



Radisys* and Intel Deliver Agile and Flexible Rack-Scale NFV Infrastructure for Communications Service Providers

Radisys' DCEngine* integrates Intel® architecture-based servers with open source software to benefit hyperscale data centers.



The market for cloud infrastructure services has exploded. As a result, communications service providers (CommSPs) are leveraging technologies proven by leading cloud providers to build flexible networks that can support this rapid growth.

Cloud providers including the likes of Amazon Web Services,* Microsoft,* IBM,* and Google* have garnered 50% of the software services market with astounding growth rates near 50% year-over-year.¹ These cloud providers have evolved their data center infrastructure to leverage Intel® architecture-based servers, while embracing open source software in conjunction with a DevOps delivery model to rapidly develop and deploy new services. The DevOps Model,² also called “agile system administration” or “agile operations,” sprang from applying new agile and lean approaches to operations work. It leverages close work between development and operations teams who work together to rapidly develop and move a service idea from concept to revenue generation.

CommSPs that rely on traditional infrastructure are embracing these same software-centric architectures and service delivery concepts, proven by cloud providers, using software defined networking (SDN) and network functions virtualization (NFV) architectures. SDN architectures decouple network control from switching and forwarding functions, enabling network control to become directly programmable and the underlying infrastructure to be abstracted from applications and network services. NFV architectures essentially replace proprietary dedicated hardware appliances, like routers, firewalls, or session border controllers, with virtualized network functions (VNFs). Hosting multiple VNFs on Intel® processor-based servers can drive significant reduction in network and ongoing operating costs. NFV also enables faster time to market because new services can be rapidly developed using DevOps delivery models and then quickly deployed as VNF instances dynamically based on customer demand. However, deploying a carrier-scale NFV architecture will require hosting and managing thousands of VNFs in a telco data center environment.

Radisys is helping CommSPs overcome the transition and scalability challenges with SDN-enabled NFV infrastructures with its new DCEngine* hyperscale infrastructure solution. Radisys has embraced the principles of Open Compute Platform (OCP) architectures and applied these principles to NFV infrastructure (NFVI) requirements of the telco data center. DCEngine rack-scale platforms integrate Intel® Xeon® processors and Intel® Server Boards, along with open source middleware and platform software, to provide CommSPs with a turn-key NFVI solution with excellent performance and reliability. DCEngine platforms can be

Table of Contents

- The Challenges..... 2
- Radisys DCEngine Provides an Integrated Solution for Mobile Network SDN-Enabled NFV 2
- DCEngine Integrates Open Source SDN-Enabled NFV Software 3
- Conclusion..... 4

¹ Synergy Research Group: Cloud Infrastructure Services – Q1 2016 Market Share & Revenue Growth

² <https://theagileadmin.com/what-is-devops/>



installed within days, allowing CommSPs to rapidly deploy their NFV applications using DevOps service delivery models and thereby accelerate their time to revenues.

This white paper will detail the challenges in deploying SDN-enabled NFV, share how the integrated DCEngine hardware and software architecture overcomes these challenges, and provide some brief case study examples showcasing the benefits of this comprehensive solution offering.

The Challenges

Although traditional appliance-based networking equipment solutions are not as flexible and scalable as rack-scale NFVI, one of the advantages they offer is that software and hardware come pre-integrated from one vendor, which also provides support for the entire solution. Operators can turn to a single appliance provider for updates, even for updates to the operating system and other middleware.

In an NFV solution, all of these components are disaggregated and come from multiple vendors or open source consortiums, which presents a new integration workload for CommSPs. In addition, open source software does not have 24/7 support capabilities, again presenting new support challenges that CommSPs never needed to consider with their integrated network element purchases of the past.

The core of an NFV solution is the NFVI platform software, which supports the virtualization of server, storage, and network resources. The software required to support VNFs includes the NFVI software as well as management and orchestration software. Another key element is the hypervisor software, which abstracts the physical resource into virtual resources. In a virtualized environment, virtual machines (VMs) provide all of the necessary elements for a VNF to run, including an operating system, computing power, and memory. VMware* and open source Linux* KVM are leading suppliers of virtualization and hypervisor software.

Alternatively, services might be deployed using containers, a method of virtualization that creates software containers that provide the resources to run applications. Container platform software is available from open source consortiums like Docker.* One difference between containers and virtual machines is that multiple containers can run on a single Linux* OS instance.

To be a true easily deployed and scalable NFV solution, Radisys can pre-integrate the DCEngine hardware components with any required NFVI hypervisor or container platform software. Through its professional services

“The combination of Intel hardware with Radisys’ software, integration, and support experience makes Radisys and Intel ideal partners for CommSPs adopting a hyperscale data center design.”

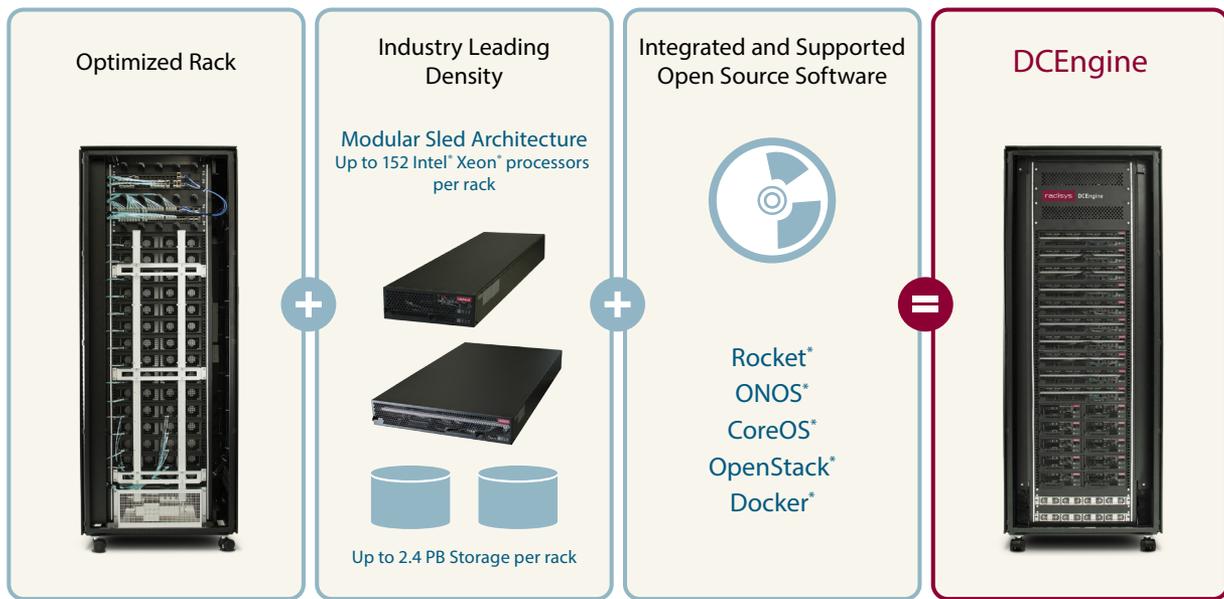
organization, Radisys can customize the software integration to the needs of the NFV application layers and then maintain that solution through its complete lifecycle once it has been deployed.

Radisys DCEngine Provides an Integrated Solution for Mobile Network SDN-Enabled NFV

Radisys has launched its DCEngine framework, an Intel® Xeon® processor-powered rack-scale server, storage, and network solution with integrated open source NFV platform software, and offers 7/24/365 support and full integration services. Radisys also provides full 24/7 support for DCEngine and full integration services to pre-integrate the NFVI platform and orchestration software leveraging the company’s 25 years of telecom professional services experience. The combination of hardware, software, and Radisys’ experience makes the company an ideal partner for CSPs adopting a hyperscale data center design.

DCEngine rack-scale hardware, with pre-integrated hypervisor or container platform software, is the essence of the integrated Radisys NFVI platform offering. The platform solution is specifically designed for rapid installation and turn-up in a traditional central office or modern data center environment. Radisys’ professional services organization delivers a customized mix of compute and storage pre-integrated with selected software. By delivering a pre-integrated and validated solution, Radisys can help reduce deployment time from months to a few days. And then with DCEngine infrastructure in place, CommSPs can accelerate their NFV architecture deployments and rapidly expand their services revenue opportunities.

Radisys has built flexibility into DCEngine to address telco switching center demands for seismic, power, emissions, and NEBS, which are above and beyond the traditional data center requirements. CommSPs use DCEngine to provide pools of compute and storage resources that they can quickly scale to meet their evolving service requirements while improving agility in their service delivery.



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Figure 1. Key Elements of the DCEngine Integrated Hardware/Software Solution

Key elements of the solution include:

Rack Core – The foundation of the solution is the Rack Core, which serves as the frame for all of the DCEngine components. The NEBS-compliant frame is 42RU high with up to 19 shelves for compute or storage sleds. It is designed for rapid installation, and after deployment, rapid maintenance when required. The frame comes with full blind mate rear connections for simplified replacement of compute and storage modules. Each compute or storage module is a field replaceable unit that can be swapped in a few minutes with no requirement to disconnect individual cables.

Top-of-Rack Switch – The Radisys DCEngine top-of-rack (ToR) switch delivers layer 3 - 4 switching on up to 96 10 GbE ports and eight 40 GbE ports. The switch is pre-wired to the blind mate connectors. Installation is simplified through the need for only one power connection point for the entire rack and a handful of network connections to spine switches in the data center.

Compute Sled – The use of 2RU-high half-width compute sleds provides scalable performance that balances cost, power dissipation, and flexible configuration. Each sled includes up to four Intel Xeon processors E5-2600 v4 or up to eight per shelf (four per sled). Each sled includes an Intel® Server Board connected to the network via dual-port Intel® 82599EB 10 Gigabit Ethernet Controllers and also featuring two 1 GbE management ports.

Storage Sled – The high-density storage sleds are 2RU high, full-width modules that store up to 160 terabytes of data via up to 16 x 3.5" SAS and 2 x 2.25" SATA drives. The sleds are powered by two Intel Xeon processors E5-2600 v4 per shelf, and each uses an Intel® Server Board S2600TPR and hard drive carrier.

The frame can support a wide range of compute and storage configurations depending on the need of the application.

Radisys Integration Services for ON.Lab*

As NFV replaces legacy network equipment, CommSPs are revamping their mobile switching centers and central offices to more resemble hyperscale enterprise data centers. The Central Office Re-architected as a Data Center (CORD) initiative has been developed to guide these transformations.

Radisys is contributing to this effort as a member³ of the CORD open source project. This initiative will define standards for efficient and scalable storage and data center hardware for virtualized computing. Radisys is also a certified integrator for CORD projects.

The company has become a significant collaborator with ON.Lab and the Linux Foundation, which head up the CORD project. The Radisys DCEngine is leveraged by the CORD project to pre-validate and fully support the software suite from OS through orchestration layers of the platform, including Ubuntu,* OpenStack,* ONOS,* XOS,* and Docker* (container) software.

DCEngine Integrates Open Source SDN-Enabled NFV Software

The DCEngine framework comes with standard open source software and middleware that can be pre-installed and integrated in the factory, so that operators can install and get their DCEngine racks operational as quickly as possible. This pre-integration and certification of NFV middleware software (operating system, hypervisor, container software, management utilities, etc.) on top of the DCEngine hardware delivers to customers the flexibility and agility they require while accelerating time to revenue.

³ <http://www.radisys.com/press-releases/radisys-joins-cord-partner-together-google-and-samsung>

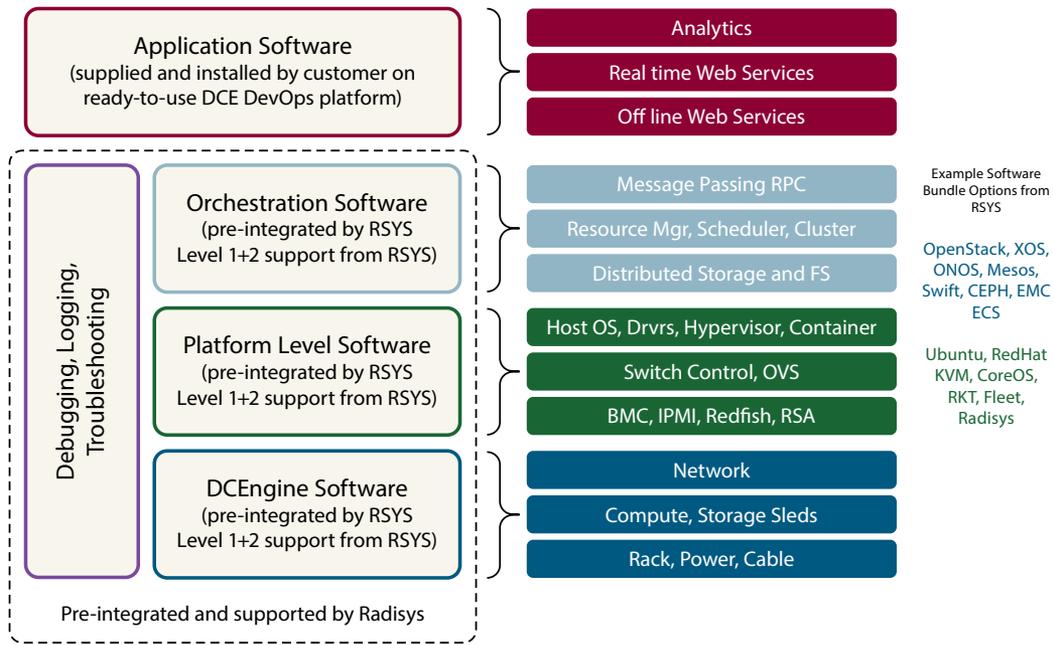


Figure 2. Diagram of NFV Platform Software Included with DCEngine

Another important NFV deployment consideration is the platform management tools and interfaces that CommSP Operations Engineers require. The DCEngine platform supports Intel® Rack Scale Design and provides a Redfish* Restful Application Program Interface (API) as well as Intelligent Platform Management Interface (IPMI) and Data Center Infrastructure Management (DCIM) protocols to easily integrate into an existing DCIM. The DCEngine platform provides a tool kit for rapid deployment and also supports a hardware manager and cluster manager, which simplifies deployment, maintenance, and monitoring. These tools deliver external access through Graphical User Interface (GUI), Command Line Interface (CLI), or Representational State Transfer (REST) API.

Depending on customer requirements, management and SDN orchestration software that automates the deployment of VNFs and manages their lifecycle can also be pre-integrated into DCEngine. With this software, the DCEngine is ready for the VNFs to be deployed. Figure 2 shows a block-level look at the DCEngine’s typical software integration, and how the application layers supplied by the customer run on top of the pre-integrated DCEngine hardware, platform software, and orchestration layers.

Tier 1 CommSP Turns to DCEngine for Fast Turnaround

When a tier 1 CommSP had only a few months to stand up a 600-node bare metal Mesos* cluster, it turned to the pre-integrated Radisys DCEngine to help it meet its deadline. The initial deployment involved a 20-rack cluster to help with new service development. Each DCEngine compute rack was configured with 12 compute sleds, 10 storage sleds, and four switches. The storage rack was configured with 16 storage sleds. This gave the CommSP 50 CPU sockets, 960 TB of HDD storage, 55 TB of SSD storage, and 3.8 TB+ DRAM.

The CommSP also faced an impossible internal deadline to deploy its new server cluster, a process that included upgrading its power and installing all software applications and configuring the entire system. It selected the DCEngine due to its performance and flexibility, and because the system’s pre-integrated nature made the impossible schedule possible, taking just days rather than weeks to install and configure.

The success of the initial 20-rack deployment has led the tier 1 CommSP to continue to deploy DCEngine in multiple locations, with hundreds of petabytes of storage and more than 200 racks being installed by the end of 2016. Radisys’ professional services organization is working closely with the carrier’s data center operations teams, resulting in even greater installation and turn-up efficiencies. The established weekly joint meetings between Radisys and the tier 1 CommSP have brought even further collaboration with agile-style development and integration. In summary, Radisys has become a strategic partner and contributor, serving as the carrier’s extended DevOps Team.

Conclusion

The immense scale and new challenges faced when rolling out an SDN-enabled NFV architecture and data center network build out mean that CommSPs must count on their vendors for a level of integration and technical support that can simplify this transition and help them maintain carrier-grade network reliability. Radisys addresses the dramatic shift in CommSP data center design with its high-density hyperscale solution and the services necessary to make this transition. With its OCP rack-scale design and integrated open source software, the Radisys DCEngine solution with Intel Xeon processors and additional Intel technology is a significant advancement toward delivering NFV capabilities that meet these requirements. Radisys and Intel are the ideal partners for CommSPs considering the transition to the hyperscale data center.



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