



BROCADE, KAPSCH CARRIERCOM, AND WIND RIVER

An Open, Easy-to-Deploy, Carrier Grade Virtual Core for Mobile Solution

As part of the Wind River® Titanium Cloud™ Ecosystem, Brocade, Kapsch CarrierCom, and Wind River have partnered to integrate the Brocade Virtual Core for Mobile (VCM) product family (which includes the vEPC, vPGW, vHSS, and vC-SGN products) with Wind River Titanium Cloud, to achieve the following benefits of Network Functions Virtualization (NFV):

- Lower total cost of ownership (TCO) for customers via optimized resource usage resulting from NFV and cloud-friendly micro-services-based modular architecture
- Increased business agility and reduction in time-to-market for new services, as well as migration of existing services onto NFV platforms
- Improved service reliability with no single point of failure and best redundancy model for each tier—interface, database, control plane, user plane

Kapsch, an independent system integrator and NFV expert, carried out the standard Titanium Cloud Ecosystem validation. In addition, Kapsch completed an end-to-end solution validation using the Brocade Virtual Evolved Packet Core (vEPC) virtual network function (VNF). This produced the following key learnings:

- Titanium Cloud includes the required tools to enable easy vertical integration.
- The Brocade VCM modular approach smooths the horizontal integration with adjacent VNFs.
- Both solutions proved cloud friendly and open.

PRE-INTEGRATED MOBILE PACKET CORE NFV SOLUTIONS

A network transformation is underway to enable better utilization through software-defined services. Communication service providers (CSPs) are seeking best-of-breed solutions that can help accelerate this transformation. They are also demanding solutions that provide seamless automation without compromising the “always on” reliability expected from carrier grade systems. Brocade, Kapsch CarrierCom, and Wind River have joined forces to offer pre-integrated carrier grade mobile packet core NFV solutions. These solutions can be easily automated via third-party orchestrators that accelerate a CSP’s ability to deploy and manage new services while minimizing risk.

WIND RIVER: TITANIUM CLOUD

As the industry’s first fully integrated and feature-complete NFV software platform, Titanium Cloud enables an NFV infrastructure to achieve the high reliability and performance mandated for telecom networks. It delivers six nines (99.9999%) reliability, compared to the three nines of



Ecosystem Component

- VNF provider

Solutions

- Virtual Core for Mobile

Value

- Lower TCO
- Increased business agility
- Improved service reliability



Solution validated by independent system integrator Kapsch CarrierCom

virtualized platforms based on common enterprise software. Combining open source and open industry standards with required carrier grade extensions, Titanium Cloud is the only commercial server solution enabling service providers to maintain the rigorous uptime required as networks transition to a virtualized infrastructure. With Titanium Cloud, service providers can now meet the “always on” expectations of consumers.

An Ecosystem Enabling the Promise of NFV for CSPs

Through the Titanium Cloud Ecosystem, Wind River has collaborated with industry-leading hardware and software companies to ensure the availability of interoperable standard NFV products optimized for deployment with Titanium Cloud. Using solutions from the Titanium Cloud Ecosystem will accelerate time-to-market, reduce risk, and significantly improve the deployment of an end-to-end NFV infrastructure.

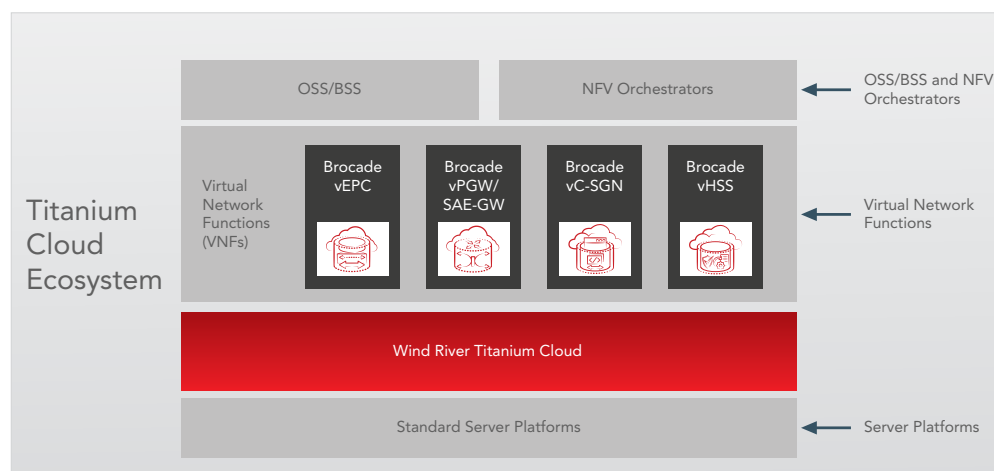


Figure 1. Titanium Cloud components with Brocade Virtual Core for Mobile based VNFs

BROCADE: VEPC, VPGW, VHSS, vC-SGN

The Brocade Virtual Core for Mobile (VCM) platform transforms mobile networks through feature-rich and highly scalable VNFs, including vEPC, vPGW, vHSS, and vC-SGN. This modular approach eliminates the expensive hardware, long upgrade cycles, overprovisioning, and years-in-advance budgeting that traditionally characterize mobile service provider networks. As a result, operators can experience the benefits of cloud-friendly design and fully virtualized implementation.

Brocade VCM platform-based VNFs provide the following additional benefits:

- Adaptability to multiple deployment use cases (fixed LTE, private LTE, public safety LTE, NB-IoT dedicated core networks)
- Effective use of horizontal and vertical scaling options to support networks of any size
- Flexible, linear, and independently scalable control and user planes
- Support for low-latency use cases by placing the user plane at the network edge
- Facilitation of rich application integration using inbuilt data correlation and streaming capabilities

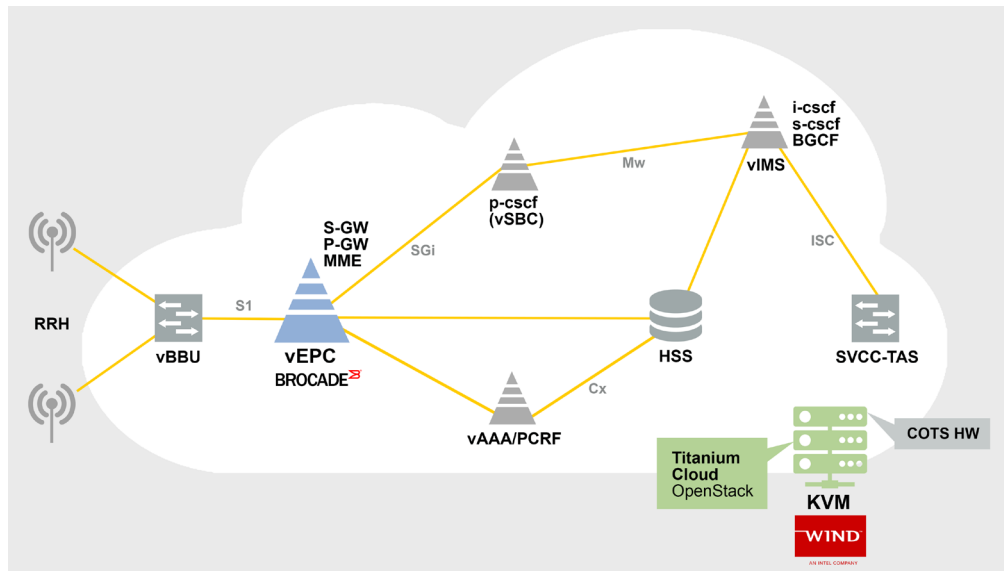


Figure 2. Cross-validation concept with Brocade VCM running on Wind River Titanium Cloud in a fully virtualized environment

KAPSCH CARRIERCOM: KEY LEARNINGS ON CROSS-VALIDATION FROM AN INDEPENDENT NFV EXPERT

Tasked with the cross-validation of this multi-vendor solution, Kapsch CarrierCom has completed an end-to-end pure-play NFV solution validation in their fully virtualized lab, considering the three dimensions—vertical, horizontal, and global. While orchestrating the complete solution, Kapsch has used native and third-party orchestrators. The solution’s balanced approach between carrier grade requirements and open source standards brought several key learnings to light.

Ease of Deployment with Titanium Cloud in the Vertical Integration

The user-centric design of Titanium Cloud is powerful, making the most use of the cloud without losing points on user experience and friendliness. The GUI is flawless and fits nicely with the OpenStack dashboard. This made it easy to successfully deploy Titanium Cloud within hours, rather than in the days or weeks needed previously. The cloud environment installs automatically, self-configures, runs properly and smoothly, and provides an operational cloud environment with security features, GUI, and logs. It is a highly consistent solution that lets you easily manage your infrastructure. Titanium Cloud delivered on its promise; it is a fully integrated solution.

Horizontal Integration and Testing: How to Deploy a Complex, Cloud Native EPC in an Invalidated Cloud Environment?

Kapsch CarrierCom set up the Brocade VCM on Titanium Cloud manually, following the standard cloud approach. The accelerated virtual switch (AVS) from Titanium Cloud makes this task an easy one. Kapsch then deployed the vEPC according to the cloud structure, first in a non-high availability (HA) mode and then in an HA mode. Both deployments went smoothly and the vEPC services successfully registered to the OpenStack services. The consistency of the Titanium Cloud deployment and the modular approach of the VCM are a perfect fit.

MORE INFORMATION

Detailed technical information about the Brocade VCM product family can be found at www.brocade.com/en/products-services/mobile-networking.html.

Detailed technical information about Kapsch CarrierCom can be found at www.kapsch.net/KCC/nfv, or contact kcc.carriers@kapsch.net.

Detailed technical information about Wind River Titanium Cloud can be found at www.windriver.com/products/titanium-cloud, or contact salesinquiry@windriver.com.

Additional information about the Titanium Cloud Ecosystem can be found at www.windriver.com/announces/titanium_cloud_partner_program.

The next step was to challenge the VCM and inspect how it behaves on the data plane side. Again, it ran smoothly, delivering the expected throughput, especially due to use of the end-to-end Data Plane Development Kit, both on the virtual switch and inside the data plane VNF components of the VCM.

When Kapsch connected multiple VNFs, including vEPC, vIMS, mobile TAS, and vRAN, they experienced smaller challenges on the network side. Having the logs from AVS at hand helped immensely in the troubleshooting process. It enabled Kapsch to monitor traffic and probe ports—to locate and understand where and why communication channels between VNFs were not established. Kapsch achieved successful horizontal integration with the surrounding elements.

Global Orchestration of the E2E Solution: How Open Is Titanium Cloud, and How Easy Is It to Orchestrate Brocade VCM?

The Brocade VCM has a cloud-friendly design, so orchestration was relatively straightforward. First, Kapsch tested Heat, a native OpenStack orchestrator. They were able to fully automate the deployment of the VCM in a core network in 10 man-days. During this time Kapsch ran the solution in different flavors: small, medium, and high capacity, as well as HA and non-HA. Next they tested an NFV-oriented solution more in line with the European Telecommunications Standards Institute, using Tosca templates with a third-party orchestration tool, Cloudify, integrating with northbound APIs of Titanium Cloud, which proved to be fully open.

SUMMARY

The Brocade and Wind River partnership enables service providers to leverage NFV without sacrificing the reliability and performance of hardware networking solutions. The partnership also highlights the value of pre-validating solutions.

The final result of the Kapsch integration is a successful cross-validation of the multi-vendor end-to-end solution in a fully virtualized lab. This solution is fit for the future and demonstrates the carrier grade attribute, while at the same time easily accommodating third-party applications. With scaling capabilities available from day one, you can unleash the full set of NFV benefits and further build on this solution.

