SOLUTION BRIEF

Laying the Foundations for a 5G Data Center Through NFVI

5G data centers need an infrastructure they can rely on. Here's how QCT QxStack with Cloud Native Platform steps up to the plate.

"The vision of QCT's 5G Data Center (5GDC) solution is to provide innovative performance-optimized infrastructures with open technologies, disaggregated hardware/software, and a lower TCO to enable 5G applications and services."

— Ruby Lin, Product Manager at QCT

Key Features

- Red Hat OpenShift that supports container and VM coexsistence
- Granular visibility over workloads and platform capacity through Intel's Enhanced Platform Awareness (EPA) methodology
- Non-uniform memory access (NUMA) balancing designed hardware
- CPU pinning and isolation, eliminating the "noisy neighbor" effect
- Support for 5G use cases such as facial recognition software, cloud gaming, and content-delivery networks (CDNs)

5G data centers need a high level of performance and low latency in order to enable the use cases telecom customers rely on. They need to rapidly scale to changing customer demands, have a high level of visibility so operators can find and fix issues before they become major problems, and have end-to-end automation in order to feasibly function in a quickly shifting environment.

Network functions virtualization infrastructure (NFVI) is able to provide a scalable platform with consistent performance. The virtualized platform supports both containers and virtual machines (VMs) for its workloads, making it more flexible than traditional, monolithic data center architectures. QCT developed its NFVI, the QCT QxStack with Cloud Native Platform, with the needs of a 5G data center in mind, creating an automated, scalable, tunable cloud platform that supports both industry-grade Red Hat OpenShift and DIY Kubernetes platforms.

QCT's Strong Ecosystem of Partners

QCT partnered with Red Hat and Intel in order to create the most robust and scalable NFV architecture for the QxStack solution. Intel provided the leading telecom platform technologies QCT was looking for in their NFV infrastructure, and the two organizations were able to work together on performance testing as they deployed the platform to their customers.

In particular, QCT turned to Intel for their Enhanced Platform Awareness (EPA) methodology, which enables granular visibility over workloads and platform capacity for better performance tuning.

"We work very closely with Intel not only through their EPA methodology, but also on testing platform performance together," said Ruby Lin, product manager at QCT.

QCT and Red Hat enjoy a long partnership in providing their customers with a combined open platform. This hyperconverged architecture built on RedHat OpenShift supports VM and container coexistence to enable efficient deployment and eliminate the silos between VM and container applications, which are the foundation of modern cloud-native infrastructure.

"Our NFVI is a software-hardware disaggregated and cloud-based architecture," Lin said. "We know that OpenStack and Kubernetes are also getting popular in an NFVI infrastructure for service providers. Among enterprises and telcos, Red Hat is a very common option when you're talking about the virtualized infrastructure."

By using an open platform, QCT is able to give its customers more options when integrating their virtualized solutions and creates a more customizable platform.

Key Features

QCT planned their QCT QxStack with Cloud Native Platform in order to create a robust 5G data center that could effectively serve any telecom's growing customer base. In order to do so, the organization leveraged the capabilities of an open source virtualized infrastructure and performance enhancement methodology offered through its partners.

QCT provides a fine-tuning option on both the hardware and software level, crafting the cloud platform to best suit their customers' needs and data capacities.

On the hardware level, QCT uses non-uniform memory access (NUMA) balancing designed hardware. The hardware supports local memory access and distributes network interface cards (NICs) across CPUs and sockets, thus improving performance and efficiency, key hallmarks of the 5G experience.

This hardware also lays the foundation for monitoring and testing. QCT has worked extensively with Intel's EPA methodology to provide performance service assurance and visibility into their 5G data center so that operators can ensure the best performance possible.

QCT uses EPA both to provide its customers with the tools they need to monitor and manage network performance, and relies on it themselves as a way to gain insights into a platform's operation.

"We talk to the customer to understand the needs and their requirements," said Marco Huang, senior technical manager at QCT. "Then back at the lab, we get the numbers and performance results for the customer and say 'Here's the performance you can expect.' If they are sufficient and you want to do a collaboration with QCT to achieve that type of performance data, we can provide the results."

A concern among developers when deploying Kubernetes in a multi-tenant scenario is the "noisy neighbor" effect, where one tenant in a cluster takes up the majority of network resources, keeping it from other tenants within the cluster.

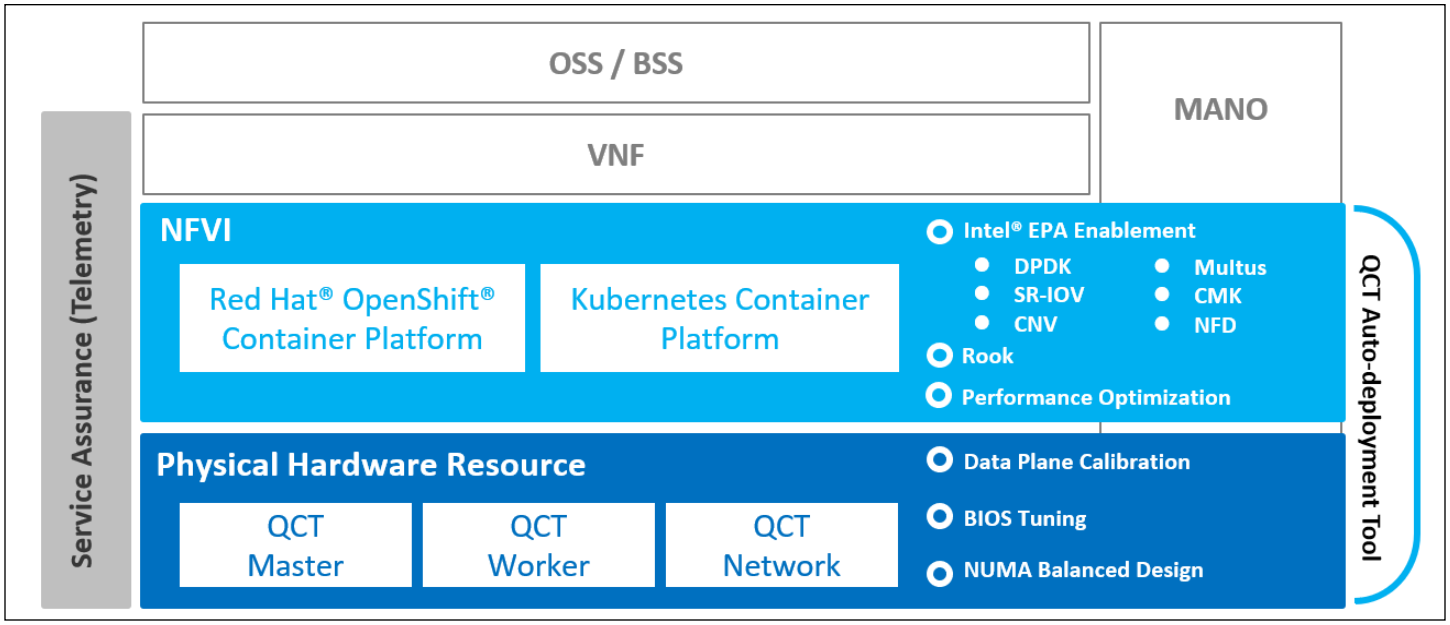
QCT circumvents this through Intel's CPU manager for Kubernetes (CMK), which enables CPU pinning and isolation. An operator can separate a CPU set so that it exclusively processes latency-critical workloads, preventing the kernel scheduler from assigning that CPU set to less critical functions.

This is done through the cloud native platform, which ensures carrier-grade service and enables scalability and high availability through optimized resource management.

Finally, QCT infrastructure enables easy and automatic solution deployment through OpenShift and the QCT deployment tool, which can deploy containers on the hardware and scale them to their workloads without the need for manual configuration, reducing the chance of human error.

"We have an interface where the customers can input their key network information," Lin said. "The tool will help the customer to simplify the process including architecture planning, hardware provisioning, and solution deployment ."

QCT provided this reference architecture as a guideline designed for low-latency networking requirements for communication service providers.



Solution Architecture (Provided by QCT)

Enabling the 5G Data Center

5G is all about performance, and ensuring that customers can get the lowest latency and most efficiency out of their mobile platform.

QCT's NFVI enables those qualities through simplified deployment, fine-tuned hardware, and performance monitoring and management.

"To build the 5G network, you need end-to-end architecture," Lin said. "When you have different 5G use cases and applications all coming together, they all rely on high performance 5G networks. Traditional central offices are hard to support, because they require computing power, agility, scalability, and speed to support new 5G services at a sustainable cost."

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With 5G data centers, resources need to be close to the user in order to maintain the throughput needed for high-bandwidth use cases.

"5GDC is like a distributed data center," Huang said. "With 5GDC architectures, we can move closer to the customers and provide more efficient throughput and lower latency. So with this concept, the engineering team decided to start working on architectures to leverage an array of solutions, and build a platform to help telco operators be more efficient on their network transformations."

These high throughput use cases include facial recognition software, cloud gaming, and content-delivery networks (CDNs), which present monetization opportunities to telecoms as they continue to roll out 5G.

For more information, visit https://go.qct.io/solutions/enterprise-private-cloud/qxstack-with-cloud-native-platform/.

About QCT

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