Software Synthesizer MIDI Player / Driver Library API Specification

Version 3.4

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History:

Date	Version	Description
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Table of Contents

1. About This Document

This document defines the specification of the Software Synthesizer MIDI Player / MIDI Driver Library.

2. Abstract

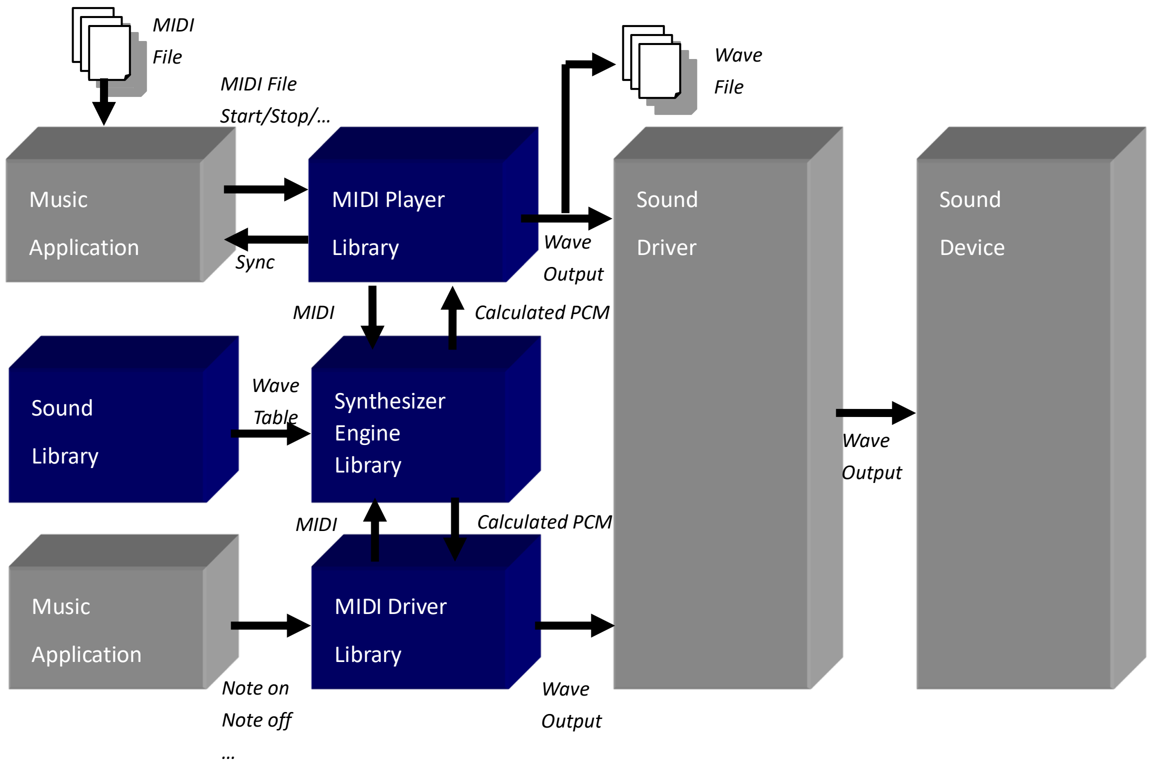
This library include Synthesizer Engine Library (bsse: bismark Synthesizer Engine）, and Sound Library, also offers application interfaces for MIDI Player (bsmp: described later), and MIDI Driver (bsmd: described later).

bsmp (bismark MIDI Player) library is an additional library for Synthesizer Engine Library. It provides functions to construct MIDI file players, Karaoke players, MIDI to Wave converts easily.
The main basic functions of bsmp library are follows;

- Import MIDI files
  - Supporting SMF (Standard MIDI File）
  - Also can be added the user specified file formats as customization
- MIDI to Wave conversion using Synthesizer Engine Library
  - Including wave output device and thread schedule control for various OS
  - Export to wave files
- Application support
  - API for playback start, stop
  - Callback functions for sending synchronizing information to the application

bsmd (bismark MIDI Driver) library is another additional library for Synthesizer Engine Library. It enables the substitution of hardware MIDI module, and provides Real-time MIDI function and simple MIDI file player for virtual musical instrument applications.
The main basic functions of bsmd library are follows;。

- Real-time MIDI
  - Including wave output device and thread schedule control for various OS
- Simple MIDI file player
  - Supporting SMF (Standard MIDI File）



bsmp and bsmd library cannot be used at the same time.

2.1. Supported OS

- Windows
- Linux BSD
- iOS
- Android

2.2. Inputs

2.2.1. MIDI Files

- SMF (Standard MIDI File）
  - Format: 0 or 1
  - Number of tracks: Up to 64
  - Division / TPQN: No limitation
  - File extension: *.mid

2.2.2. Sound Library Files

- SoundFont
  - Version 2
  - File extension: *.sf2
- DLS (Downloadable Sounds)[1]
  - Level1, Level2, Mobile DLS
  - File extension: *.dls

2.3. Outputs

2.3.1. Wave Output Devices

- Win:
  - MME drivers
  - Steinberg ASIO 2.1 drivers (Only bsmd driver, 44100Hz sample rate)
- Linux:
  - OSS
  - ALSA
- Mac OS X / iOS:

[1] There are some limitations for supporting DLS specification. Please refer to 5.1 About DLS File Format

  - AudioQueue
  - AudioUnit (Only bsmd driver)
- Android
  - OpenSL ES

- Playback sample rate: Depends on each wave output drivers

2.3.2. Wave Files

bsmp library only.

- Microsoft RIFF Wave
- Apple AIFF
  - Playback sample rate: No limitation
  - Output bit depth: 16[bit]
  - Number of output channels: 2 (Interleaved)

2.4. File Lists

- Common
  - bsmd.h : bsmd (MIDI Driver Library) header file
  - bsmp.h : bsmp (MIDI Player Library) header file
- Win (DLL / Shared library)
  - bsmpd*.dll : Shared library
  - bsmpd*.lib : Library module
- Linux / Mac OS X / iOS / Android (Static library)
  - libbsmpd*.a (MIDI Player / MIDI Driver Library)
  - libbsmp*.a (MIDI Player Library)
  - libbsmd*.a (MIDI Driver Library)

2.5. Related Libraries

- Synthesizer Engine Library
  - Win
    - Included
  - Linux / Mac OS X / iOS / Android

✧ libbsse*.a: Static library

3. MIDI Player Library Specification

3.1. Constants

3.1.1. BSMP_ERR

typedef enum for result code.

Code	Description	
BSMP_OK	Success	
BSMP_ERR_PROTECTION	Protection error	
BSMP_ERR_INVALID_HANDLE	Invalid handle error	
BSMP_ERR_FILE	File error	
BSMP_ERR_MEMORY	Memory error	
BSMP_ERR_RESOURCE	Resource error	
BSMP_ERR_PARAM	Parameter error	
BSMP_ERR_AUDIO_DRIVER	Wave output error	
BSMP_ERR_DATA	Data error	
BSMP_ERR_MODULE	External module error	
BSMP_ERR_NOT_SUPPORTED	Unsupported error	
BSMP_ERR_UNDEFINED	Undefined	

3.1.2. BSMP_CTRL

typedef enum for control API. Please refer to section 3.4.32 ctrl.

3.1.3. BSMP_CALLBACK_TYPE

typedef enum for callback types. Please refer to section 3.5 Callback (BSMP_CALLBACK).

3.1.4. BSMP_WAVE_FILE

typedef enum for bounced wave file formats.

Code	Description	
BSMP_WAVE_FILE_RIFF	Microsoft RIFF Wave	
BSMP_WAVE_FILE_AIFF	Apple AIFF	

3.1.5. BSMP_SOUND_LIBRARY_SEL_MODE

typedef enum for selection modes of sound library files.

Code	Description	
BSMP_SOUND_LIBRARY_SEL_MODE_NORMAL	Default mode	

3.2. Typedefs

3.2.1. BSMP_HANDLE

Handle for controlling this library.

3.2.2. BSMP_CALLBACK

Callback function type for sending information from this library to the user application. Please refer to section 3.5 Callback (BSMP_CALLBACK).

```
callback ()
       Input:   BSMP_HANDLE handle           Effective handle of the library
                BSMP_CALLBACK_TYPE type      Callback type
                void *data                   Pointer of the data
                void *user                   Pointer of the specified user area
       Output:  void
```

3.2.3. BSMP_CALLBACK_BOUNCE

Callback function type for displaying progress on exporting wave files. This callback will be used on calling the API "bounce" described on section 3.4.20.

```
BSMP_CALLBACK_BOUNCE ()
       Input:   int percent                  Progress value (%)
                void *user                   Pointer to the specified user area
                                             0: Continue
       Output:  int
                                             1: Cancel exporting
```

3.2.4. BSMP_LOAD

Function type for providing API table（BSMP_FUNC）.

3.3. Structures

3.3.1. BSMP_FUNC

Structure for API table. Please refer to section 3.4 API.

3.3.2. BSMP_SOUND_LIBRARY

Structure for specifying the sound library file.

```
typedef struct {
        int index; /* Index for the sound library file */
        LPCTSTR path; /* Full path of the sound library file */
} BSMP_SOUND_LIBRARY;
```

3.3.3. BSMP_SOUND_LIBRARY_MEMORY

Structure for specifying the sound library file mapped on the memory.

```
typedef struct {
        int index; /* Index for the sound library file */
        char *address; /* Memory address for the mapped sound library file */
        unsigned long *size; /* Size of the sound library file [Byte] */
} BSMP_SOUND_LIBRARY_MEMORY;
```

3.3.4. BSMP_SOUND_LIBRARY_SEL

Structure for specifying details of referring the sound library files.

```
typedef struct {
        int module; /* Module index (0, 1, …) */
        int part; /* Part index (0, 1, …, 15) */
        int index; /* Index of the sound library file */
        BSMP_SOUND_LIBRARY_SEL_MODE mode; /*  selection modes (section 3.1.5) */
} BSMP_SOUND_LIBRARY_SEL;
```

3.4. API

3.4.1. initialize

```
BSMP_ERR initialize ()

       Input:

                BSMP_HANDLE *handle                Pointer of the handle (!= NULL)

                BSMP_CALLBACK callback             Pointer of the callback function

                void *user                         Pointer of the user area for callback

                void *target                       Target independent data

                const unsigned char *key           Key code

       Output:

                Error code
```

Initialize the library and Synthesizer Engine Library.

Synthesizer Engine Library loads the default sound library (from own resource, or from the defined path) into index #0.

Before using the library, the application has to call the one of initialize* () functions.

The application has to set 64 bytes key code to the argument “key”.

This function requires the fixed processing time because of loading the sound library.

The application has to set the following values to argument “target”

- Win: The handle of the parent window (HWND)
- Android: This library receives pointer of the following sturucture, and calls the Activity class method of your application using information this information.

  ```
  typedef struct {
      JNIEnv *env;
      jobject thiz;
  }
  ```
- Other OS: NULL

3.4.2. initializeWithSoundLib

```
BSMP_ERR initializeWithSoundLib ()

       Input:
```

```
                   BSMP_HANDLE *handle                 Pointer of the handle (!= NULL)

                   BSMP_CALLBACK callback              Pointer of the callback function

                   void *user                          Pointer of the user area for callback

                   LPCTSTR libraryPath                 Full path of the sound library file

                   void *target                        Target independent data

                   const unsigned char *key            Key code

          Output:

                   Error code
```

Initialize the library and Synthesizer Engine Library.

Synthesizer Engine Library loads the sound library file on the specified path to index #0.

3.4.3. initializeWithSoundLibMemory

```
BSMP_ERR initializeWithSoundLibMemory ()

          Input:

                   BSMP_HANDLE *handle                 Pointer of the handle (!= NULL)

                   BSMP_CALLBACK callback              Pointer of the callback function

                   void *user                          Pointer of the user area for callback

                   char *libraryAddress                Address of the mapped sound library

                   unsigned long librarySize           Size of the sound library file [Byte]

                   void *target                        Target independent data

                   const unsigned char *key            Key code

          Output:

                   Error code
```

Initialize the library and Synthesizer Engine Library.

Synthesizer Engine Library loads the sound library file on the specified memory to index #0.

3.4.4. exit

```
BSMP_ERR exit ()

       Input:

                BSMP_HANDLE handle        Effective handle of the library

       Output:

                Error code
```

Finalize the library.

The application has to call this function before termination. If the library is playing, the application has to stop playback before calling this function.

3.4.5. getNumDrivers

```
int getNumDrivers ()

       Input:

                BSMP_HANDLE handle        Effective handle of the library

       Output:

                The number of supported drivers.
```

Get the number of wave output drivers supported by the library.

3.4.6. getNumDevices

```
int getNumDevices ()

       Input:

                BSMP_HANDLE handle        Effective handle of the library

                LPCTSTR driver            Name of wave output driver

       Output:

                The number of available wave output devices
```

Get the number of available wave output devices in the specified wave output driver.

3.4.7. getDriverName

```
LPCTSTR getDriverName ()

       Input:

                BSMP_HANDLE handle         Effective handle of the library

                int index                  Index for the wave output driver

       Output:

                Name of the specified wave output driver
```

Get the name of the specified wave output driver.

3.4.8. getDeviceName

```
LPCTSTR getDeviceName ()

       Input:

                BSMP_HANDLE handle         Effective handle of the library

                LPCTSTR driver             Name of the wave output driver

                int index                  Index for the wave output device

       Output:

                Name of the specified wave output device
```

Get the name of the specified wave output device.

3.4.9. showDeviceControlPanel

```
void showDeviceControlPanel ()

       Input:

                BSMP_HANDLE handle         Effective handle of the library

                LPCTSTR driver             Name of the wave output driver

                LPCTSTR device             Name of the wave output device
```

Display the control panes of the specified wave output device

3.4.10. open

```
BSMP_ERR open ()

       Input:
```

```
                 BSMP_HANDLE handle        Effective handle of the library

                 LPCTSTR driver            Name of the wave output driver

                 LPCTSTR device            Name of the wave output device

        Output:

                 Error code
```

Open the specified wave output device. If the argument “driver” and “device” is NULL, default wave output driver and device will be selected automatically.

3.4.11. close

```
BSMP_ERR close ()

       Input:

                BSMP_HANDLE handle        Effective handle of the library

       Output:

                Error code
```

Close the wave output device.

3.4.12. setFile

```
BSMP_ERR setFile ()

       Input:

                BSMP_HANDLE handle        Effective handle of the library

                LPCTSTR path              Full path of the MIDI file

       Output:

                Error code
```

Specify the MIDI sequence file with file path. See **2.2 Inputs** for available file formats.

3.4.13. setFileMemory

```
BSMP_ERR setFileMemory ()

       Input:

                BSMP_HANDLE handle        Effective handle of the library

                char *address             Memory address for the mapped MIDI file

                long size                 Size of the MIDI file [byte]

       Output:

                Error code
```

Specify the MIDI sequence file mapped on the memory controlled by the application.

3.4.14. getFileMemory

```
BSMP_ERR getFileMemory ()

       Input:

                BSMP_HANDLE handle        Effective handle of the library

                char **address            Pointer of the memory address

                long *size                Pointer of the file size [byte]

       Output:

                Error code
```

Get the memory address and size used for loading MIDI file. This memory is controlled by the library.

3.4.15. getFileInfo

```
BSMP_ERR getFileInfo ()

       Input:

                BSMP_HANDLE handle        Effective handle of the library

                int *format               Pointer of the MIDI file format

                unsigned short *division  Pointer of the MIDI file division [TPQN]

                unsigned long *totaltick  Pointer of the number of tick

                unsigned long *totaltime  Pointer of the length [s]

       Output:

                Error code
```

Get information of the specified MIDI sequence file.

3.4.16. start

```
BSMP_ERR start ()
       Input:
                BSMP_HANDLE handle        Effective handle of the library
       Output:
                Error code
```

Start playback of the specified MIDI file from current song position.

3.4.17. stop

```
BSMP_ERR stop ()
       Input:
                BSMP_HANDLE handle        Effective handle of the library
       Output:
                Error code
```

Stop playback of the specified MIDI file.

Calling this function means the application instructs the start of fade out process, and the playback still alive. The application has to detect the completion of the playback by the callback function described later.

Current song position will be saved after calling this function.

3.4.18. seek

```
BSMP_ERR seek ()
       Input:
                BSMP_HANDLE handle        Effective handle of the library
                unsigned long tick        Song Position [MIDI tick]
       Output:
                Error code
```

Specify song position.

3.4.19. isPlaying

```
int isPlaying ()
       Input:
                BSMP_HANDLE handle         Effective handle of the library
       Output:
                1: playing
                0: not playing
```

Get the flag for the library is playing the MIDI file, or not.

3.4.20. bounce

```
BSMP_ERR bounce ()

       Input:

                BSMP_HANDLE handle             Effective handle of the library

                LPCTSTR path                   Full path of the output file

                BSMP_WAVE_FILE type            Output file type

                BSMP_CALLBACK_EXPORT callback  Callback function

                void *user                     User parameter for the callback

       Output:

                Error code
```

Outputs the result of the specified MIDI file to the wave file. This function can not be used when normal playback process is effective. (Started with 3.4.16 start)

3.4.21. insertChannelMessage

```
void insertChannelMessage ()

       Input:

                BSMP_HANDLE handle         Effective handle of the library

                unsigned char port         MIDI Port (0 = A, 1 = B, …)

                unsigned char status       MIDI Status (0x80～0xEF)

                unsigned char data1        1st data (0x00～0x7F)

                unsigned char data2        2nd data (0x00～0x7F)
```

Insert MIDI channel message into the current file playback.

There is a latency time until inserted message will be applied. This time depends on audio output driver being used.

Consistency with data of the file being played is not guaranteed. For example, if you set program change message, then the program is changed, but the program may be overwritten by another program change message provided from the file.

3.4.22. insertSystemExclusiveMessage

```
void insertSystemExclusiveMessage ()

       Input:

                BSMP_HANDLE handle         Effective handle of the library

                unsigned char port         MIDI Port (0 = A, 1 = B, …)

                unsigned char status       MIDI Status (0xF0)

                unsigned char *data        Address of data array

                int size                   Length of data [byte]
```

Insert MIDI system exclusive message into the current file playback.

There is a latency time until inserted message will be applied. This time depends on audio output driver being used.

Consistency with data of the file being played is not guaranteed.

3.4.23. getRxChannel

```
tnsigned char getRxChannel ()

       Input:

                BSMP_HANDLE handle        Effective handle of the library

                int module                MIDI Module (0 = A, 1 = B, …)

                int part                  MIDI Part (0 ~ 15)

       Output:

                Receive MIDI channel      0 (Channel 1) ~ 15 (Channel 16)
```

Get MIDI receive channel for the specified module / part of the synthesizer engine.

3.4.24. getUseForRhythmPart

```
unsigned char getUseForRhythmPart ()

       Input:

                BSMP_HANDLE handle        Effective handle of the library

                int module                MIDI Module (0 = A, 1 = B, …)

                int part                  MIDI Part (0 ~ 15)

       Output:

                Use for rhythm part       0 (Melody), 1 (Drum 1), 2 (Drum 2), …
```

Get type for the specified module / part of the synthesizer engine.

3.4.25. getProgramChangeMessage

```
unsigned char getProgramChangeMessage ()

       Input:

                BSMP_HANDLE handle        Effective handle of the library

                int module                MIDI Module (0 = A, 1 = B, …)

                int part                  MIDI Part (0 ~ 15)

       Output:

                Program change            0 ~ 127
```

Get current program change value for the specified module / part of the synthesizer engine.

3.4.26. getControlChangeMessage

```
unsigned char getControlChangeMessage ()

       Input:

                BSMP_HANDLE handle         Effective handle of the library

                int module                 MIDI Module (0 = A, 1 = B, …)

                int part                   MIDI Part (0 ~ 15)

                unsigned char control      Control (0 ~ 127)

       Output:

                Control change             0 ~ 127
```

Get current control change value for the specified module / part of the synthesizer engine.

3.4.27. getPitchBendSense

```
unsigned char getPitchBendSense ()

       Input:

                BSMP_HANDLE handle         Effective handle of the library

                int module                 MIDI Module (0 = A, 1 = B, …)

                int part                   MIDI Part (0 ~ 15)

       Output:

                Pitch bend sense
```

Get current pitch bend sensitivity value for the specified module / part of the synthesizer engine.

3.4.28. getMasterCoarseTune

```
unsigned char getMasterCoarseTune ()

       Input:

                BSMP_HANDLE handle         Effective handle of the library

                int module                 MIDI Module (0 = A, 1 = B, …)

                int part                   MIDI Part (0 ~ 15)

       Output:

                Master coarse tune
```

Get current master coarse tune value for the specified module / part of the synthesizer engine.

3.4.29. getMasterFineTune

```
unsigned short getMasterShortTune ()

       Input:

                BSMP_HANDLE handle          Effective handle of the library

                int module                  MIDI Module (0 = A, 1 = B, …)

                int part                    MIDI Part (0 ~ 15)

       Output:

                Master fine tune
```

Get current master fine tune value for the specified module / part of the synthesizer engine.

3.4.30. getPitchBend

```
unsigned short getPitchBend ()

       Input:

                BSMP_HANDLE handle          Effective handle of the library

                int module                  MIDI Module (0 = A, 1 = B, …)

                int part                    MIDI Part (0 ~ 15)

       Output:

                Pitch bend
```

Get current pitch bend value for the specified module / part of the synthesizer engine.

3.4.31. getMode

```
unsigned short getMode ()

       Input:

                BSMP_HANDLE handle          Effective handle of the library

                int module                  MIDI Module (0 = A, 1 = B, …)

                int part                    MIDI Part (0 ~ 15)

       Output:

                Mode
```

Get current mode value for the specified module / part of the synthesizer engine.

3.4.32. ctrl

```
BSMP_ERR ctrl ()

       Input:

                BSMP_HANDLE handle        Effective handle of the library

                BSMP_CTRL ctrl            Control target

                void *data                Address of data

                int size                  Size of data [byte]

       Output:

                Error code
```

Do various operations.

Control	Data		Description
	Type	I/O	
BSMP_CTRL_SET_MASTER_VOLUME	int	I	Set playback volume (BSMP_VOLUME_MIN ~ BSMP_VOLUME_MAX）. The default value is BSMP_VOLUME_DEF.
BSMP_CTRL_GET_MASTER_VOLUME	int	O	Get playback volume
BSMP_CTRL_SET_MASTER_KEY	int	I	Set playback key (BSMP_KEY_MIN ~ BSMP_KEY_MAX）. The unit of the values is 100[cent], and the default value is BSMP_KEY_DEF. This value is not cleared on the end of the playback.
BSMP_CTRL_GET_MASTER_KEY	int	O	Get playback key.
BSMP_CTRL_SET_MASTER_TUNE	int	I	Set fine tuning (BSMP_TUNE_MIN ~ BSMP_TUNE_MAX). The unit of the values is 1[cent], and the default value is BSMP_TUNE_DEF. This value is not cleared on the end of the playback.
BSMP_CTRL_GET_MASTER_TUNE	int	O	Get fint tuning.
BSMP_CTRL_SET_SPEED	int	I	Set playback speed. (BSMP_SPEED_MIN ~ BSMP_SPEED_MAX). The unit of the value is 1[%], and the default value is BSMP_SPEED_DEF. This value is not cleared on the end of the playback.
BSMP_CTRL_GET_SPEED	int	O	Get playback speed.

Control	**Data**		**Description**
	Type	**I/O**	
BSMP_CTRL_SET_GUIDE	int	I	Set guide melody playback volume (BSMP_GUIDE_MIN ~ BSMP_GUIDE_MAX). The default value is BSMP_GUIDE_DEF. This value is not cleared on the end of the playback.
BSMP_CTRL_GET_GUIDE	int	O	Get guide melody playback volume.
BSMP_CTRL_SET_GUIDE_MAIN_CH	int	I	Set target of guide melody control. -1: off 0: MIDI port A, MIDI channel 1 1: MIDI port A, MIDI channel 2 ... 15: MIDI port A, MIDI channel 16 16: MIDI port B, MIDI channel 1 ...
BSMP_CTRL_GET_GUIDE_MAIN_CH	int	O	Get target of guide melody control
BSMP_CTRL_SET_GUIDE_SUB _CH	int	I	Same as BSMP_CTRL_SET_GUIDE_MAIN_CH
BSMP_CTRL_GET_GUIDE_SUB _CH	int	O	Same as BSMP_CTRL_SET_GUIDE_MAIN_CH

Control	Data		Description
	Type	I/O	
BSMP_CTRL_SET_REVERB	int	I	Set effectiveness of reverb. This value is not cleared on the end of the playback.
BSMP_CTRL_GET_REVERB	int	O	Get effectiveness of reverb
BSMP_CTRL_GET_REVERB _AVAILABLE	int	O	Get availability of reverb
BSMP_CTRL_SET_CHORUS	int	I	Set effectiveness of chorus. This value is not cleared on the end of the playback.
BSMP_CTRL_GET_CHORUS	int	O	Get effectiveness of chorus
BSMP_CTRL_GET_CHORUS _AVAILABLE	int	O	Get availability of chorus
BSMP_CTRL_SET_DELAY	int	I	Set effectiveness of delay. This value is not cleared on the end of the playback.
BSMP_CTRL_GET_DELAY	int	O	Get effectiveness of delay
BSMP_CTRL_GET_DELAY _AVAILABLE	int	O	Get availability of delay
BSMP_CTRL_SET_REVERB_HQ	int	I	Set HQ Reverb (1: On, 0: Off, Customized version only)

Control	Data		Description
	Type	I/O	
BSMP_CTRL_SET_SAMPLE_RATE	unsigned long	I	Set playback sample rate [Hz]
BSMP_CTRL_GET_SAMPLE_RATE	unsigned long	O	Get playback sample rate [Hz]
BSMP_CTRL_SET_BLOCK_SIZE	long	I	Set frame size [sample] of wave output.
BSMP_CTRL_GET_BLOCK_SIZE	long	O	Get frame size [sample] of wave output.
BSMP_CTRL_SET_CHANNELS	int	I	Not supported
BSMP_CTRL_GET_CHANNELS	int	O	Get number of output channels
BSMP_CTRL_SET_POLY	int	I	Set polyphonic number of synthesizer
BSMP_CTRL_GET_POLY	int	O	Get polyphonic number of synthesizer

Control	Data		Description
	Type	I/O	
BSMP_CTRL_GET_SOUND_LIBRARY_NUM	int	O	Get number of the slots for sound libraries
BSMP_CTRL_SET_SOUND_LIBRARY	BSMP_SOUND_LIBRARY	I	Set sound library with file path
BSMP_CTRL_SET_SOUND_LIBRARY_MEMORY	BSMP_SOUND_LIBRARY_MEMORY	I	Set sound library with memory
BSMP_CTRL_SET_SOUND_LIBRARY_SEL	BSMP_SOUND_LIBRARY_SEL	I	Set selection mode for the loaded sound library
BSMP_CTRL_GET_SOUND_LIBRARY_SEL	BSMP_SOUND_LIBRARY_SEL	I/O	Get selection mode for the loaded sound library
BSMP_CTRL_SET_NO_INSTRUMENT_FIX	int	I	Set function for substituting instrument. (1: On, 0: Off)
BSMP_CTRL_GET_NO_INSTRUMENT_FIX	int	O	Get value for the substituting instrument.
BSMP_CTRL_SET_NUMBER_OF_REGIONS	int	I	Set maximum number of region in each instrument

Control	Data		Description
	Type	I/O	
BSMP_CTRL_GET_INSTRUMENT_NAME ~ BSMP_CTRL_GET_INSTRUMENT_NAME + 15	char (TCHAR)	O	Get instrument name of the specified part (Ch1~16)
BSMP_CTRL_SET_MUTE ~ BSMP_CTRL_SET_MUTE + 15	int	I	Set mute (0: Off, 1: On) to the specified part (Ch1~16)
BSMP_CTRL_GET_MUTE ~ BSMP_CTRL_GET_MUTE + 15	int	O	Get mute (0: Off, 1: On) of the specified part (Ch1~16)
BSMP_CTRL_SET_SOLO ~ BSMP_CTRL_SET_SOLO + 15	int	I	Set solo (0: Off, 1: On) to the specified part (Ch1~16)
BSMP_CTRL_GET_SOLO ~ BSMP_CTRL_GET_SOLO + 15	int	O	Get solo (0: Off, 1: On) of the specified part (Ch1~16)

Control	Data		Description
	Type	I/O	
BSMP_CTRL_SET_CALLBACK_DELAY	int	I	Set callback sync offset
BSMP_CTRL_GET_CALLBACK_DELAY	int	O	Get callback sync offset
BSMP_CTRL_SET_PORT_SELECTION_METHOD	int	I	Set port selection method (Customized version only)
BSMP_CTRL_GET_PORT_SELECTION_METHOD	int	O	Get port selection method (Customized version only)
BSMP_CTRL_SET_WAVE	BSMP_WAVE	I	Add wave file (customized version only)
BSMP_CTRL_GET_OPEN_SL_ENGINE		O	Get OpenSL Engine (Android only)
CTMP_CTRL_GET_OPEN_SL_ENGINE_INTERFACE		O	Get OpenSL Engine Interface (Android only)

3.4.33. version

```
void version ()

       Input:

                BSMP_HANDLE handle        Effective handle of the library

                LPTSTR engine             Version of Synthesizer Engine Library

                int engineSize            Length of engine

                LPTSTR player             Version of MIDI Player Library

                int playerSize            Length of player
```

Get the name of MIDI Player Library and Synthesizer Engine Library.

3.5. Callback (BSMP_CALLBACK)

Callback function provides various information to the application. It is specified on 3.4.1 initialize, with function type defined in section 3.2.2 BSMP_CALLBACK.
This callback is not called on processing the function 3.4.20 bounce.
Each callback is called from calculation thread of synthesizer. So the application cannot spend long duration on receiving them.

3.5.1. Open

```
type = BSMP_CALLBACK_TYPE_OPEN, data = Not used
```

Wave output driver has been opened

3.5.2. Close

```
type = BSMP_CALLBACK_TYPE_CLOSE, data = Not used
```

Wave output driver has been closed

3.5.3. Start

```
type = BSMP_CALLBACK_TYPE_START, data = Not used
```

Playback has been started

3.5.4. Stop

```
type = BSMP_CALLBACK_TYPE_STOP, data = (unsigned long *) errorcode
```

Playback has beed stopeed.

```
errorcode:
        0 : Normal
        BSMP_ERR_AUDIO_DRIVER : Error stop by wave output driver
        BSMP_ERR_DATA : Error stop by data
```

3.5.5. Seek

```
type = BSMP_CALLBACK_TYPE_SEEK, data = Not used
```

Playback song position has been changed

If your application calculates song position using 3.5.6 MIDI Clock callback, please reset song position to start, tempo to 120[BPM], on receiving this callback.

3.5.6. MIDI Clock

```
type = BSMP_CALLBACK_TYPE_CLOCK, data = Not used
```

Standard MIDI clock (24[TPQN])

3.5.7. Tempo

```
type = BSMP_CALLBACK_TYPE_TEMPO, data = (unsigned long *) tempo
```

Playback tempo has been changed ([usec/beat])

3.5.8. Time Signature

```
type = BSMP_CALLBACK_TYPE_TIME_SIGNATURE, data = (unsigned long *) timeSignature
```

Playback time signature（nn/dd/cc/bb）has been changed.

3.5.9. Channel Message

```
type = BSMP_CALLBACK_TYPE_CHANNEL_MESSAGE, data = (unsigned long *) data
```

Channel message has been sent by player

```
        bit 31-24: MIDI Port (0x00 ~ )
        bit 23 - 16: Status Byte (0x90 ~ 0xEF)
        bit 15 – 8 : First Data (0x00 ~ 0x7F)
        bit 7 – 0 : Second Data (0x00 ~ 0x7F)
```

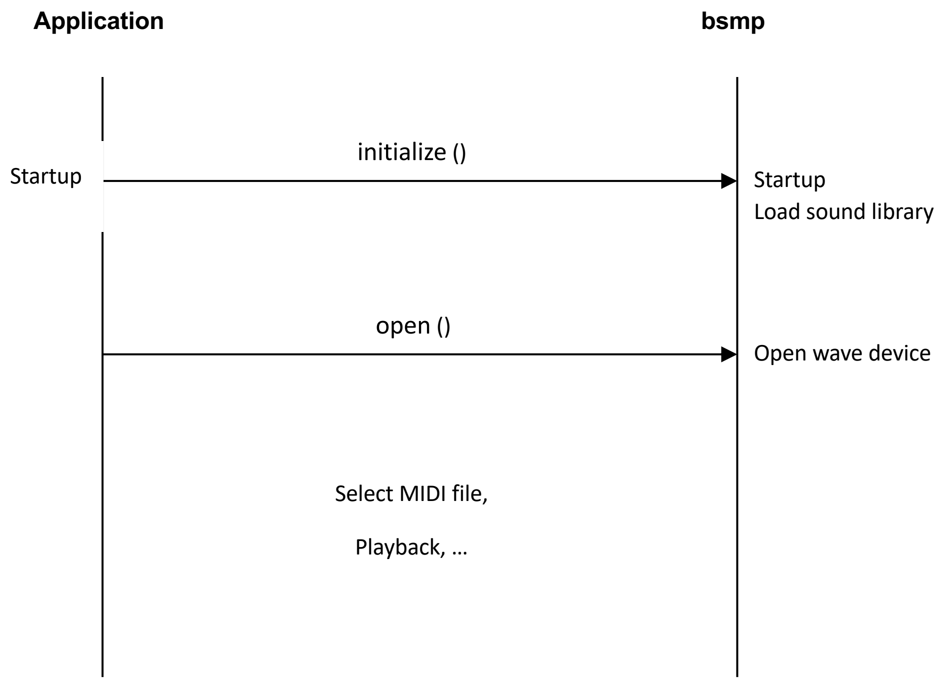
3.5.10. System Exclusive Message

```
type = BSMP_CALLBACK_TYPE_SYSTEM_EXCLUSIVE_MESSAGE, data = Not used
```

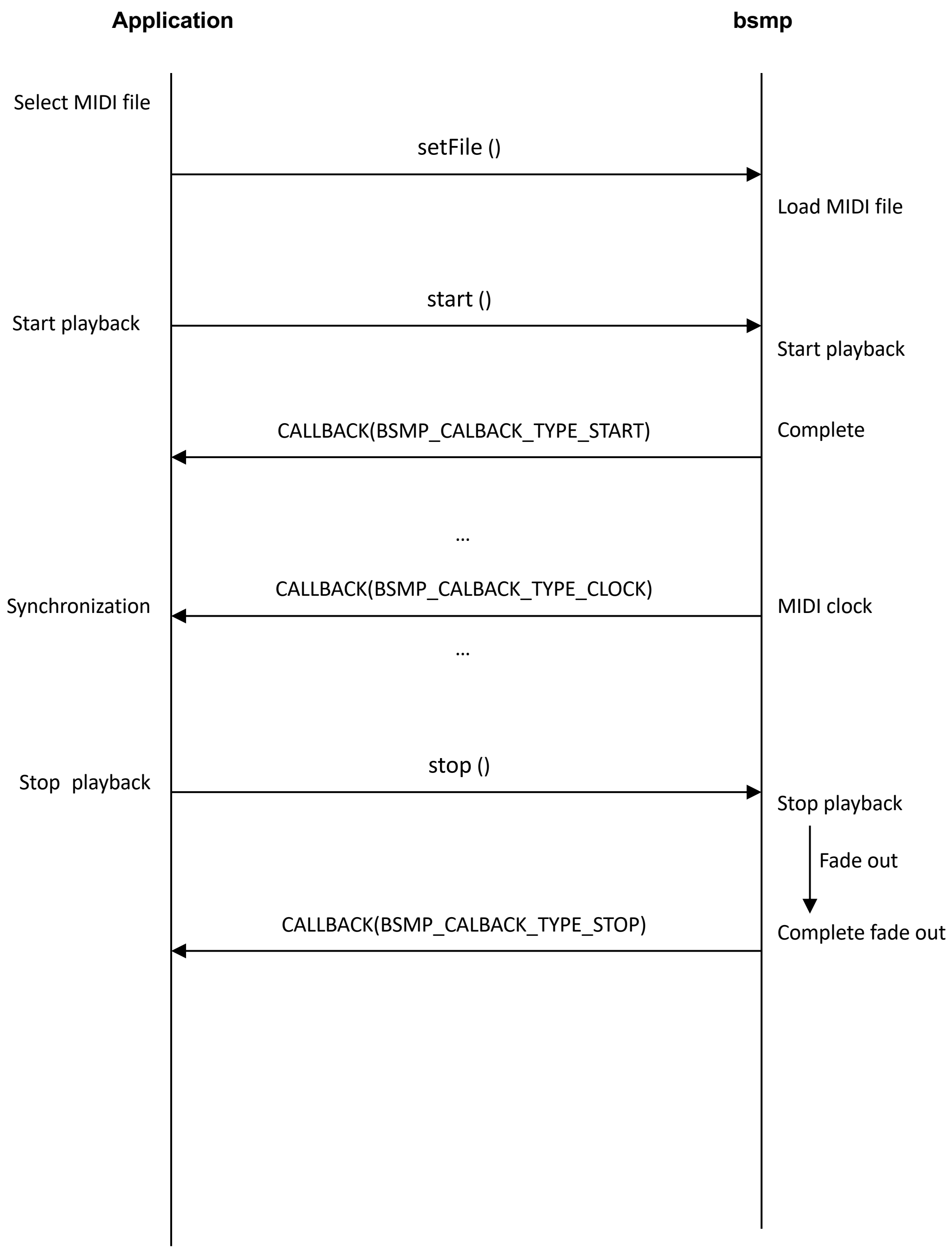
System exclusive message has been sent by player.

3.6. Sequences

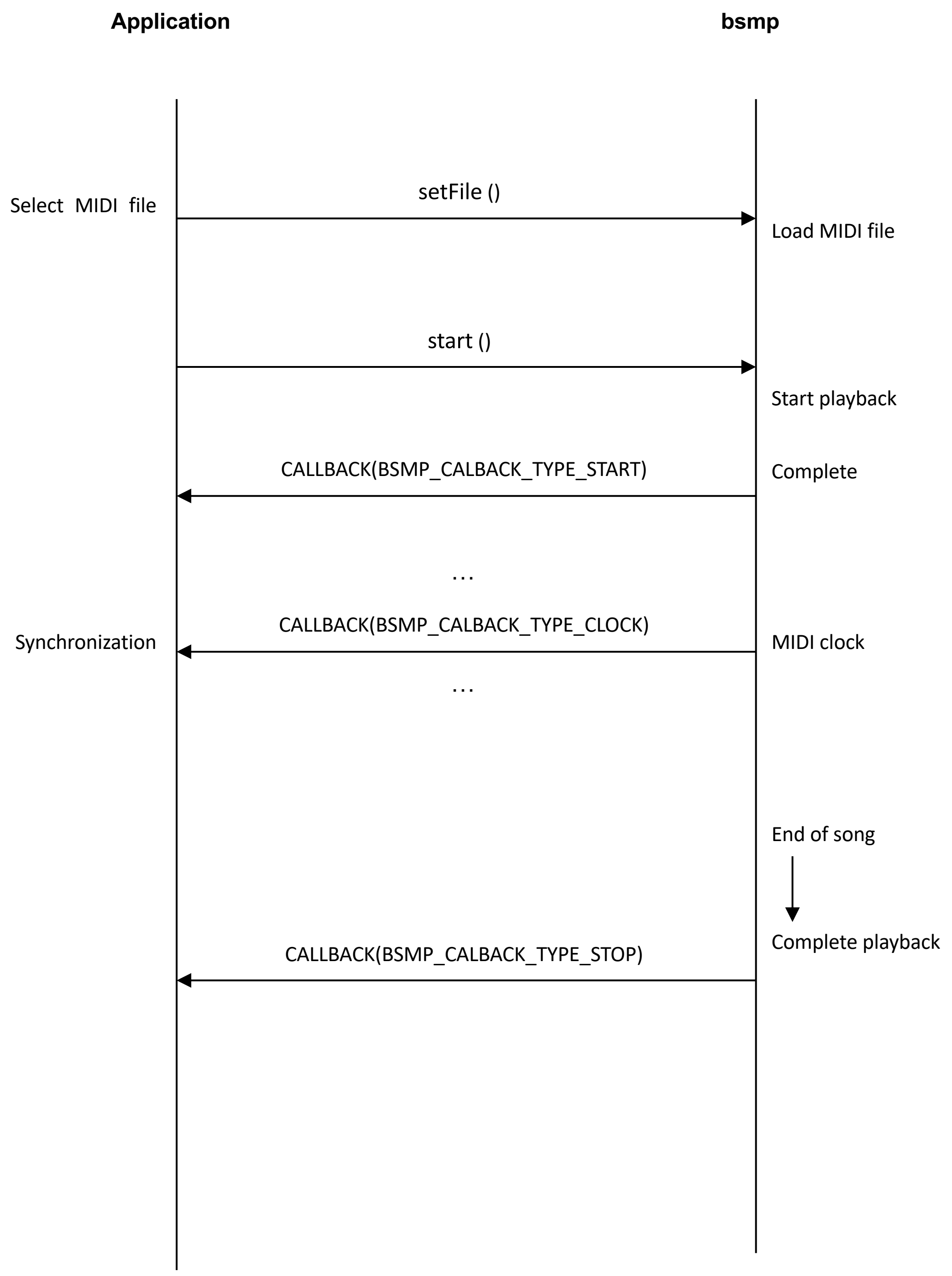
3.6.1. Initialization



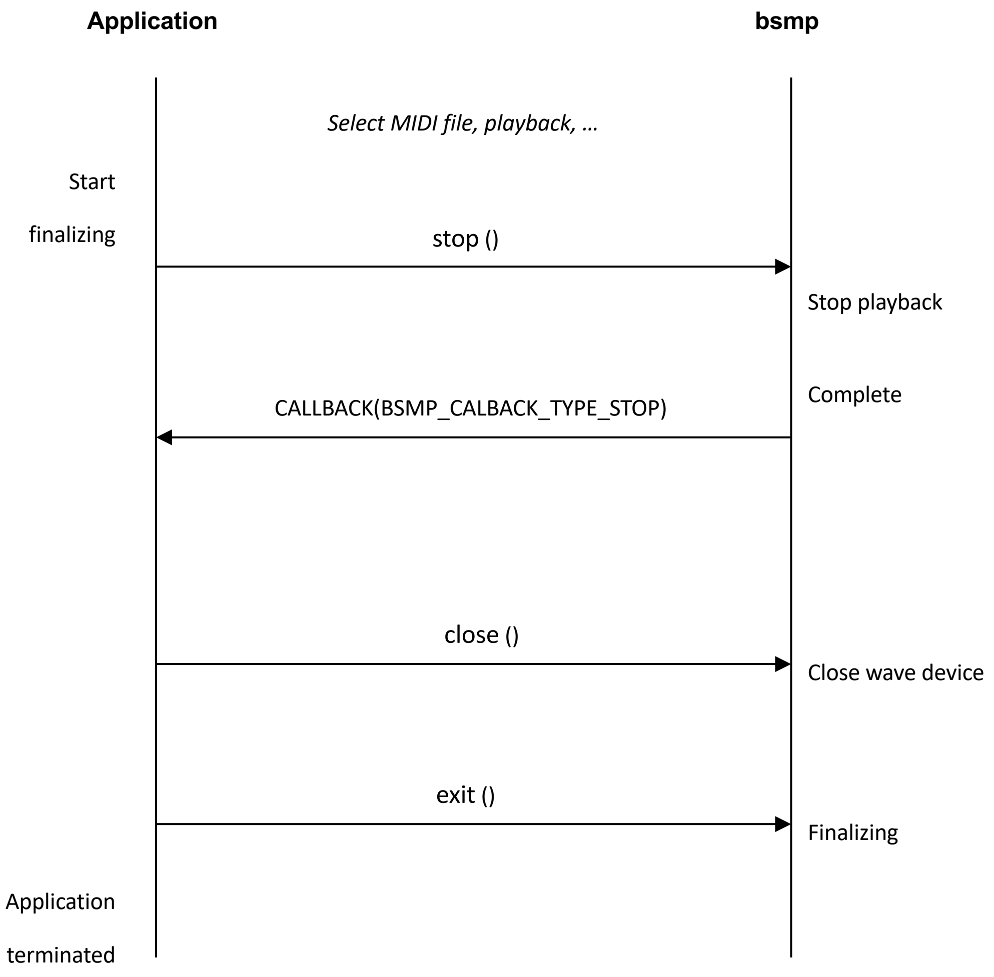
3.6.2. Specifying the MIDI Files - Start Playback – Stop by User



3.6.3. Specifying the MIDI File – Start Playback - End of the Song



3.6.4. Finalizing



4. MIDI Driver Library Specification

4.1. Constants

4.1.1. BSMD_ERR

typedef enum for result code.

Code	Description	
BSMD_OK	Success	
BSMD_ERR_PROTECTION	Protection error	
BSMD_ERR_INVALID_HANDLE	Invalid handle error	
BSMD_ERR_FILE	File error	
BSMD_ERR_MEMORY	Memory error	
BSMD_ERR_RESOURCE	Resource error	
BSMD_ERR_PARAM	Parameter error	
BSMD_ERR_AUDIO_DRIVER	Wave output error	
BSMD_ERR_DATA	Data error	
BSMD_ERR_MODULE	External module error	
BSMD_ERR_NOT_SUPPORTED	Unsupported error	
BSMD_ERR_UNDEFINED	Undefined	

4.1.2. BSMD_CTRL

Typedef enum for control API. Please refer to section 4.4.34 ctrl.

4.1.3. BSMD_CALLBACK_TYPE

Typedef enum for callback types. Please refer to section 4.5 Callback (BSMD_CALLBACK).

4.1.4. BSMD_SOUND_LIBRARY_SEL_MODE

Typedef enum for selection modes of sound library files.

Code	Description	
BSMD_SOUND_LIBRARY_SEL_MODE_NORMAL	Default mode	

4.2. Typedefs

4.2.1. BSMD_HANDLE

Handle for controlling this library.

4.2.2. BSMD_CALLBACK

Callback function type for sending information from this library to the user application. Please refer to section 4.5 Callback (BSMD_CALLBACK).

```
BSMD_CALLBACK ()
       Input:   BSMD_HANDLE handle            Effective handle of the library
                BSMD_CALLBACK_TYPE type       Callback type
                void *data                    Pointer of the data
                void *user                    Pointer of the specified user area
       Output:  void
```

4.2.3. BSMD_LOAD

Function type for providing the API table（BSMP_FUNC）.

4.3. Structures

4.3.1. BSMD_FUNC

Structure for API table. Please refer to section 4.4 API.

4.3.2. BSMD_SOUND_LIBRARY

Structure for specifying the sound library file.

```
typedef struct {
        int index; /* Index for the sound library file */
        LPCTSTR path; /* Full path of the sound library file */
} BSMD_SOUND_LIBRARY;
```

4.3.3. BSMD_SOUND_LIBRARY_MEMORY

Structure for specifying the sound library file mapped on the memory.

```
typedef struct {
        int index; /* Index for the sound library file */
        char *address; /* Memory address for the mapped sound library file */
        unsigned long *size; /* Size of the sound library file [Byte] */
} BSMD_SOUND_LIBRARY_MEMORY;
```

4.3.4. BSMD_SOUND_LIBRARY_SEL

Structure to specify relationship between each part and sound library files.

```
typedef struct {
        int module; /* Module index (0, 1, …) */
        int part; /* Part index (0, 1, …, 15) */
        int index; /* Index of the sound library file */
        BSMD_SOUND_LIBRARY_SEL_MODE mode; /* selection modes (section 4.1.4) */
} BSMD_SOUND_LIBRARY_SEL;
```

4.3.5. BSMD_FRAME

Structure for callback (BSMD_CALLBACK_TYPE_FRAME)

```
typedef struct {
        long sampleFrames; /* audio frame length [sample] */
        void *data; /* buffer for output audio (Signed 16bit, 2ch interleaved) */
} BSMD_FRAME;
```

4.4. API

4.4.1. initialize

```
BSMD_ERR initialize ()

       Input:

                BSMD_HANDLE *handle              Pointer of the handle (!= NULL)

                BSMD_CALLBACK callback           Pointer of the callback function

                void *user                       Pointer of the user area for callback

                void *target                     Target independent data

                const unsigned char *key         Key code

       Output:

                Error code
```

Initialize the library and Synthesizer Engine Library.

Synthesizer Engine Library loads the default sound library (from own resource, or from the defined path) to index #0.

Before using the library, the application has to call the one of initialize* () functions.

The application has to set 64 byte key code to the argument "key".

This function requires the fixed processing time because of loading the sound library.

The application has to set the following values to argument "target"

- Win/WinCE: The handle of the parent window (HWND)
- Android: This library receives pointer of the following sturucture, and calls the Activity class method of your application using information this information.

  ```
  typedef struct {
      JNIEnv *env;
      jobject thiz;
  }
  ```

- Other OS: NULL

4.4.2. initializeWithSoundLib

```
BSMD_ERR initializeWithSoundLib ()

       Input:
```

```
                  BSMD_HANDLE *handle              Pointer of the handle (!= NULL)
                  BSMD_CALLBACK callback           Pointer of the callback function
                  void *user                       Pointer of the user area for callback
                  LPCTSTR libraryPath              Full path of the sound library file
                  void *target                     Target independent data
                  const unsigned char *key         Key code
        Output:
                  Error code
```

Initialize the library and Synthesizer Engine Library.

Synthesizer Engine Library loads the sound library file on the specified path to index #0.

4.4.3. initializeWithSoundLibMemory

```
BSMD_ERR initializeWithSoundLibMemory ()
        Input:
                  BSMD_HANDLE *handle              Pointer of the handle (!= NULL)
                  BSMD_CALLBACK callback           Pointer of the callback function
                  void *user                       Pointer of the user area for callback
                  char *libraryAddress             Address of the mapped sound library
                  unsigned long librarySize        Size of the sound library file [Byte]
                  void *target                     Target independent data
                  const unsigned char *key         Key code
        Output:
                  Error code
```

Initialize the library and Synthesizer Engine Library.

Synthesizer Engine Library loads the sound library file on the specified memory to index #0.

4.4.4. exit

```
BSMD_ERR exit ()

       Input:

                BSMD_HANDLE handle        Effective handle of the library

       Output:

                Error code
```

Finalize the library.

The application has to call this function before termination. If the library is playing, the application has to stop playback before calling this function.

4.4.5. getNumDrivers

```
int getNumDrivers ()

       Input:

                BSMD_HANDLE handle        Effective handle of the library

       Output:

                The number of supported drivers.
```

Get the number of wave output drivers supported by the library.

4.4.6. getNumDevices

```
int getNumDevices ()

       Input:

                BSMD_HANDLE handle        Effective handle of the library

                LPCTSTR driver            Name of wave output driver

       Output:

                The number of available wave output devices
```

Get the number of available wave output devices in the specified wave output driver.

4.4.7. getDriverName

```
LPCTSTR getDriverName ()

       Input:

                BSMD_HANDLE handle         Effective handle of the library

                int index                  Index for the wave output driver

       Output:

                Name of the specified wave output driver
```

Get the name of the specified wave output driver.

4.4.8. getDeviceName

```
LPCTSTR getDeviceName ()

       Input:

                BSMD_HANDLE handle         Effective handle of the library

                LPCTSTR driver             Name of the wave output driver

                int index                  Index for the wave output device

       Output:

                Name of the specified wave output device
```

Get the name of the specified wave output device.

4.4.9. showDeviceControlPanel

```
void showDeviceControlPanel ()

       Input:

                BSMD_HANDLE handle         Effective handle of the library

                LPCTSTR driver             Name of the wave output driver

                LPCTSTR device             Name of the wave output device
```

Display the control panes of the specified wave output device

4.4.10. open

```
BSMD_ERR open ()

       Input:
```

```
                 BSMD_HANDLE handle         Effective handle of the library
                 LPCTSTR driver             Name of the wave output driver
                 LPCTSTR device             Name of the wave output device
        Output:
                 Error code
```

Open the specified wave output device. If the argument “driver” and “device” is NULL, default wave output driver and device will be selected automatically.

4.4.11. close

```
BSMD_ERR close ()
        Input:
                 BSMD_HANDLE handle         Effective handle of the library
        Output:
                 Error code
```

Close the wave output device.

4.4.12. start

```
BSMD_ERR start ()
        Input:
                 BSMD_HANDLE handle         Effective handle of the library
        Output:
                 Error code
```

Start Real-time MIDI function.

4.4.13. stop

```
BSMD_ERR stop ()
        Input:
                 BSMD_HANDLE handle         Effective handle of the library
        Output:
                Error code
```

Stop Real-time MIDI function.

4.4.14. isPlaying

```
int isPlaying ()

       Input:

                BSMD_HANDLE handle        Effective handle of the library

       Output:

                1: playing

                0: not playing
```

Get the flag for the library’s Real-time function is enabled, or not.

4.4.15. setChannelMessage

```
void setChannelMessage ()

       Input:

                BSMD_HANDLE handle         Effective handle of the library

                unsigned char port         MIDI Port (0 = A, 1 = B, …)

                unsigned char status       MIDI Status (0x80～0xEF)

                unsigned char data1        1st data (0x00～0x7F)

                unsigned char data2        2nd data (0x00～0x7F)
```

Set MIDI channel message.

4.4.16. setSystemExclusiveMessage

```
void setSystemExclusiveMessage ()

       Input:

                BSMD_HANDLE handle         Effective handle of the library

                unsigned char port         MIDI Port (0 = A, 1 = B, …)

                unsigned char status       MIDI Status (0xF0)

                unsigned char *data        Address of data array

                int size                   Length of data [byte]
```

Set MIDI system exclusive message.

4.4.17. getRxChannel

```
tnsigned char getRxChannel ()

       Input:

                BSMD_HANDLE handle          Effective handle of the library

                int module                  MIDI Module (0 = A, 1 = B, …)

                int part                    MIDI Part (0 ~ 15)

       Output:

                Receive MIDI channel        0 (Channel 1) ~ 15 (Channel 16)
```

Get MIDI receive channel for the specified module / part of the synthesizer engine.

4.4.18. getUseForRhythmPart

```
unsigned char getUseForRhythmPart ()

       Input:

                BSMD_HANDLE handle          Effective handle of the library

                int module                  MIDI Module (0 = A, 1 = B, …)

                int part                    MIDI Part (0 ~ 15)

       Output:

                Use for rhythm part         0 (Melody), 1 (Drum 1), 2 (Drum 2), …
```

Get type for the specified module / part of the synthesizer engine.

4.4.19. getProgramChangeMessage

```
unsigned char getProgramChangeMessage ()

       Input:

                BSMD_HANDLE handle          Effective handle of the library

                int module                  MIDI Module (0 = A, 1 = B, …)

                int part                    MIDI Part (0 ~ 15)

       Output:

                Program change              0 ~ 127
```

Get current program change value for the specified module / part of the synthesizer engine.

4.4.20. getControlChangeMessage

```
unsigned char getControlChangeMessage ()

       Input:

                BSMD_HANDLE handle          Effective handle of the library

                int module                  MIDI Module (0 = A, 1 = B, …)

                int part                    MIDI Part (0 ~ 15)

                unsigned char control       Control (0 ~ 127)

       Output:

                Control change              0 ~ 127
```

Get current control change value for the specified module / part of the synthesizer engine.

4.4.21. getPitchBendSense

```
unsigned char getPitchBendSense ()

       Input:

                BSMD_HANDLE handle          Effective handle of the library

                int module                  MIDI Module (0 = A, 1 = B, …)

                int part                    MIDI Part (0 ~ 15)

       Output:

                Pitch bend sense
```

Get current pitch bend sensitivity value for the specified module / part of the synthesizer engine.

4.4.22. getMasterCoarseTune

```
unsigned char getMasterCoarseTune ()

       Input:

                BSMD_HANDLE handle          Effective handle of the library

                int module                  MIDI Module (0 = A, 1 = B, …)

                int part                    MIDI Part (0 ~ 15)

       Output:

                Master coarse tune
```

Get current master coarse tune value for the specified module / part of the synthesizer engine.

4.4.23. getMasterFineTune

```
unsigned short getMasterShortTune ()

       Input:

                BSMD_HANDLE handle         Effective handle of the library

                int module                 MIDI Module (0 = A, 1 = B, …)

                int part                   MIDI Part (0 ~ 15)

       Output:

                Master fine tune
```

Get current master fine tune value for the specified module / part of the synthesizer engine.

4.4.24. getPitchBend

```
unsigned short getPitchBend ()

       Input:

                BSMD_HANDLE handle         Effective handle of the library

                int module                 MIDI Module (0 = A, 1 = B, …)

                int part                   MIDI Part (0 ~ 15)

       Output:

                Pitch bend
```

Get current pitch bend value for the specified module / part of the synthesizer engine.

4.4.25. getMode

```
unsigned short getMode ()

       Input:

                BSMD_HANDLE handle         Effective handle of the library

                int module                 MIDI Module (0 = A, 1 = B, …)

                int part                   MIDI Part (0 ~ 15)

       Output:

                Mode
```

Get current mode value for the specified module / part of the synthesizer engine.

4.4.26. setFile

```
BSMD_ERR setFile ()

       Input:

                BSMD_HANDLE handle         Effective handle of the library

                LPCTSTR path               Full path of the MIDI file

       Output:

                Error code
```

Specify the MIDI sequence file with file path. See **2.2 Inputs** for available file formats.

4.4.27. setFileMemory

```
BSMD_ERR setFileMemory ()

       Input:

                BSMD_HANDLE handle         Effective handle of the library

                char *address              Memory address for the mapped MIDI file

                long size                  Size of the MIDI file [byte]

       Output:

                Error code
```

Specify the MIDI sequence file mapped on the memory controlled by the application.

4.4.28. getFileMemory

```
BSMD_ERR getFileMemory ()

       Input:

                BSMD_HANDLE handle        Effective handle of the library

                char **address            Pointer of the memory address

                long *size                Pointer of the file size [byte]

       Output:

                Error code
```

Get the memory address and size used for loading MIDI file. This memory is controlled by the library.

4.4.29. getFileInfo

```
BSMD_ERR getFileInfo ()

       Input:

                BSMD_HANDLE handle        Effective handle of the library

                int *format               Pointer of the MIDI file format

                unsigned short *division  Pointer of the MIDI file division [TPQN]

                unsigned long *totaltick  Pointer of the number of tick

                unsigned long *totaltime  Pointer of the length [s]

       Output:

                Error code
```

Get information of the specified MIDI sequence file.

4.4.30. startFilePlay

```
BSMD_ERR startFilePlay ()

       Input:

                BSMD_HANDLE handle        Effective handle of the library

       Output:

                Error code
```

Start playback of the specified MIDI file from current song position.

4.4.31. stopFilePlay

```
BSMD_ERR stopFilePlay ()

       Input:

                BSMD_HANDLE handle        Effective handle of the library

       Output:

                Error code
```

Stop playback of the specified MIDI file.

Calling this function means the application instructs the start of fade out process, and the playback still alive. The application has to detect the completion of the playback by the callback function described later.

Current song position will be saved after calling this function.

4.4.32. seekFilePlay

```
BSMD_ERR seekFilePlay ()

       Input:

                BSMD_HANDLE handle        Effective handle of the library

                unsigned long tick        Song position [MIDI tick]

       Output:

                Error code
```

Specify song position.

4.4.33. isFilePlaying

```
int isFilePlaying ()

       Input:

                BSMD_HANDLE handle        Effective handle of the library

       Output:

                1: playing

                0: not playing
```

Get the flag for the library is playing the MIDI file, or not.

4.4.34. ctrl

```
BSMD_ERR ctrl ()

       Input:

                BSMD_HANDLE handle         Effective handle of the library

                BSMD_CTRL ctrl             Control target

                void *data                 Address of data

                int size                   Size of data [byte]

       Output:

                Error code
```

Do various operations.

Control	Data		Description
	Type	I/O	
BSMD_CTRL_SET_SAMPLE_RATE	unsigned long	I	Set playback sample rate [Hz]
BSMD_CTRL_GET_SAMPLE_RATE	unsigned long	O	Get playback sample rate [Hz]
BSMD_CTRL_SET_CHANNELS	int	I	Not supported
BSMD_CTRL_GET_CHANNELS	int	O	Get number of output channels
BSMD_CTRL_SET_BLOCK_SIZE	long	I	Set frame size [sample] of wave output. This value affects the latency of Real-time MIDI function. In ASIO / AudioUnit drives, this value is overwrote by the device drivers. So the applications have to get this value after calling open in section 3.4.10, using BSMD_CTRL_GET_BLOCK_SIZE.
BSMD_CTRL_GET_BLOCK_SIZE	long	O	Get frame size [sample] of wave output.
BSMD_CTRL_SET_BUFFERS	int	I	Set number of frames for wave output. This value affects the latency of Real-time MIDI function. In ASIO / AudioUnit drivers, this value is fixed (= 1).
BSMD_CTRL_GET_BUFFERS	int	O	Get number of frames for wave output.
BSMD_CTRL_SET_POLY	int	I	Set polyphonic number of synthesizer
BSMD_CTRL_GET_POLY	int	O	Get polyphonic number of synthesizer

Control	Data		Description
	Type	I/O	
BSMD_CTRL_SET_MASTER_VOLUME	int	I	Set playback volume (BSMP_VOLUME_MIN ~ BSMP_VOLUME_MAX）. The default value is BSMP_VOLUME_DEF.
BSMD_CTRL_GET_MASTER_VOLUME	int	O	Get playback volume
BSMD_CTRL_SET_MASTER_KEY	int	I	Set playback key (BSMD_KEY_MIN ~ BSMD_KEY_MAX）. The unit of the values is 100[cent], and the default value is BSMD_KEY_DEF. This value is not cleared on the end of the playback.
BSMD_CTRL_GET_MASTER_KEY	int	O	Get playback key.
BSMD_CTRL_SET_MASTER_TUNE	int	I	Set fine tuning (BSMD_TUNE_MIN ~ BSMD_TUNE_MAX). The unit of the values is 1[cent], and the default value is BSMD_TUNE_DEF. This value is not cleared on the end of the playback.
BSMD_CTRL_GET_MASTER_TUNE	int	O	Get fint tuning.
BSMD_CTRL_SET_SPEED	int	I	Set playback speed. (BSMD_SPEED_MIN ~ BSMD_SPEED_MAX). The unit of the value is 1[%], and the default value is BSMD_SPEED_DEF. This value is not cleared on the end of the playback.
BSMD_CTRL_GET_SPEED	int	O	Get playback speed.

Control	Data		Description
	Type	I/O	
BSMD_CTRL_SET_REVERB	int	I	Set effectiveness of reverb. This value is not cleared on the end of the playback.
BSMD_CTRL_GET_REVERB	int	O	Get effectiveness of reverb
BSMD_CTRL_GET_REVERB _AVAILABLE	int	O	Get availability of reverb
BSMD_CTRL_SET_CHORUS	int	I	Set effectiveness of chorus. This value is not cleared on the end of the playback.
BSMD_CTRL_GET_CHORUS	int	O	Get effectiveness of chorus
BSMD_CTRL_GET_CHORUS _AVAILABLE	int	O	Get availability of chorus
BSMD_CTRL_SET_DELAY	int	I	Set effectiveness of delay. This value is not cleared on the end of the playback.
BSMD_CTRL_GET_DELAY	int	O	Get effectiveness of delay
BSMD_CTRL_GET_DELAY _AVAILABLE	int	O	Get availability of delay
BSMD_CTRL_SET_REVERB_HQ	int	I	Set HQ Reverb (1: On, 0: Off, Customized version only)

Control	Data		Description
	Type	I/O	
BSMD_CTRL_GET_SOUND_LIBRARY_NUM	int	O	Get number of the slots for sound libraries
BSMD_CTRL_SET_SOUND_LIBRARY	BSMD_SOUND_LIBRARY	I	Set sound library with file path
BSMD_CTRL_SET_SOUND_LIBRARY_MEMORY	BSMD_SOUND_LIBRARY_MEMORY	I	Set sound library with memory
BSMD_CTRL_SET_SOUND_LIBRARY_SEL	BSMD_SOUND_LIBRARY_SEL	I	Set selection mode for the loaded sound library
BSMD_CTRL_GET_SOUND_LIBRARY_SEL	BSMD_SOUND_LIBRARY_SEL	I/O	Get selection mode for the loaded sound library
BSMD_CTRL_SET_NUMBER_OF_REGIONS	int	I	Set maximum number of region in each instrument

Control	Data		Description
	Type	I/O	
BSMD_CTRL_GET_INSTRUMENT_NAME ~ BSMD_CTRL_GET_INSTRUMENT_NAME + 15	char (TCHAR)	O	Get instrument name of the specified part (Ch1~16)
BSMD_CTRL_SET_MUTE ~ BSMD_CTRL_SET_MUTE + 15	int	I	Set mute (0: Off, 1: On) to the specified part (Ch1~16)
BSMD_CTRL_GET_MUTE ~ BSMD_CTRL_GET_MUTE + 15	int	O	Get mute (0: Off, 1: On) of the specified part (Ch1~16)
BSMD_CTRL_SET_SOLO ~ BSMD_CTRL_SET_SOLO + 15	int	I	Set solo (0: Off, 1: On) to the specified part (Ch1~16)
BSMD_CTRL_GET_SOLO ~ BSMD_CTRL_GET_SOLO + 15	int	O	Get solo (0: Off, 1: On) of the specified part (Ch1~16)

Control	**Data**		**Description**
	Type	**I/O**	
BSMD_CTRL_GET_AUDIO_U NIT			Get AudioUnit

4.4.35. version

```
void version ()

       Input:

                BSMD_HANDLE handle         Effective handle of the library

                LPTSTR engine              Version of Synthesizer Engine Library

                int engineSize             Length of engine

                LPTSTR driver              Version of MIDI Driver Library

                int driverSize             Length of driver

       Output:

                void
```

Get the name of MIDI Driver Library and Synthesizer Engine Library.

4.5. Callback (BSMD_CALLBACK)

Callback function provides various information to the application. It is specified on 4.4.1 initialize, with function type defined in section 4.2.2. BSMD_CALLBACK.
Each callback is called from calculation thread of synthesizer. So the application can not spend long duration on receiving them.

4.5.1. Open

```
type = BSMD_CALLBACK_TYPE_OPEN, data = Not used
```

Wave output driver has been opened

4.5.2. Close

```
type = BSMD_CALLBACK_TYPE_CLOSE, data = Not used
```

Wave output driver has been closed

4.5.3. Start

```
type = BSMD_CALLBACK_TYPE_START, data = Not used
```

Real-time MIDI function has been started

4.5.4. Stop

```
type = BSMD_CALLBACK_TYPE_STOP, data = Not used
```

Real-time MIDI function has been stopped

4.5.5. Audio Frame

```
type = BSMD_CALLBACK_TYPE_FRAME, data = (BSMD_FRAME *) frameData
```

Called on every frames of wave output process

4.5.6. File Start

`type = BSMD_CALLBACK_TYPE_FILE_START, data = Not used`

Playback has been started

4.5.7. File Stop

`type = BSMD_CALLBACK_TYPE_FILE_STOP, data = (unsigned long *) errorcode`

Playback has been stopped

```
errorcode:
        0：Normal
        BSMD_ERR_AUDIO_DRIVER：Error stop by wave output driver
        BSMD_ERR_DATA：Error stop by data
```

4.5.8. File Seek

`type = BSMP_CALLBACK_TYPE_FILE_SEEK, data = Not ussed`

Playback song position has been changed.

If your application calculates song position using 4.5.9 MIDI Clockcallback, please reset song position to start, tempo to 120[BPM], on receiving this callback.

4.5.9. MIDI Clock

`type = BSMP_CALLBACK_TYPE_CLOCK, data = Not used`

Standard MIDI clock (24[TPQN])

4.5.10. Tempo

`type = BSMP_CALLBACK_TYPE_TEMPO, data = (unsigned long *) tempo`

Playback tempo has been changed ([usec/beat])

4.5.11. Time Signature

```
type = BSMP_CALLBACK_TYPE_TIME_SIGNATURE, data = (unsigned long *) timeSignature
```

Playback time signature（nn/dd/cc/bb）has been changed.

4.5.12. Channel Message

```
type = BSMP_CALLBACK_TYPE_CHANNEL_MESSAGE, data = (unsigned long *) data
```

Channel message has been sent by player

```
        bit 31-24: MIDI Port (0x00 ~ )

        bit 23 - 16: Status byte (0x90 ~ 0xEF)

        bit 15 – 8 : First Data (0x00 ~ 0x7F)

        bit 7 – 0 : Second Data (0x00 ~ 0x7F)
```

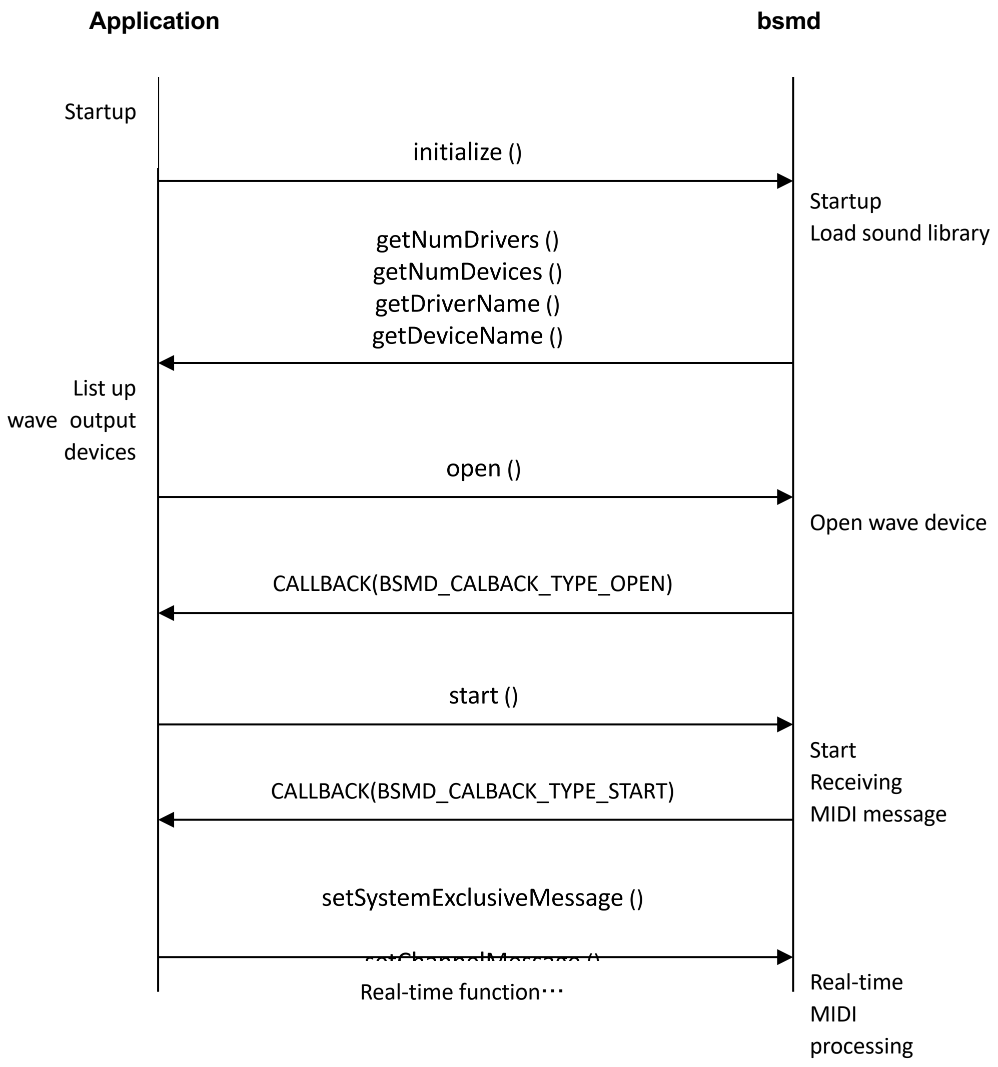
4.5.13. System Exclusive Message

```
type = BSMP_CALLBACK_TYPE_SYSTEM_EXCLUSIVE_MESSAGE, data = Not used
```

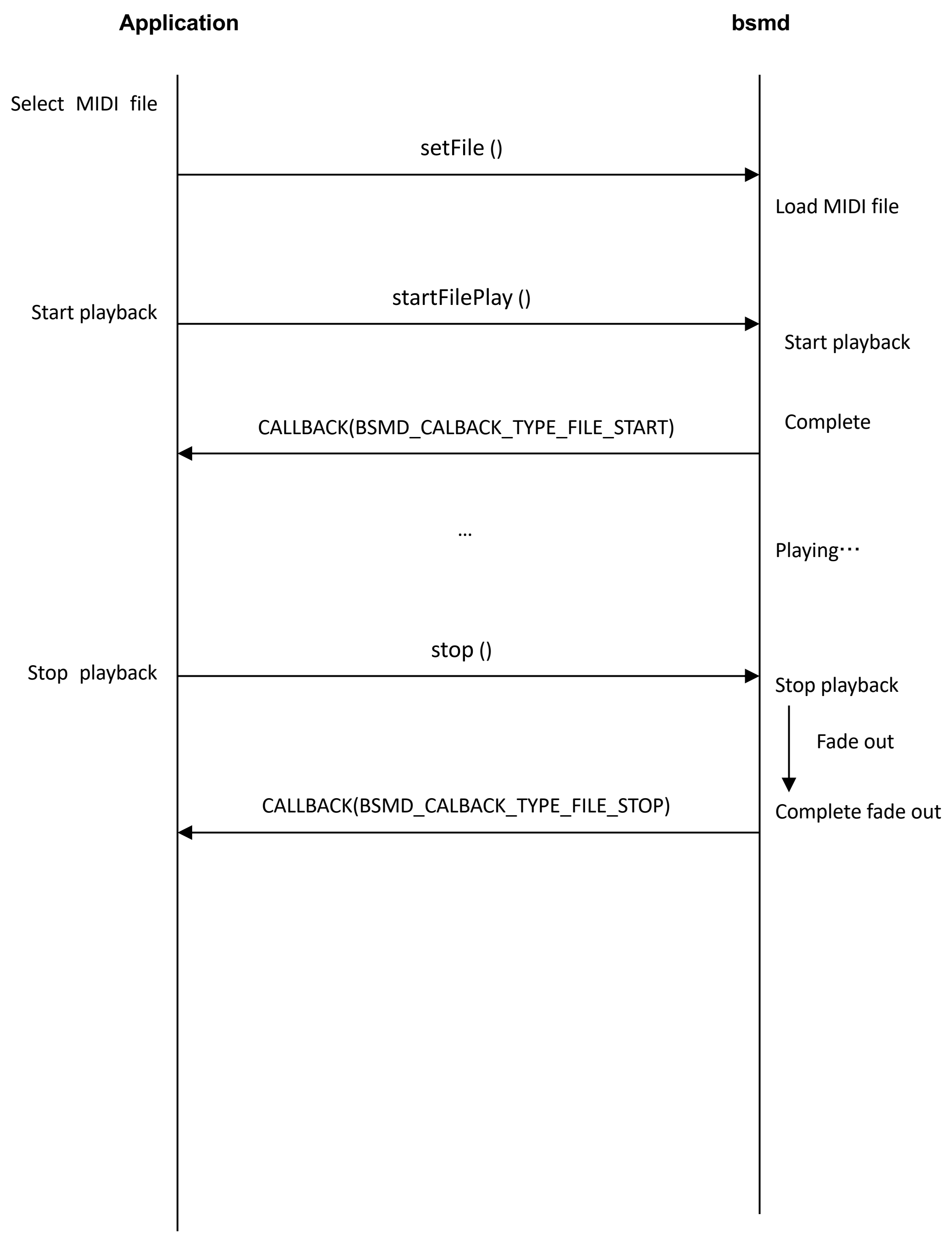
System exclusive message has been sent by player.

4.6. Sequences

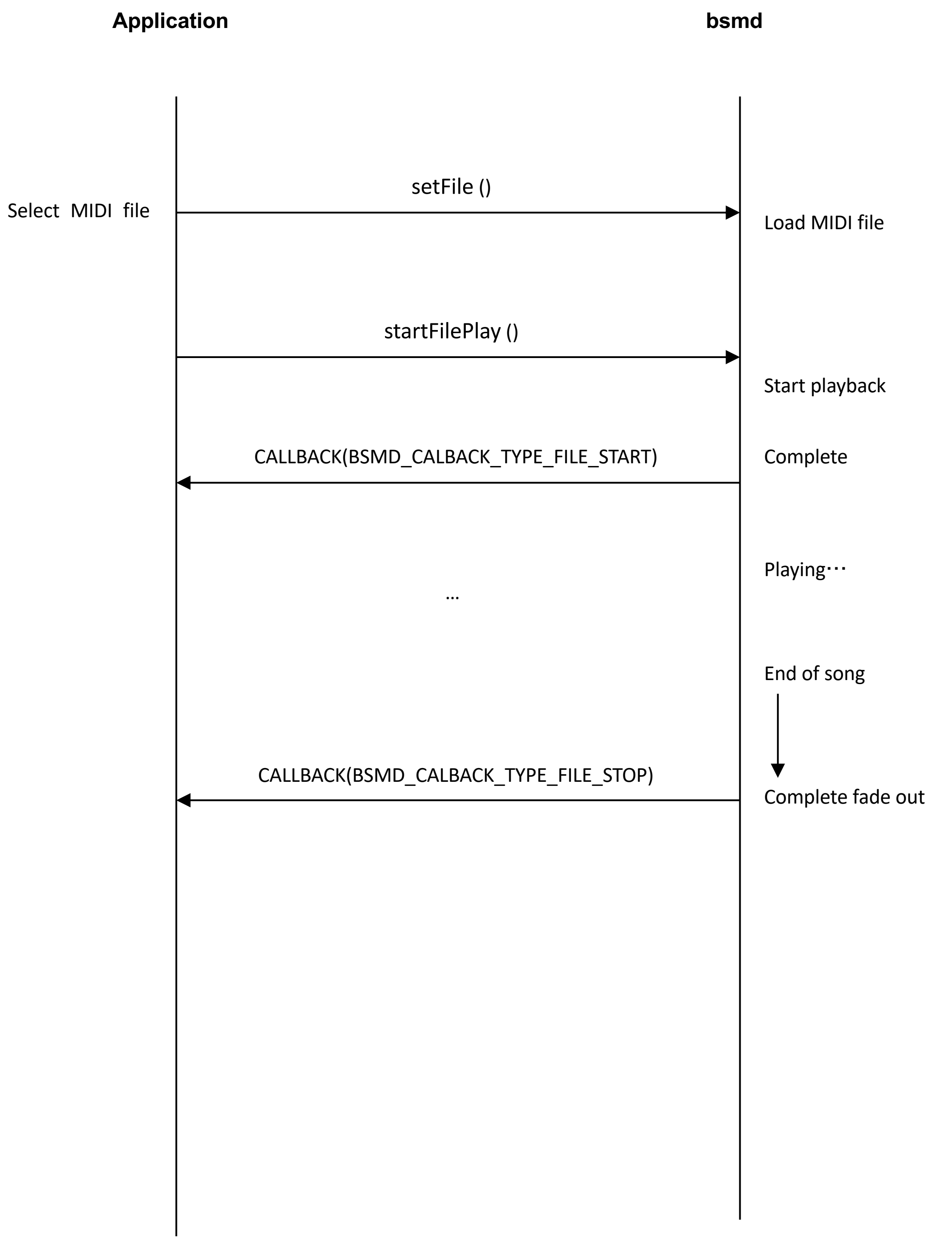
4.6.1. Initializing



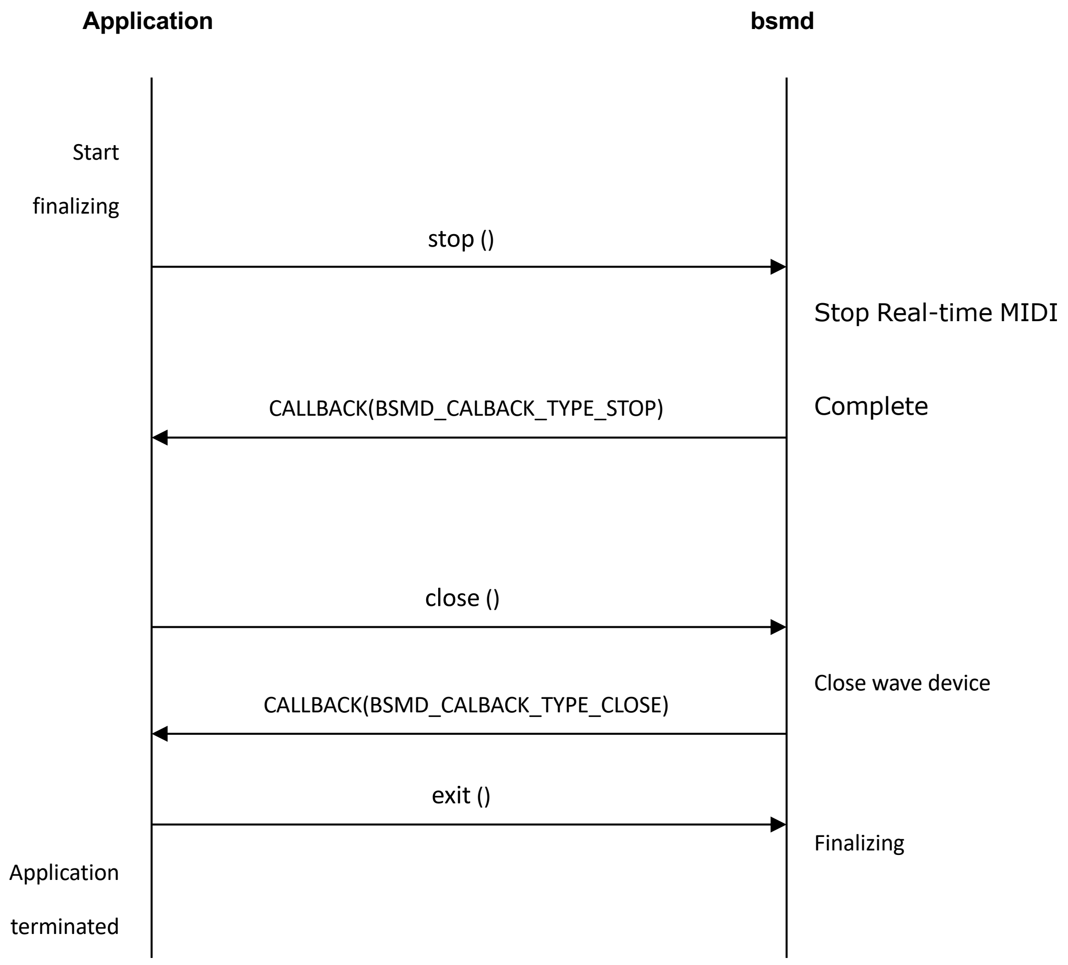
4.6.2. Specifying the MIDI Files – Start Playback – Stop by User



4.6.3. Specifying the MIDI File – Start Playback – End of the Song



4.6.4. Finalizing



5. Appendix

5.1. About DLS File Format

Wave format in <wave-list> chunk should satisfy following specification.

- linear PCM
- monaural

Following modulation routings are not supported. All parameters work with default value.

- Key Number Generator
  - MIDI Note to Key
  - RPN2 to Key
- Filter
  - Mod LFO CC1 to Fc
  - Mod LFO Channel Press. to Fc
- Gain
  - Mod LFO CC1 to Gain
  - Mod LFO Chan. Press. to Gain
  - Velocity to Gain
  - MIDI CC7 to Gain
  - MIDI CC11 to Gain
- Pitch
  - Pitch Wheel RPN0 to Pitch
  - RPN1 to Pitch
  - Vib LFO CC1 to Pitch
  - Vib LFO Chan. Press. to Pitch
  - Mod LFO CC1 to Pitch
  - Mod LFO Chan. Press. to Pitch
- Output
  - MIDI CC10 to Pan
  - Default Reverb Send
  - Default Chorus Send