Mobile Codes Requirements

Candidate Version 1.0 – 12 May 2009

Open Mobile Alliance

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Contents

1. SCOPE (INFORMATIVE) 5

2. REFERENCES 6

2.1 NORMATIVE REFERENCES 6
2.2 INFORMATIVE REFERENCES 6

3. TERMINOLOGY AND CONVENTIONS 7

3.1 CONVENTIONS 7
3.2 DEFINITIONS 7
3.3 ABBREVIATIONS 8

4. INTRODUCTION (INFORMATIVE) 9

4.1 GENERAL INTRODUCTION 9
4.2 ACTORS AND ROLES 9
4.2.1 Mobile Code Publisher (or Brand) 9
4.2.2 End User 10
4.2.3 Mobile Code Client (also called Mobile Code Reader) 10
4.2.4 Mobile Device 10
4.2.5 Code Management Platform (CMP) 10
4.2.6 Code Clearing House (CCH) 10
4.2.7 Code Resolution Server (CRS) 10
4.2.8 Mobile Operator 10
4.2.9 Global Mobile Code Registry (GMCR) 11
4.2.10 Summary 11

5. MOBILE CODES ENABLER DESCRIPTION (INFORMATIVE) 12

5.1 INTRODUCTION 12
5.2 VERSION 1.0 12

6. REQUIREMENTS (NORMATIVE) 13

6.1 MODULARISATION 13
6.1.1 Symbology 13
6.1.2 Mobile Code Data Format 13
6.1.3 Service Aspects – offline 13
6.1.4 Service Aspects - online 13
6.1.5 System requirements 13
6.1.6 User Interaction requirements 13
6.1.7 Security 13
6.2 HIGH-LEVEL FUNCTIONAL REQUIREMENTS 13
6.2.1 1D Barcode Specific Requirements 18
6.2.2 Security 18
6.2.3 Charging 20
6.2.4 Administration and Configuration 24
6.2.5 Usability 24
6.3 OVERALL SYSTEM REQUIREMENTS 25

APPENDIX A. CHANGE HISTORY (INFORMATIVE) 27

A.1 APPROVED VERSION HISTORY 27
A.2 DRAFT VERSION 1.0 HISTORY 27

APPENDIX B. USE CASES (INFORMATIVE) 30

B.1 DIRECT URL ENCODING 30
B.1.1 Short Description 30
B.1.2 Market benefits 30
B.2 INDIRECT URL RESOLUTION 30
B.2.1 Short Description 30

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B.2.2 Market benefits 30
B.3 DIRECT ENCODING 30
B.3.1 Short Description 30
B.3.2 Market benefits 30

Figures

Figure 1 – Symbology Examples 9

Tables

Table 1: High-Level Functional Requirements 18

Table 2: High-Level Functional Requirements – Security Items 19

Table 3: High-Level Functional Requirements – Authentication Items 19

Table 4: High-Level Functional Requirements – Authorization Items 19

Table 5: High-Level Functional Requirements – Data Integrity Items 20

Table 6: High-Level Functional Requirements – Confidentiality Items 20

Table 7: High-Level Functional Requirements – Charging Items 24

Table 8: High-Level Functional Requirements – Administration and Configuration Items 24

Table 9: High-Level Functional Requirements – Usability Items 25

Table 10: High-Level System Requirements 26

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1. Scope (Informative)

OMA Mobile Codes Enabler aims to stimulate, by the creation of a standard, a global market in which barcodes act as enablers for camera-equipped handsets to access content and services. Some technologies already exist; for example, in Japan, 2D barcode scanning is in widespread use. However, there is fragmentation in the worldwide market currently due to the variety of approaches as to which barcode Symbologies should be supported, what format of data they should contain, and how client software should behave when barcodes are read. The Open Mobile Alliance aims to halt fragmentation by providing a standard by creating specifications to address interoperability needs as they arise. Once enough mobile code clients that follow those specifications are deployed on consumer handsets, marketing organisations and publishers will be able to include mobile codes as links to online content and services with confidence, in advertising and promotional campaigns, and in printed and displayed media of many kinds.

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3. Terminology and Conventions

3.1 Conventions

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119].

All sections and appendixes, except “Scope” and “Introduction”, are normative, unless they are explicitly indicated to be informative.

This is an informative document, which is not intended to provide testable requirements to implementations.

3.2 Definitions

Code Clearing House	The Code Clearing House performs Code Routing functions as part of the CMP; CCH exists in markets where the CMP role is not owned by a single entity.
Code Management Platform	The Code Management Platform performs a resolution service pertaining to Indirect Mobile Codes; specifically, it resolves Indirect Code Identifiers into corresponding addresses of target content or services as intended by the Code Publisher for appropriate further actions by the Mobile Code Client.
Code Resolution	The process of mapping an Indirect Code Identifier supplied from an Indirect Code into either content to be consumed directly by the handset, or the address of content (or a service) to be consumed by the handset. Typically, Code Resolution is performed by a network service.
Code Resolution Server	The Code Resolution Server performs the code resolution part of the CMP; CRS exists in markets where the CMP role is not owned by a single entity.
Code Transfer	The ability for a Code Publisher to change the resolving CMP (or CRS where applicable) for a single or multiple Indirect Code Identifiers.
Routing Prefix	That part of the Indirect Code Identifier that contains a value that is uniquely assigned to the CMP (or CRS, as applicable) and is used for routing.
Direct Code	A Mobile Code that contains either (1) content for direct consumption for the handset, or (2) the address of the service to be accessed (typically a URI [URI])
Global Mobile Code Registry	The Global Mobile Code Registry is a singular and unique component within an Indirect Code eco-system that is entrusted to allocate, administer, and maintain global uniqueness of Routing Prefixes used in the given eco-system.
Indirect Code	A Mobile Code that contains an Indirect Code Identifier.
Indirect Code Identifier	An identifier in the Indirect Code that has to be resolved in order to access the intended content or service. See also Code Resolution.
Mobile Code	A 1D or 2D barcode as read by camera-equipped handsets
Mobile Code Client	The MC enabler software entity that resides in the device, and contains the functionality to acquire, decode, and extract the encoded information for further processing as required. This is often referred to as a Mobile Code Reader and these terms may be used synonymously.
Mobile Code Data Format	The syntactical description of the information contained within a Mobile Code.
Mobile Code Publisher	This is a brand (business, organisation or individual) who wants to distribute certain content or services (i.e. an advertising campaign) to a mass audience by using Mobile Code scanning as a channel.
Mobile Code Sales Agency	The Mobile Code Sales Agency ensures the best Mobile Code service or campaign success by coordinating business topics and related activities on behalf of the Mobile Code Publisher.
Mobile Code Scanning	The physical act of capturing a Mobile Code symbol and decoding the information contained within the Mobile Code into a Data Format.
Mobile Code Service Policy	A set of Policy Conditions [Ref: OMA Dictionary] that convey any service level constraints that are placed on Mobile Code Resolution. Mobile Code Service Policy is typically defined by the Mobile Code Publisher and is applicable to one or more Indirect Code Identifiers.

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Resolution Identifier	That part of the Indirect Code Identifier that is used to index the content or service.
Symbology	The algorithm by which data is encoded as visual elements (typically arrangements of lines or squares), and the resultant "look and feel" for the user.

3.3 Abbreviations

1D	1-Dimensional
2D	2-Dimensional
CCH	Code Clearing House
CMP	Code Management Platform
CP	Code Publisher
CRS	Code Resolution Server
EAN	European Article Number, see EAN/UPC
EAN/UPC	Barcode symbology family including EAN-8, EAN-13, UPC-A, and UPC-E [EAN/UPC]
FTP	File Transfer Protocol
GMCR	Global Mobile Code Registry
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
JAN	Japanese Article Number, a barcode of the EAN symbology family, used in Japan
MC	Mobile Code
NDEF	NFC Data Exchange Format
NFC	Near Field Communications
OMA	Open Mobile Alliance
QR	Quick Response, a type of barcode symbology [QR]
SMS	Short Message Service
UPC	Universal Product Code, see EAN/UPC
URI	Uniform Resource Identifier [URI]

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4. Introduction (Informative)

4.1 General Introduction

Mobile codes – 2D and 1D barcodes – have emerged as a promising enabler of the mobile Internet in some markets. Camera-equipped handsets now have good enough optics, image resolution and processing capacity to read mobile codes on printed materials and electronic displays. These symbols or 'symbologies' (see Fig. 1) encode information such as, URLs, phone numbers, and in-line content (e.g. business cards).

There is, however, still a lack of interoperability between different markets and players. The majority of consumers are unlikely to adopt the technology before it comes pre-installed on their devices. Similarly, marketing, publishing and other industries that are otherwise motivated to provide mobile codes will not adopt them without adequate potential for consumer take-up. That in turn would entail deployment on a large variety of devices, and interoperability between different service providers.

Example			5 901234 123457 >
Symbology	QR [QR]	Data Matrix [DATAMATRIX]	EAN-13 [EAN/UPC]
Data	http://www.openmobilealliance.org	http://www.openmobilealliance.org	5901234123457

Figure 1 – Symbology Examples

4.2 Actors and Roles

As described therein (see [OMAWP] OMA-WP-MobileCodes-20080617-C Section 4.1Section 6.1), two methods of encoding data in the mobile code are: a) Direct mobile codes, and b) Indirect mobile codes. Due to more elaborate network functions required for the Indirect Mobile Code eco-system, it is useful to highlight the primary Actors and their respective Key Roles in major advertising campaigns using Indirect Mobile Codes. This information is motivated by knowledge gained from extensive consultation with stakeholders including the advertising community and operators in both the GSMA and CTIA.

Note that other mobile code usage scenarios not related to advertising campaign may not involve the Code Sales Agency. For brevity, 'Code' here implies 'Mobile Code'.

4.2.1 Mobile Code Publisher (or Brand)

In the case of Indirect Codes, the Code Publisher executes a campaign or service by acquiring Indirect Code Identifiers (ICIs) from the Code Management Platform (CMP), encodes them into Symbology images and then publishes these as Mobile Codes in print or electronic media for distribution. The Code Publisher may optionally contract a Code Sales Agency (i.e., a broker or 'middleman' entity) that acts on its behalf in different capacities. Such capacities may range from turnkey advertising campaign design, results tracking & reporting, or simply obtaining ICIs from the CMP, or including encoding of ICIs into Symbology images for distribution. The Code

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Sales Agency exists as a surrogate, and is expected to act as a trusted agent on behalf of the Code Publisher, but is not deemed as a sufficiently distinct actor in the Indirect Mobile Code eco-system.

In the case of Direct Codes, the Code Publisher may encode the Mobile Code Data into the Direct Code himself, or via a business partner.

4.2.2 End User

In the context of Mobile Codes, the End User is the consumer of the content or service accessed via Mobile Code scanning.

4.2.3 Mobile Code Client (also called Mobile Code Reader)

In the case of Direct Codes, the Mobile Code Client processes the decoded Mobile Code data appropriately (e.g. triggering a browsing session to a directly encoded URL)

In the case of Indirect Codes, the Mobile Code Client is configured to send the decoded Mobile Code data containing the Indirect Code Identifier to a designated Code Management Platform (or Code Clearing House where appropriate) to resolve acquired Indirect Codes. Although the Mobile Code Client residing in the Mobile Device may interact with other components in the device (e.g. camera, OS or other resident applications), only interactions between the Mobile Code Client and the Server entities in the network are of interest in the Mobile Code Enabler.

4.2.4 Mobile Device

In the MC Enabler, the Mobile Device hosts and supports operations of the Mobile Code Client insofar as its interactions with other relevant components in the device (e.g. camera, OS and other resident applications).

4.2.5 Code Management Platform (CMP)

The Code Management Platform is only used in the Indirect Code ecosystem. The Code Management Platform performs multiple functions, chief among these are: Code Registration, Code Routing, and Code Resolution. See definition of Resolution in Section 3.2

The CMP can be split into two entities, the CCH and the CRS. Note, the exact functional split and interworking arrangements between the two functional entities and other CMPs will be addressed during AD and TS work.

4.2.6 Code Clearing House (CCH)

The Code Clearing House is only used in the Indirect Code ecosystem. The CCH is primarily responsible for Code Routing.

4.2.7 Code Resolution Server (CRS)

The Code Resolution Server is only used in the Indirect Code ecosystem. The CRS is primarily responsible for Code Registration and Code Resolution.

4.2.8 Mobile Operator

In the Mobile Code Enabler, the Mobile Operator is responsible for the following key roles:

It provides data connectivity service up to the transport level only; it may not have any visibility of the code scanning application (i.e. does not have know the meanings of specific interactions between the Mobile Code Client and the Network Entities). As such, it is responsible for all normal data usage charging process, unless otherwise specified.

In the case of Indirect Codes, it may perform the functions of, or collaborate with, the Mobile Code Client, Code Clearing House, Code Resolution Entity, Code Management Platform, or combination thereof, to collect & report additional user and device related information (where legally permissible and technically feasible) that may be of interest to Code Publishers.

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4.2.9 Global Mobile Code Registry (GMCR)

The Global Mobile Code Registry is only used in the Indirect Code eco-system. The GMCR is responsible for allocating and registering Routing Prefixes associated with each CMP (or CRS, where applicable) in the given eco-system. In addition, the GMCR is responsible for maintaining a repository containing the network addresses of registered CMPs, or of CCHs through which registered CRSs can be reached.

4.2.10 Summary

The following summary indicates all the Key Actors identified in the previous subsections:

- Mobile Code Publisher (or Brand)
- End User
- Mobile Code Client (or Mobile Code Reader)
- Mobile Device
- Code Management Platform
- Code Clearing House
- Code Resolution Server
- Mobile Operator
- Global Mobile Code Registry

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5. Mobile Codes enabler description (Informative)

5.1 Introduction

The Mobile Codes Enabler contains support for a full ecosystem for both Direct and Indirect Codes.

Technology is specified for:

- Symbology(ies)
- Mobile Code Data Format
- Direct encoding of content
- Encoding of Indirect Code Identifiers
- Resolution of Indirect Code Identifiers
- Security procedures

5.2 Version 1.0

This version of the Mobile Codes Enabler supports all functionality described in section 5.1 of this document.

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6. Requirements (Normative)

NOTE: The classifications of requirements are generally based on the level of support indicated in the development of this Enabler, including business/market, regional and technical reasons.

6.1 Modularisation

6.1.1 Symbology

This Functional Module includes the requirements for mandating certain Symbology(ies), symbol creation, physical aspects of the symbols, robustness, reliability, choice of symbology(ies), and decoding aspects.

6.1.2 Mobile Code Data Format

This Functional module includes requirements on application identifiers, element identifiers, messaging formats, payload types, and decoding aspects.

6.1.3 Service Aspects – offline

Service Aspects – offline refers to the aspects of the Mobile Code Enabler that will enable services that require no network interaction to be performed .e.g. locally scanning and storing a vCard. This Functional Module includes requirements on various content types, application invocation and character sets.

6.1.4 Service Aspects - online

Service Aspects – online refers to the aspects of the Mobile Code Enabler that will enable services that require network interaction to be performed .e.g. scanning an Indirect Code, resolving it in the network and browsing to the indicated destination content or service. Service Aspects – online includes requirements on Direct and Indirect Codes, Indirect Code resolution and the back-end architecture needed for this.

6.1.5 System requirements

The System Requirements Functional module includes requirements across client and server software and hardware including terminal requirements that are not included elsewhere.

6.1.6 User Interaction requirements

The User Interaction Functional Module includes specific User Interaction requirements e.g. notifications, user authorisation, and user authentication.

6.1.7 Security

The Security Functional Module includes specific security requirements e.g. authentication, and confidentiality.

6.2 High-Level Functional Requirements

Label	Description	Enabler Release	Functional module
SYMB-001	The MC Enabler MUST mandate at least one open standards defined Symbology	MC 1.0	Symbology
SYMB-002	The MC Enabler SHALL only mandate open standards defined Symbology(ies).	MC 1.0	Symbology

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SYMB-003	The MC Enabler Symbology(ies) MUST be compatible with the Mobile Code Data Format(s)	MC 1.0	Symbology
SYMB-004	The Mobile Code Enabler SHALL make it possible for the Service Provider to provision or update the Mobile Code Client to support additional Symbology(ies), subject to the capabilities and access privileges of that device. NOTE: Additional Symbology(ies) as mentioned above may include ones not mandated by the MC Enabler.	MC 1.0	Symbology
SYMB-005	If a Symbology is technically capable of supporting both Direct Codes and Indirect Codes, and is supported by a Mobile Code Client, the MC Enabler MUST be able to use the Symbology for both Direct Codes and Indirect Codes.	MC 1.0	Symbology
SYMB-006	The Mobile Codes Symbologies mandated by the MC Enabler SHALL support error correction.	MC 1.0	Symbology
SYMB-007	The Mobile Code Symbologies not mandated by the MC Enabler SHOULD support error correction.	MC 1.0	Symbology
SYMB-008	The Mobile Codes Symbologies MAY support multiple error correction levels (tradeoffs between size and accuracy).	MC 1.0	Symbology
SYMB-009	The Mobile Codes Symbologies mandated by the MC Enabler SHALL be implemented in accordance with their respective open standards Symbology Specification.	MC 1.0	Symbology
MCDF-001	The Mobile Code Data Format SHALL be able to support a payload of an Indirect Code Identifier.	MC 1.0	Mobile Code Data Format
SA-ON-001	The MC Enabler SHOULD allow an Indirect Code Identifier to be transferred from one CMP (or CRS where applicable) to another such that the new CMP (or CRS where applicable) shall become responsible for resolving this identifier.	MC 1.0	Service Aspects - Online
SA-ON-002	The Indirect Code Identifier SHALL contain a CMP (or CRS where applicable) Routing Prefix and a Resolution Identifier.	MC 1.0	Service Aspects – Online
SA-ON-003	Each Indirect Code Identifier SHALL be globally unique	MC 1.0	Service Aspects – Online
SA-ON-004	Each CMP (or CRS where applicable) Routing Prefix SHALL globally uniquely identify one and only one CMP (or CRS where applicable).	MC 1.0	Service Aspects – Online
SA-ON-005	The Global Mobile Code Registry SHALL assign at least one CMP (or CRS where applicable) Routing Prefix to each CMP (or CRS where applicable).	MC 1.0	Service Aspects – Online
SA-ON-006	The MC Enabler SHALL enable the Global Mobile Code Registry to be responsible for assigning CMP (or CRS where applicable) Routing Prefixes such that they are globally unique	MC 1.0	Service Aspects - Online
SA-ON-007	The MC Enabler SHALL enable the CMP (or CRS, where applicable) to be locally aware of the mapping between all locally hosted Indirect Code Identifiers with their associated content, or addresses of content or service.	MC 1.0	Service Aspects – Online

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SA-ON-008	The MC Enabler SHALL enable the CMP (Or CRS where applicable) to be able to resolve the Indirect Code Identifier to its associated content or address of content or service.	MC 1.0	Service Aspects – Online
SA-ON-009	The MC Enabler SHALL enable the CMP (or CRS where applicable) to be able to deliver the content or address of content or service to the requestor.	MC 1.0	Service Aspects – Online
SA-ON-010	The MC Enabler SHALL enabler the Global Mobile Code Registry to maintain a one to one mapping of CMP (or CRS where applicable) Routing Prefix with an associated network address.	MC 1.0	Service Aspects – Online
SA-ON-011	The MC Enabler SHALL enable the CMP (or CCH where applicable) to be able to locally cache information on the mapping between CMP (or CRS where applicable) Routing Prefixes and associated network addresses	MC 1.0	Service Aspects – Online
SA-ON-012	There SHALL be only one Global Mobile Code Registry.	MC 1.0	Service Aspects – Online
SA-ON-013	The MC Enabler SHALL enable the Global Mobile Code Registry to maintain an authoritative list of CMP (or CRS where applicable) Routing Prefixes and their associated network addresses.	MC 1.0	Service Aspects – Online
SA-ON-014	The MC Enabler SHALL enable the Global Mobile Code Registry to be able to deliver the CMP network address(es) to the requestor	MC 1.0	Service Aspects – Online
SA-ON-015	The MC Enabler SHALL enable the Global Mobile Code Registry to maintain an authoritative database of Indirect Code Identifiers that have been transferred between CMPs (or CRSs where applicable) and their new associated network addresses	MC 1.0	Service Aspects – Online
SA-ON-016	The MC Enabler SHALL enable the Global Mobile Code Registry to make the full (or partial) database of transferred Indirect Code Identifiers available to a CMP (or CCH where applicable).	MC 1.0	Service Aspects – Online
SA-ON-017	The MC enabler MAY utilise symbology type indication detected as part of resolution of the Indirect Mobile Code.	MC 1.0	Service Aspects - Online
SA-ON-018	The MC Enabler MAY be able to utilise supplemental information not contained within the Mobile Code, but included by MC Enabler entities, to supplement Code Resolution, specifically: • identification of the Mobile Code enabled device; • identification of the End User associated with the Mobile Code Reader; • Subscriber information from the Service Provider; • Additional information (e.g. information added by a Mobile Code Reader application).	MC 1.0	Service Aspects - Online
SA-OFF-001	The MC Enabler SHALL support the encoding of business cards in the Symbology.	MC 1.0	Service Aspects - Offline

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SA-OFF-002	The MC Enabler SHALL be able to recognize and process business card information, e.g. name, addresses, company name, email addresses, phone numbers, birthday, Nickname and URLs.	MC 1.0	Service Aspects - Offline
SA-OFF-003	The MC Enabler SHALL support the encoding of at least the following: • email addresses, • phone numbers • http, https URIs • sms URIs • mailto URIs • tel URIs • im URIs	MC 1.0	Service Aspects - Offline
SA-OFF-004	The MC Enabler SHALL support the encoding of multiple characters set including: • numeric • alphanumeric • special character sets • 2 byte character sets (e.g., Asian languages) • plain text • international text	MC 1.0	Service Aspects - Offline
SA-OFF-005	The MC Enabler MAY expose the data that was read from a Direct Code to an execution environment through an application interface.	MC 1.0	Service Aspects - Offline
SA-OFF-006	The MC Enabler MAY support application invocation that is to be executed in an execution environment.	MC 1.0	Service Aspects - Offline
SYS-001	The MC Enabler SHALL enable the Direct Mobile Codes to be capable of containing content. The type of content SHALL be declared in the Mobile Code (e.g. by MIME type).	MC 1.0	System Requirements
SYS-002	The MC Enabler SHALL enable the Mobile Code Client to invoke an appropriate application, based on the type of content, including: • If a phone number is selected, the MC enabler SHALL be able to invoke an application to initiate a voice call, or SMS / MMS message client. • If an email address is selected, the MC enabler SHALL be able to invoke an email client. • If a URL is selected, the MC enabler SHALL be able to invoke a browser to access the designated URL, or an appropriate application to store the URL in a designated storage. • If business card information is selected, the MC Enabler SHALL be able to invoke an application to store the data in the phone book. • If location data is selected, the MC Enabler SHALL, for Indirect Mobile Codes, be able to invoke a location application on the device.	MC 1.0	System Requirements

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SYS-003	The MC Enabler SHALL support collecting and reporting of anonymous user information provided by the End User voluntarily, subject to legal and technical limitations.	MC 1.0	System Requirements
SYS-004	When user personal data collection and reporting is implemented, the MC Enabler SHALL provide a means for the End User to “Opt-In” or “Opt-Out” (i.e. enable or disable) of user personal data collection and reporting for Code Scanning processes under the following conditions: • Default for all Code Scanning processes. • Per Code Scanning process.	MC 1.0	System Requirements
SYS-005	When user personal data collection and reporting is implemented, the MC Enabler SHOULD support the collection of, user attributes based on information entered by the End User on a voluntary, or “Opt-In” basis, for example: • Age • Gender • Postal Code/Zip Code • Household Income • Preferred language	MC 1.0	System Requirements
SYS-006	When User personal data collection is implemented by the MC Enabler, it SHALL be possible for the End User to update, modify or delete the information previously entered by the End User.	MC 1.0	System Requirements
SYS-007	The MC Enabler SHOULD support tracking and logging of user code scanning behaviours subject to legal and technical limitations.	MC 1.0	System Requirements
SYS-008	When tracking and logging of user code scanning behaviours are implemented, the MC Enabler SHALL provide a means for the User to “Opt-In” or “Opt-Out” (i.e. enable or disable) related to the tracking and logging of user code scanning behaviours under the following conditions: • Default for all Code Scanning processes. • Per Code Scanning process.	MC 1.0	System Requirements
SYS-009	When tracking and logging of user code scanning behaviours are implemented, the MC Enabler SHALL provide a means to account for attributes for unique user reporting and statistical reporting. For example: • User personal data collected as per SYS-008, as available. • Number of code scans. • Date and Time of code scans. • Identification of Network from which the code scans are originated. • User device Make and Model.	MC 1.0	System Requirements
SYS-010	The MC Enabler MAY enable the CMP (or CCH where applicable) to support a means to access MNO subscriber profile database pertinent to each End User.	MC 1.0	System Requirements

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SYS-011	When CMP (or CCH where applicable) access to MNO Subscriber Profile Database is implemented, the MC Enabler SHOULD enable it to be able to access attributes pertinent to the End User, for example: • Data Usage Tariff Plan Subscribed • Geo-Location Data	MC 1.0	System Requirements

Table 1: High-Level Functional Requirements

6.2.1 1D Barcode Specific Requirements

Label	Description	Enabler Release	Functional module
SYS-012	The MC Enabler SHALL be able to process the EAN/UPC (ISO/IEC 15420) family of 1D barcodes as Mobile Codes, with the restrictions applicable due to their small data capacity.	MC 1.0	System Requirements
SYS-013	The MC Enabler SHOULD enable the Mobile Code Client be able to process EAN/UPC barcodes	MC 1.0	System Requirements
SYS-014	The default processing of EAN/UPC barcodes SHOULD be made common with that of 2D Indirect Mobile Codes, by combining the symbology identifier with the identifier read from the barcode as input to the Indirect resolution system.	MC 1.0	System Requirements
SYS-015	MC Enabler components SHALL NOT modify the URI associated with a specific Indirect Code Identifier without prior agreement with the Mobile Code Publisher.	MC 1.0	System Requirements
SYS-016	Mobile Code Clients MAY support customised End User-selectable handlers (e.g., downloaded Java applets) for the data read from EAN/UPC codes. (e.g., for independent information-provision concerning consumer products).	MC 1.0	System Requirements

6.2.2 Security

Label	Description	Enabler Release	Functional module
SEC-001	When resolving an Indirect Code Identifier, the trusted server (e.g. CMP (or CRS where applicable)) and the Mobile Code Client SHALL be able to provide security measures to protect the End User (e.g. from phishing, spam, viruses etc.)	MC 1.0	Security
SEC-002	The CMP (or CRS and CCH where applicable) SHALL be a trusted Server	MC 1.0	Security
SEC-003	The MC Enabler SHALL enable the trusted server (e.g. CMP (or CRS, where applicable)) to be able to check the validity of the Indirect Code Identifier and provide associated Indirect Code Identifier details to the End User prior to resolving the Indirect Code Identifier.	MC 1.0	Security

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SEC-004	When resolving an Indirect Code Identifier, the MC Enabler SHALL provide security measures to protect network entities from attacks (e.g. Denial of Service, man-in-the-middle etc.).	MC 1.0	Security
SEC-005	The Mobile Code Enabler SHALL enable the Mobile Code Client to be able to communicate in a secure manner with a trusted server (e.g. CMP (or CCH where applicable)) to resolve Indirect Code Identifiers	MC 1.0	Security
SEC-006	The MC Enabler SHALL provide a secured communication between the network entities.	MC 1.0	Security
SEC-007	The MC enabler SHOULD support for Indirect Mode a non-repudiation mechanism between the code publisher and the end user.	MC 1.0	Security

Table 2: High-Level Functional Requirements – Security Items

6.2.2.1 Authentication

Label	Description	Enabler Release	Functional module
SEC-008	The MC Enabler SHOULD support for Indirect Mode the authentication of the source of the Mobile Code by the UE at the time of processing the Mobile Code.	MC 1.0	Security
SEC-009	The MC Enabler MAY enable the code-hosting CMP (or CRS, where applicable) to authenticate the requesting MC Client based on various profile criteria.	MC 1.0	Security

Table 3: High-Level Functional Requirements – Authentication Items

6.2.2.2 Authorization

Label	Description	Enabler Release	Functional module
SEC-010	The MC Enabler SHALL enable the Mobile Code Client to be securely updateable or reconfigurable from a trusted server.	MC 1.0	Security

Table 4: High-Level Functional Requirements – Authorization Items

6.2.2.3 Data Integrity

Label	Description	Enabler Release	Functional module
SEC-011	The MC Enabler MAY enable the CMP (or CRS, where applicable) and the Mobile Code Client to support a security mechanism (e.g. digital signature) to validate Indirect Codes.	Future	Security
SEC-012	The security mechanism, if present in Indirect Codes, MAY be used by the Mobile Code Client and CMP (or CRS, where applicable) to validate the Indirect Mobile Code.	Future	Security

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SEC-013	The MC Enabler MAY enable the trusted server and the Mobile Code Client to support a security mechanism (e.g. digital signature) to validate Direct Codes.	MC 1.0	Security
SEC-014	The MC Enabler MAY enable the security mechanism, if present, in Direct Codes to be validated by the Mobile Code Client.	MC 1.0	Security
SEC-015	The MC Enabler SHOULD support for Indirect Mode and MAY support for Direct Mode the verification of the integrity of Mobile Code Payload.	MC 1.0	Security

Table 5: High-Level Functional Requirements – Data Integrity Items

6.2.2.4 Confidentiality

Label	Description	Enabler Release	Functional module
SEC-016	The MC enabler SHALL provide security measures to prevent exposure of network sensitive information (e.g. network entity addresses, network topology. etc.).	MC 1.0	Security
SEC-017	The MC enabler SHOULD support for Indirect Mode and MAY support for Direct Mode the confidentiality (e.g. via encryption) of the Mobile Code Payload as a secret between the code publisher and end user. [NOTE: this is not intended for mass market application, but to enable creation of closed user groups.]	MC 1.0	Security

Table 6: High-Level Functional Requirements – Confidentiality Items

6.2.3 Charging

Charging Information for the MC Enabler in this section refers to requirements to track chargeable events that are unique to Mobile Code scanning which can be used as a basis to support possible charging based on prevailing online advertising purchase models [Ref: Wikipedia - Online Advertising] and considered widely accepted to Code Publishers/Brands executing advertising campaigns. Unless otherwise specified, all charging information requirements herein are applicable to Indirect Codes used in advertising campaigns.

The MC Enabler, in Indirect Codes, SHOULD support tracking of chargeable events for possible charging between different actors using the MC Enabler.

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Label	Description	Enabler Release	Functional module
Conditionality of Main Requirement			
SYS-017	Chargeable events to be tracked in the MC Enabler for Indirect Codes SHOULD support the following online advertising purchase model relevant to the Mobile Code Scanning: **COST PER CLICK (CPC) CHARGING:** This is based on every time the User "clicks on", or otherwise interacts with, the Code Publisher's content or service as a direct result from the User's initial Mobile Code Scanning.	MC 1.0	System Requirements
Dependent Functional Requirements			
SYS-017A	If the MC Enabler supports SYS-017, then it SHALL track the number of times the User initiates access to, or otherwise invokes the Code Publisher's content or service.	MC 1.0	System Requirements
SYS-017B	If the MC Enabler supports SYS-017, then it SHALL correlate between the first User access and subsequent User accesses to the Code Publisher's content or service access points (e.g. web portal browsing, downloading of a video clip).	MC 1.0	System Requirements
Conditionality of Main Requirement			
SYS-018	Chargeable events to be tracked in the MC Enabler for Indirect Codes SHOULD support the following online advertising purchase model relevant to the Mobile Code Scanning: **COST PER ACTION /ACQUISITION (CPA) CHARGING:** This is based on performance or effectiveness of the advertising campaign; whereby 'Action' or 'Acquisition' is defined as the completion of a recordable event by the User as a direct result from the User's initial Mobile Code Scanning. Note that User Action is uniquely defined and agreed between the Service Provider and Code Publisher relative to its specific content or service.	MC 1.0	System Requirements
Dependent Functional Requirements			

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SYS-018A	If MC Enabler supports SYS-018, then it SHALL track the number of "Recordable User Action" Completion Indications. Note: A "Recordable User Action" is defined within this context as possessing all of the following attributes: 1. It involves network based application interactions. 2. Upon its completion, it generates a specific Completion Indication that is observable, repeatable and traceable using an objective method. Examples of pertinent "Recordable User Actions" include: completion of a Code Publisher specified application for User online registration, opening of an online account, signing up to a online distribution list or taking an online survey, etc.	MC 1.0	System Requirements
SYS-018B	If MC Enabler supports SYS-018, then it SHALL correlate each "Recordable User Action" Completion Indication with the User access to the Code Publisher's content or service as a direct result from the User's initial Mobile Code Scanning.	MC 1.0	System Requirements
Conditionality of Main Requirement			
SYS-019	Chargeable events to be tracked in the MC Enabler for Indirect Codes SHOULD support the following online advertising purchase model relevant to the Mobile Code Scanning: **COST PER CONVERSION (CPCV) CHARGING:** This is based on the highest degree of effectiveness of an advertising campaign in that the User is converted from a prospective into an actual customer/subscriber of the Code Publisher. 'User Conversion' is defined as completion of a recordable User action that carries certain commitments to the Code Publisher's offerings as a direct result from the User's initial Mobile Code Scanning. Note that User Conversion is uniquely defined and agreed between the Service Provider and Code Publisher relative to its specific content or service.	MC 1.0	System Requirements
Dependent Functional Requirement			

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SYS-019A	If MC Enabler supports SYS-019, then it SHALL track the number of "Recordable User Conversion" Completion Indications. Note: A "Recordable User Conversion" is defined within this context as possessing all of the following attributes: 1. It involves network based application interactions. 2. Upon its completion, it generates a specific Completion Indication that is observable, repeatable and traceable using an objective method. Examples of pertinent "Recordable User Conversions" include: an e-commerce transaction for a purchase, an application for a paid subscription, etc.	MC 1.0	System Requirements
SYS-019B	If MC Enabler supports SYS-019, then it SHALL correlate each "Recordable User Conversion" Completion Indication with the User access to the Code Publisher's content or service as a direct result from the User's initial Mobile Code Scanning.	MC 1.0	System Requirements
Conditionality of Main Requirement			
SYS-020	The MC Enabler SHOULD be able to support persistency of the initial resolved content/service URI in order to correlate to the User's subsequent access to Code Publishers content or service (see SYS-017). Notes: 1. The solution for this requirement may have dependency upon other OMA enablers, specifically MobAd. The interconnection between these enablers needs to be investigated to explore reuse of solutions, as available and appropriate. 2: Concerns of complexity of the solution to this requirement have been expressed. This requirement may be reassessed during AD and TS stages of the Enabler.	MC 1.0	System Requirements
Dependent Functional Requirements			
SYS-020A	If MC Enabler supports SYS-020, then persistency of the initial resolved content/service URI, SHOULD be configurable (e.g. as to scope, time duration, or both). Note: Specifics of this persistency will be defined in the TS stage.	MC 1.0	System Requirements
SYS-020B	If MC Enabler supports SYS-020, then persistency of the initial resolved content/service URI SHALL be held by a trusted network entity.	MC 1.0	System Requirements
SYS-020C	If MC Enabler supports SYS-020, then persistency of the initial resolved content/service URI SHALL be auditable.	MC 1.0	System Requirements

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SYS-021	The MC Enabler SHOULD be able to support cost defraying of the User's data transport usage charges and other costs at the discretion of the Actors (e.g. Code Publisher/Brand, Code Resolution Service Provider, and Operator). Cost defraying (including possibly Zero-rating) for the User applies to Post-paid subscription plans only. Cost defraying for Pre-paid subscription plans is for further releases. It SHOULD be possible to apply user cost defraying to Roaming Charges according to national or international categories, individually or jointly.	MC 1.0	System Requirements

Table 7: High-Level Functional Requirements – Charging Items

6.2.4 Administration and Configuration

Label	Description	Enabler Release	Functional module
SYS-022	The Mobile Code enabled device SHALL support network configuration of Mobile Code Scanning capability parameters, as initiated by the network Service Provider.	MC 1.0	System Requirements
SYS-023	The MC Enabler SHALL support the specification of conditions of service for each Mobile Code (i.e. "Mobile Code Service Policy"). MC Service Policy MAY include, for example, the following: • Validity Period • Geographic Coverage Area(s) • Support of defraying cost of Data Transport Charges	MC 1.0	System Requirements

Table 8: High-Level Functional Requirements – Administration and Configuration Items

6.2.5 Usability

Label	Description	Enabler Release	Functional module
UINT-001	The MC Enabler SHALL NOT suppress any user confirmation messages generated by other entities associated with processing a Mobile Code.	MC 1.0	User Interaction
UINT-002	The End User SHALL be able to set personal preferences within the Mobile Code Client.	MC 1.0	User Interaction
UINT-003	The Mobile Code Client SHOULD read Mobile Codes in such a way as to provide the End User with real-time feedback on when a code has been read. The Mobile Code Client MAY offer reading static image capture as an alternative in difficult situations.	MC 1.0	User Interaction

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UINT-004	The MC Enabler SHOULD make it unambiguous to the End User which Mobile Code(s) will be processed. (E.g. if several Mobile Codes are in the field of view, the one selected by the End User would be processed).	MC 1.0	User Interaction
UINT-005	Once a Mobile Code has been read, the MC Enabler SHALL make it possible to provide the End User with information regarding: (1) If it is known (Direct Code, or resolved Indirect Code Identifier), the type of content stored in-line or details of the network access needed for the service (URI, phone number, etc.), or if it is unknown (unresolved Indirect Code Identifier), an indication that the information must first be fetched from the network; (2) The text string optionally included in the Mobile Code.	MC 1.0	User Interaction
UINT-006	The MC Enabler SHALL enable the End User to be notified when it is not possible to process the Mobile Code. (E.g. the device does not support FTP; the Mobile Code Client cannot extract the data; Home CMP cannot route to Code-hosting CMP; or Code Policy reasons).	MC 1.0	User Interaction
UINT-007	The MC Enabler SHOULD notify the End User if the Mobile Code is read but the Mobile Code Data Format is not recognized.	MC 1.0	User Interaction
UINT-008	The MC Enabler SHOULD enable the Mobile Code Client to inform the End User about the content or address of content or service after Mobile Code Scanning and/or Resolution (e.g. SMS, phone call, URI, etc...).	MC 1.0	User Interaction
UINT-009	The MC enabler SHALL support obtaining user authorisation before executing the application that is to be invoked by the data in the Direct Code, or by resolution of the Indirect Code.	MC 1.0	User Interaction

Table 9: High-Level Functional Requirements – Usability Items

6.3 Overall System Requirements

Label	Description	Enabler Release	Functional module
SYS-024	The combinations of Symbology and Mobile Code Data Format used by the MC Enabler SHALL be uniquely identifiable.	MC 1.0	System Requirements
SYS-025	The MC Enabler SHALL support provisioning of service parameters.	MC 1.0	System Requirements
SYS-026	The MC Enabler SHOULD enable the Mobile Code Client to be able to access available and authorised preference profile or context information.	MC 1.0	System Requirements
SYS-027	Processing a given Mobile Code from any device SHALL result in access to the content or service determined by the Code Publisher (if the device is able to process the Mobile Code and the End User is authorised to consume the content or service).	MC 1.0	System Requirements

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SYS-028	The MC Enabler SHALL support both Direct and Indirect Mobile Codes using a common set of Mobile Code Symbology(ies), a common Data Format and a common processing methodology.	MC 1.0	System Requirements
SYS-029	In the case of sms and mailto, the MC Enabler SHALL make it possible for the Code Publisher to specify whether the Body and/or Subject fields may or may not be changed by the End User. (The End User may decline to send the message.)	MC 1.0	System Requirements
SYS-030	Mobile Code Clients supporting the Direct Mode SHALL support Mobile Codes containing free text that includes any URIs allowed by [OMAURI]. This is to provide backwards-compatibility with the many Mobile Codes containing some combination of text and a URI.	MC 1.0	System Requirements
SYS-031	The Mobile Code Data Format SHALL support embedding additional code-specific text strings (e.g. the message for the user when decoding the Mobile Code).	MC 1.0	System Requirements
SYS-032	The Mobile Code Enabler SHALL support a mechanism for returning an Indirect Code-specific text string from the CMP (or CRS, where applicable) that can be used for information to the user. Such text is optional for any given Mobile Code.	MC 1.0	System Requirements
SYS-033	The MC Enabler SHALL enable the Mobile Code Client to allow the End User to access any content or service whose address it has retrieved.	MC 1.0	System Requirements
SYS-034	Code Readers SHALL support deferred Processing of Mobile Code Data (e.g. creation of some bookmark list).	MC 1.0	System Requirements
SYS-035	The MC Enabler SHALL make it possible for the Mobile Code Client to transmit additional information after reading a Mobile Code (e.g., current local weather conditions).	MC 1.0	System Requirements
MCDF-002	The Mobile Code Enabler SHALL ensure that the MC Data Format is reasonably distinguishable from any other data encoded in a Mobile Code Symbology.	MC 1.0	Mobile Code Data Format

Table 10: High-Level System Requirements

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Appendix A. Change History (Informative)

A.1 Approved Version History

Reference	Date	Description
n/a	n/a	No prior version –or- No previous version within OMA

A.2 Draft Version 1.0 History

Document Identifier	Date	Sections	Description
Draft Version OMA-RD-MC-V0_0_1	14 Apr 2008	Cover page	Accepted changes from Draft RD template from REL. Edited cover page to name and date document Removed some comments
Draft Versions OMA-RD-MC-V1_0_0	15 Apr 2008	Cover page, 1, 2, 3, 4, 5, 6.1	Added Scope, References, Definitions, Abbreviations, and Introduction from the OMA MC White Paper [OMAWP] with some modifications. Added Enabler Description taken primarily from the MC Work Item. Added Modularised functional blocks Implemented: OMA-MC-2008-0045R01-CR_MC_RD_Modularisation OMA-MC-2008-0044R01-CR_MC_RD_Enabler_Description OMA-MC-2008-0043R01-CR_MC_RD_Introduction OMA-MC-2008-0042-CR_Mobile_Codes_RD_references_... OMA-MC-2008-0041-CR_MC_RD_Scope
	12 May 2008	Cover page, 3.2, 6.3	Added requirement on backwards compatibility. Corrected Version History table and added implemented CRs. Editorial spelling clean-up. Implemented: OMA-MC-2008-0035R03-INP_Backward_Compatibility_Requirement_A_mechanism_to_enable_OMA_MC_uniquely_identifiable_from_existing_ OMA-MC-2008-0057-CR_Definition_Editorials
	19 Jun 2008	Cover page, Contents, 3.2, 6.2, 6.2.3	Implemented: OMA-MC-2008-0049R02-CR_CR_to_introduce_Mobile_Code_Reader_and_Client_definitions OMA-MC-2008-0050R01-CR_Introduction_of_Symbology_requirements OMA-MC-2008-0056R02-CR_Symbology_Support OMA-MC-2008-0068R01-CR_Update_Code_Reader_Symbology_Requirement OMA-MC-2008-0070-CR_Mobile_Code_Data_Format_Definition
	10 Jul 2008	Cover page, Contents, 6.2, 6.2.4, 6.3, Appendix C	Implemented: OMA-MC-2008-0066-CR_Introduction_of__Symbology_Requirements_Change OMA-MC-2008-0067-CR_Symbology_mandation_requirements_Changes OMA-MC-2008-0076R01-CR_Code_Reader_Requirements OMA-MC-2008-0077R01-CR_User_Experience_Requirements OMA-MC-2008-0081R01-CR_Device_Requirements OMA-MC-2008-0082R01-CR_1D_Barcode_Requirements OMA-MC-2008-0083R01-CR_Feedback_Requirements Added Appendix C – User Experience Guidelines (Informative)

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Document Identifier	Date	Sections	Description
	17 Sep 2008	Cover page, Contents, 3.2, 3.3, 6.2, 6.2.1, 6.2.3, 6.2.4, 6.3	Implemented: OMA-MC-2008-0074R01-CR_Initial_Scan_Requirements OMA-MC-2008-0093-CR_Editorial_Clean_up_of_SYS_0001 OMA-MC-2008-0096R04-CR_Mobile_Code_Reader_Related_Definitions OMA-MC-2008-0101R02-CR_Indirect_Code_Portability_Requirements OMA-MC-2008-0103-CR_Abbreviations_on_EAN_and_UPC OMA-MC-2008-0104R01-INP_Security_requirements OMA-MC-2008-0114R01-INP_Requirements_on_Service_Aspects
	15 Oct 2008	Cover page,	Implemented: OMA-MC-2008-0084R02-CR_Basic_Semantics OMA-MC-2008-0123R01-CR_Routing_Prefix_Change OMA-MC-2008-0129R01-CR_Changes_in_Definition_section OMA-MC-2008-0130R01-CR_Changes_in_Abbreviations_section OMA-MC-2008-0132R01-CR_Changes_to_section_6.2 OMA-MC-2008-0133R01-CR_Changes_in_section_6.2.1 OMA-MC-2008-0138R01-CR_Changes_in_section_6.2.4 OMA-MC-2008-0140R01-CR_INP_Symbologies OMA-MC-2008-0141R01-CR_Service_Aspects_offline__Requirements__ OMA-MC-2008-0145R01-CR_Mobile_Code_Use_Policy_Support OMA-MC-2008-0146R01-CR_User_Code_Scanning_contextual_metrics Added information to Version 1.0 and Version 2.0 section. Made changes to Functional Modules, and hence changes to exiting requirements allocation and names. Added, removed and reformatted editor's notes. Requirements were reformatted into REQ suggested formats.
	06 Dec 2008	Cover page, contents, 5.2, 5.3, 5.4, 6.2, 6.2.1, 6.2.2, 6.2.3, 6.2.5, Appendix B	Implemented: OMA-MC-2008-0113R01-CR_Primary_Actors_and_Key_Roles_for_Indirect_Codes_Eco_system OMA-MC-2008-0128R04-CR_MC_data_security_requirements OMA-MC-2008-0144R02-CR_Charging_Information_for_MC OMA-MC-2008-0153-CR_141R01_Edit OMA-MC-2008-0162-CR_Use_Cases_for_MC_Enabler
Draft Version OMA-RD-MC-V1_0	10 Dec 2008	All	Versioning fixed from 1.0.0 to 1.0 Minor Editorial fixes: Cover page with correct filename Removed duplicate ref in 2.2 Sorted 3.2 alphabetically History box fixed Text and Heading styles fixed
	14 Dec 2008	6.2	Implemented: OMA-MC-2008-0155R01-CR_155R01_Symbologies
	16 Mar 2009	All	Added OMAWP reference. Corrected reference in section 5.2 to refer to OMAWP. Editorial correction in MCC definition. Removed empty Appendix C. Implemented: OMA-MC-2009-0022R01-CR_containing_multiple_CRs_based_on_MC_RDRR_resolution OMA-MC-2009-0024R01-CR_Definition_for_Code_Transfer OMA-MC-2009-0030R01-CR_to_MC_RD_as_per_RDRR_agreed_Action_Points_assigned_to_AT_T OMA-MC-2009-0037-CR_to_MC_RD_Charging_Section_6_2_3
	17 Mar 2009	All	Added Security functional module. Allocated Security requirements against new Security module Renamed majority of Requirements for consistency. Changed font colour to Black in Charging section

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Document Identifier	Date	Sections	Description
	18 Mar 2009	All	Edited Actors and roles text. Edited SEC-010 to remove (e.g.) statement. Set language formatting to English (UK). Corrected spelling. Edited formatting.
	24 Mar 2009	6.2.3	Corrected numbering of dependent requirements affected by SYS-018, -019, -020 & -021. Inserted previous SYS-054 "Cost Defraying" charging requirement from RC-MC-V1_0-20081214-D that was omitted inadvertently as the new SYS-022. SYS-xxx requirement numbering after SYS-022 was shifted by one.
	18 Apr 2009	All	Implemented comments from REQ WG (email dated 2009-04-02) as follows: - SEC-011 and SEC-012 marked as for 'Future Release'. - Section 5.3 Version 2.0 deleted. Additional editorial clean-up was performed as follows: - SYMB-005 and SYMB-003 are identical duplicates; SYMB-005 is deleted; all SYMB-xxx numbering after SYMB-003 is updated. - 'Underlines' for SA-OFF requirements are removed. - SYS-017 is missing due to mis-numbering. SYS-018 is renumbered as SYS-017; all SYS-xxx numbering after SYS-017 is updated. - Old SYS-033 (or new SYS-032) has a strikeout on "~~CCH~~" that is a remnant from previous editing; "~~CCH"~~ is deleted. - Figure number is added to the illustration of symbology examples; minor rewording in Section 4.1 to add the reference to Figure 1. - Minor corrections due to general 'Spelling & Grammar' checks. - General updates to the Table of Content, Figures and Tables.
Candidate Version: OMA-RD-MC-V1_0	12 May 2009	All	Status changed to Candidate by TP: OMA-TP-2009-0187-INP_MC_V1_0_RD_for_Candidate_Approval Editorial fixes: History Box

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Appendix B. Use Cases (Informative)

B.1 Direct URL Encoding

B.1.1 Short Description

A URL is encoded into a Direct Code, and a subscriber scans the code with the Mobile Code Client, which then decodes the Mobile Code and extracts the URL. The Mobile Code Client passes this URL to the Browser on the terminal which browses to the URL.

B.1.2 Market benefits

The use case provides a convenient way for subscribers to access Online content without manual entry of URLs.

B.2 Indirect URL Resolution

B.2.1 Short Description

An Indirect Code Identifier is encoded into an Indirect Code, and a subscriber scans the code with the Mobile Code Client, which then decodes the Mobile Code and extracts the Indirect Code Identifier. The Mobile Code Client then passes this Indirect Code Identifier to the MC Enabler network architecture and is returned a URL. The Mobile Code Client passes this URL to the Browser on the terminal which browses to the URL.

B.2.2 Market benefits

The use case provides a convenient way for subscribers to access Online content without manual entry of URLs. This use case can provide benefits over the Direct URL Encoding in terms of post-publishing flexibility, security and value-added service.

B.3 Direct Encoding

B.3.1 Short Description

The business card information is encoded to a Direct Code, and a subscriber scans the code with the Mobile Code Client, which then decodes the card information and displays it on the terminal. Card information may include name, title, telephone number, email address, etc. Business Card information can be saved directly into the phone book. Besides, other functions could be invoked by click the card information on the phone, e.g. the subscriber clicks the telephone number to dial up.

B.3.2 Market benefits

The use case provides a convenient way for subscribers to save business card information into the phone book.

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