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A. Morton
AT&T Labs
M. Bagnulo
UC3M
P. Eardley
BT
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Initial Performance Metric Registry Entries
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Abstract

This memo defines the Initial Entries for the Performance Metrics Registry.

Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC 2119](#) [[RFC2119](#)].

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1. Introduction

Note: Efforts to synchronize structure and terminology with [\[I-D.ietf-ippm-metric-registry\]](#) will likely be incomplete until both drafts are stable.

This memo defines the Initial set of entries for the Performance Metric Registry. The registry will contain Active Performance Metrics, especially those defined in RFCs prepared in the IP Performance Metrics (IPPM) Working Group of the IETF, according to their framework [\[RFC2330\]](#). Three aspects make IPPM metric registration difficult: (1) Use of the Type-P notion to allow users to specify their own packet types. (2) Use of Flexible input variables, called Parameters in IPPM definitions, some which determine the quantity measured and others which should not be specified until execution of the measurement. (3) Allowing

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flexibility in choice of statistics to summarize the results on a stream of measurement packets. This memo uses terms and definitions from the IPPM literature, primarily [\[RFC2330\]](#), and the reader is assumed familiar with them or may refer questions there as necessary.

Although there are several standard templates for organizing specifications of performance metrics (see [\[RFC2679\]](#) for an example of the traditional IPPM template, based to large extent on the Benchmarking Methodology Working Group's traditional template in [\[RFC1242\]](#), and see [\[RFC6390\]](#) for a similar template), none of these templates were intended to become the basis for the columns of an IETF-wide registry of metrics. As we examined the aspects of metric specifications which need to be registered, it was clear that none of the existing metric templates fully satisfies the particular needs of a registry.

2. Scope

[I-D.ietf-ippm-metric-registry] defines the overall structure for a Performance Metric Registry and provides guidance for the process to examine proposed metrics and maintain Registered Metrics.

This document defines the initial set of Performance Metrics Registry entries; all are active metrics, or those where the packets measured have been specially generated for the purpose.

A row in the registry corresponds to one Registered Performance Metric, with entries in the various columns specifying the metric.

As discussed in [I-D.ietf-ippm-metric-registry], each entry (row) must be tightly defined; the definition must leave open only a few parameters that do not change the fundamental nature of the measurement (such as source and destination addresses), and so promotes comparable results across independent implementations. Also, each registered entry must be based on existing reference RFCs (or other standards) for performance metrics, and must be operationally useful and have significant industry interest. This is ensured by expert review for every entry before IANA action.

3. Registry Categories and Columns

This section defines the categories and columns of the registry. Below, 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).

THIS NEEDS UPDATING

Registry Categories and Columns, shown as

Category			

Column		Column	
Comments and Remarks			

4. UDP Round-trip Latency Registry Entry			
This section gives an initial registry entry for the UDP Round-trip Latency.			
Note: If each Registry entry should only produce a "raw" output or a statistical summary, then the "Output" Category can be split and this section can become two closely-related metrics.			
4.1. Summary			
This category includes multiple indexes to the registry entries, the element ID and metric name.			
4.1.1. ID (Identifier)			
<insert numeric identifier, an integer>			
4.1.2. Name			
<insert name according to metric naming convention>			
Act_IP_UDP_Round-trip_Delay_Raw_95th-percentile_Poisson			
URL: ??			
4.1.3. URI			
URI: Prefix urn:ietf:params:performance:metric...<name>			
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4.1.4. Description			

This metric assesses the delay of a stream of packets exchanged between two hosts (or measurement points), and reports the Round-trip delay for all successfully exchanged packets and the 95th percentile of their conditional delay distribution.

[4.2.](#) Metric Definition

This category includes columns to prompt the entry of all necessary details related to the metric definition, including the RFC reference and values of input factors, called fixed parameters.

[4.2.1.](#) Reference Definition

<Full bibliographic reference to an immutable doc.>

Almes, G., Kalidindi, S., and M. Zekauskas, "A Round-trip Delay Metric for IPPM", [RFC 2681](#), September 1999.

[RFC2681]

<specific section reference and additional clarifications, if needed>

[Section 2.4 of \[RFC2681\]](#) provides the reference definition of the singleton (single value) Round-trip delay metric. [Section 3.4 of \[RFC2681\]](#) provides the reference definition expanded to cover a multi-value sample. Note that terms such as singleton and sample are defined in [Section 11 of \[RFC2330\]](#).

Note that although the definition of "Round-trip-Delay between Src and Dst at T" is directionally ambiguous in the text, this metric tightens the definition further to recognize that the host in the "Src" role will send the first packet to "Dst", and ultimately receive the corresponding return packet from "Dst" (when neither are lost).

[4.2.2.](#) Fixed Parameters

<list and specify Fixed Parameters, input factors that must be determined and embedded in the measurement system for use when needed>

Type-P:

- o IPv4 header values:

- * DSCP: set to 0

- * TTL set to 255
- * Protocol: Set to 17 (UDP)
- o UDP header values:
 - * Checksum: the checksum must be calculated
- o Payload
 - * Sequence number: 8-byte integer
 - * Timestamp: 8 byte integer. Expressed as 64-bit NTP timestamp as per [section 6 of RFC 5905](#) [RFC5905]
 - * No padding (total of 9 bytes)

Timeout, Tmax: 3 seconds

[4.3.](#) Method of Measurement

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

[4.3.1.](#) Reference Method

<for metric, insert relevant section references and supplemental info>

The methodology for this metric is defined as Type-P-Round-trip-Delay-Poisson-Stream in [section 2.6 of RFC 2681](#) [RFC2681] and [section 3.6 of RFC 2681](#) [RFC2681] using the Type-P and Timeout defined under Fixed Parameters.

The method requires sequence numbers or other send-order information to be retained at the Src or included with each packet to disambiguate packet reordering if it occurs. Sequence number is part of the payload described under Fixed Parameters.

Refer to [Section 4.4 of \[RFC6673\]](#) for expanded discussion of the instruction to "send a Type-P packet back to the Src as quickly as possible" in [Section 2.6 of RFC 2681](#) [RFC2681]. [Section 8 of \[RFC6673\]](#) presents additional requirements which shall be included in the method of measurement for this metric.

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[4.3.2.](#) Packet Generation Stream

This section gives the details of the packet traffic which is the basis for measurement. In IPPM metrics, this is called the Stream, and can easily be described by providing the list of stream parameters.

<list of generation parameters and section/spec references if needed>

[Section 11.1.3 of RFC 2681](#) [[RFC2330](#)] provides three methods to generate Poisson sampling intervals. the reciprocal of lambda is the average packet rate, thus the Run-time Parameter is $1/\lambda$.

>>> Check with Sam, most likely it is this...

Method 3 is used, where given a start time (Run-time Parameter), the subsequent send times are all computed prior to measurement by computing the pseudo-random distribution of inter-packet send times, (truncating the distribution as specified in the Run-time Parameters), and the Src sends each packet at the computed times.

[4.3.3.](#) Traffic Filtering (observation) Details

The measured results based on a filtered version of the packets observed, and this section provides the filter details (when present).

<section reference>.

NA

[4.3.4.](#) Sampling Distribution

<insert time distribution details, or how this is diff from the filter>

NA

[4.3.5.](#) Run-time Parameters and Data Format

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.

<list of run-time parameters, and their data formats>

- o Src, the IP address of a host (32-bit value for IPv4, 128-bit value for IPv6)

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- o Dst, the IP address of a host (32-bit value for IPv4, 128-bit value for IPv6)
- o T0, a time (start of measurement interval, 128-bit NTP Date Format, see [section 6 of \[RFC5905\]](#)). When T0 is "all-zeros", a start time is unspecified and Tf is to be interpreted as the Duration of the measurement interval.
- o Tf, a time (end of measurement interval, 128-bit NTP Date Format, see [section 6 of \[RFC5905\]](#)), interpreted as the Duration of the measurement interval.
- o 1/lambda, average packet rate (for Poisson Streams). (1/lambda = 1 packet per second, if fixed)
- o Upper limit on Poisson distribution (values above this limit will be clipped and set to the limit value). (if fixed, Upper limit = 30 seconds.)

The format for 1/lambda and Upper limit of Poisson Dist. are the short format in [\[RFC5905\]](#) (32 bits) and is as follows: the first 16 bits represent the integer number of seconds; the next 16 bits represent the fractional part of a second.

>>> should Poisson run-time params be fixed instead? probably yes if modeling a specific version of MBA tests.

[4.3.6.](#) Roles

<lists the names of the different roles from the measurement method>

Src - launches each packet and waits for return transmissions from

Dst.

Dst - waits for each packet from Src and sends a return packet to Src.

[4.4.](#) Output

This category specifies all details of the Output of measurements using the metric.

[4.4.1.](#) Type/Value (two diff terms used)

<insert name of the output type, raw or a selected summary statistic>

Raw -- for each packet sent, pairs of values.

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Percentile -- for the conditional distribution of all packets with a valid value of Round-trip delay (undefined delays are excluded), a single value corresponding to the 95th percentile.

[4.4.2.](#) Data Format

<describe the data format for each type of result>

For all outputs ---

- o T0, a time (start of measurement interval, 128-bit NTP Date Format, see [section 6 of \[RFC5905\]](#))
- o Tf, a time (end of measurement interval, 128-bit NTP Date Format, see [section 6 of \[RFC5905\]](#))

Raw -- for each packet sent, pairs of values as follows:

- o T, the time when the packet was sent from Src, 128-bit NTP Date Format, see [section 6 of \[RFC5905\]](#))
- o dT, a value of Round-trip delay, format is *similar to* the 32-bit short NTP Time format in [Section 6 of \[RFC5905\]](#) and is as follows: the first 16 bits represent the *signed* integer number of seconds; the next 16 bits represent the fractional part of a

second.

- o dT is undefined when the packet is not received at Src in waiting time Tmxax seconds (need undefined code)

Percentile -- for the conditional distribution of all packets with a valid value of Round-trip delay (undefined delays are excluded), a single value as follows:

See [section 4.1 of \[RFC3393\]](#) for details on the conditional distribution to exclude undefined values of delay, and [Section 5 of \[RFC6703\]](#) for background on this analysis choice.

See [section 4.3 of \[RFC3393\]](#) for details on the percentile statistic (where Round-trip delay should be substituted for "ipdv").

The percentile = 95.

Data format is a 32-bit signed value, *similar to* the 32-bit short NTP Time format in [Section 6 of \[RFC5905\]](#) and is as follows: the first 16 bits represent the *signed* integer number of seconds; the next 16 bits represent the fractional part of a second.

[4.4.3.](#) Reference

<pointer to section/spec where output type/format is defined>

See the Data Format column for references.

[4.4.4.](#) Metric Units

<insert units for the measured results, and the reference specification>.

Round-trip Delay, dT, is expressed in seconds.

The 95th Percentile of Round-trip Delay is expressed in seconds.

[4.5.](#) Administrative items

[4.5.1.](#) Status

<current or deprecated>

[4.5.2.](#) Requestor (keep?)

name or RFC, etc.

[4.5.3.](#) Revision

1.0

[4.5.4.](#) Revision Date

YYYY-MM-DD

[4.6.](#) Comments and Remarks

Additional (Informational) details for this entry

[5.](#) Packet Delay Variation Registry Entry

This section gives an initial registry entry for a Packet Delay Variation metric.

Note: If each Registry entry should only produce a "raw" output or a statistical summary, then the "Output" Category can be split and this section can become two closely-related metrics.

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[5.1.](#) Summary

This category includes multiple indexes to the registry entries, the element ID and metric name.

<skipping some Summary columns for now>

[5.1.1.](#) ID (Identifier)

<insert numeric identifier, an integer>

[5.1.2.](#) Name

<insert name according to metric naming convention>

Act_IP-UDP-One-way-pdv-95th-percentile-Poisson

URL: ??

[5.1.3.](#) URI

URI: Prefix urn:ietf:params:performance:metric<add name>

[5.1.4.](#) Description

An assessment of packet delay variation with respect to the minimum delay observed on the stream.

[5.2.](#) Metric Definition

This category includes columns to prompt the entry of all necessary details related to the metric definition, including the RFC reference and values of input factors, called fixed parameters.

[5.2.1.](#) Reference Definition

<Full bibliographic reference to an immutable doc.>

Paxson, V., Almes, G., Mahdavi, J., and M. Mathis, "Framework for IP Performance Metrics", [RFC 2330](#), May 1998. [[RFC2330](#)]

Demichelis, C. and P. Chimento, "IP Packet Delay Variation Metric for IP Performance Metrics (IPPM)", [RFC 3393](#), November 2002. [[RFC3393](#)]

Morton, A. and B. Claise, "Packet Delay Variation Applicability Statement", [RFC 5481](#), March 2009. [[RFC5481](#)]

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Mills, D., Martin, J., Burbank, J., and W. Kasch, "Network Time Protocol Version 4: Protocol and Algorithms Specification", [RFC 5905](#), June 2010. [[RFC5905](#)]

<specific section reference and additional clarifications, if needed>

See sections [2.4](#) and [3.4](#) of [\[RFC3393\]](#). Singleton delay differences measured are referred to by the variable name "ddT".

[5.2.2](#). Fixed Parameters

<list and specify Fixed Parameters, input factors that must be determined and embedded in the measurement system for use when needed>

- o F, a selection function defining unambiguously the packets from the stream selected for the metric. See [section 4.2 of \[RFC5481\]](#) for the PDV form.
- o L, a packet length in bits. L = 200 bits.
- o Tmax, a maximum waiting time for packets to arrive at Dst, set sufficiently long to disambiguate packets with long delays from packets that are discarded (lost). Tmax = 3 seconds.
- o Type-P, as defined in [\[RFC2330\]](#), which includes any field that may affect a packet's treatment as it traverses the network. The packets are IP/UDP, with DSCP = 0 (BE).

[5.3](#). Method of Measurement

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

[5.3.1](#). Reference Method

<for metric, insert relevant section references and supplemental info>

See [section 2.6](#) and 3.6 of [\[RFC3393\]](#) for singleton elements.

[5.3.2](#). Packet Generation Stream

<list of generation parameters and section/spec references if needed>

Poisson distributed as described in [\[RFC2330\]](#), with the following Parameters.

- o λ , a rate in reciprocal seconds (for Poisson Streams).
 $\lambda = 1$ packet per second
- o Upper limit on Poisson distribution (values above this limit will be clipped and set to the limit value). Upper limit = 30 seconds.

[5.3.3.](#) Traffic Filtering (observation) Details

<insert the measured results based on a filtered version of the packets observed, and this section provides the filter details (when present), and section reference>.

NA

[5.3.4.](#) Sampling Distribution

<insert time distribution details, or how this is diff from the filter>

NA

[5.3.5.](#) Run-time Parameters and Data Format

<list of run-time parameters, and any reference(s)>.

- o Src, the IP address of a host (32-bit value for IPv4, 128-bit value for IPv6)
- o Dst, the IP address of a host (32-bit value for IPv4, 128-bit value for IPv6)
- o T, a time (start of measurement interval, 128-bit NTP Date Format, see [section 6 of \[RFC5905\]](#)). When T0 is "all-zeros", a start time is unspecified and Tf is to be interpreted as the Duration of the measurement interval.
- o Tf, a time (end of measurement interval, 128-bit NTP Date Format, see [section 6 of \[RFC5905\]](#)), interpreted as the Duration of the measurement interval.

[5.3.6.](#) Roles

<lists the names of the different roles from the measurement method>

Src - the host that sends the stream of packets.

Dst - the host that receives the stream of packets.

[5.4.](#) Output

This category specifies all details of the Output of measurements using the metric.

[5.4.1.](#) Type/Value (two diff terms used)

<insert name of the output type, raw or a selected summary statistic>

Raw -- for each packet sent, pairs of values.

Percentile -- for the conditional distribution of all packets with a valid value of one-way delay (undefined delays are excluded), a single value corresponding to the 95th percentile of the singletons, ddT.

[5.4.2.](#) Data Format

<describe the data format for each type of result>

For all Output types

- o T, a time (start of measurement interval, 128-bit NTP Date Format, see [section 6 of \[RFC5905\]](#))
- o Tf, a time (end of measurement interval, 128-bit NTP Date Format, see [section 6 of \[RFC5905\]](#))

Raw -

- o T1, the wire time of the first packet in a pair, measured at MP(Src) as it leaves for Dst (64-bit NTP Timestamp Format, see [section 6 of \[RFC5905\]](#)).
- o T2, the wire time of the second packet in a pair, measured at MP(Src) as it leaves for Dst (64-bit NTP Timestamp Format, see [section 6 of \[RFC5905\]](#)).
- o I(i),I(i+1), $i \geq 0$, pairs of times which mark the beginning and ending of the intervals in which the packet stream from which the

measurement is taken occurs. Here, $I(0) = T_0$ and assuming that n is the largest index, $I(n) = T_f$ (pairs of 64-bit NTP Timestamp Format, see [section 6 of \[RFC5905\]](#)).

- o When the one-way delay of a packet in the calculation pair for ddT is undefined, then ddT is undefined for that pair.

Percentile -- for the conditional distribution of all packets with a valid value of one-way delay (undefined delays are excluded), a single value as follows:

See [section 4.1 of \[RFC3393\]](#) for details on the conditional distribution to exclude undefined values of delay, and [Section 5 of \[RFC6703\]](#) for background on this analysis choice.

See [section 4.3 of \[RFC3393\]](#) for details on the percentile statistic (where p_{dv} should be substituted for "ipdv").

The percentile = 95.

Data format is a 32-bit signed floating point value, *similar to* the 32-bit short NTP Time format in [Section 6 of \[RFC5905\]](#) and is as follows: the first 16 bits represent the *signed* integer number of seconds; the next 16 bits represent the fractional part of a second.

[5.4.3.](#) Reference

<pointer to section/spec where output type/format is defined>

see Data Format column.

[5.4.4.](#) Metric Units

<insert units for the measured results, and the reference specification>.

See [section 3.3 of \[RFC3393\]](#) for singleton elements, ddT . The units are seconds, and the same units are used for 95th percentile.

[RFC2330] recommends that when a time is given, it will be expressed

in UTC.

The timestamp format (for T, Tf, etc.) is the same as in [[RFC5905](#)] (64 bits) and is as follows: the first 32 bits represent the unsigned integer number of seconds elapsed since 0h on 1 January 1900; the next 32 bits represent the fractional part of a second that has elapsed since then.

[5.5.](#) Administrative items

[5.5.1.](#) Status

<current or deprecated>

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[5.5.2.](#) Requestor (keep?)

<name of individual or RFC, etc.>

[5.5.3.](#) Revision

1.0

[5.5.4.](#) Revision Date

YYYY-MM-DD

[5.6.](#) Comments and Remarks

<Additional (Informational) details for this entry>

Lost packets represent a challenge for delay variation metrics. See [section 4.1 of \[RFC3393\]](#) and the delay variation applicability statement[RFC5481] for extensive analysis and comparison of PDV and an alternate metric, IPDV.

[6.](#) DNS Response Latency Registry Entry

This section gives an initial registry entry for DNS Response Latency. [RFC 2681](#) [[RFC2681](#)] defines a Round-trip delay metric. We build on that metric by specifying several of the input parameters to

precisely define a metric for measuring DNS latency.

[6.1.](#) Summary

This category includes multiple indexes to the registry entries, the element ID and metric name.

<skipping some admin columns for now>

[6.1.1.](#) ID (Identifier)

<insert numeric identifier, an integer>

[6.1.2.](#) Name

<insert name according to metric naming convention>

URL: ??

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[6.1.3.](#) URI

URI: Prefix urn:ietf:params:performance:metric

[6.1.4.](#) Description

This metric assesses the response time, the interval from the query transmission to the response.

[6.2.](#) Metric Definition

This category includes columns to prompt the entry of all necessary details related to the metric definition, including the RFC reference and values of input factors, called fixed parameters.

[6.2.1.](#) Reference Definition

<Full bibliographic reference to an immutable doc.>

Mockapetris, P., "Domain names - implementation and specification", STD 13, [RFC 1035](#), November 1987. (and updates)

[RFC1035]

Almes, G., Kalidindi, S., and M. Zekauskas, "A Round-trip Delay Metric for IPPM", [RFC 2681](#), September 1999.

[RFC2681]

<specific section reference and additional clarifications, if needed>

[Section 2.4 of \[RFC2681\]](#) provides the reference definition of the singleton (single value) Round-trip delay metric. [Section 3.4 of \[RFC2681\]](#) provides the reference definition expanded to cover a multi-value sample. Note that terms such as singleton and sample are defined in [Section 11 of \[RFC2330\]](#).

For DNS Response Latency, the entities in [\[RFC1035\]](#) must be mapped to [\[RFC2681\]](#). The Local Host with its User Program and Resolver take the role of "Src", and the Foreign Name Server takes the role of "Dst".

Note that although the definition of "Round-trip-Delay between Src and Dst at T" is directionally ambiguous in the text, this metric tightens the definition further to recognize that the host in the "Src" role will send the first packet to "Dst", and ultimately receive the corresponding return packet from "Dst" (when neither are lost).

[6.2.2.](#) Fixed Parameters

<list and specify Fixed Parameters, input factors that must be determined and embedded in the measurement system for use when needed>

Type-P:

- o IPv4 header values:

- * DSCP: set to 0

- * TTL set to 255
- * Protocol: Set to 17 (UDP)
- o UDP header values:
 - * Source port: 53
 - * Destination port: 53
 - * Checksum: the checksum must be calculated
- o Payload: The payload contains a DNS message as defined in [RFC 1035](#) [[RFC1035](#)] with the following values:
 - * The DNS header section contains:
 - + QR: set to 0 (Query)
 - + OPCODE: set to 0 (standard query)
 - + AA: not set
 - + TC: not set
 - + RD: set to one (recursion desired)
 - + RA: not set
 - + RCODE: not set
 - + QDCOUNT: set to one (only one entry)
 - + ANCOUNT: not set
 - + NSCOUNT: not set

- + ARCOUNT: not set
- * The Question section contains:
 - + QNAME: the FQDN provided as input for the test

- + QTYPE: the query type provided as input for the test
- + QCLASS: set to IN

* The other sections do not contain any Resource Records.

Observation: reply packets will contain a DNS response and may contain RRs.

Timeout: Tmax = 5 seconds (to help disambiguate queries)

[6.3.](#) Method of Measurement

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

[6.3.1.](#) Reference Method

<for metric, insert relevant section references and supplemental info>

The methodology for this metric is defined as Type-P-Round-trip-Delay-Poisson-Stream in [section 2.6 of RFC 2681](#) [RFC2681] and [section 3.6 of RFC 2681](#) [RFC2681] using the Type-P and Timeout defined under Fixed Parameters.

The method requires sequence numbers or other send-order information to be retained at the Src or included with each packet to disambiguate packet reordering if it occurs. Sequence number is part of the payload described under Fixed Parameters.

DNS Messages bearing Queries provide for random ID Numbers, so more than one query may be launched while a previous request is outstanding when the ID Number is used.

IF a DNS response does not arrive within Tmax, the result is undefined. The Message ID SHALL be used to disambiguate the successive queries.

>>> This would require support of ID generation and population in the Message. An alternative would be to use a random Source port on the Query Message, but we would choose ONE before proceeding.

Refer to [Section 4.4 of \[RFC6673\]](#) for expanded discussion of the instruction to "send a Type-P packet back to the Src as quickly as possible" in [Section 2.6 of RFC 2681 \[RFC2681\]](#). [Section 8 of \[RFC6673\]](#) presents additional requirements which shall be included in the method of measurement for this metric.

[6.3.2.](#) Packet Generation Stream

This section gives the details of the packet traffic which is the basis for measurement. In IPPM metrics, this is called the Stream, and can easily be described by providing the list of stream parameters.

<list of generation parameters and section/spec references if needed>

[Section 11.1.3 of RFC 2681 \[RFC2330\]](#) provides three methods to generate Poisson sampling intervals. the reciprocal of lambda is the average packet rate, thus the Run-time Parameter is 1/lambda.

>>> Check with Sam, most likely it is this...

Method 3 is used, where given a start time (Run-time Parameter), the subsequent send times are all computed prior to measurement by computing the pseudo-random distribution of inter-packet send times, (truncating the distribution as specified in the Run-time Parameters), and the Src sends each packet at the computed times.

[6.3.3.](#) Traffic Filtering (observation) Details

The measured results based on a filtered version of the packets observed, and this section provides the filter details (when present).

<section reference>.

NA

[6.3.4.](#) Sampling Distribution

<insert time distribution details, or how this is diff from the filter>

NA

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[6.3.5.](#) Run-time Parameters and Data Format

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.

<list of run-time parameters, and their data formats>

- o Src, the IP address of a host (32-bit value for IPv4, 128-bit value for IPv6)
- o Dst, the IP address of a host (32-bit value for IPv4, 128-bit value for IPv6)
- o T0, a time (start of measurement interval, 128-bit NTP Date Format, see [section 6 of \[RFC5905\]](#)). When T0 is "all-zeros", a start time is unspecified and Tf is to be interpreted as the Duration of the measurement interval.
- o Tf, a time (end of measurement interval, 128-bit NTP Date Format, see [section 6 of \[RFC5905\]](#)), interpreted as the Duration of the measurement interval.
- o 1/lambda, average packet rate (for Poisson Streams). (1/lambda = 0.1 packet per second, if fixed)
- o Upper limit on Poisson distribution (values above this limit will be clipped and set to the limit value). (if fixed, Upper limit = 300 seconds.)
- o ID, the 16-bit identifier assigned by the program that generates the query, and which must vary in successive queries, see [Section 4.1.1 of \[RFC1035\]](#). This identifier is copied into the corresponding reply and can be used by the requester to match-up replies to outstanding queries.

The format for 1/lambda and Upper limit of Poisson Dist. are the short format in [\[RFC5905\]](#) (32 bits) and is as follows: the first 16 bits represent the integer number of seconds; the next 16 bits represent the fractional part of a second.

>>> should Poisson run-time params be fixed instead? probably yes if

modeling a specific version of MBA tests.

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[6.3.6.](#) Roles

<lists the names of the different roles from the measurement method>

Src - launches each packet and waits for return transmissions from Dst.

Dst - waits for each packet from Src and sends a return packet to Src.

[6.4.](#) Output

This category specifies all details of the Output of measurements using the metric.

[6.4.1.](#) Type/Value (two diff terms used)

<insert name of the output type, raw or a selected summary statistic>

For all output types:

- o T0, a time (start of measurement interval, 128-bit NTP Date Format, see [section 6 of \[RFC5905\]](#))
- o Tf, a time (end of measurement interval, 128-bit NTP Date Format, see [section 6 of \[RFC5905\]](#))

Raw -- for each packet sent, pairs of values.

>>> and the status of the response, only assigning values to successful query-response pairs.

Percentile -- for the conditional distribution of all packets with a valid value of Round-trip delay (undefined delays are excluded), a single value corresponding to the 95th percentile.

[6.4.2.](#) Data Format

<describe the data format for each type of result>

Raw -- for each packet sent, pairs of values as follows:

- o T, the time when the packet was sent from Src, 128-bit NTP Date Format, see [section 6 of \[RFC5905\]](#))
- o dT, a value of Round-trip delay, format is *similar to* the 32-bit short NTP Time format in [Section 6 of \[RFC5905\]](#) and is as follows: the first 16 bits represent the *signed* integer number of

seconds; the next 16 bits represent the fractional part of a second.

- o dT is undefined when the packet is not received at Src in waiting time Tmxax seconds (need undefined code for no-response or unsuccessful response)

Percentile -- for the conditional distribution of all packets with a valid value of Round-trip delay (undefined delays are excluded), a single value as follows:

See [section 4.1 of \[RFC3393\]](#) for details on the conditional distribution to exclude undefined values of delay, and [Section 5 of \[RFC6703\]](#) for background on this analysis choice.

See [section 4.3 of \[RFC3393\]](#) for details on the percentile statistic (where Round-trip delay should be substituted for "ipdv").

The percentile = 95.

Data format is a 32-bit signed floating point value, *similar to* the 32-bit short NTP Time format in [Section 6 of \[RFC5905\]](#) and is as follows: the first 16 bits represent the *signed* integer number of seconds; the next 16 bits represent the fractional part of a second.

[6.4.3.](#) Reference

<pointer to section/spec where output type/format is defined>

See the Data Format column for references.

[6.4.4.](#) Metric Units

<insert units for the measured results, and the reference specification>.

Round-trip Delay, dT, is expressed in seconds.

The 95th Percentile of Round-trip Delay is expressed in seconds.

[6.5.](#) Administrative items

[6.5.1.](#) Status

<current or deprecated>

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[6.5.2.](#) Requestor (keep?)

name or RFC, etc.

[6.5.3.](#) Revision

1.0

[6.5.4.](#) Revision Date

YYYY-MM-DD

[6.6.](#) Comments and Remarks

Additional (Informational) details for this entry

[7.](#) partly BLANK Registry Entry

This section gives an initial registry entry for

[7.1.](#) Summary

This category includes multiple indexes to the registry entries, the element ID and metric name.

<skipping the admin columns for now>

[7.1.1.](#) ID (Identifier)

<insert numeric identifier, an integer>

[7.1.2.](#) Name

<insert name according to metric naming convention>

URL: ??

[7.1.3.](#) URI

URI: Prefix urn:ietf:params:performance:metric

[7.1.4.](#) Description

TBD.

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[7.2.](#) Metric Definition

This category includes columns to prompt the entry of all necessary details related to the metric definition, including the RFC reference and values of input factors, called fixed parameters.

[7.2.1.](#) Reference Definition

<Full bibliographic reference to an immutable doc.>

Almes, G., Kalidindi, S., and M. Zekauskas, "A Round-trip Delay Metric for IPPM", [RFC 2681](#), September 1999.

<specific section reference and additional clarifications, if needed>

[Section 2.4 of \[RFC2681\]](#) provides the reference definition of the singleton (single value) Round-trip delay metric. [Section 3.4 of \[RFC2681\]](#) provides the reference definition expanded to cover a multi-value sample. Note that terms such as singleton and sample are defined in [Section 11 of \[RFC2330\]](#).

Note that although the definition of "Round-trip-Delay between Src and Dst at T" is directionally ambiguous in the text, this metric tightens the definition further to recognize that the host in the "Src" role will send the first packet to "Dst", and ultimately receive the corresponding return packet from "Dst" (when neither are lost).

<<< Check how the Methodology also makes this clear (or not) >>>

[7.2.2.](#) Fixed Parameters

<list and specify Fixed Parameters, input factors that must be determined and embedded in the measurement system for use when needed>

Type-P:

- o IPv4 header values:
 - * DSCP: set to 0
 - * TTL set to 255
 - * Protocol: Set to 17 (UDP)
- o UDP header values:

- * Checksum: the checksum must be calculated
- o Payload
 - * Sequence number: 8-byte integer
 - * Timestamp: 8 byte integer. Expressed as 64-bit NTP timestamp

as per [section 6 of RFC 5905](#) [[RFC5905](#)]

- * No padding (total of 9 bytes)

Timeout: 3 seconds

[7.3.](#) Method of Measurement

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

[7.3.1.](#) Reference Method

<for metric, insert relevant section references and supplemental info>

[7.3.2.](#) Packet Generation Stream

This section gives the details of the packet traffic which is the basis for measurement. In IPPM metrics, this is called the Stream, and can easily be described by providing the list of stream parameters.

<list of generation parameters and section/spec references if needed>

[7.3.3.](#) Traffic Filtering (observation) Details

The measured results based on a filtered version of the packets observed, and this section provides the filter details (when present).

<section reference>.

[7.3.4.](#) Sampling Distribution

<insert time distribution details, or how this is diff from the filter>

[7.3.5.](#) Run-time Parameters and Data Format

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.

<list of run-time parameters>

<reference(s)>.

[7.3.6.](#) Roles

<lists the names of the different roles from the measurement method>

[7.4.](#) Output

This category specifies all details of the Output of measurements using the metric.

[7.4.1.](#) Type/Value (two diff terms used)

<insert name of the output type, raw or a selected summary statistic>

[7.4.2.](#) Data Format

<describe the data format for each type of result>

- o Value:

- o Data Format: (There may be some precedent to follow here, but otherwise use 64-bit NTP Timestamp Format, see [section 6 of \[RFC5905\]](#)).

- o Reference: <section reference>

[7.4.3.](#) Reference

<pointer to section/spec where output type/format is defined>

[7.4.4.](#) Metric Units

<insert units for the measured results, and the reference specification>.

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[7.5.](#) Administrative items

[7.5.1.](#) Status

<current or deprecated>

[7.5.2.](#) Requestor (keep?)

name or RFC, etc.

[7.5.3.](#) Revision

1.0

[7.5.4.](#) Revision Date

YYYY-MM-DD

[7.6.](#) Comments and Remarks

Additional (Informational) details for this entry

[8.](#) BLANK Registry Entry

This section gives an initial registry entry for

[8.1.](#) Summary

This category includes multiple indexes to the registry entries, the element ID and metric name.

<skipping the Summary columns for now>

[8.1.1.](#) ID (Identifier)

<insert numeric identifier, an integer>

[8.1.2.](#) Name

<insert name according to metric naming convention>

URL: ??

[8.1.3.](#) URI

URI: Prefix urn:ietf:params:performance:metric

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[8.1.4.](#) Description

TBD.

[8.2.](#) Metric Definition

This category includes columns to prompt the entry of all necessary details related to the metric definition, including the RFC reference and values of input factors, called fixed parameters.

[8.2.1.](#) Reference Definition

<Full bibliographic reference to an immutable doc.>

<specific section reference and additional clarifications, if needed>

[8.2.2.](#) Fixed Parameters

<list and specify Fixed Parameters, input factors that must be determined and embedded in the measurement system for use when needed>

[8.3.](#) Method of Measurement

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

[8.3.1.](#) Reference Method

<for metric, insert relevant section references and supplemental info>

[8.3.2.](#) Packet Generation Stream

<list of generation parameters and section/spec references if needed>

[8.3.3.](#) Traffic Filtering (observation) Details

<insert the measured results based on a filtered version of the packets observed, and this section provides the filter details (when present), and section reference>.

[8.3.4.](#) Sampling Distribution

<insert time distribution details, or how this is diff from the filter>

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[8.3.5.](#) Run-time Parameters and Data Format

<list of run-time parameters, and any reference(s)>.

[8.3.6.](#) Roles

<lists the names of the different roles from the measurement method>

[8.4.](#) Output

This category specifies all details of the Output of measurements using the metric.

[8.4.1.](#) Type/Value (two diff terms used)

<insert name of the output type, raw or a selected summary statistic>

[8.4.2.](#) Data Format

<describe the data format for each type of result>

[8.4.3.](#) Reference

<pointer to section/spec where output type/format is defined>

[8.4.4.](#) Metric Units

<insert units for the measured results, and the reference specification>.

[8.5.](#) Administrative items

[8.5.1.](#) Status

<current or deprecated>

[8.5.2.](#) Requestor (keep?)

<name of individual or RFC, etc.>

[8.5.3.](#) Revision

1.0

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[8.5.4.](#) Revision Date

YYYY-MM-DD

[8.6.](#) Comments and Remarks

Additional (Informational) details for this entry

[9.](#) Example RTCP-XR Registry Entry

This section is MAY BE DELETED or adapted before submission.

This section gives an example registry entry for the end-point metric described in [RFC 7003](#) [[RFC7003](#)], for RTCP-XR Burst/Gap Discard Metric reporting.

[9.1.](#) Registry Indexes

This category includes multiple indexes to the registry entries, the element ID and metric name.

[9.1.1.](#) Identifier

An integer having enough digits to uniquely identify each entry in the Registry.

[9.1.2.](#) Name

A metric naming convention is TBD.

[9.1.3.](#) URI

Prefix urn:ietf:params:performance:metric

[9.1.4.](#) Status

current

[9.1.5.](#) Requestor

Alcelip Mornuley

[9.1.6.](#) Revision

1.0

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[9.1.7.](#) Revision Date

2014-07-04

[9.1.8.](#) Description

TBD.

[9.1.9.](#) Reference Specification(s)

[[RFC3611](#)] [[RFC4566](#)] [[RFC6776](#)] [[RFC6792](#)] [[RFC7003](#)]

[9.2.](#) Metric Definition

This category includes columns to prompt the entry of all necessary

details related to the metric definition, including the RFC reference and values of input factors, called fixed parameters. [Section 3.2 of \[RFC7003\]](#) provides the reference information for this category.

[9.2.1.](#) Reference Definition

Packets Discarded in Bursts:

The total number of packets discarded during discard bursts. The measured value is unsigned value. If the measured value exceeds 0xFFFFFD, the value 0xFFFFFE MUST be reported to indicate an over-range measurement. If the measurement is unavailable, the value 0xFFFFFFFF MUST be reported.

[9.2.2.](#) Fixed Parameters

Fixed Parameters are input factors that must be determined and embedded in the measurement system for use when needed. The values of these parameters is specified in the Registry.

Threshold: 8 bits, set to value = 3 packets.

The Threshold is equivalent to Gmin in [\[RFC3611\]](#), i.e., the number of successive packets that must not be discarded prior to and following a discard packet in order for this discarded packet to be regarded as part of a gap. Note that the Threshold is set in accordance with the Gmin calculation defined in [Section 4.7.2 of \[RFC3611\]](#).

Interval Metric flag: 2 bits, set to value 11=Cumulative Duration

This field is used to indicate whether the burst/gap discard metrics are Sampled, Interval, or Cumulative metrics [\[RFC6792\]](#):

I=10: Interval Duration – the reported value applies to the most recent measurement interval duration between successive metrics reports.

I=11: Cumulative Duration – the reported value applies to the accumulation period characteristic of cumulative measurements.

Senders MUST NOT use the values I=00 or I=01.

[9.3.](#) Method of Measurement

This category includes columns for references to relevant sections of the RFC(s) and any supplemental information needed to ensure an unambiguous methods for implementations. For the Burst/Gap Discard Metric, it appears that the only guidance on methods of measurement is in [Section 3.0 of \[RFC7003\]](#) and its supporting references. Relevant information is repeated below, although there appears to be no section titled "Method of Measurement" in [\[RFC7003\]](#).

[9.3.1.](#) Reference Method

Metrics in this block report on burst/gap discard in the stream arriving at the RTP system. Measurements of these metrics are made at the receiving end of the RTP stream. Instances of this metrics block use the synchronization source (SSRC) to refer to the separate auxiliary Measurement Information Block [\[RFC6776\]](#), which describes measurement periods in use (see [\[RFC6776\]](#), [Section 4.2](#)).

This metrics block relies on the measurement period in the Measurement Information Block indicating the span of the report. Senders MUST send this block in the same compound RTCP packet as the Measurement Information Block. Receivers MUST verify that the measurement period is received in the same compound RTCP packet as this metrics block. If not, this metrics block MUST be discarded.

[9.3.2.](#) Stream Type and Stream Parameters

Since RTCP-XR Measurements are conducted on live RTP traffic, the complete description of the stream is contained in SDP messages that proceed the establishment of a compatible stream between two or more communicating hosts. See Run-time Parameters, below.

[9.3.3.](#) Output Type and Data Format

The output type defines the type of result that the metric produces.

- o Value: Packets Discarded in Bursts

- o Data Format: 24 bits

- o Reference: [Section 3.2 of \[RFC7003\]](#)

[9.3.4.](#) Metric Units

The measured results are apparently expressed in packets, although there is no section of [\[RFC7003\]](#) titled "Metric Units".

[9.3.5.](#) Run-time Parameters and Data Format

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).

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

SSRC of Source: 32 bits As defined in [Section 4.1 of \[RFC3611\]](#).

SDP Parameters: As defined in [\[RFC4566\]](#)

Session description v= (protocol version number, currently only 0)

o= (originator and session identifier : username, id, version number, network address)

s= (session name : mandatory with at least one UTF-8-encoded character)

i=* (session title or short information) u=* (URI of description)

e=* (zero or more email address with optional name of contacts)

p=* (zero or more phone number with optional name of contacts)

c=* (connection information--not required if included in all media)

b=* (zero or more bandwidth information lines) One or more Time descriptions ("t=" and "r=" lines; see below)

z=* (time zone adjustments)

k=* (encryption key)

a=* (zero or more session attribute lines)

Zero or more Media descriptions (each one starting by an "m=" line; see below)

m= (media name and transport address)

i=* (media title or information field)

c=* (connection information -- optional if included at session level)

b=* (zero or more bandwidth information lines)

k=* (encryption key)

a=* (zero or more media attribute lines -- overriding the Session attribute lines)

An example Run-time SDP description follows:

v=0

o=jdoe 2890844526 2890842807 IN IP4 192.0.2.5

s=SDP Seminar i=A Seminar on the session description protocol

u=http://www.example.com/seminars/sdp.pdf e=j.doe@example.com (Jane Doe)

c=IN IP4 233.252.0.12/127

t=2873397496 2873404696

a=recvonly

m=audio 49170 RTP/AVP 0

m=video 51372 RTP/AVP 99

a=rtpmap:99 h263-1998/90000

[9.4.](#) Comments and Remarks

TBD.

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[10.](#) Security Considerations

These registry entries represent no known security implications for Internet Security. Each referenced Metric contains a Security Considerations section.

[11.](#) IANA Considerations

IANA is requested to create The Active Performance Metric Sub-registry within the Performance Metric Registry defined in [[I-D.ietf-ippm-metric-registry](#)]. The Sub-registry will contain the following categories and (bullet) columns, (as defined in [section 3](#) above):

Common Registry Indexes and Info

- o Identifier
- o Name
- o Status
- o Requester
- o Revision
- o Revision Date
- o Description
- o Reference Specification(s)

Metric Definition

- o Reference Definition
- o Fixed Parameters

Method of Measurement

- o Reference Method
- o Stream Type and Parameters
- o Output type and Data format
- o Metric Units

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- o Run-time Parameters

Comments and Remarks

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13. References

13.1. Normative References

- [I-D.ietf-ippm-metric-registry]
Bagnulo, M., Claise, B., Eardley, P., and A. Morton,
"Registry for Performance Metrics", Internet Draft (work
in progress) [draft-ietf-ippm-metric-registry](#), 2014.
- [RFC1035] Mockapetris, P., "Domain names - implementation and
specification", STD 13, [RFC 1035](#), November 1987.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate
Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC2330] Paxson, V., Almes, G., Mahdavi, J., and M. Mathis,
"Framework for IP Performance Metrics", [RFC 2330](#), May
1998.

- [RFC2679] Almes, G., Kalidindi, S., and M. Zekauskas, "A One-way Delay Metric for IPPM", [RFC 2679](#), September 1999.
- [RFC2680] Almes, G., Kalidindi, S., and M. Zekauskas, "A One-way Packet Loss Metric for IPPM", [RFC 2680](#), September 1999.
- [RFC2681] Almes, G., Kalidindi, S., and M. Zekauskas, "A Round-trip Delay Metric for IPPM", [RFC 2681](#), September 1999.
- [RFC3393] Demichelis, C. and P. Chimento, "IP Packet Delay Variation Metric for IP Performance Metrics (IPPM)", [RFC 3393](#), November 2002.

Morton, et al. Expires September 10, 2015 [Page 40]

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- [RFC3432] Raisanen, V., Grotefeld, G., and A. Morton, "Network performance measurement with periodic streams", [RFC 3432](#), November 2002.
- [RFC4737] Morton, A., Ciavattone, L., Ramachandran, G., Shalunov, S., and J. Perser, "Packet Reordering Metrics", [RFC 4737](#), November 2006.
- [RFC5357] Hedayat, K., Krzanowski, R., Morton, A., Yum, K., and J. Babiarz, "A Two-Way Active Measurement Protocol (TWAMP)", [RFC 5357](#), October 2008.
- [RFC5905] Mills, D., Martin, J., Burbank, J., and W. Kasch, "Network Time Protocol Version 4: Protocol and Algorithms Specification", [RFC 5905](#), June 2010.
- [RFC6673] Morton, A., "Round-Trip Packet Loss Metrics", [RFC 6673](#), August 2012.

[13.2.](#) Informative References

- [Brow00] Brownlee, N., "Packet Matching for NeTraMet Distributions", March 2000.
- [I-D.ietf-lmap-framework]

Eardley, P., Morton, A., Bagnulo, M., Burbridge, T., Aitken, P., and A. Akhter, "A framework for Large-Scale Measurement of Broadband Performance (LMAP)", [draft-ietf-lmap-framework-11](#) (work in progress), February 2015.

- [RFC1242] Bradner, S., "Benchmarking terminology for network interconnection devices", [RFC 1242](#), July 1991.
- [RFC3611] Friedman, T., Caceres, R., and A. Clark, "RTP Control Protocol Extended Reports (RTCP XR)", [RFC 3611](#), November 2003.
- [RFC4148] Stephan, E., "IP Performance Metrics (IPPM) Metrics Registry", [BCP 108](#), [RFC 4148](#), August 2005.
- [RFC4566] Handley, M., Jacobson, V., and C. Perkins, "SDP: Session Description Protocol", [RFC 4566](#), July 2006.
- [RFC5472] Zseby, T., Boschi, E., Brownlee, N., and B. Claise, "IP Flow Information Export (IPFIX) Applicability", [RFC 5472](#), March 2009.

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- [RFC5477] Dietz, T., Claise, B., Aitken, P., Dressler, F., and G. Carle, "Information Model for Packet Sampling Exports", [RFC 5477](#), March 2009.
- [RFC5481] Morton, A. and B. Claise, "Packet Delay Variation Applicability Statement", [RFC 5481](#), March 2009.
- [RFC6248] Morton, A., "[RFC 4148](#) and the IP Performance Metrics (IPPM) Registry of Metrics Are Obsolete", [RFC 6248](#), April 2011.
- [RFC6390] Clark, A. and B. Claise, "Guidelines for Considering New Performance Metric Development", [BCP 170](#), [RFC 6390](#), October 2011.
- [RFC6703] Morton, A., Ramachandran, G., and G. Maguluri, "Reporting IP Network Performance Metrics: Different Points of View", [RFC 6703](#), August 2012.

- [RFC6776] Clark, A. and Q. Wu, "Measurement Identity and Information Reporting Using a Source Description (SDS) Item and an RTP Extended Report (XR) Block", [RFC 6776](#), October 2012.
- [RFC6792] Wu, Q., Hunt, G., and P. Arden, "Guidelines for Use of the RTP Monitoring Framework", [RFC 6792](#), November 2012.
- [RFC7003] Clark, A., Huang, R., and Q. Wu, "RTP Control Protocol (RTCP) Extended Report (XR) Block for Burst/Gap Discard Metric Reporting", [RFC 7003](#), September 2013.

Authors' Addresses

Al Morton
AT&T Labs
200 Laurel Avenue South
Middletown,, NJ 07748
USA

Phone: +1 732 420 1571
Fax: +1 732 368 1192
Email: acmorton@att.com
URI: <http://home.comcast.net/~acmacm/>

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Marcelo Bagnulo
Universidad Carlos III de Madrid
Av. Universidad 30
Leganes, Madrid 28911
SPAIN

Phone: 34 91 6249500
Email: marcelo@it.uc3m.es
URI: <http://www.it.uc3m.es>

Philip Eardley
BT
Adastral Park, Martlesham Heath
Ipswich
ENGLAND

Email: philip.eardley@bt.com