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MULTIMEDIA GROUP COMMUNICATION

Foreword

Here is a book with pioneers in action.

When the world wide web was being shaped, few observers realised what was emerging.

This book documents an exciting step which reaches beyond classic telephone services. It is too early to see which inventions will last, but it is exciting to observe this innovation in action. Multimedia group communication, as described in this book, is an inspiring invention stretching the envelope of new services based on internet technologies. Some of the brightest minds in the industry saw how group communication capabilities seen previously in closed enterprise services based on trunking radio could be brought to the mainstream consumer market based on mass market terminals and data connectivity using GSM/GPRS infrastructure.

Combining session management and streaming technologies, a service is provided where any member of a group may take the floor and speak to others. One can think of this as an enhanced chat session. Rather than writing a comment on a shared chat board, here we exchange observations and comments in a shared voice channel. This is more convenient, in particular, when on the move.

Group communication like this enables teams spread across physical locations to share comments, helping them maintain a view of the status of other team members. It also enables casual peer groups at leisure to, keep in touch when apart. Establishing such a shared context would be a tedious exercise using classic voice calls, conference calls or exchange of text messages.

Group communication changes the way we think about our contacts. They no longer look like a plain alphabetical list of entries. With group communication we see individuals in the context of the groups where they are members. Presenting such structured contacts is an essential part of implementing a group communication service.

While considering initiating a session or during a session, we are interested to observe the actual availability status of members of our group. Hence presence becomes an active on-line attribute of high relevance.

Many of us would be surprised to realise that the authors of the book do not describe a conceptual theoretical model, but a real implemented service. The latest mobile terminals have a group communication feature (often known as push to talk) already included and many network operators already have deployed the infrastructure needed to offer such a service.

Understanding this new communication paradigm helps us to realise how internet based technologies will enrich communication.

Petri Pöyhönen
Head of Converged Internet Connectivity Business Line
Nokia Siemens Networks

Preface

Multimedia Group Communications encapsulates three enablers – Push-to-Talk over Cellular (PoC) service, XML Document Service (XDMS), and Presence with SIMPLE service – that have been standardized by Open Mobile Alliance (OMA). These services combine to allow mobile users to create and store their own groups, and communicate with the group members in real time.

Group communications and Push-to-Talk over Cellular in particular is a topic of interest in the mobile industry within the last ten to tweleve years. After the success of the Push-to-Talk service in the US during the mid-nineties, operators worldwide started to look at *walkie-talkie over cellular* service with attention. With this interest in mind, a group of leading mobile infrastructure and handset vendors developed the *Industry Consortium* for PoC. Regardless of the effort, this work did not move on to the commercial stage. Rather, different non-compatible PoC solutions were commercially deployed in several countries around the world in the early 2000s (Germany, New Zealand, Japan, Mexico, Sweden, Spain).

Pre-standard PoC solutions have made an important contribution in bringing the cellular walkie-talkie user experience to the market. However, at some point in time it became evident that, for a community-based service, it is crucial to ensure interoperability across handsets (*I can PoC any other user, regardless of the handset they use*), and across networks (*I can PoC any other user, regardless of the network operator they are subscribed to*). A common playground (a standard) is required to ensure such degree of interoperability, as a key enabler of real service take-up and success.

With this idea in mind, the Open Mobile Alliance started standardization activities around PoC, Presence and Group Management (later on renamed as *XML Document Management*) during 2003. The results of that work cristalized in 2006, when the three enablers were officially approved as a first step to let device and infrastructure providers develop standards-based products.

At the time of writing (September 2007), there are interesting signs in the market that operators are progressively migrating their pre-standard deployments towards an OMA compliant infrastructure. The first OMA PoC / Presence / XDM devices are already available, with new models and brands progresively incorporating PoC during 2008. Operators are now again looking at PoC and group communications with attention, possibly focusing on the corporate sector as a first step, as a critical mass of handsets becomes available prior to a residential PoC launch.

Interestingly, PoC is the first one of a new paradigm of SIP-based services to be deployed in a large scale. Effectively, Push-to-Talk over Cellular is the first service providing a real

group communication experience (it is very easy to build up and communicate between groups of users with PoC), and it is the first service that delivers a *real-time communications* experience over the *packet-switched* cellular network (before PoC, most real-time services were run on top of the circuit-switched infrastructure). It comes as no surprise that these two paradigms represent a new step in the communications industry. In fact, these concepts are the foundation for future, innovative services that are already in the standardization pipeline or about to reach commercial status, such as SIP-based messaging or SIP-based multimedia conferencing.

Yet, it is understood that the deployment of these new communication paradigms introduced by PoC is not a trivial task. It requires developing new sets of skills and solutions across handset and infrastructure vendors, network operators and service providers. Furthermore, users need to get used to the service and understand the value it brings to their everyday life, both in the corporate and in the consumer sectors. It is our very modest aim with this book to try to help all these players make their move towards this new communications concept.

This book was written to provide detailed insights about the new multimedia group communication experience in general, and PoC, Presence and XDM enablers in particular – the concepts, architecture, protocols, application and future orientation. Its intended audience ranges from marketing managers, research and development engineers, and test engineers to university students. The book is written in a manner that allows readers to choose the level of knowledge they need and the depth in understanding they desire to achieve about multimedia group communication. The book is also very suitable as a reference. Each chapter can read as individual source and references are given for further study. We briefly describe the book structure below.

Part I defines the concepts and gives a detailed overview of the system architectures and entities that, when combined, support the group communication service. Chapter 1 provides an overview on the main concepts associated with group communication. Chapters 2–4 provide details for each enabler –such as their respective architecture and associated protocols and specific features.

Part II gives a more practical viewpoint of group communication and focuses on applications. Chapter 5 cover deployment issues – integration with IMS, identity management, PoC charging and radio issues. Chapter 6 gives a step by step example of the PoC service at the protocol level, detailing the procedures taken at every entity and paying special attention to signalling flows.

Part III alludes to evolution of multimedia group communication and points out future opportunities. Chapter 7 focuses on the present, and combines PoC and Presence with current Value Added Services. Chapter 8 turns to the future and discusses new concepts introduced by OMA PoC2. Chapter 9 finalises describing the architectural evolution of OMA enablers: PoC2, XDMS 2, Presence 2 and SIMPLE instant messaging.

The original idea of this book was born at OMA Test Fests 2005–2006. Whilst working through countless interoperability test cases and endless cups of coffee with industry vendors, it was thought prudent to simplify the good work put together by the OMA forum. From that point on, we as authors applied our observations on PoC, XDMS and Presence and compiled this publication.

We want to thank all colleagues in our companies and in the industry that had ideas and the ability to create multimedia group communication technology in the mobile domain. We also thank the people OMA who had the patience to bring this technology to life through the process of standardization.

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The authors welcome any comments and suggestions for the improvements or changes that could be used to enhance future editions of this book. Our email addresses are:

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Abbreviations

3GPP	3rd Generation Partnership Project
3GPP2	3rd Generation Partnership Project 2
ACL	Access Control List
ACR	ACcounting Request
AKA	Authentication and Key Agreement
AMR	Adaptive Multi Rate
AoR	Address of Record
APN	Access Point Name
APP	Application defined RTCP packet
ARPU	Average Revenue Per User
AS	Application Server
AUID	Application Unique ID
AVP	Attribute Value Pair
B2BUA	Back to Back User Agent
BGCF	Break-Out Gateway Control Function
BSC	Base Station Controller
BTS	Base Transceiver Station
BW	Band Width
CCA	Credit Control Answer
CCF	Charging Collection Function
CCR	Credit Control Request
CDF	Charging Data Function
CDMA	Code Division Multiple Access
CDR	Charging Data Record
CGF	Charging Gateway Function
CID	Content ID
CLIR	Calling Line Identification Restriction
CMR	Codec Mode Request
CNAME	Canonical name
CIPID	Contact Information in Presence Information Data Format
CPF	Controlling PoC Function
CS	Circuit Switched
DCCA	Diameter Credit Control Application
DM	Device Management
DMS	Device Management Server

DND	Do Not Disturb
DNS	Domain Name Service
DTMF	Dual Tone Multi-Frequency
EBCF	Event Based Charging Function
ECUR	Event Charging with Unit Reservation
EDGE	Enhanced Data Rates for the GSM Evolution
ENUM	Telephone NUmber Mapping
EPA	Event Publication Agent
ESC	Event State Compositor
EVRC	Enhanced Variable Rate Codec
FDCFO	Full Duplex Call Follow-On
FQDN	Fully Qualified Domain Name
GA	Group Advertisement
GAA	General Authentication Architecture
GEOPRIV	GEOgraphic Location and PRIVacy (IETF WG)
GERAN	GSM/EDGE Radio Access Network
GGSN	Gateway GPRS Support Node
GML	Geographic Mark-up Language
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communications
GSU	Granted Service Units
GUI	Graphical User Interface
HDVC	Half Duplex Voice Chat
HLR	Home Location Register
HSDPA	High Speed Downlink Packet Access
HSS	Home Subscriber Server
HTTP	HyperText Transfer Protocal
HTTPS	Secure HyperText Transport Protocol (HTTP over TLS)
IAB	Incoming Personal Alert Barring
IANA	Internet Assigned Numbers Authority
IEC	Inmediate Event Charging
IETF	Internet Engineering Task Force
iFC	initial Filter Criteria
IM	Instant Messaging
IMPI	IP Multimedia (IMS) PrIvate User Identity
IMPS	Instant Messaging and Presence Service (aka Wireless Village)
IMPU	IP Multimedia (IMS) PUblic User Identity
IMS	IP Multimedia Subsystem
IMSI	International Mobile Subscriber Identifier
IN	Intelligent Network
IP	Internet Protocol
IP-CAN	IP – Connectivity Access Network
IPA	Instant Personal Alert
IPIIM	Invited Party Identity Information Mode
ISB	Incoming Session Barring

ISC	IMS Service Control Interface
ISIM	IMS Subscriber Identity Module
IVR	Interactive Voice Response
LBS	Location Based Services
LI	Lawful Interception
MAO	Manual Answer Override
MBCP	Media Burst Control Protocol
MCC	Mobile Country Code
MIDP	Mobile Information Device Profile
MIME	Multipurpose Internet Mail Extensions
MMD	MultiMedia Domain
MMS	Multimedia Messaging Service
MNC	Mobile Network Code
MO	Management Object
MRF(C/P)	Media Resource Function Controller/Processor
MSC	Mobile Services Switching Centre
MSIN	Mobile Subscriber Identity Number
MSISDN	Mobile Subscriber Integrated Services Digital Network Number
MSRP	Message Session Relay Protocol
MWS	Mobile Web services
NACC	Network Assisted Cell Change
NAME	User Name SDES Item
NNI	Network-to-Network Interface
NTP	Network Time Protocol
O-CTF	OMA Charging Trigger Function
OCS	Online Charging System
OMA	Open Mobile Alliance
OMNA	OMA Naming Authority
OTAP	Over the Air Provisioning
P2HDVC	PoC to Half Duplex Voice Chat
P2P	Peer to Peer
P2T	Push-to-Talk
P2VIM	PoC to Voice IM
PCRF	Policy and Charging Rules Function
PCU	Packet Control Unit
PDA	Personal Digital Assistant
PDF	Policy Decision Function
PDN	Packet Data Network
PDP	Packet Data Protocol
PEA	Presence External Agent
PEP	Presence Enabled Phonebook
PIDF	Presence Information Data Format
PLMN	Public Land Mobile Network
PMR	Private Mobile Radio
PNA	Presence Network Agent
PoC V1.0	Push-to-Talk over Cellular, Version 1

PoC V2.0	Push-to-Talk over Cellular, Version 2
POI	Point of Interest
PPF	Participating PoC Function
PS	Presence Server
PS	Packet Switched
PSI	Packet System Information
PSI	Public Service Identity
PSL	Presence Subscription List
PSTN	Public Switched Telephone Network
PT	Payload Type
PTT	Push-to-Talk
PUA	Presence User Agent
P-CSCF	Proxy Call State Control Function
QoE	Quality of Experience
QoS	Quality of Service
RAN	Radio Access Network
RFC	Request For Comments (IETF specification)
RLMI	Resource List Meta Information
RLS	Resource List Server
RPID	Rich Presence Information Data
RR	Receiver Report
RRC	Radio Resource Control
RTCP	RTP Control Protocol
RTP	Real-time Transport Protocol
R-UIM	Removable User Identity Module
SCR	Static Conformance Requirement
SDES	Source Description RTCP Packet
SDP	Service Delivery Platform
SDP	Session Description Protocol
SGSN	Serving GPRS Support Node
SIM	Subscriber Identity Module
SIMPLE	SIP Instant Message and Presence Leveraging Extensions
SIP	Session Initiation Protocol
SMPP	Short Message Peer-to-Peer Protocol
SMS	Short Messaging Service
SMTP	Simple Mail Transfer Protocol
SR	Sender Report
SSL	Secure Socket Layer
SSRC	Synchronization source
SSS	Simultaneous PoC Session Support
S-CSCF	Serving Call State Control Function
TBCP	Talk Burst Control Protocol
TBF	Temporary Block Flow
TCP	Transport Control Protocol
TETRA	Terrestrial Trunked Radio
TLS	Transport Layer Security

TSL	Time Slot
UA	User Agent
UAC	User Agent Client
UAS	User Agent Server
UDP	User Datagram Protocol
UE	User Equipment
UI	User Interface
UIM	User Identity Module
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
USIM	UMTS Subscriber Identity Module
UMTS	Universal Mobile Telecommunications System
UTRAN	UMTS Radio Access Network
VAS	Value Added Service
VoIP	Voice over IP
VXML	Voice XML
WAP	Wireless Application Protocol
WCDMA	Wideband Code Division Multiple Access
WG	Working Group
WLAN	Wireless LAN
WPS	Wireless Priority Service
WV	Wireless Village
XCAP	XML Configuration Access Protocol
XDM	XML Document Management
XDMC	XML Document Management Client
XDMS	XML Document Management Server
XML	Extensible Markup Language
XUI	XCAP User Identity

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