A Management Framework for IMS Using Service Managed Objects[*]

Muhammad Shoaib Siddiqui, Syed Obaid Amin, and Choong Seon Hong[**]

Kyung Hee University, Korea
{shoaib,obaid}@networking.khu.ac.kr, cshong@khu.ac.kr

Abstract. In this paper we identify the needs and critical issues of management and monitoring in IP Multimedia Subsystem (IMS). As an IMS provides a layered architecture converging heterogeneous networks; it requires network management as well as service management. We provide a framework for managing an IMS system by utilizing network management server, session management and service managed objects (SMOs). SMOs are similar to managed objects (MO) except they are used for managing the provided services, error detection and fault recovery in services.

Keywords: Service management, Service managed objects, IMS, SDP.

1 Introduction

IP multimedia subsystem (IMS) is the future for all IP next-generation converged networks with potential of enabling service providers to create and provide value added services to users on heterogeneous networks. IMS was defined by 3GPP [1] as an standard architecture which provides a horizontal, cross-functional layer of intelligence on top of IP, enabling the creation, control and execution of new and rich user-to-user services (video streaming), user-to-server offerings (IPTV) and multi-user media services (game-playing on the move and at home via PC). To enable this, IMS architecture must be made compatible with existing service delivery environment such as Service Delivery Platform (SDP). A service delivery platform helps to standardize all the service interfaces for a provider, creating a horizontal platform from which they can provision, control and bill for all the value-added services they provide. A typical SDP+IMS [2] solution is depicted in figure 1.

In this paper, we have provided a study of management and control of services provided using IP Multimedia Subsystem Architecture. In section 2, we discuss some related work to management of IMS and SDP. In section 3, we discuss the management of IMS and SDP. Section 4 discusses the new concept for the management of IMS and SDP, which we have named Service Managed Objects (SMO). Finally, we conclude our work.
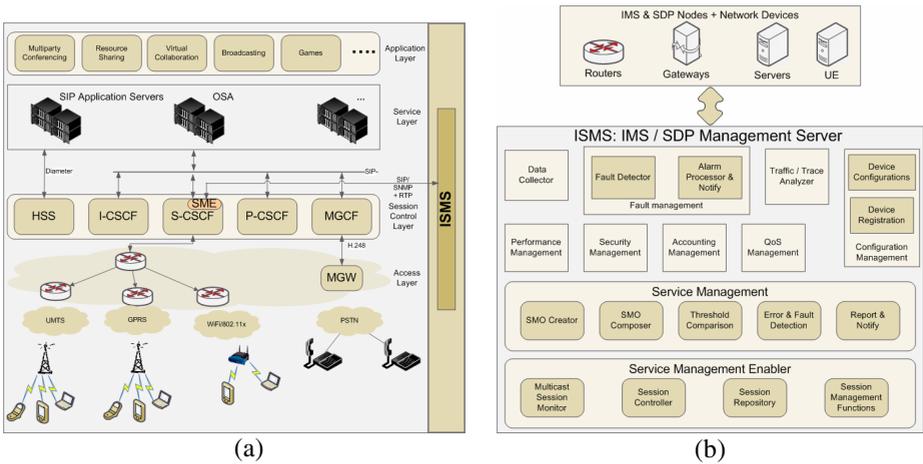

Fig. 1. (a). Simplified view of IMS/ SDP architecture with ISMS as a vertical layer (b). IMS/ SDP Management Server component diagram

2   Related Works

Standards organizations such as ETSI/TISPAN, 3GPP, 3GPP2, OMA, Parlay Group, Java Community Process (JCP) and Internet Engineering Task Force (IETF) are all cooperating to deliver mature open and industry-standard architectural specifications, which spell out what protocols and APIs are needed by CSPs and application developers to facilitate the deployment of IMS and SDP systems. Many companies have introduced their solution of SDP provisioning through IMS, which include IBM, Ericsson, BEA, HP, Motorola and etc.

The Fraunhofer FOKUS Institute opened in July 2004, the "Open IMS Playground" [3]. The FOKUS Open IMS Playground is an open test environment, all major IMS components (especially the FOKUS Open IMS Core). The components come from their own development and from leading industry partners. Open IMS has the IMS Management architecture, which provides means for monitoring and controlling all vital IMS core network components. Open IMS use active and passive traffic generation to control and monitor the IMS environment.

All the available IMS solutions use conventional traffic analysis and performance parameters to manage the IMS and SDP environment. After analyzing the available systems for SDP using IMS, we came to a conclusion that a comprehensive management framework is required which can ease up the management process in all aspect staring from service delivery to network performance and that more emphasis should be given to the management and control issues of IMS and SDP with three major aspects, which are, network management, service management and session management.

3   Management in SDP/IMS

Management Server (ISMS) is a fundamental part of OSS as shown in figure 1-a. It supervises the vital states of IMS/SDP components. IMS/SDP process and traffic are

constantly monitored, both actively and passively. The captured traffic is collected, correlated and analyzed and performance information of session control layer and quality of delivered services is diagnosed. Management server also gathers different performance, security, fault and configuration parameters from all over the network to maintain a healthy state of the network. For this it uses Agents at each managed nodes to deliver it the required information.

4   Services Managed Objects

Service Level Managed Object is a concept to define the service parameters which identify the performance, configuration, faults, accounting and security parameters. As the service is delivered by the service provider with help of different nodes within the system, service parameters are gathered throughout the network. A SMO may consists of managed object from the Network Element level parameters gathered from IMS or SDP nodes or an SMO may be consisted of different SMOs. A high level SMO, which is composed of low level SMOs and final at the lowest level there are some Managed Objects.

High level SMOs are made of generic terminologies which are understandable to service provider, operator and as well as the customer. As the SMOs of lower level are defined, they become more and more technology specific. Given is an example of an SMO defined for a session disruption in IPTV service. The higher level SMO is defined and then more detailed SMOs are defined (one for each level).
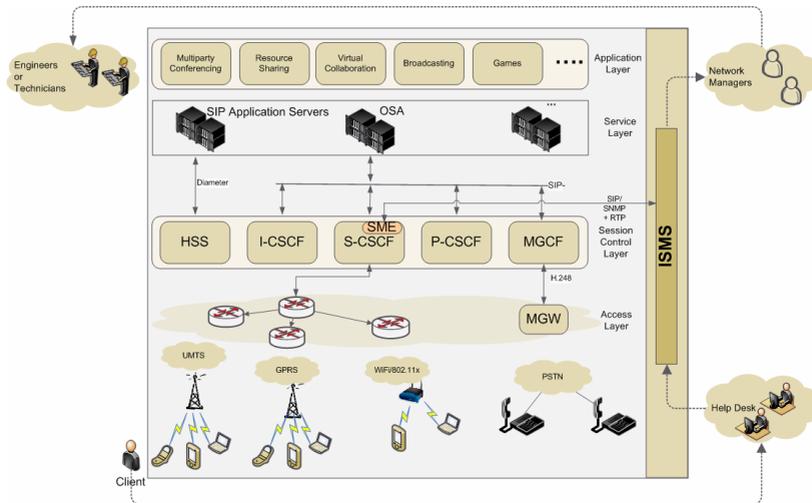
Fig. 2. A simplified IMS environment showing the flow of calls after a service disruption scenario is observed

Service management in the system is handled by the ISMS server. Figure 1-b shows the modular diagram of ISMS. Along with the conventional modules of any management server, there are five more modules for service management. These

modules are SMO Creator, SMO Composer, Threshold Comparer, Error & Fault Detector and Reporter & Notifier.

A typical scenario for how the SMO would help in management of a Service is given in figure 2. A typical service disruption observed by an end user is provided for analyzing the service management. The monitoring and management of this problem can be envisioned as follows:

Service is disrupted while the client is watching IPTV- Customer calls the Help Desk using the VoIP service - From the Help desk the message of Service disruption is sent to ISMS - IPTV_Session_Service_Disruption SMO is created at the ISMS by the SMO Creator module - ISMS sends on-demand request of Managed Objects to the Managed Nodes - Managed Objects (MOs) are sent back by the different IMS, SDP nodes and other network elements - SMO composer builds up SMO from the gathered MOs - Different SMOs provide different measurement of the services, network and quality - Using the SMOs the system can identify the problems in the system by comparing the measured values with the threshold values - Fault detection & localization is performed by the fault detection module - Alarm notification is sent to the configuration management module for reconfigurations - Maintenance parameters are sent to the Network Managers and maintenance personnel - Once the problem is identified, it can also be reported to the concerned nodes (Network Elements) - The notification is made to the service providers and QoS and SLA ensuring nodes - Business processing modules may be notified about the problems in the system - The configuration parameters of those nodes are changed accordingly - Testing can be performed to verify the system after the problem is solved.

5   Conclusion

In this paper, we provided a management server for IMS/SDP solution, which utilizes the new concept of service managed objects. To be a competitor in the field of service provision an IMS/SDP solution needs to be properly managed to provide competitive services at high quality with efficient performance.

References

1. 3GPP, Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS), Stage 2 (Release 7.5.0) (September 2006)
2. Khlifi, H., Gregoire, J.-C.: IMS for Enterprises. IEEE Communications Magazine 45(7), 68–75 (2007)
3. Magedanz, T., Witaszek, D., Knuettel, K.: The IMS playground @ FOKUS-an open testbed for generation network multimedia services. In: First International Conference on Testbeds and Research Infrastructures for the Development of Networks and Communities, February 23-25, 2005, pp. 2–11 (2005)