draft-ietf-bmwg-mlrsearch-03

IETF-115 London, BMWG Meeting
Authors: Maciek Konstantynowicz, Vratko Polák
Draft Status

- draft-ietf-bmwg-mlrsearch-03 posted on 9th of November 2022 (post IETF-115 deadline)
- Still work in progress.
Draft changes -02 to -03

• Major updates in all sections
  • Addressing most/all points from BMWG feedback (thanks to Al, Gabor, Vladimir)
  • Clearer articulation of the problem statement
  • Clearer description of MLRsearch methodology and strategies to address listed problems
  • Stricter references to methodologies and terms specified in RFCs 1242, 2285, 2544
  • Updated Terminology section
    • Many details intentionally not specified (for now)

• Sections describing sample implementations
  • Outdated and got removed to avoid confusion
  • Will be added in future revision
MLRsearch – What is it, Motivation and Objectives

• Multiple Loss Ratio search (MLRsearch)
  • A new test methodology aiming to improve network throughput search specified in RFC 2544

• Motivation:
  • Address problems posed by testing NFV systems and other software based network data planes.

• Objectives:
  • minimize the total test duration
  • search for multiple loss ratios
  • improve results repeatability and comparability
Problems

• Long Test Duration
  • Vanilla bisection is too slow

• DUT within SUT
  • DUT – software program processing packets, device of interest
  • SUT – server hardware and operating system, server resources shared
  • DUT is effectively ”nested” within SUT
  • SUT performance is a spectrum, “noiseless” end is more stable and of interest

• Repeatability and Comparability
  • Need for search procedure that reports more stable results across iterations and environments

• Throughput with Non-Zero Loss
  • Searching for multiple loss ratio goals helps to describe SUT performance better
  • Non-Zero loss performance is more stable

• Inconsistent Trial Results
  • Is a zero-loss trial a throughput if there was non-zero-loss trial with smaller load?
Terminology update (highlights)

• Throughput
  • Defined as in RFC2544, must be zero loss

• Conditional throughput
  • For non-zero loss
  • Coincides with throughput when the loss ratio goal is zero
  • Refers to forwarding rate (instead of load) for non-zero loss ratio goal

• Lower / upper bound:
  • Highlighted they are relative to the current search phase
  • Otherwise vague, to avoid “inconsistent results” issues
MLRsearch Approach

• Main inputs
  • One or more loss ratio goals, Target trial duration, Target precision

• Sequence of phases
  • Initial phase, Middle phases, Final phases

• Initial phase
  • Establish “starting” bounds for first middle phase
  • Use 3 trials with following Oloads: i) MOL, ii) FRMOL [terms in RFC2285], iii) FRFRMOL [new]
  • By default FRMOL used as upper bound, FRFRMOL used as lower bound

• Middle phases
  • Explicit 4 actions within a phase
  • Turns “starting” bounds into “ending” bounds

• Final phases
  • One for each goal
  • Final phase for first goal is done before middle phases for second goal
  • (FR of) Lower ending bound becomes the conditional throughput
## MLRsearch - Running code

### Versions

<table>
<thead>
<tr>
<th>ver.</th>
<th>Goals</th>
<th>IOrder</th>
<th>Track</th>
<th>trial</th>
<th>DV</th>
<th>(reference to patch in gerrit.fd.io)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NDR+PDR</td>
<td>GiP</td>
<td>2pG</td>
<td>1</td>
<td>-01</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(30954)</td>
</tr>
<tr>
<td>2</td>
<td>Multiple</td>
<td>GiP</td>
<td>AFS</td>
<td>1</td>
<td>-02</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(36061)</td>
</tr>
<tr>
<td>3</td>
<td>Multiple</td>
<td>PiG</td>
<td>AFS</td>
<td>1</td>
<td>-03</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(37418)</td>
</tr>
<tr>
<td>4</td>
<td>Multiple</td>
<td>PiG</td>
<td>AFS</td>
<td>n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Multiple</td>
<td>PiG</td>
<td>2</td>
<td>n</td>
<td>(-04)</td>
<td></td>
</tr>
</tbody>
</table>

### Legend

- **Goals**: How many loss ratio goals are supported.
  - NDR+PDR: Unconditional NDR goal, optional configurable PDR goal.
  - Multiple: One or more goals, sorted from low to high loss.

- **IOrder**: Iteration order of phases.
  - GiP: Goal in phase, meaning all goals at 1s are bounded before 5s.
  - PiG: Phase in goal, meaning first goal to 30s before second goal starts.

- **Track**: How much data from shorter load results is tracked.
  - 2pG: Upper and lower bounds from previous phase are tracked for each goal separately.
  - AFS: All results are tracked, but Forgetting Short if load is re-measured.
  - 2: Only upper and lower bounds from immediately preceding phase are tracked.

- **Trial**: Whether "sub-trials" are supported.
  - 1: No. Load time is always spent in a single trial.
  - n: Yes. Multiple trials are added (behaves as "1" if load time is short).

- **DV**: IETF draft version applicable the most.

---

IETF-115 London BMWG Meeting: draft-ietf-bmwg-mlrsearch-03
Next steps

- BMWG review
  - Scrutiny and validation of listed problems
  - Review of proposed MLRsearch approach

- MLRsearch draft work
  - Compatibility with Binary Search with Loss Verification is coming (not in -03)
  - Inconsistent trial handling is important, but currently not described
  - Non-ambiguous definitions are needed for comparability between MLRsearch implementations
    - At least for “final phase goal” and “lower bound”
THANK YOU!

draft-ietf-bmwg-mlrsearch-03

IETF-115 London, BMWG Meeting
Authors: Maciek Konstantynowicz, Vratko Polák