Chapter 13

Optimizing the Traffic of Voice Core Domain in UMTS Network through RNC Re-Homing

Ye Ouyang
Stevens Institute of Technology, USA

Hosein Fallah
Stevens Institute of Technology, USA

ABSTRACT

The past few years have seen mobile operators transition to next-generation mobile networks, specifically from third-generation networks (3G) to long term evolution (LTE). This paper describes the basic architecture and topology of UMTS R4 core network and introduces two options in network planning, i.e., flat structure or layered structure. This paper introduces the re-homing of radio network controller (RNC) and base station controller (BSC) and studies the impact on the performance of voice core of UMTS networks. The proposed RNC re-homing models are created and analyzed for voice core of UMTS networks. The paper concludes that the appropriate RNC re-homing optimizes the traffic of voice core in UMTS network.

INTRODUCTION

The past few years have seen mobile operators transition to next-generation mobile networks; specifically from third-generation networks (3G) to long term evolution (LTE). Subscriber numbers and network usage are up; and forecasts point to even greater expansion for many years. Mobile operators are challenged to retain existing subscribers, acquire new ones, and manage costs for serving both. With increased traffic, introduction of data, rich multimedia services as well as larger service areas, the mobile operators are facing the issue of radio network congestion and confronting the demands for larger service coverage areas.

DOI: 10.4018/978-1-4666-0050-8.ch013

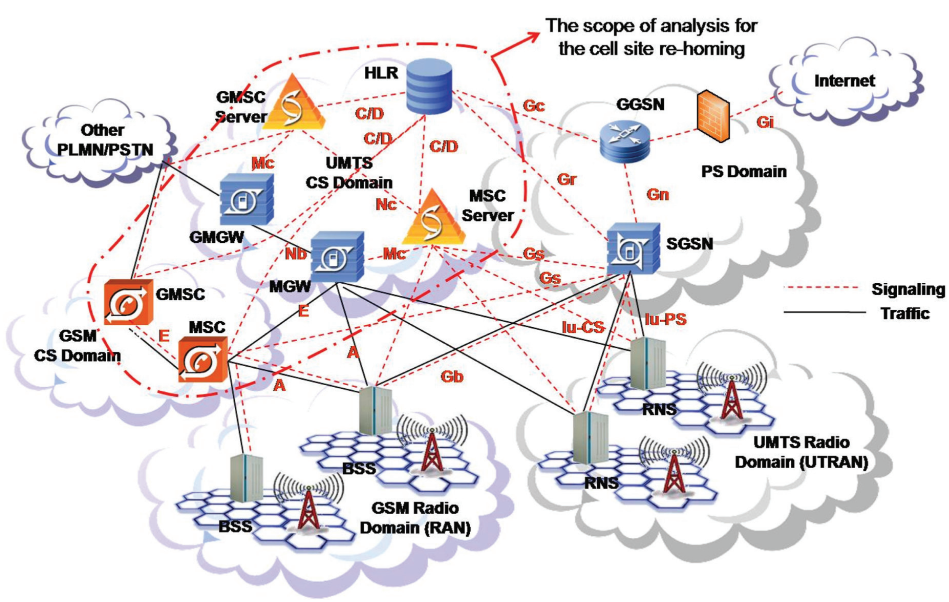
Radio access domain is a primary concern of the UMTS deployment strategy, as it is closely coupled with the mobile operators' most valued asset: spectrum. However, equally important, the core network (CN) is also playing an essential role in enhancing mobility, service control, efficient use of mobile network resources and a seamless evolution from 2G to 3G/4G. Therefore the network evolution calls for a migration to a softswitch core network with a "flat," all-IP and simplified architecture and open interfaces which interwork with non- 3rd Generation Partnership Project (3GPP) mobile networks.

Mobile operators are looking for a best network structure to maximize quality of service for users and minimize the impact on legacy networks. Therefore a new challenge for the UMTS operators is how to prevent radio network from congestion and meet the demands from the rapid growing network throughput due to the sharply penetrated mobile data services.

Normally the solution is the network expansion, increasing the size and capacity of mobile networks by installing more network infrastructure into the existing networks, which is an expensive and human-resource intensive undertaking. Therefore, from the radio network aspect, the best approach to avoid cell congestion or channel blocking due to the subscriber increase is to enhance the radio coverage and capacity via increasing the radio infrastructure such as base stations (BTS) and Base Station Controllers (BSC) in Global System for Mobile Communications (GSM), radio domain, or Node-B and Radio Network Controller (RNC) in the Universal Mobile Telecommunication System (UMTS) radio domain.

Figure 1 displays the topology of a GSM/UMTS radio domain in which BTS and Node-B are the first reference point for end subscribers to access into the mobile networks. BSC and RNC, standing above cell sites logically, are responsible for the connection, control and management of base stations in the radio domain. In particular, the radio domain in UMTS, according to 3GPP TS 25.401 and 3GPP TS 23.002, is called UMTS Terrestrial Radio Access Network (UTRAN) which includes one or multiple Radio Network Sub-system (RNS). An RNS contains one RNC and one or more Node B. Similarly, the radio domain in GSM is called GSM RAN which includes one

Figure 1. Architecture of the GSM/UMTS network and the impact scope of the cell site re-homing



Related Content