



Mobile Broadcast Services Requirements

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Open Mobile Alliance

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Contents

1. SCOPE (INFORMATIVE)	8
2. REFERENCES	9
2.1 NORMATIVE REFERENCES	9
2.2 INFORMATIVE REFERENCES	9
3. TERMINOLOGY AND CONVENTIONS	10
3.1 CONVENTIONS	10
3.2 DEFINITIONS	10
3.3 ABBREVIATIONS	12
4. INTRODUCTION (INFORMATIVE)	14
4.1 VERSION 1.0	14
4.2 VERSION 1.1	14
5. USE CASES (INFORMATIVE)	16
5.1 USE CASE I&E, DISCOVERING AND THE AVAILABLE MOBILE BROADCAST SERVICES AND THEIR DESCRIPTIONS 18	
5.1.1 Short Description	18
5.1.2 Actors	18
5.1.3 Pre-conditions	19
5.1.4 Post-conditions	19
5.1.5 Normal Flow	19
5.1.6 Alternative Flow	19
5.1.7 Operational and Quality of Experience Requirements	20
5.2 USE CASE I&E, PROTECTED MOBILE BROADCAST SERVICES AND CONTENT DELIVERED WITHIN	20
5.2.1 Short Description	20
5.2.2 Actors	20
5.2.3 Pre-conditions	21
5.2.4 Post-conditions	21
5.2.5 Normal Flow	21
5.2.6 Alternative Flow	21
5.2.7 Operational and Quality of Experience Requirements	21
5.3 USE CASE I&E, MOBILE BROADCAST SERVICE WITH AUXILIARY DATA AND INTERACTION	21
5.3.1 Short Description	21
5.3.2 Actors	22
5.3.3 Pre-conditions	23
5.3.4 Post-conditions	23
5.3.5 Normal Flow	23
5.3.6 Alternative Flow	23
5.3.7 Operational and Quality of Experience Requirements	23
5.4 USE CASE I&E, MOBILE BROADCAST FILE DISTRIBUTION – EXAMPLE OF NEWS SERVICE AND MOBILE LEARNING 23	
5.4.1 Short Description	23
5.4.2 Actors	24
5.4.3 Pre-conditions	24
5.4.4 Post-conditions	24
5.4.5 Normal Flow	24
5.4.6 Alternative Flow	25
5.4.7 Operational and Quality of Experience Requirements	25
5.5 USE CASE I&E, PERSONALIZED NEWS BROADCAST	25
5.5.1 Short Description	25
5.5.2 Actors	25
5.5.3 Pre-conditions	26
5.5.4 Post-conditions	26

5.5.5	Normal Flow	26
5.5.6	Alternative Flow	26
5.5.7	Operational and Quality of Experience Requirements.....	26
5.6	USE CASE I&E, COMMUNICATIONS RELATED BROADCAST	27
5.6.1	Short Description	27
5.6.2	Actors.....	27
5.6.3	Pre-conditions	27
5.6.4	Post-conditions.....	27
5.6.5	Normal Flow	28
5.6.6	Alternative Flow	28
5.6.7	Operational and Quality of Experience Requirements.....	28
5.7	USE CASE I&E, RICH MEDIA NEWS BROADCAST	28
5.7.1	Short Description	28
5.7.2	Actors.....	28
5.7.3	Pre-conditions	29
5.7.4	Post-conditions.....	29
5.7.5	Normal Flow	29
5.7.6	Alternative Flow	29
5.7.7	Operational and Quality of Experience Requirements.....	29
5.8	USE CASE I&E , ACTIVATION OF ALREADY DOWNLOADED BROADCAST SERVICE CONTENT	29
5.8.1	Short Description	29
5.8.2	Actors.....	29
5.8.3	Pre-conditions	30
5.8.4	Post-conditions.....	30
5.8.5	Normal Flow	30
5.8.6	Alternative Flow	31
5.8.7	Operational and Quality of Experience Requirements.....	31
5.9	USE CASE I&E, SCALABLE VIEWING OF MOBILE BROADCAST CONTENT	31
5.9.1	Short Description	31
5.9.2	Actors.....	31
5.9.3	Pre-conditions	32
5.9.4	Post-conditions.....	32
5.9.5	Normal Flow	32
5.9.6	Alternative Flow	33
5.9.7	Operational and Quality of Experience Requirements.....	33
5.10	USE CASE I&E, BROADCAST SERVICE HOPPING.....	33
5.10.1	Short Description	33
5.10.2	Actors.....	33
5.10.3	Pre-conditions	34
5.10.4	Post-conditions.....	34
5.10.5	Normal Flow	34
5.10.6	Alternative Flow	34
5.10.7	Operational and Quality of Experience Requirements.....	34
5.11	USE CASE I&E, USER INFORMATION FILTERING OF BROADCAST SERVICES AND CONTENT	34
5.11.1	Short Description	34
5.11.2	Actors.....	34
5.11.3	Pre-conditions	35
5.11.4	Post-conditions.....	35
5.11.5	Normal Flow	35
5.11.6	Alternative Flow	35
5.11.7	Operational and Quality of Experience Requirements.....	35
5.12	USE CASE I&E, TIMING OF BROADCAST SERVICES AND CONTENT	36
5.12.1	Short Description	36
5.12.2	Actors.....	36
5.12.3	Pre-conditions	36
5.12.4	Post-conditions.....	36
5.12.5	Normal Flow	37

5.12.6	Alternative Flow	37
5.12.7	Operational and Quality of Experience Requirements.....	37
5.13	USE CASE I&E, SUBSCRIBING TO MOBILE BROADCAST SERVICES.....	37
5.13.1	Short Description	37
5.13.2	Actors.....	37
5.13.3	Pre-conditions	38
5.13.4	Post-conditions.....	38
5.13.5	Normal Flow	38
5.13.6	Alternative Flow	38
5.13.7	Operational and Quality of Experience Requirements.....	38
5.14	USE CASE I&E, BROADCAST SERVICE FOR ROAMING MOBILE TERMINAL.....	39
5.14.1	Short Description	39
5.14.2	Actors.....	39
5.14.3	Pre-conditions	40
5.14.4	Post-conditions.....	40
5.14.5	Normal Flow	40
5.14.6	Alternative Flow	40
5.14.7	Operational and Quality of Experience Requirements.....	41
5.15	USE CASE I&E, SERVICE GUIDE ACQUISITION	41
5.15.1	Short Description	41
5.15.2	Actors.....	41
5.15.3	Pre-conditions	42
5.15.4	Post-conditions.....	42
5.15.5	Normal Flow	42
5.15.6	Alternative Flow	42
5.15.7	Operational and Quality of Experience Requirements.....	42
5.16	USE CASE I&E, LOCATION FILTERING OF BROADCAST SERVICES AND CONTENT	42
5.16.1	Short Description	42
5.16.2	Actors.....	42
5.16.3	Pre-conditions	43
5.16.4	Post-conditions.....	43
5.16.5	Normal Flow	44
5.16.6	Alternative Flow	44
5.16.7	Operational and Quality of Experience Requirements.....	44
5.17	USE CASE I&E, DEVICE OUTSIDE BROADCAST COVERAGE.....	44
5.17.1	Short Description	44
5.17.2	Actors.....	44
5.17.3	Pre-conditions	45
5.17.4	Post-conditions.....	45
5.17.5	Normal Flow	45
5.17.6	Alternative Flow 1	45
5.17.7	Alternative Flow 2	46
5.17.8	Operational and Quality of Experience Requirements.....	46
5.18	USE CASE I&E, INTERACTIVE TV GAMES	46
5.18.1	Short Description	46
5.18.2	Actors.....	46
5.18.3	Pre-conditions	47
5.18.4	Post-conditions.....	47
5.18.5	Normal Flow	47
5.18.6	Alternative Flow	47
5.18.7	Operational and Quality of Experience Requirements.....	48
5.19	USE CASE I&E, PERVASIVE MULTIPLAYER GAMES.....	48
5.19.1	Short Description	48
5.19.2	Actors.....	48
5.19.3	Pre-conditions	49
5.19.4	Post-conditions.....	49
5.19.5	Normal Flow	49

5.19.6 Alternative Flow 49

5.19.7 Operational and Quality of Experience Requirements..... 49

5.20 USE CASE I&E, NAVIGATION AND TRAFFIC INFORMATION SUPPORT 49

5.20.1 Short Description 49

5.20.2 Actors..... 49

5.20.3 Pre-conditions 50

5.20.4 Post-conditions..... 50

5.20.5 Normal Flow 50

5.20.6 Alternative Flow 51

5.21 USE CASE I&E, MULTI-PARTY CONFERENCE CALL 51

5.21.1 Short Description 51

5.21.2 Actors..... 51

5.21.3 Pre-conditions 52

5.21.4 Post-conditions..... 52

5.21.5 Normal Flow 52

5.21.6 Alternative Flow 1 52

5.21.7 Alternative Flow 2 53

5.21.8 Operational and Quality of Experience Requirements..... 53

5.22 USE CASE I&E, MULTIPLE DATA RATE FOR MOBILE BROADCAST CONTENT 53

5.22.1 Short Description 53

5.22.2 Actors..... 53

5.22.3 Pre-conditions 54

5.22.4 Post-conditions..... 54

5.22.5 Normal Flow 54

5.22.6 Alternative Flow 54

5.22.7 Operational and Quality of Experience Requirements..... 54

6. REQUIREMENTS (NORMATIVE)..... 55

6.1 HIGH-LEVEL FUNCTIONAL REQUIREMENTS 55

6.1.1 Security 55

6.1.2 Charging..... 57

6.1.3 Interoperability..... 57

6.1.4 Privacy 57

6.1.5 Secure storage requirements 57

6.2 OVERALL SYSTEM REQUIREMENTS 58

6.2.1 Broadcast Channel Issues..... 59

6.2.2 Interaction Channel Issues 59

6.2.3 Service Discovery and Service Guide..... 60

6.2.4 Stream Distribution..... 61

6.2.5 File Distribution..... 61

6.2.6 Provisioning 62

6.2.7 Service and Content Protection..... 63

6.2.8 Notifications..... 65

APPENDIX A. CHANGE HISTORY (INFORMATIVE)..... 66

A.1 APPROVED VERSION HISTORY 66

A.2 DRAFT/CANDIDATE VERSION 1_1 HISTORY 66

Tables

Table 1: Mapping of use cases to representative services and functionalities 17

Table 2: High-Level Functional Requirements 55

Table 3: High-Level Functional Requirements – Security Items 56

Table 4: High-Level Functional Requirements – Charging Items 57

Table 5: High-Level Functional Requirements – Interoperability Items	57
Table 6: High-Level Functional Requirements – Privacy Items.....	57
Table 7: Overall System Requirements	59
Table 8: Overall System Requirements – Broadcast Channel Issues.....	59
Table 9: Overall System Requirements – Interaction Channel Issues	59
Table 10: Overall System Requirements – Service Discover and Service Guide	61
Table 11: Overall System Requirements – Stream Distribution	61
Table 12: Overall System Requirements – File Distribution	62
Table 13: Overall System Requirements – Provisioning	63
Table 14: Overall System Requirements – Service and Content Protection	65
Table 15: Overall System Requirements – Notification	65

1. Scope

(Informative)

The overall goal of the Mobile Broadcast Service is to define an end-to-end framework. This document covers requirements on both existing and new enablers. For existing enablers, this may involve enhancements or extensions to make them broadcast capable.

The use cases contained in chapter 5 of this document provide examples of Mobile Broadcast Services that should be enabled.

The requirements contained in chapter 6 of this document address the whole end-to-end framework for Mobile Broadcast, and are structured along the following functions of the Mobile Broadcast Services Enabler: service discovery, service guide, provisioning, content and service protection, real-time streaming distribution, file distribution, and charging.

The enablers must be bearer independent in order to be useful for a diverse and heterogeneous infrastructure. The development of an enabler for Mobile Broadcast Services will consider a broad set of stakeholders from various industries, the varied business links between them, and may take into account any existing infrastructure.

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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

(U)SIM	An SIM or a USIM application residing in the memory of the UICC.
Audience Measurement	Audience measurement is the method of measuring usage statistics in relation to consumption of BCAST <i>Content and Service</i> .
Broadcast Channel	<p>The logical channel (usually uni-directional) that provides Broadcast Transport which the Broadcast Enabler uses for broadcast distribution of data to Mobile Terminals.</p> <p>Typically, the Broadcast Channel supports high bitrates. It is inherently used for downlink purposes and is particularly useful for conveying information that is targeted to all or many Mobile Terminals.</p> <p>The Broadcast Channel is implemented by a BCAST Distribution System that can efficiently distribute IP-based services to Mobile Terminals. Typically, this means that a broadcast-capable bearer is used as the underlying network technology.</p> <p>Broadcast transport mechanisms allow simultaneous distribution of content to many recipients. Broadcast transport can be accomplished using both broadcast and multicast mechanisms in the underlying BCAST Distribution System.</p>
BCAST Distribution System	A system typically but not necessarily containing the ability to transmit the same IP flow to multiple Terminal devices simultaneously. A BCAST Distribution System (BDS) typically uses techniques that achieve efficient use of radio resources. A BDS consists of Network functionality up to the IP layer and optional Service Distribution/Adaptation functionality above the IP layer. Most BDSs support broadcast/multicast distribution in the network. Some BCAST Distribution Systems have the capability to deliver the IP flows in the network via unicast.
Broadcast Service	<p>A Broadcast Service is a “content package” suitable for simultaneous distribution to many recipients (potentially) without knowing the recipient. Either each receiver has similar receiving devices or the content package includes information, which allows the client to process the content according to his current conditions.</p> <p>Examples of Broadcast Services are:</p> <p>pure Broadcast Services:</p> <ul style="list-style-type: none"> - mobile TV - mobile newspaper - mobile file downloading (clips, games, SW upgrades, other applications, applications) <p>combined broadcast/interactive Broadcast Services:</p> <ul style="list-style-type: none"> - mobile TV for filedownloading with voting - betting Broadcast Services - auction Broadcast Services - trading Broadcast Services
Broadcast Service Area	The geographical or logical area in which a Broadcast Service is distributed.
Broadcast Subscription	The commercial relationship between an Subscriber and a Mobile Broadcast Service Provider, under which the Subscriber can obtain rights to access a service or Service Bundle.
Component (of Function)	A Function is further decomposed into Components. Components are used to separate logically separate parts within the Function. This decomposition is helpful in architecture and specification work.
Content Protection	This involves the protection of content (files or streams) during the complete lifetime of the content i.e. it is NOT an access control mechanism only as it involves post-acquisition rules. Content protection is

enabled for encrypted content through the use of appropriate rules or rights, e.g. using OMA DRM v2.0 for files and OMA DRM Broadcast extensions for streamed content. Content remains protected in the Terminal.

Usage rules are enforced at "consumption time" (typically, based on DRM). In addition to subscription and pay-per-view, typically associate with Service Protection, Content Protection enables also more fine-grained usage rules, such as for displaying, saving in unencrypted form, printing, processing, re-distributing, etc. [DRMDRM-v2.0].

Content Provider	Provides content to the Mobile Broadcast Service provider. The Content Provider may be the original source of the content, own the rights to the content distribution, and manage the charging, authorization, and/or subscriptions to content.
Content Subscription	The commercial relationship between an Subscriber and a Mobile Broadcast Service Provider and/or Content Provider, under which the Subscriber can obtain rights to access content.
CSIM	A Cdma2000 Subscriber Identify Module is an application defined in [3GPP2 C.S0065] residing on the UICC to register services provided by 3GPP2 mobile networks with the appropriate security.
Digital Rights Management	A set of technologies that provide the means to control the distribution and consumption of digital media objects.
End-User	An Individual who uses services and content [OMA DIC]
File Activation	The act of opening a file with its associated application, or executing it (if it is itself an application) in the Terminal.
File Expiration	The point in time when a file becomes invalid.
Function (of Enabler)	The Mobile Broadcast Service Enabler consists of several Functions. Functions provide finer granularity than Enabler. Function covers a particular end-to-end functionality within the Enabler. For example, Service Guide is a Function that belongs to Mobile Broadcast Service Enabler.
General Notification	The function that allows all End Users to receive service, operational, or emergency related general notices.
Interaction Channel	The logical channel for point-to-point communication through which the Mobile Terminal interacts with the Broadcast Services.
Mobile Broadcast Network Operator	The Mobile Broadcast Network Operator distributes Broadcast Services to the Subscriber.
Mobile Broadcast Service Provider	The Mobile Broadcast Service Provider provides Broadcast Services to the Subscriber. The Mobile Broadcast Service Provider may use the facilities of a Mobile Broadcast Network Operator to distribute the Mobile Broadcast Services to the Subscriber.
Notification	The function that allows a Subscriber to receive notices about Broadcast Services that match the End User's specified preferences.
Rich-Media Solution	A rich media solution is usually composed of a Rich Media Format, Rich Media Packaging, and Rich Media Delivery components to ensure an end-to-end RMS framework for consumption of Rich Media Content by the end-user. - Rich Media Content is a static or animated media consumed and displayed in a time interval. The media may take advantage but is not constraint to and not limited to enhanced features such as audio, video, data, text, images, and interaction and are composed together in regards to the terminal capabilities to give to the end-user a rich multimedia experience - Rich Media Format is a language describing the presentation composition and timing model of rich media content - Rich Media Packaging is a packaging schema used to represent Rich Media Content in a single packaging format (e.g. 3gp file) - Rich Media Delivery refers to a delivery mechanism used for Rich Media Content including file (e.g. Unicast or Broadcast download) and stream (e.g. Unicast or Broadcast streaming) delivery
Secure Removable Media	A removable media that implements means to protect against unauthorized access to its internal Data and includes a SRM Agent (e.g. Secure Memory Card, Smart Card) [SRM v1.0]
Service Aggregator	An entity that receives broadcast content from one or more Content Providers and acts as a single Content

	Provider in presenting those broadcast contents to the Mobile Broadcast Service Enabler using the appropriate defined interfaces.
Service Bundle	The Mobile Broadcast Service Provider may choose to combine otherwise unrelated services (possibly originating from different Content Providers and/or Service Aggregators) into a single package, the "Service Bundle", which is presented to the Subscribers for subscription as a whole. A certain service may be part of more than one bundle.
Service Discovery	The process of discovering and acquiring the Service Guide.
Service Guide	The information describing the Broadcast Services available to the Subscriber and the Terminal.
Service Guide Component	A fragment of Service Guide, which can be used and possibly displayed independently, for example, a SDP file describing a streaming Broadcast Service, a XML fragment containing metadata about a Broadcast Service. [XML]
Service Hopping	Changing of Broadcast Services initiated by the End User's operation, usually in a fast pace, in order to quickly scan through the Broadcast Services that are available to the End User.
Service Protection	This involves protection of content (files or streams) during its delivery i.e. it is an access control mechanism only. Content is freely available (thus unencrypted) once securely delivered. For the benefit of allowing Content Protection to be provided for the same service, Service Protection may be limited to immediate consumption / rendering only, allowing recording of encrypted content for future acquisition of post-acquisition rights (see Content Protection).
SIM	A Subscriber Identity Module is a standalone module defined in [3GPP TS 51.011] to register services provided by 2G mobile networks with the appropriate security.
Subscriber	Designation for the customer (i.e., a person, organization, or other entity) with which the Mobile Broadcast Service Provider and/or the Content Provider maintains a commercial relationship.
Terminal	The mobile device with which an End-User receives and consumes a Broadcast Service.
UICC	A Universal Integrated Circuit Card, an ICC (or 'smart card') is a physically removable secured device as defined in [3GPP TS 31.101] for communication purposes not restricted to mobile convenience only. It is a platform to all the resident applications (e.g. USIM or CSIM or ISIM)
USIM	A Universal Subscriber Identity Module is an application defined in [3GPP TS 31.102] residing in the memory of the UICC to register services provided by 3GPP mobile networks with the appropriate security.

3.3 Abbreviations

A/V	Audio/Visual
APP	Application
BC	Broadcast
BCMCS	Broadcast Multicast Service
BDS	BCAST Distribution System
CSIM	cdma2000 subscriber Identify Module
DRM	Digital Rights Management
DVB	Digital Video Broadcast
DVB-H	Digital Video Broadcast - Handheld
HLFR	High Level Functional Requirement
I&E	Information and Entertainment
IC	Interaction Channel
ICC	Integrated Circuit(s) Card
IM	Instant Message
IP	Internet Protocol

ISDB-T	Integrated Services Digital Broadcasting for Terrestrial
ISIM	IP Multimedia Services Identity Module
MBMS	Multimedia Broadcast/Multicast Service
MIME	Multipurpose Internet Mail Extensions
MMS	Multimedia Messaging Service
N/A	Not Applicable
OMA	Open Mobile Alliance
OSR	Overall System Requirements
PROV	Provisioning
RMS	Rich Media Solution
R-UIM	Removable User Identity Module
SD	Service Discovery
SDP	Session Description Protocol
SIM	Subscriber Identity Module
SMS	Short Message Service
SRM	Secure Removal Media
SW	Software
T-DMB	Terrestrial Digital Multimedia Broadcasting
TV	Television
UI	User Interface
UICC	Universal Integrated Circuit(s) Card
UK	United Kingdom
USIM	Universal Subscriber Identity Module
XML	Extensible Markup Language

4. Introduction (Informative)

The term "Mobile Broadcast" refers to a broad range of Broadcast Services, which jointly leverage the unidirectional one-to-many broadcast paradigm and the bi-directional unicast paradigm in a mobile environment, and covers one-to-many services ranging from classical broadcast to mobile multicast.

Building on mobile network systems, which provide bi-directional links, and digital broadcast systems, which provide unidirectional broadcast, Mobile Broadcast Services will enable distribution of rich, interactive, and bandwidth consuming media content to large mobile audiences.

4.1 Version 1.0

The Mobile Broadcast Services Enabler 1.0 addresses functional areas which are generic enough to be common to many Broadcast Services, and which can be defined and implemented in a bearer-independent way. The corresponding system requirements found in §6.2 are:

- BDSs supported via adaptation include: DVBH-IPDC, MBMS and BCMCS.
- **broadcast channel** addressing the mechanisms that enable a specific BDS to be used as a generic broadcast link for Mobile Broadcast Services
- **interaction channel** addressing the mechanisms that enable a specific interaction system (eg. a cellular network) to be used as a generic interaction link for Mobile Broadcast Services
- **service discovery and service guide** addressing the mechanisms that enable an End User (and Terminal) to discover and access Mobile Broadcast Services; the area covers the data model, network-agnostic transport, and external interfaces for Service Providers
- **notification**: addressing mechanisms that
 - allow an End User to specify a set of rules that allow the Mobile Broadcast Service to determine when broadcast content exist which are of interest to the End User, and
 - send notifications to the End User to make her/him aware of the broadcast contents of interest.
- **service and content protection** addressing the mechanisms by which Mobile Broadcast Services and content can be protected to enable various purchasing and charging models, usage tracking, and usage rights enforcement: service protection covers access control for any kind of IP-based service, whereas content protection covers application-level end-to-end security for file- and stream-based services
- **service provisioning** addressing the mechanisms that enable a Service Provider to provision Mobile Broadcast Services to an End User (and Terminal); the area covers subscriptions to services and related payments
- **stream distribution** addressing the mechanisms that enable stream distribution to be part of Mobile Broadcast Services; the area covers coding, transport and related signalling
- **file distribution** addressing the mechanisms that enable file distribution to be part of Mobile Broadcast Services; the area covers coding, transport and related signalling

4.2 Version 1.1

BCAST 1.1 aims to achieve 16 requirements that were not fulfilled in BCAST 1.0 and to enhance the existing functionalities with new technical solutions.

For the enhancement of existing functions, the items listed below will be in BCAST 1.1

- Location enhanced Mobile Broadcast Service

- Personalized enhanced Service (Personalized UGC reception, Personalized Service, and User Defined Bundle)
- Enhance Interactive Service (Parental rating info for interactive Service, Enhanced interactive Media Document, Enhanced Service Guide delivery over Unicast, and Interactive Service new functionalities)
- Enhance subscription (Pause and Resume of subscription status, Coupons and Tokens for Content Redemption, Parental Control , Start times for subscription periods, and Un-subscription to all subscribed purchase items))
- Supporting for User's multiple devices
- Roaming Enhancements (Service provider roaming and DVB-H roaming enhancement)
- Service Protection and Content Protection enhancement(Generic STKM extension, TEK management, Second TEK in STKM ,and Secure Removal Media Extension for BCAST 1.1)
- Optimal operation of BCAST enabler in hybrid network environment
- Mobile TV date invoked from the Smartcard
- Notification Function enhancement

In addition to these, Rich Media Solution and Audience Measurement will be added to BCAST 1.1 and, for the efficient usage of Broadcast channel, DM(FUMO) over BCAST and Smartcard Broadcast Provisioning will be added.

Finally, 3 new BDSs – DVB-SH, WiMAX, FLO IP – will be supported in BCAST 1.1

[Editor's note : section 4.2 may be revised after TS work is done.]

5. Use Cases

(Informative)

The following matrix lists vertically all use cases and horizontally functionality, which has been identified as essential. It is understood that the horizontal functionality serves at least as an orientation for identifying all functions for Mobile Broadcast Services.

In addition, it is noted that there are two types of use cases, first is function-oriented use cases, and the second is application-oriented use cases. It is proposed to group the application-oriented use cases in 5 categories:

- Interactive mobile TV; scheduled programs (news, soaps, trailers, game show, advertising, ...) with specific back channels (WEB-access, voting, betting, chat, ...)
- Buffered infotainment; news player, learning lessons, movie guide
- Massively multiplayer online games; Online Quiz, Online Roll Play), Online Realtime Strategy Game, Online Tactical Roll Play Shooter, Online Player Community Game
- Location based Traffic Guide; Navigation support and Traffic Information Public Transport Guidance
- Non-interactive, plain TV-services

interactive mobile TV

multiplayer games

buffered infotainment

location based traffic guide

non-interactive regular TV

Use cases	primarily illustrates a function	primarily illustrates an application	ESG		SDSG		RD sections									
			File distribution	stream distribution	file distribution	stream distribution	Service Protection	Content Protection	Authenticate / authorize	Security	subscription	Purchase	Charging	provisioning	Charging	Interaction Channel
1 Discovering and the available Mobile Broadcast Services and their descriptions	x				x			x		x				x	x	
2 Protected Mobile Broadcast Services and content delivered within	x							x	x				x		x	
3 Mobile Broadcast Service with auxiliary data and interaction		x		x	x				x						x	
4 Mobile broadcast file distribution – example of news service		x			x				x							
5 Personalized news broadcast		x			x								x		x	x
6 communications related broadcast		x							x						x	
7 rich media news broadcast		x							x						x	
8 Activation of already downloaded Broadcast Service content	x								x	x			x		x	
9 Scalable Viewing of Mobile Broadcast Content	x															x
10 Broadcast Service Hopping	x				x										x	
11 User Information Filtering of Broadcast Services and Content	x				x	x	x									x
12 Timing of Broadcast Services and Content	x				x	x										x
13 Subscribing to Mobile Broadcast Services	x								x	x	x	x	x		x	
14 Broadcast Service for Roaming Mobile Terminal	x				x				x	x	x	x	x		x	
15 Service Guide Acquisition	x				x					x					x	
16 Location Filtering of Broadcast Services and Content	x				x	x									x	x
17 Device outside Broadcast Coverage	x				x										x	
18 Interactive TV games		x													x	
19 Pervasive multiplayer games		x				x	x	x			x				x	
20 Navigation and Traffic Information Support		x				x									x	x
21 Multi-party conference call		x								x				x	x	x
22 Multiple data rate for Mobile Broadcast Content	x															x

Table 1: Mapping of use cases to representative services and functionalities

5.1 Use Case I&E, Discovering and the available Mobile Broadcast Services and their descriptions

5.1.1 Short Description

This use case describes the End User searching, discovering and then browsing the set of Mobile Broadcast Services, programmes and/or content (for example, audio-visual services such as TV programmes), which are either available right now or at some later time, with his or her Mobile Terminal. First the End User switches on the Terminal, soon the Terminal displays a directory of services available together with their descriptions, schedule, etc. The End User searches the list of available services and possibly organizes it according to different parameters (start time, genre, keyword, etc.) After finding an interesting service the End User selects it. If this is a pay service, the Terminal prompts with a payment dialogue and completes a sequence of key acquisition.

5.1.2 Actors

Network Operator

Provides the network that carries the Mobile Broadcast Services. The Network Operator organizes the lower layer signalling so that the End User's Terminal is able to find a point of entry to service discovery.

Service Provider

Provides the Mobile Broadcast Service to the End User. The Service Provider broadcasts the services and also maintains and delivers the service discovery information to the End User enabling him or her to find out about available services. The Service Provider also packages and schedules the content provided by a Content Provider.

Content Provider

Provides the content and may also manage the charging and/or authorization for the access to the content.

End User

Consumes the Mobile Broadcast Services and digital content delivered within the services. The End User pays for the Mobile Broadcast Services. The payment for content goes to either the Service Provider or the Content Provider (in the latter case, possibly via a Service Provider). In the context of this use case, the End User receives and browses the list of available services.

5.1.2.1 Actor Specific Issues

End User

Wants to find the services conveniently and to be able to organize and sort the list of services according to several parameters. The End User may have a possibility to discover services related to several Service Providers.

Service Provider

Wants to provide information about its available Mobile Broadcast Services, their schedules, their prices and how to access those services. Wants to have a way to describe the content and services with metadata such as genre, title, rating and also with renderable data such as images.

Content Provider

Wants to provide content to End Users via Mobile Broadcast Service Providers. Depending on business arrangements, the Content Provider may want to manage subscriptions.

5.1.2.2 Actor Specific Benefits

End User

The End User benefits from having a comprehensive list of Mobile Broadcast Services available and/or digital content available through those. Having such a list enables the End User to make a selection of which service to receive. Intuitive selection leads to automatic device configuration for reception without hindering the friendly UI. Note, this still allows the End User access to the administration/technical configuration as an auxiliary option if desired.

Service Provider

The Service Provider benefits from being able attract End Users to its services with a low user complexity barrier to discovery and purchase initiation. The Service Provider can convey rich information that relates to a subscription / purchase decision as well as the price of the service in a flexible way. Service description is independent of bearer so that information can be delivered to a mixture of device types over a mixture of network types, and still lead to a consistent and simple user interaction experience (encouraging End Users to repeatedly return with the Provider's offering to lower churn-rate).

5.1.3 Pre-conditions

The End User's Terminal must have a configuration with at least one entry point, which provides machine-readable information on how to access, and tune into, broadcast delivery of the service descriptions; and, as a complementary method, how to establish a connection to the Service Provider over a bi-directional bearer to request the service discovery information. The configuration can be provided within the signalling over broadcast bearer or through a bi-directional bearer.

5.1.4 Post-conditions

The End User has a list of services displayed and possibly he or she has selected a Mobile Broadcast Service out of the list of services.

5.1.5 Normal Flow

1. The End User switches on the Terminal.
2. The Terminal possibly shows a cached view of service descriptions.
3. The Terminal scans the bearer(s), which are delivering Mobile Broadcast Services.
4. The Terminal identifies a set of Service Providers with their specific service discovery information.
5. The Terminal receives service discovery information.
6. The Terminal renders the service discovery information to the End User. The Terminal displays a directory of services available together with their descriptions, schedule, etc.
7. The End User organizes, filters, sorts and browses through received information. While doing so, the information can be continuously updated. The filtering and sorting criteria include but is not limited to title, genre, start time, content type, price, language, etc.
8. The End User examines a service description closer. More details are presented and possibly a list of related services.
9. After finding an interesting service the End User selects it. If this is a pay service, the Terminal may prompt with a payment dialogue and complete a sequence of key acquisition.

5.1.6 Alternative Flow

Instead of delivering the service discovery information by broadcast it is fetched through a connection from End User to Service Provider over bi-directional bearer.

5.1.7 Operational and Quality of Experience Requirements

The service discovery information shall be accessible by the End User as fast as possible. The access time will consist of several parts: (1) initial access to service discovery information; (2) reception of initial (sufficient to start using) service discovery information; (3) consistency verification; and (4) update discovery

The system shall allow receiving, identifying and accessing service discovery information from several independent sources (Service Providers), by the End User.

5.2 Use Case I&E, Protected Mobile Broadcast Services and content delivered within

5.2.1 Short Description

This use case describes the End User accessing a Mobile Broadcast Service that has been protected from unauthorized reception and consumption. The End User selects a Mobile Broadcast Service. If he or she does not have rights to receive or consume the service, the End User is prompted with a question concerning whether or not he wants to purchase rights for the service or content. If yes, the rights are delivered to the End User allowing him or her to receive Mobile Broadcast Services and/or consume the content delivered.

5.2.2 Actors

Network Operator

Provides the network that carries the Mobile Broadcast Services. The Network Operator may provide some part of service protection.

Service Provider

Provides the Mobile Broadcast Service to the End User. The Service Provider broadcasts the services and content, and also takes care of protecting those.

Content Provider

The ultimate owner of the content delivered as a part of Mobile Broadcast Service.

End User

Consumes the Mobile Broadcast Services and digital content delivered within the services. The End User pays for the Mobile Broadcast Services and/or content to the Service Provider or to the Content Provider.

Terminal vendor

Provides the End User Terminal.

5.2.2.1 Actor Specific Issues

End User

Wants to be able to subscribe to larger bundles of services to avoid micro purchases (every soccer match individually from soccer world cup service).

Service Provider

Wants to protect the services and content from unauthorized use.

Content Provider

Wants to trust that the Service Provider can provide adequate security mechanisms so that content is distributed only to those paying for the content.

Terminal vendor

Wants to provide the service and content protection feature in the most cost-efficient and interoperable way possible.

5.2.2.2 Actor Specific Benefits

Service Provider

Only those End Users who have paid or will pay, are able to access the services and content.

5.2.3 Pre-conditions

The End User has concluded the service discovery phase and selected a Mobile Broadcast Service.

5.2.4 Post-conditions

The End User has received rights to receive the service and/or consume the content.

5.2.5 Normal Flow

1. The End User discovers a Mobile Broadcast Service of interest (or a piece of content that has been already delivered within the service and then stored locally).
2. The End User acquires rights for receiving the service / consuming the content.
3. The End User receives the service and/or consumes the content.

5.2.6 Alternative Flow

None Specified

5.2.7 Operational and Quality of Experience Requirements

None Specified

5.3 Use Case I&E, Mobile Broadcast Service with auxiliary data and interaction

5.3.1 Short Description

The End User receives a Mobile Broadcast Service such as a linear audio/video (A/V) stream carrying a TV programme or other content. Related to the broadcast content there is auxiliary data such as a hypertext document, multimedia file or subtitling of various languages that are delivered within the Mobile Broadcast Service and on some level are synchronized with the main content (A/V stream). The client application on the Terminal renders the service for the display of the device so that the auxiliary data is presented within the main content (links or hotspots in the A/V stream) or next to the main content (web page displayed in data area next to the main service, subtitles displayed below the main service, etc). The auxiliary data can change or be updated several times during the course of time that the Mobile Broadcast Service is available. Further, the auxiliary data can contain web links or “voting buttons” or other elements that provide the interactivity. Real-time voting, acknowledgment message and real-time betting services can belong to this category of service. The acknowledgment message of the End User is needed when the Service Provider wants to know whether a broadcast message or content was sent to the End User successfully or not. In other words, the Terminal confirms the receipt of a broadcast message or content. When the End User accesses those elements, service interaction takes place, for example, browsing the web link or sending a vote through the interaction path over a cellular or similar network. Repetitive interaction also would be needed for real-time betting and similar services whenever the new information for real-time betting is triggered.

5.3.2 Actors

Network Operator

Provides the network that carries the Mobile Broadcast Services and may support the bi-directional unicast bearer.

Service Provider

Provides the Mobile Broadcast Service to the End User. The Service Provider broadcasts the Mobile Broadcast Services and content, as well as auxiliary data associated with the services.

Content Provider

The ultimate owner of the content delivered as a part of the Mobile Broadcast Service. The Content Provider may or may not also be the owner and source of the auxiliary data (for example subtitles).

End User

Consumes the Mobile Broadcast Services and digital content delivered within the services. The End User views the auxiliary data and initiates any service interaction.

Terminal vendor

Provides the End User's Terminal.

5.3.2.1 Actor Specific Issues

End User

Wants to be able to toggle the display of auxiliary services "on/off" or to select one from a set of auxiliary service. An example of this case is the selection of subtitles "on/off" or then the selection of subtitling language.

Service Provider

Wants to be able to provide End Users with Mobile Broadcast Services that allow the End User to interact with the service (e.g. voting), or to initiate a separate service (e.g. browsing).

Content Provider

In some cases, wants to provide content or data elements as complementary to the main content, for example, subtitles.

Terminal vendor

Wants to enable the End User interaction through making a communication path available by the request of the Terminal application. Needs a (scene) presentation to know how to render the auxiliary data with the service.

5.3.2.2 Actor Specific Benefits

End User

Auxiliary, complementary information related to the Mobile Broadcast Service can be provided to the End User. This possibly enhances the End User experience. In addition, the End User may be given an opportunity to interact with the service, or, to initiate an additional service within the Mobile Broadcast Service.

Service Provider

The service interaction will generate traffic on the Service Provider's system. For example, the web links delivered with the Mobile Broadcast Service may point to the portal of the Service Provider.

5.3.3 Pre-conditions

The End User has finished the service discovery phase and selected a Mobile Broadcast Service. If required, the End User has also acquired rights to access the selected Mobile Broadcast Service and related content.

5.3.4 Post-conditions

The End User continues receiving the selected Mobile Broadcast Service delivered with auxiliary data. The End User may have concluded a service interaction.

5.3.5 Normal Flow

1. The End User discovers a Mobile Broadcast Service of interest.
2. (Optionally) The End User acquires rights for receiving the service / consuming the content
3. The End User receives a Mobile Broadcast Service and associated auxiliary data. The auxiliary data is rendered within the service or next to the service in the End User device.

5.3.6 Alternative Flow

Same as Normal Flow for steps 1 to 3.

4. The End User accesses the interactive element delivered within the auxiliary data. The interactive element may be, for example a web link or a voting button.
5. There are two options:
 - a. The interaction results in an outbound data communication from the End User Terminal to, for example, the Service Provider. An example of this is browsing a web link pointing to a resource not stored on a Terminal; OR;
 - b. The interaction does not result in any outbound data communication from the End User Terminal. In this case the interaction is internal to the Mobile Broadcast Service. An example of this is selecting the subtitling language.
6. The End User possibly resumes the main Mobile Broadcast Service.

In case of real-time betting, steps 1 to 3 would repeat. For example, when the End User participates in a real-time betting service and bids a price at betting, he/she wants to know the current highest price which other participants have bid. The Service Provider informs the latest information whenever the betting related information changes. Until the betting closes, steps 1 to 3 would repeat.

5.3.7 Operational and Quality of Experience Requirements

None Specified

5.4 Use Case I&E, Mobile broadcast file distribution – example of news service and mobile learning

5.4.1 Short Description

The End User has subscribed to a Mobile Broadcast Service that delivers and updates an electronic news portal. The portal consists of a main page with headlines and files that make the presentation richer. These can be, for example, images, video

clips, etc. that are related to the main page. The files are broadcasted at scheduled times. Terminals receive and store the files. When the End User decides to consume the news service the files are retrieved from the Terminal storage.

The mechanism used for mobile broadcast file distribution as used for news distribution can almost identically be used for electronic learning lessons. An End User subscribes to a course and on a regular basis, e.g. over night, the lessons of a course are broadcast. Since the End User can work on the lesson on his speed the Terminal stores only the next relevant lessons. For verification the lessons include tests, but no results. Thus, the End User needs to contact the service platform via the interaction link for verification of his test results and probably obtaining hints for improving his learning.

5.4.2 Actors

Network Operator

Provides the network that carries the Mobile Broadcast Services.

Service Provider

Provides the Mobile Broadcast Service to the End User. The Service Provider broadcasts the files that make up the news service.

Content Provider

The ultimate owner of the content delivered as a part of Mobile Broadcast Service.

End User

Consumes the Mobile Broadcast Services and digital content delivered within the services.

Terminal vendor

Provides the End User Terminal.

5.4.2.1 Actor Specific Issues

End User

Wants to be able to access the news service any time and in any place. Delivering files and later displaying them provides this flexibility.

5.4.2.2 Actor Specific Benefits

End User

Recent news items are always accessible fast with the Terminal.

5.4.3 Pre-conditions

The End User has finished the service discovery phase and selected a Mobile Broadcast Service.

5.4.4 Post-conditions

The End User has a set of files stored at the Terminal for immediate consumption. It may be required that the End User acquire the rights to access the content, if the content has been delivered in encrypted form.

5.4.5 Normal Flow

1. The End User discovers a Mobile Broadcast Service of interest. In this case it is a content delivered via the file distribution service.
2. The Terminal automatically receives the broadcasted files over a Mobile Broadcast channel. The Terminal stores the files (this may include version management).

3. (Optionally) the Terminal alerts the End User that new files have been received / the service has new content.
4. At some point of time the End User accesses the stored files.

5.4.6 Alternative Flow

1. End User discovers on the ESG a mobile learning course organised in 12 lessons.
2. He is interested in that training and subscribes to the service.
3. From the ESG data of that service the Terminal identifies the next scheduled download of the lessons and prepares for it.
4. During the broadcast of all lessons for download over night the Terminal downloads only the first 3 lessons.
5. On the next morning the Terminal indicates to the End User, that the first lessons are available.
6. The test included in each lesson offers a verification, for which the Terminal connects to the lesson service.
7. After going through 2 lessons, the Terminal identifies the next download session and prepares for downloading the next lessons.
8. The Terminal automatically receives the broadcasted files over Mobile Broadcast channel. The Terminal stores the files (this may include version management)

5.4.7 Operational and Quality of Experience Requirements

None Specified

5.5 Use Case I&E, Personalized news broadcast

5.5.1 Short Description

There is a news broadcast on a regular basis, possibly free-to-air. The End User is interested in information on certain topics in the news categories economics and sports, but not politics and local news. Whenever there is a news broadcast the device filters the broadcast based on the topics selected and records the desired content. Afterwards the End User can view those contents. In parallel the device presents an overview of all topics based on information (abstract) contained in the service description. When viewing the overview of the news he gets interested in a particular political topic. Thus, he connects to the server of the Service Provider to access and retrieve the clip of that topic. The server filters the topic out of the regular broadcast and streams the topic individually to the consumer over a point-to-point logical channel after payment clearance. The current bandwidth of the wireless connection is too small for the original format of the content, which is therefore on the fly being transcoded.

5.5.2 Actors

Network Operator

Provides the network that carries the Mobile Broadcast Services, consisting of a broadcast bearer and perhaps a bi-directional unicast bearer. The Network Operator provides also the infrastructure for authentication, authorization, accounting, and service / content adaptation.

Service Provider

Provides the Mobile Broadcast Service to the End User. The Service Provider broadcasts the news on a regular basis complemented by the service description and additional related material. The Service Provider operates also a WEB server and streaming server to make additional information available upon request.

Content Provider

The ultimate owner of the content delivered as a part of Mobile Broadcast Service.

End User

Consumes the Mobile Broadcast Services and digital content delivered within the services.

Terminal vendor

Provides the End User Terminal.

5.5.2.1 Actor Specific Issues

End User

Wants to be able to access the news service any time any place. Filter and record Broadcast (streaming) of news and later displaying them provides this flexibility.

5.5.2.2 Actor Specific Benefits

End User

Recent news are always accessible fast with the Terminal.

Service Provider

Additional service in providing news which was broadcast earlier and has not been recorded on the device. Content adaptation.

5.5.3 Pre-conditions

The End User has finished the service discovery phase and selected a Mobile Broadcast Service.

5.5.4 Post-conditions

The End User has a set of files of the selected topics stored at the Terminal for immediate consumption. It may be required that the End User needs to acquire rights to access the content if the content has been delivered in encrypted form.

5.5.5 Normal Flow

1. The End User discovers a Mobile Broadcast Service of interest.
2. The Terminal automatically receives the broadcasted files over Mobile Broadcast channel. The Terminal filters the broadcast and stores the clips as files (this may include version management).
3. The End User sends his or her preference based on the stored files to the Server operated by Service Provider.
4. (Optionally) the Terminal alerts the End User that new news topics were recorded / the service has new content.
5. At some point of time the End User accesses the stored files.

5.5.6 Alternative Flow

None Specified

5.5.7 Operational and Quality of Experience Requirements

None Specified

5.6 Use Case I&E, communications related broadcast

5.6.1 Short Description

There is a broadcast of a sports event on a regular basis, possibly free-to-air. The End User wants to notify a friend about that event and sends an MMS with a short clip grabbed of the sports event by just pushing a single button. Looking at his presence list he sees that there are several friends watching that event and they enter a chat room offered by the Service Provider.

5.6.2 Actors

Network Operator

Provides the network that carries the Mobile Broadcast Services, and the communication infrastructure for messaging and chat.

Service Provider

Provides the Mobile Broadcast Service to the End User. The Service Provider may also operate a presence server, an instant messaging server, and a chat server.

Content Provider

The ultimate owner of the content delivered as a part of Mobile Broadcast Service.

End User

Consumes the Mobile Broadcast Services and digital content delivered within the services.

Terminal vendor

Provides the End User Terminal.

5.6.2.1 Actor Specific Issues

End User

Wants to be able to access the news service any time and in any place. Recording of a Broadcast (streaming) of news and later displaying the news provides this flexibility.

5.6.2.2 Actor Specific Benefits

End User

Recent news are always accessible fast with the Terminal, some part of the news can be shared with the End User's friends through MMS, and a communication program (e.g. chatting program) can also be supported for conversations between the End User and his or her friends.

5.6.3 Pre-conditions

The End User has finished the service discovery phase and selected a Mobile Broadcast Service. The End User has downloaded an appropriate IM and chat client.

5.6.4 Post-conditions

None Specified

5.6.5 Normal Flow

1. The End User discovers a Mobile Broadcast Service of interest.
2. The Terminal automatically receives the broadcasted content over a Mobile Broadcast channel. The Terminal stores the files (this may include version management)
3. The End User can send an MMS-based notification to his friends
4. He recognizes that several friends are watching the event in his presence manager
5. The Mobile Broadcast Service allows him to negotiate and setup a chat room

5.6.6 Alternative Flow

None Specified

5.6.7 Operational and Quality of Experience Requirements

None Specified

5.7 Use Case I&E, rich media news broadcast

5.7.1 Short Description

There is a news broadcast on a regular basis, possibly free-to-air. The news broadcast contains some basic additional information, provided as WEB pages and short video clips within the broadcast. The service description of the news broadcast provides all necessary links to that information. The description contains also a hint that there is related material available upon request from the Service Provider, assuming a subscription of the End User. The End User subscribes to that service. In turn he receives a complementary service description with links to all related information, which consists of WEB pages, and additional A/V clips, through his "interaction channel" (bidirectional, IP-based unicast link) Now the End User can access a server through a WEB portal to retrieve that information. Since the Service Provider keeps only one format, an additional adaptation engine of the network operator transcodes the formats according to the End User needs.

5.7.2 Actors

Network Operator

Provides the network that carries the Mobile Broadcast Services, consisting of a broadcast bearer and a bi-directional unicast bearer. Provides also the infrastructure for authentication, authorization, accounting, and service / content adaptation.

Service Provider

Provides the Mobile Broadcast Service to the End User. The Service Provider broadcasts the news on a regular basis complemented by the service description and additional related material. The Service Provider operates also a WEB server and streaming server to make additional information available upon request.

Content Provider

The ultimate owner of the content delivered as a part of Mobile Broadcast Service.

End User

Consumes the Mobile Broadcast Services and digital content delivered within the services.

Terminal vendor

Provides the End User Terminal.

5.7.2.1 Actor Specific Issues

End User

Wants to be able to access the news service any time any place. He records the news Broadcast (streaming) and later displaying the contents to provide this flexibility.

5.7.2.2 Actor Specific Benefits

End User

Recent news are always accessible fast with the Terminal and rich-media can be accessible with Terminal.

5.7.3 Pre-conditions

The End User has finished the service discovery phase and selected a Mobile Broadcast Service.

5.7.4 Post-conditions

The End User has a set of files stored at the Terminal for immediate consumption. It may be required that the End User acquire the rights to access the content if the content has been delivered in encrypted form.

5.7.5 Normal Flow

1. The End User discovers a Mobile Broadcast Service of interest. In this case it is content provided via the file distribution service.
2. The Terminal automatically receives the broadcasted files over a Mobile Broadcast channel. The Terminal stores the files (this may include version management)
3. (Optionally) the Terminal alerts the End User that new files have been received / the service has new content.
4. At some point of time the End User accesses the stored files.
5. During or after the stored file is displaying, the End User can access a server having the rich-media, whose address is contained in the stored file.

5.7.6 Alternative Flow

None Specified

5.7.7 Operational and Quality of Experience Requirements

None Specified

5.8 Use Case I&E , Activation of already downloaded Broadcast Service content

5.8.1 Short Description

This use case describes the activation of prior downloaded Broadcast Service content which is protected from unauthorised consumption. The Content Provider offers digital content within a Broadcast Service e.g. the latest top 10 UK music charts. The Terminal receives the content and stores them. If the End User wants to consume the content or only parts of them he has to purchase rights for the content. The rights will be delivered to the End User enabling consumption of the stored content. In the case of the End User deciding not to consume the content he may delete the content.

5.8.2 Actors

Network Operator

Provides the network that carries the Mobile Broadcast Services. The Network Operator may provide some part of service protection.

Service Provider

Provides the Mobile Broadcast Service to the End User. The Service Provider broadcasts the services and content, and also takes care of protecting those contents.

Content Provider

The ultimate owner of the content delivered as a part of Mobile Broadcast Service.

Rights Issuer

An entity that issues rights to Broadcast Services and content.

End User

Receives the content delivered within the Broadcast Service. The End User pays for the content. The payment for content may go to the Service Provider, the Content Provider, or the Rights Issuer.

5.8.2.1 Actor Specific Issues

End User

Wants to receive the selected content. He does not like to be subject to time restrictions in the consumption of the content. I.e. he decides at a later date if he wants to consume the contents or parts of them.

Content Provider

Wants to use the most efficient distribution channel, i.e. broadcast but also wants to sell contents 24 hours a day even if the content is not broadcast during the full 24 hours.

5.8.2.2 Actor Specific Benefits

End User

Is able to decide at a later date to consume the content or not. He does not need to purchase rights at the time of receiving the content or service.

Content Provider

Is able to sell content even at times when it is not being broadcast or when broadcasting is not possible for any reason (e.g. the End User moved out of the area being served via broadcast). The Content Provider is not required to provide broadcast of the content during the entire day.

5.8.3 Pre-conditions

The End User has concluded the service discovery phase and the content of the Mobile Broadcast Service is saved at the Terminal. The End User selected a content of Broadcast Service which he wants to receive/consume without taking the time of broadcasting into account.

5.8.4 Post-conditions

The End User has received rights to consume the content.

5.8.5 Normal Flow

1. The Terminal has concluded the service discovery phase. The Terminal is ready for operation.

2. The End User selects a content of a Broadcast Service he wants to receive/consume, which was delivered over a Broadcast Channel. The time of broadcasting the content does not matter.
3. The selected content is saved at the time of broadcasting at the Terminal.
4. At a later date the End User wants to consume the content.
5. The End User acquires rights for consuming the content.
6. The End User consumes the content.

5.8.6 Alternative Flow

1. The End User discards the content because he is no longer interested in the content. This may be done automatically by the Terminal under defined conditions.

5.8.7 Operational and Quality of Experience Requirements

None Specified

5.9 Use Case I&E, Scalable Viewing of Mobile Broadcast Content

5.9.1 Short Description

This use case involves three End Users, Alice, John and Bob, who are watching the same football program with their mobile Terminals with different capabilities. They stay at different places where transmission conditions are different. First, the End Users switch on their Terminals and access the same football program. Then, each Terminal displays the same program in a scalable way according to the different reception conditions and the capability of each End User's Terminal. After that, Alice, John and Bob begin to enjoy the same football program, each with a different view.

5.9.2 Actors

Alice

The End User who is going to watch the football program with her mobile Terminal, she is at the place where the reception condition is good.

John

The End User who is going to enjoy the football program with his mobile Terminal, he is at the place where the reception condition is good, but his Terminal is not capable of displaying video.

Bob

The End User who is going to enjoy the football program with his mobile Terminal, he is at the place where the reception condition is bad.

Content Provider

The ultimate owner of the content delivered as a part of Mobile Broadcast Service.

Service Provider

Service Provider provides the Mobile Broadcast Services and content to mobile Terminal End Users. In the context of this use case, the Service Provider broadcasts the services and content, and also provides scalability information.

5.9.2.1 Actor Specific Issues

Alice

Wants to watch the football program with high quality video because the reception condition is good.

John

Wants to enjoy the football program even though his Terminal is not able to display video.

Bob

Interested in the football program but he cannot receive the broadcast video of the program, because the reception condition is bad.

Service Provider

Wants different End User Terminals to display the same MobileMobile Broadcast content in a scalable way, according to different Terminal capabilities and/or reception conditions.

5.9.2.2 Actor Specific Benefits

Alice

Alice benefits from being able to view the football program in a scalable way corresponding to the high reception rate.

John

John benefits from being able to enjoy the football program in a scalable way, despite the fact that his Terminal is not able to display video.

Bob

Bob benefits from being able to enjoy the football program in a scalable way corresponding to the low reception rate.

Service Provider

The Service Provider benefits from broadcasting the digital content and providing scalability information. Service Provider can provide the same MobileMobile Broadcast content to different End User Terminals which have different capabilities or are under different reception conditions.

5.9.3 Pre-conditions

The Service Provider provides rich media services, which include video, audio, images and text. The Service Provider also provides some scalability information.

Alice, John and Bob have mobile Terminals which can display the broadcast content in a scalable way.

5.9.4 Post-conditions

None Specified

5.9.5 Normal Flow

1. The End Users, Alice, John and Bob, switch on their mobile Terminals, and select the same football program.
2. Alice's Terminal automatically displays the football program which includes video, audio, and text data, because her Terminal is in a good reception condition and is capable of rendering all media at a high rate.
3. John's Terminal automatically displays the football program in a scalable way with only image, audio, and text data, because his Terminal is not capable of rendering video.

4. Bob's Terminal automatically displays the football program in a scalable way with only audio and text data, because the bandwidth is not high enough to receive image or video.

5.9.6 Alternative Flow

None Specified

5.9.7 Operational and Quality of Experience Requirements

None Specified

5.10 Use Case I&E, Broadcast Service Hopping

5.10.1 Short Description

This use case describes an End User who is receiving Mobile Broadcast Services and contents with his/her mobile Terminal. First the End User switches on the Terminal, and then he/she switches broadcast channels quickly to check out all programs available. During hopping, the Terminal quickly displays the title image/text or other representative items of every channel the End User selects.

5.10.2 Actors

End User

The End User consumes the Mobile Broadcast Services and digital content delivered within the services. In the context of this use case, the End User quickly changes broadcast channels to check out what programs are available and know some information or outline of the programs.

Content Provider

The ultimate owner of the content delivered as a part of Mobile Broadcast Services; The Content Provider also may specify what is displayed for quick preview when each program is selected.

Service Provider

Provides the Mobile Broadcast Services and content to the End User; the Service Provider broadcasts the services and content, and also may specify what is displayed for quick preview when each program is selected.

5.10.2.1 Actor Specific Issues

End User

Wants to have some information or outline of a program without waiting when he/she changes broadcast channels quickly, instead of staring at the boring black screen.

Service Provider

Wants to enable quick program preview for an End User when the End User changes broadcast channels, to enhance the End User's satisfaction.

Content Provider

Wants to enable quick program preview for an End User when the End User changes broadcast channels, to enhance the End User's satisfaction.

5.10.2.2 Actor Specific Benefits

End User

The End User benefits from being able to know information or outline of a program while waiting for the program to start after switching to a program channel.

Service Provider

The Service Provider benefits from enabling quick program preview for the End User. The End User will not change a channel just because of the long waiting time before the program starts.

Content Provider

The Content Provider benefits from enabling quick content preview for the End User. The End User will not change a channel just because of the long waiting time before the program starts.

5.10.3 Pre-conditions

The Content Provider provides rich media programs, which include video, audio, images and/or text, so a buffering time is needed before the program starts to play.

The Service Provider or the Content Provider specifies what is displayed for quick preview when each program is selected.

The End User has a mobile Terminal which can receive Mobile Broadcast Services and switch channels.

5.10.4 Post-conditions

None Specified

5.10.5 Normal Flow

1. The End User switches on the Terminal.
2. The End User switches channels quickly to check out what broadcast programs are available at the moment and what these programs are about.
3. The Terminal of the End User displays the title image/text or other representative items of the selected channels quickly to enable program preview.
4. The Terminal of the End User starts to display the selected broadcast program after receiving and buffering the program data.

5.10.6 Alternative Flow

None Specified

5.10.7 Operational and Quality of Experience Requirements

The Terminal should display the title image/text or other representative items as fast as possible (within one second).

5.11 Use Case I&E, User Information Filtering of Broadcast Services and Content

5.11.1 Short Description

This use case describes that the End User is watching MobileMobile Broadcast programs filtered(customized/selected) for him/her by his/her mobile Terminal according to the End User's profile. After the End User switches on the Terminal, it displays football news which suits his/her taste.

5.11.2 Actors

End User

The End User consumes the Mobile Broadcast Services and digital content. In the context of this use case, the End User is a football fan.

Content Provider

The ultimate owner of the content delivered as a part of Mobile Broadcast Services

Service Provider

The Service Provider provides the Mobile Broadcast Services and content to the End User. In the context of this use case, the Service Provider broadcasts the services and content, and also provides target End User information of the content.

5.11.2.1 Actor Specific Issues

End User

Likes football very much and is interested in all news and programs about it

Service Provider

Wants to provide services for target End Users

5.11.2.2 Actor Specific Benefits

End User

The End User benefits from the target End User information of the content. He/she can easily watch football related news, games or programs which suit his/her taste.

Service Provider

The Service Provider benefits from being able to provide services for target End Users by specifying some target End User information of the content.

5.11.3 Pre-conditions

The Service Provider broadcasts the services and content, and also specifies the target End User information of the content.

The End User has a mobile Terminal which stores the End User's profile information, such as age, gender, hobbies (football), etc.

5.11.4 Post-conditions

None Specified

5.11.5 Normal Flow

1. The End User switches on his/her mobile Terminal.
2. The mobile Terminal selects the football news which suits the End User's taste and displays the football news for him/her.
3. The End User happily watches the football news which he/she is interested in.

5.11.6 Alternative Flow

None Specified

5.11.7 Operational and Quality of Experience Requirements

None Specified

5.12 Use Case I&E, Timing of Broadcast Services and Content

5.12.1 Short Description

This use case describes an End User who is shopping in a shopping mall with a mobile Terminal in his/her pocket. After he/she switches on the Terminal, it displays advertisements of the sales with a limited time. Soon the End User knows that a promotion sale with a limited time is going to start in five minutes.

5.12.2 Actors

End User

The End User consumes the Mobile Broadcast Services and digital content. In the context of this use case, the End User receives broadcast advertisements with his/her mobile Terminal in a shopping mall.

Content Provider

The ultimate owner of the content delivered as a part of Mobile Broadcast Services. In the context of this use case, the Content Provider provides some time information for the content.

Service Provider

The Service Provider provides the Mobile Broadcast Services and content to End User.

5.12.2.1 Actor Specific Issues

End User

Wants to know the information about certain events that are happening now or will happen shortly

Content Provider

Wants to provide time-based content for the End User

5.12.2.2 Actor Specific Benefits

End User

The End User benefits from time information of the content. He/she can receive the information about the events that are happening now or will happen shortly, in a timely manner.

Content Provider

The Content Provider benefits from being able to specify some time information of the content, for example, content start-up time, content's term of validity. The Content Provider can therefore provide time-based content for the End User.

5.12.3 Pre-conditions

The Content Provider specifies the time information of the content, such as start-up time, term of validity.

The End User has been given the permission to receive the advertisement services and content.

The contents are received and stored in the Terminal before the valid time.

5.12.4 Post-conditions

None Specified

5.12.5 Normal Flow

1. The End User enters a shopping mall and switches on his/her mobile Terminal.
2. The mobile Terminal receives and stores the advertisement content within the Mobile Broadcast Service.
3. The mobile Terminal starts to display the advertisement of the sales with a limited time five minutes before the sales.
4. The End User knows that the sales with a limited time are going to start on the first floor in five minutes.
5. The mobile Terminal automatically deletes the advertisement after its expiration time.

5.12.6 Alternative Flow

None Specified

5.12.7 Operational and Quality of Experience Requirements

None Specified

5.13 Use Case I&E, Subscribing to Mobile Broadcast Services

5.13.1 Short Description

The End-User finds information about Broadcast Services in the service guide (which is itself a Broadcast Service), from a web shop, or some other mechanism. These services may be broadcast encrypted, and can only be received if the End-User has previously purchased the service access keys valid for a certain time period, or – in other words – has subscribed to the service. Subscriptions can be renewed automatically, or on End User request. From the End-User point of view, service subscriptions are usually purchased for whole bundles of services, which may or may not be made out of services from the same Content Provider. It is up to the Service Aggregator to define which services belong to a certain bundle. It is up to the Service Provider (from whom the End User purchases the keys) to determine a bundle's pricing.

5.13.2 Actors

Network Operator

Provides the broadcast network that carries the Mobile Broadcast Services.

Service Aggregator

Provides the Mobile Broadcast Service to the Service Provider. The Service Aggregator also maintains and delivers the service guide information to the Service Provider.

The Service Aggregator has no commercial relationship to the End-User.

Service Provider

Provides the Mobile Broadcast Service and the service guide information to End User. The Service Provider also handles purchase of service subscriptions and billing or other financial clearance.

Content Provider

Can be either the original source of the content, or itself a content aggregator.

End User

Consumes the Mobile Broadcast Services and digital content delivered within the services. The End User may pay for the Mobile Broadcast Services. The payment for content goes to either the Service Provider or the Content Provider (in the latter case, possibly via a Service Provider). In the context of this use case, the End User receives and browses the list of available services.

5.13.2.1 Actor Specific Issues

End User

Maintains a list of subscribed services or service bundles. In case of open-ended subscriptions, it must be possible to cancel a subscription (with a period of notice). In case of fixed-period subscriptions, it must be possible to renew them. In all cases the End-User must be aware of the purchase price.

Service Provider

Wants to provide information about its available Mobile Broadcast Services, their schedules, their prices and how to access them. The Service Provider wants a way to describe the content and services with metadata such as genre, title, rating and also with renderable data such as images.

Pay-per-view could lead to scalability problems. Care has to be taken to avoid peak loads on the Service Provider. In case pay-per-view is used to implement free pre-views, such rights might not have to be bound to a Terminal and could be broadcast optimisation may be possible to mitigate the scalability problems.

5.13.2.2 Actor Specific Benefits

End User

Different subscription models can be supported, e.g., calendar months/weeks, or even periods which are specific to an End-User.

5.13.3 Pre-conditions

None Specified

5.13.4 Post-conditions

None Specified

5.13.5 Normal Flow

1. The End User switches on the Terminal.
2. The Terminal possibly shows a cached view of service or service bundle descriptions, or then acquires them.
3. The End User opens a service, which has already been subscribed to. The service is displayed.
4. The End User opens a service, which has not been subscribed to, neither directly nor through a service bundle.
5. The relevant subscription information for the selected service is retrieved from the Service Provider.
6. The End User is presented with a list of options how to purchase the service. The options can include various bundling options, longer and shorter time periods, pay-per-view options, etc. The information includes the purchase price. The End User selects a purchase option.
7. The subscription keys for the selected purchase option are retrieved from the Service Provider. The Service Provider collects the money through any mechanism, e.g., pre-paid, post-paid, or credit card transaction.

5.13.6 Alternative Flow

None Specified

5.13.7 Operational and Quality of Experience Requirements

None Specified

5.14 Use Case I&E, Broadcast Service for Roaming Mobile Terminal

5.14.1 Short Description

This use case describes the capability for a Service Provider to provide Broadcast Service for the roaming mobile Terminal of the End User.

5.14.2 Actors

End User

The End User consumes the mobile broadcasting contents.

Content Provider

The owner of the content delivered as a part of Mobile Broadcast Services.

Service Provider of the Home Network

The Service Provider of the Home Network provides the Mobile Broadcast Services and related contents when the mobile Terminal of the End User is in the Home Network.

The Service Provider of the Home Network has a business agreement with the Service Provider of the Visited Network to authorise the Visited Network to provide Broadcast Services and content to the End User while roaming.

Service Provider of the Visited Network

The Service Provider of the Visited Network provides the Mobile Broadcast Services and related contents when the mobile Terminal of the End User is roaming from the Home Network to the Visited Network.

The Service Provider of the Visited Network has a business agreement with the Service Provider of the Home Network to obtain authorisation to provide Broadcast Services and content to the End User while roaming in the Visited Network.

5.14.2.1 Actor Specific Issues

End User

Wants to receive Broadcast Service and related contents when a mobile Terminal of the End User is roaming

Service Provider of the Visited Network.

Wants to provide Broadcast Service and related contents when a mobile Terminal of the End User is roaming

Service Provider of the Home Network.

Wants to allow the End User to receive Broadcast Service and related contents while the End User is roaming.

5.14.2.2 Actor Specific Benefits

End User

Allows End User to get and/or stores Broadcast Service and related contents when his/her mobile Terminal is roaming from his/her Home Network to the Visited Network

Service Provider of the Visited Network

Provides Broadcast Service and related contents when mobile Terminal of the End User is roaming in a Visited Network.

Service Provider of the Home Network

Receives revenues for Broadcast Service and related contents when the mobile Terminal of the End User is roaming.

Has a satisfied End User

5.14.3 Pre-conditions

The Service Provider provides broadcasting services and related contents.

A roaming agreement exists between Service Provider of the Home Network and that of the Visited Network

The Terminal of the End User can receive mobile broadcasting contents.

5.14.4 Post-conditions

The End User receives Broadcast Service and related contents while roaming

5.14.5 Normal Flow

The mobile Terminal is roaming from the Home Network to the Visited Network.

1. The End User discovers a Mobile Broadcast Service of interest in the Visited Network.
2. The End User selects an interesting service and requests it in the Visited Network.
3. The Visited Network obtains authorisation from the Home Network to provide the broadcast contents to the roaming End User. In this case, the Home Network may transfer the user information to the Visited Network for roaming.
- 4.
5. The Service Provider of the Visited Network provides the MobileMobile Broadcast contents that the End User has requested.
6. The Visited Network collects revenues from the Home Network for the Broadcast Service provided to the roaming End User.
7. The Home Network collects revenues from the End User for the Broadcast Service provided within the Visited Network.

5.14.6 Alternative Flow

1. The End User subscribes to a number of service bundles (e.g. "basic bundle" and "sports bundle") in her/his Home Network. [DRM REL]
2. The mobile Terminal is roaming out from the Home Network to the Visited Network. However the available services are not the same, as follows:
 - There are some identical services, but possibly in a different encoding (e.g., H.264 instead of H.263) and most likely with different encryption (different rights objects).
 - There are some services that are the same as in the Home Network, but have a local variant (e.g., same video, but audio stream in the local language; local advertisements).
 - The bundling is different (e.g., there is also a "basic bundle", but there is a "motor sport bundle", a "team sport bundle", and an "individual sport bundle").
3. The End User selects an interesting service and requests it in the Visited Network.

4. The Visited Network obtains authorisation from the Home Network to provide the broadcast contents to the roaming End User. In this case, the Home Network may transfer the user information to the Visited Network for roaming.
5. The Service Provider of the Visited Network provides the Mobile Mobile Broadcast contents that the End User has requested.
6. The Visited Network collects revenues from the Home Network for the Broadcast Service provided to the roaming End User.
7. The services used by the End User in the Visited Network can be identified as being included in the "basic service package with global roaming" that the End User has subscribed to in the Home Network, so the End User pays no extra charge for the services consumed in the Visited Network.

5.14.7 Operational and Quality of Experience Requirements

None Specified

5.15 Use Case I&E, Service Guide Acquisition

5.15.1 Short Description

John is a Mobile Broadcast Service user. He has not used his device for some time. When he switches (powers) on the device, the service guide information storage / cache is outdated or empty. John does not want to wait until the service guide information for the service he is interested in is broadcasted. He requests it from the Service Provider over an interactive channel. The Service Provider delivers the service guide information that John is interested in. John is able to browse and use the received service guide information.

5.15.2 Actors

John

John is an End User who uses Mobile Broadcast Services.

Service Provider

The Service Provider provides the Mobile Broadcast Services and content to mobile Terminal End Users.

5.15.2.1 Actor Specific Issues

John

Wants to use his Mobile Broadcast Services enabled device. When switching on the phone after some time, he wants to use service guide information for the services he is interested in, as quickly as possible.

Service Provider

Wants to deliver the service to the End Users and increase End User satisfaction.

5.15.2.2 Actor Specific Benefits

John

Does not have to wait long for broadcasted service guide information after switching on his Mobile Broadcast Service enabled device.

Service Provider

Increases End User satisfaction.

5.15.3 Pre-conditions

The Service Provider provides IP based Mobile Broadcast Services, e.g., a news service. Services are described by service guide information. The service guide information can be broadcasted (e.g., IP data casting via DVB), or unicast (e.g., IP over mobile packet data networks). [DBV-H]

John has a mobile Terminal capable of receiving broadcast, and of sending and receiving IP unicast over mobile packet data networks.

5.15.4 Post-conditions

None Specified

5.15.5 Normal Flow

1. John, the End User, switches on his mobile device that he has not used for a while. He wants to use a Mobile Broadcast Service. The service guide information for the service is not available on the device.
2. John does not want to wait until the broadcasted service guide information becomes available. He knows what service he is interested in.
3. John decides to request service guide information for this service. He requests, and receives, this information over a mobile communication system.
4. John uses the received service guide information.

5.15.6 Alternative Flow

None Specified.

5.15.7 Operational and Quality of Experience Requirements

None Specified

5.16 Use Case I&E, Location Filtering of Broadcast Services and Content

5.16.1 Short Description

This use case describes an End User who is receiving Broadcast Services and content customized for him/her based on the location of his/her mobile Terminal. First the End User switches on the Terminal, and then he/she selects a Broadcast Service, such as local traffic, weather or advertisements. Then, his/her Terminal sorts out all location-specific content (e.g., banner advertisements of the local stores) near to his/her current location and displays them.

Data about the location of End User(s) may be available in the network. This would permit a variety of sorting or filtering techniques to be used to direct location specific broadcast data over the broadcast network. Alternatively, the mobile Terminal may do the specific filtering from a more general broadcast stream.

5.16.2 Actors

End User

The End User consumes the Mobile Broadcast Services and content. In the context of this use case, the End User browses the location-oriented content and gets the data associated with the current location. For example, the local traffic data or advertisement banners of the nearby stores would be available.

Content Provider

The ultimate owner of the content delivered as a part of Mobile Broadcast Services. The Content Provider may associate location specific information with the content to permit distribution or filtering operations.

Service Provider

The Service Provider provides the Mobile Broadcast Services and content to the End User. The Service Provider who broadcasts the services and content may develop location specific streams to be distributed over the broadcast network based on information related to geographic delivery considerations. In addition, the Service Provider may utilize information of current registered End Users or their locations to further refine the content streams to be broadcast., The Service Provider may also provide location information related to the content if necessary, possibly by adding such information as latitude and longitude of an advertising store.

Mobile Terminal

The device which receives the broadcast data and may provide some filtering of the content based upon the received location data.

5.16.2.1 Actor Specific Issues

End User

Wants to know certain information related to his/her current location such as local weather or traffic data or nearby stores' advertisements

Service Provider

Wants to provide location-based services for End User

5.16.2.2 Actor Specific Benefits

End User

The End User benefits from location information of the content. He/she can get stores' information near his/her current location and filter off those distant stores' information. Information from stores in other distant locations would not be presented as it would be filtered out and not presented for view.

Service Provider

The Service Provider benefits from being able to provide location-based services for End Users by specifying some location information related to the content. These services may be offered for premium charges.

5.16.3 Pre-conditions

The Content Provider may provide location-enhanced content.

The Service Provider broadcasts the services and content, and specifies location information which describes the applicable geographical position of the services and content.

The Terminal of the End User can receive Mobile Broadcast Services and content, and the Terminal may be equipped with a means to get its geographical position. The Terminal would be in an operational mode and able to receive Broadcast Services and content which includes the location-specific information.

A method (or methods) exist which permits location information to be associated with content. Different methods may exist in different parts of the value chain (e.g., the approach used in the Content Provider or the Service Provider may differ from that used over the air for the Mobile Terminal).

5.16.4 Post-conditions

None Specified

5.16.5 Normal Flow

1. The End User switches on his/her Terminal. The Content Provider generates content. This content may include location-specific information. The data may be distributed in various ways (e.g. specific stream for a particular region or specially coded data over a common channel).
2. The Service Provider receives content from the Content Provider. There may be some filtering to segregate the data for distribution over specific areas of the broadcast area.
3. The End User selects a stores advertisement channel. The mobile Terminal receives the location-oriented content and may filter it based on knowledge of its current location to limit the content to information that is made available to the End User.
4. The content of this channel includes many banner advertisements with location information. The End User's mobile Terminal gets its current location by a physical means, and then the Terminal compares its location with the location information of each banner advertisement. After that, the Terminal sorts out the banner advertisements of the stores which are near to the End User's current location and displays them.
5. End User knows that one boutique nearby has a discount sale which he/she is interested in.

5.16.6 Alternative Flow

1. The mobile Terminal or associated network entity reports the location of the mobile Terminal to the Service Provider or the Content Provider (it is recognized that there are privacy issues).
2. The Service Provider and/or Content Provider filters the content stream based on where subscribers are located.
3. Content is distributed to the mobile terminal.

5.16.7 Operational and Quality of Experience Requirements

None Specified

5.17 Use Case I&E, Device outside Broadcast Coverage

5.17.1 Short Description

Phil is a End User of a broadcast news service. He likes the service and uses it frequently. When he is travelling, Phil may have no broadcast access to the service, because he is outside the area where his favorite service is broadcasted using a non-cellular broadcast technology that he normally employs, e.g., in a mountain area, or abroad. However, Phil has cellular access with his device and also has broadcast coverage using cellular technology. When he wants to use the service, he switches on the device and detects that he has no broadcast access to the service using non-cellular broadcast technology. He does not even have cached service guide information. He interactively requests and receives service guide information from his Service Provider over the cellular network. Alternatively, the Service Provider may also push service guide information to him. Phil wants to use the service, i.e. render the content comprising the service at this time. He interactively requests and receives the service / content from his Service Provider over the cellular network, and is able to render it on his device.

5.17.2 Actors

Phil

Phil is an End User who likes his favourite news service, which he usually receives via a non-cellular broadcast system, but which he also enjoys receiving when being outside the coverage area of that system.

Service Provider

The Service Provider provides the Mobile Broadcast Services and content to End Users. The services are broadcasted over one or several non-cellular broadcast networks, and in addition transmitted over cellular networks.

5.17.2.1 Actor Specific Issues

Phil

Wants to use the service with his device, irrespective of whether he is in the non-cellular broadcast coverage area or not

Service Provider

Wants to deliver the service to as many End Users at each point in time as possible, including to End Users that are not able to receive the service broadcasted over non-cellular networks, but can connect via cellular networks.

5.17.2.2 Actor Specific Benefits

Phil

Can always receive the service, whether in non-cellular broadcast range or not.

Service Provider

Can provide the service to more customers. The Service Provider increases the number of simultaneous customers, and customer satisfaction.

5.17.3 Pre-conditions

The Service Provider provides IP based Mobile Broadcast Services, e.g. a news service. The service can be broadcasted over cellular or non-cellular networks (e.g., IP data casting via DVB), or multicasted over cellular networks (e.g., IP over 3GPP MBMS), or unicasted over cellular networks (e.g., IP over mobile packet data networks). [3GPP MBMS] [DVB-H]

Phil has a mobile Terminal capable of receiving broadcast over both non-cellular and cellular technology. He has used a broadcast news service and likes it. He has stored information (e.g., a bookmark) that allows him to identify and locate the service even when outside the non-cellular broadcast area for this service.

5.17.4 Post-conditions

None Specified

5.17.5 Normal Flow

1. Phil, the End User, is travelling. He may or may not be aware that he is outside the broadcast area of the non-cellular broadcast system for his favourite news service.
2. Phil switches on his device and tries to access the service. However, the service and even the service guide information for this service are not available via the non-cellular broadcast system.
3. Phil decides to interactively request service guide information for this service over a cellular system. He requests, and receives, this information over a cellular system.
4. Phil decides to request the service. He requests, and receives, the service over a cellular system.
5. Phil uses the service and is satisfied.

5.17.6 Alternative Flow 1

1. Phil, the End User, is travelling. He may or may not be aware that he is outside the broadcast area of the non-cellular broadcast system for his favourite news service. However, the Service Provider is aware that he is outside the non-cellular broadcast area (*Note: the mechanism by which the Service Provider gains this knowledge is out of scope here, and is not relevant for the use case*).
2. The Service Provider pushes service guide information for the service to Phil's device using a cellular system.

3. Phil tries to access the service. However, although the service guide information for the service is available, the service itself is not available via the non-cellular broadcast system.
4. Phil decides to request the service over a cellular system. He requests, and receives, the service over a cellular communication system.
5. Phil uses the service and is satisfied.

5.17.7 Alternative Flow 2

1. Phil, the End User, is within the non-cellular broadcast coverage area. He receives and uses his favourite news service.
2. While travelling, Phil moves outside the non-cellular broadcast coverage area. The device detects that non-cellular broadcast reception has been lost. Based on the available service guide information for the service, the device presents information to Phil how to re-start the service using a cellular communication system.
3. Phil decides to request the service over a cellular system. He requests, and receives, the service over a cellular communication system.
4. Phil uses the service and is satisfied.

5.17.8 Operational and Quality of Experience Requirements

None Specified

5.18 Use Case I&E, Interactive TV games

5.18.1 Short Description

A Content Provider creates a game show consisting of a broadcast video clip and interaction options for the End User. The content along with a description of these interactions are broadcast. An interested End User can view the show. His Terminal presents him the interaction options when available and / or activates them (e.g. for voting / betting). Depending on his current context the End User participates in the show by sending his answer / opinion back to the Service Provider's platform. The type of interaction could be SMS, MMS, voice, by touching predefined symbols on the screen and so forth. Depending on the business case each interaction may be charged.

5.18.2 Actors

Network Operator

Network operator provides the network that carries the Mobile Broadcast Services, consisting of a broadcast bearer and a bi-directional unicast bearer. He provides also the infrastructure for authentication, authorization, accounting, and service / content adaptation.

Service Provider

Operator of service provisioning platform, which combines the video content (TV-centric) with the interaction services. Interactions leading to a modification of the actually broadcast content are forwarded to the Content Provider.

Content Provider

Generates the TV-show content, indicates the interaction points and modifies the content in case of online input from viewers.

End User

Consumes the Mobile Broadcast Services and digital content delivered within the services; has the opportunity to interact / participate in a TV-like game show.

Terminal vendor

Provides the End User Terminal.

5.18.2.1 Actor Specific Issues

End User

Wants to be participate in a TV-like gaming show. Interaction must be adaptable to present interaction capabilities (speech, touch, writing, ...)

Service Provider

Combines the TV-gaming show content with the interaction means; ensures proper authentication and authorization and takes care of charging either the access and /or the interactions.

Content Provider

Generates the TV gaming show; obtains with “mobile broadcast” an additional distribution channel

Terminal vendor

Ensures the operation of the service on the Terminal

5.18.2.2 Actor Specific Benefits

End User

Entertainment with easy and context sensitive interaction.

Service Provider

Increased interaction increases revenue

5.18.3 Pre-conditions

The End User gets to know about a TV gaming show and can tune in at the time it is being broadcast

5.18.4 Post-conditions

The End User has tuned in and is ready to interact.

5.18.5 Normal Flow

1. End User discovers a Mobile Broadcast Service of interest. In this case it is a TV gaming show.
2. The End User indicates his interest and when the show starts the Terminal will tune into the service
3. The Terminal present the interaction options in a way which suites best the context of the End User and matches the Terminal capabilities.

5.18.6 Alternative Flow

None Specified

5.18.7 Operational and Quality of Experience Requirements

5.19 Use Case I&E, Pervasive multiplayer games

5.19.1 Short Description

The philosophy of this type of game is to create communities which can be joined or left at any time. A gaming session can be played over a long time, even weeks, involving a large number of players. An End User wishing to play can join the service and remain an individual or can join a group. The kind of interactions is not meant to be time critical like in racing games, but is possible until a certain time. An example of such a game is to move a figure into a certain position in order to win, where the movements are the result of a majority vote. The display is rendered in a gaming engine in the backend and streamed to the End User. Once 3D rendering engines are available on phones, the modified nodes of the scene graph can be broadcast and the Terminal renders the scene, which leaves more freedom to the End User to view and navigate within scene. Other games out of the gaming community may be suitable as well, such as simulation games or “singing” to a current hit in the charts within a virtual group (karaoke style).

5.19.2 Actors

Network Operator

Provides the network that carries the Mobile Broadcast Services, consisting of a broadcast bearer and a bi-directional unicast bearer. Provides also the infrastructure for authentication, authorization, accounting, and service / content adaptation.

Service Provider

is the operator of gaming platform and provider of the gaming application to be downloaded to the Terminal. All interactions terminate at the gaming platform.

Content Provider

The gaming content may be provided by an independent entity, but is not lined into the active game.

End User

participates in a game whenever he likes.

Terminal vendor

Provides the End User Terminal with the necessary features, and the ability to download and run a gaming application

5.19.2.1 Actor Specific Issues

End User

Wants to be participate in a game whenever he has time and is interested. Interaction must be adaptable to present interaction capabilities (speech, touch, writing, ...)

Service Provider

Prepares the game content and combines it with the interaction means; ensures proper authentication and authorization and takes care of charging either the access and /or the interactions.

Content Provider

Generates the game

Terminal vendor

Ensures the operation of the service on the Terminal

5.19.2.2 Actor Specific Benefits

End User

Entertainment with easy and context sensitive interaction. The End User can join and leave a game at any time

Service Provider

Increased interaction increases revenue; offers new services

Content Provider

New distribution channel for games

5.19.3 Pre-conditions

The End User gets to know about a game and can download the game application when needed.

5.19.4 Post-conditions

The End User has tuned in and is ready to play

5.19.5 Normal Flow

1. End User wants to play a game and discovers one in the ESG.
2. The tunes into the service.
3. The Terminal loads the gaming application from the broadcast if not present on the Terminal
4. the End User logs-on to the game (authorization, authentication)
5. the End User can start playing

5.19.6 Alternative Flow

None Specified

5.19.7 Operational and Quality of Experience Requirements

5.20 Use Case I&E, Navigation and Traffic Information Support

5.20.1 Short Description

The End User has a car with a navigation system. Changes of the maps material is being broadcast for download to the Terminals. When reaching an area not covered by the maps of the navigation system (or the maps do not provide sufficient level of detail), the system looks for a navigation channel with current maps of that area (e.g. a town). In addition the actual traffic situation, e.g. congestions is broadcast. The Terminal filters this broadcast for the current location and surrounding area along the route and maps it into the presentation of the navigation system.

Within the town, the End User continues his trip by public transportation. For that the system is supplemented by broadcast of the present timing of the public transportation for the route of choice. Based on the time information, the application can present to the End User the optimal connection.

5.20.2 Actors

Network Operator

Provides the network that carries the Mobile Broadcast Services, consisting of a broadcast bearer and a bi-directional unicast bearer. Provides also the infrastructure for authentication, authorization, accounting, and service / content adaptation.

Service Provider

manages the broadcast of map material and local complementary maps. Connects to traffic supervision and other traffic authorities and collects all relevant data.

Content Provider

is basically a set of navigation system manufacturer, local traffic authorities, and public transportation authorities

End User

Receives the navigation update service, the current traffic information and public transportation timing

Terminal vendor

Provides the End User Terminal.

5.20.2.1 Actor Specific Issues

5.20.2.2 Actor Specific Benefits

End User

Has an always up to date navigation system, gets informed about the present traffic situation depending on his current location, and gets an optimized time schedule for a ride with public transportation.

Content Provider

Cheap and simple distribution channel for update of navigation systems

Service Provider

New Service offering

Others

Reduced congestions due to early on information – traffic shaping

Optimized occupancy of public transportation

5.20.3 Pre-conditions

The End User has a navigation system build in his car or stored on his mobile device (like a PDA). He subscribes to an automated update service for the map material along with the service to get informed about traffic situations.

5.20.4 Post-conditions

The navigation system is updated with the most recent material, has the relevant local maps available and presents the current traffic situation for the relevant area.

5.20.5 Normal Flow

1. Through the service announcement mechanism the Terminal is notified about an update of the map material at a dedicated time.
2. At that time the Terminal activates itself and downloads the content.

3. For permanent update with traffic information the End User has subscribed a traffic information service.
4. When start driving the navigation system tunes into the channel with all traffic information.
5. The information is filtered automatically depending on the current position.
6. As a supplementary service a End User can subscribe to a service which offers him after entering the destination the best selection of public transportation based on the current timing

5.20.6 Alternative Flow

None Specified

5.21 Use Case I&E, multi-party conference call

5.21.1 Short Description

End Users attending a multi-party conference call (e.g., Video Conference or Push To Talk over cellular) in a certain area will receive the same data transmitted over the individual point to point channel. This can cause the waste of radio resource. Instead of multiple point to point channels, one signal Broadcast channel can be used for the delivery of data of multi-party conference call. The data can be multi-media data, files and voice call. Each End User in multi-party conference call group receives the other End User's data over Broadcast Channel and sends his or her data over the point to point channel. If the Service Provider wants to offer a more attractive service allowing the End User to select the video stream among all incoming video streams, it can make the End User's device filter, merge, and manage the streams according to End User's preference (and device capabilities). This even would make a central video processing unit obsolete. In parallel to the video conferencing streams additional video or any other data can be broadcast to the other multi-party conference call members.

5.21.2 Actors

End User

Joins multi-party conference call and BCAST service, receives the data of multi-party conference call over Broadcast Channel and sends his or her data to the multi-party conference call service with point to point channel.

Network Operator

Provides the network that carries the Mobile Broadcast Services requiring Broadcast channel and carries the End User's data requiring the point to point channel.

Service Provider

Provides the multi-party conference call over Broadcast channel to End Users. The Service Provider may operate multi-party conference call server or may have the business agreement with another Service Provider having multi-party conference call server.

Content Provider

Each End User of multi-party conference call group can be the Content Provider. Or Multi-party conference call server can process the data from each End User and send the processed data to Service Provider.

Terminal Vendor

Provides the Terminal supporting multi-party conference call.

5.21.2.1 Actor Specific Issues

End User

Wants to join a multi-party conference call and wants to select or filter an interesting multi-party conference call among multi-party conference calls

Network Provider

Want to deliver the data of multi-party conference call with the low radio resource consumption

Service Provider

Wants to offer multi-party conference call over Broadcast Channel

5.21.2.2 Actor Specific Benefits

End User

The End User can receive multi-party conference call data over Broadcast channel. Due to the characteristic of BCAST channel, he or she can join multi-party conference call with low cost.

Network Operator

The Network Operator optimises radio resource for multi-party conference call, which delivers the same data to all participants.

Service Provider

The Service Provider can provide Broadcast Service delivering multi-party conference call data. Due to the characteristic of Broadcast Channel, Service Provide can provide multi-party conference call with a relative low cost.

5.21.3 Pre-conditions

The End User's Terminal should be able to receive Broadcast channel as well as point-to-point channel simultaneously.

The End User has registered a multi-party conference call and also has registered Broadcast service delivering the data of multi-party conference call.

5.21.4 Post-conditions

After a multi-party conference call start, the End User receives other End User's data over Broadcast Channel and sends his or her data over point-to-point channel.

5.21.5 Normal Flow

1. An End User who wants multi-party conference call registers multi-party conference call service and Broadcast service respectively.
2. The End User searches a multi-party conference call that he or she wants to join.
3. If he or she finds the interesting multi-party conference call, he or she joins that multi-party conference call.
4. The Terminal of End User receives other End User's data over Broadcast channel.
5. The Terminal of End User sends the End User's data to multi-party conference call server with point to point channel.
6. After the multi-party conference call is over, the End User leaves multi-party conference call and Broadcast Service.

5.21.6 Alternative Flow 1

1. An End User who wants to setup multi-party conference call registers multi-party conference call service and Broadcast service respectively.
2. The Service Provider announces the service to all invited recipients

3. Each participant receives other End User's data over BCAST channel and sends his or her data to multi-party conference call server with point to point channel.
4. After the multi-party conference call is over, each participant leaves multi party conference call and Broadcast Service.

5.21.7 Alternative Flow 2

1. An End User who wants to setup multi-party conference call registers multi-party conference call service and Broadcast service respectively.
2. The Service Provider announce the service to all invited multi-party conference call members.
3. The End User can see the schedule of multi-party conference call, to which he or she is invited or (he or she may join).
4. The multi-party conference call starts.
5. The Service Provider broadcasts all streams over the Broadcast channel..
6. The End User's Terminal filters, processes, and displays the various streams depending on the user preferences.

5.21.8 Operational and Quality of Experience Requirements

None Specified.

5.22 Use Case I&E, Multiple data rate for Mobile Broadcast Content

5.22.1 Short Description

This use case can be applied for cellular mobile network based BCAST Distribution Systems (e.g. MBMS or BCMCS). In cellular mobile network based BDS, available radio resource or the radio transmission condition can be different per cell. In this use case, a network operator will inform a Service Provider of the appropriate data rate of Broadcast Service. With this information, a Service Provider provides a network operator with a Broadcast Service having multiple data rate. A network operator delivers a Broadcast Service with appropriate data rate to each cell. Consequently, an End User will receive BCAST service, whose data rate is suitable for a cell where an End User is located. [3GPP2 BCMCS].

5.22.2 Actors

End User

The End User who is going to receive BCAST service and he or she is at the place where the radio resource or the transmission condition can be frequently changed.

Network Operator

Provides the network that can determine the appropriate data rate of Broadcast service based on the available radio resource and the transmission condition.

Content Provider

The ultimate owner of the content delivered as a part of Mobile Broadcast Service

Service Provider

Service Provider provides the Mobile Broadcast Services and content to mobile Terminal users. In the context of this use case, the Service Provider provides BCAST service with multiple data rates to a network operator.

5.22.2.1 Actor Specific Issues

End User

Wants to receive BCAST service regardless of his or her location

Network Operator

Want to deliver Broadcast service with appropriate data rate

Service Provider

Wants to provide BCAST service with the different data rate to the End Users, whose locations are different.

5.22.2.2 Actor Specific Benefits

End User

End User benefits from being able to receive BCAST service regardless of his or her location.

Network Operator

Network Operator benefits from providing the network, which delivers Broadcast Service with the appropriate data rate based on the available radio resource and the transmission condition.

Service Provider

Service Provider benefits from providing BCAST service with multiple data rates. Service Provider can provide the same BCAST services to different End Users who are under different reception conditions.

5.22.3 Pre-conditions

Service Provider provides rich media services, which include video, audio, images and text. Service Provider also provides BCAST service with multiple data rates.

End User's mobile Terminal can receive BCAST service, which has the different data rate based on the radio resource and the transmission condition..

5.22.4 Post-conditions

None Specified

5.22.5 Normal Flow

1. The End User switches on his or her mobile Terminals, and selects the BCAST service.
2. Before the selected BCAST service Stars, Network operator inform the appropriate data rates to Service Provider.
3. Based on the information from Network operator, Service Provider provides BCAST service with the appropriate data rates..
4. The End User's Terminal receives BCAST service with the appropriate data rate.

5.22.6 Alternative Flow

None Specified

5.22.7 Operational and Quality of Experience Requirements

None Specified

6. Requirements (Normative)

6.1 High-Level Functional Requirements

Label	Description	Enabler Release
HLFR-01 Protected Mobile Broadcast Services and content	Open solution for protection of Broadcast Services and content SHALL be defined.	BCAST 1.0
HLFR-02 Broadcast Service Area	It SHALL be possible to configure a Broadcast Service Area individually for each Broadcast Service.	BCAST 1.0
HLFR-03 Localized Broadcast Service	A Broadcast Service SHALL be able to distribute different content data to different locations, i.e. different Broadcast Service Areas.	BCAST 1.0
HLFR-04a QoS Configuration	It SHALL be possible to configure the quality of service for BCMCS.	BCAST 1.0
HLFR-04b QoS Configuration	It SHALL be possible to configure the quality of service for BDS other than BCMCS	BCAST 1.1
HLFR-04c QoS Configuration	It SHALL be possible to configure the quality of service for multiple BDS independently of each other	BCAST 1.1
HLFR-05 Efficient Resource Usage	Mobile Broadcast Services SHALL use the resources of the underlying BCAST Distribution System efficiently.	BCAST 1.0
HLFR-06 Multiple Service Providers	It SHALL be possible for a BCAST Distribution System to distribute services and/or content from multiple service or Content Providers.	BCAST 1.0
HLFR-07 Enabling/Disabling Service Reception	The End User SHALL be able to enable/disable the reception of specific Broadcast Services.	BCAST 1.0
HLFR-08 Simultaneous Reception of Services	It SHOULD be possible for a Terminal that is receiving one Mobile Broadcast Service to also receive simultaneously other Mobile Broadcast Services, if supported by BDS and terminal.	BCAST 1.0
HLFR-09 Declaration of End User Preferences	It SHOULD be possible for the End User to temporarily or permanently declare service preferences to the Mobile Broadcast Service Provider.	BCAST 1.0
HLFR-10 Use of other OMA Enablers	The Mobile Broadcast solution SHALL use other OMA enablers to accomplish its purpose whenever appropriate enablers exist.	BCAST 1.0
HLFR-11 Expectations to Underlying BDS	The Mobile Broadcast solution SHALL be able to make use of the following functionality that can be expected to be provided by the underlying BDS: 1. the transmission of IP flows to all parts of the associated wireless network 2. the coordination of transmission requirements of those IP flows	BCAST 1.0
HLFR-12 – Support for Point-to-Point Communication	The Mobile Broadcast solution SHALL be capable of supporting point-to-point communication between a Mobile Broadcast Service Application in the network and a Mobile Broadcast Service Client on the mobile Terminal.	BCAST 1.0

Table 2: High-Level Functional Requirements

6.1.1 Security

Label	Description	Enabler Release
SEC-01a Signalling Confidentiality in Network	The Mobile Broadcast solution SHALL be capable of providing signalling confidentiality between its components and the underlying BDS, where the underlying BDS is BCMCS.	BCAST 1.0

SEC-01b Signalling Confidentiality in Network	The Mobile Broadcast solution SHALL be capable of providing signalling confidentiality between its components and the underlying BDS, other than BCMCS.	BCAST 1.1
SEC-02a Signalling Integrity in Network	The Mobile Broadcast solution SHALL be capable of protecting the integrity of the signalling between its components and the underlying BDS, where the underlying BDS is BCMCS.	BCAST 1.0
SEC-02b Signalling Integrity in Network	The Mobile Broadcast solution SHALL be capable of protecting the integrity of the signalling between its components and the underlying BDS, other than BCMCS.	For Future Release
SEC-0 Content and Service Confidentiality in Network	The Mobile Broadcast solution SHALL be capable of protecting content and service confidentiality between its components and the underlying BDS.	BCAST 1.0
SEC-04 Content and Service Integrity in Network	The Mobile Broadcast solution SHALL be capable of protecting the integrity of the content and services between its components and the underlying BDS.	BCAST 1.0
SEC-05 Signalling Privacy and Confidentiality End-to-End	The Mobile Broadcast solution SHALL be capable of protecting the privacy and confidentiality of the signalling between its components in the network and in the Terminal.	BCAST 1.0 - partial ¹
SEC-06a Signalling Integrity End-to-End	The Mobile Broadcast solution SHALL be capable of protecting the integrity of the signalling between its components in the network and in the Terminal, for all functions except the notification function.	BCAST 1.0
SEC-06b Signalling Integrity End-to-End	The Mobile Broadcast solution SHALL be capable of protecting the integrity of the signalling between its components in the network and in the Terminal, for the notification function.	BCAST 1.1
SEC-07 Component Authentication in Network	The Mobile Broadcast solution SHALL be capable of authenticating its components to the underlying BDS.	BCAST 1.1
SEC-08 BDS Authentication in Network	The Mobile Broadcast solution SHALL be capable of authenticating the underlying BDS to its components.	BCAST 1.1
SEC-09 Mutual Component Authentication	The Mobile Broadcast solution SHALL be capable of authenticating its components to other components.	BCAST 1.0
SEC-10 Service Provider Authentication and Authorization	It SHALL be possible to authenticate and authorize Service Providers to the Mobile Broadcast Network Operator.	BCAST 1.1
SEC-11a Protection of Data between Service Provider and BDS	It SHALL be possible to protect the confidentiality and integrity of data between the Service Provider and Mobile Broadcast Network Operator.	BCAST 1.0
SEC-11b Protection of Signalling between Service Provider and BDS	It SHALL be possible to protect the confidentiality and integrity of signalling between the Service Provider and Mobile Broadcast Network Operator.	BCAST 1.1
SEC-12 Content and Service Confidentiality End-to-End	The Mobile Broadcast solution SHALL be capable of protecting content and service confidentiality between its components in the network and in the Terminal.	BCAST 1.0
SEC-13 Content and Service Integrity End-to-End	The Mobile Broadcast solution SHALL be capable of protecting the integrity of the content and services between its components in the network and in the Terminal.	BCAST 1.0

Table 3: High-Level Functional Requirements – Security Items

¹ Notification over broadcast channel is an example that is not supported

6.1.2 Charging

Label	Description	Enabler Release
CRG-01 Charging Information	It SHALL be possible for the Mobile Broadcast Service Providers in the home and visited network to exchange data for charging related to content and services consumed by End-Users, when supported by the Charging Enabler.	BCAST 1.0
CRG-02 Collection of Charging Data	It SHALL be possible to collect charging information for the delivery of Mobile Broadcast Services to enable billing of Mobile Broadcast Services.	BCAST 1.0
CRG-03	It SHALL be possible for the Mobile Broadcast Service Providers and Content Providers to exchange data for charging related to content and services consumed by End-Users.	BCAST 1.1

Table 4: High-Level Functional Requirements – Charging Items

6.1.3 Interoperability

Label	Description	Enabler Release
IOP-01 Network-Terminal Interoperability	The Mobile Broadcast solution SHALL ensure interoperability between the network-agnostic parts of Networks and Terminals from different vendors.	BCAST 1.0
IOP-02 Enabler Interoperability	The Mobile Broadcast enabler SHALL be interoperable with other OMA enablers when applicable.	BCAST 1.0

Table 5: High-Level Functional Requirements – Interoperability Items

6.1.4 Privacy

Label	Description	Enabler Release
PRIV-01 Identity Information	It SHALL be possible for an End User to receive free-to-air as well as paid services and content without disclosing identity information to the Broadcast Service provider or the Content Provider. For post-paid broadcast services, it SHALL be possible for an End User to receive free-to-air as well as paid services and content without disclosing identity information to the Broadcast Service provider or the Content Provider, in the case that the End User is not the Subscriber	BCAST 1.0
PRIV-02 Consumption Information	It SHALL be possible to prevent disclosing to the Service Provider or to the Content Provider information about the free-to-air as well as subscription-based paid services and content effectively consumed by the End User at a time-specific program level without the End Users permission.	BCAST 1.0

Table 6: High-Level Functional Requirements – Privacy Items

6.1.5 Secure storage requirements

Here is a short definition of the secure storage entity introduced by SEC-STO-01.

Secure storage entity definition

The secure storage entity may be implemented on either the (U)SIM /(R)UIM on the terminal, or on a Secure Removable Media.

It shall be implemented in a protected environment within the device to prevent any threats (either from the network or the device) towards sensitive information. This enables the most sensitive security constraints on the system to be concentrated

within the secure storage entity, which would also allow an easier security evaluation of the implementation of the BCAST solution.

The Mobile Broadcast enabler introduces several layers of cryptographic keys with the higher layers being the most sensitive. Other sensitive data (for instance rights objects) may also be qualified as sensitive information. Storage and access to these sensitive data should be protected regarding confidentiality, access control and integrity aspects.

Regarding the actual architecture, only the Traffic Encryption Key among cryptographic keys is needed to be transmitted outside the secure storage entity within the device on request from the service decryption block. Other sensitive data should not be exposed to unprotected part of the device.

Security constraints related to the secure storage entity are referred in the requirements SEC-STO-01, SEC-STO-02 and SEC-STO-03.

Label	Description	Enabler Release
SEC-STO-01 secure storage entity	The Mobile Broadcast solution SHALL employ a security solution to guarantee the access control, the confidentiality and the integrity of data and processing functions identified as sensitive within the device. These features SHALL be provided by a function referred as a secure storage entity.	BCAST 1.0
SEC-STO-02 Key Storage	The Mobile Broadcast solution SHALL allow only the Traffic Encryption Key among cryptographic keys to be transmitted outside the secure storage entity within the device. Higher cryptographic keys SHALL NOT be exposed within the device during their processing/handling.	BCAST 1.0
SEC-STO-03 Interface description	In case of a smart-card based or Secure Removable Media based implementation, the Mobile Broadcast solution SHALL precisely reference and describe functionally the interfaces between the secure storage entity and other entities of the Broadcast system	BCAST 1.1
SEC-STO-04 Service and Program Key Storage	In case of a Secure Removable Media based implementation, the Mobile Broadcast solution SHALL ensure that the Service Encryption Key or Program Encryption Key is not exposed outside the Secure Removable Media.	BCAST 1.1

SEC-STO-01: refers to the introduction of a secure storage entity within the device to ensure security features regarding data and processing functions handling such data.

SEC-STO-02: refers to the fact that the sensitive cryptographic keys and related processing functions are not exposed to the unprotected part of the device.

SEC-STO-03: refers to interfaces between the secure storage entity introduced by SEC-STO-01 and other entities of BCAST system (in case of smartcard based implementation).

SEC-STO-04: refers to the fact that the most sensitive cryptographic key for the Mobile Broadcast Service and related processing functions is not exposed outside the SRM.

6.2 Overall System Requirements

Label	Description	Enabler Release
OSR-01 Leverage	The Mobile Broadcast enablers SHALL leverage existing technologies and specifications as far as possible to satisfy the requirements, especially protocols, data representations and encoding formats and BCAST Distribution Systems defined by other standards bodies.	BCAST 1.0
OSR-02 Broadcast and multicast distribution of Broadcast Services	It SHALL be possible to distribute Mobile Broadcast Services over broadcast mode and/or multicast mode of a BCAST Sistribution System.	BCAST 1.0

OSR-03 Modularity, Scalability and Extensibility	The Mobile Broadcast solution SHALL be modular, scalable and extensible.	BCAST 1.0
OSR-04 Parental Control	The Mobile Broadcast solution SHALL support parental control.	BCAST 1.0
OSR-05 Re-use of Subscription Information	It SHALL be possible to use subscription information for management of distribution of Mobile Broadcast Service to End Users, e.g. in multicast mode.	BCAST 1.1
OSR-06 Emergency Broadcast Content	It SHALL be possible to treat particular broadcast content as “Emergency” in nature, such that preferential treatment can be given to the processing and transmission of that content.	BCAST 1.0
OSR-07 Broadcast Content Priority	It SHALL be possible to assign different priorities to particular broadcast content, where the underlying BDS is BCMCS.	BCAST 1.0
OSR-08 Broadcast Content Priority	It SHALL be possible to assign different priorities to particular broadcast content, where the underlying BDS is something other than BCMCS.	

Table 7: Overall System Requirements

6.2.1 Broadcast Channel Issues

Label	Description	Enabler Release
BC-01 Abstraction	Broadcast Services SHALL use IP based protocols as the technology- and bearer-independent abstraction layer for the Broadcast Channel.	BCAST 1.0
BC-02 Network Technology Agnosticism	It SHALL be possible to use any network technology that provides IP-based Broadcast Channel capabilities as the underlying network technology.	BCAST 1.0
BC-03 Terminal Availability	Broadcast Services or Enablers or Distribution Systems SHALL NOT assume the Broadcast Terminal to be always switched on, or located within coverage.	BCAST 1.0
BC-04 Broadcast Content Priority	It SHALL be possible to indicate the priority of particular broadcast content to the underlying BCAST Distribution System, where the underlying BDS is BCMCS.	BCAST 1.0
BC-05 Broadcast Content Priority	It SHALL be possible to indicate the priority of particular broadcast content to the underlying BCAST Distribution System, where the underlying BDS is something other than BCMCS.	BCAST 1.1

Table 8: Overall System Requirements – Broadcast Channel Issues

6.2.2 Interaction Channel Issues

This section defines high-level requirements to the Interaction Channel.

Label	Description	Enabler Release
IC-01 Possibility to Utilize	A Broadcast Service MAY utilize an Interaction Channel.	BCAST 1.0
IC-02 Abstraction through IP	The Interaction Channel SHOULD use IP-based protocols.	BCAST 1.0
IC-03 Abstraction through Messaging	The Interaction Channel MAY use messaging mechanisms such as SMS or MMS.	BCAST 1.0
IC-04 Necessity to Interact	If a Broadcast Service is being transmitted – even if the Interaction Channel is not available for a Terminal, be it temporarily or permanently – it SHOULD be possible for the Terminal to receive Broadcast Services, possibly with limited functionality.	BCAST 1.0

Table 9: Overall System Requirements – Interaction Channel Issues

6.2.3 Service Discovery and Service Guide

Label	Description	Enabler Release
SD-01 Use of Broadcast Channel	It SHALL be possible to deliver the Service Guide over the Broadcast Channel.	BCAST 1.0
SD-02 Use of Interaction Channel	Service Discovery SHALL provide a mechanism to deliver some or all of the Service Guide over the Interaction Channel. Note: whether or not the Interaction Channel is used is up to the operator, and very likely depends on the mechanisms used for Service Discovery; a broadcast-only Terminal may experience some degradation of Service Discovery	BCAST 1.0
SD-03 Structure	Service Discovery SHALL specify a structured representation of Service Guide, which is extensible and facilitates merging of Service Guide Components that originate from different sources.	BCAST 1.0
SD-04 Update	It SHALL be possible to update the Service Guide.	BCAST 1.0
SD-05 Service Preview	The Service Guide SHALL provide mechanisms to find a service preview where available.	BCAST 1.0
SD-06 Identification	Service Discovery SHALL support a service identification scheme.	BCAST 1.0
SD-07 Initial Discovery	It SHALL be possible for the Terminal to find the initial entry-point for Service Guide acquisition.	BCAST 1.0
SD-08 Validity of Service Guide Fragment	The Service Guide SHALL enable the Terminal to know the validity of a particular Service Guide Fragment.	BCAST 1.0
SD-09 Timing	The Service Guide SHALL enable indication of activation time and expiration of each Broadcast Service.	BCAST 1.0
SD-10 Location	The Service Guide SHALL specify means to provide location information for a particular Broadcast Service which enables location based filtering of Broadcast Services.	BCAST 1.0
SD-11 User Profile and Preference	The Service Guide SHALL specify means to provide an extensible list of attributes, such as information about target End User groups, or genre attributes for a particular Broadcast Service, which enables End User profile filtering and End User preference filtering of Broadcast Services.	BCAST 1.0
SD-12 Terminal Capabilities	The Service Guide SHALL specify means to provide target Terminal capabilities requirements for a particular Broadcast Service which enables Terminal capability filtering of Broadcast Services.	BCAST 1.0
SD-13 Roaming	Service Discovery SHALL enable a roaming Terminal to discover and access services from the visited network.	BCAST 1.0
SD-14 Application Binding	The Service Guide SHALL enable binding of Broadcast Services with applications or specifying the types of the service (for example, MIME type in Service Guide).	BCAST 1.0
SD-15 Subscription Release Information	The Service Guide MAY include subscription-related information.	BCAST 1.0
SD-16 Efficient Representation	The Service Guide SHALL support efficient representation for transmission.	BCAST 1.0
SD-17 Service Guide Covering Multiple Service Areas	It SHALL be possible to provide to an End User service guide information for Mobile Broadcast Services distributed in different Broadcast Service areas.	BCAST 1.0
SD-18 Modification of Service Guide by BDS	It SHALL be possible for the BDS to add or modify information in the Service Guide to enable the Terminal to receive the service.	BCAST 1.1
SD-19 Emergency Broadcast Content	It SHALL be possible to indicate the “Emergency” nature of particular broadcast content in the Service Guide.	BCAST 1.0
SD-20 Emergency Broadcast Notification	It SHOULD be possible for the Terminal device to notify the End User of available broadcast content that is “Emergency” in nature.	BCAST 1.0

Table 10: Overall System Requirements – Service Discover and Service Guide

6.2.4 Stream Distribution

Label	Description	Enabler Release
STREAM-01 Use of Broadcast Channel	It SHALL be possible to use the Broadcast Channel for distribution of continuous or intermittent streaming services.	BCAST 1.0
STREAM-02 Use of Interaction Channel	It SHALL be possible to use the Interaction Channel in conjunction with Stream Distribution.	BCAST 1.0
STREAM-03 Synchronization	Stream Distribution SHALL enable synchronization of media streams consisting of multiple components, where each component can have a different content type, encoding or media format.	BCAST 1.0
STREAM-04 Adaptive Reception	Stream Distribution SHALL support selective reception and rendering of media streams, according to the Terminal capabilities and the current reception conditions.	BCAST 1.0
STREAM-05 Codecs	Stream Distribution SHALL provide a mechanism to address the situation where different codecs are used.	BCAST 1.0
STREAM-06 Protection	It SHALL be possible to use Content and/or Service Protection in conjunction with streaming Broadcast Services.	BCAST 1.0
STREAM-07 Agnostic to Stream Type and Encoding	The Stream Distribution mechanism SHALL be agnostic with respect to the stream type or stream encoding.	BCAST 1.0
STREAM-08 Reception Reporting	It SHOULD be possible to report from the device to the Broadcast Service provider whether a streaming service has been received by the Terminal.	BCAST 1.0
STREAM-09 Error Resilience	Stream Distribution SHALL provide means to adapt the error resilience to the characteristics of both the Broadcast Service and of the Broadcast Channel with the help of underlying BCAST Distribution System, where the underlying BDS is BCMCS	BCAST 1.0
STREAM-10 Error Resilience	Stream Distribution SHALL provide means to adapt the error resilience to the characteristics of both the Broadcast Service and of the Broadcast Channel with the help of underlying BCAST Distribution System, where the underlying BDS is something other than BCMCS	BCAST 1.1

Table 11: Overall System Requirements – Stream Distribution

6.2.5 File Distribution

File Distribution defines an enabler for the distribution of files or sets of files over broadcast which is at the same time

- bearer-independent
- application-independent
- makes no assumption about the content of the files that are distributed

Label	Description	Enabler Release
FILE-01 Use of Broadcast Channel	It SHALL be possible to use the Broadcast Channel for distribution of files.	BCAST 1.0
FILE-02 Use of Interaction Channel	It SHALL be possible to use the Interaction Channel for distribution of files.	BCAST 1.0
FILE-03 Repetition	File Distribution SHALL enable distribution of a set of files in a repetitive manner, where the set of files can change over time.	BCAST 1.0
FILE-04 Single Transmission	File Distribution SHALL enable a single distribution of a set of files, meaning that the files are scheduled to be distributed only once.	BCAST 1.0
FILE-05 File Type	File Distribution SHALL enable specifying the types of the files, for example, MIME type.	BCAST 1.0

FILE-06 Validity of File	File Distribution SHALL enable means to indicate activation and expiration time of each file.	BCAST 1.0
FILE-07 Location	File Distribution SHALL enable means to provide location information for a particular file which enables location based filtering of files.	BCAST 1.0
FILE-08 User Profile and Preference	File Distribution SHALL enable means to provide target user information or attributes (eg. Genre) for a particular file which enables user profile and user preference filtering of files.	BCAST 1.0
FILE-09 Protection	It SHALL be possible to use Content and/or Service Protection in conjunction with File Distribution.	BCAST 1.0
FILE-10 Error Resilience	File Distribution SHALL provide means to adapt the error resilience to the characteristics of both the Broadcast Service and of the Broadcast Channel.	BCAST 1.0
FILE-11 Codecs	File Distribution SHALL provide mechanism to address the situation where different codecs are used by itself or with the help of underlying BCAST Distribution System.	BCAST 1.0
FILE-12 Agnostic to File Type and Encoding	File Distribution mechanism SHALL be agnostic with respect to the file type or file encoding.	BCAST 1.0
FILE-13 Reception Reporting	It SHOULD be possible to report from the device to the Broadcast Service provider whether a file delivery service has been received by the Terminal.	BCAST 1.0

Table 12: Overall System Requirements – File Distribution

6.2.6 Provisioning

Label	Description	Enabler Release
PROV-01 Free-to-Air Services	It SHALL be possible to provide Free-to-Air Broadcast Services that don't require the End-User to subscribe to a Broadcast Service or to have any other interaction with the Mobile Broadcast Service Provider or Content Provider.	BCAST 1.0
PROV-02 Broadcast Subscription	It SHALL be possible to offer a subscription to a Broadcast Service or a bundle of Broadcast Services (= "Service Bundle").	BCAST 1.0
PROV-03 Time-based Broadcast Subscription	It SHALL be possible to offer subscriptions based on time period.	BCAST 1.0
PROV-04 Consumption-based Subscription	It SHALL be possible to offer subscriptions based on effectively consumed content.	BCAST 1.0
PROV-05 Purchase Transaction Initiation	The End-User SHALL be able to initiate the acquisition of Broadcast Subscriptions from the Terminal.	BCAST 1.0
PROV-06 Purchase Transaction Security	It SHALL be possible to secure the purchase transaction (authentication, confidentiality, integrity).	BCAST 1.0
PROV-07 Individualized Rights	The Mobile Broadcast Service Provider SHALL be able to specify and provide the rights to services and content particular to each individual End-User.	BCAST 1.0
PROV-08 Rights Association	It SHALL be possible to associate rights with the Broadcast Service or content to which it applies.	BCAST 1.0
PROV-09 Rights Delivery Reliability	The rights associated with the Broadcast or content SHOULD be delivered reliably.	BCAST 1.0
PROV-10 Roaming	It SHALL be possible to permit visiting End-Users to access free services or subscribe to content or services.	BCAST 1.0
PROV-11 Account Inquiry	It SHOULD be possible to offer to the End-User means to inquire account status information (eg. All currently active subscriptions) from the Mobile Broadcast Service Provider and/or Content Provider.	BCAST 1.0
PROV-12 Content-based Subscription	It SHALL be possible to offer subscriptions based on content or content category.	BCAST 1.0

PROV-13 Content-based notification settings	The Mobile Broadcast Service Provider SHALL be able to offer notification requests settings based on broadcasted content.	BCAST 1.0
PROV-14 Subscribing and Unsubscribing Service	The Mobile Broadcast Service Enabler SHALL provide mechanisms that enables the End User to subscribe and to unsubscribe to a service or a service bundle.	BCAST 1.0
PROV- 15 Content Subscription	The Content Provider SHALL be able to offer for purchase a subscription to content.	BCAST 1.0
PROV-16 Terminal Provisioning using DM	The Terminal provisioning function for Mobile Broadcast Services SHALL build on OMA Device Management (DM).	BCAST 1.0
PROV-17 Terminal Provisioning over Broadcast	The Terminal provisioning function SHALL enable delivery of software updates over Broadcast Channel.	BCAST 1.1

Table 13: Overall System Requirements – Provisioning

6.2.7 Service and Content Protection

Label	Description	Enabler Release
SPCP-01 OMA DRM	The service and content protection functions for Mobile Broadcast Services SHALL build on OMA DRM 2.0, where appropriate. [DRM v2.0]	BCAST 1.0
SPCP-02 Openness	Service and content protection, including e.g. the key management, the delivery, and encryption and decryption operations of keys and content, and interfaces, SHALL be fully specified which permits well-defined variations in operational behaviour without introducing proprietary elements to any part of the system.	BCAST 1.0
SPCP-03 Interoperability Points	The service and content protection functions SHALL be designed with specific interoperability points to enable competition between vendors.	BCAST 1.0
SPCP-04 No mandatory 3 rd -party HW in Terminals	The service and content protection functions SHALL NOT mandate usage of additional third party or external hardware other than Smartcards in Terminals.	BCAST 1.0
SPCP-05 Broadcast Mode	In the DRM Profile, the service and content protection functions SHALL support (one-way) broadcast channels, or have a broadcast mode of operation.	BCAST 1.0
SPCP-06 Discrete Object Protection	The service and content protection functions SHALL provide protection for discrete objects of any type.	BCAST 1.0
SPCP-07 Stream Protection	The service and content protection functions SHALL provide means for protecting real-time streaming.	BCAST 1.0
SPCP-08 Terminal-initiated Rights Acquisition	The service and content protection functions SHALL support Terminal-initiated access requests.	BCAST 1.0
SPCP-09 Content-based Rights Acquisition	The service and content protection functions SHALL provide the means for retrieving related rights and/or keys for chosen protected content items.	BCAST 1.0
SPCP-10 Network-initiated Rights Distribution	The service and content protection functions SHALL support network-initiated distribution of access keys and rights.	BCAST 1.0

SPCP-11 Distribution	The service and content protection functions SHALL support distribution of access keys and rights over interaction and/or broadcast channels.	BCAST 1.0
SPCP-12 Time Restricted Protection	The service and content protection functions SHALL provide a means for protecting time-restricted services or content (e.g. subscription and pay-per-view).	BCAST 1.0
SPCP-13 Bundling	The service and content protection functions SHALL allow bundling of access keys and rights such that a single access key or rights can be linked to an entire selection of services or content.	BCAST 1.0
SPCP-14 Agnostic wrt. Object Type	It SHALL be possible to deliver any type of protected discrete objects and streams over Mobile Broadcast Services.	BCAST 1.0
SPCP-15 Target User Group Granularity	The service and content protection functions SHALL support different groups of recipients for different pieces of Broadcast Services and content, and SHALL provide granularity down to an individual End User.	BCAST 1.0
SPCP-16 Access Protection, Integrity, Confidentiality	The service protection functions SHALL support means to protect the service against unauthorized access, and ensure integrity and confidentiality.	BCAST 1.0
SPCP-18 Mobility	If the underlying BDS supports mobility, the service and content protection functions SHALL NOT restrict End User mobility within the coverage area of the network.	BCAST 1.0
SPCP-19 Roaming	The service and content protection functions SHALL support End User roaming, i.e. upon roaming to another network, the End User have access services or content local to the serving network.	BCAST 1.0
SPCP-20 Agnostic wrt. Media Type	The service and content protection functions SHALL be agnostic with respect to the media type they protect.	BCAST 1.0
SPCP-21 –Local Domains	The service and content protection functions for Mobile Broadcast Services MAY support the concept of domains (as described in OMA DRM v2.0).	BCAST 1.0
SPCP-22 Revoking of Terminal Credentials	The service and content protection functions SHALL be able to revoke the credentials of Terminals.	BCAST 1.0
SPCP-23 Authentication, Integrity, Confidentiality	The service and content protection functions SHALL be able to authenticate and ensure the integrity and confidentiality of communication between enablers and Terminals.	BCAST 1.0
SPCP-24 DRM-Controlled Recording	The service and content protection functions for Mobile Broadcast Services SHALL allow Terminals to record selected portions of broadcast content when allowed for such operation.	BCAST 1.0
SPCP-25 DRM-Controlled Editing	The service and content protection functions for Mobile Broadcast Services SHALL allow Terminals to edit recorded portions of broadcast content when digital rights management (DRM) allows for such operation and the type of editing operations is commensurate with the rights specified in the DRM for the broadcast.	BCAST 1.1
SPCP-26 Secure Delivery of Services and Keys	The service protection function SHALL support means to protect the service against unauthorized access, and ensure integrity and confidentiality of the service and associated keys and/or rights.	BCAST 1.0
SPCP-27 Secure Delivery of Content and Rights Objects	The content protection function SHALL support means to protect the content against unauthorized access, and ensure integrity and confidentiality of the content and associated keys and/or rights.	BCAST 1.0
SPCP-28 Re-keying	It SHALL be possible to support re-keying for the content and service protection function during an ongoing service.	BCAST 1.0

SPCP-30 User Identity/Rights Portability	In the Smart Card profile, it SHOULD be possible to bind keys/rights (pertaining to service access, digital rights for content and any post-acquisition rights, as applicable) to user identity and not only to the device. When the user identity is stored in a removable smartcard administered by the service provider (such as, in 3G mobile terminals), portability of these rights to another DRM-compliant device SHOULD enable the user's continued use of any pre-existing digital rights	BCAST 1.1
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Table 14: Overall System Requirements – Service and Content Protection

6.2.8 Notifications

Label	Description	Enabler Release
NOTIF-1 Notification Transmision	The Mobile Broadcast Service Provider SHALL be able to send notifications to the End User based on the End User preferences and the availability of an appropriate channel over which the notification may be sent.	BCAST 1.0
NOTIF-2 Notification Information	It SHALL be possible for the notification sent to the End User to include the relevant service guide information, or a reference to that information, related to the Broadcast Service for which the notification is sent.	BCAST 1.0
NOTIF-3 Subscribed/Scheduled Notifications	The Mobile Broadcast Service Provider SHALL be able to send notifications to the End User based on subscribed services or scheduled services before Broadcast Services start, based on the availability of an appropriate channel over which the notifications may be sent.	BCAST 1.0

Table 15: Overall System Requirements – Notification

Appendix A. Change History

(Informative)

A.1 Approved Version History

Reference	Date	Description
n/a	n/a	No prior version

A.2 Draft/Candidate Version 1_1 History

Document Identifier	Date	Sections	Description
Draft Versions OMA-RD_BCAST-V1_1	01 Jul 2008	all	Baseline for version 1.1 of this RD
	02 Dec 2008	2,3, 4 and 6	OMA-BCAST-V1_1-2008-0128R01 was implemented <ul style="list-style-type: none"> - The introduction of BCAST 1.1 was added - New Normative reference of OMA SRM 1.0 was added - New informative references of 3 new BDS were added. - Section 3 was cleaned up - The colume of enabler release of 1.0 unfulfilled requirement were changed from "future release" to "BCAST 1.1".
	26 Feb 2009	3, 4, and 6	OMA-BCAST-V1_1-2009-0035R02 was implemented. <ul style="list-style-type: none"> - Two new definitions are added to section 3. - Items for BCAST 1.1 were added to section 4.2. - Some editorial corrections were done
Candidate Version OMA-RD_BCAST-V1_1	24 Mar 2009	n/a	Status changed by TP TP ref# OMA-TP-2009-0114- INP_BCAST_V1_1_RD_for_Candidate_Approval
Draft Version OMA-RD_BCAST-V1_1	12 Nov 2009	2, 3, 5, 6	Incorporated agreed CRs: Partial application of OMA-BCAST-v1_1-2008-0093- CR_Adding_SRM_requirements_for_BCAST in 6.1.5 (other changesof the CR were already implemented) OMA-BCAST-v1_1-2008-0162-CR_BDS_renaming_RD (change 2 not applied) OMA-BCAST-v1_1-2009-0120-CR_ISIM_RD OMA-BCAST-v1_1-2009-0174-CR_Update_of_3GPP_references_RD
Draft Version OMA-RD_BCAST-V1_1	12 Feb 2010	2.1	Incorporated agreed CR: - OMA-BCAST-v1_1-2010-0009-CR_Resolution_A001_RD - Editorial change to the copyright from 2009 to 2010
Draft Version OMA-RD BCAST-V_1	18 Feb 2010	2.1	Incorporated agreed CR: - OMA-BCAST-v1_1-2010-0009R01-CR_Resolution_A001_RD
Candidate Version OMA-RD_BCAST-V1_1	14 Sep 2010	n/a	Approved by TP as candidate TP ref# OMA-TP-2010-0371- INP_BCAST_V1_1_ERP_and_ETR_for_Candidate_approval