IMDA-DEVICE PROFILE 1, Rev 1

IMDA Device Profile 1

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IMDA Device Profile 1

1. Introduction

This document outlines the Internet Media Device Alliance [IMDA] Profile 1 specification.

IMDA Device Profile 1

The IMDA's mission is to develop and promote a set of open, interoperable standards and device profiles to maximise the growth of a global consumer market in internet-connected media devices.

Profile 1 is the IMDA's baseline Internet Media profile. It defines the minimal set of features of an IMDA-approved Profile 1 device.

The goal of Profile 1 is, in line with the IMDA's objectives, to promote greater understanding and adoption of Internet Media Devices and associated technology. In order to achieve this goal, the IMDA has been careful to be as inclusive as possible both of existing devices and existing broadcast setups.

Profile 1 does not attempt to describe comprehensively all possible Internet Media Device features and broadcast setups, or even all desirable ones. It is the hope of the IMDA that the inclusive nature of this Profile will encourage its adoption and promote the concept of standards in Internet Media Devices, and that the release of future profiles by the IMDA will help create a feature rich, highly interoperable ecosystem for digital content.

Devices complying with all required features of Profile 1 as described below can be certified through the IMDA organisation. The details are given in [IMDA Certification].

During the period that the Licensee uses the Mark and/or the Logo Mark, Licensee agrees to pay to Licensor a one-time fee for each of the Licensor's Compliant Goods (i.e., each product certified). For Compliant Goods certified prior to January 31, 2010, there is no fee. For Complaint Goods certified after January 31, 2010, the fee for IMDA Members is $100.00 per Compliant Good, the fee for Non-IMDA members is $500.00 per Compliant Good.

2. This is the IMDA baseline Internet Media Profile for an Audio Product

2.1 Browseable List

Capability to display a browseable categorized list or filterable list of Internet radio stations is required. The list can be displayed on the device itself or on a remote control. Note that an external web browser is also considered to be a remote control.

2.2 Playing audio live streams

Capability of receiving and decoding live streams being broadcast by a user selected Internet radio station and output it either to speakers or to an audio output connector is required.

2.3 Radio Station directory updates

Capability of demonstrating that it is possible to maintain an updated station list is required. This can be by either updating/maintaining the list locally on the device or by updating/maintaining the list on servers which power the directories for the device.

2.4   MPEG-1 Audio Layer (MP3) files must play on the device

Capability to play all MPEG-1 Audio Layer (MP3) streams provided by IMDA Certification Stream Test Directory is required.

2.5   Windows Media Audio (WMA) files must play on the device

Capability to play all Windows Media Audio (WMA) streams provided by IMDA Certification Stream Test Directory is required.

2.6   Playlists

2.6.1   M3U/pls Playlist

Capability to play all M3U/pls Playlist streams provided by IMDA Certification Stream Test Directory is required.

Attempt must be made to play all playable items in a playlist, regardless of playback failure, up to a limit of ten consecutive playback failures is required.

2.6.2   ASX

Capability to play all ASX streams provided by IMDA Certification Stream Test Directory is required. Attempt must be made to play all playable items in a playlist, regardless of playback failure, up to a limit of ten consecutive playback failures.

2.6.3   A new line separated list of URLs as plain text

Capability to play all-new-line-separated lists of URLs as plain text streams provided by IMDA Certification Stream Test Directory is required.

Attempt must be made to play all playable items in a playlist, regardless of playback failure, up to a limit of ten consecutive playback failures.

2.7   HTTP Redirection

2.7.1   HTTP 301 Redirection

Capability to redirect all http 301 redirection streams provided by IMDA Certification Stream Test Directory is required. PRODUCT must attempt to redirect a minimum of 7 times.

2.7.2   HTTP 302 Redirection

Capability to redirect all http 302 redirection streams provided by IMDA Certification Stream Test Directory is required. PRODUCT must attempt to redirect a minimum of 7 times.

2.8   Handling of Stereo Streams

2.8.1   Stereo Streams

Capability to play all stereo streams provided by IMDA Certification Stream Test Directory either through 2 channels or as a download-mix of the 2 channels is required.

3. Specification

3.1 Internet Media Device Features

A Profile 1 Internet Media Device is an Internet Protocol (IP) [IP] connected consumer electronics device that can discover, connect to, decode and play back live Internet Radio broadcasts. The device must, at least:

- Present a browseable categorised list or filterable list of Internet Radio stations on a display capable of displaying at least 8 characters, either on the device or on a remote control (this can also be a web browser).

- Receive and decode the Live Stream being broadcast by a user-selected Internet Radio station and output it either to speaker(s) or to an audio interface.

- Be able to receive updates to its Internet Radio station lists to keep the content relevant and correct.

3.2 Audio Content Encoding (Codecs):

The IMDA's research indicates that more than 90% of Live Streams available in some of the largest Internet Radio directories in the world are being encoded as either WMA or MP3. Profile 1 compliant devices must be capable of playing at least:

- MPEG-1 Audio Layer 3 (MP3) streams [MP3] and

- Windows Media Audio (WMA) version 9 (Standard) streams [WMA].

At a minimum, the following bitrates and sample rates must be supported for mono and stereo signals:

Codec	Bitrates	Sampling rates
MPEG-1/2 Audio Layer 3 (MP3), CBR	32 – 192 kb/s	22.05, 32, 44.1 and 48 kHz
Windows Media Audio (WMA) v9, CBR	*Mono: 32 – 48 kb/s* *Stereo: 32 – 128 kb/s*	16, 22, 32 44, 48 kHz

Devices presenting Mono audio must down-mix Stereo signals, i.e. must not simply discard one channel.

Broadcasters wishing to reach Profile 1 compliant devices will need to provide Streams within these parameters.

Device manufacturers are encouraged to support as wide a range of codecs, bitrates and sample rates as is practical and commercially viable.

3.3 Containers

WMA streams are usually delivered in an Advanced Systems Format (ASF) [ASF] container. Profile 1 compliant devices must be able to decode ASF streams. Support for video streams or Digital Rights Management is not required.

MP3 is already a bit stream format, so no additional container support is required.

3.4 Transports

Broadcasters wishing to reach Profile 1 compliant devices will need to support the Hypertext Transport Protocol (HTTP) [HTTP] for MP3 and WMA streams. Device manufacturers are encouraged to support as wide a range of transports as is practical and commercially viable.

3.4.1 MP3 Streams

MP3 streams are usually transported over the Internet via HTTP. Profile 1 compliant devices must support playback of MP3 streams made available via HTTP.

Profile 1 devices must be able to play Streams from Shoutcast-compatible streaming services. The exact requirements for interoperability are detailed on the IMDA website [IMDA Shoutcast].

3.4.2 WMA Streams

WMA streams are commonly transported in a number of formats, but the IMDA's research indicates that the majority of Windows Media Servers in operation support Protocol Rollover [WMPR], allowing their content to be accessed via HTTP. Windows Media servers use extensions to the HTTP protocol to facilitate this; the extensions are described in Microsoft's Windows Media HTTP Streaming Protocol (WMSP) [WMSP] .

A Profile 1 compliant Solution must support playback from Windows Media Servers that support streaming over HTTP. Solutions that support RTSP/MMS streaming may stream over whichever protocol is convenient, but Solutions which do not support RTSP/MMS must implement Protocol Rollover to negotiate the playback of the stream over HTTP. Specifically, a Solution must be able to process a stream URL that is prefixed with the MMS moniker (mms://) and negotiate playback of that stream where HTTP streaming is available (though Solutions are not required to use HTTP if other preferred transports are available). Specifically, Solutions should be able to process a stream URL that is prefixed with the MMS moniker (mms://) and negotiate playback of that stream over HTTP where the server supports it.

The IMDA acknowledges that the streaming of WMA content over RTSP [RTSP] and, less commonly, over the MMS protocol [MMS] is possible. Because of the deprecated status of the MMS protocol and the relative complexity of implementing RTSP, the IMDA feels that neither transport is suitable for inclusion in this Profile.

Some broadcasters use Microsoft's Intelligent Streaming to allow multi-bitrate transmission. The default behavior of devices that do not implement Intelligent Streaming is to play the lowest bitrate

stream. It is recommended that the device manufacturers implement Intelligent Streaming to improve the user experience.

3.5   Playlists

It is common practice amongst Internet Radio broadcasters to use playlists of Streams to support failover between multiple servers and to include pre-roll advertisements before Live Streaming commences. Profile 1 compliant solutions must support the following playlist formats:

- M3U [IMDA M3U] and

- A subset of ASX as described on the IMDA website [IMDA ASX]

- PLS [IMDA PLS] and

- A new-line separated list of URLs as plain text. Note that resources referenced in a playlist may themselves be playlists and solutions should be able to interpret them. Profile 1 compliant devices must also handle HTTP 301 and 302 redirections as described in the HTTP 1.1 specification [30X].

3.6   Recommendation to Broadcasters

As well as making their content available in the format outlined in the previous sections, broadcasters wishing to fully support Profile 1 should make their Station metadata discoverable by content aggregators. Doing so provides a simple and reliable way of ensuring their content is accurately listed in content directories that are sent to Internet Media Devices. The metadata and discovery protocol is described in [IMDA Metadata Guidelines].

4. Appendix

4.1 Glossary

Stream: *An IP delivered byte stream that encodes audio content using a codec, possibly packaged in a container, access to which may need to be negotiated by some protocol.*

Live Stream: *A Stream whose content is encoded / generated in real time and made available immediately or with a fixed time delay.*

Internet Radio Station: *An audio Live Stream provided by a broadcaster.*

Audio Interface: *Wired and/or wireless audio output, e.g. audio jack, A2DP Bluetooth, proprietary connections*

A solution: *"Solution" means a completely working PRODUCT with all ingredients for functioning of that PRODUCT but not necessarily engineered for mass production. The ingredients include functions performed directly on the device as well as functions performed external to the device but supporting the device overall functionality. These functions must be regularly employed for PRODUCT as commercially deployed."*

Standard vocabulary: *(e.g. must, should, may) used by IETF and also other standardization organisations: http://www.ietf.org/rfc/rfc2119.txt*

CBR: *Constant Bitrate: During analogue to digital encoding or during conversion of one previously encoded file to another codec encoded file the bit rate represents the amount of data stored about the audio per each time unit. Bit rate is measured in number of bits per second - bps, in audio codecs this is usually at the thousands of bits (kilo-bits) per second rate: kbps, or higher. The bit rate is affected by the sampling rate (see) of the input signal, the codec's internal encoding algorithms and the compression within a codec's algorithm. There are also variable bit-rate and constant bit-rate versions of some codecs. Most common are constant bit-rate codecs where consumption of the data by a decoder is handled in a constant rate, variable means that the consumption happens in varying rates.*

Playlist: *In general Playlist is a list of songs or streams and the list is governed by certain pre-defined framework. In the context of this document Playlist is a list of Stream/Live stream.*

Container: *Container is a wrapper format which defines the way data is stored/streamed where as it does not specify or imply on the data themselves. Container is used to identify and package (or interleave) different data types.*

4.2 References

[IMDA] Internet Media Device Alliance: http://www.imdalliance.org/

[IP] Internet Protocol version 4: IETF RFC791. http://www.ietf.org/rfc/rfc791.txt

[MP3] MP3: MPEG-1/2 Layer III: ISO/IEC 11172-3 (MPEG-1); ISO/IEC 13818-3 (MPEG-2)

[WMA] WMA: http://msdn.microsoft.com/en-us/library/dd443195(VS.85).aspx

[ASF] ASF: http://www.microsoft.com/windows/windowsmedia/forpros/format/asfspec.aspx

[HTTP] HTTP: Hyper Text Transfer Protocol: IETF RFC2616. http://www.ietf.org/rfc/rfc2616.txt

[WMPR]: About protocol rollover, Microsoft Technet: http://technet.microsoft.com/en-us/library/cc771761.aspx

[WMSP] WMSP: http://msdn.microsoft.com/en-us/library/cc251060.aspx

[MMS] MMS: http://msdn.microsoft.com/en-gb/library/cc234711(PROT.10).aspx

[RTSP] RTSP: Realtime Streaming Protocol: IETF RFC2326. http://www.ietf.org/rfc/rfc2326.txt

[IMDA M3U] M3U: http://www.imdalliance.org/file-formats/playlist-definitions/

[IMDA ASX]: http://www.imdalliance.org/file-formats/playlist-definitions/

[IMDA PLS]: http://www.imdalliance.org/file-formats/playlist-definitions/

[30X] HTTP Redirects: http://www.w3.org/Protocols/rfc2616/rfc2616-sec10.html#sec10.3

[XML] XML: Extensible Markup Language http://www.w3.org/XML/

[IMDA Certification]: IMDA-CERT001

[IMDA Shoutcast]: http://www.imdalliance.org/file-formats/protocol-definitions/

[IMDA Metadata Guidelines]: describes the metadata discovery protocol working practice suggested by the IMDA, a copy of the guidelines is available on request.

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