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FACULTY OF ENGINEERING
Electronics and Communication Engineering Department

Advanced Central System For Multi-media Services

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Statement

This Thesis is submitted to Faculty of Engineering, Ain Shams University for the degree of Master of Science in Electrical Engineering (Electronics and Communications Engineering).

The work included in this thesis was carried out by the author at the Electronics and Communications Department, Faculty of Engineering, Ain Shams University, Cairo, Egypt.

No part of this thesis was submitted for a degree or a qualification at any other university or institution.

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Abstract

Provisioning multimedia services via packet switched network is one of the most innovative trends in telecommunication world. IP Multimedia Subsystem (IMS) was a masterwork system that it can provide all services over an IP-based infrastructure. This thesis aims to illustrate a new model called IP Multimedia Mediator System (IMM) which is a unified communication system able to provide all communication and multimedia services. IMM uses the idea of virtualized cloud infrastructure to enhance the interoperability between different established systems as well as reduce the overall core network complexity. IMM testbed is evaluated as a central system for broadcasting multimedia services via several scenarios also, may be deployed in three types of network campus use cases.

This thesis reviews some of the steps of IMS's evolution series and explains all about its drawbacks in detail. This is in addition to a comparison with the new novel proposal IMM. IMS aspects were thoroughly investigated and its advantages and disadvantages are widely recognized. In spite of IMS is a complex architecture and not scalable enough, 4G and beyond that are not based on IMS core would be fraught with inefficiencies and would be suffering from performance degradation. For these reasons, it is vital to reduce complexity and cost of IMS.

As that, the new novel proposal provides a suitable solution to enhance the network operability with its full services in non-complex environment. As well as reducing the power consumption from the mobile base stations,

that led to reduce the carbon footprint that is emitted from them, which are considered one of the most important green communications' requirements.

In IMM smart community, the user does not need more than a device that has WLAN interface to direct communicate with IMM services station to have a complete package of existing services as well as any forthcoming smart services/applications.

IMM is a promising approach for resolving IMS problems. Also, IMM may be considered as one of the proposed prototypes for SDN/NFV deployment techniques.

Key Words: (IMS) IP Multimedia Subsystem, (3GPP) 3^{rd} Generation Partnership Project, (WLAN) Wireless Local Area Network, Cloudification, Virtualization, (NV) Network Virtualization, (NFV) Network Functions Virtualization, (SDN) Software-Defined Networking, (IMM) IP Multimedia Mediator System.

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List of Symbols

E%	Traffic Intensity
m	Number of available channels
N	Numbers
N_R	Number of packets received at destination
N_S	Number of packets sent from destination
Ø	Throughput

List of Abbreviations

1G	First Generation
2G	Second Generation
3G	Third Generation
3GPP	Third Generation Partnership Project
4G	Fourth Generation
5G	Fifth Generation
AXE4GN	ATCOM GSM Cards
BGCF	Breakout Gateway Control Function
BH	Busy Hour
BHCA	Busy Hour Call Attempts
BHCR	Busy Hour Calling Rate
CCR	Call Completion Rate
CSCF	Call Session Control Function
CPU	Central Processing Unit
CLI	Command Line Interface
CRC	Cyclic Redundancy Check
CCITT	Consultative Committee for International Telephony Telegraphy
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Server
EHCP	Elastix Hardware Certification Program