Understanding the effectiveness of open standards for providing access to functions in Next Generation Networks

by

Samson Lee

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Certificate of Authorship

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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Abstract

The traditional telecommunications environment is 'closed', where applications can only be developed internally with specific knowledge of individual network technologies. In the last several years, there has been an enormous increase in efforts to 'open up' these networks for application development, leading to open standards such as the Parlay/OSA APIs. This thesis is primarily concerned with understanding the effectiveness of open standards for providing third party stakeholders with access to functions in Next Generation Networks. Effectiveness in this context is to do with how well open systems may, and can, enable the business aims, and consequent technological advantages to achieve the business aims. We reason about the effectiveness from three perspectives in terms of whether the open standard provides sufficient openness, functional coverage, and practicality. While the methodology and models are applicable to evaluating open standards in general, we specifically apply them to the QoS control functionality provided by the Parlay/OSA Connectivity Manager Service Capability Feature.

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Contents

Certificate of Authorship i

Abstract ii

Acknowledgements iii

List of Figures viii

List of Tables x

Abbreviations xi

1 Introduction 1
- 1.1 Context and Motivations . . . 1
- 1.2 Research Framework . . . 2
  - 1.2.1 Research Objective . . . 2
  - 1.2.2 Hypothesis . . . 2
  - 1.2.3 Research Questions . . . 3
  - 1.2.4 Approach . . . 4
- 1.3 Thesis Structure . . . 4
- 1.4 Original Contributions . . . 6
- 1.5 Publications . . . 7

2 The case for open access in Next Generation Networks 11
- 2.1 Introduction . . . 11
- 2.2 An analysis of open access in next generation networks using a PEST framework . . . 12
  - 2.2.1 The Impact of Privatization and Open Competition (Political) . . . 13
  - 2.2.2 The Recovering Telecommunications Economy . . . 15
  - 2.2.3 User-centric services (Social-cultural) . . . 18
  - 2.2.4 Convergence of networks (Technological) . . . 20

2.3 The changing role of telecommunications providers 24
2.3.1 Stakeholders 25
2.3.2 Infrastructure Providers 26
2.3.3 Vendors 28
2.4 Standardization of Open Access in NGNs 29
2.4.1 ITU-T 29
2.4.2 3GPP IP Multimedia Subsystem (IMS) 32
2.4.3 ETSI TISPAN 33
2.4.4 The Parlay Group 34
2.5 An overview of Open Service Access 35
2.5.1 Parlay/OSA 36
2.5.2 Parlay X Web Services 40
2.6 Summary and Conclusions 44

3 Open Systems Engineering Measures and Requirements 47
3.1 Introduction 47
3.2 Overview of Open Systems Engineering 48
3.2.1 Open System Characteristics 50
3.2.2 Open Standards 54
3.2.3 Relationship between Open Standards and Open System Qualities 59
3.3 Parlay/OSA and Open Systems Qualities 60
3.3.1 Portability 60
3.3.2 Interoperability 61
3.4 Parlay/OSA and Open Standards 62
3.4.1 Open Meeting 62
3.4.2 Consensus 63
3.4.3 Due Process 63
3.4.4 One World 64
3.4.5 Open Intellectual Property Rights 65
3.4.6 Open Change 66
3.4.7 Open Documents 66
3.4.8 Open Interface 66
3.4.9 Open Use 67
3.4.10 Ongoing Support 68
3.5 Parlay/OSA and Open Systems Engineering Measures 68
3.5.1 Standards Measures 70
3.5.2 Profile Measures 75
3.5.3 Product Measures 78
3.6 Summary and Conclusions 79

4 An abstract model of NGN functionality 83
4.1 Introduction 83
4.2 Defining the SAMSON abstract model of NGN functions 84
4.2.1 Fundamental principles 84

4.2.2 Defining the SAMSON abstract model of NGN functions . 86
4.2.3 Related work 94
4.3 Evaluating open access to QoS control using the SAMSON abstract model of NGN functions 97
4.3.1 Service management-plane 99
4.3.2 Service control-plane 102
4.3.3 Service data-plane 105
4.3.4 Transport management-plane 105
4.3.5 Transport control-plane 106
4.3.6 Transport data-plane 106
4.4 Identification of functional gaps 107
4.4.1 Improving the Parlay/OSA Connectivity Manager 107
4.5 Summary and Conclusions 108

5 Implementation of an open API for QoS control 110
5.1 Introduction 111
5.2 Methodology—Learning-Outcome Approach to the Experimental Design Life-Cycle 112
5.2.1 Experimental Design 112
5.2.2 The Experimental Design Life-Cycle 113
5.2.3 The Learning-Outcome Approach 116
5.3 Prototype Scenario 118
5.3.1 Prototype Scenario / High Level Architecture 118
5.3.2 An example QoS-enabled multimedia application 120
5.3.3 QoS control in the Next Generation Network 121
5.3.4 Experimental Design Life-Cycle 122
5.4 Stage 1—Prototyping the existing Parlay/OSA Connectivity Manager API 124
5.4.1 Overview of the Parlay/OSA Gateway 124
5.4.2 Details of example QoS-enabled multimedia application . . 127
5.4.3 Learning-Outcome Evaluation 129
5.5 Stage 2—Prototyping an improved Parlay/OSA Connectivity Manager API 130
5.5.1 Improvements to the specification 130
5.5.2 An example QoS-enabled application with asynchronous feedback 131
5.5.3 Learning-Outcome Evaluation 133
5.6 Stage 3—Prototyping a new QoS control Web service for Parlay X 133
5.6.1 Prototype Scenario / High Level Architecture 133
5.6.2 Overview of the new specification 135
5.6.3 Implementing the new Web service 135
5.6.4 An example QoS-enabled application 136
5.6.5 Learning-Outcome Evaluation 136
5.7 Summary and Conclusions 137

6 Conclusions and Future Work **138**
6.1 Objectives Fulfilled 138
6.1.1 Is there really a business case for open access in NGNs? . . 138
6.1.2 How effective are open standards for providing access to functions in NGNs? 139
6.2 Summary of Conclusions 142
6.3 Future Work 143

Bibliography **145**

A Detailed Network Diagrams **156**

B Prototype Screenshots **159**

C Publications **169**
C.1 Evaluating Open Service Access with a PEST Framework 170
C.2 Evaluating Open Service Access with an Open Standards Requirements Framework 176
C.3 Evaluating Open Service Access with an Abstract Model of NGN Functions 181
C.4 Managing the Enriched Experience Network—Learning-Outcome Approach to the Experimental Design Life-Cycle 191
C.5 Open API for QoS control in Next Generation Networks 196
C.6 Open Service Access for QoS control in Next Generation Networks—Improving the Parlay/OSA Connectivity Manager 208
C.7 Measuring the effect of cross traffic on execution time in a parallel and distributed network simulator 218
C.8 Performance benchmark of a parallel and distributed network simulator 222

List of Figures

1.1 Structure of this thesis 10

2.1 Deloitte Global Telco Index 15
2.2 Hierarchy of Broadband Needs 19
2.3 Each network with own access, transport switching and service architecture. 21
2.4 Next Generation Network with unified service network architecture. 22
2.5 ITU-T FGNGN Transport and Service Stratums. 31
2.6 3GPP IMS Basic Architecture. 33
2.7 Architecture of Parlay/OSA APIs 38
2.8 Architecture of Parlay/OSA APIs 42

3.1 The vertical portable component model. 52
3.2 The horizontal interoperable service model. 52
3.3 Relationship between Open Standards and Open Systems Characteristics 60
3.4 Relationship between required features, standard features and profile features. 69

4.1 Fundamental principles of separation. 85
4.2 The SAMSON abstract model of NGN functions—Examples. . . . 87
4.3 The Five-Layer TMN Network Management Architecture. 88
4.4 The importance of the service control-plane. 90
4.5 The 5-tier SIMPSON model. 95
4.6 Scope of Parlay/OSA and RACS draft requirements (1–13) within SAMSON abstract model of NGN functions. 100

5.1 Incremental Experimental Design Life-Cycle Model. 114
5.2 Evolutionary Experimental Design Life-Cycle Model. 115
5.3 Prototype Scenario—Service and Transport Layers. 119
5.4 Prototype Scenario. 119
5.5 Three incremental stages. 123
5.6 Parlay/OSA Connectivity Manager. 125
5.7 Class Diagram of Parlay/OSA Connectivity Manager API. 126
5.8 Sequence Diagram of Example QoS-aware application. 129
5.9 Class Diagram of Prototype Improved Parlay/OSA Connectivity Manager API. 131

5.10 Parlay X QoS Control scenario. 134

A.1 Network Topology 157
A.2 IP Numbering 158

B.1 Parlay/OSA Gateway Configuration Page 160
B.2 Connectivity Manager Configuration Console 160
B.3 QoS Template Customization 161
B.4 Enterprise Network Site Configuration Console 165
B.5 VPrP Details 166
B.6 User Application 168

List of Tables

2.1 Relationship ETSI/Parlay and 3GPP. 36
2.2 Summary of the Parlay/OSA APIs. 37
2.3 Summary of Parlay X Web Services, and mapping to Parlay/OSA. 41
2.4 Architectural comparison of Parlay/OSA versus Web Services. . . 43

3.1 Expectations of Open/Modular systems. 53
3.2 Krechmer's 10 requirements for open standards in relation with other popular definitions. 58
3.3 Summary of results for Standard Maturity measures. 72
3.4 Summary of results for Standard Explicitness measures. 74

4.1 Summary of 5-tier SIMPSON abstract model of NGN functions. . 96
4.2 Summary of relevant RACS functional requirements. 98
4.3 Summary of functional gaps—Parlay/OSA Connectivity Manager versus RACS requirements. 99

Abbreviations

3GPP	Third Generation Partnership Program
7750SR	Alcatel-Lucent 7750 Service Router
ACCC	Australian Competition and Consumer Commission
AF	Application Function
AHV	Application Host Vendor
API	Application Programming Interface
AplP	Appliance Provider
AplV	Appliance Vendor
ARIB	Association of Radio Industries and Businesses (Japan)
ASIC	Application Specific Integrated Circuit
ASP	Application Service Provider
ATIS	Alliance for Telecommunications Industry Solutions (North America)
ATM	Asynchronous Transfer Mode
BGP	Border Gateway Protocol
CAMEL	Customized Applications for Mobile network Enhanced Logic
CATV	Cable Television
CCSA	China Communications Standards Association
CDMA	Code Division Multiple Access
COPS	Common Open Policy Service
CORBA	Common Object Request Broker Architecture
CoS	Class of Service
COTS	Commercial Off The Shelf
CP	Connectivity Provider

CPE	Customer Premises Equipment
CR-LDP	Constraint based Label Distribution Protocol
CTI	Computer Telephony Integration
DECT	Digital Enhanced Cordless Telecommunications
DHCP	Dynamic Host Configuration Protocol
DSL	Digital Subscriber Line
DSTO	Defence Science Technology Organization
ED	Experimental Design
EDGE	Enhanced Data rates for GSM Evolution
FW	Firewall
eTOM	Enhanced Telecommunications Operations Map
ETSI	European Telecommunications Standards Institute
FAB	Fulfilment, Assurance and Billing
FCAPS	Fault, Configuration, Accounting, Performance and Security
FGNGN	ITU-T Focus Group on Next Generation Networks
FTP	File Transfer Protocol
FTTH	Fiber To The Home
GII	Global Information Infrastructure
GSM	Global System for Mobile communications
GW	Gateway
HDTV	High Definition Television
HTTP	Hypertext Transfer Protocol
IAD	Integrated Access Device
ICT	Information and Communications Technology
IDL	Interface Definition Language
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IMAP	Internet Message Access Protocol
IMS	IP Multimedia Subsystem
IN	Intelligent Network

INAP	Intelligent Network Application Part
IP	Internet Protocol
IPR	Intellectual Property Rights
IPTV	Internet Protocol Television
IS	Information System
IS-95	Interim Standard 95 (for CDMA)
ISO	International Organization for Standardization
ITU-T	International Telecommunication Union—Telecommunication Standardization Sector
JAIN	Java APIs for Integrated Networks
LSP	Label Switched Path
MEEN	Management of Enriched Experience Networks
MPLS	Multi Protocol Label Switching
NAT	Network Address Translation
NAPT	Network Address and Port Translation
NGN	Next Generation Network
NIV	Network Infrastructure Vendor
NMS	Network Management System
NSI	Network Service Interface
NSIS	Next Steps in Signaling
OASIS	Organization for the Advancement of Structured Information Standards
OMG	Object Management Group
OSA	Open Service Access
OSE	Open Systems Engineering
OSEM	OSE Measures
OSI-BRM	Open Systems Interconnection—Basic Reference Model
OSPF	Open Shorted Path First
OSS	Operational Support System
PADI	PPPoE Active Discovery Initiation
PADO	PPPoE Active Discovery Offer

PC	Personal Computer
PDA	Personal Digital Assistant
PEST	Political, Economic, Social-Cultural and Technological
PHB	Per Hob Behaviour
PLMN	Public Land Mobile Network
PPP/LCP	Point to Point Protocol / Link Control Protocol
PPPoE	Point to Point Protocol over Ethernet
PPTP	Point to Point Tunneling Protocol
POP	Point of Presence or Post Office Protocol
POSIX	Portable Operating System Interface
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RA	Broker / Retail Agent
RACS	Resource Admission Control Subsystem
RIP	Routing Information Protocol
RMI	Java Remote Method Invocation
RSVP-TE	Resource Reservation Protocol with Traffic Engineering
RTSP	Realtime Streaming Protocol
SAML	Security Assertion Markup Language
SAMSON	Service Access Model for Standardized Open Networks
SAP	Service Access Point
SCF	Service Capability Feature
SCP	Service Control Point
SCS	Service Capability Server
SDLC	Software Development Life-Cycle
SDO	Standards Development Organization
SDP	Service Delivery Platform
SEI	Software Engineering Institute
SIMPSON	SIgnaling Model for Programmable Services on Networks
SIP	Session Initiation Protocol
SIV	Support Infrastructure Vendor

SLEE	Service Logic Execution Environment
SMTP	Simple Mail Transport Protocol
SNMP	Simple Network Management Protocol
SOA	Service Oriented Architecture
SOLO	Structure of the Observed Learning Outcome
SS7	Signaling System #7
SSO	Standard Setting Organization
STB	Set Top Box
TCP	Transmission Control Protocol
TD-CDMA	Time Division CDMA
TINA-C	Telecommunications Information Networking Architecture Consortium
TISPAN	Telecoms & Internet converged Services & Protocols for Advanced Networks
TMF	Tele Management Forum
TMN	Telecommunications Management Network
TTA	Telecommunications Technology Association (Korea)
TTC	Telecommunication Technology Committee (Japan)
UDDI	Universal Description, Discovery, and Integration
UML	Unified Modeling Language
UMTS	Universal Mobile Telecommunications System
VC	Virtual Circuit
VoD	Video on Demand
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
VPrN	Virtual Provisioned Network
VPrP	Virtual Provisioned Pipe
W-CDMA	Wideband CDMA
W3C	World Wide Web Consortium
WFQ	Weighted Fair Queuing
WSDL	Web Services Description Language

WSLA	Web Service Level Agreements
XML	Extensible Mark-up Language