRQ.
Condition	Indicate the average of Total CPU usage in the current GP.
Collection Method	Gauge
Aggregation	AVG
Result Type	Integer
Application Level	Node level
Measurement Object Class	OSProcessingUnit





Reference List

Ericsson Documents

- [1] IPWorks Performance Measurements
- [2] ENUM, Total Query Failure Error
- [3] ENUM, Query Failure Error
- [4] ENUM, Total Query Failure Error
- [5] ERH, TPS Exceed Threshold
- [6] ERH, NP Query Error
- [7] ERH, Toll-free Query Error
- [8] ERH, Total Query Error
- [9] System Load Threshold Reached, Load Average too High
- [10] LDE PM Counters Interface, 1/155 19-CAA 901 2978/4 Uen