WIND RIVER TITANIUM CLOUD: AN OPENSTACK NFVI PRODUCT PORTFOLIO WITH ENHANCED PLATFORM AWARENESS

Heterogeneous private clouds are expanding beyond the enterprise to include Network Functions Virtualization infrastructure (NFVI). NFVI may be colocated with enterprise infrastructure in a data center, deployed at the edge, or housed on premise. NFV use cases are deployed differently than enterprise applications. They require predictable performance indicators such as guaranteed CPU allocation and high availability, as well as up/down and in/out scalability. Thus, NFV applications require an NFVI such as Wind River® Titanium Core or Wind River Titanium Edge. Both products are part of the Wind River Titanium Cloud™ family of virtualization platforms, which provide enhanced platform awareness (EPA).

EPA is a set of tools to optimize the placement and performance of your virtual machine (VM). This performance is enabled via OpenStack Nova "flavors" and easy-to-configure platform parameters. Nova flavors are created with these extra specifications, and virtual network functions (VNFs) are launched with these flavors. Multiple VNFs are chained together to form an optimized NFV service chain. That service chain may consist of several VNFs optimally placed on a specific CPU socket directly connected to network ports, with the appropriate CPU model, dedicated cores, and isolated hyper-threads. This results in higher performance because the VNFs run uninterrupted and can use advanced processor instructions (i.e., AES-NI, SHA-NI). Also, the interactions between the VNFs avoid the QPI bus between CPU sockets because the VM is on the same socket as the NIC. This optimized service-chain deployment is depicted in the diagram below.
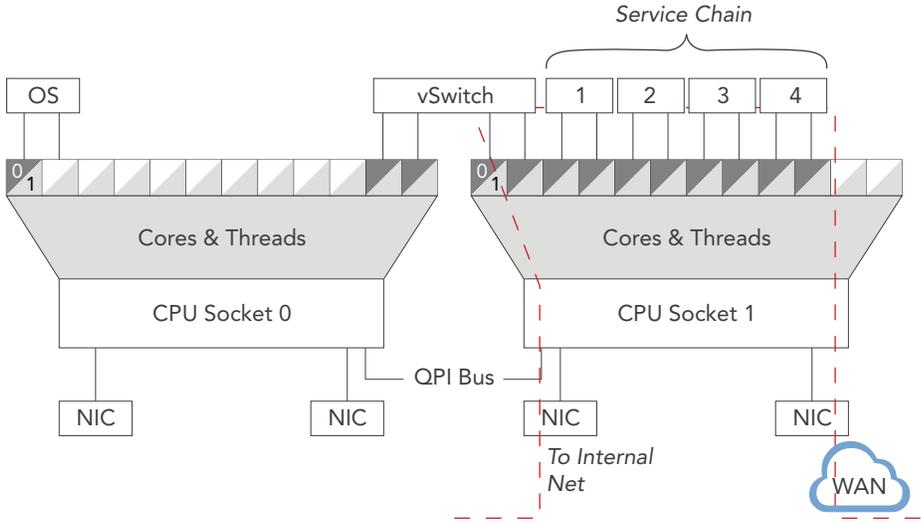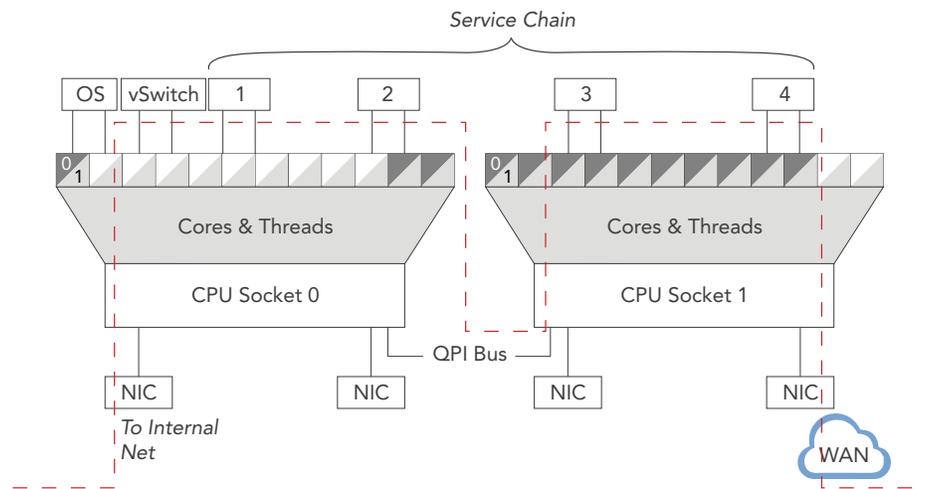

Figure 1. An optimized service chain on an NFVI platform with EPA

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By contrast, an NFVI platform without EPA support will deploy non-optimized service chains, and many will allow for a 20x CPU overcommit. For example, the cores assigned to the virtual switch might reside on one CPU socket and VNFs might reside on the other. This will result in traffic traversing the QPI bus between CPU sockets, limiting the maximum network performance. Additionally, some high-performance VNFs might inadvertently be assigned shared physical cores or threads, or—even worse—use two threads on a single physical core (see Figure 2).

Figure 2. A non-optimized service chain on an NFVI platform without EPA

An NFVI platform with EPA, such as Titanium Core, may be deployed in the same data center as enterprise virtualization platforms in different server racks. VNFs requiring performance, physical proximity, or lower latency may be deployed at the edge of the network on Titanium Edge, the smaller-scale edge solution. If NFVI service chains and enterprise workloads are co located within the same data center, the management and orchestration functions may be centralized. In that case, the orchestration tools will ideally use policy platform awareness (PPA) to deploy the workloads or service chains on the appropriate virtualization platform.

PPA is the ability of centralized management and orchestration tools to deploy a given service chain or enterprise workload without EPA on the appropriate enterprise data center or with EPA on an NFVI data center or on edge compute servers. An enterprise workload may be deployed by simply launching it on a pool of compute servers without concern for performance or high availability. On the other hand, deploying an NFVI service chain in a data center may require a specific network performance and high availability. For example, it is not enough for the NFVI to assign a VNF with dedicated cores for high performance. In this case, the orchestrator will deploy NFV services using REST APIs with the necessary EPA awareness. This is depicted in the diagram below.
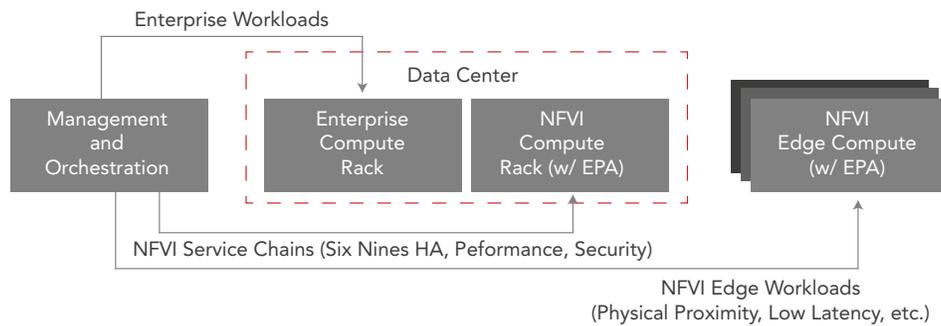
Figure 3. Policy platform awareness

In summary, physical network appliances are being transformed into virtual network appliances to run on commercial off-the-shelf servers. This achieves CAPEX and OPEX savings and enables service providers to deploy new services faster than ever. These virtual appliances must be deployed on an NFVI platform such as those in the Titanium Cloud product portfolio that support EPA and PPA, which ensures that the virtual appliances can achieve the performance, scalability, and high-availability requirements. It also enables the management and orchestration tools to deploy VNF workloads on the appropriate private cloud that supports EPA and PPA. With EPA and Titanium Cloud products, you can best leverage the extra instructions and optimize placement of workloads, which in turn means you can best leverage the Intel® platform.