

Network Virtualization Architecture: Proposal and Initial Prototype

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ABSTRACT

The tussle between reliability and functionality of the Internet is firmly biased on the side of reliability. New enabling technologies fail to achieve traction across the majority of ISPs. We believe that the greatest challenge is not in finding solutions and improvements to the Internet's many problems, but in how to actually deploy those solutions and re-balance the tussle between reliability and functionality. Network virtualization provides a promising approach to enable the co-existence of innovation and reliability. We describe a network virtualization architecture as a technology for enabling Internet innovation. This architecture is motivated from both business and technical perspectives and comprises four main players. In order to gain insight about its viability, we also evaluate some of its components based on experimental results from a prototype implementation.

Categories and Subject Descriptors

C.2.1 [Computer Communication Networks]: [Network Architecture and Design]

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General Terms

Design, Management

Keywords

Network virtualization, Network architecture, Socio-Economics

1. INTRODUCTION

The Internet has been playing a central and crucial role in our society. Indeed, as the main enabler of our communications and information era, it plays a critical role in the work and business, the education, entertainment, and even the social life of many people. However, the Internet is also a victim of its own success as its size and scope render the introduction and deployment of new network technologies and services very difficult. In fact, the Internet can be considered to be suffering from "ossification" [11], a condition where technical and technological innovation meets natural resistance, as exemplified by the lack of wide deployment of inter-domain multicast or IPv6 in the public Internet. More precisely, while the network itself has indeed evolved tremendously in terms of size, speed, new sub-IP link technologies, and new applications, it is the architecture of the public Internet that has mostly remained the same and is difficult to change, because of the sheer size of the system.

The Internet, which aptly fulfills its current mission as a packet network delivering connectivity service, was also designed with assumptions that no longer describe future communications needs. Stronger security, better mobility support, more flexible routing, enhanced reliability, and robust service guarantees are only examples of areas where innovation is needed [15].

