draft-ietf-bmwg-mlrsearch-07

IETF-120 Vancouver, BMWG Meeting
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MLRsearch Update

- draft-ietf-bmwg-mlrsearch-07 posted on 21st of July 2024.
- Changes from -06
  - Substantial edits in MLRsearch Specification section.
  - Added Search Goal Examples for compatibility with RFC2544 and TST009 goals.
  - Added note on implementation compliance.
  - Overall focus on improving clarity of definitions, discussions and references.
- BMWG next steps
  - Draft ready for BMWG Last Call.
MLRsearch Update - Topics

- Problems
- Specification
  - Existing Terms
  - Trial Terms
  - Goal Terms
  - Search Goal Examples
  - Result Terms
  - Architecture
  - Implementation Compliance
- Work Status as of -07
- References
Problems

- **Long Search Duration** => Let’s shorten it by finding interesting region faster.
- **DUT in SUT** => Use performance spectrum.
- **Repeatability and Comparability** => Improve with performance spectrum and conditional throughput.
- **Throughput with Non-Zero Loss** => Address a common practice in SW networking.
- **Inconsistent Trial Results** => Address this new phenomena resulting from repeated trials at the same load and multiple search goals.
Specification 1/11 – Existing Terms
Relying on existing definitions without any deviations

- SUT
- DUT
- Trial
Specification 2/11 – Trial Terms
Some new, some existing terms with deviations

- **Trial Duration**: intended duration.
- **Trial Load**: intended load.
- **Trial Input**: composite of trial duration and trial load.
- **Traffic Profile**: composite of other quantities including frame sizes, burst profile.
Specification 3/11 – Trial Terms
Some new, some existing terms with deviations

- **Trial Forwarding Ratio**: ratio of \( \frac{\text{(#frames forwarded)}}{\text{(#frames sent by tester)}} \).
- **Trial Loss Ratio**: 1 minus Trial Forwarding Ratio.
- **Trial Forwarding Rate**: Trial Load multiplied by Trial Forwarding Ratio.
- **Trial Effective Duration**: by default equal to Trial Duration.
- **Trial Output**: composite of Trial Loss Ratio, Trial Effective Duration and Trial Forwarding Rate.
- **Trial Result**: composite of Trial Input and Trial Output.
Specification 4/11 – Goal Terms
Some new, some existing terms with deviations

- **Goal Final Trial Duration**: threshold value for trial durations.
- **Goal Duration Sum**: threshold value for a particular sum of trial effective durations.
- **Goal Loss Ratio**: threshold value for Trial Loss Ratios.
- **Goal Exceed Ratio**: threshold value for a particular ratio of sums of Trial Effective Durations.
- **Goal Width**: threshold value used for deciding if two trial loads are close enough.
Specification 5/11 – Goal Terms
Some new, some existing terms with deviations

• **Search Goal**: composite of several attributes including
  • Required attributes:
    • Goal Final Trial Duration,
    • Goal Duration Sum,
    • Goal Loss Ratio,
    • Goal Exceed Ratio.
  • Optional attribute:
    • Goal Width.

• **Controller Input**: list of Search Goal instances
Specification 6/11 – Search Goal Examples
RFC2544 Goal

The following set of values makes the search result unconditionally compliant with [RFC2544] (section 24 Trial duration)

• Goal Final Trial Duration = 60 seconds
• Goal Duration Sum = 60 seconds
• Goal Loss Ratio = 0%
• Goal Exceed Ratio = 0%
specification 7/11 – search goal examples

TST009 Goal

[TST009] (section 12.3.3 Binary search with loss verification) describes one of the alternatives to RFC2544:
• repeat lossy trials, hoping for zero loss on second try,
• so the results are closer to the noiseless end of performance spectrum,
• and more repeatable and comparable.

For example, for "r = 2" variant\(^1\), the following search goal should be used:
• Goal Final Trial Duration = 60 seconds
• Goal Duration Sum = 120 seconds
• Goal Loss Ratio = 0%
• Goal Exceed Ratio = 50%

\(^1\) From TST009 section 12.3.3: “r is a variable tracking the number of verifications of a particular Offered Load level (The recommended value of max(r) = 2). r is initially set to 1.”
Specification 8/11 – Result Terms

• **Relevant Upper Bound**: the smallest trial load value classified at the end of search as upper bound.

• **Relevant Lower Bound**: the largest trial load value classified at the end of search as lower bound.

• **Conditional Throughput**: forwarding rate at Relevant Lower Bound of given Search Goal at the end of search.
Specification 9/11 – Result Terms

- **Goal Result**: composite of Relevant Upper Bound and Relevant Lower Bound (REQUIRED), Conditional Throughput (RECOMMENDED).

- **Search Result**: composite object mapping Search Goal instance to a corresponding Goal Result instance.

- **Controller Output**: composite quantity returned from the Controller to the Manager at the end of the search. The Search Result instance is its only REQUIRED attribute.
MLRsearch architecture consists of three main system components:

- **Manager**: component tasked to pre-configure everything and to produce the test report
  - responsible for configuring other components,
  - calling the Controller component once,
  - creating the test report following the reporting format as defined in [RFC2544] (section 26. Benchmarking tests).

- **Controller**: component tasked to select trial loads and durations
  - when called with a Controller Input instance,
  - repeatedly computes Trial Input instance for the Measurer,
  - obtains corresponding Trial Output instances,
  - and eventually returns a Controller Output instance.

- **Measurer**: component tasked to perform trials
  - when called with a Trial Input instance,
  - performs one Trial,
  - and returns a Trial Output.
Any networking measurement setup
  • where there can be logically delineated system components, and
  • there are components satisfying requirements for
    • the Measurer,
    • the Controller and
    • the Manager,

is considered to be compliant with MLRsearch specification.
MLRsearch Work Status

• Draft is ready for BMWG Last Call.
References

• MLRsearch Applied
  • LFN FD.io CSIT: https://csit.fd.io

• SW Networking Benchmarking
  • GCP Blogs: 100Mpps with FD.io VPP on x86
    • Forwarding over 100 Mpps with FD.io VPP on x86
    • Forwarding over 100 Mpps with FD.io VPP on x86 — Part2
THANK YOU!

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