



Webscale cloud for large enterprises

Use case

Operate at high scale/webscale, get mission-critical network control and security, and get ahead of your competition

Do you have a mandate to lead worldwide in terms of functionality that you provide over the web? Are you asked to deliver scalability more akin to the levels attained by consumer web providers more so than that of other enterprises? Are you struggling with delivering so-called webscale within the constraints of your legacy environment?

Let Nokia show you how to leverage webscale approaches in your enterprise environment. This Nokia use case describes how our cloud approach makes webscale viable and provides a framework for market-leading approaches.

Challenges

Although a comprehensive discussion of webscale versus high scalability enterprise environments is beyond the scope of this use case, we address three important areas in which webscale requirements exceed the capabilities of legacy as well as most open source-based architectures.

Leading-edge functionality

Most webscale enterprises seek to capitalize on an entirely new market where functionality and time to market are critical, or to disrupt an existing market, which makes leading-edge functionality critical. In both instances, these enterprises strive for functionality not found in legacy products. As a result, they can't rely on their in-house resources so they typically leverage open source projects. And, because they need to unify a variety of code bases, they usually focus on industry-standard APIs, such as REST.

As a result of their business model plus their need to leverage both in-house and open source projects, their applications are typically designed as a distributed architecture. Since the focus is on software, these enterprises want to minimize reliance on vendor-specific hardware and maximize their ability to control the entire stack using software.

Online delivery

Webscale enterprises typically differ from other large enterprises in that their revenue comes largely, if not all, from online business. So, if web properties are down, the revenue impact is catastrophic. Further, they typically have heightened compliance needs from operating globally as well as often providing regulated services such as financial transactions, gaming, and even betting. Further, legacy architectures rely on high-end, reliable hardware configured in high-availability pairs so that a single failure will not take down the system. In contrast, webscale configurations rely on lots of inexpensive hardware configured in parallel so that even multiple hardware failures do not impact availability. As a result of this approach and scalability, logging demands for capacity management, problem determination, and compliance often exceed the capability of legacy tools, including databases. That's why webscale companies typically appreciate big data approaches for handling volumes of data and for automating compliance tracking.

Staggering scale

Saving perhaps the most profound difference for last, webscale companies handle staggering volumes of business—whether that is measured in transactions, web pages, or data—most typically using a web-based front-end. Webscale companies also have to accommodate huge variability in demand across applications, geographies, and events. For example, global sporting events such as the FIFA World Cup and elections can drive demand in excess of average daily volumes by 500 percent or more.

Because of limits to their ability to provide leading-edge functionality and expense, webscale companies avoid scaling-up (i.e., forklift upgrades of successive generations of higher performance hardware) on proprietary vendor hardware architectures. Instead, they design scale-out architectures (i.e., providing more or less similar hardware instances in parallel).

This leads to a requirement for fast, automated, provisioning of new and repurposed hardware used for virtualized or bare metal applications. This provisioning model also heightens the need for software-driven processes for DevOps and for operations.

These considerations are summarized in Table 1.

Table 1. Webscale applications/services break legacy and open source systems

Business objective: lead worldwide market(s) in terms of functionality, online ‘delivery’, and sheer scale	Breaks legacy and demands a new architectural and application approach – aka “webscale”
Leading-edge functionality • Can’t rely on in-house resources and tools • Need to be able to leverage best in class software packages and tools worldwide	Distributed applications with open source • High reliance on Open Source/contributed code bases • Software-driven stack • Absolute requirement for rich, industry-standard APIs such as REST
Global online delivery • Ultra-high availability • No service, no revenue • Multinational compliance needs	“Big data” availability/compliance approach • Hardware “expect failure then swap” paradigm versus legacy “HA pair and repair” • Logging exceeds DBMS capabilities • Automated compliance tracking
Sheer scale • Volume of data • Demand for extremely high volume of transactions—web server and/or web applications • Highly variable demand across applications, geographies, and events (e.g. World Cup, election night, ...)	Scale-out on commodity server hardware versus scale up on proprietary hardware • Fast provisioning, consistent virtualized and bare metal • Software-driven provisioning, de-provisioning, changes

How we help you

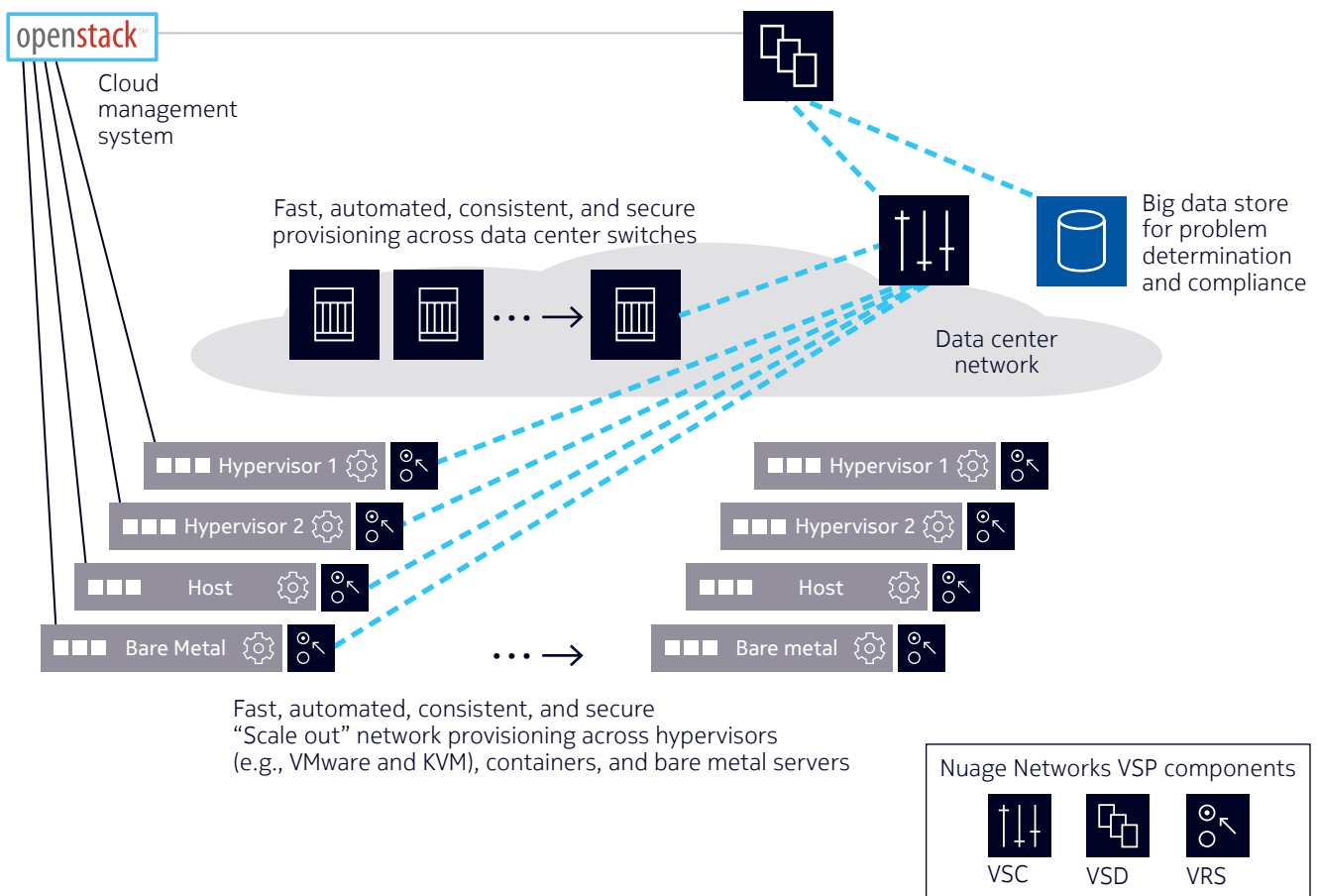
Nokia makes webscale viable for large enterprises in two ways. Within the data center, Nokia provides a scale-out and open approach. Throughout the cloud environment, Nokia enables a software defined everything and layered architecture.

Provides a scale-out and open approach

By leveraging market-leading and thought-leading network products, including those of Nuage Networks (a subsidiary of Nokia) and a variety of Nokia IP, optical, and other hardware, Nokia provides a scale-out and open approach for cloud networking. As shown in Figure 1, cloud management software, such as OpenStack makes a provisioning request across server, network, and storage (not shown). The Nuage Networks Virtualized Services Platform (VSP) provides the automation and security required to have the network flex in synch with server and storage provisioning. Provisioning is consistent across multiple hypervisors, container hosts, and even bare metal servers. By using declarative policies that are intelligently

interpreted at the end point, operational requirements are decreased while increasing security overall. And, by storing each interpretation of a policy along with diagnostic information in big data store, problem determination and compliance tracking do not break at scale.

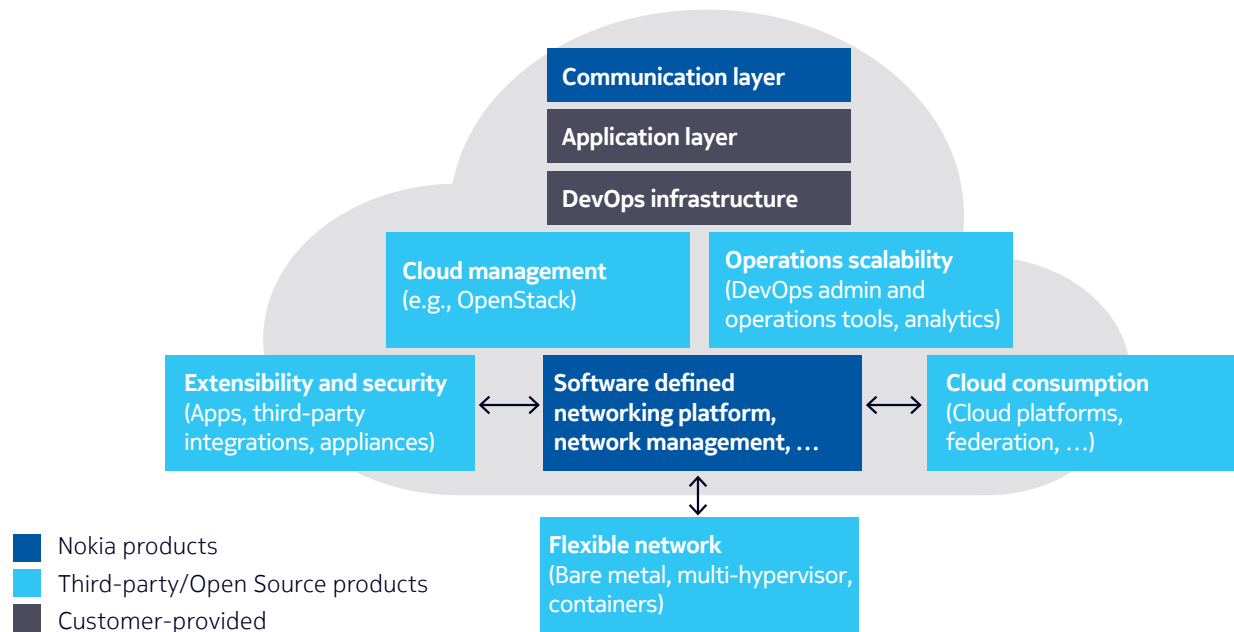
Figure 1. Nokia makes webscale viable for large enterprises by providing a scale-out and open approach



Enables a software defined everything and layered architecture

Illustrated Figure 2, the foundation for the webscale cloud is a robust and unified software defined networking and software defined WAN approach from Nuage Networks (a subsidiary of Nokia). With APIs based on developer-friendly standard REST, a wide variety of security and special-purpose appliances can be integrated into the application logic. Cloud consumption interfaces enable public cloud resources to be leveraged, as well as leading development tools, such as Kubernetes and Mesos. The operations scalability interface provides communications with tools that provide mapping between physical and virtual resources along with other DevOps tools and approaches. Lastly, the flexible network interface ensures that the environment can overlay even the most sophisticated and complex network environment without requiring a forklift upgrade. At the top communication layer, the Nokia Rapport platform provides device support for a wide range of devices—from mobile through ATMs to distributed information kiosks.

Figure 2. Nokia provides a framework for webscale applications by enabling “software-defined everything”



How our approach changes the game

This innovative approach provides a webscale cloud with scalability up to the level of the largest web service providers. Capabilities include:

- **Comprehensive software stack:** For programming purposes, this approach enables the entire environment to be treated as a single software-friendly stack. This provides enterprises with the flexibility and controls needed for true digital transformation.
- **Webscale-friendly development tools:** The Nokia cloud architecture supports the leading edge development tools, such as Mesos and Kubernetes, that are used by webscale companies. This not only provides the required capabilities for global transformation but also puts the enterprise on par with even the webscale giants.
- **Application templates:** With the Nuage Networks VSP, network administrators can define application templates with embedded network and security definitions that handle the complexity of the network environment automatically. Furthermore, application and workload moves do not require application developer assistance.
- **Service chaining:** Application templates provide step-by-step definitions for multi-tier applications using service chaining. For example, a service chain of declarative policies would define that web server A can talk to application server B using firewall B and application server B can talk to database server C using firewall C. This approach removes the complexity of the application environment from the application developer's task list. Additionally, settings are automatically updated with minimum impact on development teams when servers are added or moved.

- **Automated, location-independent provisioning:** By automating network operations in synchronization with the virtualization environment, the Nokia cloud enables the ability to spin up new applications and servers anywhere in the cloud to handle demand.
- **Extensive device support:** This approach eliminates the enterprise's precious development resources from having to invest in expensive and tedious device support programming.
- **Flexible integration capabilities:** The platform leverages developer-friendly interfaces such as REST and universal network protocols such as border gateway protocol (BGP) to integrate with a wide range of applications, development tools, and devices. For cloud management systems (e.g., OpenStack) and virtualization environments, plug-ins provide seamless and powerful interoperability.
- **Universal approach:** The same approach works within the data center, across the IP network, throughout the WAN, and even to public clouds. This capability minimizes security risk and operations costs.
- **Compliance tracking:** Each policy interpretation is logged and stored in a central big data store for compliance analysis and reporting.
- **Improved security:** We deliver a layered defense for the entire cloud—far more than a bolt-on afterthought:
 - At the physical layer, encryption built into Nokia's optical products provides defense against physical taps.
 - At the virtualization layer, microsegmentation guards communications within and between hypervisors and container hosts.
 - A robust API enables every packet and every stream to be inspected by one-to-many security programs or appliances.
 - Automated declarative policies with endpoint interpretation minimize, if not eliminate, the manual errors responsible for most day-to-day breaches.

Why our approach is different

- **The Nokia advantage:** Our industry-leading webscale approach has been validated by name-brand market and thought leaders across multiple enterprise segments, such as banking, online betting, social networks, vendor stores, and more.
- **Enables software-driven everything:** In terms of treating the entire enterprise environment as a single software stack that can be fully controlled, automated, and secured, the Nokia approach is the most comprehensive in the industry.
- **Delivers the ultimate in scalability:** With proven implementations at some of the largest service providers in the world, the Nokia webscale approach provides large enterprises with the ultimate scalability protection.

How you benefit

- **Minimizes project risk:** The Nokia approach ensures that an enterprise can elevate their current environment into a webscale architecture risky forklift upgrades or, when planned properly, enduring scalability lapses.
- **Enables faster market response:** By removing limitations caused by vendor lock-in and hardware incompatibilities while leveraging best in class software project and development tools, the Nokia webscale approach enables faster capture and response to the market.
- **Provides cost efficiencies that scale:** Through supporting industry-standard hardware and providing operational efficiencies, the Nokia webscale approach delivers CapEx and OpEx cost efficiencies that scale along with the environment.

For more information on our solutions for large and webscale enterprises, visit <https://networks.nokia.com/large-enterprises>

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We create the technology to connect the world. Powered by the research and innovation of Nokia Bell Labs, we serve communications service providers, governments, large enterprises and consumers, with the industry's most complete, end-to-end portfolio of products, services and licensing.

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