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Registry for Performance Metrics  
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## Abstract

This document defines the IANA Registry for Performance Metrics. This document also gives a set of guidelines for Registered Performance Metric requesters and reviewers.

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Registry for Performance Metrics

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[1.](#) Open Issues

1. Many aspects of the Naming convention are TBD, and need discussion. For example, we have distinguished RTCP-XR metrics as End-Point (neither active nor passive in the traditional sense, so not Act\_ or Pas\_). Even though we may not cast all naming conventions in stone at the start, it will be helpful to look at several examples of passive metric names now.
2. We should expand on the different roles and responsibilities of the Performance Metrics Experts versus the Performance Metric Directorate. At least, the Performance Metric Directorate one should be expanded. --- (v7) If these are different entities, our only concern is the role of the "PM Experts".
3. Revised Registry Entries: Keep for history (deprecated) or Delete?
4. Need to include an example for a name for a passive metric
5. Definition of Parameter needs more work?
6. Whether the name of the metric should contain the version of the metric

7. reserve some values for examples and private use?
8. should we define a "type" column with the possible values "active" "passive" "hybrid" "endpoint"? if we go for all 4 of them, we should define the corresponding prefixes for the metric name (at this point only the pas and act are defined)
9. URL: should we include a URL link in each registry entry with a URL specific to the entry that links to a different text page that contains all the details of the registry entry as in <http://www.iana.org/assignments/xml-registry/xml-registry.xhtml#ns>

## 2. Introduction

The IETF specifies and uses Performance Metrics of protocols and applications transported over its protocols. Performance metrics are such an important part of the operations of IETF protocols that [RFC6390] specifies guidelines for their development.

The definition and use of Performance Metrics in the IETF happens in various working groups (WG), most notably:

The "IP Performance Metrics" (IPPM) WG is the WG primarily focusing on Performance Metrics definition at the IETF.

The "Metric Blocks for use with RTP's Extended Report Framework" (XRBLOCK) WG recently specified many Performance Metrics related to "RTP Control Protocol Extended Reports (RTP XR)" [RFC3611], which establishes a framework to allow new information to be conveyed in RTP, supplementing the original report blocks defined in "RTP: A Transport Protocol for Real-Time Applications", [RFC3550].

The "Benchmarking Methodology" WG (BMWG) defined many Performance Metrics for use in laboratory benchmarking of inter-networking technologies.

The "IP Flow Information eXport" (IPFIX) WG Information elements related to Performance Metrics are currently proposed.

The "Performance Metrics for Other Layers" (PMOL) concluded WG,

defined some Performance Metrics related to Session Initiation Protocol (SIP) voice quality [[RFC6035](#)].

It is expected that more Performance Metrics will be defined in the future, not only IP-based metrics, but also metrics which are protocol-specific and application-specific.

However, despite the importance of Performance Metrics, there are two related problems for the industry. First, how to ensure that when one party requests another party to measure (or report or in some way act on) a particular Performance Metric, then both parties have exactly the same understanding of what Performance Metric is being referred to. Second, how to discover which Performance Metrics have been specified, so as to avoid developing new Performance Metric that is very similar. The problems can be addressed by creating a registry of performance metrics. The usual way in which IETF organizes namespaces is with Internet Assigned Numbers Authority (IANA) registries, and there is currently no Performance Metrics Registry maintained by the IANA.

This document therefore creates a Performance Metrics Registry. It also provides best practices on how to define new or updated entries in the Performance Metrics Registry.

### [3.](#) Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [[RFC2119](#)].

The terms Performance Metric and Performance Metrics Directorate are defined in [[RFC6390](#)], and copied over in this document for the readers convenience.

**Performance Metric:** A Performance Metric is a quantitative measure of performance, specific to an IETF-specified protocol or specific to an application transported over an IETF-specified protocol. Examples of Performance Metrics are the FTP response time for a complete file download, the DNS response time to resolve the IP address, a database logging time, etc.

**Registered Performance Metric:** A Registered Performance Metric (or Registered Metric) is a Performance Metric expressed as an entry in the Performance Metric Registry, and comprised of a specifically named metric which has met all the registry review criteria, is under the curation of IETF Performance Metrics Experts, and whose changes are controlled by IANA.

**Performance Metrics Registry:** The IANA registry containing Registered Performance Metrics. In this document, it is also called simply "Registry".

**Proprietary Registry:** A set of metrics that are registered in a proprietary registry, as opposed to Performance Metrics Registry.

**Performance Metrics Experts:** The Performance Metrics Experts is a group of experts selected by the IESG to validate the Performance Metrics before updating the Performance Metrics Registry. The Performance Metrics Experts work closely with IANA.

**Performance Metrics Directorate:** The Performance Metrics Directorate is a directorate that provides guidance for Performance Metrics development in the IETF. The Performance Metrics Directorate should be composed of experts in the performance community, potentially selected from the IP Performance Metrics (IPPM), Benchmarking Methodology (BMWG), and Performance Metrics for Other Layers (PMOL) WGs.

**Parameter:** An input factor defined as a variable in the definition of a metric. A numerical or other specified factor forming one of a set that defines a metric or sets the conditions of its operation. All Input Parameters must be known to measure using a metric and interpret the results. Although Input Parameters do not change the fundamental nature of the metric's definition, some have substantial influence on the network property being assessed and interpretation of the results.

Consider the case of packet loss in the following two cases. The first case is packet loss as background loss where the parameter set includes a very sparse Poisson stream, and only characterizes the times when packets were lost. Actual user streams likely see much higher loss at these times, due to tail drop or radio errors. The second case is packet loss as

inverse of Throughput where the parameter set includes a very dense, bursty stream, and characterizes the loss experienced by a stream that approximates a user stream. These are both "loss metrics", but the difference in interpretation of the results is highly dependent on the Parameters (at least), to the extreme where we are actually using loss to infer its compliment: delivered throughput.

**Active Measurement Method:** Methods of Measurement conducted on traffic which serves only the purpose of measurement and is generated for that reason alone, and whose traffic characteristics are known a priori. An Internet user's host can generate active measurement traffic (virtually all typical user-generated traffic is not dedicated to active measurement, but it can produce such traffic with the necessary application operating).

**Passive Measurement Method:** Methods of Measurement conducted on network traffic, generated either from the end users or from network elements. One characteristic of Passive Measurement Methods is that sensitive information may be observed, and as a consequence, stored in the measurement system.

**Hybrid Measurement Method:** Methods of Measurement which use a combination of Active Measurement and Passive Measurement methods.

#### 4. Scope

The intended audience of this document includes those who prepare and submit a request for a Registered Performance Metric, and for the Performance Metric Experts who review a request.

This document specifies a Performance Metrics Registry in IANA. This Performance Metric Registry is applicable to Performance Metrics

issued from Active Measurement, Passive Measurement, from end-point calculation or any other form of Performance Metric. This registry is designed to encompass Performance Metrics developed throughout the IETF and especially for the following existing working groups: IPPM, XRBLOCK, IPFIX, and BMWG. This document analyzes an prior attempt to set up a Performance Metric Registry, and the reasons why this design was inadequate [[RFC6248](#)]. Finally, this document gives a set of guidelines for requesters and expert reviewers of candidate

Registered Performance Metrics.

This document makes no attempt to populate the Registry with initial entries. It does provide a few examples that are merely illustrations and should not be included in the registry at this point in time.

Based on [\[RFC5226\] Section 4.3](#), this document is processed as Best Current Practice (BCP) [\[RFC2026\]](#).

## [5.](#) Design Considerations for the Registry and Registered Metrics

In this section, we detail several design considerations that are relevant for understanding the motivations and expected use of the Performance Metric Registry.

### [5.1.](#) Interoperability

As any IETF registry, the primary use for a registry is to manage a namespace for its use within one or more protocols. In this particular case of the Performance Metric Registry, there are two types of protocols that will use the values defined in the Registry for their operation:

- o Control protocol: this type of protocols is used to allow one entity to request another entity to perform a measurement using a specific metric defined by the Registry. One particular example is the LMAP framework [\[I-D.ietf-lmap-framework\]](#). Using the LMAP terminology, the Registry is used in the LMAP Control protocol to allow a Controller to request a measurement task to one or more Measurement Agents. In order to enable this use case, the entries of the Performance Metric Registry must be well enough defined to allow a Measurement Agent implementation to trigger a specific measurement task upon the reception of a control protocol message. This requirements heavily constrains the type of entries that are acceptable for the Performance Metric Registry.
- o Report protocol: This type of protocols is used to allow an entity to report measurement results to another entity. By referencing to a specific Performance Metric Registry, it is possible to



transferred. Using the LMAP terminology, the Registry is used in the Report protocol to allow a Measurement Agent to report measurement results to a Collector.

## 5.2. Criteria for Registered Performance Metrics

It is neither possible nor desirable to populate the Registry with all combinations of input parameters of all Performance Metrics. The Registered Performance Metrics should be:

1. interpretable by the user.
2. implementable by the software designer,
3. deployable by network operators, without major impact on the networks,
4. accurate, for interoperability and deployment across vendors,
5. Operational useful, so that it has significant industry interest and/or has seen deployment,
6. Sufficiently tightly defined, so that changing Parameters does not change the fundamental nature of the measurement, nor change the practicality of its implementation.

In essence, there needs to be evidence that a candidate Registry entry has significant industry interest, or has seen deployment, and there is agreement that the candidate Registered Metric serves its intended purpose.

## 5.3. Single point of reference for Performance metrics

A Registry for Performance metrics serves as a single point of reference for Performance Metrics defined in different working groups in the IETF. As we mentioned earlier, there are several WGs that define Performance Metrics in the IETF and it is hard to keep track of all them. This results in multiple definitions of similar metrics that attempt to measure the same phenomena but in slightly different (and incompatible) ways. Having a Registry would allow both the IETF community and external people to have a single list of relevant Performance Metrics defined by the IETF (and others, where appropriate). The single list is also an essential aspect of communication about metrics, where different entities that request measurements, execute measurements, and report the results can benefit from a common understanding of the referenced metric.

#### [5.4.](#) Side benefits

There are a couple of side benefits of having such a Registry. First, the Registry could serve as an inventory of useful and used metrics, that are normally supported by different implementations of measurement agents. Second, the results of the metrics would be comparable even if they are performed by different implementations and in different networks, as the metric is properly defined. [BCP 176 \[RFC6576\]](#) examines whether the results produced by independent implementations are equivalent in the context of evaluating the completeness and clarity of metric specifications. This BCP defines the standards track advancement testing for (active) IPPM metrics, and the same process will likely suffice to determine whether Registry entries are sufficiently well specified to result in comparable (or equivalent) results. Registry entries which have undergone such testing SHOULD be noted, with a reference to the test results.

#### [6.](#) Performance Metric Registry: Prior attempt

There was a previous attempt to define a metric registry [RFC 4148 \[RFC4148\]](#). However, it was obsoleted by [RFC 6248 \[RFC6248\]](#) because it was "found to be insufficiently detailed to uniquely identify IPPM metrics... [there was too much] variability possible when characterizing a metric exactly" which led to the [RFC4148](#) registry having "very few users, if any".

A couple of interesting additional quotes from [RFC 6248](#) might help understand the issues related to that registry.

1. "It is not believed to be feasible or even useful to register every possible combination of Type P, metric parameters, and Stream parameters using the current structure of the IPPM Metrics Registry."
2. "The registry structure has been found to be insufficiently detailed to uniquely identify IPPM metrics."
3. "Despite apparent efforts to find current or even future users, no one responded to the call for interest in the [RFC 4148](#) registry during the second half of 2010."

The current approach learns from this by tightly defining each entry in the registry with only a few variable Parameters to be specified by the measurement designer, if any. The idea is that entries in the Registry represent different measurement methods which require input

parameters to set factors like source and destination addresses (which do not change the fundamental nature of the measurement). The

downside of this approach is that it could result in a large number of entries in the Registry. We believe that less is more in this context - it is better to have a reduced set of useful metrics rather than a large set of metrics with questionable usefulness. Therefore this document defines that the Registry only includes metrics that are well defined and that have proven to be operationally useful. In order to guarantee these two characteristics we require that a set of experts review the allocation request to verify that the metric is well defined and it is operationally useful.

#### [6.1.](#) Why this Attempt Will Succeed?

The Registry defined in this document addresses the main issues identified in the previous attempt. As we mention in the previous section, one of the main issues with the previous registry was that the metrics contained in the registry were too generic to be useful. In this Registry, the Registry requests are evaluated by an expert group, the Performance Metrics Experts, who will make sure that the metric is properly defined. This document provides guidelines to assess if a metric is properly defined.

Another key difference between this attempt and the previous one is that in this case there is at least one clear user for the Registry: the LMAP framework and protocol. Because the LMAP protocol will use the Registry values in its operation, this actually helps to determine if a metric is properly defined. In particular, since we expect that the LMAP control protocol will enable a controller to request a measurement agent to perform a measurement using a given metric by embedding the Performance Metric Registry value in the protocol, a metric is properly specified if it is defined well-enough so that it is possible (and practical) to implement the metric in the measurement agent. This was clearly not the case for the previous attempt: defining a metric with an undefined P-Type makes its implementation unpractical.

#### [7.](#) Definition of the Performance Metric Registry

In this section we define the columns of the Performance Metric Registry. This registry will contain all Registered Performance

Metrics including active, passive, hybrid, endpoint metrics and any other type of performance metric that can be envisioned. Because of that, it may be the case that some of the columns defined are not applicable for a given type of metric. If this is the case, the column(s) SHOULD be populated with the "NA" value (Non Applicable). However, the "NA" value MUST NOT be used any any metric in the following columns: Identifier, Name, URI, Status, Requester, Revision, Revision Date, Description and Reference Specification. Moreover, In addition, it may be possible that in the future, a new

type of metric requires additional columns. Should that be the case, it is possible to add new columns to the registry. The specification defining the new column(s) MUST define how to populate the new column(s) for existing entries.

The columns of the Performance Metric Registry are defined next. The columns are grouped into "Categories" to facilitate the use of the registry. Categories are described at the 3.x heading level, and columns are at the 3.x.y heading level. The Figure below illustrates this organization. An entry (row) therefore gives a complete description of a Registered Metric.

Each column serves as a check-list item and helps to avoid omissions during registration and expert review. In some cases an entry (row) may have some columns without specific entries, marked Not Applicable (NA).

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Registry Categories and Columns, shown as

Category

-----  
Column | Column |

Summary

-----  
ID | Name | URI | Description |

Metric Definition

-----  
Reference Definition | Fixed Parameters |

Method of Measurement

-----  
Reference Method | Packet Generation | Traffic | Sampling | Run-time  
| Stream | Filter | distribution | Param

Output

-----  
| Type | Reference | Data | Units |  
| | Definition | Format | |

Administrative information

-----  
Status | Request | Rev | Rev.Date |

Comments and Remarks  
-----

[7.1.](#) Summary Category

[7.1.1.](#) Identifier

A numeric identifier for the Registered Performance Metric. This identifier MUST be unique within the Performance Metric Registry.

The Registered Performance Metric unique identifier is a 16-bit integer (range 0 to 65535). When adding newly Registered Performance Metrics to the Performance Metric Registry, IANA SHOULD assign the lowest available identifier to the next Registered Performance Metric.

[7.1.2.](#) Name

As the name of a Registered Performance Metric is the first thing a potential implementor will use when determining whether it is suitable for a given application, it is important to be as precise and descriptive as possible. New names of Registered Performance Metrics:

1. "MUST be chosen carefully to describe the Registered Performance Metric and the context in which it will be used."
2. "MUST be unique within the Performance Metric Registry."
3. "MUST use capital letters for the first letter of each component . All other letters MUST be lowercase, even for acronyms. Exceptions are made for acronyms containing a mixture of lowercase and capital letters, such as 'IPv4' and 'IPv6'."

4. "MUST use '\_' between each component composing the Registered Performance Metric name."
5. "MUST start with prefix Act\_ for active measurement Registered Performance Metric."
6. "MUST start with prefix Pas\_ for passive monitoring Registered Performance Metric."
7. Other types of metrics should define a proper prefix for identifying the type.
8. The remaining rules for naming are left to the Performance Experts to determine as they gather experience, so this is an area of planned update by a future RFC.

An example is "Act\_UDP\_Latency\_Poisson\_99mean" for a active monitoring UDP latency metric using a Poisson stream of packets and producing the 99th percentile mean as output.

### [7.1.3.](#) URI

The URI column MUST contain a URI [[RFC 3986](#)] that uniquely identified the metric. The URI is a URN [[RFC 2141](#)]. The URI is automatically generated by prepending the prefix `urn:ietf:params:ippm:metric:` to the metric name. The resulting URI is globally unique.

### [7.1.4.](#) Description

A Registered Performance Metric Description is a written representation of a particular Registry entry. It supplements the metric name to help Registry users select relevant Registered Performance Metrics.

## [7.2.](#) Metric Definition Category

This category includes columns to prompt all necessary details related to the metric definition, including the RFC reference and

values of input factors, called fixed parameters, which are left open in the RFC but have a particular value defined by the performance metric.

#### [7.2.1.](#) Reference Definition

This entry provides a reference (or references) to the relevant section(s) of the document(s) that define the metric, as well as any supplemental information needed to ensure an unambiguous definition for implementations. The reference needs to be an immutable document, such as an RFC; for other standards bodies, it is likely to be necessary to reference a specific, dated version of a specification.

#### [7.2.2.](#) Fixed Parameters

Fixed Parameters are input factors whose value must be specified in the Registry. The measurement system uses these values.

Where referenced metrics supply a list of Parameters as part of their descriptive template, a sub-set of the Parameters will be designated as Fixed Parameters. For example, for active metrics, Fixed Parameters determine most or all of the IPPM Framework convention "packets of Type-P" as described in [[RFC2330](#)], such as transport protocol, payload length, TTL, etc. An example for passive metrics is for RTP packet loss calculation that relies on the validation of a packet as RTP which is a multi-packet validation controlled by MIN\_SEQUENTIAL as defined by [[RFC3550](#)]. Varying MIN\_SEQUENTIAL values can alter the loss report and this value could be set as a fixed parameter

A Parameter which is Fixed for one Registry entry may be designated as a Run-time Parameter for another Registry entry.

#### [7.3.](#) Method of Measurement Category

This category includes columns for references to relevant sections of the RFC(s) and any supplemental information needed to ensure an



unambiguous method for implementations.

### [7.3.1.](#) Reference Method

This entry provides references to relevant sections of the RFC(s) describing the method of measurement, as well as any supplemental information needed to ensure unambiguous interpretation for implementations referring to the RFC text.

Specifically, this section should include pointers to pseudocode or actual code that could be used for an unambiguous implementation.

### [7.3.2.](#) Packet Generation Stream

This column applies to metrics that generate traffic for measurement purposes including but not necessarily limited to Active metrics. The generated traffic is referred as stream and this columns describe its characteristics. Principally, two different streams are used in IPPM metrics, Poisson distributed as described in [[RFC2330](#)] and Periodic as described in [[RFC3432](#)]. Both Poisson and Periodic have their own unique parameters, and the relevant set of values is specified in this column.

Each entry for this column contains the following information:

- o Value: The name of the packet stream scheduling discipline
- o Stream Parameters: The values and formats of input factors for each type of stream. For example, the average packet rate and distribution truncation value for streams with Poisson-distributed inter-packet sending times.
- o Reference: the specification where the stream is defined

The simplest example of stream specification is Singleton scheduling, where a single atomic measurement is conducted. Each atomic measurement could consist of sending a single packet (such as a DNS request) or sending several packets (for example, to request a webpage). Other streams support a series of atomic measurements in a "sample", with a schedule defining the timing between each transmitted packet and subsequent measurement.

### [7.3.3.](#) Traffic Filter

This column applies to metrics that observe packets flowing in the wire i.e. that is not specifically addressed to the measurement agent. This includes but is not limited to Passive Metrics. The filter specifies the traffic constraints that the passive measurement method used is valid (or invalid) for. This includes valid packet sampling ranges, width of valid traffic matches (eg. all traffic on interface, UDP packets packets in a flow (eg. same RTP session)).

It is possible that the measurement method may not have a specific limitation. However, this specific registry entry with it's combination of fixed parameters implies restrictions. These restrictions would be listed in this field.

### [7.3.4.](#) Sampling distribution

The sampling distribution defines out of all the packets that match the traffic filter, which one of those are actually used for the measurement. One possibility is "all" which implies that all packets matching the Traffic filter are considered, but there may be other sampling strategies. It includes the following information:

Value: the name of the sampling distribution

Parameters: if any.

Reference definition: pointer to the specification where the sampling distribution is properly defined.

### [7.3.5.](#) Run-time Parameters

Run-Time Parameters are input factors that must be determined, configured into the measurement system, and reported with the results for the context to be complete. However, the values of these parameters is not specified in the Registry, rather these parameters are listed as an aid to the measurement system implementor or user (they must be left as variables, and supplied on execution).

Where metrics supply a list of Parameters as part of their descriptive template, a sub-set of the Parameters will be designated as Run-Time Parameters.

A Data Format of each Run-time Parameter SHALL be specified in this column, to simplify the control and implementation of measurement devices.

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Examples of Run-time Parameters include IP addresses, measurement point designations, start times and end times for measurement, and other information essential to the method of measurement.

#### [7.3.6.](#) Role

In some method of measurements, there may be several roles defined e.g. on a one-way packet delay active measurement, there is one measurement agent that generates the packets and the other one that receives the packets. This column contains the name of the role for this particular entry. In the previous example, there should be two entries in the registry, one for each role, so that when a measurement agent is instructed to perform the one way delay source metric know that it is supposed to generate packets. The values for this field are defined in the reference method of measurement.

#### [7.4.](#) Output Category

For entries which involve a stream and many singleton measurements, a statistic may be specified in this column to summarize the results to a single value. If the complete set of measured singletons is output, this will be specified here.

Some metrics embed one specific statistic in the reference metric definition, while others allow several output types or statistics.

##### [7.4.1.](#) Value

This column contain the name of the output type. The output type defines the type of result that the metric produces. It can be the raw results or it can be some form of statistic. The specification of the output type must define the format of the output. In some systems, format specifications will simplify both measurement implementation and collection/storage tasks. Note that if two different statistics are required from a single measurement (for example, both "Xth percentile mean" and "Raw"), then a new output type must be defined ("Xth percentile mean AND Raw").

##### [7.4.2.](#) Data Format

This column provides the data format for the output. It is provided to simplify the communication with collection systems and implementation of measurement devices.

### [7.4.3.](#) Reference

This column contains a pointer to the specification where the output type is defined

### [7.4.4.](#) Metric Units

The measured results must be expressed using some standard dimension or units of measure. This column provides the units.

When a sample of singletons (see [[RFC2330](#)] for definitions of these terms) is collected, this entry will specify the units for each measured value.

## [7.5.](#) Administrative information

### [7.5.1.](#) Status

The status of the specification of this Registered Performance Metric. Allowed values are 'current' and 'deprecated'. All newly defined Information Elements have 'current' status.

### [7.5.2.](#) Requester

The requester for the Registered Performance Metric. The requester MAY be a document, such as RFC, or person.

### [7.5.3.](#) Revision

The revision number of a Registered Performance Metric, starting at 0 for Registered Performance Metrics at time of definition and incremented by one for each revision.

#### [7.5.4.](#) Revision Date

The date of acceptance or the most recent revision for the Registered Performance Metric.

#### [7.6.](#) Comments and Remarks

Besides providing additional details which do not appear in other categories, this open Category (single column) allows for unforeseen issues to be addressed by simply updating this Informational entry.

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### [8.](#) The Life-Cycle of Registered Metrics

Once a Performance Metric or set of Performance Metrics has been identified for a given application, candidate Registry entry specifications in accordance with [Section 7](#) are submitted to IANA to follow the process for review by the Performance Metric Experts, as defined below. This process is also used for other changes to the Performance Metric Registry, such as deprecation or revision, as described later in this section.

It is also desirable that the author(s) of a candidate Registry entry seek review in the relevant IETF working group, or offer the opportunity for review on the WG mailing list.

#### [8.1.](#) Adding new Performance Metrics to the Registry

Requests to change Registered Metrics in the Performance Metric Registry are submitted to IANA, which forwards the request to a designated group of experts (Performance Metric Experts) appointed by the IESG; these are the reviewers called for by the Expert Review [RFC5226](#) policy defined for the Performance Metric Registry. The Performance Metric Experts review the request for such things as compliance with this document, compliance with other applicable Performance Metric-related RFCs, and consistency with the currently defined set of Registered Performance Metrics.

Authors are expected to review compliance with the specifications in this document to check their submissions before sending them to IANA.

The Performance Metric Experts should endeavor to complete referred reviews in a timely manner. If the request is acceptable, the Performance Metric Experts signify their approval to IANA, which changes the Performance Metric Registry. If the request is not acceptable, the Performance Metric Experts can coordinate with the requester to change the request to be compliant. The Performance Metric Experts may also choose in exceptional circumstances to reject clearly frivolous or inappropriate change requests outright.

This process should not in any way be construed as allowing the Performance Metric Experts to overrule IETF consensus. Specifically, any Registered Metrics that were added with IETF consensus require IETF consensus for revision or deprecation.

Decisions by the Performance Metric Experts may be appealed as in [Section 7 of RFC5226](#).

## [8.2.](#) Revising Registered Performance Metrics

A request for Revision is ONLY permissible when the changes maintain backward-compatibility with implementations of the prior Registry entry describing a Registered Metric (entries with lower revision numbers, but the same Identifier and Name).

The purpose of the Status field in the Performance Metric Registry is to indicate whether the entry for a Registered Metric is 'current' or 'deprecated'.

In addition, no policy is defined for revising IANA Performance Metric entries or addressing errors therein. To be certain, changes and deprecations within the Performance Metric Registry are not encouraged, and should be avoided to the extent possible. However, in recognition that change is inevitable, the provisions of this section address the need for revisions.

Revisions are initiated by sending a candidate Registered Performance

Metric definition to IANA, as in Section X, identifying the existing Registry entry.

The primary requirement in the definition of a policy for managing changes to existing Registered Performance Metrics is avoidance of interoperability problems; Performance Metric Experts must work to maintain interoperability above all else. Changes to Registered Performance Metrics may only be done in an inter-operable way; necessary changes that cannot be done in a way to allow interoperability with unchanged implementations must result in the creation of a new Registered Metric and possibly the deprecation of the earlier metric.

A change to a Registered Performance Metric is held to be backward-compatible only when:

1. "it involves the correction of an error that is obviously only editorial; or"
2. "it corrects an ambiguity in the Registered Performance Metric's definition, which itself leads to issues severe enough to prevent the Registered Performance Metric's usage as originally defined; or"
3. "it corrects missing information in the metric definition without changing its meaning (e.g., the explicit definition of 'quantity' semantics for numeric fields without a Data Type Semantics value); or"

4. "it harmonizes with an external reference that was itself corrected."
5. "BENOIT: NOTE THAT THERE ARE MORE RULES IN [RFC 7013 SECTION 5](#) BUT THEY WOULD ONLY APPLY TO THE ACTIVE/PASSIVE DRAFTS. TO BE DISCUSSED."

If a change is deemed permissible by the Performance Metric Experts, IANA makes the change in the Performance Metric Registry. The requester of the change is appended to the requester in the Registry.

Each Registered Performance Metric in the Registry has a revision

number, starting at zero. Each change to a Registered Performance Metric following this process increments the revision number by one.

COMMENT: Al (and Phil) think we should keep old/revised entries as-is, marked as deprecated >>>> Since any revision must be interoperable according to the criteria above, there is no need for the Performance Metric Registry to store information about old revisions.

When a revised Registered Performance Metric is accepted into the Performance Metric Registry, the date of acceptance of the most recent revision is placed into the revision Date column of the Registry for that Registered Performance Metric.

Where applicable, additions to Registry entries in the form of text Comments or Remarks should include the date, but such additions may not constitute a revision according to this process.

### [8.3.](#) Deprecating Registered Performance Metrics

Changes that are not permissible by the above criteria for Registered Metric's revision may only be handled by deprecation. A Registered Performance Metric MAY be deprecated and replaced when:

1. "the Registered Performance Metric definition has an error or shortcoming that cannot be permissibly changed as in Section Revising Registered Performance Metrics; or"
2. "the deprecation harmonizes with an external reference that was itself deprecated through that reference's accepted deprecation method; or"

A request for deprecation is sent to IANA, which passes it to the Performance Metric Expert for review, as in Section 'The Process for Review by the Performance Metric Experts'. When deprecating an Performance Metric, the Performance Metric description in the Performance Metric Registry must be updated to explain the

deprecation, as well as to refer to any new Performance Metrics created to replace the deprecated Performance Metric.

The revision number of a Registered Performance Metric is incremented upon deprecation, and the revision Date updated, as with any



revision.

The use of deprecated Registered Metrics should result in a log entry or human-readable warning by the respective application.

Names and Metric ID of deprecated Registered Metrics must not be reused.

#### 9. Performance Metric Registry and other Registries

BENOIT: TBD.

THE BASIC IDEA IS THAT PEOPLE COULD DIRECTLY DEFINE PERF. METRICS IN OTHER EXISTING REGISTRIES, FOR SPECIFIC PROTOCOL/ENCODING. EXAMPLE: IPFIX. IDEALLY, ALL PERF. METRICS SHOULD BE DEFINED IN THIS REGISTRY AND REFERS TO FROM OTHER REGISTRIES.

#### 10. Security considerations

This draft doesn't introduce any new security considerations for the Internet. However, the definition of Performance Metrics may introduce some security concerns, and should be reviewed with security in mind.

#### 11. IANA Considerations

This document specifies the procedure for Performance Metrics Registry setup. IANA is requested to create a new Registry for Performance Metrics called "Registered Performance Metrics" with the columns defined in [Section 7](#).

New assignments for Performance Metric Registry will be administered by IANA through Expert Review [[RFC5226](#)], i.e., review by one of a group of experts, the Performance Metric Experts, appointed by the IESG upon recommendation of the Transport Area Directors. The experts will initially be drawn from the Working Group Chairs and document editors of the Performance Metrics Directorate [performance-metrics-directorate].

This document requests the allocation of the URI prefix urn:ietf:params:ippm:metric for the purpose of generating URIs for registered metrics.

## 12. Acknowledgments

Thanks to Brian Trammell and Bill Cerveny, IPPM chairs, for leading some brainstorming sessions on this topic.

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