Overview

The growing usage of cloud computing has hastened the convergence of internet and cloud technologies and increased the demand for “everything as a service” cloud-based offerings. This is creating tremendous pressure on conventional fixed-function service gateways, which require new hardware or an upgrade to be scaled up to meet the demands of cloud services delivery. Additionally, with the proliferation of over-the-top (OTT) competitors, communications service providers (CommSPs) and direct-to-home (DTH) TV providers are feeling an impact on their services revenues. This pressure is driving the need for solutions that can enable commercially viable service innovation and accelerate service rollouts.

Sanctum Networks,* working with Intel® technology and the Intel® Network Builders ecosystem, has developed Jupiter,* a next-generation software defined networking (SDN) controller and orchestration platform. Jupiter aims to solve the critical bottleneck of visibility and programmability of customer network behavior. It introduces an open, standards-based innovation platform that allows any service provider to rapidly extend the reach and impact of multidevice broadband experience, bringing improved service deployment agility for the service providers.

The Challenge

SDN replaces a high-cost networking paradigm that was based on fixed-function routers that required ASICs to make local routing decisions for each packet. These routers utilized expensive hardware with proprietary interfaces. This situation led enterprises and communications service providers to become overly dependent on established vendors for network functionality, or meant uneven service delivery, interoperability, and end-to-end management challenges in a multivendor network. Now, with Jupiter providing a network-wide control plane, the network can be constructed in a simpler, less expensive, more agile, and open way that leverages widely available Intel® architecture-based server platforms.

The lack of network agility today is impacting consumer networks where a revolution in personalized and alternative content is underway. As content consumption is becoming more personalized, defined viewing habits are becoming a thing of the past. Rapid personalization is increasingly blurring the line between the primary and secondary screen as millennial consumers can watch a show on their TV while also consuming content on a phone or laptop. Not only is the line between the primary and secondary devices blurring, but so are the viewing schedules as time- and place-shifting technologies that stream content to you when and where you want grow in popularity. These technologies erase the lines between live, on-demand, and time-shifted viewing experiences. As this change...
has put more pressure on the network as well as on the content distribution, service providers are challenged to build a
network with the service agility to keep up with customer demands profitably.
Sanctum Networks’ Jupiter is designed to change this paradigm through an access-agnostic, distributed SDN solution that
puts the control of network services and data flows back into the hands of service providers with no vendor lock in. This frees
providers to focus on deploying network services that deliver the value that customers expect.

The Solution
Sanctum Networks’ Jupiter is an end-to-end orchestration solution comprising an orchestration engine combined with a
lightweight SDN controller that can be deployed in residential gateways, cloud servers, or other locations at the core or edge
of the network.

The Jupiter Orchestration Engine sits in the core of the
network and accepts data from the distributed Jupiter
Agents over an elastic message bus. The orchestration
engine coordinates data flow routing and provides
extensive services, including authentication management,
policy management, network intelligence, and resource
management.

Distributed throughout the network are Jupiter Agents, the
unique lightweight, fault-tolerant, and security-enabled
software controllers that collect intelligence and enforce
policies throughout the network.

Jupiter Agents can operate autonomously throughout the
network to enforce policies when they apply to the local
users. Because the Jupiter Agent resides on the switch
or piece of network equipment near where the policy is
enforced, control plane data traffic is minimized. Once
policies are defined and pushed to Jupiter Agents, the result
is an end-to-end SDN-based network that allows for high
performance and programability across any switch, router,
server, network interface card (NIC), or customer premises
devices that support OpenFlow* or NETCONF/Yang. This
innovative approach of using distributed intelligent agents
gives enterprises much better control over quality of service
(QoS) and quality of experience (QoE) for applications,
services, and users.

The lightweight distributed nature of the Jupiter Agent
works together with the central controller to deliver network-
wide control, which helps internet service providers and
communications service providers to achieve horizontal
scale. In addition, the solution leverages REST APIs, providing
an open vertical integration capability with a wide range
of third parties. Requiring a low memory footprint of as
little as 4 MB, each Jupiter Agent can be deployed on small
customer premises equipment (CPE) with very low compute
power, such as modems, Wi-Fi routers, set-top boxes, and
more. This provides granular access and control for service
providers beyond the CPE into the home or office, allowing
them to proactively service their customers’ networks.
Jupiter gives the operator the ability to the gather key data
analytics, make real-time network decisions, and provision
new monetized services to subscribers.

The Jupiter Orchestrator features a visibility layer that
provides a simultaneous network view to service providers
and their customers. Network managers can initiate a new
service via a fully featured provider portal, which configures
the network service as well as all of the data flows required
for that service. Customers meanwhile get a refined level of
visibility into their connected devices and their behaviors.

The Jupiter SDN solution enables network features such as
zero-touch provisioning, offline management, virtual
customer edge, dynamic interconnects, virtual core and aggregation, network access control at the user and device level to greatly simplify broadband subscription rollouts, virtualized broadband services delivery, and convergence of triple/quad play services.

**Powered by Intel® Technology**

Sanctum has collaborated with Intel to optimize the Jupiter orchestration and agent stack to run on a wide range of Intel technologies including the Intel® Puma™ 6 SoCs and Intel Puma 7 SoCs, Intel® AnyWAN™ GRX750 network processors, Intel Atom® processors, and Intel® Xeon® Scalable processors. An important technology built into the solution is the Data Plane Development Kit, an open source family of libraries that accelerate packet processing and have been optimized for workloads running on Intel® CPU architectures.

**Conclusion**

With its pioneering distributed architecture enabled by lightweight, access-agnostic agent technology, Jupiter enables service providers to derive all of the benefits of SDN. This greatly reduces network complexity. As the world of connected devices magnifies, the benefits of service delivery convergence are many, and the potential Jupiter brings to service providers and their end customers is immense. Jupiter Agents can extend controller features to the network edge and can leverage emerging 5G and European Telecommunications Standards Institute (ETSI)* multi-access edge computing (MEC) to bridge the application-consumer gap, giving consumers compelling new ways to consume content and bringing about an era of connected engagements.

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¹ Figure provided courtesy of Sanctum Networks.

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