Nokia CloudBand products help service providers make their NFV deployments reliable and automated. With CloudBand, operators can rapidly and repeatedly launch new services using OpenStack and/or VMware.

Benefits
- Rapid service introduction while controlling operational costs
- Alignment with open source upstream allows rapid innovation and reduced cost
- Meets stringent telco performance and availability requirements
- Proven multi-vendor deployments, with products flexibly available as either a completely pre-integrated MANO or as only the functions you select (NFVI/VIM, Generic VNFM, and/or NFVO).

Overview
Competition from web-scale internet giants, and the demands of Internet of Things (IoT) and 5G, changes the way networks are built and operated. To thrive, operators need a flexible and scalable NFV Management and Orchestration (MANO) system that reduces new services’ time-to-revenue and automates network operations.

Nokia CloudBand is a cornerstone for a new competitive era. It enables service providers to run network functions on a federated, distributed cloud infrastructure and use DevOps to rapidly evolve their service offerings. CloudBand simplifies the deployment of network functions, ranging from enterprise virtual appliances to advanced network services, such as SD-WAN, VoLTE and RAN. With CloudBand, service providers can quickly deploy and upgrade services, and manage capacity. CloudBand’s tools help assess and operationalize the cloud infrastructure and its virtualized network functions (VNFs), which minimizes the risk of malfunction.

CloudBand is aligned with the ETSI NFV framework. CloudBand’s three products are optimized to fit the NFVI/VIM, VNFM and NFVO roles, as shown in Figure 1. The modular design lets you flexibly decide between deploying only what’s needed to get started (such as the NFVI/VIM), a completely integrated MANO stack (encompassing NFVI, VIM, VNFM, NFVO), or select individual items for multi-vendor deployments.
CloudBand Infrastructure Software

CloudBand Infrastructure Software (CBIS) is a multi-purpose NFV infrastructure (NFVI) and virtualized infrastructure manager (VIM) for OpenStack. It virtualizes and manages compute, storage, and network resources to enable VNFs or cloud applications to run while meeting the strict requirements for robustness, performance, and security. Each CBIS instance manages one NFVI node, with one or more racks of equipment at a single site. It performs the VIM function and provides virtualization software (hypervisor, virtual switch, monitoring) on each server. It virtualizes the storage resources across servers, including external storage arrays. It also supports enhanced platform awareness (EPA) for high-performance VNFs with high packet throughput, using a variety of methods, such as DPDK, huge pages, and SR-IOV.

Carrier networking: CloudBand enables carrier network requirements with software-defined networking (SDN) control through integration with the Nuage Networks™ Virtualized Services Platform (VSP) and supports any other Neutron-compliant networking framework. The VSP supports policy-based networking, the automatic extension of virtual networks across distributed data center locations, and seamless interoperability with existing WANs, such as Multiprotocol Label Switching (MPLS).

Security hardened: CloudBand pursues a multi-level security strategy, including security groups, secure inter-module communications, API hardening, and security appliances. NFVI nodes can be partitioned into security zones to isolate NFV applications and protect them from each other. The CloudBand multi-tenant capability supports the new NFV roles and responsibilities, such as platform operator and VNF operator. Platform resources can be securely allocated to individual tenants, such as different service provider departments and divisions.
CloudBand Infrastructure Software is a ready-to-use software package and installs itself within hours and can itself be upgraded without service interruption. It optimizes and simplifies additional infrastructure lifecycle operations, including capacity management, auto-healing, troubleshooting and software maintenance. It also provides extensive analytics and monitoring and notifies higher management systems of events and alarms. It provides analytics tools to prevent VNF malfunction due to a mismatch with the infrastructure characteristics needed by VNFs. It includes OpenStack Vitrage root-cause analysis, extended with Nokia rules and templates, which helps service providers quickly identify the source of failures and look for risks that could affect service. CBIS' standards-based, northbound APIs simplify multi-vendor interoperability with VNF managers and NFV orchestrators.

CloudBand Infrastructure Software provides tools and a blueprinting process for easy integration with server, storage, and networking hardware from any vendor. It has been pre-integrated and validated with Hewlett Packard Enterprise (HPE) c7000, Dell Power Edge, and Nokia AirFrame hardware.

CloudBand Application Manager

CloudBand Application Manager is an ETSI NFV aligned VNF Manager (VNFM) for OpenStack and VMware. It automates VNF lifecycle management actions by managing resources and applying associated workflows. Operating as a Generic VNFM (G-VNFM), it manages VNFs from Nokia, partners, and competitors. Using an open templating system, it interprets complex VNF Descriptor (VNFD) templates and enables actions based on a managed workflow to ensure predictable deployments. To achieve the widest interoperability and to simplify onboarding, Nokia developed, published, and implemented detailed guidelines for the creation of VNFD templates based on ETSI NFV specifications, and implemented open technologies, including TOSCA, HOT, Mistral and Ansible. Based on this open templating system, CloudBand Application Manager automates the VNF's lifecycle, including basic functions (create, instantiate, scale in/out, terminate, delete, query VNF, and modify VNF), and it provides a framework for implementing advanced functions (such as healing, update/patching, upgrades, backup and restore).

Multiple VIMs and VNFs are supported, both OpenStack and VMware, where one instance of CloudBand Application Manager manages resources from multiple VIMs that can have differing capabilities; it also supports multiple VNF types that have differing versions. It is a multi-tenant VNFM, supporting accounts per VNF type. It can be deployed localized to NFVI, localized to VNF, or centralized.

CloudBand Network Director

CloudBand Network Director automates network services delivery and operation, for OpenStack and VMware, in a distributed, multi-tenant, multi-vendor environment while optimizing and governing the usage of the infrastructure resources. It is an NFV Orchestrator, aligned with ETSI NFV, and provides two main functions. As a resource orchestrator, it administers, monitors and optimizes NFV infrastructure resources and provides an aggregated view across geographically distributed NFVI nodes. As a network service orchestrator, it onboards network services, which are comprised of multiple VNFs and connected through forwarding graphs and service chaining. It automates the network service lifecycle, including deployment, monitoring, updates, and termination.

Multiple VNFs, including the forwarding graphs and service chains connecting them, are integral parts of the Network Service Descriptors (NSD) expressed using OASIS TOSCA, a domain-specific modeling language for network services. Together with the Mistral open source workflow engine, this ensures that CloudBand Network Director can manage any network service, without requiring changes to its software code.

CloudBand Network Director is easily extended and integrates with many domain managers through plug-ins. Its ETSI NFV northbound interface simplifies integration with OSS systems.
Aligned with OpenStack, VMware, and open source

Service providers deploying CloudBand products make use of the rapid evolution and performance of OpenStack and/or VMware. They also benefit from a multi-disciplinary team with a deep understanding of carrier and data center demands and with experience from numerous customer engagements around the world.

With CloudBand, operators benefit from the rapid pace of open source innovation while getting a carrier-grade product ready for deployment. CloudBand meets the requirements of service providers wishing to deploy VNFs and services that offer high availability, security, performance, seamless software upgrades and service assurance. By using CloudBand, operators may obtain required features and bug fixes before they are available from open source distribution. The Nokia CloudBand team contributes to open source upstream development to ensure carrier requirements are met and open source technologies evolve in the desired direction.

VNF Certification Services

NFV succeeds when a variety of vendors and the broader community work together on open solutions. Nokia Professional Services provide VNF onboarding and certification, using the team’s extensive experience to integrate and certify the technical readiness of a VNF to be deployed and orchestrated on Nokia CloudBand. For a more flexible approach to varying needs, several certification levels are defined that characterize the supported automation use cases.

For more information about Nokia CloudBand, contact your local representative or visit:

CloudBand portfolio page
NFV page
Lean Operations page
### Portfolio features and benefits

| Flexible deployments | • Pre-integrated, combining NFVI/VIM, VNFM, and NFVO, which reduces the need for professional services.  
|                      | • Selectable on a standalone basis (NFVI/VIM, VNFM, and/or NFVO), which enables getting started with only what’s needed, or integrating into multi-vendor deployments.  
|                      | • CBAM and CBND support OpenStack and VMware.  |
| Open source upstream aligned | • Benefit from Nokia’s active role in innovative open source communities while delivering a robust solution for production deployments  
|                           | • Reduced vendor dependency  |
| Modular and multi-vendor | • ETSI NFV API and plug-in based architecture for easy integration  
|                       | • Interoperability of CloudBand products in multi-vendor solutions has been independently validated in independent labs and in commercial deployments  |
| Automated orchestration and operations | • Reduced operational effort in managing the telco cloud infrastructure and the lifecycles of VNFs and network services  
|                                      | • Infrastructure validation tool to verify VNF requirements  |
| Extensive VNF onboarding experience | • VNF onboarding and certification methodology and tools  
|                                     | • Generic VNFM simplifies deployments by reducing the number of different VNFMs, and increases interoperability  
|                                      | • Variety of VNFs onboarded from Nokia, partners, and competitors  |
| Carrier networking | • Seamless connectivity on a network-aware cloud  
|                    | • SDN integration (Nuage Networks)  |
| Robustness and high availability | • CloudBand remains operational during component outages  
|                               | • In-service software upgrade, patch management, backup and restore  |
| Performance | • Supports demanding VNFs with high data plane speed and low or no packet loss (enhanced platform awareness)  |