Chapter 40
Exploiting P2P Solutions in Telecommunication Service Delivery Platforms

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ABSTRACT

Network Operators provide Telecommunication services according the “Network Intelligence” paradigm based on centralized sets of specialized resources. Their major competitors in offering new services are Web2.0 Service Providers, which adopt the “Web as a platform” approach: services, designed according to client-server paradigm, are deployed on large, but cost effective, data centers able to satisfy an increasing number of service requests. Web2.0 Service Providers seem to have a technological edge on service delivery over Network Operators. To face this threat, Network Operators could adopt P2P technology, as an alternative to “Network Intelligence” and client-server paradigms, to build future proof service platforms, “naturally” open and extensible by users and communities, and leveraging connectivity, their main asset. This chapter describes motivations and characteristics of a novel service platform based on P2P technology for delivering Telecommunication and ICT services. It includes also an analysis of technical advantages, and considerations on business and costs aspects.

INTRODUCTION

The consolidation of distributed processing capabilities (e.g., Cloud Computing), the spread of adaptive computing techniques (e.g., P2P, Grid Computing), opportunistic communication mechanisms (wireless sensor network, mesh networking), the Web2.0 approach and its evolutions (semantic web, dataweb) pose new challenges to the traditional telecommunication world. What can Network Operators (NOs) do in this environment?
In a traditional approach, named Network Intelligence [Minerva & Moiso, 2004], NOs develop functionally capable systems, able to support supplementary services on top of a major capability: the call control, or the session control in IP Multimedia Subsystem (IMS). This paradigm enables the construction of a limited set of communication services. The large part of the Internet services is instead focusing on data retrieval. The two major computing paradigms of the Internet, the Client-Server (CS), and the Peer-to-Peer (P2P), are good for data services and are not wholly exploited in Telco related solutions.

Web2.0 service providers (SPs) have extended the common usage of the CS, by setting-up huge Data Centers made out of general purpose computing machines. SPs have a clear technological advantage in the delivery of large scale services over many NOs: the Data Center infrastructure, comprised of hundred of thousand of servers, is becoming so complex to manage and so expensive to build from scratch that many NOs simply cannot close the technological gap in a short time period. This prevents them to be better competitors in the Internet service realm.

Conversely, P2P technology enables new services and in particular the massive file sharing in large communities. The strength of the solution is the cooperative working of several networked nodes that are part of a community. The P2P technology is not only about file sharing, it is a distributed processing technique that fosters the sharing of resources and the cooperation between different nodes in order to reach a common goal.

The CS and the P2P approaches fit better than the Network Intelligence paradigm [Isenberg, 1998] into the Internet service scenario. Currently NOs are refurbishing the network infrastructure moving towards All-IP networks. This yields to the opportunity to rethink to the network control and service infrastructure. NOs adopt an “IMS+SDP approach”, which, as described in the following section, consists of deploying a SDP (Service Delivery Platform) on top of an IMS infrastructure. These technologies are implemented according to the traditional attitude of NOs: they are central-ized and over-imposed over an IP Network. They are expensive; do not follow the IP approach of having intelligent nodes and simple networks, and do not scale in the same manner as the Web Data Center do. Besides, they are mainly focused on the delivery of NOs’ communication services, and are not suitable to promote new business eco-systems for broader classes of services. The NO embracing the “IMS+SDP approach” can lag behind the SPs in programming, governing and build a service layer infrastructure.

Therefore, NOs need to welcome other technologies that allow them to compete with the offering of services of the Web Actors: P2P technologies are a disruptive means to compete with the Web SPs.

The rest of this Chapter summarizes the current approaches for delivering telecommunication services, the evolution trends, and some critical issues from the NO’s standpoint. Then, it describes how an advanced P2P platform could address the identified critical issues: the proposed solution would replace the server-centric approaches with a highly distributed solution involving both end-users terminals, and computing and communication resources in the domains of NOs and SPs. Finally, the chapter analyzes the advantages and opportunities concerning the adoption of the proposed solution.

BACKGROUND

Telecommunication services are currently provided according to the Network Intelligence approach, where they are created, executed and managed by a “Service Architecture”, comprising a set of systems implementing network functions needed for the service delivery. Services are characterized by a “business logic” that uses basic Telco features (e.g., call/session control, end-user presence and