draft-ietf-bmwg-mlrsearch-06

IETF-119 Brisbane, BMWG Meeting

Authors: Vratko Polák, Maciek Konstantynowicz

MLRsearch Update

- draft-ietf-bmwg-mlrsearch-06 posted on 4th of March 2024
- Changes from -05
    - Fixed few logical inconsistencies left from previous edits.
    - Added chapter Addressed Problems.
    - Improved language.
- BMWG next steps
    - Draft ready for BMWG review.

Topics

- MLRsearch Introduction
- Problems Summary and Approach
- Sample Results and Discussion
- Work Status as of -06
    -

MLRsearch Introduction

- Multiple Loss Ratio search (MLRsearch)
    - defines a new network throughput testing methodology extending RFC2544.
- MLRsearch goals include
    - minimizing overall search duration,
    - supporting multiple loss ratio searches,
    - improving result repeatability and comparability.
- Primary target for MLRsearch
    - evaluation and testing of software-based networking systems' data planes.

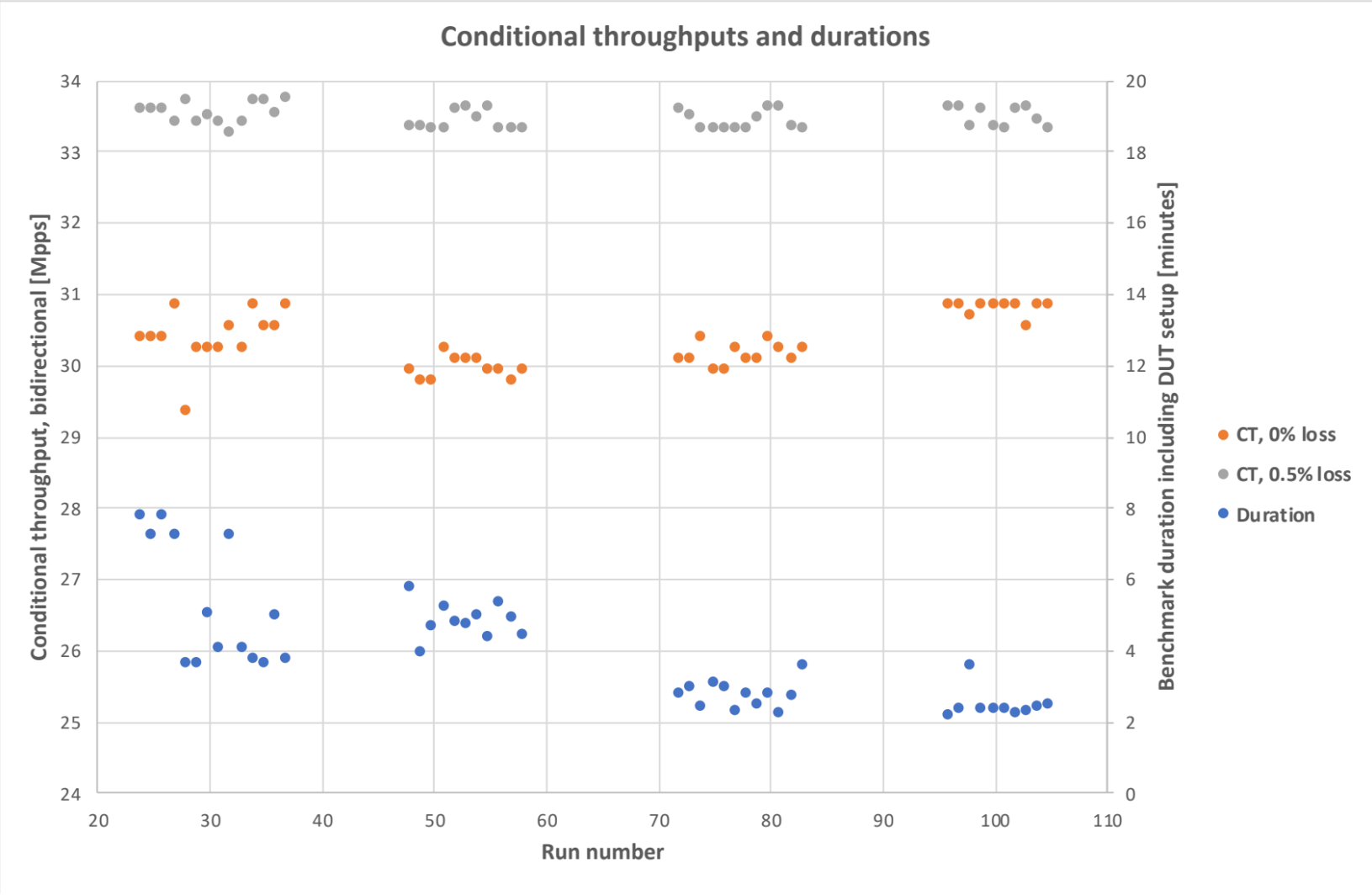
Problems Summary

Problem	Applicability
Long Search Duration	• Time efficiency is critical in high cadence development and deployment of software networking systems. • The bisection method (binary search) is excessively slow.
• DUT in SUT	• SUT is multi-tenanted, software DUT is nested within the SUT. • DUT is subject to interference from SUT Operating System and other applications running on the SUT.
• Repeatability and Comparability	• Repeatability of measurement cannot be determined from just one discovered throughput value. • Binary search results tend to wander away from the noiseless end of SUT performance spectrum, resulting in poor throughput repeatability.
• Throughput with Non-Zero Loss	• Many benchmarking teams settle with small non-zero loss ratio as the goal for their load search of software DUTs. • Support for non-zero loss goals makes any search algorithm more user friendly.
• Inconsistent Trial Results	• Any throughput search is subject to encountering inconsistencies between trial results. • Any robust throughput search algorithm needs to decide how to continue the search in presence of such inconsistencies.

MLRsearch Approach

Problem	Approach
Long Search Duration	• Major reduction in execution time achieved with the introduction of preceding targets. • Additional time savings achieved with pre-initial trials, halving mode and smart splitting in bisecting mode.
• DUT in SUT	• SUT with performance spectrum instead of a single performance value. • Noiseless performance on one end of the spectrum, noiseful performance on the other . • DUT in SUT performance measurement problem reduced to estimating the noiseless end of SUT performance spectrum.
• Repeatability and Comparability	• Multiple trials with noise tolerance enhancement to increase result stability. • Additional configuration parameters to aid repeatability and comparability. • Achieves benefits of Binary Search with Loss Verification, [RFC9004] (section 6.2) and [TST009] (section 12.3.3).
• Throughput with Non-Zero Loss	• MLRsearch search goals include configurable loss ratios.
• Inconsistent Trial Results	• Relevant lower bound to be smaller than any upper bound. • Unequal handling of good and bad short trials. • Preference to lower load when choosing the winner among candidates.

Sample Results and Discussion: Plot



* CT stands for Conditional Throughput

Sample Results and Discussion: Table

(CT stands for Conditional Throughput)

quantity	**1x60s**,0%	**60x1s**,0%	**21x1s**,0%	**21x1s**,50%
duration avg [s]	315	289	165	147
duration stdev [s]	101	28	21	22
0% CT avg [pps]	30,405,394	29,966,406	30,152,424	30,806,424
0% CT stdev [pps]	367,722	140,646	144,197	98,543
0.5% CT avg [pps]	33,542,114	33,419,650	33,425,449	33,481,149
0.5% CT stdev [pps]	138,155	129,493	122,457	132,460

trials,exceed ratio

Sample Results and Discussion: Comments

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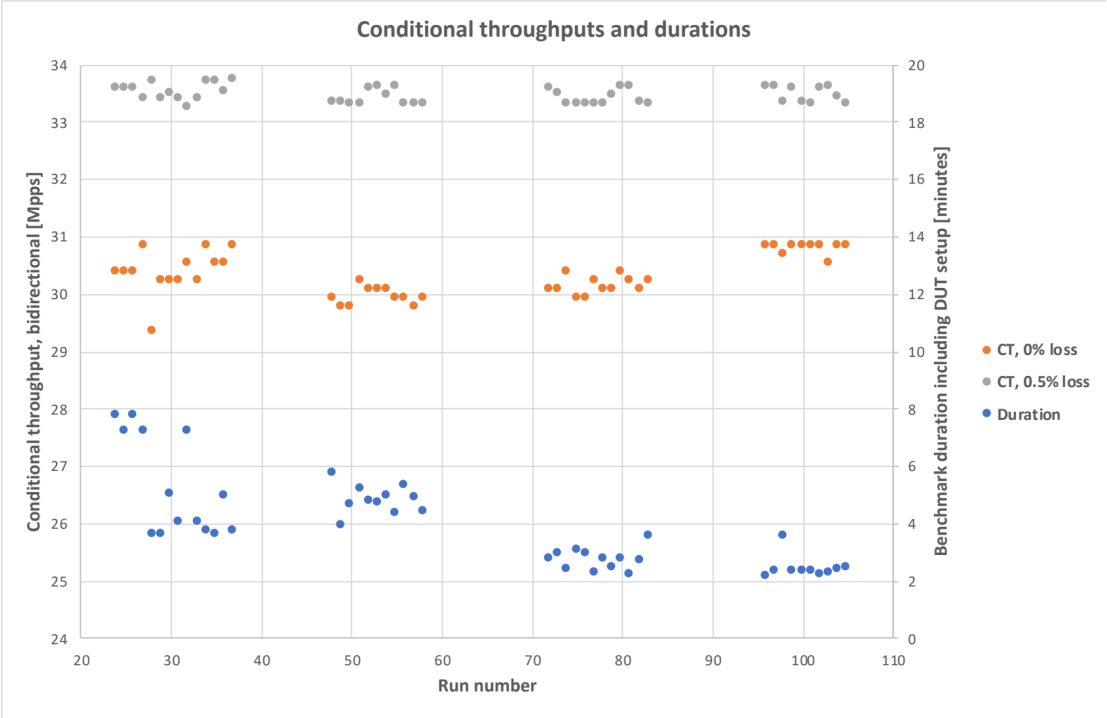
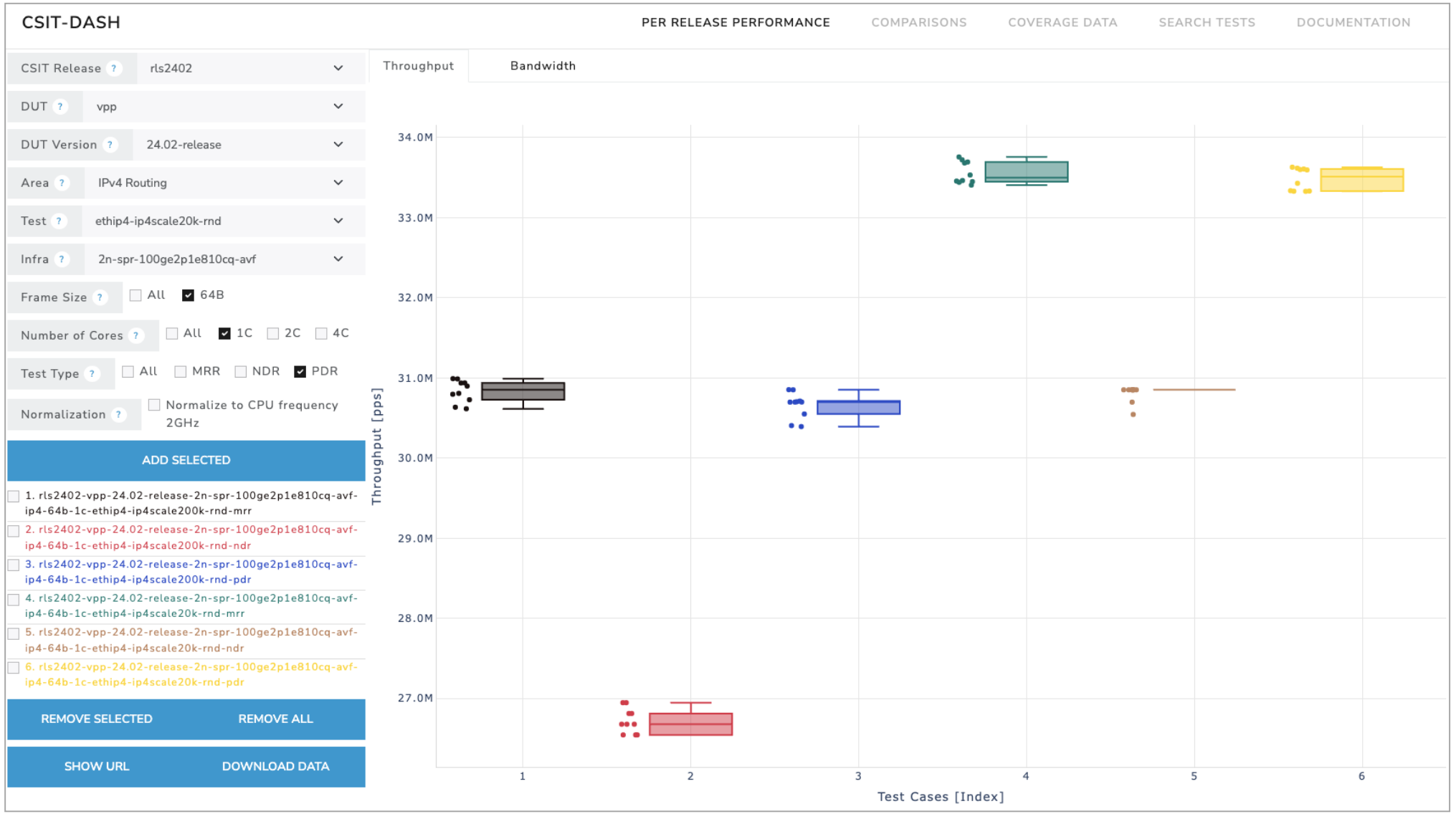
- Columns show the overall duration and two conditional throughputs for each run.
  - Duration uses right Y axis, throughput share common left Y axis.
- The runs are grouped by different input parameters used:
  - Always two search goals, differing in goal loss ratio (0% or 0.5%).
  - Leftmost group has final trial duration 60s, all other groups have 1s.
  - All groups have 1s as the initial trial duration.
  - Two left groups have goal duration sum 60s, two right groups 21s.
  - Rightmost group has exceed ratio 50%, all others have 0%.
- Towards right, durations get shorter and more consistent, zero loss throughput gets more consistent and higher, 0.5% throughput barely changes.



Sample Results and Discussion: Production

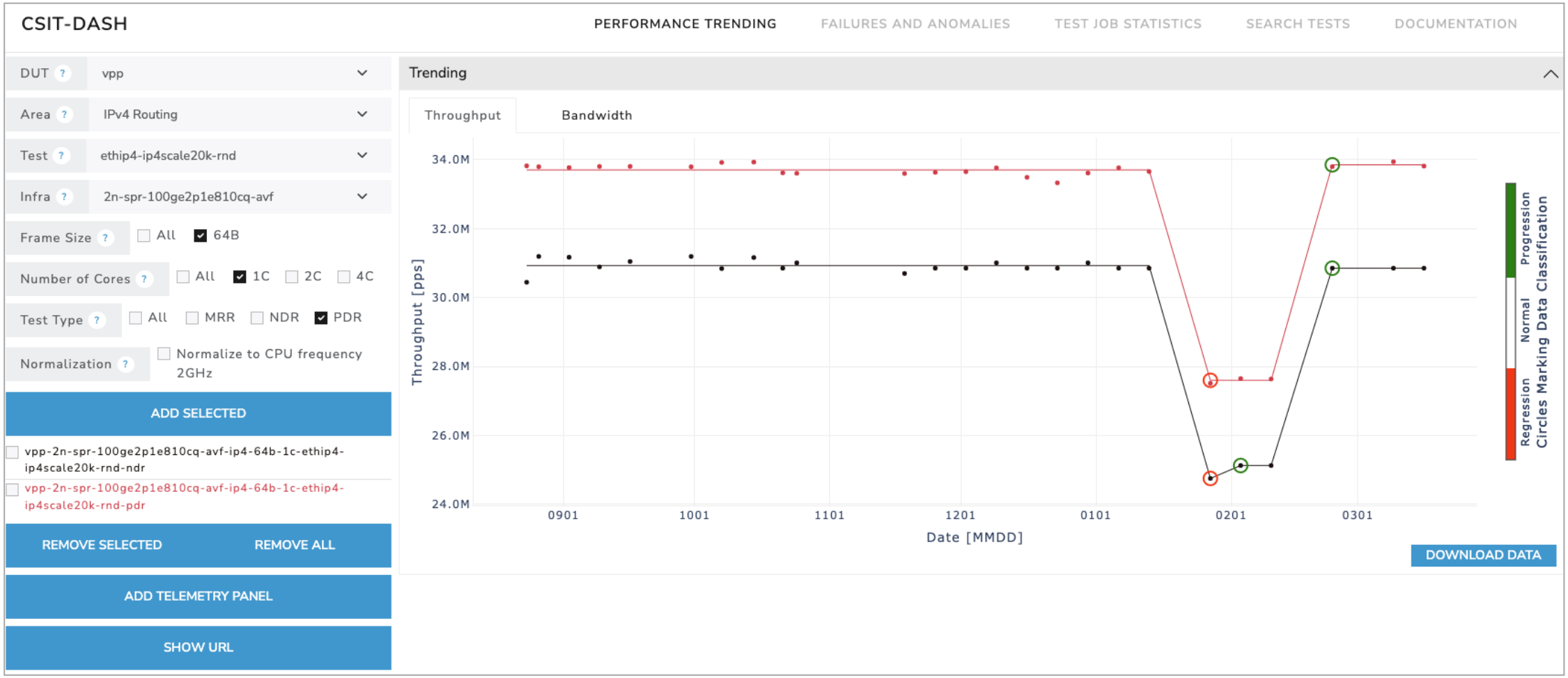
csit.fd.io Dashboard: Release Report Testing



Link to Report Graph

Sample Results and Discussion: Production

csit.fd.io Dashboard: Trending Testing



Link to Trending Graph

MLRsearch Work Status

- Draft is ready for review

THANK YOU !

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