# SDN testbed

**Group:**

The Janet SDN (Software Defined Network) testbed is available for use by academic networking researchers.  If you're interested in using it, read on, or jump to the contact information at the foot of this text. If you log in to the Communities area and have joined the SDN testbed group, you can also view more details of the testbed design and configuration.

**About SDN**

If you've stumbled onto this page and just want to find out more about SDN in general, then you could read the white paper at https://www.opennetworking.org/images/stories/downloads/sdn-resources/white-papers/wp-sdn-newnorm.pdf [1] or see the tutorial at https://www.sdxcentral.com/sdn/definitions/software-defined-networking-tutorial/ [2].

In the traditional networking model, the control plane is distributed, which means that routing protocols (IS-IS, OSPF, BGP, etc) run inside each router and allow routers to build forwarding tables in an independent but co-ordinated manner. Layer 2 switch devices learn their forwarding decisions based on observations on the physical ports on which traffic arrives. It is very common for a device in a campus network to act as both a switch and a router.

In the SDN model, the control and forwarding plane functions are abstracted, and network equipment - switches, routers, DWDM and OTN multiplexors – instead receive forwarding instructions from a central controller.

The emphasis in the SDN model is thus on how the controller computes paths for traffic to flow through a group of otherwise 'dumb' switch/routers, and how it then propagates those forwarding rules to each box. A commonly used protocol for instantiating the rules into devices is the OpenFlow (OF) protocol.

The potential benefits of the SDN approach include better network dynamism, flexibility and adaptivity to user traffic.

**The Janet SDN Testbed**

Various forms of SDN are already in use in production by commercial operators. In the academic community, a growing number of UK universities and research centres now have dedicated SDN testbeds of varying scales, with varying application domains, allowing them to apply SDN principles in practice rather than just in theory.

After holding a workshop in 2014 to discuss requirements for SDN research, Jisc created the Janet SDN testbed, which is available for use by the UK academic community. The testbed can be used for inter-connection of local university SDN testbeds to create a multi-domain SDN testbed, or as a virtual testbed for those  universities that don't yet have their own

testbeds. Access to the testbed can be ‘sliced’ to allow multiple concurrent users.

The main Janet SDN testbed technical parameters are as follows:

- The testbed consists of 4 HP 3800 switches and is built as an overlay on top of the Janet Netpath infrastructure. The switches are located at the Janet PoPs at London Telecity, Manchester Telecity, Leeds, and Bradley Stoke.
- The switches work in the hybrid mode, i.e. they support both the SDN/OpenFlow 1.3 protocol and all major L2 and L3 standard networking protocols.
- The testbed has a ring topology with 10GigE core connections between the switches and the 1GigE access Netpath connections to the testbed users at the universities and research centres. The Netpath connections are transparent for testbed user traffic.
- The testbed resources are virtualised and sliced between users and their tests. Each testbed slice is based on a unique vlan set assigned to a particular test.
- Each test can be carried out by a single testbed user (a single-site test) or by a number of users (a multiple-site test). The HP3800 OF architecture supports separation and mutual protection of the tests.
- Tests can be run concurrently; each test can use its own SDN controller.

More technical details about the Janet SDN testbed can be found in the ‘SDN testbed design’ document in the Articlea area of this group (available only for group members, when logged in).

The main users of the testbed are currently the members of the TOUCAN project, as described at http://gow.epsrc.ac.uk/NGBOViewGrant.aspx?GrantRef=EP/L020009/1 [3] or http://www.bristol.ac.uk/engineering/research/smart/projects/toucan/ [4]. TOUCAN (Towards Ultimate Convergence of All Networks) is research project led by the University of Bristol that aims to implement radically new network models.

The testbed is also used by Jisc staff to conduct experiments on potential future SDN use cases for the Janet network, e.g., we are currently working with the GEANT JRA2 activity on ‘Bandwidth on Demand’, validating the tools on our testbed.

**How to became a Janet SDN testbed user**

If you would like to start using the Janet SDN testbed for your project it would be very useful to have a preliminary discussion with you about your requirements and objectives. For this you might contact the following people:

- David Salmon, David.Salmon@jisc.ac.uk [5]
- Tim Chown, Tim.Chown@jisc.ac.uk [6]
- Rob Evans, Rob.Evans@jisc.ac.uk [7]
- Victor Olifer, Victor.Olifer@jisc.ac.uk [8]

Any formal request for joining the Janet SDN testbed should be sent to the Janet Service Desk (JSD Service), service@ja.net [9]

We are also very keen to hear of testbed requirements you may have that are not met by the current Janet SDN testbed, so we can include such requirements in plans for future versions of the testbed.

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**Links**
[1] https://www.opennetworking.org/images/stories/downloads/sdn-resources/white-papers/wp-sdn-newnorm.pdf
[2] https://www.sdxcentral.com/sdn/definitions/software-defined-networking-tutorial/
[3] http://gow.epsrc.ac.uk/NGBOViewGrant.aspx?GrantRef=EP/L020009/1
[4] http://www.bristol.ac.uk/engineering/research/smart/projects/toucan/
[5] mailto:David.Salmon@jisc.ac.uk
[6] mailto:Tim.Chown@jisc.ac.uk
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[10] https://community-stg.jisc.ac.uk/