Implementing Parental Controls by Using PBDA

Guidelines for Independent Hardware Vendors and Independent Software Vendors

June 29, 2009

Abstract

This white paper provides information about the parental control formats and interfaces that the Windows Media® Center for the Windows®7 operating system supports. It provides guidelines for independent hardware vendors (IHVs) and independent software vendors (ISVs) to develop parental control solutions by using the Windows Protected Broadcast Driver Architecture (PBDA).

This information applies to the Windows 7 operating system.

References, resources, and specifications discussed here are listed at the end of this paper.

The current version of this paper is maintained on the Web at:   
 <http://www.microsoft.com/whdc/device/broadcast/pbda/ParentalCtrls.mspx>

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Document History

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| --- | --- | --- | --- | --- |
| Date | Change |  |  |  |
| June 29, 2009 | First publication | | | |

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# Introduction

This white paper provides guidelines to independent hardware vendors (IHVs) and independent software vendors (ISVs) for implementing parental control solutions through Windows® Protected Broadcast Driver Architecture (PBDA). PBDA is supported by Windows Media® Center in Windows 7.

This paper describes the different parental control rating systems that can be implemented by using PBDA. Additional clarifications and details can be found in the PBDA specification, which is listed in “Resources” at the end of this paper.

# Overview of PBDA TAG Tables

PBDA defines a standard way to use the Moving Picture Experts Group-2 (MPEG‑2) transport stream to encode arbitrary data objects in the stream. The encoding is performed by the PBDA-compatible device (such as a tuner), which inserts sections of the data object into one or more transport stream packets until the complete object is transferred. The final data object is called a TAG table.

The encoding of TAG table sections in an MPEG-2 transport stream packet is performed by using the MPEG-2 adaptation field, as shown in Figure 1.



Figure 1. MPEG-2 transport stream packet TAG encoding

TAG table sections are reassembled to form TAG tables as shown in Figure 2.

Figure 2. Reassembling table sections into TAG tables

The TAG header contains fields that are used to specify the type of the TAG table and to reassemble the table sections into a TAG table. The following table specifies the various types of TAG table that PBDA supports.

PBDA TAG Table Types

| **Table ID** | **Description** |
| --- | --- |
| 0x00 | Descramble Failure Notification |
| **0x01** | **Parental Control Table** |
| 0x02-0xEF | Reserved |
| 0xF0-0xFF | Application Data Table |

This paper discusses the PBDA Parental Control TAG table and the methods that are used to encode parental control data.

For more information about PBDA TAG packets and tables, refer to Section 5 of the “Part 1: Core Services” document in the PBDA specification, which is listed in “Resources” at the end of this paper.

# The PBDA Parental Control TAG Table

PBDA supports the transfer of parental control data by using a Parental Control TAG table that is inserted in MPEG-2 transport stream packets. This TAG table encodes a parental access policy for the playback of the content in which the table is provided. The Parental Control TAG table can be inserted with other PBDA TAG table data (such as Descramble Failure Notifications) in the transport stream for the content.

For more information about the PBDA Parental Control TAG table, refer to Section 5.2.3 of the ”Part 1: Core Services” document in the PBDA specification, which is listed in “Resources” at the end of this paper.

## Parental Control TAG Table Format

The following table shows the format of the Parental Control TAG table. All the data types in this table are in big-endian format.

Parental Control TAG Table Format

| Table field | Data type |
| --- | --- |
| **rating\_system\_count**  for( j=0; j< **rating\_system\_count**; ++j )  {  **rating\_system\_id**  **reserved**  **country\_code**  **rating\_attribute\_count**  for( k=0; k < **rating\_attribute\_count**; ++k )  {  **rating\_attribute**  **rating\_attribute\_value**  }  } | uintb32  uuidb  uintb8  uintb8[3]  uintb32  uintb32  uintb32 |

The fields of the Parental Control TAG table are as follows:

* **rating\_system\_count** specifies the number of rating systems in the table. Each rating system is identified by a **rating\_system\_id** and contains one or more **rating\_attribute** values.
* **rating\_system\_id** specifies the type of the rating system. This field is specified by using the following universally unique identifier (UUID):

Parental Control TAG Table UUID

| UUID | Description |
| --- | --- |
| {11DF0672-C2B6-4fc5-8E35-07E1877E46F9} | PBDA General |

* **reserved** is a reserved byte for future use.
* **country\_code** is used to specify a country or region. To specify a value for a specific country or region, you must use a value that is defined in the ISO 3166-1 alpha 3 standard. If the specified value of **country\_code** is not listed in the standard, thevalue is ignored.

For more information about the ISO 3166-1 alpha 3 standard, refer to “Resources” at the end of this paper.

In addition to a specific country code, you can use a value of ”ZZZ” to apply to all countries and regions. This country code is defined in the ISO 3166-1 alpha 3 standard to be “user assigned”, and PBDA defines this value to represent all locales.

* **rating\_attribute\_count** specifies the number of **rating\_attribute** and **rating\_attribute\_value** fields that immediately follow this field in the table.
* **rating\_attribute** specifies the type of value that is set in the **rating\_attribute\_value** field. The **rating\_attribute** values are defined in the following table:

rating\_attribute Field Values

| rating\_attribute | Description | Attribute type |
| --- | --- | --- |
| 0x00000001 | Parental Control Time Range | Time-based |
| 0x00000002 | Required Parental Control Time Range | Time-based |
| 0x00000100 | Overall | Age-based |
| 0x00000200 | Violence | Age-based |
| 0x00000201 | Language | Age-based |
| 0x00000202 | Sexual Content | Age-based |
| 0x00000203 | Dialogue | Age-based |
| 0x00000204 | Fantasy Violence | Age-based |
| Other | Reserved | Not applicable |

* **rating\_attribute\_value** is the value to which the **rating\_attribute** field refers. Depending on the **rating\_attribute** value, this field contains either a time-based or age-based value.

Each **rating\_system** that is specified in the Parental Control TAG table is applied to the specified country or region. In the **rating\_system** field, you can specify one or more **rating\_attribute** and related **rating\_attribute\_value** fields. This lets you specify different time-based and age-based ratings for the same locale.

### Age-Based Rating Attributes

Age-based rating attributes specify the minimum age that is required for content playback. Windows Media® Center processes age-based rating attributes in the following ways:

* If the content’s age-based rating attribute is less than or equal to the maximum Windows Media Center age-based parental control rating value, Windows Media Center starts the content playback and does not prompt the user for a 4-digit personal identification (PIN).
* If the content’s age-based rating attribute is greater than the maximum Windows Media Center age-based parental control rating value, Windows Media Center first prompts the user for the PIN. If the user correctly enters the PIN, Windows Media Center starts the content playback.

As soon as the user enters the correct PIN, Windows Media Center starts the content playback.

**Note:** As long as the ratings of the content have not changed, Windows Media Center prompts the user for PIN entry every two hours during the playback. If the user does not enter the correct PIN, Windows Media Center stops the playback.

You specify the aged-based attribute by setting the **rating\_attribute** field to a value greater than or equal to 0x00000100. The associated **rating\_attribute\_value** field specifies the minimum viewing age for the content.

PBDA defines the following types of age-based rating attributes:

0x00000100 (Overall):

This attribute specifies the general age-based rating for the content.

0x00000200 (Violence):

This attribute specifies the age-based rating for the level of violence in the content. The scope of this attribute involves violence that is based on real-life situations.

0x00000201 (Language):

This attribute specifies the age-based rating for the level of adult or offensive language in the content. The scope of this attribute involves individual words or phrases that are adult or offensive.

0x00000202 (Sexual Content):

This attribute specifies the age-based rating for the level of sexual content (such as nudity) in the content.

0x00000203 (Dialogue):

This attribute specifies the age-based rating for the level of adult or offensive dialog in the content. The scope of this attribute involves dialog in the content that is adult or offensive.

0x00000204 (Fantasy Violence):

This attribute specifies the age-based rating for the level of violence in the content. The scope of this attribute involves violence that is based on fantasy situations.

The following table lists the range of viewing ages that the United States TV rating system defines:

US TV Rating System Values

| Value | Description |
| --- | --- |
| 2 | TV-Y |
| 7 | TV-Y7 |
| 8 | TV-G |
| 10 | TV-PG |
| 14 | TV-14 |
| 17 | TV-MA |

The following table lists the range of viewing ages that the MPAA rating system defines:

MPAA Rating System Values

| Value | Description |
| --- | --- |
| 0 | G |
| 10 | PG |
| 13 | PG-13 |
| 17 | R |
| 18 | NC-17 |

A rating system that is specified in a Parental Control TAG table can contain multiple age-based rating attributes. When it applies its parental control settings, Windows Media Center selects the youngest age from all rating attributes in the rating system.

### Time-Based Rating Attributes

Time-based rating attributes specify an inclusive time when Windows Media Center must perform parental control authorization before it performs content playback. Parental control authorization requires the user to enter the 4-digit PIN that is managed by Windows Media Center and stored on the device.

PBDA defines the following types of time-based rating attributes for parental control specifications:

Parental Control Time Range Rating Attribute:

This attribute is specified by setting the **rating\_attribute** field to a value of 0x00000001. It applies only to the country or region that is specified in the **country\_code** field.

If the user configured Windows Media Center with a 4-digit PIN for parental control, Windows Media Center prompts the user for the PIN during the specified time. If the user enters the correct PIN, Windows Media Center starts the content playback.

If the user did not configure a PIN for parental control, Windows Media Center does not prompt the user for the PIN. Instead, Windows Media Center starts the content playback.

**Note:** If Windows Media Center has not been configured to have a PIN, it ignores all rating attributes except for the Required Parental Control Time Range rating attribute.

Required Parental Control Time Range Rating Attribute:

This attribute is specified by setting the **rating\_attribute** field to a value of 0x00000002. It applies to all countries and regions regardless of the value of the **country\_code** field.

If the user configured Windows Media Center with a 4-digit PIN for parental control, Windows Media Center prompts the user for the PIN during the specified time. If the user enters the correct PIN, Windows Media Center starts the content playback.

If the user did not configure a PIN for parental control, Windows Media Center first prompts the user to configure a PIN during the specified time. As soon as the PIN is configured, Windows Media Center starts the content playback.

If Windows Media Center prompts the user for PIN entry and the user enters the correct PIN, Windows Media Center does the following:

Starts the content playback.

As long as the ratings of the content have not changed, prompts the user for PIN entry every two hours during the playback. If the user does not enter the correct PIN, Windows Media Center stops the playback.

The time range is encoded in the **rating\_attribute\_value** field by using the following subfields:

rating\_attribute Subfields

| Field name | Data type |
| --- | --- |
| **controlled\_start\_time**  **controlled\_end\_time** | uintb16  uintb16 |

Where:

* **controlled\_start\_time** provides the inclusive start time, in units of minutes from 00:00, when parental control authorization is required to start the content playback regardless of the content rating.
* **controlled\_end\_time** provides the inclusive end time, in units of minutes from 00:00, when parental control authorization is required to stop the content playback regardless of the content rating.

The PBDA-compatible device may specify that parental control authorization is required for playback at any time of day by encoding a **controlled\_start\_time** value of 0:0 and **controlled\_end\_time** of 24:00. This results in a **rating\_attribute** value of 1440.

## Parental Control TAG Table Usage

The Parental Control TAG table is optional. However, as soon as the PBDA-compatible device sends the TAG table in the MPEG-2 transport stream, the device must continue to send the table every 10 seconds while it streams content to Windows Media Center. The device must send the table in every transport stream packet that is part of the media stream of the content.

If Windows Media Center does not receive the Parental Control TAG table from the PBDA-compatible device within 30 seconds while the content streams, it considers the content unrated. Windows Media Center also considers content unrated if it does not receive the Parental Control TAG table from the device either during a change of the current channel or a change of the program in the current channel.

When Windows Media Center receives and assembles the Parental Control TAG table from the PBDA-compatible device, it compares the table values against the user’s local settings. If Windows Media Center must perform parental control, it prompts the user for the entry of the 4-digit PIN before it starts the content playback.

In Windows Media Center, the user can specify a parental control setting to explicitly block the playback of unrated content. In this case, unrated content is blocked regardless of whether the PBDA-compatible device no longer transmits the Parental Control TAG table.

# Specifying Age-Based Rating Attributes

PBDA-compatible devices can meet the requirements of different parental control ratings systems. This section describes how these devices can support parental control by specifying aged-based rating attributes.

Example 1 is a basic example of a Parental Control TAG table that uses age-based rating attributes. In this example, the content is intended to be viewed by ages 10 and older in France (as specified by the ”FRA” country code). Also, this example specifies a single age-based rating attribute.

Example 1. Single Age-Based Parental Control Setting

rating\_system\_count = 1

rating\_system\_id = {11DF0672-C2B6-4fc5-8E35-07E1877E46F9}

country\_code = FRA

rating\_attribute\_count = 1

rating\_attribute = 0x00000100

rating\_attribute\_value = 10

Example 2 shows a PBDA Control TAG table that specifies multiple age-based rating attributes. In this example, the content is targeted for the United States (as specified by the ”USA” country code). In addition, the example specifies the following rating attributes:

* A primary content rating attribute (**rating\_attribute** = 0x100) for ages 10 and older (**rating\_attribute\_value** = 10).
* A violence-based rating attribute (**rating\_attribute** = 0x200) for ages 10 and older (**rating\_attribute\_value** = 10).
* A dialog-based rating attribute (**rating\_attribute** = 0x203) for ages 10 and older (**rating\_attribute\_value** = 10).

Example 2. Multiple Age-Based Parental Control Settings

rating\_system\_count = 1

rating\_system\_id = {11DF0672-C2B6-4fc5-8E35-07E1877E46F9}

country\_code = USA

rating\_attribute\_count = 3

rating\_attribute = 0x00000100

rating\_attribute\_value = 10

rating\_attribute = 0x00000200

rating\_attribute\_value = 10

rating\_attribute = 0x00000203

rating\_attribute\_value = 10

# Specifying Time-Based Rating Attributes

PBDA-compatible devices can specify time-based rating attributes during which adult content can be shown only during a certain time periods. Adult content (such as content that contains nudity or graphic violence) that is shown during a specified time period is known as *watershed content*.

To handle watershed content, the PBDA-compatible device must specify the correct time-based attribute type and value for the controlled playback of the content. The following are the types of time-based rating attributes:

Parental Control Time Range attribute (0x00000001).

Required Parental Control Time Range attribute (0x00000002).

For more information about these attributes, see “[Time-Based Rating Attributes](#_Time-Based_Rating_Attributes)” earlier in this paper.

Example 3 shows how to use the Parental Control Time Range attribute setting. In this example, users from the United Kingdom are prompted to enter the 4-digit PIN from 10:00 PM to 6:00 AM to unblock the content. This action is performed regardless of the Windows Media Center maximum parental control setting on the user’s computer.

Also, the specified time applies to watershed content that is either streamed directly from live TV or recorded and played back from Windows Media Center.

Example 3. Parental Controls for Watershed Content in a Single Locale

rating\_system\_count = 1

rating\_system\_id = {11DF0672-C2B6-4fc5-8E35-07E1877E46F9}

country\_code = GBR

rating\_attribute\_count = 1

rating\_attribute = 0x00000001

rating\_attribute\_value

controlled\_start\_time = 22:00

controlled\_end\_time = 06:00

Example 4 shows how to use the Parental Control Time Range attribute setting for more than one country or region. This example shows the following:

* Users from the United Kingdom are prompted to enter the 4-digit PIN from 10:00 PM to 6:00 AM to unblock the watershed content.
* Users from France are prompted to enter the 4-digit PIN from 11:00 PM to 4:00 AM to unblock the watershed content.

Example 4. Parental Controls for Watershed Content in Multiple Locales

rating\_system\_count = 2

rating\_system\_id = {11DF0672-C2B6-4fc5-8E35-07E1877E46F9}

country\_code = GBR

rating\_attribute\_count = 1

rating\_attribute = 0x00000001

rating\_attribute\_value

controlled\_start\_time = 22:00

controlled\_end\_time = 06:00

rating\_system\_id = {11DF0672-C2B6-4fc5-8E35-07E1877E46F9}

country\_code = FRA

rating\_attribute\_count = 1

rating\_attribute = 0x00000001

rating\_attribute\_value

controlled\_start\_time = 23:00

controlled\_end\_time = 04:00

Example 5 shows how to use the Required Parental Control Time Range attribute setting. In this example, all countries and regions have the same time period for the playback of the same watershed content. Users from any country or region are prompted to enter the 4-digit PIN from 12:00 AM to 6:00 AM to unblock the watershed content. This action is performed regardless of the Windows Media Center maximum parental control setting on the user’s computer.

Because the Required Parental Control Time Range attribute setting is specified in the **rating\_attribute** field, Windows Media Center ignores the specified **country\_code** value and applies the action to all locales.

Example 5. Parental Controls for Watershed Content in All Locales

rating\_system\_count = 1

rating\_system\_id = {11DF0672-C2B6-4fc5-8E35-07E1877E46F9}

country\_code = FRA

rating\_attribute\_count = 1

rating\_attribute = 0x00000002

rating\_attribute\_value

controlled\_start\_time = 24:00

controlled\_end\_time = 06:00

Example 6 shows a more complex watershed content scenario with the Required Parental Control Time Range rating attribute. In this example, the specified time to playback the watershed content applies to all countries and regions. However, when the specified time is not in effect, the rating applies to only one locale through an age-based rating attribute.

Example 6. Specifying Time-Based and Age-Based Rating Systems

rating\_system\_count = 1

rating\_system\_id = {11DF0672-C2B6-4fc5-8E35-07E1877E46F9}

country\_code = FRA

rating\_attribute\_count = 2

rating\_attribute = 0x00000002

rating\_attribute\_value

controlled\_start\_time = 24:00

controlled\_end\_time = 06:00

rating\_attribute = 0x00000100

rating\_attribute\_value = 14

In this example, the following parental controls are specified:

* A Required Parental Control Time Range rating attribute is specified for viewing watershed content between 12:00 AM to 6:00 AM, inclusive.

Users who view the content from any country or region during this time are prompted to enter the 4-digit PIN to unblock the content. This action is performed regardless of the Windows Media Center maximum parental control setting on the user’s computer.

* Users from France, who view the watershed content when the specified time is not in effect, are prompted to enter the 4-digit PIN if the Windows Media Center maximum parental control setting is less than 14 on the user’s computer.

# Specifying Multiple Countries or Regions

PBDA-compatible devices can use the Parental Control TAG table to specify different age-based and time-based rating attributes for the same video or audio content that is targeted for different countries or regions.

To specify multiple countries or regions, the value of the **rating\_system\_count** field must be set to the number of locales to which the content applies. In addition, the **country\_code** field must be set to the three-character value of the country code as specified by the ISO 3166-1 alpha 3 standard. For more information about the ISO 3166-1 alpha 3 standard, refer to “Resources” at the end of this paper.

Example 7 shows a basic Parental Control TAG table that specifies content that is provided to two countries. In this example, the following countries have different parental ratings restrictions on the same content:

* In France (as specified by the ”FRA” country code), the content can be viewed by ages 10 and older.
* In the United Kingdom (as specified by the ”GBR” country code), the same content can be viewed by ages 8 and older.

Example 7. Different Parental Control Settings for the Same Content in Multiple Locales

rating\_system\_count = 2

rating\_system\_id = {11DF0672-C2B6-4fc5-8E35-07E1877E46F9}

country\_code = FRA

rating\_attribute\_count = 1

rating\_attribute = 0x00000100

rating\_attribute\_value = 10

rating\_system\_id = {11DF0672-C2B6-4fc5-8E35-07E1877E46F9}

country\_code = GBR

rating\_attribute\_count = 1

rating\_attribute = 0x00000100

rating\_attribute\_value = 8

If the Parental Control TAG table specifies a **country\_code** value that does not match the user’s locale, Windows Media Center processes the parental control attributes in the following way:

* For age-based rating attributes, Windows Media Center uses the youngest age from all rating systems in the table. For example, if a user in Germany receives the content with the Parental Control TAG table from Example 7, Windows Media Center selects the age-based attribute of 8 for the content.
* For time-based rating attributes that are specified by using the Parental Control Time Range attribute, Windows Media Center ignores the rating. For time-based rating attributes that are specified by using the Required Parental Control Time Range attribute, Windows Media Center applies the rating for all locales.

Example 8 shows a Parental Control TAG table that specifies the same age-based parental control settings but is applied to all countries and regions. In this example, the **country\_code** is set to ”ZZZ”. PBDA defines this value to represent all locales. Therefore, in this example, all locales have the same ratings for the content.

For example, users in Germany and the United States can view the content only if the Windows Media Center maximum age-based parental control rating on the user’s computer is set to age 14 or older.

Example 8. Parental Control Settings for the Same Content in All Locales

rating\_system\_count = 1

rating\_system\_id = {11DF0672-C2B6-4fc5-8E35-07E1877E46F9}

country\_code = ZZZ

rating\_attribute\_count = 1

rating\_attribute = 0x00000100

rating\_attribute\_value = 14

PBDA-compatible devices are expected to provide the correct **country\_code** value that is based on the ISO 3166-1 alpha 3 standard. Windows Media Center deals with invalid **country\_code** values in the following way:

* If the **country\_code** value contains invalid numeric, symbol, or alphanumeric characters, Windows Media Center ignores the ratings that are associated with that **country\_code** field.
* If the **country\_cod**e value does not contain three uppercase alphabetical characters, Windows Media Center ignores the ratings that is associated with that **country\_code** field.

# Resetting the Parental Control PIN

Broadcasters may require PBDA-compatible devices to provide a mechanism for resetting or clearing the parental control PIN. This 4-digit PIN is managed by Windows Media Center and is defined by the user.

To clear or reset this PIN, the device must signal a PinReset event to Windows Media Center. As soon as Windows Media Center receives the PinReset event from the device, the device may generate a Man-Machine Interface (MMI) message to notify the user that the parental control PIN was reset or cleared.

The PinReset event is defined by the following UUID:

PinReset Event Type

| UUID | Event name |
| --- | --- |
| C6E048C0-C574-4c26-BCDA-2F4D35EB5E85 | PinReset |

The data for the PinReset event is as follows:

PinReset Data

| Field name | Data type |
| --- | --- |
| **new\_pin** | String |

To reset the old PIN to a new 4-digit numeric PIN, the **new\_pin** field must contain string data in the following format:

{<string length>, <1st digit>, <2nd digit>, <3rd digit>, <4th digit>, ‘\0’}

For example, to set the 4-digit numeric PIN to “1234”, the **new\_pin** field contains the following string data:

{5, ‘1’,’2’,’3’,’4’,’\0’}

To clear the old PIN, the **new\_pin** field contains an empty string in the following format:

{1, ‘\0’}

For more information about the PBDA PinReset event, refer to Section 6.5.9 of the “Part 1: Core Services” document in the PBDA specification, which is listed in “Resources” at the end of this paper.

# Requiring Parental Controls during Live TV Setup

PBDA-compatible devices can require users to set parental controls when they perform the Live TV setup in Windows Media Center. This option is defined through a PBDA name/value pair that the General Purpose Named Value Service (GPNVS) manages and advertises in the PBDA-compatible device.

The GPNVS lets the device expose its capabilities and also lets Windows Media Center set preferences on the device. For more information about GPNVS, refer to Section 6.5 of the “Part 1: Core Services” document in the PBDA specification, which is listed in “Resources” at the end of this paper.

The Microsoft GPNVS profile defines the following name/value pair for the configuration of parental control on the PBDA-compatible device.

Microsoft GPNVS Profile Name/Value Pair

| Name | Type | Description |
| --- | --- | --- |
| PBDA:/Microsoft.com/NV/Variable /MCE/ConfigureParentalControl | RO | If this value is nonzero, Windows Media Center expects that setup and configuration steps include parental control configuration.  This value would typically be set if the tuner can output a Parental Control Table that indicates that a PIN is required for certain content playback access. |

If the user tries to clear the 4-digit PIN and a PIN is always required to be set, Windows Media Center prompts the user to enter a new 4-digit PIN when the user tunes to content with parental ratings specified by using the Parental Control TAG table.

For more information about the Microsoft GPNVS profile, refer to Section 2.3 of the “PBDA Part 1 Profile Microsoft” document in the PBDA specification, which is listed in “Resources” at the end of this paper.

# Resources

For the latest information about the Microsoft Windows family, see the [Windows Web site](http://www.microsoft.com/windows) at <http://www.microsoft.com/windows>.

#### Microsoft

#### WHDC Web site:

Home page

<http://www.microsoft.com/whdc/default.mspx>

Protected Broadcast Driver Architecture (PBDA) Specification (Version 1.3.1)

<http://www.microsoft.com/whdc/device/broadcast/PBDA/pbda_spec.mspx>

#### Organization Specifications

International Standardization Organization ISO Standards

<http://www.iso.org/iso/iso_catalogue.htm>

* ISO 3166-1 Alpha-3 Country Code