

Chapter 23

An Agent-Based B2C Electronic Market in the Next-Generation Internet

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ABSTRACT

In a global multi-service and multi-provider market, Internet Service Providers (ISPs) will increasingly need to base their operation on new consumer-centric business models. In this article, the authors present an agent-based framework for the Business-to-Consumer (B2C) electronic market, comprising User Agents, Broker Agents and Provider Agents, which enable Internet users to select an ISP in an automated manner.

INTRODUCTION

In the late 1980s, when Mark Weiser introduced the concept of ubiquitous computing (also referred to as pervasive computing), it was just a vision for the 21st century (Weiser & Brown, 1997). Meanwhile, continual advances in wireless technologies and telecommunication systems, in conjunction with rapid proliferation of various types of (portable) devices, have made Weiser's vision a technical and economic viability. Weiser's ideas are becom-

ing a reality as the new generation of ICT-based (*Information and Communication technology*) systems evolve. The next-generation Internet, the most prominent example of such a system, creates heterogeneous environments populated with diverse types of ubiquitous communication-enabled devices in need of specific services. Consequently, such an environment requires efficient mechanisms which can match demands (requested services) to supplies (available services), anywhere and anytime. The focus of this article is on creating an agent-based framework for service provider selection in the next-generation Internet.

DOI: 10.4018/978-1-61520-611-7.ch023

BACKGROUND

The Evolution of the Internet

The Internet emerged in the early 1970s, as a small network interconnecting just a few computers. As the Internet grew through the 1970s and 1980s, many people started to realize its potential. Nevertheless, the Internet did not experience real proliferation until the invention of the World Wide Web (WWW or simply Web 1.0), a service provisioned through the Internet infrastructure. Web 1.0, as a global information medium enabling users to read and write via computers connected to the Internet, became the bearer of the digital revolution in the 1990s which was a major catalyst of globalization and an important driver of economic prosperity. Consequently, all further Internet evolution after the invention of Web 1.0, is characterized as Web X.0, in spite of the fact that the WWW is just one of many Internet services. Web 2.0, also called “the Social Web”, is no longer simply about connecting information, but also about connecting people through various forms of social networks (e.g., Facebook (<http://www.facebook.com>), MySpace (<http://www.myspace.com>), or LinkedIn (<http://www.linkedin.com>)). The phrase “Web 2.0” was coined a couple years ago when the social networking phenomenon was recognized, having more than half a billion users world-wide in 2007, employing it on a daily basis for both personal and businesses uses (Reid & Gray, 2007). Web 3.0, also called “the Semantic Web”, is the next stage in the evolution of the Internet in which it will become a platform for connecting knowledge. Web 3.0 is an evolutionary path which will enable people and machines to connect, evolve, share, and use knowledge on an unprecedented scale and in many new ways make our experience of the Internet better (Davis, 2007). One of the most promising Web 3.0 technologies, besides the Semantic Web, are intelligent software agents which can utilize

semantically annotated information and reason in a quasi-human fashion.

Stakeholders in the Internet Domain

There are a number of different stakeholders present in the Internet domain (see Figure 1) who need to establish strategic partnerships in order to provide end-users with Internet services, integrate information and transport services. A stakeholder may take on a number of roles in a particular scenario, and a number of stakeholders can play the same role.

Examples of roles include the following (Fischer & Lorenz (European Telecommunications Consultants), 2000) (Podobnik & Lovrek, 2008):

- *User*: An Internet service user, having at his disposal one or more devices (e.g., mobile phone, laptop, digital TV receiver) attached/able to connect to the Internet.
- *Access Line Provider*: Provides telecommunication access to service consumers (e.g., an operator providing wireline access through a local loop or a mobile/wireless access operator).
- *Internet Connection Provider*: Provides network layer access to the Internet and its services (e.g., an operator with entry points to the Internet).
- *Internet Service Provider (ISP)*: Facilitates integrated services for the consumers (e.g., a company offering IPTV service).
- *Service Broker*: Provides simplified filtering and access to a vast number of services available on the Internet (e.g., search engines).
- *Network Infrastructure Owner*: Provides transmission lines (e.g., telecoms or cable TV operators).
- *Carrier*: Provides a transport service for data traffic (e.g., companies which buy bandwidth from a Network Infrastructure Owner).

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