Benchmarking SDN Controller Performance

draft-bhuvan-bmwg-sdn-controller-benchmark-term-00

draft-bhuvan-bmwg-sdn-controller-benchmark-meth-00

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Objective

- Develop a comprehensive set of tests for benchmarking SDN controllers for
  - ✓ Performance
  - ✓ Scalability
  - ✓ Reliability and
  - ✓ Security

- Define metrics and methodology to assess/evaluate SDN controllers

- Provide a standard mechanism to measure and compare the performance of various controller implementations

History

Revision 00

- Submitted in March 2014 (OpenFlow Specific) (draft-bhuvan-bmwg-of-controller-benchmarking-00)
- Presented initial version in IETF-90 meeting

Revision 01

- Submitted in October 2014 (Protocol Agnostic) (draft-bhuvan-bmwg-of-controller-benchmarking-01)
- Presented the revised version in IETF-91 meeting

Revision 02

- Submitted in March 2015 (Terminology and Methodology) (draft-bhuvan-bmwg-sdn-controller-benchmark-term-00) (draft-bhuvan-bmwg-sdn-controller-benchmark-meth-00)

Revision 02 – Updates

- **Changes Highlight**
  - Split into two different drafts (Terminology and Methodology)
  - Defined an additional metric - Control Sessions Capacity
  - Provided an example Benchmarking Methodology for OpenFlow Controller
  - Addressed review comments from last IETF meeting and on the mailing list

Revision 02 – Benchmarking Metrics Revision

Categories	Metrics Rev 01	Metrics Rev 02	Change Description
Performance	1. Synchronous Message Processing Time	1. Asynchronous Message Processing Time	Measure the time to handle messages triggered by network events
	2. Synchronous Message Processing Rate	2. Asynchronous Message Processing Rate	Measure the time to handle messages triggered by network events
Scalability	1. Flow scalable limit	1. Forwarding Table Capacity	Reworded the metric title
	-	2. Control Sessions Capacity	Maximum number of control sessions the controller can maintain

Revision 02 – Updates based on Comments

Terminology Section
Provided more clarity in definition of the following terminologies ▪ Flow ▪ Path ▪ Northbound/Southbound Interfaces
Dropped following definitions ▪ Synchronous Messages ▪ Learning Rate
Added following new definitions ▪ SDN Applications ▪ Traffic Endpoints ▪ Asynchronous Messages

Revision 02 – Updates based on Comments (Contd.)

Test setup and Test Considerations Sections

Test Setup

- Updated Test Setups to show the network path more explicitly between the nodes.

Test Considerations

- Updated Traffic Consideration to recommend default test traffic sizes
- Reworded Measurement Accuracy - Measurement Point Specification and Recommendation
- Added Connectivity Recommendation between SDN Nodes and Controller
- Updated Test Reporting to include H/W specifications and Test setup details

Benchmarking Tests Sections

Topology Discovery Time

- Redefined test procedure
  - Now determines time to discover 'n' nodes rather than finding number of nodes within specified duration.
- Additional measurement suggestion to handle Network Latency during the discovery process.

Revision 02 – Updates based on Comments (Contd.)

Benchmarking Tests
Asynchronous Message Processing Time ▪ Redefined the procedure to measure the response time based on asynchronous message Tx/Rx time
Asynchronous Message Processing Rate ▪ Added note for connectivity requirements between controller and SDN nodes while performing this test.
Exception Handling ▪ Provided more clarity on generating incorrect frames.
Network Discovery Size ▪ Redesigned the tests to determine the controllers maximum discovery capability without having any time limit.

Revision 02 – Discussion Points

Points for Discussion
▪ Need for Test Duration
▪ Some of the tests seem suitable for benchmarking SDN applications rather than SDN controllers. ▪ e.g., Network Topology Discovery Time. Currently, the methodology assumes SDN networking application and SDN controller together as a black-box. Will this approach be fine?
▪ Do we need to recommend any specific topology e.g., number of nodes, links and topology type etc.. for benchmarking?

Next Steps

- Adopt the draft as WG item??

- Thanks to Al Morton(AT&T), Sandeep Gangadharan (HP), Ramakrishnan (Brocade), Jay Karthik (Cisco), Andrew McGregor (Google), Scott Bradner (Harvard University) , M. Georgescu (NAIST) for sharing valuable comments.

Thank You!!!

The authors of

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