

MAKE TRANSFORMATION POSSIBLE

Unlocking Network Value in an Application-Centric World

What does it mean to create and unlock network value? It means maximizing both the capabilities of the network and the many ways the network differentiates a company in a crowded market. Ciena understands that tapping a network's full potential allows it to play a pivotal and proactive role in advancing strategic initiatives and driving game-changing outcomes for businesses and their customers.

Ciena is well known as the network specialist, with deep expertise in optical, Ethernet, and network automation. But behind that core competence is a deeply ingrained set of beliefs that guides how the company engages with customers, making Ciena unique in the industry. For Ciena, merely selling boxes does not equal success. Instead, Ciena believes its mission is to help its customers create and unlock network value, making any kind of network transformation possible.

To Ciena, "transformation" means making fundamental changes in how a network differentiates a business, allowing it to contend with dramatic shifts in the market. Such a shift is occurring today, driven by network applications.

Welcome to the App-centric World

The one constant in life is change. Today, service providers are feeling the weight of this statement in the use and operation of their networks. This is an application-centric world that revolves around three fundamental needs: computing power, storage capacity, and high-speed connectivity. For network operators, the ability to meet these fundamental needs requires a transformation from their present mode of operation.

Service providers must transform a multi-layer, multi-domain, multi-network design that offers commodity-type connectivity, which is both expensive and manually intensive, into a new, less costly, tightly integrated service model that is automated, application-sensitive, and software-defined. The days of static connections, rigid bandwidth, and closed networks are gone.

This new, app-centric environment presents both pros and cons. New risks have emerged, generating questions that must be answered by the provider, such as: "Who captures

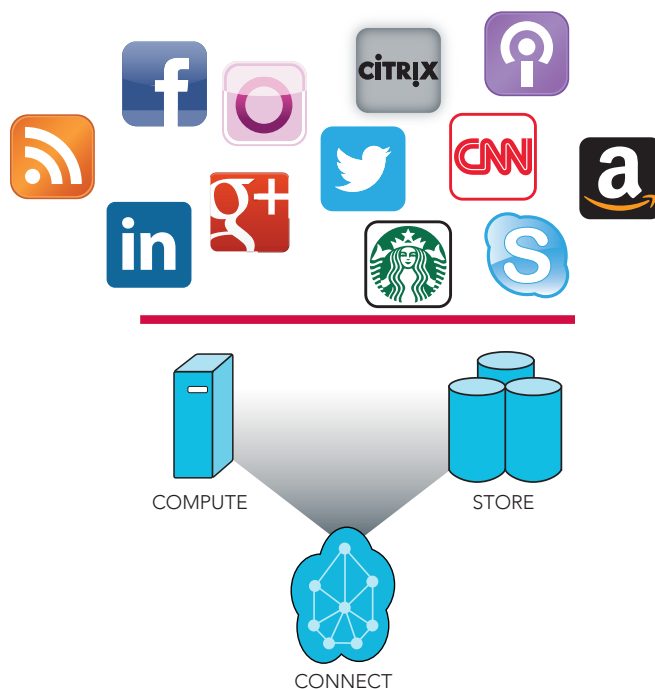


Figure 1. Compute, store, and connect in an app-centric world

value?", "Who is the customer?", "Who is the competition?", "Will software eat the world?", and "How do I secure my network in both a cloud and an 'open' environment?"

On the positive side, there are new opportunities for success for those able to effectively answer questions such as: "What new products and services can I offer?", "In what new ways can I differentiate?", "Can I finally break vendor lock-in in my network?", and "Can big data improve my business model?"

Unlock Network Value through Engagement

Every business and network transformation is unique. As the network specialists, Ciena can bring insights and expertise to examine how to quantifiably help transform its customers' networks in a way that positively impacts their business. As stated earlier, Ciena's approach is to help its customers create and unlock network value to make network transformation possible. Engaging Ciena helps service providers execute their transformations, which fall mainly in two categories: modernization and monetization. This

unique **engagement** model with customers is the cornerstone of Ciena's success, the attribute that the company's customers most often cite as what they value most, and Ciena's enduring differentiation from competitors.

The conversation starts with an understanding of customers' current business goals, solution alternatives and their associated risks. Then, using a highly consultative approach, Ciena's subject matter experts deliver processes, business analytics, and insights to challenge status quo thinking and modernize and monetize the network.



Figure 2. Ciena engagement: people, processes, business analytics, and insights

The status quo must be challenged because the network historically has been a collection of static silos—single-purpose networks for different kinds of services and applications. Now, however, the network infrastructure that enables the connected world is becoming increasingly application-centric. Applications evolve very quickly, and the infrastructure on which they are delivered also must adapt quickly. All these changes make the network more central to the end-user's experience. The role of the network is becoming more and more integral to business success, and a new approach is required.

Make Transformation Possible through Convergence and Openness

OPⁿ (pronounced "Open") is Ciena's network architecture, derived from the company's vision of how networks will evolve. The name OPⁿ reflects exponential (n) scale at lower cost, made possible by packet-optical networks. The aim of OPⁿ is to 'bend the cost curve' of networking down in the face of rapidly increasing bandwidth and evolving service demands, and enable service providers to deliver new applications and superior user experiences. To do this, OPⁿ provides three key elements: It reduces cost at scale, makes the network programmable, and opens the network via software applications, automatically adapting to changes in capacity needs, traffic type, and user or application location.

With OPⁿ architecture, Ciena makes any kind of network transformation possible through the implementation and use of two key attributes: convergence and openness. This transformation provides the ability to create an application ecosystem to serve as a foundation for a platform infrastructure that can resolve the various transformation challenges outlined above.

That platform infrastructure calls for computing, storage, and the network connecting those functions with users to work seamlessly, in an ecosystem that can deliver the resources any application demands, at whatever level of performance required. Ciena calls this the "performance-on-demand application ecosystem," uniting the silos of computing, storage, and network connectivity into a single, programmable platform driven by the applications riding on top of the infrastructure.

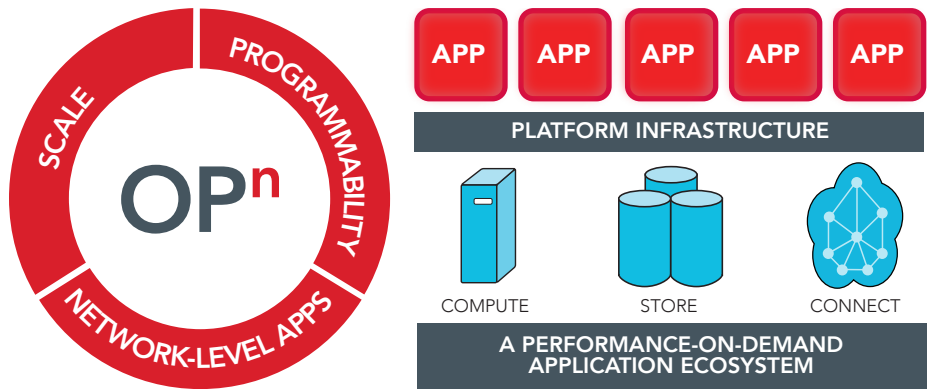


Figure 3. OPⁿ architecture enables an application ecosystem

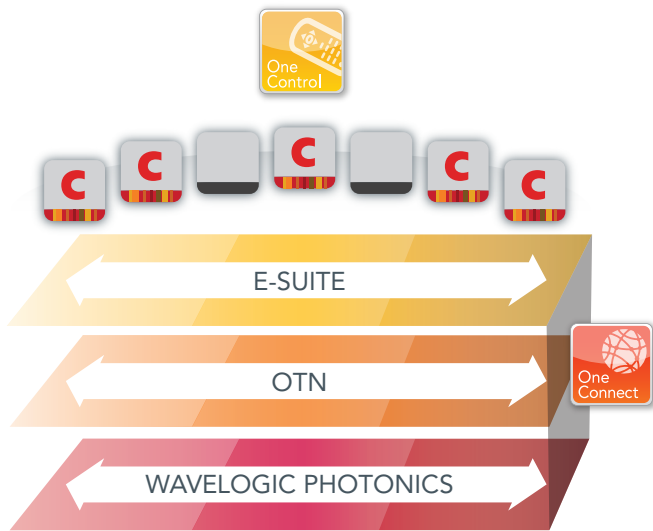


Figure 4. Ciena convergence enablers across layers and geographies

Convergence

Ciena's approach to convergence is about providing customers with the ability to increase optical and packet capacity at great scale, without exploding costs, by converging networks, network layers, and domains. This includes the convergence of disparate network segments across various geographies, as well as multiple single-purpose networks, for residential, mobility, and enterprise traffic in a single network infrastructure. This convergence ultimately delivers a better

experience in a network that transforms user-to-content and content-to-content connectivity.

For many years, Ciena has been laying the foundation for convergence through its WaveLogic coherent optics; unified multi-layer management; intelligent switching and control plane solutions; and common, cross-portfolio packet networking capabilities. The company continues to evolve the network into a truly programmable platform by embedding an unprecedented amount of intelligence and flexibility into its solutions. These advances provide increasing scalability and efficiency, as well as unsurpassed network visibility and control. But, perhaps more importantly, they provide the OPⁿ building blocks to create tailored and cohesive packet-optical solutions that provide a simpler operational architecture for each unique networking environment.

This simpler operational architecture means faster provisioning of Layer 0-2 services, faster fault isolation and mean time to repair, and a fully flexible, programmable network foundation that can operate in a Software-Defined Networking (SDN) architecture and respond intelligently to application needs.

Openness

Ciena envisions the role of the network changing dramatically, with connectivity becoming an equal participant along with computing and storage in the application ecosystem—a scenario that presents a variety of implications.

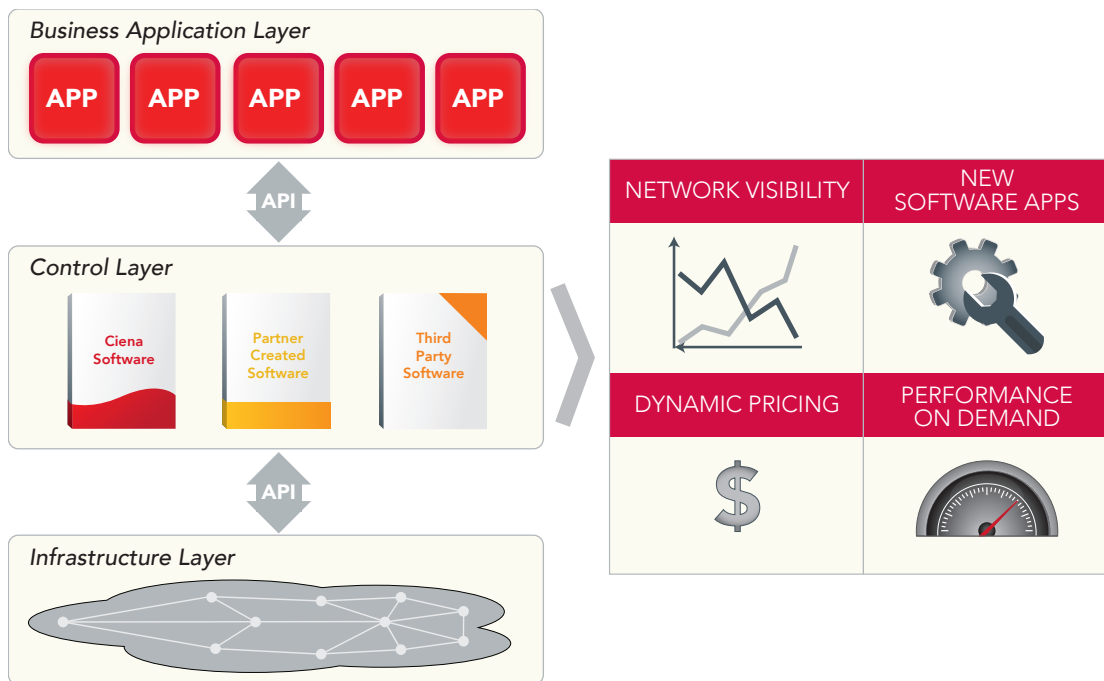


Figure 5. An open framework for programmability and applications

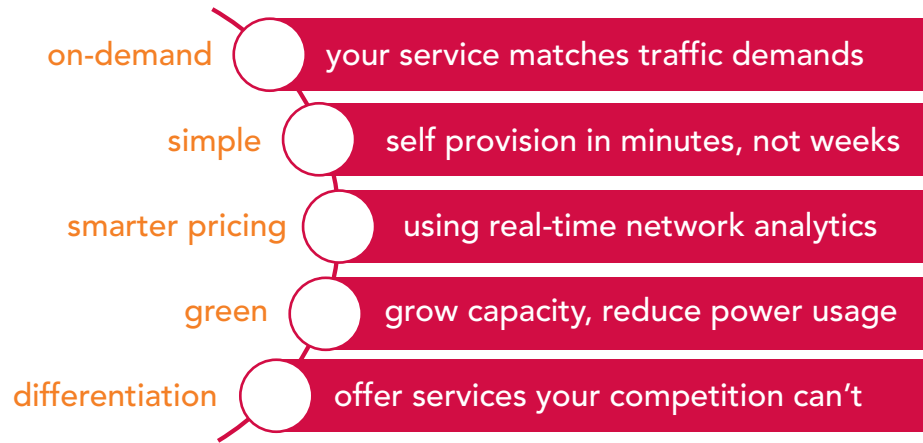


Figure 6. Make [...] possible opportunities

Typically, virtualization has been thought of in terms of how to make computing and storage resources adapt to changing needs and be used more efficiently. The same principle should be applied to the network. 'Virtualization' is really the ability run a variety of services and functions as applications within this ecosystem, have that ecosystem adapt as user needs evolve, and use the resources as efficiently as possible.

Openness is all about enabling customers to control their differentiation and innovation with an open framework for programmability and software. For service providers, this enables a whole new paradigm for on-demand delivery of services and again addresses the problems with today's traditional slow and manual model.

Ciena has been an early and consistent innovator and promoter of the benefits of openness in the network with its performance-on-demand cloud capabilities, its "Data Center Without Walls" solution based on virtualized-WAN (V-WAN) software applications, and participation in the OPn test bed at Supercomputing '13, where the company prototyped a multi-layer, open architecture SDN controller. Ciena's

approach to openness helps lay the foundation for an open/SDN-enabled network.

What Do You Want to Make Possible?

Current dynamics indicate that the market is likely in a once-per-decade moment of uncertainty and change. The world is transforming into an application-centric environment, and the role of the network takes center stage with computing and storage. This new environment brings both pros and cons and places unprecedented demands on networks of all kinds.

Ciena's engagement model enables customers to transform their networks with an OPⁿ architecture that delivers convergence and openness for simpler, more programmable, and more responsive operations. The opportunities to engage and explore the transformative possibilities are limited only by the imagination.

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