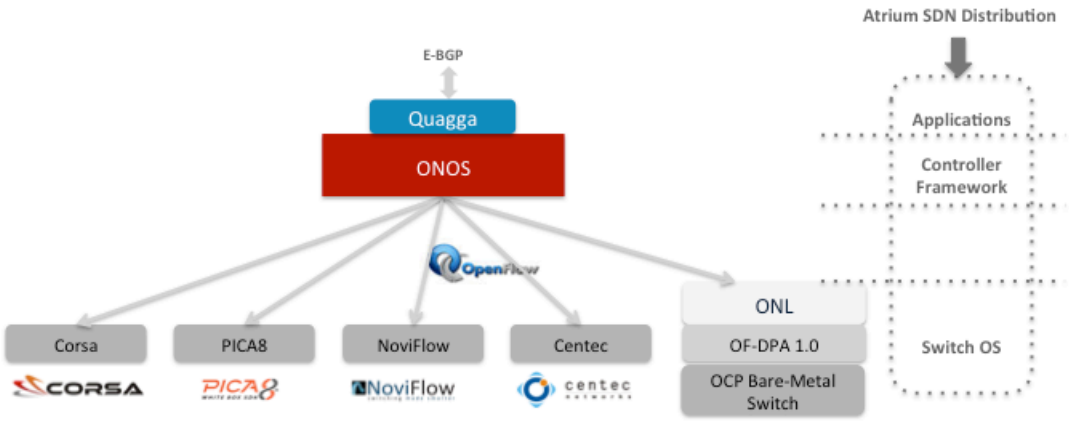
Atrium: A complete SDN distribution from ONF

The Open Network Foundation's (ONF) Atrium is the first-of-its-kind effort to integrate the industry's best-of-breed open source SDN building blocks into a complete SDN distribution for network operators. The first release of Atrium features ONOS as the carrier-grade control plane. ON.Lab and The ONOS Project have been closely involved in this effort since its inception.

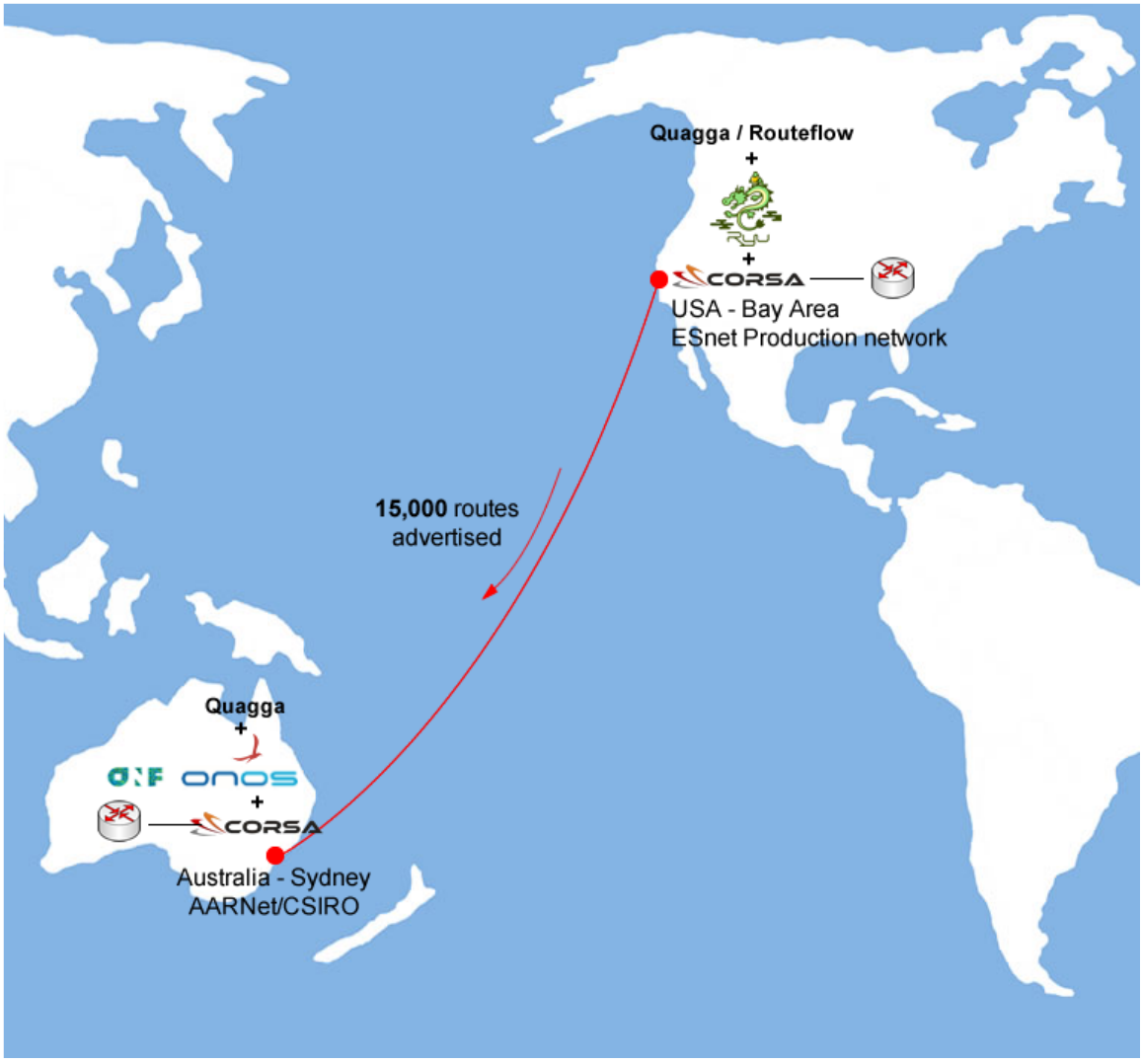
The current state of SDN technology suffers from two significant gaps that interfere with the development of a vibrant ecosystem. First, there is a large gap in the integration of the elements that are needed to build an SDN stack. While there may be multiple choices at some layers, there are missing pieces and poor or no integration.

Second, there is a gap in interoperability. This exists both at a product level, where existing products from different vendors have limited compatibility, and at a protocol level, where interfaces between the layers are either over or under specified. For example, the number of versions of OpenFlow currently defined, and the complexity of determining the particulars of one version, make it difficult to connect an arbitrary switch and controller. On the other hand, the interface for writing applications on top of a controller platform is mostly under specified, making it difficult to write a portable application.

The Atrium project attempts to address these challenges, not by working in the specification space, but by instantiating and integrating a set of production quality components. ONOS is a key component in the initial distribution of Atrium. See the diagram below for how ONOS fits into the Atrium architecture:

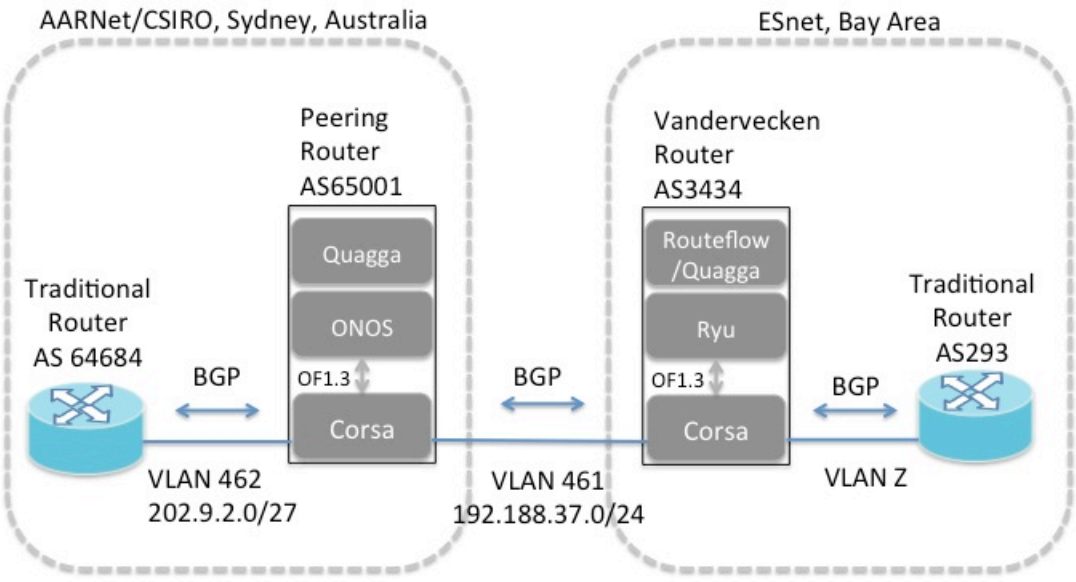


The first example of the power of Atrium was shown in an inter-continental deployment of peering routers. See the diagram below.



The deployed SDN-based peering router, developed by ONF and the ONOS Project, is a free, open source application built on ONOS and is currently available for download from the ONOS Project website. It enables SDN networks to seamlessly interact with software-defined and traditional (non-SDN) networks by peering with one another to advertise, collect and exchange routes using eBGP. The peering application receives route advertisements from peers, resolves next hops and then programs the OpenFlow™ switch in the SDN data plane through ONOS.

The ONOS-based peering router is deployed across two sites in Sydney, Australia. The Corsa switch is located in an AARNet data center in Haymarket and the ONOS application in a CSIRO research laboratory in Marsfield, approximately 15km away. It controls the high throughput Corsa OpenFlow DP6410 data plane and successfully peers across a trans-Pacific Layer 2 VLAN with a complementary SDN-based router, Vandervecken, at ESnet in Berkeley, Calif. The ESnet site also uses a Corsa DP6420 data plane, programmed by the Vandervecken SDN router software developed by Google and based on Routeflow project and Quagga on a Ryu controller. See the figure below:



The production ESnet (AS293) router advertises 15,000 routes comprising research and education networks to the Vandervecken Router, which in turn advertises these to the peering router in Sydney, Australia. In addition to successfully peering with the Vandervecken router, the ONOS-based router also peers with a traditional router in a private AS within AARNet/CSIRO.

ONOS provided the high performance, scalable SDN control plane for the peering router at AARNet. It also programmed the multi-table pipeline in the Corsa

DP6420 data plane using OpenFlow v1.3.

For more information on Atrium, visit the Open Network Foundation's open source website at opensourcesdn.org.

Other links:
ONOS solution details on the onosproject wiki:
https://wiki.onosproject.org/display/ONOS/Peering+Router+-+ONF's+Project+Atrium

Peering router press release: http://prn.to/1EQ2JQM

ONOS Atrium announcement: http://www.prnewswire.com/news-releases/onos-powers-onfs-open-source-sdn-distribution-atrium-300096838.html

ONF Atrium announcement: https://www.opennetworking.org/news-and-events/press-releases/2327-open-networking-foundation-releases-atrium-open-sdn-software-distribution