MOTODEV

The Motorola developer network

MOTORAZR² V9

V 02.00

MEDIA GUIDE

MOTORAZR² V9 Media Guide

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1 Display

This chapter describes the display characteristics for the MOTORAZR² V9.

Figure 1: MOTORAZR² V9 Handset

Display Info

The physical internal display characteristics of the MOTORAZR² V9 are as follows:

Table 1 Display Information

Item	Description
Screen resolution	Internal: 320 x 240 External: 320 x 240
Screen dimensions	Internal: 2.2 inches External: 2.0 inches
Color depth	16 bits
Maximum Colors	Internal: 64K External: 64K
Text area	Numeric

Figure 2: The MOTORAZR² V9 display

NOTE: Screen shot may not reflect actual display size.

2 Graphics and Video

This chapter describes the graphic environment available in the MOTORAZR² V9. It includes information on picture and animation formats, size restrictions, pre-defined media, and more. Use this chapter as a reference when creating pictures or animations that support your products.

In general, file size is limited by available memory. All media (wallpaper, screensavers, ring tones, and themes), whether pre-loaded on the device or downloaded by the user, share the same storage area. The available memory for downloaded files will vary based on the media pre-loaded into the device. This pre-loaded media will vary from region to region and from carrier to carrier. Motorola recommends keeping all media files as small as possible to ensure the consumer has the ability to download and use a variety of files to enhance the user experience.

Supported Picture Formats

The MOTORAZR² V9 supports the following graphic and animation formats:

Table 2 Graphic and animation formats

Type	Description
BMP	File writing format, where the information is recorded using "bitmap".
GIF 87a	Graphics Interchange Format, a standard file format for lossless compression of still images. It is used to display static images and is the preferred format for pictures.
GIF 89a	The GIF 89a standard is a superset of the GIF 87a specification. It allows a sequence of GIF images to be displayed in succession, thus generating an animation.
JPEG	Joint Photography Expert Group standard. JPEG is designed for compressing either full-color or gray-scale images of natural, real-world scenes, not line art or lettering.
PNG	Portable Network Graphics (PNG) format is intended to provide a portable, legally unencumbered, well-compressed, well-specified standard for lossless bit mapped image files.
WBMP	Wireless Bitmap format described in the WAP specifications. It is an optimized bitmap format intended for use in portable devices with smaller screens and limited display capabilities.
EMS BMP	Enhanced Messaging Service bitmap

Table 3 shows the maximum decode size and resolution for supported picture formats.

Table 3 Maximum decode size and resolution

Format	Maximum Decode Size
JPEG	Up UXGA 1200 x 1600 pixels
PNG	Up to VGA 640 x 480 pixels
BMP	
GIF 87a, 89a	
WBMP	QVGA 320 x 240 pixels
EMS BMP	

Video Playback

The MOTORAZR² V9 handset supports the following video formats.

Table 4 Video formats

Type	Description
MPEG-4	The MPEG-4 format provides standardized technological elements that enable interactive multimedia (video/audio), interactive graphics, and digital television. Codec support includes: • MPEG • H.263 Baseline
H.263	An International Telecommunication Union (ITU) standard for video compression.
RV8/RV9	Real Video format for Packet and Circuit Switched Streaming services and clip playback from local files.
WMV v7, 8 & 9	Windows Media Video is a generic name for the set of streaming video technologies developed. This format also supports WMV version 7 and 8.

NOTE: Maximum file sizes are determined by the handset's available memory

Table 5 shows the bit rate, frame size, and frame rate for all supported video playback formats.

Table 5 Bit rate, frame size and frame rate video playback supported

Format	Bit Rate (kbps)	Frame Size	Frame Rate (fps)
MPEG4	Up to 256	QCIF	25
H.263			
WMV v7, 8 & 9	Up to 128		15
Real Video 8, 9			

Table 6 shows the specifications for all supported audio + video playback formats.

Table 6 Audio + Video playback

Format	Total Bit Rate	Video			Audio		
		Size	Bit rate (kbps)	Frame Rate (fps)	Bit Rate (kbps)	Sampling Rate (KHz)	Stereo/Mono
MPEG4 + AMR-NB	Up to 256 kbps	QCIF	Up to 243	25	Up to 12.2	8	Mono
MPEG4 + AMR-WB			Up to 232		Up to 23.85	16	
MPEG4 + AAC / AAC+ / Enhanced AAC+			Up to 224		Up to 128	Up to 44.1 kHz	Stereo/Mono
H.263 + AMR-NB			Up to 243		Up to 12.2	8	Mono
H.263 + AMR-WB			Up to 232		Up to 23.85	16	
H.263 + AAC / AAC+ / Enhanced AAC+			Up to 224		Up to 128 kbps	Up to 44.1	Stereo/Mono
WMV + WMA	Up to 128 kbps		Up to 108	15	Up to 96		
Real Audio + Video			Up to 96				

Table 7 shows the bit rate, frame size, frame rate, and extension for supported video streaming formats.

Table 7 Video streaming

Format	Bit Rate (kbps)	Frame Size	Frame Rate (fps)	Extension
MPEG4	Up to 128 kbps	QCIF	15 fps	.sdp .rts
H.263				
WMV v9 (also WMV v7, v8)				
Real Video 9 (also Real Video 8)				

Table 8 shows the specifications for all supported audio + video streaming formats.

Table 8 Audio + Video streaming

Format	Total Bit Rate (kbps)	Video			Audio		
		Size	Bit rate (kbps)	Frame Rate	Bit Rate (kbps)	Sampling Rate (KHz)	Stereo/Mono
MPEG4 / H.263 + AMR-NB	128 kbps	QCIF	Up to 115 kbps	15 fps	Up to 12.2 kbps	8 kHz	Mono
MPEG4 / H.263 + AMR-WB			Up to 104 kbps		Up to 23.85 kbps	16 kHz	
MPEG4 / H.263 + AAC / AAC+ / Enhanced AAC+			Up to 96 kbps		Up to 32 kbps	Up to 44.1 kHz	Stereo / Mono
WMV+WMA			Up to 112 kbps		Up to 48 kbps		
Real Audio + Video			Up to 96 kbps		Up to 32 kbps		

Table 9 shows the specifications for audio streaming.

Table 9 Audio streaming

Format	Audio		
	Bit Rate (kbps)	**Sampling Rate (KHz)**	**Stereo/Mono**
AMR-NB	4.75 kbps – 12.20 kbps (supports all 3GPP specified rates)	8 kHz	Mono
AMR-WB	6.6 kbps - 23.85 Kbps (supports all 3GPP specified rates)	16 kHz	
AAC	Up to 128 kbps	48 kHz	Stereo / Mono
AAC+	Up to 128 kbps (16 to 128 kbps)	Up to 48 kHz (16, 22.05, 24, 32, 44.1, 48 kHz)	
AAC+ Enhanced	Up to 128 kbps(16 to 128 kbps)	Up to 48 kHz(16, 22.05, 24, 32, 44.1, 48 kHz)	
WMA v9 (also WMA v3, v7, v8)	Up to 128 kbps	48 kHz	
Real Audio 8 Supports LBR (Cook) formats	Up to 96 kbps	44.1 kHz	
Real Audio Sipro (ACELP®.net)	5.0 Kbps (fixed rate)8.5/6.5 Kbps (dual rate)	8 kHz	Mono
	16 Kbps (wide-band)	16 kHz	

Media Capture (Video and Still Image)

Table 10 shows the video quality, bit rates, frame size, frame rate, and maximum durations for video capture.

Table 10 Maximum durations for video capture

Format	Video Quality	Profile, Level	Bit Rate (kbps)	Frame Size	Maximum Frame Rate	Maximum Capture Duration
MPEG4 or H.263	Low	MPEG 4 SVP, L0 H.263 Baseline, L10	64	QCIF	15 fps	1 hour
	Medium		96			
	High	MPEG 4 SVP, L2 H.263 Baseline, L20	128			

Table 11 shows the video quality, bit rates, frame size, frame rate, and maximum durations for video + audio capture.

Table 11 Maximum durations for video + audio capture

Format	Total Bit rate (kbps)	Video				Audio			Maximum Capture Duration
		Quality	Size	Bit rate (kbps)	Frame Rate	Bit Rate (kbps)	Sampling Rate	Stereo/ Mono	
MPEG4 or H.263 + AMR-NB	Up to 128	Low	QCIF	115	15 fps	12.2	8 kHz	Mono	1 hour
		Medium							
		High							
MPEG4 or H.263 + AMR-WB		Low		104		23.85	16 kHz		
		Medium							
		High							

Table 12 shows the still image capture resolution and size of the supported formats.

Table 12 Still image capture

Format	Resolution	Size	File Formats
JPEG	Large (UXGA 2.0 MP)	1200x1600 pixels	JFIF, EXIF
	Medium (1.3 MP)	1062x1280 pixels	
	Small (VGA)	480x640 pixels	
	X-Small (QVGA)	240x320 pixels	

MMS/SMS Support

The MOTORAZR² V9 MMS/SMS applications support use of the following image formats:

- JPEG
- BMP
- WBMP
- PNG
- GIF 87a, 89a
- Progressive JPG

The MOTORAZR² V9 supports use of the following audio formats:

- AMR-NB
- AAC (MPEG4 AAC-LC)
- AAC +
- Enhanced AAC+
- MP3
- MIDI 1, 2 & 3
- iMelody

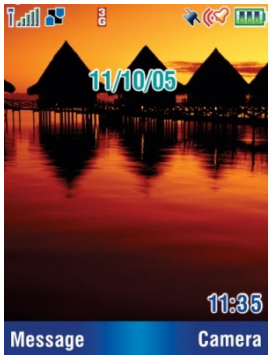
Wallpaper Support

Wallpaper images are static images that are shown on both the idle screen and the main menu screen. Wallpaper images can be tiled or centered as selected by the user; centered is the default setting.

Technical Specifications for Wallpapers:

- Dimensions: Internal & External: 320 X 240
- Colors: Internal & External: 64 K
- Recommended File Size: up to 15kb

Wallpaper images appear behind all screen elements on the idle screen and on the menu screen as shown in Figure 3.



Wallpaper images appear behind all screen elements on the idle screen.

Main menu screen.

Figure 3: How wallpaper is displayed on the idle screen and main menu screen

If the user has selected to tile the wallpaper, the image is tiled starting from the upper left hand corner of the working area. The image is tiled horizontally and vertically equal to the display size.

The user has the following options for wallpaper:

- **Center** – the image is resized to fit on the screen while keeping the aspect ratio.
- **Fit-to-screen** – the image is resized to fill the screen while keeping the original aspect ratio (refer to Figure 3).
- **Tile** – if the image is too large, it is resized to fit the display and tiled, if the image is too small, it tiles as displayed.

If the user selects an animated GIF image, the first frame of the animated GIF becomes the wallpaper image. It's important that the colors of the wallpaper image allow the text displayed on the screen to remain legible.

3 Sound

This chapter describes the sound environment available in the MOTORAZR² V9 handset. It includes information on sound formats and more. Use this chapter as a reference when creating sounds for your products.

In general, file size is limited by available memory. The available memory for downloaded files will vary based on the media that is pre-loaded into the device. This pre-loaded media varies by region and carrier. We recommend keeping all media files as small as possible to ensure the consumer has the ability to download and use a variety of files to enhance the user experience.

Alert Tone Support

Downloaded audio files can be applied to a number of alert tones on the device including ringtones for incoming calls, Text Message, and Date Book Alarms.

Ring Tones

Ring tones should not exceed 30 seconds because most voice mail systems pick up after four rings (16-25 seconds depending on the system).

Supported Sound Formats

The MOTORAZR² V9 supports the sound formats shown in the following table.

Table 13 Sound formats

Type	Description
AAC	Short for Advanced Audio Encoding (.aac, .adcs, .adif), one of the audio compression formats defined in the MPEG-2 standard. AAC boosts higher quality audio reproduction than MP3 and requires 30% less data to do so.
AMR-NB	Adaptive Multi Rate offers a wide range of data rates. The philosophy behind AMR is to lower the data rate as the interference increases to enable better error correction.
GSM Full Rate	Format for speech coding used in most GSM networks. The GSM full rate requires one full rate traffic channel to carry its data. The compression involves mapping input blocks of 160 speech samples to encoded blocks of 260 bits.
iMelody	iMelody is the Infrared Data Association (IrDA) standard for the textual representation of a ring tone that can be used to transfer melodies between devices.
MIDI	The MOTORAZR² V9 handset is MIDI 1.0 compliant (.mid, .midi, .mmf, .smf), and supports any data format described in *The Complete MIDI 1.0 Detailed Specification*, including: - MIDI, Type 0 - MIDI, Type 1 Scalable Polyphonic MIDI (SP-MIDI)
MP3	The MP3 format (.mp3) provides the coding of audio for digital storage.
Real Audio	Real Audio (.ra, .rm) is a compressed format suitable for streaming over the internet.
WAV	Format for storing files (.wav). Linear pcm 8-bit and 16-bit, CCITT A-law and U-law.
XMF	Mobile XMF-MIDI: XMF (eXtensible Music Format) is an open standard file format that renders a MIDI note-based piece with consistent audio playback across all players and platforms. It gathers all media assets and their associated links, into a single file. It is suited for interactivity, content protection, meta-data, and the Internet.

Table 14 shows the bit rate, sampling rate, and stereo/mono capabilities for each supported format.

Table 14 Bit rate, sampling rate and stereo/mono capabilities (sound formats)

Format	Bit Rate (kbps)	Sampling Rate (kHz)	Stereo/Mono
AMR-NB	4.75 kbps – 12.20 (supports all 3GPP specified rates)	8	Mono
AMR-WB	6.6 kbps - 23.85 Kbps (supports all 3GPP specified rates)	16	Mono
AAC (MPEG4 AAC-LC)	Up to 256	48	Stereo/Mono
AAC+	Up to 128 (16 to 128)	Up to 48 (16, 22.05, 24, 32, 44.1, 48)	
Enhanced AAC+			Stereo
MP3	Up to 256	48	Stereo/Mono
8-bit Linear PCM	64	8	Mono
16-bit Linear PCM	128		
8-bit A-law PCM	64		
8-bit mu-law PCM			
GSM Full Rate	12.20	8	Mono
WMA v9 L2 (also WMA v3, v7, v8)	Up to 160	48 kHz	Stereo/Mono
Real Audio 8 Supports LBR (Cook) formats	Up to 96	Up to 44.1 kHz	Stereo/Mono
Real Audio Sipro (ACELP®.net)	5.0 (fixed rate)	8	Mono
	8.5/6.5 (dual rate)		
	16 (wide-band)	16	

Table 15 shows the bit rate, sampling rate, stereo/mono, and extension for supported streaming audio formats.

Table 15 Bit rate, sampling rate, stereo/mono streaming

Format	Bit Rate (kbps)	Sampling Rate (kHz)	Stereo/Mono	Extension
AMR-NB	4.75 kbps – 12.20 kbps (supports all 3GPP specified rates)	8	Mono	.sdp .rts
AMR-WB	6.6 kbps - 23.85 Kbps (supports all 3GPP specified rates)	16		
AAC	Up to 128	48	Stereo/Mono	
AAC+	Up to 128 (16 to 128)	Up to 48 (16, 22.05, 24, 32, 44.1, 48)		
AAC+ Enhanced				
WMA v9 (also WMA v3, v7, v8)	Up to 128	48		
Real Audio 8 Supports LBR (Cook) formats.	Up to 96	44.1		
Real Audio Sipro (ACELP®.net)	5.0 Kbps (fixed rate)	8	Mono	
	8.5/6.5 Kbps (dual rate)			
	16 Kbps (wide-band)	16		

MIDI Support

The Musical Instrument Digital Interface (MIDI) enables consumers to use multimedia computers and electronic musical instruments to create, enjoy and learn about music.

The MIDI protocol is a music description language in which every word describes an action of musical performance. Each action is stored as a binary word and when combined, stored as MIDI files. These files can then be replayed by any electronic device that can read the MIDI file and recreate the performance using its available sound system.

Technical Specifications for MIDI:

- Recommended File Size: No limitation
- MIDI Instruments: 128
- Maximum Polyphony: 64 Channels
- Minimum Duration per note: 10ms
- Maximum Duration: No limitation

Table 16 MIDI Format Specification

Format	File Type	Polyphony Channels	Instruments (Gen. MIDI Level 1)
Standard MIDI	Type 0	64	128 Melodic, 47 Percussion
	Type 1		
	SP		
Mobile XMF MIDI	Type 0		
	Type 1		
	Type 2 (Mobile DLS)		

MIDI Key Mapping

The MOTORAZR² V9 supports all 128 general MIDI instruments and the standard drum kit, but due to frequency limitations, not all MIDI notes are supported for all patches.

Table 17 MIDI Key Mapping

Patch Number	Patch Names	Valid MIDI Note Numbers
0	Acoustic Grand Piano	21-108
1	Bright Acoustic Piano	21-108
2	Electric Grand Piano	22-108
3	Honky-tonk Piano	21-108
4	Electric Piano 1	21-108
5	Electric Piano 2	24-103
6	Harpsichord	24-89
7	Clavinet	24-96
8	Celesta	48-108
9	Glockenspiel	65-108
10	Music Box	48-84
11	Vibraphone	48-96
12	Marimba	48-97
13	Xylophone	48-108
14	Tubular Bells	48-96
15	Dulcimer	48-96
16	Drawbar Organ	24-96
17	Percussive Organ	24-96
18	Rock Organ	24-96
19	Church Organ	21-96
20	Reed Organ	24-96
21	Accordion	48-89
22	Harmonica	48-84

23	Tango Accordion	48-89
24	Acoustic Guitar (nylon)	36-84
25	Acoustic Guitar (steel)	36-84
26	Electric Guitar (jazz)	36-86
27	Electric Guitar (clean)	36-86
28	Electric Guitar (muted)	36-86
29	Overdriven Guitar	36-96
30	Distortion Guitar	36-96
31	Guitar Harmonics	36-96
32	Acoustic Bass	24-72
33	Electric Bass (finger)	24-72
34	Electric Bass (pick)	24-72
35	Fretless Bass	24-72
36	Slap Bass 1	24-72
37	Slap Bass 2	24-72
38	Synth Bass 1	24-96
39	Synth Bass 2	24-96
40	Violin	48-96
41	Viola	48-96
42	Cello	36-96
43	Contrabass	24-96
44	Tremolo Strings	24-96
45	Pizzicato Strings	24-96
46	Orchestral Harp	21-103
47	Timpani	36-84

48	String Ensemble 1	24-96
49	String Ensemble 2	24-96
50	Synth Strings 1	24-96
51	Synth Strings 2	24-96
52	Choir Aahs	36-96
53	Voice Oohs	36-96
54	Synth Voice	36-96
55	Orchestra Hit	36-72
56	Trumpet	36-96
57	Trombone	36-96
58	Tuba	24-72
59	Muted Trumpet	48-84
60	French Horn	36-96
61	Brass Section	24-96
62	Synth Brass 1	24-96
63	Synth Brass 2	24-96
64	Soprano Sax	48-89
65	Alto Sax	48-84
66	Tenor Sax	36-84
67	Baritone Sax	24-84
68	Oboe	48-96
69	English Horn	48-96
70	Bassoon	24-84
71	Clarinet	48-96
72	Piccolo	60-108

73	Flute	48-96
74	Recorder	60-96
75	Pan Flute	48-96
76	Blown Bottle	48-96
77	Shakuhachi	48-96
78	Whistle	48-91
79	Ocarina	60-96
80	Lead 1 (square)	24-96
81	Lead 2 (sawtooth)	24-96
82	Lead 3 (calliope)	36-96
83	Lead 4 (chiff)	36-96
84	Lead 5 (charang)	36-96
85	Lead 6 (voice)	36-96
86	Lead 7 (fifths)	36-96
87	Lead 8 (bass+lead	24-96
88	Pad 1 (new age)	36-96
89	Pad 2 (warm)	36-96
90	Pad 3 (polysynth)	36-96
91	Pad 4 (choir)	36-96
92	Pad 5 (bowed)	36-96
93	Pad 6 (metallic)	36-96
94	Pad 7 (halo)	36-96
95	Pad 8 (sweep)	36-96
96	FX 1 (rain)	36-96
97	FX 2 (soundtrack)	36-96

98	FX 3 (crystal)	36-108
99	FX 4 (atmosphere)	36-96
100	FX 5 (brightness)	36-96
101	FX 6 (goblins)	36-96
102	FX 7 (echoes)	36-96
103	FX 8 (sci-fi)	36-96
104	Sitar	48-77
105	Banjo	48-84
106	Shamisen	48-79
107	Koto	48-96
108	Kalimba	48-96
109	Bagpipe	36-77
110	Fiddle	48-96
111	Shanai	48-96
112	Tinkle Bell	60-96
113	Agogo	48-72
114	Steel Drums	48-88
115	Woodblock	48-72
116	Tailo Drum	48-72
117	Melodic Drum	36-84
118	Synth Drum	36-84
119	Reverse Cymbal	48-72
120	Guitar Fret Noise	48-72
121	Breath Noise	48-72
122	Seashore	48-72

123	Bird Tweet	48-72
124	Telephone Ring	48-72
125	Helicopter	48-72
126	Applause	48-72
127	Gunshot	48-72
none	Drums	35-81

MIDI Audio Guidelines

The following are suggested guidelines to maximize sound quality while reducing the overall file size of a MIDI Ring Tone file for use with the MOTORAZR² V9.

Tip 1: Use MIDI's running status feature

In the MIDI standard, a key-on or a key-off event uses, at most, three bytes each. However, when several key events occur on the same MIDI-channel, the running status feature can be used. In principle, running status means the first byte of a key-on event is omitted. In addition, the key-on event having a velocity of zero is equivalent to the key-off event. Thus, combining running status with key-on events that have zero velocity reduces the number of bytes needed to encode all key events.

EXAMPLE:

Without using the running status feature, the following sequence:

```
91 2E 23 8E, 91 2B 50 8E, 81 2E 64 00, 81 2B 64 00
```

represents "Key 2E ON" Velocity 23 MIDI Ch 1", "Key 2B ON Velocity 50 MIDI Ch 1", "Key 2E OFF Velocity 64 MIDI Ch 1", "Key 2B OFF Velocity 64 MIDI Ch 1". Using the running status feature reduces the sequence to:

```
91 2E 23 8E, 2B 50 8E, 2E 00 00, 2B 00 00,
```

That is, the command byte is omitted and velocity zero is used for key off.

Tip 2: Use Standard MIDI File (SMF) type 1

The MIDI content can be stored in a Standard MIDI File (SMF) of type 0 or type 1. In a type 0 SMF, the file format uses one header chunk with one-track chunk. In a type 1 SMF, the format uses one header chunk with several track chunks. SMF type 2 should not be used.

In general, it is more efficient to store the MIDI data as a type 1 file. The increased efficiency is achieved because each track contains only one MIDI channel and one instrument, as is often the case. The running status feature can be applied on each individual track, thereby reducing the track size. To reduce the size of the file even further, use one track for each MIDI channel. That is, if a temple/conductor track exists, merge it with the first instrument track and remove all unnecessary meta-events such as the "track name" and "lyric" meta-events.

To summarize, the following measures can be taken in order to reduce the SMF:

1. Use SMF type 1 (Or verify that a type 1 file is smaller than a type 0 file and use the smallest file).
2. Use running status.
3. One and only one instrument per track. Try not to change channels.
4. Do not change tempo in the middle of the music. That is, set the tempo once.
5. Use beat, instead of SMPTE, to set the tempo.
6. Do not use Copyright Text Fields.
7. Limit the use of continuous controller information such as pitch-bend and volume.
8. Turn off the options below:
    - Sequence Number - MIDI sequence ids
    - Text - embedded text for any optional fields
    - Sequence / Track Name
    - Instrument Name
    - Lyric
    - Marker - for synchronization purposes
    - Cue Point
    - Midi Channel Presix - associate channels with all events following
    - Sequencer-Specific settings

Items one through three above optimize the encoding of the notes, while items four to eight optimize the overall melody. The above measures provide an SMF file that is ready-made for compression. However, prior to compression, the composer/content author can add a few values for key velocity, thereby increasing the redundancy of the file.

Tip 3: Consider the Frequency Response

Even though the MIDI synthesizer is sampled at 22 KHz, the polyphonic speaker's frequency response is not as wide. Try to keep the majority of melodic information below 6000 Hz.

NOTE: The use of MIDI notes below 800 Hz may cause a decrease in volume when playing the note. Always test your audio on an actual device to ensure the accuracy of the sound you want to produce.

MP3 Audio Guidelines

MP3 (MPEG Audio Layer 3) is an audio compression technology that is part of the MPEG-1 and MPEG-2 specifications. Developed in Germany in 1991 by the Fraunhofer Institute, MP3 uses perceptual audio coding to compress CD-quality sound by a factor of 12, while providing almost the same fidelity. Because MP3 audio is digitized, not synthesized, reproduction (disregarding speaker quality) is identical on all devices. Therefore MP3 ring tones provide a near-CD quality audio experience for listeners as opposed to their MIDI counterparts which differ greatly from device to device.

The following recommendations should be used when designing MP3 audio clips for use in the phone.

Technical Specifications for MP3

- Sample Rates: 48 kHz
- Recommended Bit Rate: 64 or 40 kbps
- Recommended file size: No limitation

Available Sound Properties

Follow technical specifications outlined above.

Design Guidelines

Since ring tones need to be at a consistent audible level, compressing the original content to reduce the peak-to-average ratio is necessary. After the audio is compressed it is advisable to re-normalize the audio to 0db before saving the compressed MP3 file.

NOTE: Ring tones are generally between 15-20 seconds in length. Based on the recommended bit rates, that duration would yield a file size of 75-150K per ring tone. It is advisable to keep file size less than 100K to allow the end-user to download multiple tones, but file size is limited only by the total free memory available on the device.

Appendix A DRM

Digital Rights Management

Digital Rights Management (DRM) is a method of protecting content from illegal distribution by embedding the content into an encrypted package along with rules dictating its use. Using a set of keys and a license for the specific file, a DRM application is required to decrypt the content for playback. The DRM application will be transparent to the user except for the cases where the user acquires a file without a proper license. Applications that will interact with DRM encoded files include the following:

- Media Center
- MMS
- EMS
- Browser
- Email
- KJava

For more information, refer to the following references found at http://www.openmobilealliance.org :

- OMA-Download-DRM-v1_0-20020905-C
- OMA-Download-DRMREL-v1_0-20030801-C
- OMA-Download-DRMCF-v1_0-20030801-C

Supported DRM Solutions

The following three DRM solutions are supported by Motorola handsets.

- Forward Locking – Forward locking construct defined by the OMA DRM specification. Similar to NDIS implementation in MMS/EMS.
- Combined Delivery – The OMA Combined Delivery mechanism is an extension of OMA forward locking. The Combined Delivery mechanism differs by including a rights object within the DRM message which governs the consumption of the content included along with the rights object. A handset that supports Combined Delivery will support OMA forward locking.
- Separate Delivery – The OMA Separate Delivery mechanism is an extension of OMA Forward locking. The Separate Delivery mechanism differs by delivering the content and the rights object separately. The MOTORAZR² V9 supports retrieving rights via WAP Push and via HTTP response.

Download

Forward Lock files are downloaded within a DRM message. The download manager recognizes the DRM message of MIME type 'application/ vnd.oma.drm.message' as a valid file type.

The download manager will discard any DRM message that contains more than one media object within the DRM message.

OMA Combined Delivery is downloaded within a DRM message and consists of a media object and a rights object. The download manager recognizes the DRM message MIME type and the MIME type 'application/vnd.oma.drm.rights+xml' as a valid file type. A single media object in the body of the DRM message, that is encoded in the following identity transfer encoding '7bit', '8 bit', and 'binary,' will be accepted by the download manager.

Installation

Forward Lock

After the download of a DRM message has been completed, the download manager strips out the media object that is encapsulated within the DRM message prior to dispatching the object for preview. The MIME type associated with the encapsulated media object is used to verify that the OMA download descriptor 'type' meta data field matches the MIME type of the media object within the DRM message.

Once the media object has been extracted from the DRM message, the original DRM message can be discarded. Along with passing the media object to the content dispatcher for preview, the download manager shall indicate to the content dispatcher that the media object is 'forward locked'.

The mechanism for indicating a 'forward locked' status is to set the NDIS bit for the file within the file system.

Combined Delivery

After the download of a DRM message has been completed, the handset strips out the media object and the rights object that are encapsulated within the DRM message prior to dispatching the object for preview. If the DRM message is received without a descriptor file, the MIME type associated with the encapsulated media object isused to verify that the OMA download descriptor 'type' meta data field matches the MIME type of the media object within the DRM message.

Once the media object has been extracted from the DRM message, the original DRM message can be discarded. Along with passing the media object to the content dispatcher for preview, the handset indicates to the content dispatcher that the media object is 'forward locked'.

- If the user selects to store the content from the preview, then the media is stored in the appropriate file directory and is marked as 'forward-locked' using the NDIS bit. The rights object is stored in a protected portion of the file system. Rights objects are NEVER to be forwarded. Association between the rights object and the media MUST be maintained while stored in the file system.

Separate Delivery

In the Separate Delivery method the media object is always encrypted and converted into the DCF format. Typically, the DCF object is downloaded to the device using OMA download, after which the rights object is separately delivered to the device using WAP Push. The service is expected to indicate this special behavior to the device by using the mechanism defined in the Digital Rights Management Media Types (Rights, DRM Content Format and DRM Message). After receiving the pushed rights objects, the device renders the media object.

The device is also allowed to forward the DCF file to another device. However, rights objects are not allowed to be forwarded with the DCF. This means the receiving device must acquire rights for the media object from the rights issuing service.

Right Object

Forward Lock files do not have Right Objects associated with the content. The user has unlimited usage. The handset marks the file as "do not forward" and the user isable to consume the content as a normal file. The only limitation is that the handset does not allow the user to send the file via any transfer method.

In the case of Combined Delivery there is a Right Object associated with the content. The Right Object is stored in a secure area and the user does not have access to it. The handset does not allow the user to send the object via any delivery method. The Right Object defines the constraints for content usage. This Right Object can have count, time, date, or interval constraints. The application checks the Right Object before consuming the content.

Content downloaded using the OMA Separate Delivery format has been converted from plain text format into DRM content format (DCF). This conversion includes symmetric encryption of the content making the DRM protected content object useless to parties not having access to the Content Encryption Key (CEK). The CEK is contained within a rights object which is delivered independently of the DCF containing the media. The DCF file can be distributed as much as desired, yet it remains protected as the rights object is forward-locked. This is the basis for the superdistribution model. Typically, the DCF object is downloaded using the browser, after which the rights object is separately delivered to the device using WAP push.

File Types

DRM solutions apply to all file formats. The OMA DRM solution is content agnostic and can be used for any type of content that the handset supports. Individual files are handled in the same manner as a DRM file would be handled. Files downloaded using OMA Combined Delivery are downloaded within a DRM message and consist of a media object and a rights object. The download manager recognizes the DRM message MIME type and the MIME type 'application/vnd.oma.drm.rights+xml' as a valid file type. A single media object in the body of the DRM message that is encoded in the following identity transfer encoding '7bit', '8 bit', and 'binary' is accepted by the download manager.

Appendix B MIME Types

This appendix provides a list of common MIME types used on various Motorola handsets. The list is sorted by category and provides file type descriptions, as well as the MIME types used to download different media files.

NOTE: The file and MIME types shown below are not supported by all Motorola handsets. Refer to the media guide for a particular handset to determine what file types are supported.

Table 18 MIME Types

File type	Suffix	Mimetype
Gif	.gif	image/gif
Jpeg	.jpg, .jpeg	image/jpeg
bmp	.bmp	image/bmp
ems bmp	.ems	Image/ems.userdefined.picture Image/ems.userdefined.animation Image/ems.predefined.animation
wbmp	.wbmp	image/vnd.wap.wbmp
Png	.png	image/png
aac	.mp4	audio/mp4
	.3ga	audio/3gpp
aac (mpeg4 aac-lc) aac+ Enhanced aac+	.mp4 .3ga .m4a	audio/mp4 audio/3gpp audio/m4a
		audio/x-midi
Mp3	.mp3	audio/mp3
		audio/x-mp3
		audio/mpeg3
		audio/x-mpeg3
wav	.wav	audio/wav
		audio/x-wav
amr,	amr	audio/amr
amr-nb, amr-wb	.mpg4, .3ga	audio/mp4, audio/3gpp, audio/amr-wb
xmf, midi	.xmf, .midi, .mid	audio/midi, audio/mid, audio/x-mid, audio/x-midi, audio/xmf, audio/sp-midi, audio/mxmf, audio/xmf0, audio/xmf1
iMelody	.imy	audio/imelody

3gp		video/3gpp
	.3ga	audio/3gpp
mp4	.mp4	video/mp4
		audio/mp4
		video/mp4v-es
mpeg4	.mp4, .3gp	video/mp4, video/3gpp
		video/mpeg4
		video/mp4v-es
rm	.rm, .ram	video/vnd.rn-realvideo
		audio/x-pn-realaudio
		application/vnd.rn-realmeida.
h.263	.mp4, .3gp	video/mp4, video/3gpp
mpeg4 + amr-nb, mpeg4	.mp4, .3gp	video/mp4, video/3gpp
mpeg4 + aac	.mp4, .3gp	video/mp4, video/3gpp
h.263 + amr-nb, h.263	.mp4, .3gp	video/mp4, video/3gpp
h.263 + aac	.mp4, .3gp	video/mp4, video/3gpp
Real Audio LBR (Cook)	.rm, .ra	Audio/x-pn-realaudio Audio/vnd.rn-realaudio
Real Audio Sipro (ACELP®.net)		
Real Audio 10		

NOTE: Tone Sequence as defined in JSR-135 is equal to the following: audio/x-tone-seq Different strings in the same group are synonyms and are equally applicable for the corresponding media type.

Please note the following when mapping MIME types to a server:

- A MIME type can be mapped to zero or more file extensions
- Extension mapping is cas7e insensitive

For information on configuring servers to deploy programs or files over-the-air, or to determine which MIME types are supported by a particular handset, download the Basic Over-the-Air Server Configuration whitepaper from the MOTODEV website (http://developer.motorola.com).

Appendix CAdditional Information

Glossary

AMR	Adaptive Multi Rate
EMS	Enhanced Messaging Service
GIF	Graphics Interchange Format
iMelody	Infrared Data Association (IrDA) standard for the textual representation of a ring tone.
MIDI	Musical Instrument Digital Interface
MIDI Patch	One of the channels in a MIDI device, defined by the general MIDI standard
MPEG	Moving Pictures Experts Group
Pixel	One picture element on the display
QCIF	Quarter Common Intermediate Format
WAP	Wireless Application Protocol
WBMP	Wireless Bitmap

References

3GPP	http://www.3gpp.org
Infrared Data Association	http://www.irda.org
MIDI Manufacturers Association	http://www.midi.org
Motorola Developer Program	http://developer.motorola.com
Moving Pictures Experts Group	http://www.chiariglione.org/mpeg/
WAP Forum	http://www.wapforum.org
World Wide Web Consortium	http://www.w3.org

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