

Chapter 10

Definition and Analysis of a Fixed Mobile Convergent Architecture for Enterprise VoIP Services

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ABSTRACT

Fixed Mobile Convergence is an important challenge for telecommunication operators given the heterogeneity of access networks technologies and the variety of terminals. Fixed Mobile Convergence, which introduces the concept 'Being always best connected', is considered to be the next step in the evolution of telecommunication networks and should increase the operators' revenues. In order to enforce the concept 'Being always best connected', this paper presents and analyzes an architecture for enterprises, named 'Business Zone'. After defining the Business Zone, we present its architecture and we analyze its main components while limiting our study to the transport of VoIP flows. Then we present two methods that we have patented: the first method authorizes a VoIP flow to be transmitted according to the available resources in the Business Zone; the second method enhances the decision process during a handover.

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INTRODUCTION

Fixed Mobile Convergence (FMC) is an important challenge for telecommunication operators because of the heterogeneity of access networks technologies and the diversity of terminals. From a technical point of view, FMC is considered to be the next step in the evolution of telecommunication networks. Bihannic *and al* (BIHANNIC, 2009) provide an overview of the different technologies and the different network elements involved in defining the operator convergence strategy. From a commercial point of view, FMC enables new services for residential users and enterprises and should increase the operators' revenues (Katsianis, 2007).

In this proliferation context, the concept 'Being always connected' becomes 'Being always best connected'. In order to enforce the concept 'Being always best connected', this paper presents and analyzes a FMC architecture for enterprises, named 'Business Zone' (BZ).

In the BZ, a user can use a fixed and/or a mobile terminal. A mobile terminal compliant with the Third Generation Partnership Project Unlicensed Mobile Access (3GPP UMA) specification (3GPP TS 43.318, 2007), is named 'UMA terminal'. To facilitate handovers between heterogeneous networks, the BZ implements a mechanism compliant with the MIH (Media Independent Handover) Services Standard as defined in (IEEE 802.21, 2008). During a handover, a mobile terminal selects a network from a network list located in a database named 'Network Base'. This database provides the topology of the networks constituting the BZ.

The remainder of this paper is organized as follows. After defining the Business Zone, we present the BZ architecture and analyze the main BZ components while limiting the scope of our study to the transport of VoIP flows. Then, we describe a method which authorizes a UMA terminal to transmit or receive a VoIP flow according to the available resources in the BZ. We have patented this method. After that, we define a method to

automatically update the WiFi network topology in the Network Base. This method, that we have patented and which can be extended to different radio access network technologies, enhances the decision process during a handover. Then we conclude the paper and introduce the foreseen future studies.

DEFINITION OF THE BUSINESS ZONE

The BZ is a logical network that enables a small enterprise to access to voice, video and data services. It is composed of four network technology types, Ethernet, WiFi, GSM, UMTS, and is connected to an IP Multimedia Subsystem (IMS) architecture. Camarillo (2008) describes an overview of an IMS architecture. The BZ implements the 3GPP UMA specification (3GPP TS 43.318, 2007), the IEEE 802.21 Standard (IEEE 802.21, 2008), the IEEE 802.11e Standard (IEEE 802.11, 2007), the IEEE 802.11i Standard (IEEE 802.11, 2007), the IEEE 802.11k Standard (IEEE 802.11k, 2008), the IEEE 802.11r Standard (IEEE 802.11r, 2008).

Fixed terminals can access to Voice, Video and Data services while the UMA terminals can access to voice and data services. A UMA terminal has an AMR (Adaptive Multi-Rate) codec compliant with the 3GPP TS 26.071 specification (3GPP TS 26.071, 2007). A packet sent by an Adaptive Multi-Rate codec is named 'AMR' packet.

The BZ transports voice, video, data and UMA signalling flows. These flows are classified into 'FIXED' flows and 'UMA' flows. A 'FIXED' flow is a flow sent or received by a fixed terminal. A 'UMA' flow is a flow sent or received by a UMA terminal. A UMA signalling flow is composed of the flows used to set up and maintain an IPsec connection in ESP UDP-Encapsulated-Tunnel mode between a UMA terminal and the SEGW (Secure Gateway). In this paper, a 'FIXED' voice flow is named 'FIXED Voice' flow, and a 'UMA' voice flow is named 'UMA Voice' flow. A 'FIXED' video

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