VNF deployment of Domain Name Servers based on F5 application delivery controller

In this use case, Alcatel-Lucent and CloudBand™ Ecosystem program member F5 Networks have worked together to demonstrate Virtual Network Function (VNF) deployment of F5 BIG-IP Local Traffic Manager (LTM) virtual appliance with Domain Name Server (DNS) infrastructure on top of the CloudBand platform.

CLOUDBAND ECOSYSTEM PARTICIPANTS

- Alcatel-Lucent
- F5 Networks

Challenge

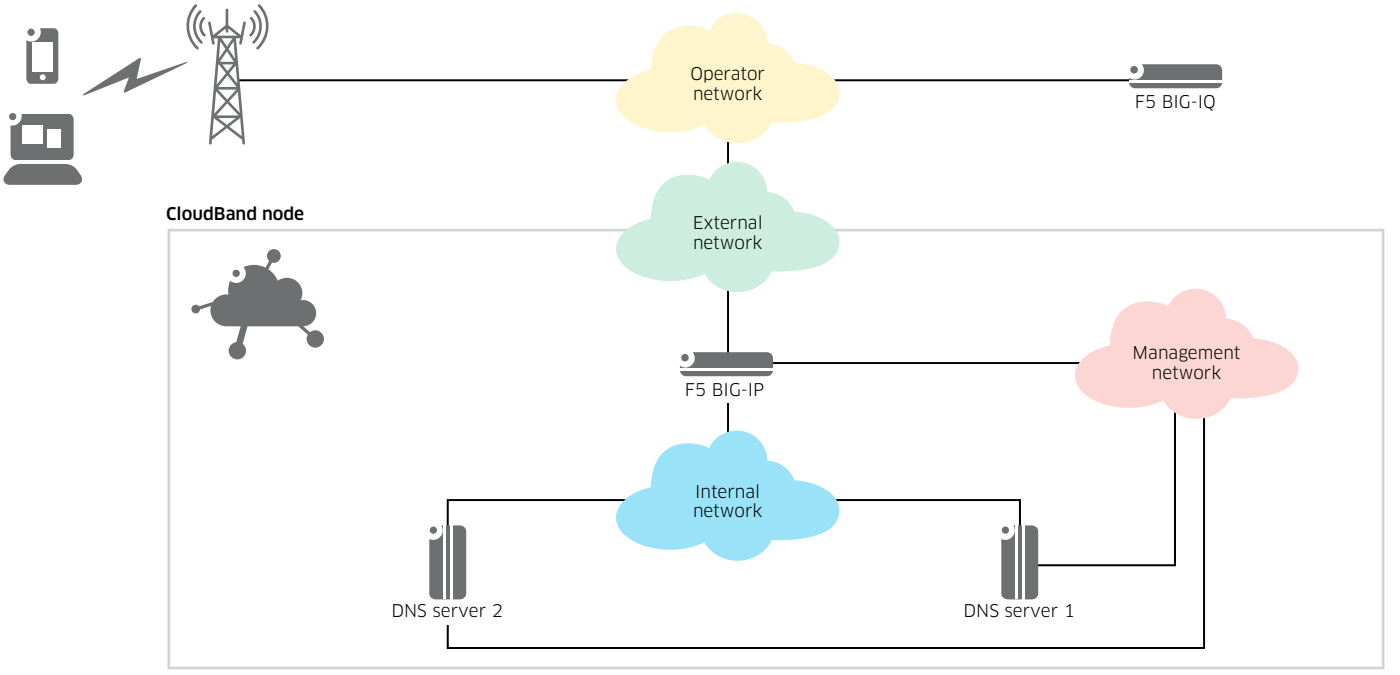
In the past, service providers installed multiple servers to serve all users (for example, DNS,DHCP). However, the growth of users' traffic as well as the need for high availability requires adding more servers and a high throughput load balancer for traffic distribution. Therefore, the maintenance of the solution became a complex task: adding an additional DNS server required buying the hardware, and then installing, configuring and adding it to the load balancer configuration during a maintenance window. The use of physical servers resulted in high capital expenditures (CAPEX) and operating expenses (OPEX), which in turn required a different operating model.

Solution components

The suggested solution is an automated deployment of virtual service infrastructure composed of the following elements:

- Alcatel-Lucent CloudBand Node 3.0 (NFV infrastructure) and CloudBand Management System (NFV Orchestrator) 3.0 serving as the Network Functions Virtualization platform
- F5 Networks BIG-IP LTM 11.6.1 virtual appliance serving as the virtual load balancer
- F5 Networks BIG-IP Global Traffic Manager (GTM) 11.6.1 virtual appliance serving as the DNS delivery engine
- Common Linux servers with Berkeley Internet Name Domain (BIND) service configured acts as the DNS service

Figure 1. Joint solution architecture



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How does it work?

The following steps show how a service provider can virtualize its physical DNS infrastructure by using the CloudBand platform NFV capabilities:

1. Based on the OpenStack Heat template, the CBMS deploys:
   a. F5 VM:
      i. F5 BIG-IP LTM/GTM virtual appliance
   b. Networks
      i. Management network – used for management commands between the VMs and F5 licensing server (BIG-IQ)
      ii. External network – between the BIG-IP, the users and Internet
      iii. Internal network – between the BIG-IP and the DNS servers
   c. BIG-IP LTM/GTM virtual appliance will create a connection between the F5 BIG-IQ (can reside in the CloudBand node or other geographical location) for licensing the BIG-IP
2. The operator installs a single configuration file (SCF) to the BIG-IP VM. The configuration will prepare the BIG-IP for load balancing DNS traffic.
3. CBMS deploys a second Heat template that contains:
   a. Two DNS servers connected to the management network and internal network
   b. Using CloudInit, the VMs register its internal IP address to the BIG-IP DNS load balancing pool to start receiving DNS traffic.
4. The operator can update the stack (in Step 3) to add DNS VMs in case the traffic exceeds the set-up capacity, or use the Heat template that includes scaling capabilities which will update the number of DNS VMs automatically based on Ceilometer telemetry information such as CPU/memory.

VNF and platform vendor solution components

F5 Networks

F5 Networks contributes the BIG-IP system with its virtual appliance and APIs for the cloud. In this use case the virtual appliance is licensed and configured to be the DNS delivery engine.

CloudBand

The Alcatel-Lucent CloudBand Management System is used to deploy all the components of this use case such as BIG-IP virtual appliance, management VM for licensing and DNS servers. The other element is the CloudBand node – a set of computing, storage, virtualization and cloud management components for each cloud facility on the network. With these CloudBand components, deploying VNF containing multiple DNS servers that are efficiently load balanced, highly available, and support scale out with a simple configuration template allows fast automation compared to the legacy physical DNS service.

Figure 2. Workflow

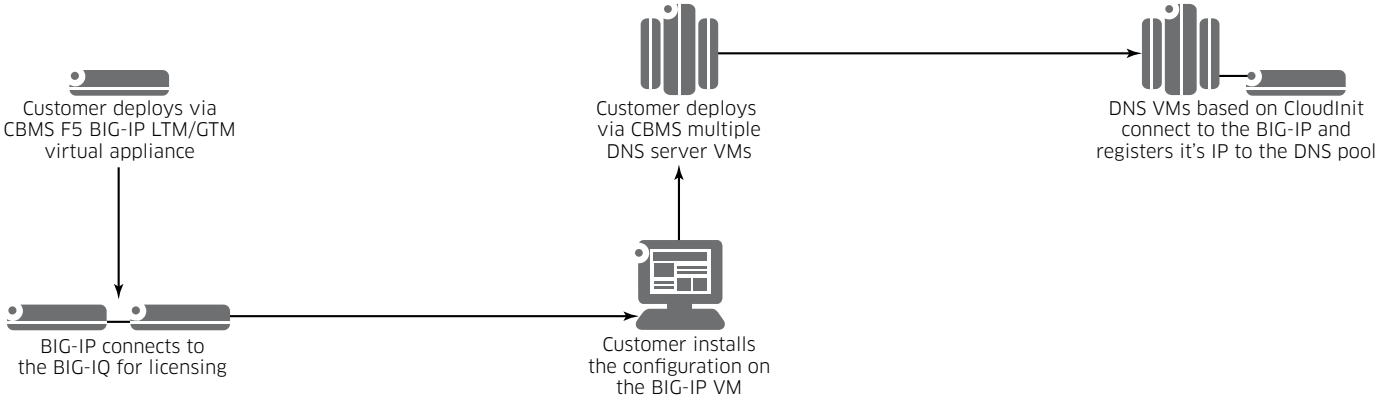

Table 1. Key benefits of each solution

CLOUDBAND ECOSYSTEM PARTNER SOLUTIONS	KEY BENEFITS
Alcatel-Lucent CloudBand and CloudBand nodes	• Enhances automation • Improves operations • High Availability infrastructure • Scales on demand for simplicity and speed • Hosts and orchestrates multiple VNFs • Enables automatic or manual scripting of business logic • Provides resiliency • Delivers scale-out/scale-in logic
F5, BIG-IP system, LTM	• Provides software-defined application services and load-balancing applications • High-performance security/DNS distributed denial of service (DDoS) mitigation • Performance and scale of subscribers and DNS transactions • Geographic distribution/redundancy • No BIND vulnerabilities

Summary

This use case demonstrates a virtualized DNS VNF solution, based on CloudBand infrastructure to massively scale DNS clusters and reduce service provisioning cycle-time from months to minutes. CloudBand infrastructure supports an automated deployment of services which allows a quick NFV-based, zero-touch operational model, leveraging service providers ability to accelerate their time to market cycle.

To learn more about the CloudBand Ecosystem Program or to become a member, visit: **http://ecosystem.cloud-band.com**

For more information about the participant in this use case, visit **F5 Networks**.

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