

Recommendation ITU-R BT.2053-0
(02/2014)

**Technical requirements for integrated
broadcast-broadband systems**

BT Series
Broadcasting service
(television)

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RA	Radio astronomy
RS	Remote sensing systems
S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
TF	Time signals and frequency standards emissions
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Note: This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.

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RECOMMENDATION ITU-R BT.2053-0¹**Technical requirements for integrated broadcast-broadband systems***

(2014)

Scope

This Recommendation defines technical requirements for integrated broadcast-broadband systems; intended to harmonize the behaviour and the interaction of a variety of types of applications by broadcast delivery, broadband delivery, pre-installed, via application repository, and home area network delivery.

The ITU Radiocommunication Assembly,

considering

- a) that devices with broadband Internet access are becoming widely available and offer multimedia applications;
- b) that being able to provide connected TV enabled devices with already integrated off-the-shelf applications is of relevance to the end-user;
- c) that the addition of broadband delivery content to the broadcast channel optimizes the bandwidth usage of the transport streams;
- d) that common platforms are desirable for production and international exchange of hybrid broadcast and broadband content;
- e) that a unified platform would allow simplifying and reducing the development effort of hybrid content and applications;
- f) that Recommendation ITU-R BT.1889 refers to Recommendation ITU-T J.200 that defines the high-level architecture for a harmonized set of interactive instruction sets and application programming interfaces (APIs) and identifies the structure of application environment comprising the executable application environment and the declarative application environment for digital television services;
- g) that Recommendation ITU-R BT.2037 states general requirements of integrated broadcast-broadband (IBB) systems and Report ITU-R BT.2267 contains various information on IBB systems,

¹ Radiocommunication Study Group 6 made editorial amendments to this Recommendation in November 2014 in accordance with Resolution ITU-R 1.

* This Recommendation is a part of the family of Recommendations and Reports on IBB systems.

recommends

that Recommendation ITU-T J.205 (2012) Corrigendum 1 (01/2013) – Requirements for an application control framework using integrated broadcast and broadband digital television should be taken into account when specifying IBB systems.²

NOTE 1 – Appendix 1 shows for information which requirements listed in Recommendation ITU-T J.205 are relevant to the broadcast-oriented scenario.

Appendix 1 (Informative)

1 Application type in IBB systems

Recommendation ITU-T J.205 assumes the model of IBB system and application types as described in § 7. There are two major types of IBB applications:

- Stand-alone IBB applications
Applications that are not delivered within the DTV service. Usually, they would be manually launched by the end user from the application catalogue user interface.
- Service associated IBB applications
Applications that are part of IBB DTV services. They are delivered or listed as a component part of the DTV service. And within the service associated IBB applications, there are two types of applications:
 - Service exclusive IBB applications
Execution of service exclusive IBB applications (service bounded) must be terminated when the service exhibition is stopped.
 - Service shared IBB applications
Service shared IBB applications (service unbounded) execution should continue in case of the same application being also signalled in the service that is selected next.

Service associated IBB application will be a major type to broadcast oriented scenario. Each application type is defined in Recommendation ITU-T J.205 as follows:

Service associated IBB application: An application that is part of the integrated broadcast and broadband (IBB) DTV service tuned to by the user at a given time.

Service exclusive IBB application: An application that is listed as a component of an integrated broadcast and broadband (IBB) DTV service; its life cycle is strictly tied to the exhibition of such an IBB DTV service.

² Recommendation ITU-T J.205 refers to three ITU-T J.200-series Recommendations. The corresponding ITU-R Recommendations in the BT-series are listed below.

Recommendation ITU-T J.200 (2010)	Recommendation ITU-R BT.1889
Recommendation ITU-T J.201 (2009)	Recommendation ITU-R BT.1699-2
Recommendation ITU-T J.202 (2010)	Recommendation ITU-R BT.1722-2

Service shared IBB application: An application that is listed as a component of several different integrated broadcast and broadband (IBB) DTV services; its life cycle is for as long as any of those IBB DTV services are being exhibited.

Stand-alone IBB application: Resident or downloaded integrated broadcast and broadband (IBB) application that is not part of an IBB DTV service. Such an application can be created by an authorized IBB application provider, and typically delivered through the application repository.

2 Relationship between items in Recommendation ITU-R BT.2037 and Recommendation ITU-T J.205

When focusing on broadcast oriented scenario, i.e. service associated IBB applications, the relationship between items defined in Recommendation ITU-R BT.2037 and Recommendation ITU-T J.205 is examined.

2.1 Relevancy of items

Table 1 shows relevancy of items in Recommendation ITU-R BT.2037 and Recommendation ITU-T J.205.

TABLE 1

Relevancy of items in Recommendation ITU-R BT.2037 and Recommendation ITU-T J.205

	Items in general requirements	Relevant technical requirements (FR-ACF ³ -xx)
1	i)	1, 2, 9, part of 11, 22, 23, 27 (in case of paid service)
	ii)	1, 2, 9, part of 11, 22, 23, 27 (in case of paid service)
	iii)	1 (depending on involved broadcasting systems), 2 (depending on involved broadcasting systems), 19
	iv)	1 (depending on involved broadcasting systems), 2 (depending on involved broadcasting systems)
2	i)	3, 4 (in some cases), 6, 7, 10, part of 11, 19, 20, 21
	ii)	3
	iii)	5, 7, 8, part of 11
	iv)	20, 22
	v)	4, 21
	vi)	4
3	i)	12, 13, 14
	ii)	3, 4, 12
	iii)	12, 17, 18
	iv)	14, 16
	v)	15, 17
	vi)	Possibly 3, 13
4	i)	1
	ii)	1, 2, 23
	iii)	None

³ “FR-ACF” stands for “Functional Requirement of Application Control Framework” and it is a term used in Recommendation ITU-T J.205 to designate each requirement.

Notes to Table 1

NOTE 1 – FR-ACF-24, 25, 26, 28, and 29 are not relevant to General requirements.

NOTE 2 – Relevant items in FR-ACF-11 to 1-i) and 1-ii) are described in § 2.2.

NOTE 3 – For 1-iii) and 1-iv) with FR-ACF-1 and 2, which is related to regional and mobile services, relevancy between them depends upon characteristics of digital broadcasting system used for IBB services.

NOTE 4 – Situation considered in combination of 2-i) and FR-ACF-4 is described in § 2.2.

NOTE 5 – Relevancy about FR-ACF-11 is described in § 2.2.

NOTE 6 – Relevancy between 3-vi) and FR-ACF-3 is described in § 2.2.

As shown in Table 1, Recommendation ITU-T J.205 has enough coverage for broadcast oriented scenario except implementation related issues.

2.2 Detailed analysis of items in Recommendation ITU-T J.205 for broadcast oriented scenario

In this section, detailed analysis of each requirement defined in Recommendation ITU-T J.205 for broadcast oriented scenario is described.

FR-ACF-01: Use the Recommendation ITU-T J.200 series as a basis for a new Recommendation of an ACF

There is no problem for this requirement by referring relevant ITU-R Recommendations listed in § 1.

FR-ACF-02: Coexistence and backward compatibility with current DTV systems adherent to Recommendations ITU-T J.200, ITU-T J.201, ITU-T H.761 and ITU-T J.202

There is no problem for this requirement. Recommendation ITU-T H.761 is not listed in a table in footnote 1 but the standard defined in Recommendation ITU-T H.761 is included in Recommendation ITU-R BT.1699.

FR-ACF-03: Support for delivering IBB applications using a combination of delivery mechanisms

In Table 1 of Recommendation ITU-T J.205, cases where control is service associated IBB applications are relevant to broadcast oriented scenario. If applicable combination involves only reliable delivery channels and service providers, such combination may be a basis of a trust chain to avoid malicious activities by the applications.

For transport over broadband channel in Table 1, additional formats such as MPEG-DASH may be used for delivering applications and their components.

FR-ACF-04: User Interface for application discovery, selection, acquisition and launching

This function is navigator functionality on a receiver. This is required for stand-alone IBB applications. However, if the IBB system supports concurrent execution of multiple applications, this may be also needed even for service associated IBB applications (for broadcast oriented scenario) to select a new one to execute in parallel.

FR-ACF-05: Installable IBB application support and management

This function is applicable to stand-alone IBB applications for launch. This function will bring quick start capability for the applications even for service associated IBB applications, and it may be useful for some applications such as those for emergency.

FR-ACF-06: Standardized application repository – remote application catalogue

This entity is for stand-alone IBB applications. When this entity is used in broadcast oriented scenario, the role of this entity will be just centralized application servers only.

FR-ACF-07: Application installation package

This function is useful for the applications of which rights has to be strictly protected such as paid applications. If such applications are considered in broadcast oriented scenario, this function is mandatory.

FR-ACF-08: Resident IBB application support

This function is for stand-alone IBB applications. This function may be useful for some applications such as those for emergency for quick start capability.

FR-ACF-09: Application life cycle model

The life cycle model shall be defined for any kind of applications including service associated IBB applications.

FR-ACF-10: User interface for application life cycle manager

This function is useful and may be required in an IBB system which supports concurrent execution of multiple applications of any types.

FR-ACF-11: IBB application control

For launching applications, a) and b) are necessary for service associated IBB applications. c) is used for stand-alone IBB applications. For termination of applications, a), b), e), f) and g) are the condition to terminate service associated IBB applications. d) can be applicable to both service associated and stand-alone IBB applications. c) is an optional condition for both types of applications. h) and i) are the cases of error of execution.

FR-ACF-12: Rules for choosing service associated IBB application's source

It is necessary to define the rule for channel delivery of the application to be service associated IBB application. While Table 2 in Recommendation ITU-T J.205 is just an example, content of the Table is considered reasonable. However, it may be "Yes" in the case of combination of "Download from the available source, avoiding interruption of the service exhibition" and "Is the IBB application transmitted in the current selected service?" because service associated IBB applications can be downloaded through broadband network. And if the IBB system supports stand-alone applications, it is needed to consider the cases of "Installable" and "Resident" applications, as shown in Table 1.

FR-ACF-13: Mechanism for authenticating IBB applications

If so-called third-party service providers are allowed to contribute to the development or provision of the applications, it is required even for the service associated IBB application to be authenticated or to be developed with trust chain in B2B basis.

FR-ACF-14: Ensure DTV service integrity and IBB application permissions policy

For service exclusive IBB applications, this requirement is implicitly achieved unless third-party service providers are allowed to contribute to the development or provision of the applications. When occurring this case, or when using stand-alone IBB applications or service shared IBB applications, conditions and mechanisms defined in this requirement should be satisfied.

FR-ACF-15: Ensure user privacy and user data protection

As described in this requirement, policy for accessing sensible data and connecting to servers should be defined. This requirement should be applied to all types of applications.

FR-ACF-16: Service content protection

Content protection and presentation condition such as parental rating should be considered for all types of applications.

FR-ACF-17: User account management

Provision of user account management mechanism and protection of accessing to other user account is applicable to all types of applications.

FR-ACF-18: IBB application's user settings management

Application setting management for each user is applicable to all types of applications.

FR-ACF-19: Location awareness

This requirement is to provide regional and/or mobile services regardless of application types.

FR-ACF-20: Home area network integration

Collaboration with multiple devices is applicable to all types of applications.

FR-ACF-21: IBB DTV receiver capabilities

Probing and detection of receiver capabilities is required in many cases because there may be difference of the capabilities by receiver model. Sometimes this function is fundamental to avoid execution errors. This characteristic does not depend upon application types, i.e. this requirement is applicable to all types of applications.

FR-ACF-22: DTV service synchronization (stream events)

Synchronization of application execution to broadcasting programme brings fundamental difference to IBB applications from others. Synchronization between multiple devices in accordance with progress of the broadcasting programme can be considered as well. This function is applicable to all types of applications.

FR-ACF-23: Mono-media formats, encodings and protocols

Consideration of mono-media formats, encodings and protocols for broadband usage is important for all types of applications as well as those for broadcasting.

FR-ACF-24: Download feature

In broadcast oriented scenario, functions to download and store content may be useful.

FR-ACF-25: PVR feature

Functions to schedule recording, playback recorded content, and execute the applications which are signalled by recorded content may be useful for broadcast oriented scenario.

FR-ACF-26: Streaming capabilities

This function may be important for all types of applications to play additional or independent content. Careful consideration may be needed for playing streaming content by stand-alone IBB applications to maintain integrity of broadcasting content which is being presented.

FR-ACF-27: Content purchase

When introducing IBB functions to paid services, this function is important regardless of application types. FR-ACF-07 is important as well to maintain the form of applications and content.

FR-ACF-28: System updating and expandability

This function is applicable to all IBB systems.

FR-ACF-29: Pluggable modules support

System capability expansion by plugin module is applicable to all types of applications.

3 Consideration on stand-alone IBB applications

As defined in Recommendation ITU-T J.205, life cycle of stand-alone IBB applications is not influenced by selection of broadcasting services. In other words, once a stand-alone IBB application is launched, the application continues to run unless termination signal is issued by end users or privileged application control signals. In broadcast oriented scenario, use of stand-alone IBB applications has pros and cons:

- Stand-alone IBB application allows the services being independent from broadcasting service. For example, EPG collaborating with tablet computers may be implemented by using this type of application.
- Stand-alone IBB applications allow enhancing system functions. For example, pay-per-view management application which manages multiple broadcasting services should run in background. It may be difficult to implement such application by using other types.
- Stand-alone IBB applications have similar execution form to applications on smart phones or tablet computers. Thus end users may understand how to use and manage them easily.
- Stand-alone IBB applications require careful security consideration on both broadcast resource access and user information.
- Use of stand-alone IBB applications will require functionality of concurrent execution of multiple applications. It leads complex receiver implementation and display management. However, concurrent execution is already achieved in some interactive TV systems, such as those included in Recommendation ITU-R BT.1722.

Considering pros and cons mentioned above, use of stand-alone IBB applications will bring new service opportunity to broadcasters and complexity of the system.
