A Network Application Programming Interface for OSA/Parlay

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Abstract—A Network Interface for OSA/Parlay has not been defined, however it is critical for delivering services to the end user. This research intends to investigate the use of an open, standard, technology independent API for the interface. The full interface will need to be platform independent and therefore defined in UML for the categories: CSN, PSN, MG and IVR.

Index Terms—OSA/Parlay, Network Interface, API.

I. Introduction

Convergence between telecommunications and information technology has resulted in new technologies that enable the future multiservice network supporting data, voice and multimedia. A key feature of these new technologies is an open, standard, application-programming interface (API). The API provides a level of abstraction in which the application engineer does not need knowledge of the underlying network to develop services. Similarly, the network designer uses general rather than specific service considerations. Another central feature is the migration of intelligence from high-performance centralised hardware such as the traditional Intelligent Network (IN) towards the edges of the network in a Distributed Processing Environment (DPE) [1, 2].

The OSA/Parlay Gateway is based on these new technologies and provides a point of integration between Next Generation Network (NGN) application services and the underlying Transport Network infrastructure. OSA/Parlay allows 3rd Party intelligent application developers to provide services using the telco connectivity [4]. OSA/Parlay is a three-layered architecture, consisting of the transport network layer, the service control layer (the OSA/Parlay Gateway) and the application & services layer [3, 4] as depicted in Figure 1. Each layer is independent of its neighbouring layer and is accessed through an open, standard and secure API [3, 4]. The architecture allows for a multitude of intelligent service functions such as mobility, generic call control, data session control and many others [4]. It facilitates the integration of various underlying networks and provides a single gateway to provision services on these networks [4].

The standard is in early stages of deployment. Current research efforts focus on development of applications and services using the application interface. However, the interface between the Gateway and the Transport network, i.e. the Network Interface (NI) has not received the same attention.

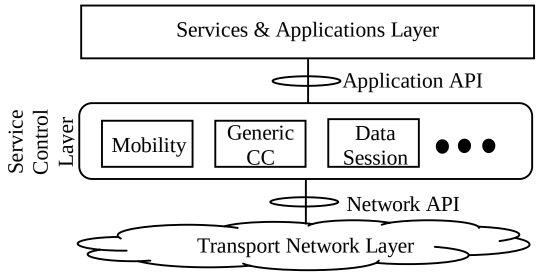

Figure 1: OSA/Parlay Architecture

In this project, we examine the design of the OSA/Parlay Network Interface (NI). We propose an API-based interface defined to be technologically independent. Similar to the definition of the Application Interface, the NI will be Object Oriented (OO) using UML. The interface should accommodate a broad range of transport networks and special resources and thus be defined for circuit switched networks (CSN), packet switched networks (PSN) and accommodate nodes such as media gateways (MG) and interactive voice response units (IVR).

The NI will encapsulate capabilities to query the state of the Transport Network and send connection control requests to the Transport Network. The capabilities of the NI will include QoS and network-level federation queries and requests.

The NI will be designed, built and demonstrated through a proof of concept case study. This study will highlight the advantages and disadvantages of the API based NI according to criteria for connection setup, maintenance and teardown in CSNs and PSNs. Other criteria will include communication with special resources, FCAPS management, federation and QoS.

II. Problem Statement

The Network Interface has not been defined in the OSA/Parlay standard. The NI is however a critical part of the architecture for delivering services to the end user. Due to the fast paced evolution of technologies it is essential that the interface is future proof and must therefore be technology independent. The Parlay Group has alluded to the use of protocol adapters for the interface. Technology dependent adapters would have a negative effect on the future proof characteristics of the gateway. The resulting proliferation of protocol adapters would also need to be managed for various transport networks. This research intends to make use of standard, open APIs that have characteristics of technology independence and hence future proofing the interface.

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The interface must be technologically independent and will therefore be defined in UML for four broad categories which will include all the existing transport networks as well as core nodes: CSNs, PSNs, MGs and IVRs. Mechanisms for receiving network state information as well as sending connection control information with QoS requirements to the transport network will be defined. The definition of the network interface will need to include a number of additional operations, which includes the operation of the QoS mechanism for call quality, admission control and ensuring QoS in a federated network architecture.

III. Key Literature

A number of standards contribute to the development of the OSA/Parlay Network Interface. Specific concepts in the TINA, MSF and 3GPP architectures can be adapted and used for the OSA/Parlay Network Interface.

A. *TINA*

TINA is one of the most comprehensive telecommunication architectures [5] with separate service and network resource architectures. TINA [6, 7] defines a Network Interface between the service and network resource architectures with generic functionality for connection control. Federation of teleco's is envisaged in TINA and therefore an interdomain interface is defined. QoS and access control aspects are emphasized. QoS interrogation and end-to-end provisioning is relevant to the present research. The TINA Management Architecture supports FCAPS and the network management concepts are applicable. The TINA access session and authorization can be used specifically for the federation of telco networks.

B. *Multiservice Switching Forum (MSF)*

The MSF's objective is to develop and promote open architecture, multiservice switching systems. The MSFs VoIP QoS Architecture [8] makes use of core and edge routers for the transport of packets in the network. An important concept of MSF that is applicable to the OSA/Parlay Gateway is the QoS interrogation provisioning between the Bandwidth Manager and the Routers [8]. In addition, the access control implemented in the edge routers to manage the QoS within the network is useful [8]. While the MSF architecture has been defined, no interface definitions are available.

C. *3GPP*

The objective of the 3GPP architecture is to produce global technical standards for 3rd generation mobile systems. The idea of the architecture being able to adapt to both integrated and separated transport networks can be useful for the present research [9]. 3GPP provides technology independent layer 3 call control to accommodate various layer 2 technologies. The QoS provisioning concept can be adapted for the OSA/Parlay NI due to the stringent nature of the quality requirements of a mobile network [9].

IV. Future Work

The future research intends to define a comprehensive Enterprise-, Information-, Computational-, Engineering- and Technology viewpoint for the NI. The Reference Model for Open Distributed Processing (RM-ODP) methodology is therefore proposed for completing the viewpoints in designing the NI. A framework is to be developed for the NI and related architecture. The framework will ensure that the interface will consist of the following characteristics: *openness*, *simplicity*, *future-proof*, *QoS mechanisms* and supporting *federation* between telecos. This methodology ensures that the NI to be specified will be independent of systems and technology. Various tools will be used within the RM-ODP methodology to complete the various views, these will include SDL, ICONIX and UML amongst others.

The NI will be designed, built and illustrated through a proof of concept case study for the four broad categories: CSNs, PSNs, MGs and IVRs. The proof of concept environment will be UNIX based and implemented in a CORBA DPE. The testing procedure will be based according to criteria for connection setup, maintenance and teardown in CSNs and PSNs. Other criteria will include communication with special resources, FCAPS management, federation and QoS. The evaluation will highlight the advantages and disadvantages of the API based NI.

V. Conclusion

The network interface is a critical part of the OSA/Parlay architecture for delivering services to the end user. Due to the fast paced evolution of technologies it is essential that the interface needs to be future proof and therefore technology independent. The proposal for the use of technology-dependent protocol adaptors therefore can not meet this criteria. The network interface should be standards based and technologically independent. The interface will need to be defined in the OO paradigm, using APIs and in UML notation, similar to the approach adopted for the application interface.

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