

# Advanced Stream and Sampling Framework for IPPM

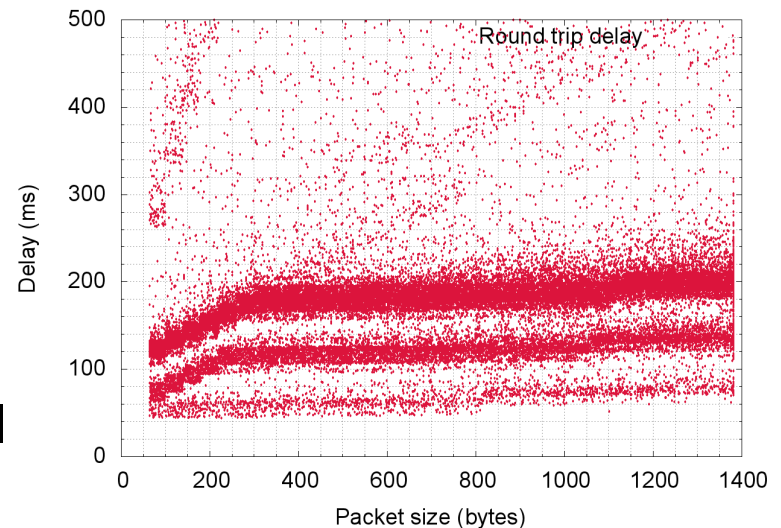
**draft-ietf-ippm-2330-update-01**

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November 2013

# Motivation

- Networks have evolved
  - RFC 2330 assumes linear network behavior (“wire“)
  - Smart networks: Measurement results depend to a large extent on measurement stream (on-demand allocation)
  - RFC 2330 **metric and methodology properties** are a useful theoretical instrument - limited in real life now (repeatability)
  - Network-internal **flow state** at layers below IP
  - RFC 2330 prerequisites fail



# Scope of Advanced Framework

- **(A) Describe useful additional stream parameters**  
Aim: improve measurements in modern networks
  - 1. Network treatment depends on Type-P (concept ext.)
  - 2. Packet history influences network/results
  - 3. Access technology may change during session
  - 4. Time-slotted service time in network path
- **(B) Qualities of Metrics and Methodologies (New Section)**
  - 1. Repeatability
  - 2. Continuity
  - 3. Actionable
  - 4. Conservative
  - 5. Spatial and Temporal Composition
  - 6. Poisson Sampling

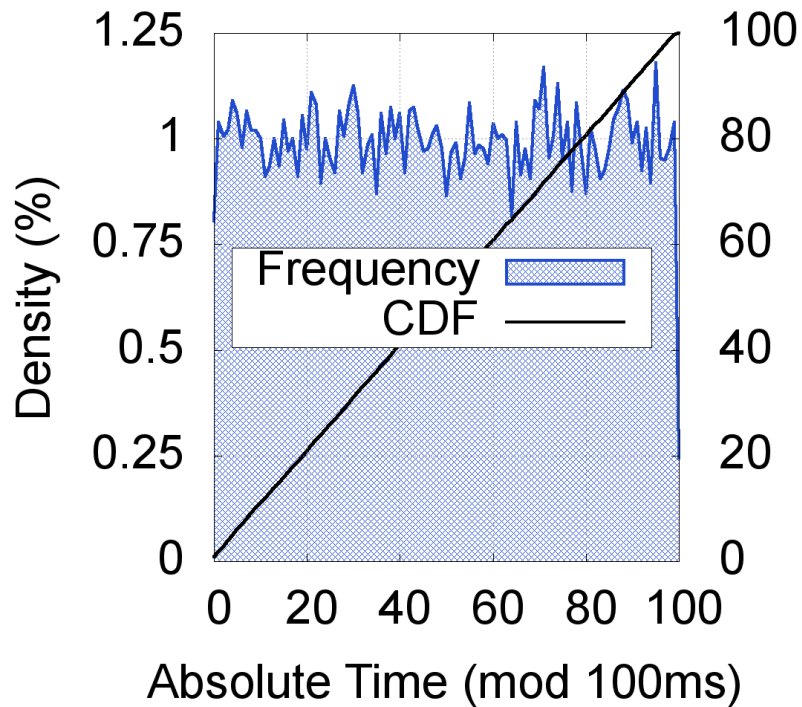
# Impact on Metric Definitions

- So far, none of the important aspects of the RFC2330 framework are changed in a way that would require modifications to the metric definitions.
- In other words, this is a true Update, clarifying and expanding RFC 2330

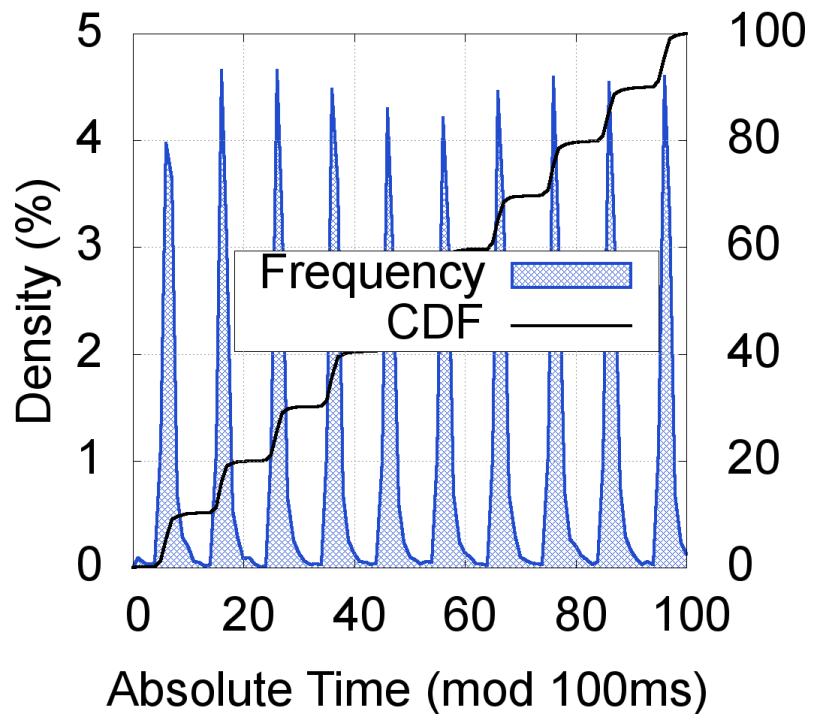
# A: Stream Parameters

1. Network treatment depends on Type-P
  - Packet size, type, payload content (compressible)
2. Packet history influences network/results
  - On-demand capacity allocation
3. Access technology may change during session
  - Technology change transparent at network layer (potentially identical IP, e.g., policy-based handover HSPA - LTE)
  - Mobility issues currently not mentioned by RFC 2330 update – how to handle repeatability (**identical** parameters)?
4. Time-slotted service time in network path
  - Random sampling impossible beyond first time-slotted link
  - Prefer hop-by-hop measurements over end-to-end
  - Deploy randomness re-generation in intermediate nodes [TSRC]

# Randomness Cancellation (TSRC)



- Ingress



- Egress

# B: Qualities of Metrics and Methodologies (New Section)

## 1. Repeatability (same conditions, same result)

- Practical relevance of “Identical” conditions?
- Relax requirements: “minimum controlled parameter set”
- Standards Track Advancement RFC 6576 “equivalence”

## 2. Continuity (meas. follow small changes in conditions)

- Proposed to deprecate (Scenario: delay measurement samples in time-slotted networks, close to allocated timeslot)

## 3. Actionable (list discussion & model-based metrics)

- Extension of “useful” requirement
- Directed measurements should support localization of cause
- Monitoring (“an error exists”) vs. Localization (“error in link x”)

# B: Qualities of Metrics and Methodologies (New Section) (ctd.)

## 4. Conservative (minimize effect of active meas. traffic)

- Challenged in paths exhibiting on-demand capacity allocation

## 5. Spatial and Temporal Composition

- Updated by RFC 5835 and RFC 6049
- “Complete Path” vs. “sub-path” vs. “randomness regeneration”

## 6. Poisson Sampling

- Impact on reactive network elements
- Recommended to truncate tail of distribution (for any mean rate)



# Input: Req. Model-based Metrics

- Metrics must be **actionable** by the ISP
  - Valid for customer, etc...
- Metrics must be **vantage point invariant** over a significant range of measurement point choices
  - **Q: Is “Ideal path” assumption realistic?**
  - “Ideal path” concept prerequisite: sub-path parameters are insignificant with respect to the metric of interest.
  - **Hidden parameters might exist with impact on measurements!**
  - Example cases where such abstraction is **NOT** acceptable include: reactive networks, time-slotting, etc.

# Input: Req. Model-based Metrics (c.)

- Metrics must be “repeatable” by multiple parties
  - (different take on repeatable definition)
  - “It must be possible for different parties to make the same measurement and observe the same results. In particular it is specifically important that both a consumer (*or their delegate*) and ISP be able to perform the same measurement and get the same result”
  - Depends to a large extent on measurement methodology
  - Consumer and ISP should have access to same measurement infrastructure
  - Explicit measurement infrastructure in place (LMAP)?

# Summary Status and Discussion

- Todo:
  - More opinions needed – volunteers to read/review?
  - Consider draft-ietf-ippm-model-based-metrics-01 requirements – is abstraction realistic?
- TSRC applicable to other areas (e.g., LMAP)
  - Prefer hop-by-hop metrics over end-to-end?
  - Randomness re-generation, new measurement protocols?

# Bibliography

[TSRC] J.Fabini and M. Abmayer, "Delay Measurement Methodology Revisited: Time-slotted Randomness Cancellation", IEEE Transactions on Instrumentation and Measurement, October 2013.  
URL: [http://publik.tuwien.ac.at/files/PubDat\\_218309.pdf](http://publik.tuwien.ac.at/files/PubDat_218309.pdf)

Backup

# Revised Definition „Repeatability“

**RFC 2330:** "A methodology for a metric should have the property that it is repeatable: if the methodology is used multiple times under identical conditions, the *same measurements should result in the same measurements.*"

**Update:** "A methodology for a metric should have the property that it is repeatable: if the methodology is used multiple times under identical conditions, the *methods should produce equivalent measurement results.*"