



BCAST Distribution System Adaptation – WiMAX

Candidate Version 1.3 – 14 Jan 2014

Open Mobile Alliance
OMA-TS-BCAST_WiMAX_Adaptation-V1_3-20140114-C

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1. Scope

This document specifies how the BCAST 1.3 enabler is implemented over a specific BDS (BCAST Distribution System).

The BCAST 1.3 Enabler supports the global interoperability among different BCAST Distribution Systems, and can also be adapted according to the characteristics of BCAST Distribution Systems for BCAST 1.3 enabler implementation over a certain BDS..

The BCAST 1.3 Enabler includes 9 functions and all 9 functions can be implemented over the specific BDS with minimal adaptation. This is referred to as "generic adaptation", which can be applied for any kind of BDS. This is the adaptation type presented in this document.

The underlying BDS may already have a method for a function defined in the BCAST 1.3 Enabler. In that case BDS adaptation specification defines the cases where this method selected in the underlying BDS is utilised for the BCAST function also, meaning that BCAST functionality is adapted. This is referred to as "BDS specific adaptation".

BDS specific adaptation is not part of this document.

2. References

2.1 Normative References

- [BCAST13-Distribution] "File and Stream Distribution for Mobile Broadcast Services", Open Mobile Alliance™, OMA-TS-BCAST_Distribution-V1_3,
[URL:http://www.openmobilealliance.org/](http://www.openmobilealliance.org/)
- [BCAST13-ServContProt] "Service and Content Protection for Mobile Broadcast Services", Open Mobile Alliance™, OMA-TS-BCAST_SvcCntProtection-V1_3,
[URL:http://www.openmobilealliance.org/](http://www.openmobilealliance.org/)
- [BCAST13-Services] "Mobile Broadcast Services", Open Mobile Alliance™, OMA-TS-BCAST_Services-V1_3,
[URL:http://www.openmobilealliance.org/](http://www.openmobilealliance.org/)
- [BCAST13-SG] "Service Guide for Mobile Broadcast Services", Open Mobile Alliance™, OMA-TS-BCAST_ServiceGuide-V1_3,
[URL:http://www.openmobilealliance.org/](http://www.openmobilealliance.org/)
- [DRM20-Broadcast-Extensions] "OMA DRM v2.0 Extensions for Broadcast Support", Open Mobile Alliance™, OMA-TS-DRM-XBS-V1_3,
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- [IOPPROC] "OMA Interoperability Policy and Process", Version 1.1, Open Mobile Alliance™, OMA-IOP-Process-V1_1,
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[URL:http://www.ietf.org/rfc/rfc2119.txt](http://www.ietf.org/rfc/rfc2119.txt)
- [WiMAX-MP] "WiMAX Forum Mobile System Profile Release 1.0 (Revision 1.4.0)", WiMAX Forum,
[URL:http://www.wimaxforum.org/technology/documents/](http://www.wimaxforum.org/technology/documents/)
- [WiMAX-S3] "WiMAX Forum Network Architecture – Stage 3 – Detailed Protocols and Procedures – Release 1.1.0", WiMAX Forum,
[URL:http://www.wimaxforum.org/technology/documents/](http://www.wimaxforum.org/technology/documents/)
- [WiMAX-SIM] "WiMAX-SIM Application on UICC - Release 1.5", WiMAX Forum,
[URL:http://www.wimaxforum.org/technology/documents/](http://www.wimaxforum.org/technology/documents/)

2.2 Informative References

- [WiMAX-S2] "WiMAX Forum Network Architecture – Stage 2 – Architecture Tenets, Reference Model and Reference Points – Release 1.1.0", WiMAX Forum,
[URL:http://www.wimaxforum.org/technology/documents/](http://www.wimaxforum.org/technology/documents/)

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.

3.2 Definitions

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.
WiMAX-SIM	WiMAX Subscriber Identity Module residing on the UICC equipped with information/credentials used to authenticate subscribers of WiMAX Network.)

3.3 Abbreviations

ADF	Application Dedicated File
AKA	Authentication and Key Agreement
BCMCS	Broadcast Multicast Service (3GPP2)
BDS	BCAST Distribution System
BSIM	BCAST Subscriber Identity Module
DF	Dedicated File
DVB-H	Digital Video Broadcasting - Handheld
EAP-AKA	Extensible Authentication Protocol AKA
EF	Elementary File
GBA	Generic Bootstrapping Architecture
MBMS	Multimedia Broadcast Multicast Service (3GPP)
WiMAX	Worldwide Interoperability for Microwave Access
WiMAX-SIM	WiMAX Subscriber Identity Module

4. Introduction (Informative)

This technical specification specifies how the OMA Mobile Broadcast Services (BCAST) Enabler can be currently implemented to achieve one mode of adaptation:

1. Generic adaptation over an underlying WiMAX IP transmission network where the radio bearer layer towards the terminal is based on unicast messaging.

In this mode, this Technical Specification explains how the BCAST Enabler has access to the IP transport layer so that BCAST services can be provided from BCAST Network entities to BCAST Terminal. Furthermore, this allows a common behaviour across multiple BCAST enabled BCAST Distribution Systems (BDSes)

Note that IP multicast and IP unicast can be used between SS/MS (Subscriber Station / Mobile Station) and CSN (Connectivity Service Network) or ASP (Application Service Provider) reachable via CSN on the network layer even though the data transmission is always unicast between one SS/MS and BS (Base Station) at the radio layer.

5. Overview of WiMAX (Informative)

WiMAX (Worldwide Interoperability for Microwave Access) has been developed by WiMAX Forum as mobile broadband technology. It consists of network and bearer system for delivering the IP traffic and IP-based services to mobile users. On bearer level WiMAX is based upon the IEEE 801.16 standard enabling the delivery of wireless broadband services. The IEEE 802.16 standard was developed to deliver non-line-of-sight (LoS) connectivity between a subscriber station and base station with typical cell radius of three to ten kilometers.

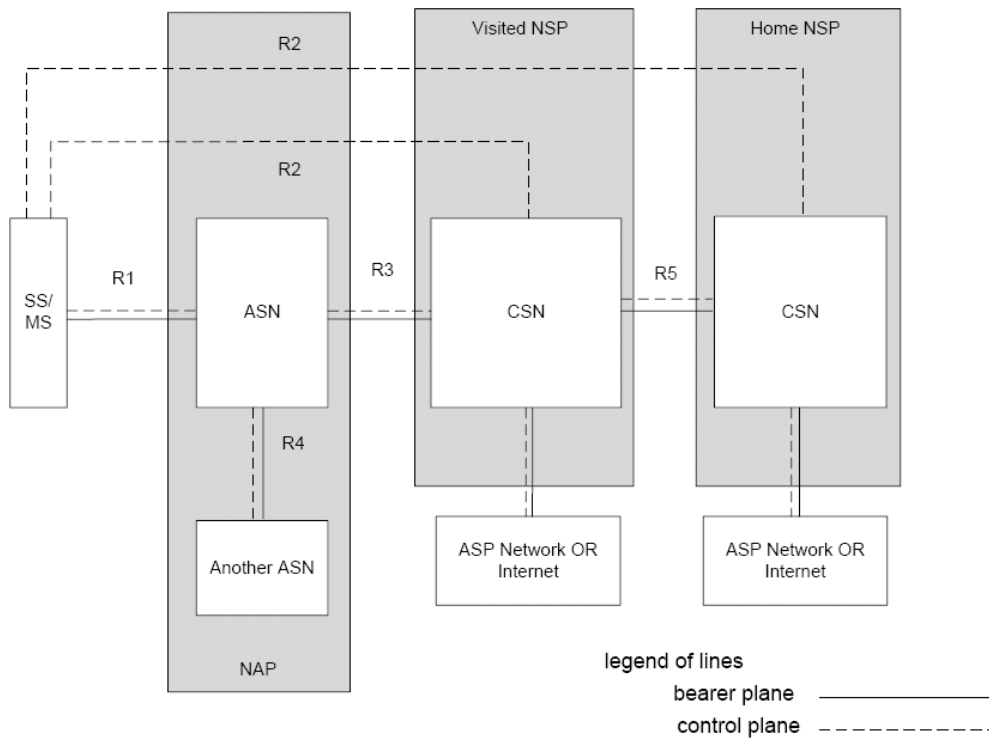


Figure 1: WiMAX Network Reference Model

WiMAX Network Reference Model (see Figure 1 above) provides simple, all-IP architecture for the delivery of IP data. WiMAX system per release 1.1.0 provides unicast delivery methods.

The following specifications define WiMAX in the scope of this specification:

- [WiMAX-S2] describes the WiMAX architecture and reference points.
- [WiMAX-S3] describes the technical details and protocols in WiMAX.
- [WiMAX-MP] defines a particular profile of bearer layer and MAC for mobile access

Architectural elements [WiMAX-S2]:

- **Subscriber Station / Mobile Station (SS/MS)** is the end user terminal implementing WiMAX access.
- **Access Service Network (ASN)** defines a logical boundary and represents a convenient way to describe aggregation of functional entities and corresponding message flows associated with the access services.
- **Connectivity Service Network (CSN)** provides connectivity service through which ASN connects with another CSN, with Application Service Provider (ASP) Network or with Internet.

- **ASP Network OR Internet** represents the network or system providing the service that is accessed via WiMAX system.

Reference points [WiMAX-S2]:

- **Reference Point R1** consists of the protocols and procedures between MS and ASN as per the air interface (physical and MAC layer).
- **Reference Point R2** consists of protocols and procedures between the MS and CSN. This reference point is logical in that it does not reflect a direct protocol interface between MS and CSN.
- **Reference Point R3** consists of the set of Control Plane protocols between the ASN and the CSN. It also encompasses the Bearer Plane methods to transfer user data between the ASN and the CSN.
- **Reference Point R4** consists of the set of Control and Bearer Plane protocols originating/terminating in various functional entities of an ASN that coordinate MS mobility between ASNs and gateways associated with ASNs.
- **Reference Point R5** consists of the set of Control Plane and Bearer Plane protocols for internetworking between the CSN operated by the home NSP and that operated by a visited NSP.

6. Generic Adaptation over WiMAX IP transmission network

This Section describes how BCAST specifications (namely [BCAST13-Services], [BCAST13-SG], [BCAST13-ServContProt], [BCAST13-Distribution] and [DRM20-Broadcast-Extensions]) are used over an WiMAX system. The provisions in this Section thus complement the ones in the generic specifications so that BCAST services can be distributed over WiMAX IP transmission network, without re-using the WiMAX functionality and hence without the ability for sharing services with native WiMAX terminals.

The sentence "as defined by BCAST Enabler specifications" is a shorthand notation that indicates both BCAST server and terminal SHALL respect the relevant BCAST specification (listed above).

Generic adaptation MAY be supported by BCAST Network entities and SHALL be supported by BCAST Terminal.

All normative statements in this specification are only applicable in the case OMA BCAST services are distributed over WiMAX.

6.1 Access to the WiMAX IP layer

WiMAX specification SHALL apply. See chapter 5 for a list of specifications.

6.2 WiMAX adaptation related to OMA-TS-BCAST_Services

6.2.1 Interaction

WiMAX system natively supports the unicast mode and therefore the concept of OMA BCAST interaction channel. The WiMAX interaction channel only supports IP-based protocols (e.g. HTTP, TCP, UDP). Since the interaction channel exists and is used in WiMAX, the BCAST Terminal SHALL support all four types of interaction defined by the generic BCAST Enabler specifications (namely, [BCAST13-Services], [BCAST13-SG] and [BCAST13-Distribution]).

6.2.2 Service Provisioning

As defined by [BCAST13-Services].

6.2.3 Terminal Provisioning

As defined by [BCAST13-Services].

6.2.4 Notification

The specification in section 5.14 of [BCAST13-Services] SHALL apply.

6.3 WiMAX adaptation related to OMA-TS-BCAST_ServiceGuide

6.3.1 Service Guide Delivery over Broadcast Channel

6.3.2 Service Guide Delivery over Interaction Channel

As defined by [BCAST13-SG].

6.3.3 Service Guide Encoding

As defined by [BCAST13-SG].

6.3.4 Session Description

As defined by [BCAST13-SG].

6.3.5 Service Guide Data Model

As defined by [BCAST13-SG].

6.3.5.1 CellTargetArea/BDSLocationID in WiMAX

Underlying WiMAX functionality is re-used, as explained below.

OMA BCAST Service Guide allows describing the target area for Service and Content and specific SG request from terminal based on its BDSLocationID as specified in [BCAST13-SG] in terms of BDS-specific cell identification. In the case of WiMAX, the value of “CellTargetArea” element of “TargetArea” element and “BDSType” as specified in [BCAST13-SG] is expressed as defined in [BCAST13-SG], but can only assume the following values for “type”: 13 WiMAX Base Station Identifier (BSID) or 14 – WiMAX Operator ID (NAP ID).

Length of the BSID is 48 bits. Length of the NAP ID is 24 bits. Both BSID and NAP ID SHALL be represented in the hexadecimal form in service guide ‘CellArea’ element.

Informative examples:

BSID: 1010 1100 1101 1110 0100 1000 0000 0000 1000 0000 1000 000

SG representation: ACDE48008080

NAP ID: 1010 1100 1101 1110 0100 1000

SG representation: ACDE48

Note that there is a relationship between the BSID and NAP ID. That is because BSID is formed by concatenating the NAP ID and an arbitrary 24bit value which is unique inside the particular operator network owning the NAP ID. Therefore it is equal either to instantiate single NAP ID value or to instantiate set of BSID values which cover all the base stations in the particular operator network.

6.3.6 Service Guide Bootstrap for SG Delivery over Broadcast Channel

6.3.7 Service Guide Bootstrap for SG Delivery over Unicast Channel

The entry point information, i.e the BSDA URL, SHALL be provisioned to the terminal using OMA DM as specified in [BCAST13-Services] and using the BCAST MO specified in [BCAST13-Services].

6.4 WiMAX adaptation related to OMA-TS-BCAST_SvcCntProtection and OMA-TS-DRM_XBS

As defined by [BCAST13-ServContProt] and [DRM20-Broadcast-Extensions].

6.4.1 DRM Profile

The Terminal MAY support service protection using the DRM Profile. If the DRM Profile based service protection is supported, the Terminal SHALL support the reception and processing of keys transported in OMA DRM 2.0 Rights Objects (ROs).

The Terminal MAY support content protection using the DRM Profile as defined in [BCAST13-ServContProt].

The Terminal MAY support extensions for service protection and content protection of broadcast-only devices as defined in [DRM20-Broadcast-Extensions].

6.4.2 OMA BCAST Smartcard Profile

As defined in [BCAST13-ServContProt] when USIM application is used for GBA procedures. As defined in [BCAST13-ServContProt] when other application than USIM is used for GBA procedures.

In case AKA mechanism of WiMAX-SIM application is used for the GBA, WiMAX-SIM is used in BCAST function only for the GBA procedures and SHALL be used in combination with BSIM.

When the AKA mechanism of a WiMAX-SIM is used for the GBA of the BSIM, the Private User Identity in the EF_{PUI} of the BSIM application (as defined in [BCAST13-ServContProt]). SHALL be built out of the Permanent User IDentity and the Realm value of identity of the AKA mechanism used in the WiMAX-SIM (as defined in [WiMAX-SIM]), and SHALL be coded as follows:

<Permanent User IDentity>@<Realm value of identity>

Where, depending of the AKA mechanism used (AKA or EAP-AKA), the Permanent User IDentity is respectively the permanent User IDentity defined in the EF_{GPUId} under the ADF_{WiMAX-SIM} or the Permanent User IDentity defined in the EF_{PUId} under the DF_{EAP-AKA}, and the Realm value of identity is respectively the Realm value of identity defined in the EF_{GRrealm} under the ADF_{WiMAX-SIM} or the Realm value of identity defined in the EF_{Realim} under the DF_{EAP-AKA}, (as defined in [WiMAX-SIM]).

6.5 WiMAX adaptation related to OMA-TS-BCAST_Distribution

6.5.1 File Distribution

As defined by [BCAST13-Distribution].

6.5.1.2 FDT Instance schema

FLUTE FDT Instances SHALL comply with BCAST FDT Instance schema defined in [BCAST13 Distribution].

6.5.2 Associated Delivery Procedures

As defined by [BCAST13-Distribution].

6.5.3 Stream Distribution

As defined by [BCAST13-Distribution].

6.5.4 Media codecs

Neither BCAST Enabler or WiMAX specifications define support of any particular media codecs.

7. BCAST enabler adapting to WiMAX functionality

Appendix A. Change History

(Informative)

A.1 Approved Version History

Reference	Date	Description
OMA-TS-BCAST_WiMAX_Adaptation-V1_1-20131029-A	29 Oct 2013	Status changed to Approved by TP TP Ref # OMA-TP-2013-0332-INP_BCAST_V1_1_ERP_for_final_Approval

A.2 Draft/Candidate Version 1.3 History

Document Identifier	Date	Sections	Description
Draft Version OMA-TS- BCAST_WiMAX_Adaptation-V1_3	17 Dec 2013	2.1; entire document	Version 1.3 Created from OMA-TS-BCAST_WiMAX_Adaptation-V1_1-20131029-A Implementation of CR OMA-BCAST-2013-0078- CR_CONR1.3_L001_L002.doc
Candidate Version OMA-TS- BCAST_WiMAX_Adaptation-V1_3	14 Jan 2014	n/a	Status changed to Candidate by TP TP Ref # OMA-TP-2014-0003- INP_BCAST_V1_3_ERP_and_ETR_for_Candidate_approval

Appendix B. Static Conformance Requirements (Normative)

The notation used in this appendix is specified in [IOPPROC].

B.1 SCR for BCAST WiMAX Client

Item	Function	Reference	Status	Requirement
BCAST-WiMAX -C-001	Support WiMAX adaptation		O	BCAST-WiMAX-C-002
BCAST-WiMAX -C-002	Support Unicast/Interaction Channel reception over IP Bearer	Section 6	O	BCAST-WiMAX-C-003 AND BCAST-WiMAX-C-004 AND BCAST-WiMAX-C-005
BCAST-WiMAX - C-003	Support Interaction Channel for BCAST WiMAX Adaptation	Section 6	O	
BCAST-WiMAX-C-004	Support Service interaction between BSA and BSM and Terminal	Section 6.2.1	O	
BCAST-WiMAX-C-005	Support the adaptation of Service Guide Function for WiMAX Network	Section 6.3	O	BCAST-WiMAX-C-006 AND BCAST-WiMAX-C-007
BCAST-WiMAX-C-006	Support for CellTargetArea in WiMAX	Section 6.3.5.1	O	
BCAST-WiMAX-C-007	Support Service Guide Discovery by Terminal	Section 6.3.7	O	
BCAST-WiMAX-C-008	Support Adaptation of BCAST Service Protection Function for interactive reception	Section 6.4	O	BCAST-WiMAX-C-009 OR BCAST-WiMAX-C-010
BCAST-WiMAX-C-009	Support DRM Profile	Section 6.4.1	O	
BCAST-WiMAX-C-010	Support Smartcard Profile	Section 6.4.2	O	

B.2 SCR for BCAST WiMAX BSM

Item	Function	Reference	Status	Requirement
BCAST-WiMAX-BSM-001	Support BCAST Adaptation on WiMAX Network		O	BCAST- WiMAX-BSM-002
BCAST- WiMAX-BSM-002	Support WiMAX Generic Adaptation	Section 6	O	BCAST- WiMAX-BSM-003
BCAST- WiMAX-BSM-003	Support interactive communication between BSM and Terminal		O	
BCAST-WiMAX-C-004	Support Adaptation of BCAST Service Protection Function for	Section 6.4	O	BCAST-WiMAX-C-0005 OR BCAST-WiMAX-C-006

Item	Function	Reference	Status	Requirement
	interactive reception			
BCAST-WiMAX-C-005	Support DRM Profile	Section 6.4.1	O	
BCAST-WiMAX-C-006	Support Smartcard Profile	Section 6.4.2	O	

B.3 SCR for BCAST WIMAX BSDA

Item	Function	Reference	Status	Requirement
BCAST-WiMAX-BSDA-001	Support BCAST Adaptation on WiMAX Network		O	BCAST-WiMAX-BSDA-002 AND BCAST-WiMAX-BSDA-003
BCAST- WiMAX - BSDA-002	Support IP bearer	Sections 6.1	O	
BCAST- WiMAX - BSDA-003	Support WiMAX Generic Adaptation	Section 6	O	BCAST-WiMAX-BSDA-004 AND BCAST-WiMAX-BSDA-005
BCAST-WiMAX-BSDA-004	Support Interactive communication between BSDA and Terminal		O	
BCAST-WiMAX-BSDA-005	Support adaptation of Service Guide Function for WiMAX Network	Section 6.3	O	BCAST-WiMAX-BSDA-006 AND BCAST-WiMAX-BSDA-007
BCAST-WiMAX-BSDA-006	Support for CellTargetArea in WiMAX	Section 6.3.5.1	O	
BCAST-WiMAX-BSDA-007	Support Service Guide Discovery by Terminal	Section 6.3.7	O	

B.4 SCR for BCAST WIMAX BSA

Item	Function	Reference	Status	Requirement
BCAST-WiMAX-BSA-001	Support BCAST Adaptation on WiMAX Network		O	BCAST- WiMAX -BSA- 002
BCAST- WiMAX - BSA- 002	Support WiMAX Generic Adaptation	Section 6	O	BCAST- WiMAX -BSA- 003
BCAST- WiMAX - BSA- 003	Support the interactive communication between BSA and Terminal	Section 6.2.1	O	