at9tool User's Guide

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1 Overview

Purpose and Characteristics

at9tool is an encoding/decoding tool for ATRAC9™ including ATRAC9™ Band Extension (shortened to "ATRAC9™" hereafter except under special conditions).

This tool is a console program that runs on Windows and encodes Riff-Wave format Linear PCM (LPCM) data into ATRAC9™ data that can be used by applications. Loops can be set at the sample level in up to two locations in each data file when encoding.

This tool is also able to decode ATRAC9™ data into LPCM data. By using this feature, it will be possible to evaluate the quality of encoded sound data, therefore this tool can be used for narrowing down problems with playback programs and sound data.

> **Note**
> Note that ATRAC9™ Band Extension is not supported in PlayStation®Vita, so do not use it in audio data for PlayStation®Vita.

Files

The following files are required when using at9tool.

File	Description
at9tool.exe	Program file

Reference Materials

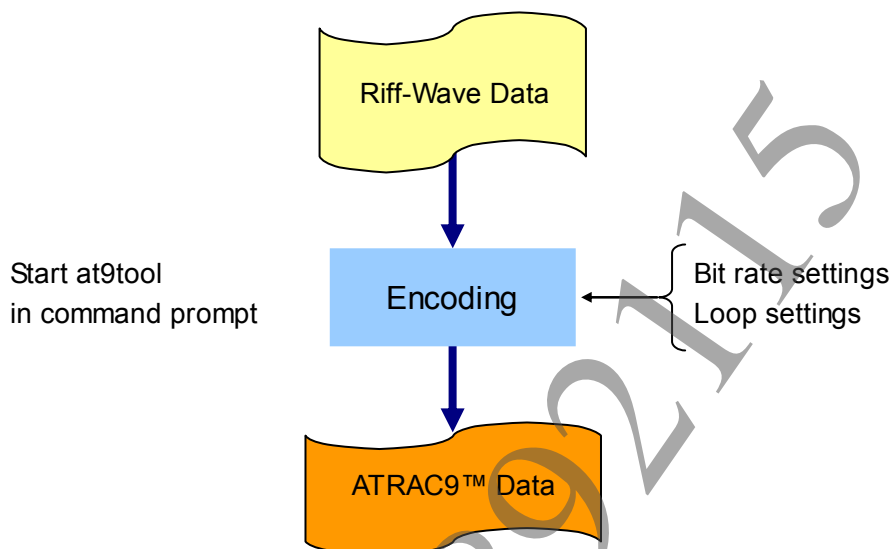For details on the ATRAC9™ file format, refer to the following document.

- ATRAC9™ File Format

2 Encoding

Encoding Instructions

Riff-Wave data can be encoded using at9tool to obtain ATRAC9™ data as follows.

Figure 1   Creating ATRAC9™ Data

(1)   Open a command prompt

Select "Start" > "All Programs" > "Accessories" > "Command Prompt" to open a command prompt.

(2)   Execute at9tool

Enter the following command to execute at9tool. Specify the filename of the source Riff-Wave data and the output filename as parameters.

Command syntax

```
at9tool -e [options] srcfilename outputfilename
```

Options

The following options are available in encoding.

Option	Description
-br N	Specify bit rate (kbps). One of the following values can be specified for N: 36, 48, 60, 72, 84, 96, 120, 144, 168, 192, 240, 288, 300, 336, 360, 420, 504. When not specifying this option, use "Table 6 Default Bit Rate" to perform encoding. When encoding is performed with a low value set, it will be possible to reduce the size of the ATRAC9™ data in the encoding results.
-loop S E	Loop settings. Specify the starting position of the loop to S and the ending position to E in sample units.
-wholeloop	Specify all data as a loop.

Option	Description
-supframeon	Encode in superframe mode (default). For details on the effects of this option, refer to the "Effects of the Superframe Encoding Option (-supframeon)" section.
-supframeoff	Do not encode in superframe mode.
-dual	Encode as dual mono. This option is only valid for 2-ch data.
-fs *N*	Specify output sampling rate (Hz). One of the following values can be specified for *N*: 12000, 24000, 48000 (default value is 48000). When encoding is performed with a low value set, it will be possible to reduce the size of PCM data in the decoding output results. For details on the effects of this option, refer to the "Effects of the Output Sampling Rate Option (-fs)" section.
-nbands *N*	Specify encode band. The values that can be specified vary according to the output sampling rate as follows. - A value from 3 to 8 for 12000 Hz - A value from 3 to 12 for 24000 Hz - A value from 3 to 18 for 48000 Hz When not specifying this option, use "Table 4 Default Encode Bands" to perform encoding.
-isband *N*	Specify intensity stereo start band. One of the following values can be specified: -1, 3 to 18. However, specifying a band surpassing the encode band will result in an error. When -1 is specified, the intensity stereo feature is disabled. For details on the effects of this option, refer to the "Effects of the Intensity Stereo Start Band Option (-isband)" section.
-gradmode *N*	Specify the encode mode (quantization noise gradient). A value between 0 and 4 can be specified. If 4 is specified, 0 - 3 will be automatically selected. Specifying low values is desirable for audio sources with high tonality, and specifying high values is desirable for audio sources with high noise.
-wband	Set the default encode band to a high level and perform band priority encoding. However, if -nbands is specified and a band other than one from "Table 4 Default Encode Bands" is specified, that band will take priority.
-bex	Specify ATRAC9™ Band Extension (off by default). However, this option has the following restrictions. - An error will occur when used with band priority encoding (-wband). - An error will occur when a value other than 5 to 10 is specified for the encode band (-nbands). For details on restrictions for the output sampling rates, channels and bit rates, refer to the information in the "Input Data Specifications" section. For details on ATRAC9™ Band Extension, refer to the "ATRAC9™ File Format" document.
-looplist *filename*	Specify loop settings with a text file. To *filename*, specify the text filename containing loop settings. For loop settings examples and file formatting, refer to the "Encoding Example" section.

Option	Description
-defaultWL	Specify all data as a loop when there is no loop information in the Riff-Wave data. This option will be disabled when it is used at the same time with -loop, -wholeloop, and/or -looplist option; the -loop, -wholeloop, and/or -looplist option will take priority.
-slc	Cut extremely low frequency component of LFE. This option is only valid for 5.1-ch and 7.1-ch data.

Notes on the -br option

By encoding with low bit rates set, it will be possible to reduce the size of the ATRAC9™ data in encoding output, but for extremely low bit rates, the shortage of bits required for encoding may cause the encoding to fail, in which case the following error codes will be displayed in the command prompt.

```
API Err Code        = 515
Detail Err Code     = 802
Internal Err Code   = 900
```

In this case, the bit rate must be increased and re-encoding is required.

Notes on the -loop option

A maximum of two loop settings may be set.

Note that for the ending position of the loop, the last sample of the repeated part must be specified. Also, S and E must be specified to satisfy the following equation.

```
0 <= S <= E < MaxSample (MaxSample is the total number of samples of the source
file)
```

If MaxSample-1 is specified to E, the playback will loop back to the position specified with S when played all the way through. If a value smaller than MaxSample-1 is specified to E, there will be an epilogue after the loop. In either case, the number of times to repeat the loop is to be specified at playback.

1 sample is the minimum number for a loop range, however, it is recommended to specify and encode a loop range of 3072 samples or more.

Figure 2   Loop Settings
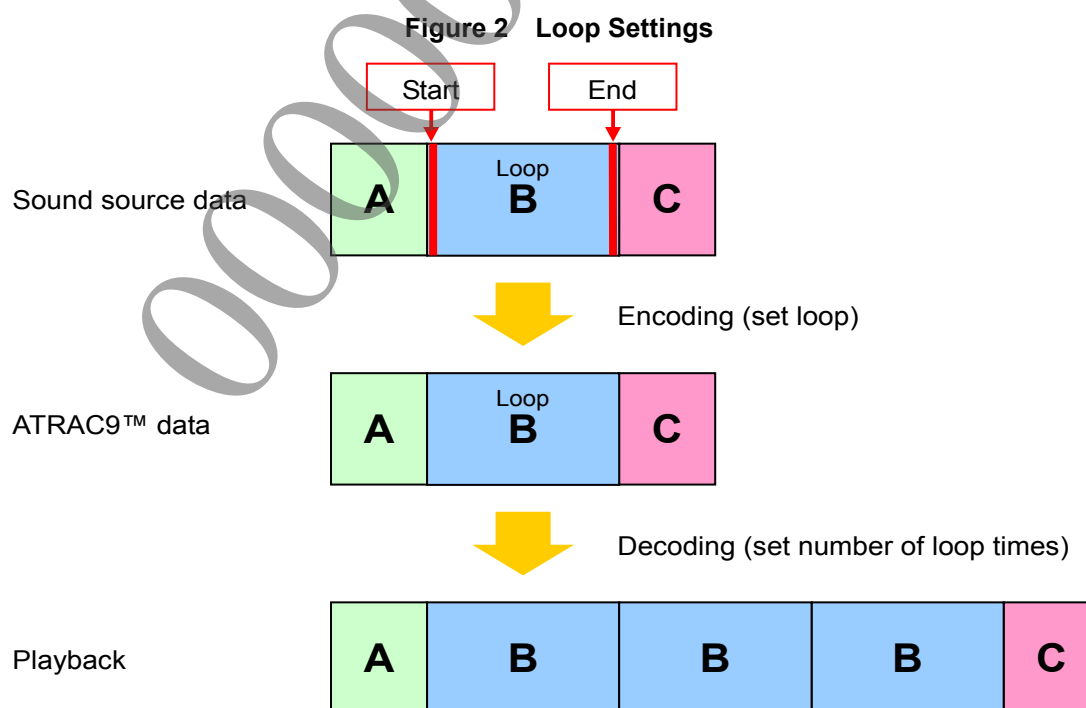
Encoding Example

The following command is an example encoding a sample.wav file (stereo, 9872 total samples) at 120 kbps. The result will be output as sample1.at9.

```
> at9tool.exe –e –br 120 sample.wav sample1.at9
Encoding 120 kbps (ATRAC9)
Total Encoded Bytes   =   3200 Bytes@10frames(ave=320bytes)
```

The following command is an example where sample.wav is encoded as in the previous example, and a loop is set so that samples from the 11th sample (counting from the start) to the end are repeated. The result will be output as sample2.at9.

```
> at9tool.exe –e –br 120 –loop 10 9871 sample.wav sample2.at9
Encoding 120 kbps (ATRAC9)
Loop Position = [10, 9871]
Total Encoded Bytes   =   3200 Bytes@10frames(ave=320bytes)
```

The following command is an example where sample.wav is encoded as in the previous examples, loops are set so that the samples from the 513rd sample (counting from the start) to the 3585th sample (counting from the start) and the 4609th sample (counting from the start) to the end are repeated.

```
> at9tool.exe –e –br 120 –loop 512 3584 –loop 4608 9871 sample.wav sample3.at9
Encoding 120 kbps (ATRAC9)
Loop Position = [512, 3584] [4608, 9871]
Total Encoded Bytes   =   3200 Bytes@10frames(ave=320bytes)
```

The following is an example of setting the same content as above using the –looplist option.

```
> at9tool.exe –e –br 120 -looplist option.txt sample.wav sample4.at9
Encoding 120 kbps (ATRAC9)
Loop Position = [512, 3584] [4608, 9871]
Total Encoded Bytes   =   3200 Bytes@10frames(ave=320bytes)
```

option.txt

```
-loop  512 3584
-loop  4608 9871
```

Input Data Specifications

at9tool is able to encode Riff-Wave data with the following specifications.

Number of Channels

1ch, 2ch, multi-channel (4.0ch, 5.1ch, 7.1ch) are supported.

However, ATRAC9™ Band Extension only supports 1 ch and 2 ch.

Note
LFE encoding for 5.1ch and 7.1ch uses special encode processing that assumes LFE data input. Therefore, there is a possibility that LFE may not be properly encoded if data that includes high frequencies in the LFE is set.

Bit Rate

The supported bit rates depend on the number of channels used, as shown in Table 1.

Table 1   Bit Rates Supported by at9tool

Format	Bit Rate	1ch	2ch	4.0ch	5.1ch	7.1ch
ATRAC9™ other than ATRAC9™ Band Extension	36 kbps	Yes	No	No	No	No
	48 kbps	Yes	No	No	No	No
	60 kbps	Yes	No	No	No	No
	72 kbps	Yes	Yes	No	No	No
	84 kbps	Yes	No	No	No	No
	96 kbps	Yes	Yes	No	No	No
	120 kbps	No	Yes	No	No	No
	144 kbps	No	Yes	No	No	No
	168 kbps	No	Yes	No	No	No
	192 kbps	No	Yes	Yes	No	No
	240 kbps	No	No	Yes	Yes	No
	288 kbps	No	No	Yes	No	No
	300 kbps	No	No	No	Yes	No
	336 kbps	No	No	No	No	Yes
	360 kbps	No	No	No	Yes	No
	420 kbps	No	No	No	No	Yes
	504 kbps	No	No	No	No	Yes
ATRAC9™ Band Extension	36 kbps	Yes	No	No	No	No
	48 kbps	Yes	No	No	No	No
	60 kbps	Yes	No	No	No	No
	72 kbps	Yes	Yes	No	No	No
	96 kbps	No	Yes	No	No	No
	120 kbps	No	Yes	No	No	No
	144 kbps	No	Yes	No	No	No

Number of Sample Bits

16bits/sample, 24bits/sample, and 32bits/sample are supported.

However, 16bits/sample and 24bits/sample respectively support 16bit and 24bit Integer PCM formats, and 32bits/sample supports IEEE float PCM format only.

Sampling Rate

8000 Hz to 96000 Hz are supported as the input sampling rate.

12000 Hz, 24000 Hz, or 48000 Hz is supported as the output sampling rate.

However, ATRAC9™ Band Extension only supports 48000 Hz as the output sampling rate.

Number of Samples

The minimum number of sample input data that can be encoded is one.

However, using input data with 3072 samples or more is recommended as a number of samples sufficiently large enough for encoding.

File Size

A maximum of 2 GiB is supported.

However, when the input sampling rate and the output sampling rate differ, the supported maximum file size will differ according to the input sampling rate; see Table 2 for reference.

Table 2   File Sizes Supported by at9tool

Format	Input Sampling Rate	Output Sampling Rate	Input File Size
ATRAC9™ other than ATRAC9™ Band Extension	8000 Hz	12000 Hz	1.33 GiB or less
	12000 Hz		2 GiB or less
	8000 Hz	24000 Hz	682 MiB or less
	12000 Hz		1 GiB or less
	16000 Hz		1.33 GiB or less
	24000 Hz		2 GiB or less
	8000 Hz	48000 Hz	341 MiB or less
	12000 Hz		512 MiB or less
	16000 Hz		682 MiB or less
	24000 Hz		1 GiB or less
	32000 Hz		1.33 GiB or less
	44100 Hz		1.83 GiB or less
	48000 Hz		2 GiB or less
ATRAC9™ Band Extension	8000 Hz	48000 Hz	341 MiB or less
	12000 Hz		512 MiB or less
	16000 Hz		682 MiB or less
	24000 Hz		1 GiB or less
	32000 Hz		1.33 GiB or less
	44100 Hz		1.83 GiB or less
	48000 Hz		2 GiB or less

Note

The current maximum input file sizes depend on the PC environment running at9tool.

Therefore, the following warning may display and at9tool may end in error without encoding, even if the input file size meets the restrictions in Table 2.

```
Not enough memory for encode
Input file needs to be smaller in order for
SRC to be dependent on the Spec or execution environment of PC
```
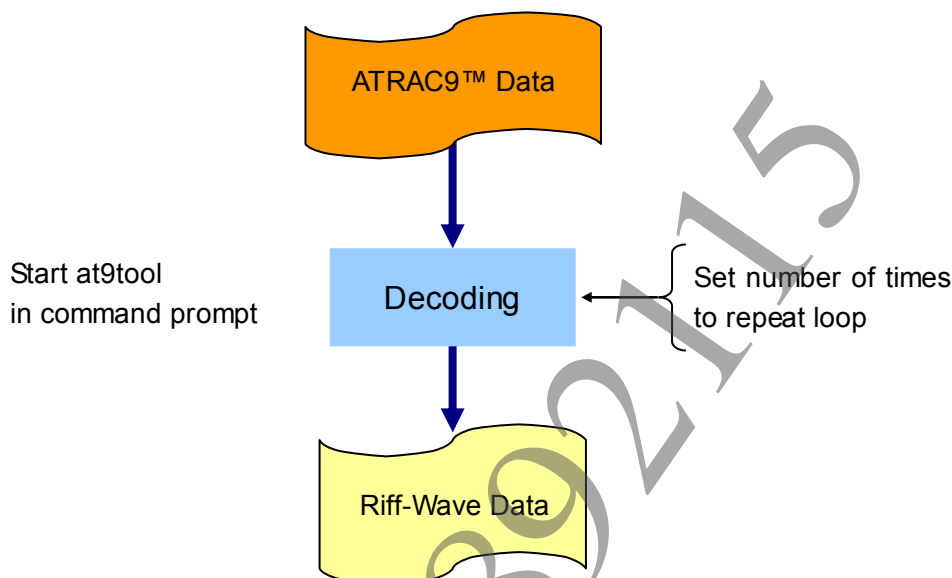
3 Decoding

Decoding Instructions

ATRAC9™ data can be decoded using at9tool to obtain Riff-Wave data as follows.

Figure 3   Decoding ATRAC9™ Data

(1) Open a command prompt

Select "Start" > "All Programs" > "Accessories" > "Command Prompt" to open a command prompt.

(2) Execute at9tool

Enter the following command to execute at9tool. Specify the filename of the source ATRAC9™ data and the output filename as parameters.

Command syntax

```
at9tool -d [options] srcfilename outputfilename
```

Options

The following options are available in decoding.

Options	Description
-repeat N	Specify number of times to repeat the loop. Loop section is output N-1 times more than the normal decoding output. This option is ignored for the following input files: - Data that did not have a loop set at encoding - Data that had multiple loops set at encoding
-wext	Output with an Extensible PCM header. If this option is not specified (default), the data is output with a PCM header.
-int16 -int24 -float	Specify the number of bits per sample (the default is -int16). - 16bits/sample (16bit Integer PCM format) for the -int16 option - 24bits/sample (24bit Integer PCM format) for the -int24 option - 32bits/sample (IEEE float PCM format) for the -float option

Decoding Example

The following command is an example decoding the sample1.at9 (no loop) file resulting from the above "Encoding Example" section. The result will be output as sample1.wav.

```
> at9tool.exe -d  sample1.at9 sample1.wav
Decoding 120 kbps (ATRAC9)
Decoded Bytes   =   12800 Bytes@40frames(ave=320bytes)
```

The following command is an example decoding the sample2.at9 file (with a loop) resulting from the above "Encoding Example" section so that it plays back the loop section 3 times. The result will be output as sample2.wav.

```
> at9tool.exe -d -repeat 3 sample2.at9 sample2.wav
Decoding 120 kbps (ATRAC9)
Loop Position = [10, 9871]
Decoded Bytes   =   12800 Bytes@40frames(ave=320bytes)
Decoded Bytes   =   12800 Bytes@40frames(ave=320bytes)
Decoded Bytes   =   12800 Bytes@40frames(ave=320bytes)
```

4 Additional Information

Fixed Sizes for Bit Rates and Elementary Streams

An ATRAC9™-encoded stream is composed of a Riff-Wave-format header and multiple elementary streams but the number of elementary streams where sizes are fixed will vary according to whether superframe mode is on/off. When superframe mode is off, the size of one elementary stream will be fixed. When superframe mode is on, the sizes of four elementary streams will be fixed.

The sizes of elementary streams under various conditions are shown in Table 3. By calculating the boundary position of a specific elementary stream with this table, seek playback, etc. will be possible when processing with audio decoding libraries.

Table 3   Fixed Size Sections for Bit Rates and Elementary Streams (in Bytes)

Format	Bit Rate	Number of elementary streams	1ch	2ch	4.0ch	5.1ch	7.1ch
ATRAC9™ Superframe mode OFF	36 kbps	1	24	N/A	N/A	N/A	N/A
	48 kbps	1	32	N/A	N/A	N/A	N/A
	60 kbps	1	40	N/A	N/A	N/A	N/A
	72 kbps	1	48	48	N/A	N/A	N/A
	84 kbps	1	56	N/A	N/A	N/A	N/A
	96 kbps	1	64	64	N/A	N/A	N/A
	120 kbps	1	N/A	80	N/A	N/A	N/A
	144 kbps	1	N/A	96	N/A	N/A	N/A
	168 kbps	1	N/A	112	N/A	N/A	N/A
	192 kbps	1	N/A	128	128	N/A	N/A
	240 kbps	1	N/A	N/A	160	160	N/A
	288 kbps	1	N/A	N/A	192	N/A	N/A
	300 kbps	1	N/A	N/A	N/A	200	N/A
	336 kbps	1	N/A	N/A	N/A	N/A	224
	360 kbps	1	N/A	N/A	N/A	240	N/A
	420 kbps	1	N/A	N/A	N/A	N/A	280
	504 kbps	1	N/A	N/A	N/A	N/A	336
ATRAC9™ Superframe mode ON	36 kbps	4	96	N/A	N/A	N/A	N/A
	48 kbps	4	128	N/A	N/A	N/A	N/A
	60 kbps	4	160	N/A	N/A	N/A	N/A
	72 kbps	4	192	192	N/A	N/A	N/A
	84 kbps	4	224	N/A	N/A	N/A	N/A
	96 kbps	4	256	256	N/A	N/A	N/A
	120 kbps	4	N/A	320	N/A	N/A	N/A
	144 kbps	4	N/A	384	N/A	N/A	N/A
	168 kbps	4	N/A	448	N/A	N/A	N/A
	192 kbps	4	N/A	512	512	N/A	N/A
	240 kbps	4	N/A	N/A	640	640	N/A
	288 kbps	4	N/A	N/A	768	N/A	N/A
	300 kbps	4	N/A	N/A	N/A	800	N/A
	336 kbps	4	N/A	N/A	N/A	N/A	896
	360 kbps	4	N/A	N/A	N/A	960	N/A
	420 kbps	4	N/A	N/A	N/A	N/A	1120
	504 kbps	4	N/A	N/A	N/A	N/A	1344

Default Encode Bands

The main default encode bands (encode bands when −nbands option is not specified) are shown in "Table 4".

Note
The default encode band settings are subject to change in future versions.
In addition, Table 4 is a compatibility chart of some of the input sampling rates. For input sampling rates not shown, the optimal default encoding band will be set based on Table 5

Table 4   Default Encode Bands

Number of Channels	Bit Rate	Input Sampling Rate	Default Encode Bands
1 ch	36 kbps	8 kHz	6
		12 kHz	8
		16 kHz	8
		24 kHz	8
		32 kHz	8
		44.1 kHz	8
		48 kHz	8
	48 kbps	8 kHz	6
		12 kHz	8
		16 kHz	10
		24 kHz	11
		32 kHz	11
		44.1 kHz	11
		48 kHz	11
	60 kbps	8 kHz	6
		12 kHz	8
		16 kHz	10
		24 kHz	12
		32 kHz	12
		44.1 kHz	12
		48 kHz	12
	72 kbps	8 kHz	6
		12 kHz	8
		16 kHz	10
		24 kHz	12
		32 kHz	14
		44.1 kHz	14
		48 kHz	14
	84 kbps	8 kHz	6
		12 kHz	8
		16 kHz	10
		24 kHz	12
		32 kHz	15
		44.1 kHz	15
		48 kHz	15
	96 kbps	8 kHz	6
		12 kHz	8
		16 kHz	10
		24 kHz	12
		32 kHz	15
		44.1 kHz	16
		48 kHz	16

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Number of Channels	Bit Rate	Input Sampling Rate	Default Encode Bands
2 ch	72 kbps	8 kHz	6(6)
		12 kHz	8(8)
		16 kHz	8(8)
		24 kHz	8(8)
		32 kHz	8(8)
		44.1 kHz	8(8)
		48 kHz	8(8)
	96 kbps	8 kHz	6(6)
		12 kHz	8(8)
		16 kHz	10(10)
		24 kHz	11(11)
		32 kHz	11(11)
		44.1 kHz	11(11)
		48 kHz	11(11)
	120 kbps	8 kHz	6(6)
		12 kHz	8(8)
		16 kHz	10(10)
		24 kHz	12(12)
		32 kHz	12(12)
		44.1 kHz	12(12)
		48 kHz	12(12)
	144 kbps	8 kHz	6(6)
		12 kHz	8(8)
		16 kHz	10(10)
		24 kHz	12(12)
		32 kHz	14(14)
		44.1 kHz	14(14)
		48 kHz	14(14)
	168 kbps	8 kHz	6(6)
		12 kHz	8(8)
		16 kHz	10(10)
		24 kHz	12(12)
		32 kHz	15(15)
		44.1 kHz	15(15)
		48 kHz	15(15)
	192 kbps	8 kHz	6(6)
		12 kHz	8(8)
		16 kHz	10(10)
		24 kHz	12(12)
		32 kHz	15(15)
		44.1 kHz	16(16)
		48 kHz	16(16)

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Number of Channels	Bit Rate	Input Sampling Rate	Default Encode Bands
4.0 ch	192 kbps	8 kHz	6
		12 kHz	8
		16 kHz	10
		24 kHz	10
		32 kHz	10
		44.1 kHz	10
		48 kHz	10
	240 kbps	8 kHz	6
		12 kHz	8
		16 kHz	10
		24 kHz	12
		32 kHz	12
		44.1 kHz	12
		48 kHz	12
	288 kbps	8 kHz	6
		12 kHz	8
		16 kHz	10
		24 kHz	12
		32 kHz	14
		44.1 kHz	14
		48 kHz	14
5.1 ch	240 kbps	8 kHz	6
		12 kHz	8
		16 kHz	10
		24 kHz	10
		32 kHz	10
		44.1 kHz	10
		48 kHz	10
	300 kbps	8 kHz	6
		12 kHz	8
		16 kHz	10
		24 kHz	12
		32 kHz	12
		44.1 kHz	12
		48 kHz	12
	360 kbps	8 kHz	6
		12 kHz	8
		16 kHz	10
		24 kHz	12
		32 kHz	14
		44.1 kHz	14
		48 kHz	14

Number of Channels	Bit Rate	Input Sampling Rate	Default Encode Bands
7.1 ch	336 kbps	8 kHz	6
		12 kHz	8
		16 kHz	10
		24 kHz	10
		32 kHz	10
		44.1 kHz	10
		48 kHz	10
	420 kbps	8 kHz	6
		12 kHz	8
		16 kHz	10
		24 kHz	12
		32 kHz	12
		44.1 kHz	12
		48 kHz	12
	504 kbps	8 kHz	6
		12 kHz	8
		16 kHz	10
		24 kHz	12
		32 kHz	14
		44.1 kHz	14
		48 kHz	14

* Values are in parentheses () when encoded as dual mono.

Relationship Between Bands and Frequency Bandwidths

The relationship between bands and frequency bandwidths is shown in Table 5.

Table 5   Relationship Chart for Bands and Frequency Bandwidths

Band	3	4	5	6	7	8	9	10
Frequency (kHz)	2.25	3.00	3.75	4.50	5.25	6.00	7.50	9.00
Band	11	12	13	14	15	16	17	18
Frequency (kHz)	10.5	12.0	13.5	15.0	16.5	18.0	21.0	24.0

Default Bit Rates

The default bit rates (bit rates when the -br option is not specified) are indicated in Table 6.

Table 6   Default Bit Rate

Number of Channels	Default Bit Rate
1 ch	72 kbps
2 ch	144 kbps
4.0 ch	240 kbps
5.1 ch	300 kbps
7.1 ch	420 kbps

When the settings file at9toolDefaultSettingFile.ini is located in the same folder as at9tool.exe, the setting values contained in that file will be applied. However, if there is an inconsistency in the setting values contained in the file, it will be automatically changed to the value in Table 6 upon execution.

When the settings file at9toolDefaultSettingFile.ini does not exist upon at9tool execution it will be automatically generated with the values in Table 6 inserted.

The format of at9toolDefaultSettingFile.ini is as follows.

```
[at9tool]
BitRate1ch=96
BitRate2ch=192
BitRate4ch=192
BitRate5_1ch=240
BitRate7_1ch=336
```

Channel Mapping upon Encoding

Channel mapping upon the encoding of a WAVE file is indicated in Table 7.

WAVE files must be configured following the order of channel maps indicated in Table 7 below.

Table 7   Channel Mapping Supported by at9tool

Number of Channels	Channel Map (Stored Order)
1 ch	Front Center
2 ch	Front Left, Front Right
4.0 ch	Front Left, Front Right, Left Surround, Right Surround
5.1 ch	Front Left, Front Right, Front Center, Low Frequency Effect, Left Surround, Right Surround
7.1 ch	Front Left, Front Right, Front Center, Low Frequency Effect, Left Surround, Right Surround, Left Extended, Right Extended

To increase the compression rate, the syntax of LFE channels and other channels are changed in multichannel (4.0 ch/5.1 ch/7.1 ch) ATRAC9™ data other than ATRAC9™ Band Extension. Because of this, data equivalent to LFE cannot be correctly played back when 6.0-ch or 8.0-ch data is encoded with 5.1 ch or 7.1 ch.

Effects of the Superframe Encoding Option (-suprameon)

Superframes are a feature that increases the compression efficiency by using the correlation of the preceding/subsequent frames in the same channel. With most audio sources, the compression efficiency will be improved by enabling the superframe feature, and audio quality improvements can be expected. Therefore, enabling superframes is normally recommended for encoding.

Note that processing loads may increase/decrease by specifying this option, but the change in load is almost imperceptible.

Effects of the Output Sampling Rate Option (-fs)

When encoding is performed with the output sampling rate set low using this option, the size will be reduced for the PCM data in the decoding output results. This will also reduce the amount of data that must be output by the decoder, therefore decoder loads will be reduced.

As a secondary effect of setting a low output sampling rate, it will be possible for the encoder to optimize the determination of the components that are important for audio quality by setting the encoded cutoff frequency low, and it will be possible to substantially improve audio quality.

On the other hand, the resolution in the direction of the temporal access will lower, and there is a risk of decreasing the audio quality of some encoded audio signals (particularly audio that contains many transient responses such as impact sounds).

Effects of the Intensity Stereo Start Band Option (-isband)

The intensity stereo feature is a system that increases the compression efficiency by using the audio characteristics when the left/right channels in stereo data have close correlation.

Therefore, when this option is correctly specified for audio sources with strong correlation for the left/right channels, improvements in the compression efficiency and audio quality can be expected. However, there will not be any effect for monaural data.

When this option is not specified, an appropriate intensity stereo start band will be set in the encoder from an analysis of the left/right channel correlation and the bit rate information.

Note that there will be a slight effect on processing loads and space when this option is specified.

Output PCM During Seek Playback of ATRAC9™ Band Extension Data

During playback of ATRAC9™ Band Extension data, if noise information is included as high band characteristic data in the audio data, seed values for random noise generation will be generated from the stream information. Therefore, when performing seek playback, etc., a different seed value will be used depending on the playback start position, and the resulting PCM data that is output may be different.

For example, when the output is compared in the following cases for certain ATRAC9™ Band Extension input data, there is a possibility of the output PCM not matching for the same section.

- Output PCM from the start of the file to the end
- Output PCM from the seek start position to the end

5 Update History

Version	Update Content
0.9.1.0	- Initial release
0.9.3.0	- Added 48 kbps (1 ch) to the supported input audio data bitrates - Adjusted the default encoding band (encoding band when the -nbands option is not specified). - Updated the ATRAC9™ library used to 1.0.1.
0.9.4.0	- Added 96 kbps (1 ch) to the supported input audio data bitrates. - Made a change so that it is possible to set loop information up to two times during encoding. - Added an option (-looplist) that sets loop information from a text file during encoding - Adjusted the default encoding band (encoding band when the -nbands option is not specified). - Updated the ATRAC9™ library used to 1.0.2.
0.9.9.0	- Updated the ATRAC9™ library used to 1.0.3.
0.9.9.5	- Corrected a bug where noise occurred in loop end components during encoding. - When the value specified with the -nbands/-isband/-gradmode option is outside the supported range, a warning will now display and at9tool will end with an error during encoding. - Updated the ATRAC9™ library used to 1.0.4.
0.9.9.6	- Corrected a bug where the file size of the output encoding would be large due to the countermeasure for the bug where noise occurred in loop end components during encoding. - Corrected a bug where noise occurred in the sampling rate conversion loop end components during encoding. - Corrected a bug where the "total number of samples" for the fact chunk and "chunk size" for the data chunk would be 0 when performing sampling rate conversion and performing loop feature settings during encoding. - Adjusted the default encoding band (encoding band when the -nbands option is not specified).
1.0.0.0	- Added 36 kbps (1 ch) and 72 kbps (2 ch) to the supported input audio data bitrates. - Corrected a bug where error termination would not occur when the specified value for the -nbands/-isband/-gradmode option was a negative value outside the supported range during encoding.
1.5.0.1	- Loop information will now be displayed when there is loop information during encoding/decoding. - An error will now be displayed and error termination will now occur when the length of the input audio data does not match the metadata information included in the file during encoding/decoding. - Adjusted the default encoding band (encoding band when the -nbands option is not specified). - Updated the ATRAC9™ library used to 1.0.5.
1.6.0.0	- Added an option (-fs) that specifies the output sampling rate (12000 Hz or 24000 Hz). However, this is limited to when the input sampling rate is 12000 Hz or 24000 Hz, respectively. - An error will now be displayed and error termination will now occur when repeat 0 is specified during decoding. - Adjusted the default encoding band (encoding band when the -nbands option is not specified). - Updated the ATRAC9™ library used to 1.0.6.

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Version	Update Content
1.8.0.0	- Added an option (-wband) that specifies band priority encoding during encoding. - Adjusted the default encoding band (encoding band when the -nbands option is not specified). - Updated the ATRAC9™ library used to 1.0.7.
2.0.0.0	- The default bit rate will now be used when the bit rate option (-br) is not specified during encoding. - Set upper limits for input files sizes for each input sampling rate during encoding. - Changed the channel mapping position for 1 ch from Front Left to Front Center.
2.0.0.3	- Multichannel (4.0 ch, 5.1 ch, and 7.1 ch) are supported as input audio data during encoding/decoding. Note: The multichannel ATRAC9™ data specifications are not yet finalized, therefore an identification value (1) is set for Reserved in the fmt chunk in multichannel ATRAC9™ files. There is a possibility that the multichannel ATRAC9™ data specifications will change in the future. - Added an option (-wext) that can output Extensible PCM headers during decoding. - Updated the ATRAC9™ library used to 1.0.9.
2.1.1.1	- 12000 Hz and 24000 Hz output sampling rates are supported when the input audio data is multichannel (4.0 ch, 5.1 ch, or 7.1 ch) during encoding Note: Multichannel ATRAC9™ decoding is possible only when inputting multichannel ATRAC9™ files that were generated with this tool. In addition, the multichannel ATRAC9™ data specifications are not yet finalized, therefore an identification value (2) is set for Reserved in the fmt chunk in multichannel ATRAC9™ files. In accordance, multichannel ATRAC9™ data created with previous versions of at9tool are no longer compatible. When decoding incompatible data, a warning will be displayed. There is a possibility that the multichannel ATRAC9™ data specifications will change in the future. - 24bit PCM/IEEE float PCM are supported as input audio data during encoding. - Added options (-int16/-int24/-float) that specify the number of output sample bits during decoding. - Updated the ATRAC9™ library used to 1.0.13.
2.5.0.0	- Multichannel (4.0 ch, 5.1 ch, and 7.1 ch) is officially supported as input audio data during encoding/decoding. Note: Not compatible with multichannel ATRAC9™ data created with at9tool version 2.0.0.3. Do not use this ATRAC9™ data, re-encode it using at9tool version 2.5.0.0 or later. Multichannel ATRAC9™ data created with at9tool version 2.1.1.1 can be used without any problems, but since the header specifications are partially different, using at9tool version 2.5.0.0 to re-encode is recommended. - Updated the ATRAC9™ library used to 1.1.0.
2.5.0.1	- Changed the supported sampling rate for input audio data to 8 kHz to 96 kHz during encoding. - An error will now be displayed and error termination will now occur when there is insufficient memory during encoding execution.
2.5.0.2	- Added an option (-defaultWL) that sets the entire data to be looped only when there is no loop information in the input file during encoding This option is valid only when there is no loop information in the input file. When it is specified for audio data that has loop information, a warning will be displayed and this option will be ignored.

Version	Update Content
2.6.0.0	- Corrected a bug where ATRAC9™ data was created with the incorrect number of samples due to invalid floating point arithmetic in the sampling rate conversion feature during encoding. Note: at9tool versions 2.5.0.1 and 2.5.0.2 include this bug, so use the latest version of at9tool. - Added an option (-slc) that cuts the low frequencies of the LFE channel during encoding. - The default bit rate can now be set with an ini file (at9toolDefaultSettingFile.ini) during encoding. - Removed the restriction where the number of samples in an input file had to be 3072 or more during encoding. - A change was made so that KSDATAFORMAT_SUBTYPE_IEEE_FLOAT for the sub-format GUID in Extensible wav headers is set when the Extensible PCM header output option (-wext) and IEEE float PCM format output option (-float) are specified during decoding. - Updated the ATRAC9™ library used to 1.3.0.
2.7.0.0	- Corrected a bug where audio quality deteriorated because of a problem in the operational precision in the Lagrange interpolation when performing sampling rate conversion during encoding. Note: at9tool versions 2.5.0.1, 2.5.0.2, and 2.6.0.0 include this bug, so use the latest version of at9tool. - Corrected a bug where temporary file creation would fail because temporary files were output to the root directory when performing sampling rate conversion during encoding. - Updated the ATRAC9™ library used to 1.4.0.
2.8.0.5	- ATRAC9™ Band Extension is supported. Note: ATRAC9™ Band Extension data is incompatible with versions of at9tool earlier than this version, so use the latest version of at9tool. - Corrected a bug where there was a risk of overflow in the sampling rate conversion feature when the number of samples was a multiple of the number of frame samples during encoding. - Corrected a bug where the warning content was incorrect when the input audio data length did not match the metadata included in the file during encoding/decoding. - Made corrections so that it is considered an error and file output is not performed when insufficient input audio data is detected during encoding. - Made corrections so that audio quality is improved when the final sample of the file is set for the loop end position and the total number of samples in the file is a multiple of the number of superframe samples during encoding in superframe mode. - Updated the ATRAC9™ library used to 1.7.1.