



Benchmarking Drafts Overview for Members of SDNRG (94th IETF, Yokohama)

Draft References

[draft-ietf-bmwg-sdn-controller-benchmark-term-00](#)

[draft-ietf-bmwg-sdn-controller-benchmark-meth-00](#)

Authors

Bhuvaneshwaran Vengainathan

Anton Basil

(Veryx Technologies)

Mark Tassinari

(Hewlett-Packard)

Vishwas Manral

(Ionos Corp)

Sarah Banks

(VSS Monitoring)

Agenda



BMWG – Who we are?



Benchmarking Drafts
Overview



Q&A

What BMWG Do?

- **BMWG Benchmarks are :**
 - A standardized test that serves as a basis for performance evaluation and comparison.
 - Unambiguous method, repeatable
 - Reveal valuable characteristics to users and provide insights to improve internetworking technology
 - Permit cross-vendor comparison with externally observable measurements

- **BMWG Benchmarks are NOT:**
 - Functional tests
 - Evaluated with PASS/FAIL criteria`
 - Performed on live networks, or performed with live network traffic

BMWG – Related Work Highlights

- **NFV Benchmarks :**
 - **VNF and Infrastructure Benchmarking Considerations (WG Adoption)**
 - <https://datatracker.ietf.org/doc/draft-ietf-bmwg-virtual-net/>
 - Benchmarking Virtual Switches in OPNFV
 - <http://tools.ietf.org/html/draft-vsperf-bmwg-vswitch-opnfv-01.txt>
 - Benchmarking Methodology for Virtualization Network Performance
 - <https://tools.ietf.org/html/draft-huang-bmwg-virtual-network-performance-01>
 - Considerations for Benchmarking High Availability of NFV Infrastructure
 - <https://tools.ietf.org/html/draft-kim-bmwg-ha-nfvi-00>

Draft Overview

- **Terminology for Benchmarking SDN Controller Performance**
 - Defines various benchmarking tests and associated terms
 - URL - [https://
tools.ietf.org/html/draft-ietf-bmwg-sdn-controller-benchmark-term-00](https://tools.ietf.org/html/draft-ietf-bmwg-sdn-controller-benchmark-term-00)
- **Methodology for Benchmarking SDN Controller Performance**
 - Defines methodologies to carry out the tests defined in benchmarking terminology draft
 - URL - [https://
tools.ietf.org/html/draft-ietf-bmwg-sdn-controller-benchmark-meth-00](https://tools.ietf.org/html/draft-ietf-bmwg-sdn-controller-benchmark-meth-00)

Objective & Scope

- **Objective:**

- Define metrics and methodology to assess/evaluate SDN controllers independent of its northbound/southbound protocols support.

- ✓ **Scope**

- This memo considers SDN controller as a function that controls and manages SDN nodes.
- SDN controller that does not have control plane functionality is out of this memo's scope

Terminologies Overview

▪ SDN Terms

- Defines terminologies that are used in benchmarking tests (e.g., Flow, Northbound Interface, Proactive flow provisioning etc.,)
- **TODO** : Need to reference some of the terms defined in RFC 7426

▪ Test Configuration/Setup Terms

- Defines test parameters used in benchmarking tests (E.g., Test Iterations, Test Duration, No. of SDN nodes etc.,)

▪ Benchmarking Terms

- Defines comprehensive set of tests for benchmarking SDN controllers
- Performance
- Scalability
- Reliability
- Security

Benchmarking Tests

■ Performance Tests

Metrics	Description	Units
1. Network Topology Discovery Time	▪ Time taken to discover the network topology - nodes and links by a controller	▪ Milliseconds
2. Asynchronous Message Processing Time	▪ Time taken by the controller to process an asynchronous message.	▪ Milliseconds
3. Asynchronous Message Processing Rate	▪ Maximum number of asynchronous messages that a controller can process within the test duration.	▪ Messages processed/sec
4. Reactive Path Provisioning Time	▪ Time taken by the controller to setup a path reactively between source and destination node	▪ Milliseconds
5. Proactive Path Provisioning Time	▪ Time taken by the controller to setup a path proactively between source and destination node	▪ Milliseconds
6. Reactive Path Provisioning Rate	▪ Maximum number of independent paths a controller can concurrently establish between source and destination nodes reactively within the test duration	▪ Paths provisioned/sec

Benchmarking Tests

■ Performance Tests (Contd.)

Metrics	Description	Units
7. Proactive Path Provisioning Rate	▪ Maximum number of independent paths a controller can concurrently establish between source and destination nodes proactively within the test duration	▪ Paths provisioned/sec
8. Network Topology Change Detection Time	▪ Amount of time required for the controller to detect any changes in the network topology.	▪ Milliseconds

■ Reliability Tests

Metrics	Description	Units
1. Controller Failover Time	▪ Time taken to switch from an active controller to the backup controller, when the controllers work in redundancy mode and the active controller fails	▪ Milliseconds
2. Network Re-Provisioning Time	▪ Time taken to re-route the traffic by the Controller, when there is a failure in existing traffic paths.	▪ Milliseconds

Benchmarking Tests

Scalability Tests

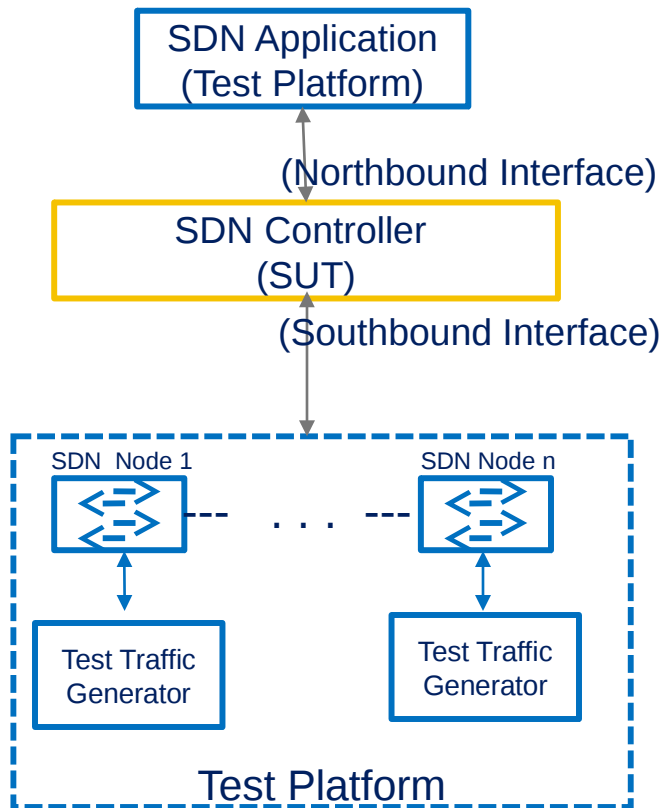
Metrics	Description	Units
1. Control Sessions Capacity	▪ Maximum number of control sessions the controller can maintain	▪ N/A
2. Network Discovery Size	▪ Network size (number of nodes, links and hosts) that a controller can discover.	▪ N/A
3. Forwarding Table Capacity	▪ Maximum number of flow entries that a controller can manage in its Forwarding table	▪ N/A

Security Tests

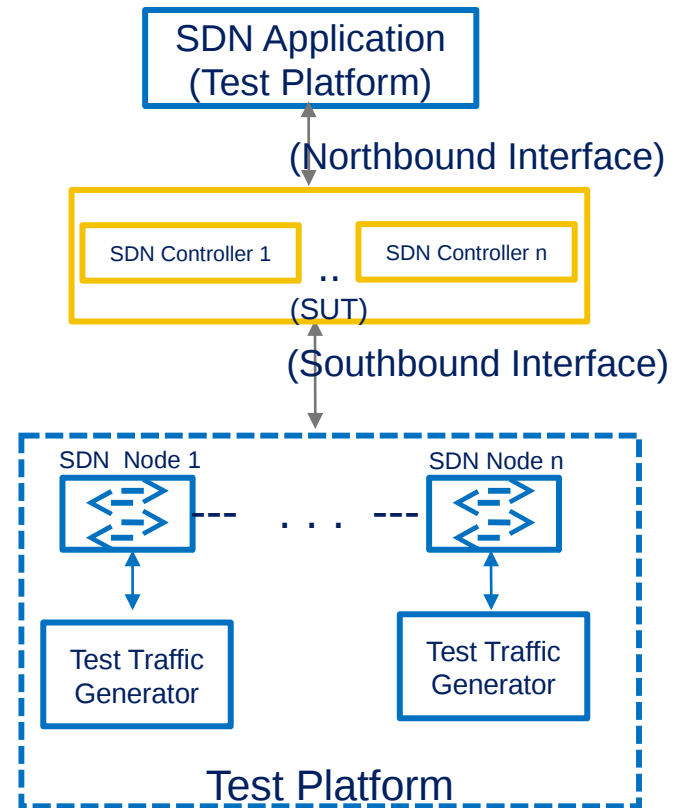
Metrics	Description	Units
1. Exception Handling	▪ Determine the effect of handling error packets and notifications on performance tests	▪ Milliseconds
2. Denial of Service Handling	▪ Determine the effect of handling denial of service (DoS) attacks on performance and scalability tests.	▪ Deviation from baseline metrics

Test Setup

- Standalone Mode



- Cluster Mode



Test Reporting

Test Configuration Parameters:

- Controller name and version
- Northbound protocols and versions
- Southbound protocols and versions
- Controller redundancy mode (Standalone or Cluster Mode)
- Connection setup (Unencrypted or Encrypted)
- Network Topology (Mesh or Tree or Linear)
- SDN Node Type (Physical or Virtual or Emulated)
- Number of Nodes
- Number of Links
- Test Traffic Type
- Controller System Configuration (e.g., CPU, Memory, Operating System, Interface Speed etc.)
- Reference Test Setup (e.g., [Section 3.1](#) etc.)

Controller Settings Parameters:

- Topology re-discovery timeout
- Controller redundancy mode (e.g., active-standby etc.)





Thank You!!!

Please send your feedback/comments to

bmwg@ietf.org

(or)

draft-ietf-bmwg-sdn-controller-benchmark-meth@tools.ietf.org