The WiMAX Network Solutions for Virtual Enterprises Business Network

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INTRODUCTION

In an age when the rhythm of evolution implies a continuous technological advance, the enterprises must make the exploitation of ICT one of their core competencies as a prerequisite to success since an organization can find out about new technology today without being able to apply it the next day (Ferdiana & Hoseanto, 2012).

The globalization process brings global competition and the achievements depend highly on the efficiency and effectiveness of the company response to the market and customer demands. The enterprises have to be able to exchange information and to operate together as an integrated unit with the preservation of their autonomy, requiring enterprise re-thinking and re-modeling, with particular designs that make an efficient use of the new network technologies.

Virtual Enterprise becomes the fastest way to develop a new product and to select operational resources. The paper (Rosu & Dragoi, 2011) describes the virtual enterprise business network (VEBN), whose target is to unite in single group different users with distinct geographical position, insuring the combination of resources and the best performance. Such a network has the advantage of adaptability, allowing the users to change the group they belong by a simple reconfiguration of the equipment, and of dynamism, creating a consortium of enterprises dispersed geographically that will benefit from the strong points of each individual one and will execute adaptively particular business projects, to the maximum satisfaction of the customers. This work explores the network architecture for a virtual private network (VPNs) as support for a geographically dispersed enterprise within WiMAX (Worldwide Interoperability for Microwave Access) solutions. We presented in (Rosu, Popescu, Dragoi, & Guica, 2012), the virtual enterprise network (VEN) architecture for a geographically dispersed enterprise as support for VPNs possible structures (based on Internet Protocol Security – IPSec) and shown a network monitoring solution using open source software to enterprise business improvement.

The vast majority of the companies in Europe are small and medium-sized enterprises (SMEs) and a large part of the working force is employed in these businesses. The collaboration infrastructure based on WiMAX we propose, centered on a virtual enterprise network, promises to reduce the participation of the members (individual small and medium-sized enterprises) in networking efforts, to insure faster and improved decision processes and to support the expansion of the business services segment. The hardware technological expansion should be accompanied by the software tools needed to put into practice the collaborative business system. The partnership creation stage of the process of virtual enterprise foundation is extremely important for the competitiveness of the project in the virtual enterprise business network system. It is difficult to subsist and impossible to prevail in the modern Knowledge Society (Bodea & Dascalu, 2012; Dragoi et al., 2011) without a strategy that will harness their intellectual assets.

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in Foreign Languages (DEFL) and at the PREMINV and CTTM Research Centers from the University "Politehnica" of Bucharest (UPB). The methodology validation is done through case-studies concerning national projects, creating support systems for resource planning and programming activities. The processes are done according to business process management (BPM) in virtual organizations using an e-platform.

A seamless inter-working amongst heterogeneous network of SME's represents the cornerstone for the success of next generation systems with different evolving access technologies (Mousa, 2012), making the WiMAX Enterprise solution a strategic one.

BACKGROUND OF VIRTUAL ENTERPRISE BUSINESS NETWORK

A VPN requires its own Private Member Collaboration System (PMCS) to exchange information and to develop its projects and offers. The virtual team is a group of persons working across links strengthened by information, communication and transport technologies who interact through mutually supporting tasks guided by a common purpose. The members use technology to work together and to fulfill a task that requires the participation of each member, even when they are parts of different organizations, are separated geographically or have different working hours. They will use extensively computer mediated communication to permit remote members to synchronize their personal efforts and inputs.

The virtual team can be mildly geographically dispersed, when just one member is apart from others members or fully detached, when each member is located in a different country. In VEBN, simple administrative solutions come with the products, allowing the users to move from one group to another group through a simple reconfiguration of the network devices.

A VPN is built on shared infrastructure, dedicated to the connection of a client (the private) to users in different locations by ensuring conditions of integrity, confidentiality and quality comparable to those of a private network (Rosu, Dragoi, Rosu, & Guran, 2010). VPNs allows the provisioning of private network services for an organization or organizations over a public or shared infrastructure such as the Internet or service provider (SP) backbone network.

VPNs solutions can be purchased from telecommunications companies or they can be created using the existing network infrastructure (Internet or public switched telephone network) and software through tunnel crossing.

The shared SP backbone network is known as the VPN backbone and is used to transport traffic for multiple VPNs, as well as possibly non-VPN traffic. VPNs provisioned using technologies such as Frame Relay and Asynchronous Transfer Mode (ATM) virtual circuits (VC) have been available for a long time, but over the past few years IP and IP/Multiprotocol Label Switching (MPLS) – based VPNs have become more and more popular (Rosu & Dragoi, 2011). We are proposed a general VEN architecture for a large enterprise or an industrial holding (with headquarters and branches) formed by a temporary alliance of different small and medium sized enterprises, geographically dispersed, with ATM Points of Presence (PoPs) (Rosu, Popescu, Dragoi, & Guica, 2012).

WiMAX refers to interoperable implementations of the IEEE 802.16 family of wireless-networks standards ratified by the WiMAX Forum, starting from 2001. Today, WiMAX network solutions (Yuanyuan, 2009; Miao, 2010) can help enterprise architecture integration much more effectively and update unanimity between, by example, all retailers of enterprise (Wu & Unhelkar, 2008). Needs for indoor high speed data services have driven the diversification of coverage modes of WiMAX networks, such as gradual coverage from local hotspots to MANs and even WANs, or simultaneous coverage for both indoor and outdoor areas (Yuanyuan, 2009).

Today, one of the major challenges reaching enterprise customers is the cost to extend the macro-cellular network for indoor coverage (Kim, Park & Choi, 2010; Kaushik & Kaushik, 2012). Additionally, enterprises are seeking higher bandwidth solutions (Potorac, 2009), beyond 802.11g, for internal high speed data networks (Goga & Veil, 2008; Potorac, 2009; Jones & Wang, 2010). Businesses want anywhere, anytime access (Sladić, Milosavljević, & Konjović, 2013) and technologies that offer seamless mobility between macro and micro-cellular networks. In-line services allow mobile operators to offer new services and easily scale those services while also ensuring efficient traffic flow end-to-end with a simplified network topology.