The pressure on today’s networks keeps building. Cloud computing, streaming video, mobility, big data, Internet of Everything—all of today’s computing trends demand more from the network. To keep up with the demands, the network has to keep getting smarter.

For independent software vendors (ISVs), this situation creates an enormous opportunity. By building solutions that are network-aware and deploying them on application-centric infrastructure, ISVs can create new competitive advantages and new opportunities for generating revenue.

What’s needed is a comprehensive approach to helping networks become more open and application-aware. As the world’s networking leader and number one IT partner, Cisco is driving this transformation with the Cisco® Open Network Environment (Cisco ONE). By partnering with Cisco, ISVs can gain access to a full range of Cisco ONE resources, including platform interfaces and development kits, agents and controllers, overlay network solutions, and more. In short, they can build solutions that build their network capabilities—and their business.
Smarter Networks Require Smarter Applications

The network must evolve quickly in response to new innovations, services, and capabilities, including:

- **Cloud computing**: The cloud demands a network that is more scalable, flexible, and application-aware. Applications must be predictable and independent of network considerations if they are to be located in various locations.

- **Rich data**: Video, voice, and other integrated, data-intensive services create the need to support all forms of network traffic and optimize performance to meet service-level agreements (SLAs).

- **Mobility**: Wireless computing and bring-your-own-device (BYOD) initiatives are forcing the network to adapt to deliver new services with new performance and security considerations.

- **Big data**: Real-time data collection and storage is increasing scalability and quality-of-service (QoS) requirements.

- **Internet of Everything**: Billions of interconnected devices exacerbate the demand for bandwidth and application-specific performance.

The result is a pressing need for change in three key areas:

- **Greater network agility**: The network must make the transition to the virtualized enterprise and data center to take full advantage of the potential efficiency gains and consolidation opportunities.

- **Lower network operational cost**: With up to 75 percent of network costs still being spent on administration, managing the network must be more automated. For instance, automation with intelligent software can help enterprises connect devices to the network edge; operational automation can help IT efficiently complete moves, adds, and changes to cut costs.

- **Smarter applications**: If the enterprise application workload is going to make the transition to cloud-based IT, applications must run outside of the enterprise’s controlled data centers. That means the next-generation network must work in combination with a new breed of network-aware applications to improve security, performance, and availability—in addition to complying with regulations.

Evolution to the Intelligent Network

Pressed to meet the new demands, the networking industry is trying to keep what has worked well in the past, such as high levels of resiliency and scalability and rich features sets, while evolving the network to meet new requirements (Figure 1). As a result:

- Some network intelligence is being logically centralized and run on a centralized server called a controller.

- The underlying network infrastructure is being abstracted from the applications through APIs, enabling network-awareness features to be built into both existing applications and an entirely new category of third-party application.

Figure 1 Building a Smarter Network Means Preserving What’s Working Well and Adding New Capabilities.

There is now unprecedented potential for network programmability, automation, and control—and unprecedented opportunities for ISVs who have the foresight and the tools to take full advantage of this potential.
Cisco ONE: A Transformation That Opens New Doors for ISVs

Cisco ONE is a comprehensive solution to help networks become more:

- **Open**, incorporating open APIs, open standards, and open-source technologies
- **Programmable**, enabling ISVs to add value to existing applications or create a new set of network-aware applications
- **Application-aware**, as the network can now respond to application requests

Cisco ONE is a customizable framework for harnessing the entire value of the intelligent network, offering openness, programmability, and abstraction on multiple layers and providing better linkages to analytics, policy engines, and orchestration tools. As shown in Figure 2, it is delivered through a variety of mechanisms, including:

- **Platform interfaces**: Cisco One Platform Kit (onePK), a comprehensive developer kit with a rich set of platform APIs across Cisco IOS®, IOS XR, and NX-OS software
- **Agents and controllers**: The Cisco ONE controller framework—which has been contributed to the OpenDaylight open source community—with related agents and controller applications (Cisco and third party)
- **Virtual overlays**: Overlay network solutions that include the Cisco Nexus® 1000V Switch for scalable, multitenant cloud deployments

Figure 2 Applications Become Network-Aware Through Cisco ONE
Multilayer Programmability

The Cisco ONE framework spans the entire network stack, from physical transport to automation and orchestration functions. It then exposes these functions in a highly granular manner. This multidimensional view of the network exposes a much more comprehensive environment for network operators, IT architects, and application developers. It provides a greater range of control and makes it easier to access network intelligence that Cisco builds into its hardware and application-specific integrated circuits (ASICs) in a more finely calibrated manner. The result is much more sophisticated interaction between applications and infrastructure.

Platform APIs: Cisco onePK for Programmatic Network Access

Cisco onePK is an easy-to-use toolkit for development, automation, rapid service creation, and more. It enables developers to access the valuable data inside the network via easy-to-use APIs. The onePK toolkit uses common tools such as Eclipse and NetBeans, and it supports programming languages developers already know, such as C and Java. Early adopters are using onePK for new applications, service automation, and more, including:

- Customized route logic
- Flow-based services such as QoS
- Enhancements to existing features
- Enabling applications to adapt to changing network conditions such as bandwidth
- Automating workflows spanning multiple devices

Cisco onePK is also platform neutral, meaning that it talks to Cisco’s network devices running Cisco IOS, IOS XE, NX-OS, and IOS XR, as the underlying network element has been abstracted for the applications. Because of this, the application can be written once and run with any Cisco device. That means the developer can write an application that talks to an API provided by Cisco, and the software development kit (SDK) takes care of the complexity involved in the talk between each service and the network element.

Controllers and Agents: Cisco ONE Controller

The Cisco ONE Controller supports the industry-standard OpenFlow protocol, which enables a more platform-independent approach to network programmability (one that includes both Cisco and third-party networking devices). It is based on a highly available, scalable, and extensible architecture that provides the following core features:

- The industry’s first multiprotocol interface support, including support for both Cisco onePK and OpenFlow
- Functions to support network visibility and programmability, such as network topology discovery, network device management, and access to detailed network statistics
- A service abstraction layer (SAL) that enables modular device support through either OpenFlow or Cisco onePK, for investment protection after the controller is deployed in a production network
- Consistent management access to the controller through a GUI REST application or through northbound programmatic APIs for inclusion in other external programs
- Security features such as role-based access control (RBAC); integration with the enterprise authentication, authorization, and accounting (AAA) infrastructure; and secure control protocols

Cisco is also helping to spearhead OpenDaylight, an initiative aimed at open-sourcing the controller platform. OpenDaylight is a subset of the controller that Cisco has placed in the public domain. All of the APIs in OpenDaylight will be offered as part of the Cisco ONE Controller. However, Cisco will have more APIs, offering a superset of OpenDaylight. More information about the OpenDaylight project is available at opendaylight.org.
Virtual Overlays: Virtualized Network Capabilities

Network virtualization reduces the complexity of talking to the physical network. As a result, the ISV, as the application provider, no longer has to worry about the physical devices that have been deployed. The application can assume that the network is connected according to the virtual network topology.

The Nexus 1000V virtual switch is a major element of Cisco’s virtual overlays. Virtual networks built on the Nexus 1000V form virtual overlays, including comprehensive Layer 4 through Layer 7 services. To program the virtual network overlays, Cisco is also making available APIs on the Cisco Nexus 1000V—for instance, the OpenStack Quantum API, which enables implementation of portable cloud orchestration applications on top of the Cisco virtual network infrastructure (VNI).

One advantage of the Cisco Nexus 1000V in building these virtual overlays is that it is consistent with the physical infrastructure, from the management and policy perspectives. Management consistency applies across physical and virtual devices and scales to cloud proportions. At the same time, the integration between the overlay virtual infrastructure and the physical continues to grow tighter, giving ISVs a choice of integrated stacks that can be programmed in a consistent manner.

One Environment, Many Possibilities

The programmability and control capabilities delivered by Cisco ONE can help ISVs meet the requirements of multiple use cases in a range of industries and sectors, creating new opportunities including:

• **Enterprise data center**: Multi-hypervisor orchestration enables the automation of the private cloud, including security profiles and implementation of self-service portals.

• **Enterprise campus and branch office**: Centralized management of the wired and wireless network can make policy-driven QoS both possible and financially practical.

• **Massively scalable data center**: Customization with programmatic APIs can provide deep insight into network traffic. Large, single-application data centers seeking more customized debugging, optimization, and analytic applications can better tune networks for optimal flow management, analysis, and debugging with deep programmatic access.

• **Agile service delivery**: Policy-based control can help optimize service delivery, and advanced analytics can enable IT to monetize new services faster and offer better SLAs.
Summary: Value of Cisco ONE to ISVs

Cisco ONE helps to create a rich ecosystem of applications that can both gather network intelligence and control the network based on user and operations requirements. For ISVs, this translates into an opportunity to:

- **Add features** and differentiation to existing applications, taking advantage of the ability to both talk to and listen to the network
- **Create entirely new applications**, enabling new revenue opportunities and broadening the customer base

Cisco ONE also opens the door to the broad range of resources and capabilities Cisco brings to the table for ISVs, including:

- **Leadership**: Cisco is a worldwide leader in networking, with a commitment to open networking, including open source, open standards, and open interfaces. Cisco has a dominant 70 to 80 percent market share in routers and switches, which translates into a US$180 billion installed base. ISVs can be confident that a Cisco ONE enabled infrastructure will be deployed in their customers’ data centers.

- **Innovation**: Cisco ONE helps enable application-centric and intelligent networking by providing programmability in hardware, software, and ASICs.

- **Ecosystem**: Cisco partners, Cisco Services, and the Cisco Developer Network can help you design software-directed programmability into the overall solution.

- **Cross-architectural solutions**: Cisco offers holistic cross-architectural solutions that are secure and transcend branch-office, campus, data center, cloud, and service provider environments.

Get Started Today

The first step toward a rewarding partnership with Cisco is to join the Cisco Developer Network (CDN). Once you’ve joined CDN, you can quickly gain access to specific resources, such as Cisco onePK, and download the SDK and sample core documentation. Developers can also access the controller SDK upon request. To join CDN, visit [here](http://www.cisco.com/go/isv).