

# Software-Defined Networking Done Right

Avaya delivers the industry's first holistic software-defined networking architecture, uniquely addressing the end-to-end relationship between applications, business logic, and networking services.

## Table of Contents

|                                                  |   |
|--------------------------------------------------|---|
| Today's SDN: Promise Unfulfilled .....           | 1 |
| Enter Avaya SDN Fx™: Simplicity Everywhere ..... | 2 |
| Enabled Edge.....                                | 3 |
| Open Ecosystem .....                             | 3 |
| Automated Core.....                              | 4 |
| Use Case Examples.....                           | 5 |
| Conclusion.....                                  | 7 |

The Avaya SDN Fx™ architecture defines a solutions framework that enables customers to reap the benefits of network simplicity, reliability, and virtualization. It supports the deployment of SDN-enabled applications in a controlled manner as, where, and when business cases drive demand. SDN Fx demonstrates Avaya's continued focus on open source and standards, delivering extensible solutions that enable businesses to achieve more than the limited scope promoted by generic software-defined networking models.

Over the past decade business environments have changed. Demand for increased levels of agility and competitiveness have affected organizational structures. In response, decision-making has been increasingly distributed to allow for greater flexibility and agility. This has led to more frequent changes to business processes. While this has given rise to innovative application development methodologies, there has been, in general, a widening of the gap between the expectations of modern business, and what conventional IT infrastructure and operations can deliver. This can be referred to as the "agility gap".

Only a truly dynamic IT infrastructure will close this gap. Specifically networking, the component that has been lagging the longest, must dramatically change in order to adapt to the new business norm. Networking must be able to accommodate constantly changing traffic patterns, provide higher availability driven by on-demand services, and deliver enhanced levels of integration between infrastructure and applications.

## Today's SDN: Promise Unfulfilled

Software-Defined Networking (SDN), as an architectural model, aims to deliver agile network capabilities. Many networking vendors, both traditional and emerging, have begun seeding the market with a variety of SDN technology based solutions.

However, while the current SDN models promise a future of simpler and more agile networking, they generally come with unintended consequences that limit their scope to networking only; in most cases they only address the Data Center network. Many also introduce greater complexity by using compensatory

## Highlights

- SDN architecture that addresses the end-to-end relationship between applications, business logic, and networking services.
- Benefits from a pragmatic foundation openness and standards
- Provides service agility without increasing complexity.
- Addresses the Network Edge, where users begin their interaction with applications and infrastructure.
- Supports traditional access technologies and the variety of emerging end-points: vSwitches and VM Hypervisors, user-centric devices, the plethora of conventional third party end-points, and positions businesses for IoT.

overlay software and hardware. This masking, or redistribution, of complexity reduces their ability to deliver compelling benefits, especially automation at the edge of network where users and applications meet the infrastructure and where effective integration must take place. Not surprisingly, when technologies are layered on top of one another, in order to address shortfalls elsewhere in the stack, complexity is born. Hence, much of the promise of SDN remains, as yet, unfulfilled.

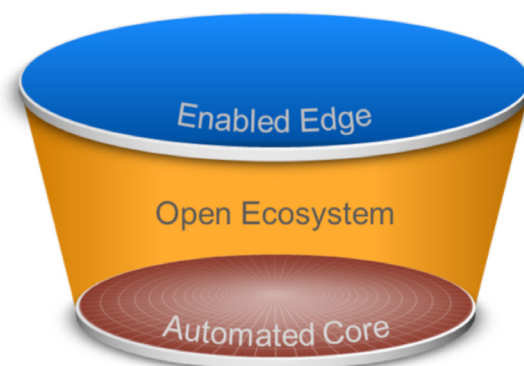
## Enter Avaya SDN Fx™: Simplicity Everywhere

Avaya believes that providing service agility should not come at the cost of increased complexity, but rather enhanced by simplicity that can be leveraged to help address business process challenges. Simplicity has been the guiding principle during the development of Avaya's Fabric Connect network virtualization technology, and continues to be front and center as we establish our SDN architecture.

A good analogy is that of utility: something that is useful, needed, and both easy to understand and deploy. Making applications and devices see the network as a series of simple plug-in points, IT personnel do not need to worry about where or what they are plugging into. The network now automatically handles what were previously manual network provisioning functions. To make this possible, Avaya's SDN Fx architecture is built upon three unique tenets:

- **Enabled Edge** – extending the Fabric beyond the Data Center, to the Edge, for powerful integration with applications, users, and devices
- **Open Ecosystem** – standardized Fabric protocols married with open interfaces and open source customization tools
- **Automated Core** – networking functions are automated using a single network-wide Ethernet Fabric

The Avaya SDN Fx architecture is based upon these core components, designed to obtain and maintain maximum simplicity, supporting effective SDN-enabled solutions in parallel with conventional applications.



*Avaya SDN Fx Architecture*

The primary purpose of a network is to interconnect users with their applications, and the best networks do this reliably, efficiently, and with a high degree of agility.

One of the most obvious focus areas for a holistic software-defined networking strategy needs to be the Network Edge. This is, after all, where most users begin their interaction with applications and the infrastructure. Avaya's SDN Fx™ architecture specifically addresses this by supporting programmability, leveraging generic techniques such as OpenFlow and OVSDB. While "Edge" has traditionally meant an Access Switch, it is increasingly including a wider variety of end-points. These now include a plethora of third party devices: compute resources such as open source vSwitches and Virtual Machine hypervisors from Xen, KVM, and Hyper-V; user-centric devices such as telephone handsets; and the new Avaya Open Networking Adapter, itself an Open vSwitch-based smart device that delivers plug-and-play attachment for seamless deployment in medical, manufacturing, hospitality, and similar environments.

## Enabled Edge

The primary purpose of a network is to interconnect users with their applications, and the best networks do this reliably, efficiently, and with a high degree of agility. Additionally, networks often need to be flexible, integrating service provider infrastructures that are beyond IT's direct control. The SDN Fx architecture delivers extensibility by leveraging two Avaya innovations: Fabric Attach and Fabric Extend.

Fabric Attach is an innovative, standards-based approach that solves the longstanding challenge of how to easily and consistently connect a broad range of devices, ranging from conventional Access Switches, through Servers and Virtual Machines, Cameras, and now Internet of Things (IoT) devices. Fabric Attach technology at the Edge of the network complements what Fabric Connect has already achieved for the Core: seamless, configuration-free self-provisioning.

Fabric Extend has been developed to support the interconnection of Fabric Connect deployments over any IP-based network. This enables Fabric Connect's Ethernet-based connectivity model to extend wherever IP connectivity is available. Fabric Extend can be used to deliver service elasticity, create new connectivity options, and provide additional resiliency.

## Open Ecosystem

The Fabric Orchestrator is a core component that enables orchestration and programmability. Designed as an easy-to-deploy appliance, leveraging Fabric Attach for configuration-free deployment, the Fabric Orchestrator provides for provisioning, monitoring, and policy management services, delivering these via a "single pane of glass" management interface. Additionally, Open Daylight and OpenStack integrations help ensure broad cross-platform interoperability. Integration with cloud management systems, manager of managers systems, and custom applications are enabled through a series of northbound

\_\_\_\_\_

Fundamental to simplicity, helping to reduce operational cost, and enhance reliability is the ability to automate. Avaya's SDN Fx™ architecture provides an automated, robust, and virtualized core network using Fabric Connect. Fabric Attach augments the solution by automating edge service attachment, and the Fabric Orchestrator delivers programmability of the Edge. Enhanced automation and SDN control is enabled by leveraging open and standardized edge-based programmability. Unlike those approaches that introduce complexity or try to mask it through additional software, Avaya uses a network-wide Fabric to deliver the foundational simplicity required for effective programmability. Network automation is inherent to the core proposition of the Fabric, avoiding complex and expensive overlay technologies or management solutions.



## Enabling the Edge: Supporting both Conventional and Emerging End-Points

## Use Case Examples

Avaya believes that SDN should not simply be about Data Center provisioning. SDN should enable programmatic control of the infrastructure driven by specific business processes and requirements. The following use case examples have been developed by Avaya in conjunction with lead customers. They demonstrate the power of a holistic SDN strategy and shows how Avaya's SDN Fx™ architecture makes, what would otherwise be very challenging, if not impossible to execute, eminently deliverable.

---

### SDN Fx Use Case 1: Private Dynamic Contact Center Agent

**Problem:** Call Center systems commonly leverage an Agent's login credentials to configure privileges, call flows, and queue access, but configuring the underlying network to ensure the privacy of application flows in a multi-tenant context, is a separate, complex and manual process.

**SDN Fx Solution:** Dynamically translates Contact Center logic into configuration policy for the data network, removing the need for any manual configuration or complex network infrastructure. Agents are uniquely authenticated and all associated traffic flows, both voice and data, are automatically assigned to pre-defined stealth virtual networks. This policies access to only those networks paths that comply with their pre-defined profile and ensures adherence to the business policy. The benefits of such a solution include extensive simplification of security configurations (often a source of error and downtime), separation and isolation of traffic flows by business role, and creation of an infrastructure that is far more dynamic and globally scalable. Such an SDN solution can substantially reduce operational expense and deliver better time-to-service.

This solution is a prime example of a genuine business-driven SDN use case, where the introduction of SDN offers tangible business benefits to Contact Center operators and business process outsourcers (BPOs).

### SDN Fx Use Case 2: Secure IoT Device Mobility

**Problem:** Environments such as hospitals, manufacturing floors, and casinos are experiencing a proliferation of devices requiring network connectivity, many of which require at least some degree of mobility. These end-point devices may themselves necessitate and include security considerations, such as authentication and encryption. However, in the context of certain environments, the broader network needs to be protected from potential threats emanating from these end-points; a compromised IoT device should not be the launch point for a network-wide assault.

**SDN Fx Solution:** End-point devices are associated with an Open Networking Adapter that provides dynamic, automated connectivity. This delivers the required mobility, and based on the device identity, allows security services to be customized. This also allows the network presence of individual devices to be tracked, and for all services and security policies to follow the device if and as it moves within prescribed tolerances. If the device becomes non-compliant with policy, the network adapter can be reset or even disabled, isolating it from the environment and thus neutralizing the risk of a threat originating from misuse or misappropriation. The burden of complex installation and configuration is removed, as plug-and-play Open Networking Adapters enable users to connect end-points on an as-required basis; automated provisioning streamlines dynamic service connectivity and activation.

Establishing a seamless solution for effective IoT mobility can improve customer satisfaction by delivering real-time service agility, while at the same time it can reduce operational cost. Releasing IT staff from mundane configuration has the associated benefit of allowing them to concentrate on strategic tasks.

## Use Case Examples (cont.)

---

### SDN Fx™ Use Case 3: Internet-Connected Branch

**Problem:** The traditional Branch Office is undergoing something of a quiet revolution: driven by less permanently based staff, as people increasingly opt for mobile connectivity and remote access. Businesses are looking to right-size their real estate footprint. Often matched with a parallel transition of CRM applications into the Cloud, MPLS connectivity, expensive in comparison with generic high-speed Broadband, becomes increasingly more difficult to justify.

**SDN Fx Solution:** Predicated on the fact that virtually all Branch Office traffic flows to and between remote application systems – either in the corporate Data Center, or to Cloud-hosted platforms – the SDN Fx solution for the Internet-Connected Branch moves the connectivity traditionally delivered by a WAN Router to the Cloud. In its place all that's deployed is a simple Open Networking Adapter, leveraging Ethernet-based high-speed Broadband, and executing centrally-administered service connectivity and privacy policy. Thus, the Branch Office now look more like a hot spot on the corporate Wi-Fi network, connected to the greater network via a high-speed pipe. Users are given policy-based access to corporate services and resources. This SDN Fx solution has the benefit of addressing both capital and operational costs. Equipment procurement and deployment costs can be minimized, and the monthly operational costs associated with traditional connectivity options are greatly reduced.

### SDN Fx Use Case 4: Flexible Remote Worker

**Problem:** With an increasing number of staff working outside of the traditional office environment, there's a corresponding increase in the need for managing access and monitoring service quality. Additionally, there are scenarios – for example, Contact Center Agents – where staff may need to transition between virtual workgroups even during the course of a single day; these changes need to be seamlessly enacted and governed by centralized policy.

**SDN Fx Solution:** This solution enables end-point user devices such as Avaya One-X handsets, or Open Networking Adaptors for larger, multi-device instances, to be centrally controlled and dynamically re-provisioned in accordance with business-driven policy.

Service operators can remotely manage users and their devices, monitor policy compliance, and manage application and resource access. This solution also features the ability to pro-actively monitor and report on service quality, helping to ensure the highest possible service level for both staff and customers. For example, Contact Center Agents can be dynamically moved between different client accounts without complex re-configuration or extended downtime, all based upon the actions of a centralized controller enacting business policy. If an individual Agent's connection falls below pre-defined quality or performance thresholds, proactive reporting tools flag this in real-time, and policy-based dynamic re-provisioning takes the appropriate action, making the necessary service and infrastructure changes. This solution can massively increase flexibility, and reduce operational cost and complexity.

## About Avaya

Avaya is a leading, global provider of customer and team engagement solutions and services available in a variety of flexible on-premise and cloud deployment options. Avaya's fabric-based networking solutions help simplify and accelerate the deployment of business critical applications and services. For more information, please visit [www.avaya.com](http://www.avaya.com).

## Conclusion

With SDN Fx™, Avaya is delivering the industry's first holistic software-defined networking architecture. Solutions support the deployment of SDN applications in a controlled, business-driven manner, and enable customers to reap the benefits of network simplicity, reliability, and virtualization in hybrid and legacy environments. SDN Fx exemplifies Avaya's continued focus on delivering networking simplicity and efficiency, benefiting from a pragmatic foundation openness and standards. Avaya SDN Fx offers levels of integration far in excess of orthodox Software-Defined Networking models.



© 2015 Avaya Inc. All Rights Reserved.

Avaya and the Avaya logo are trademarks of Avaya Inc. and are registered in the United States and other countries. All other trademarks identified by ®, TM, or SM are registered marks, trademarks, and service marks, respectively, of Avaya Inc. 03/15 • DN7688-01