

OpenNaaS-based Networking Solution for DC Automated Management

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Abstract— The main target of the proposed solution has been to develop and implement a vendor independent overlay platform on datacenter network infrastructures to simplify the administration of operational functions of SURFsara and achieve a solution easy to deploy, easy to configure and easy to manage, with “MUST BE” requirements and limited manpower resources. The solution proposes an OpenNaaS management framework powered implementation to provide data center administrators with a vendor independent overlay platform, which allows administration of the most crucial operational functions, and allows fixed administration permissions to users requesting for infrastructure resources. OpenNaaS platform constitutes an enabler for innovation opportunities for the cloud ecosystem and the European software industry. OpenNaaS is currently being proposed as service management tool to provide with a unified way to configure networking resources and ease the administrative networking load across the different network segments end to end.

Keywords— *Cloud Networking; DC Network Management, Virtualization, OpenNaaS, Operational DC, Testbed*

I. INTRODUCTION

National Research and Education Networks (NREN) connect to networks of academic and educational institutions, including University campus networks, academic hospitals, academic Data Centers (DCs), and remote instrumentation. Scientists typically want to transfer data from their data sources (e.g. from an academic hospital or remote instrumentation) to their storage or compute resources at an academic DC, and from there to a visualization or other cloud infrastructure. The providers of these infrastructures have to carry out various networking tasks to accommodate the needs of these scientists, like implementing VLANs, adding or removing routes, configuring access ports, applying routing filters, etc.

The demands from scientists can be served by either generic solutions or specific per-project solutions. In addition, the solutions can be static in nature, or dynamic. The regular Internet is an example of a generic, static solution. Per-project solutions typically involve dedicated connections and can be either static (a connection specifically for a project) or dynamic (the scientists or the application software configures a path prior to sending traffic). SURFsara deploys a recent example of generic dynamic solution since 2010: a dynamic path is automatically configured when data traffic between different

life-science grid clusters reaches a certain threshold. The many different data transfer workflows imply many different network solutions inside academic DCs, either terminated at a core router, providing another BGP peering relation or connected to a dynamically configured private network between the cloud nodes of a certain user.

With the growth in number of solutions, the need to deploy automated service solutions and tools has grown. A complicating factor is that Cloud Infrastructure providers usually operate multi-vendor network environments (since some vendors support different requirements in their devices and the network requirements for each solution may widely differ). Due to the fact that there is no unified way of configuring all devices, network engineers require specific knowledge on each of them. In the end, a lot of time is spent on operational tasks, which could also be spent otherwise.

The effort of this work addresses this specific limitation, directly issued from an Infrastructure Provider SURFsara in the context of Géant3+ project, lacking of a solution to efficiently address the networking resource provisioning problem and provide networked cloud resources with minimal management effort. SURFsara is the Dutch national academic data center.

To this end, we propose the implementation and deployment of the OpenNaaS [1] software management platform, leveraging virtualization technologies applied on top of network and DC infrastructures to enable the administration of the most crucial operational functions. Our solution also provides with an overlay GUI of the physical network infrastructure to enable, SURFsara in particular and Cloud infrastructure providers in general, with the means to effectively configure networking Cloud resources. The overlay is vendor agnostic, and works on top of OpenNaaS. This constitutes a key advantage since it allows configuring different vendor equipment in a homogenized way. Besides, OpenNaaS platform allows delegating specific resource configuration/management features to users that traditionally have been restricted to DC infrastructure managers.

This OpenNaaS-based solution has been deployed in a pre-production environment on SURFsara facilities to demonstrate the utility of integrating such management platform, easing the networking operations in DCs based on OpenNaaS technology.

The remainder of this paper is organized as follows. Section II describes the state of art in terms of solutions for networking