

Topic 1: Implementation and adoption of metrics in BBF devices

Outline

1. Introduction

- The overall Registry concept and an overview of the IPPM RFCs and documents

2. Walk through “the life of a metric” (perhaps packet delay variation):

- a. Definition, e.g. in an RFC.
- b. Additional info required for registry (roles, parameters, etc.) that’s not in RFC.
- c. The registration process, including review and approval within IETF.
- d. How Measurement Tasks are derived from a registry entry.
- e. How Measurement Results are specified.
- f. If time allows, it would also be useful to discuss a sub-IP metric.

3. BBF’s role in metrics

- a. Should the BBF define a list of metrics that BBF devices must /should /typically implement? (WT-304 Section 7 lists some performance metrics but not associated requirements)
- b. What metrics will the BBF define itself, at IP and other layers, if any? How will metrics defined by non-IETF organizations (and especially those at non-IP layers) be registered?

4. BBF’s role in related issues

- a. Should the BBF define specific statistics derived from measurement results?
- b. Should the BBF define Characterization Plans (how many probes testing on what schedule)?

Overall Registry Concept

- Current Issue: How can we specify with Precision the Metrics and Methods to Implement and Use?
 - Many Standardized Metrics with similar names
 - Registry enables all parties to be sure they're talking about the same Metric
 - Flexibility and customization of Generic Metrics seen as an advantage in standards development
 - Methods allow variables, system issues out-of-scope
- Provide Unique ID and detailed exposition
 - Raise the bar from Standard to Registered Metrics
 - (details will follow)

Overall Registry Concept

- Each entry in the registry is a row
 - Indexed by ID
 - Series of columns
 - Typically ~1 column may be Not Applicable
 - Clustered in categories
- Each row is indexed by ID
 - 16 bit flat identifier
 - With associated name (i-d defines naming convention)
 - Auto-generate URI (pre-prend urn:ietf:params:ippm:metric: to name)
 - Maybe auto-generate URL where get text file with registry entry
- Control & report protocols use URI
- Next slide shows category /column headings
 - Layout is purely presentational (slide not wide enough)

Columns & categories

Summary	ID	Name	URI	Description
---------	----	------	-----	-------------

Metric definition	Reference	Fixed parameters
-------------------	-----------	------------------

Method of measurement	Reference (eg S3 RFCx)	Role(s) (eg sender)	Packet generation stream (active tests)	Traffic filter (passive tests)	Sampling distribution (for traffic filter)	Input Parameter(s) (eg MP address)
-----------------------	---------------------------	------------------------	--	-----------------------------------	---	---------------------------------------

Maybe a lot of info (~sub-columns)

Don't change nature of Method

Output	Type	Reference	Data format	Units
--------	------	-----------	-------------	-------

Admin info	Status	Requestor	Revision #	Date
------------	--------	-----------	------------	------

Comments	Full history
----------	--------------	-------

How do I get a registry entry?

- Submit request to IANA, with columns filled in
 - Likely prior review in WG
- Review by performance metric experts
 - If necessary, work on improvements with requester
 - Does the proposed registry entry clearly define the metric & method of measurement?
 - Is it different from existing registry entries?
 - Is it operationally useful (significant industry interest or been deployed)?
- IANA adds to registry
- Similar process for revisions
 - Must be backwards compatible (eg editorial)
 - Otherwise create a new metric (& maybe deprecate old one)

How do I use a registry entry?

- To define Measurement Tasks
 - Most fields are defined by the specific registry entry
 - Measurement Tasks may differ in Input Parameters
- To supplement Measurement Results
 - To be clear about the Metric, Method & Output

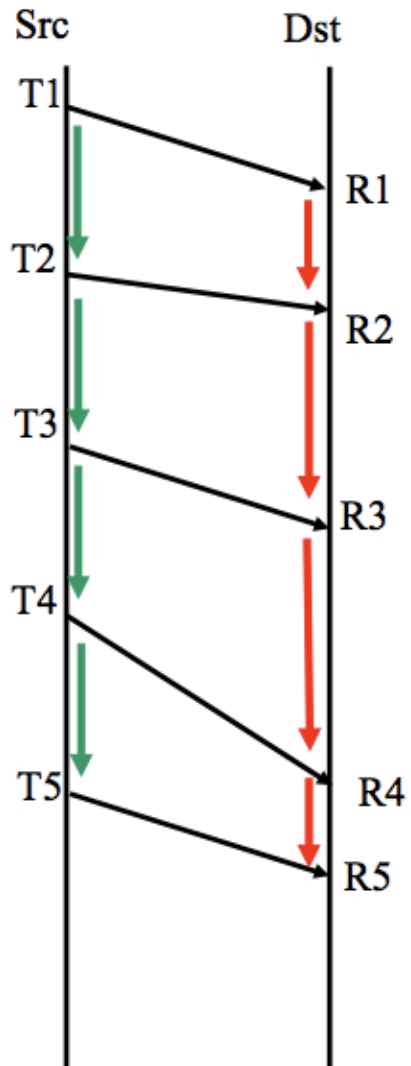
Example: Life of a Metric: Delay Variation

- When RFC 3393 was under development, there were two alternative definitions of DV:
 - Inter-Packet DV and IP Packet DV
- The solution: Phil Chimento re-wrote the fundamental metric definition to accommodate BOTH IPDV and PDV
- ITU-T Recs had preferred one form, PDV, previously called CDV (ATM Cells) FDV (Frames)
- Time passed, confusion grew, and some sought mapping between the two results (not possible!)

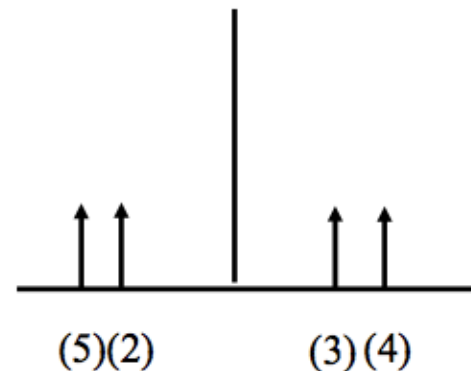
Graphical Explanation of the Two Forms of IPDV

- Next two slides from
- 67th IETF November 5-10, 2006; San Diego, CA, USA;
- [Delay Variation AS](#), Al Morton's first Draft of the text for RFC5481

Inter-Packet Delay Var. (selection $f = \text{previous packet}$)

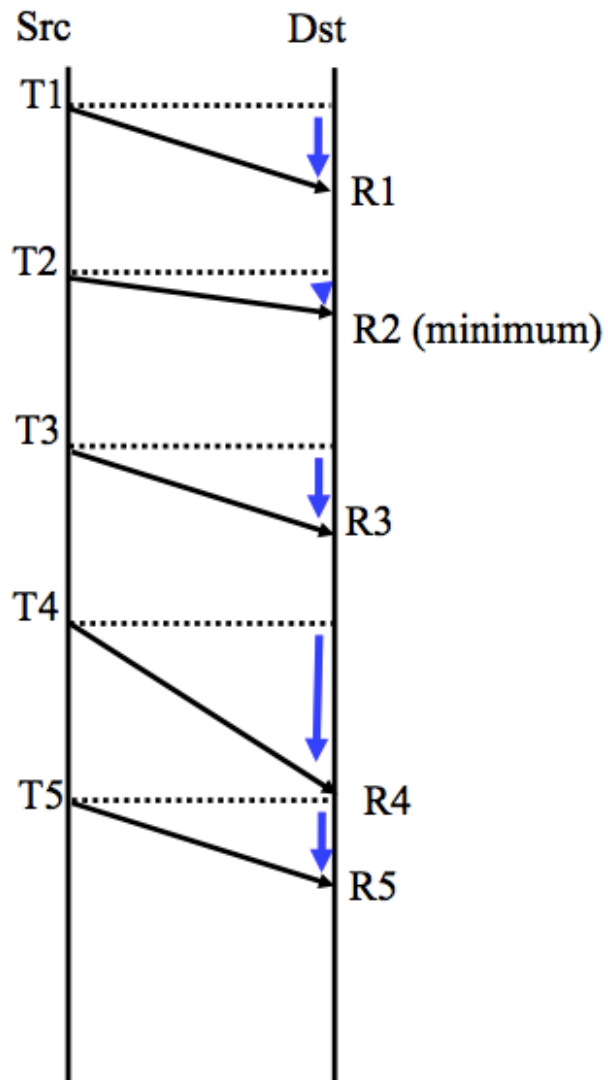


$$\text{IPDV}(2) = (R2 - R1) - (T2 - T1)$$

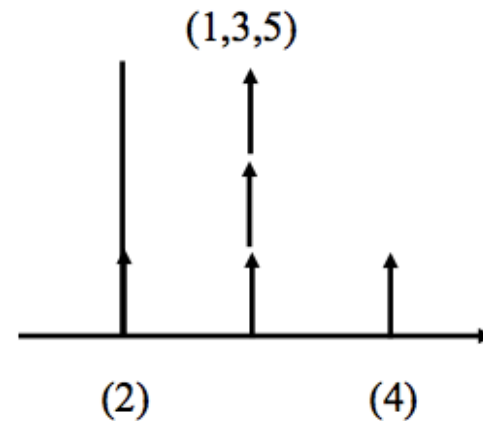


$$\text{IPDV}(4) = (R4 - R3) - (T4 - T3)$$

Packet Delay Variation (selection $f = \text{minimum delay pkt in stream}$)



$$\text{PDV}(3) = (R3 - T3) - (R2 - T2)$$



$$\text{PDV}(4) = (R4 - T4) - (R2 - T2)$$

Life of a Metric: Delay Variation Applicability Statement – RFC 5481

- Many “IPDV” comparison experiences shared, but nothing comprehensive across the uses, system requirements, network scenarios...
- The Challenge: examine a range of circumstances for active measurements of DV and their uses, and recommend which of the two forms is best matched to particular conditions and tasks.
 - 5 Uses: Estimate De-jitter buffer size, etc.
 - Not a comparison between SDOs
- Clearly, more guidance needed than “use 3393” !

Life of a (Registered) Metric: Additional Info Required for Entries (1)

- Ideally, it is exactly what the developer/ implementer needs, and is explicit enough to ensure Independent Implementations can make equivalent measurements (RFC 6576)
- Proposed entries can contain free text descriptions of definition details and methods beyond the Primary Spec/RFC
- Or, they can cite specific, relevant material in additional Specs/RFCs (roadmap to consensus guidance on implementation)

Life of a (Registered) Metric: Additional Info Required for Entries (2)

- All Entries will require:
 - References to Metric Definition and Method
 - Collect the list of Parameters for the Metric and Method -> Decide which will be:
 - Fixed – numerical values set in the Entry (no changes)
 - Input – values that must remain as variable inputs
 - Collect the list of Roles designated in the Method
 - Determine the Output Types, Units, Data Formats,
- For Active Metrics, Stream Generation Param
- For Passive Metrics, Traffic Filter and Sampling

Life of a Metric: Registry Entry Eval/Maint Process

- Submission: to IANA, or Internet Draft, ? Both
- New Entries
 - Existing reference or new specification needed
 - Review by Expert Group
- Revised Entries
 - Is the Revision Backward Compatible?
 - Reference could change
 - Requires Review by Expert Group
 - Administrative Category to track Status.

Life of a (Registered) Metric: How Tasks are Derived from a Reg Entry

- For PDV Elements in the Task will include:
 - Registry Entry ID
 - Start Time (or is this part of Scheduling tasks? Alternatively, Duration as a Run-Time Param)
 - Role
 - Input Parameters and values (e.g., Source IP Address, Destination IP address, possibly some details of Stream Generation)
 - (possibly designation of measurement points)

Life of a (Registered) Metric: How Measurement Results are Specified

- The process populating the Data Model should refer to the Entries in the “Output” Category for the Metric, and accommodate them
- -- May need to augment results with time of test, measurement points, status, errors, ...
- Reporting Protocol needs to convey all the above to the Collector.

Broadband Forum's role in metrics

- Does BBF define a list of Metrics (& their Measurement Methods) that BBF devices implement?
 - No – defined by the operator / regulator / vendor
 - Yes - define several metrics that BBF device MUST implement? SHOULD implement? MAY 'typically'?
 - Yes - define a few profiles (eg 'home gateway'), each with a list of metrics
- What about WT-304 Section 7?
 - It lists some performance metrics but not associated requirements
- What metrics will the BBF define itself, at IP and other layers, if any?
- How will metrics defined by non-IETF organizations (and especially those at non-IP layers) be registered?
 - Use IETF process & expert review [urn:ietf:params:bbf:metric: xyz]
 - Create a similar BBF-controlled process [urn:bbf:params:wt304:metric: xyz]
 - bbf would need to be formally registered as a URN namespace
 - Define locally [urn:ISP-megadublin:metric: xyz]
 - ISP-megadublin would need to be informally registered as a URN namespace

Broadband Forum's role in related issues

- Should the BBF define specific statistics derived from measurement results?
 - No – post-processing is a job for the operator
 - No – regulator may want to define specific stats (eg peak hour weekly average, excluding the extreme 10% data points)
 - Yes – useful to specify
- Should the BBF define Characterisation Plans?
 - This says how many probes testing on what schedule, etc
 - No – operator choice
 - No – for benchmarking, regulator needs Characterisation Plan – but best done by regulator, in collaboration with per-country industry group
 - No – useful guidance for end-user measurements, but best done by industry group or 3rd party
 - Yes – useful for BBF to specify