

Mobile Cloud Computing: Embracing Network as a Service

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Abstract – The recent emergence of Cloud Computing in the IT world has brought much hype and opened doors for new revenue streams and business models. The movement towards an all IP-based communication system has led to the IMS being accepted as the Next Generation Network (NGN) service control provisioning platform. The Telecommunication industry has realized the benefit of deploying their own Mobile Cloud where they can offer network capabilities/ resources (e.g. presence, location, and payment) to 3rd Party ASPs through standardized gateways. The use of Open Mobile Alliance - Policy Evaluation, Enforcement and Management (OMA PEEM) for resource exposure is a key component for embracing the concept of NaaS, as well as the GSMA OneAPI for cross-network service providers.

Index Terms — IMS, MCC, NaaS, NGN, OMA, PEEM

I. INTRODUCTION

The telecommunication industry's main revenue stream comes from voice calls; over the last decade mobile operators have been seeking new revenue streams and business models. The emerging Web 2.0 presents a great opportunity for telecom operators where they can sell their capabilities/ resources as services.

Over-the-Top architecture offer rapid one-off deployment and optimized one-off Capital Expenditure (CAPEX) [2, 3]. These stand-alone solutions require their own Operational Expenditure (OPEX). One of the key aspects of NGN telecommunication platforms is the reuse of its existing infrastructure for new market driven applications through dedicated application enablers, thus sharing OPEX across the whole architecture.

Cloud Computing is a paradigm shift in the IT world where computing (e.g. processing power, storage) is moved away from the user's personal computer or application server to a cloud of powerful computers [4, 5].

Cloud Computing offers a variety of on-demand services and adapts the delivery of Software as a Service (SaaS), Infrastructure as a Service (IaaS) or Platform as a Service (PaaS). Telco operators can benefit in the same way by offering Network as a Service (NaaS). According to AEPONA NaaS in its simplest term refers to Telco opening network and payment resources APIs to 3rd Party Application Service Providers (ASPs) [1]. This opens up an opportunity for the Telco 2.0 Two-Sided Business Model,

which is described in Figure 1.0 below.

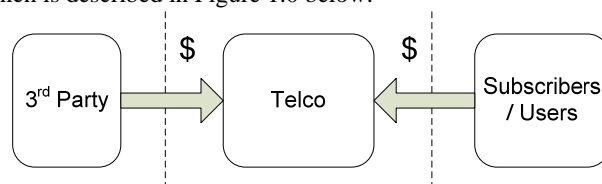


Figure 1.0 Telco 2.0 Two-Sided Business Model, showing revenue streams from both users and 3rd party ASPs.
Source [1]

II. POLICY MANAGEMENT

OMA was founded in 2002 and is the leading standardization body for mobile service related technology [8,9]. The OMA Service Environment (OSE) is a conceptual environment that includes:

- Service enablers
- Application interfaces to make use of these enablers
- Interfaces to the Service Providers' Execution Environment
- Interfaces to use underlying capabilities/ resources

The OSE architecture's main component is the Policy Evaluation, Enforcement and Management (PEEM) enabler, which provides the main Service Oriented Architecture (SOA) principles. These are: reuse, delegation and composition. Using the OSA architecture it is possible to take advantage of Parlay/OSA components and the IMS architecture [10].

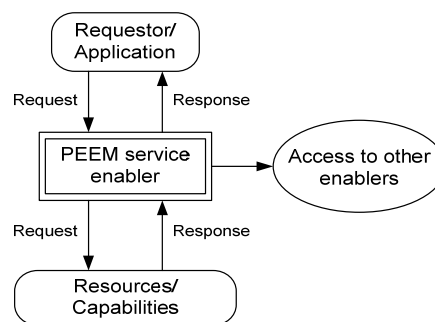


Figure 2.0 PEEM function
Adapted from [9]

The PEEM intercepts requests from foreign domains (e.g. 3rd party ASPs) and apply policies to them. These policies are evaluated and enforced depending on the SLA between the Telco operator and the 3rd Party ASP.

A. NGN and Cloud integration

Before the PEEM enabler can be used to expose network resources to 3rd party ASPs, a standard architecture is needed to support cloud services in NGN IMS/EPC.

The ETSI/TISPAN another standardization body has identified gaps/ barriers for the interoperability of NGN architecture and Cloud technology [6, 7].

In particular ETSI has identified the need for an architecture that supports end-to-end services, where the QoS is independent of the underlying networking technology. The architecture must also support interoperability among multiple network service providers.

ETSI has identified four possible architectural options whose implication must be investigated.

This subsystem-oriented architecture facilitates the addition of new subsystems to cover new users' demands and services while sharing and reducing OPEX. It also allows the adoption of subsystems defined by other standardization bodies.

B. Cross Network Service Provider

In order to embrace a true NaaS model, there is need to reduce the level of fragmentation in Telco's APIs and access network resources regardless of operator.

The GSMA OneAPI initiative was launched in 2008 with the aim to provide a common standard API to allow mobile (as well as fixed) operators to expose their network capabilities. Thus the GSMA OneAPI will be acting as a Cross Network Service Provider (CNSP) as defined by AEPOA [1], providing 3rd party ASPs access to network resources through standardized and harmonized interfaces.

IV. IMPLEMENTATION AND EVALUATION

This research work will investigate the different integration scenarios as proposed by the ETSI. A simple web-service will be developed in order to expose network capabilities through the usage of the PEEM enabler. A service broker for a web-service orchestration may be developed implicitly.

Furthermore, the ease of use and integration of the standardized GSMA OneAPI will be investigated.

Future work may include the analysis of scalability issues in particular the need for interconnecting CNSPs from different regions.

V. CONCLUSION

Telco operator are in a position to take advantage of the new Cloud computing paradigm by extending the NGN infrastructure in order to support cloud services and generate additional revenue streams.

ASPs need a standardized and common interface to access NGN enablers as well as network resources. This is being led by the GSMA OneAPI initiative.

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BIOGRAPHY

Michael Andres Feliu Gutierrez received his BSc (Hon) in Electrical and Computer Engineering in 2009 from the University of Cape Town and is presently studying towards his Master of Science degree at the same institution. His research interests include Mobile Cloud Computing, Service provisioning in Next Generation Networks and Policy Management.

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