BioStar SDK

Reference Manual

Rev. 1.9

Revision History

Rev No.	Issued date	**Description**
1.0	2008 Nov. 4	Initial Release.
1.1	2008 Dec. 3	Incorporated BioLite Net.
1.2	2009 Jun.17	- Supports integration with 3rd party RF device - 'subevent' field in BSLogRecord is described.
1.25	2009 Nov.10	- 'useFastIDMatching'filed in BSOPModeConfig is described. - Supports server APIs which can be used for making server applications. - Supports interactive APIs, which can be used for displaying user define messages and user define images, user define sounds.
1.26	2010 Apr. 6	- Incorporated Xpass. - 'BS_OpenSocketEx' function is added. 'BS_OpenSocketEx' function can open the network interface to the target IP with specific host IP. - 'disableAutoResult' field in BSDisplayConfig is added. - 'openOnce' field in BSDoor is added. - 'deviceID' field in BSInputFunction is added. - 'deviceID' field in BSOuptutEvent is added. - 'support100BaseT' field in BEConfigData and BEConfigDataBLN is added. - 'useTermination' field in BEConfigDataBLN is added.
1.3	2010 Jul 6	- Incorporated D-Station - 'theme'field in BSDisplayConfig is added. - DSTnaEventConfig ,DSTnaEventExConfig, DSSerialConfig, DS485NetworkConfig DSOPModeConfig, DSFaceConfig, DSDisplayConfig, DSInputConfig , DSFingerprintConfig, DSWLANPreset, DSSaveImageEventConfig and DSWLANConfig are added. - BSLogRecordEx and BSImageLogHdr are added. - Communication API

		BS_OpenUSBEx is added. - Log Management API BS_ClearLogCacheEx, BS_ReadLogCacheEx, BS_ReadLogEx and BS_ReadNextLogEx are added. - Image Log Management API BS_ReadImageLog, BS_GetImageLogCount, BS_DeleteImageLog, BS_DeleteAllImageLog and BS_ReadSpecificImageLog are added - Display Setup API BS_SendNoticeEx - User Management API BS_GetUserImage, BS_SetUserImage, BS_GetUserFaceInfo, BS_EnrollFace, BS_EnrollUserDStation, BS_EnrollMultipleUserDStation, BS_GetAllUserInfoDStation, BS_GetUserInfoDStation, BS_GetUserDStation and BS_ReadFaceData are added. - Configuration API BS_WriteDSTnaEventConfig, BS_ReadDSTnaEventConfig, BS_WriteDSTnaEventExConfig, BS_ReadDSTnaEventExConfig, BS_SetDSProtection, BS_WriteDSSaveImageEventConfig, BS_ReadDSSaveImageEventConfig, BS_WriteFaceConfig, BS_ReadFaceConfig, BS_WriteDSInputConfig, BS_ReadDSInputConfig, BS_WriteDSWiegandConfig,

		BS_ReadDSWiegandConfig, BS_WriteDS485NetworkConfig, BS_ReadDS485NetworkConfig, BS_WriteDSSerialConfig, BS_ReadDSSerialConfig, BS_WriteDSOPModeConfig, BS_ReadDSOPModeConfig, BS_WriteDSDisplayConfig, BS_ReadDSDisplayConfig, BS_WriteDSFingerprintConfig,i BS_ReadDSFingerprintConfig, BS_WriteDSWLANConfig and BS_ReadDSWLANConfig are added
1.31	2010 Aug 10	- Incorporated iCLASS - 'fullCardCustomID' item in BEUserHdr is added. - 'fullCardCustomID' item in BECommandCard is added. - 'customID' item in BSUserHdrEx is changed to unsigned int. - BSiClassConfig and BSiClassCardHeader are added. - BSBlacklistItemEx struct is added. - Configuration API BS_WriteiClassConfiguration, BS_ReadiClassConfiguration, BS_ChangeiClassKey, BS_WriteiClassCard, BS_ReadiClassCard, BS_FormatiClassCard, BS_AddBlacklistEx, BS_DeleteBlacklistEx, BS_ReadBlacklistEx are added.
1.35	2010 Dec 8	- Incorporated X-Station - XSTnaEventConfig, XSTnaEventExConfig struct are added. - XSSerialConfig, XS485NetworkConfig struct are added. - XSOPModeConfig struct is added. - XSSaveImageEventConfig struct is added. - XSDisplayConfig struct is added.

		- XSInputConfig struct is added. - XSUserHdr struct is added. - XSWiegandConfig struct is added. - User Management API BS_EnrollUserXStation, BS_EnrollMultipleUserXStation, BS_GetAllUserInfoXStation, BS_GetUserInfoXStation, BS_GetUserXStation are added. - Configuration API BS_WriteXSTnaEventConfig, BS_ReadXSTnaEventConfig, BS_WriteXSTnaEventExConfig, BS_ReadXSTnaEventExConfig, BS_WriteXSSaveImageEventConfig, BS_ReadXSSaveImageEventConfig, BS_WriteXSInputConfig, BS_ReadXSInputConfig, BS_WriteXSWiegandConfig, BS_ReadXSWiegandConfig, BS_WriteXS485NetworkConfig, BS_ReadXS485NetworkConfig, BS_WriteXSSerialConfig, BS_ReadXSSerialConfig, BS_WriteXSOPModeConfig, BS_ReadXSOPModeConfig, BS_WriteXSDisplayConfig, BS_ReadXSDisplayConfig are added. - Server API BS_SetImageLogCallback is added.
1.5	2011 June 30	- Incorporated BioStation2. - BS2TnaEventConfig, BS2TnaEventExConfig struct are added. - BS2SerialConfig,BS2485NetworkConfig struct is added. - BS2OPModeConfig struct is added. - BS2SaveImageEventConfig struct is added.

		- BS2DisplayConfig struct is added. - BS2InputConfig struct is added. - BS2UserHdr struct is added. - BS2WiegandConfig struct is added. - BS2FingerprintConfig struct is added. - BS2WLANPreset, BS2WLANConfig struct is added. - User Management API BS_EnrollUserBiotation2, BS_EnrollMultipleUserBioStation2, BS_GetAllUserInfoBioStation2, BS_GetUserInfoBioStation2, BS_GetUserBioStation2, BS_ReadImageEx are added. - Configuration API BS_WriteBS2TnaEventConfig, BS_ReadBS2TnaEventConfig, BS_WriteBS2TnaEventExConfig, BS_ReadBS2TnaEventExConfig, BS_WriteBS2SaveImageEventConfig, BS_ReadBS2SaveImageEventConfig, BS_WriteBS2InputConfig, BS_ReadBS2InputConfig, BS_WriteBS2WiegandConfig, BS_ReadBS2WiegandConfig, BS_WriteBS2485NetworkConfig, BS_ReadBS2485NetworkConfig, BS_WriteBS2SerialConfig, BS_ReadBS2SerialConfig, BS_WriteBS2OPModeConfig, BS_ReadBS2OPModeConfig, BS_WriteBS2DisplayConfig, BS_ReadBS2DisplayConfig, BS_WriteBS2FingerprintConfig, BS_ReadBS2FingerprintConfig, BS_WriteBS2WLANConfig, BS_ReadBS2WLANConfig,

		BS_WriteBS2InterphoneConfig, BS_ReadBS2InterphoneContifg are added.
1.52	2011 Jan 16	- Incorporated Xpass Slim. - Xpass Slim is all same with Xpass, but not supporting Mifare data card.
1.6	2012 Apr 10	- Incorporated FaceStation. - FSTnaEventConfig, FSTnaEventExConfig structure are added. - FSUSBConfig, FSSerialConfig and FS485NetworkConfig structure are added. - FSSaveImageEventConfig is added. - FSWLANPreset, FSWLANConfig structure are added. - FSDisplayConfig is added. - FSInterphoneConfig is added. - FSOPModeConfig is added. - FSFaceConfig is added. - FSInputConfig is added. - FSUserHdr and FSUserTemplateHdr are added. - FSWiegandConfig is added. - User Management API BS_EnrollMultipleUserFStation, BS_GetAllUserInfoFStation, BS_GetUserInfoFStation, BS_GetUserFStation, BS_ScanFaceTemplate are added. - Configuration API BS_WriteFSTnaEventConfig, BS_ReadFSTnaEventConfig, BS_WriteFSTnaEventExConfig, BS_ReadFSTnaEventExConfig, BS_WriteFSSaveImageEventConfig, BS_ReadFSSaveImageEventConfig, BS_WriteFSInputConfig, BS_ReadFSInputConfig, BS_WriteFSWiegandConfig, BS_ReadFSWiegandConfig,

		BS_WriteFS485NetworkConfig, BS_ReadFS485NetworkConfig, BS_WriteFSSerialConfig, BS_ReadFSSerialConfig, BS_WriteFSOPModeConfig, BS_ReadFSOPModeConfig, BS_WriteFSDisplayConfig, BS_ReadFSDisplayConfig, BS_WriteFSFaceConfig, BS_ReadFSFaceConfig, BS_WriteFSWLANConfig, BS_ReadFSWLANConfig, BS_WriteFSInterphoneConfig, BS_ReadFSInterphoneConfig, BS_WriteFSUSBConfig, BS_ReadFSUSBConfig, BS_WriteBSVideophoneConfig, BS_ReadBSVideophoneConfig are added.
1.61	2012 Jun 25	- Incorporated BioEntry W - BioEntry W is all same with BioEntryPlus.
1.62	2013 Jan 2	- FSUserHdrEx struct is added. - User Management API BS_EnrollUserFStationEx is added. BS_EnrollMultipleUserFStationEx is added. BS_GetAllUserInfoFStationEx is added. BS_GetUserInfoFStationEx is added. BS_GetUserFStationEx is added. - Miscellaneous API BS_UTF8ToString is added. BS_UTF16ToString is added. BS_EncryptSHA256 is added.
1.7	2013 Aug 30	- DSInterphoneConfig struct is added. - XSInterphoneConfig struct is added. - XSPINOnlyModeConfig struct is added. - Configuration API BS_WriteDSInterphoneConfig is added.

		BS_ReadDSInterphoneConfig is added. BS_WriteXSInterphoneConfig is added. BS_ReadXSInterphoneConfig is added. BS_WriteXSPINOnlyModeConfig is added. BS_ReadXSPINOnlyModeConfig is added.
1.8	2014 Apr 25	- Incorporated Xpass S2. - Xpass S2 is all same with Xpass Slim
1.8	2014 Sep 11	- BS_EnrollMultipleUserBEPlus
1.8	2015 Mar 13	- BS_WriteMifareConfiguration/BS_ReadMifareConfiguration - Xpass/Xpass Slim/Xpass S2 Support
1.81	2015 Apr 16	- Minor bug fix.
1.9	2015 Sep 4	- BS_UnInitSDK is added.

Contents

1. Introduction

1.1. Contents of the SDK

Directory	Sub Directory	Contents
SDK	Document	BioStar SDK Reference Manual
	Include	Header files
	Lib	- BS_SDK.dll: SDK DLL file - BS_SDK.lib: import library to be linked with C/C++ applications - libusb0.dll: libusb library necessary for accessing BioStation through USB.
	Example	Simple examples showing the basic usage of the SDK. They are written in C++, C#, and Visual Basic[1].

Table 1 Directory Structure of the SDK

1.2. Usage

1.2.1. Compilation

To call APIs defined in the SDK, **BS_API.h** should be included in the source files and **Include** should be added to the include directories. To link user application with the SDK, **BS_SDK.lib** should be added to library modules.

The following snippet shows a typical source file.

```
#include “BS_API.h”
int main()
{
      // First, initialize the SDK
      BS_RET_CODE result = BS_InitSDK();
```

[1] The Visual Basic example does not work with BioLite Net.

```
        // Open a communication channel
        int handle;
        result = BS_OpenSocket( “192.168.1.2”, 1470, &handle );

        // Get the ID and the type of the device
        unsigned deviceId;
        int deviceType;

        result = BS_GetDeviceID( handle, &deviceId, &deviceType );

        // Set the ID and the type of the device for further commands
        BS_SetDeviceID( handle, deviceId, deviceType );

        // Do something
        result = BS_ReadLog( handle, … );
        // …

        // Release resource in the SDK
        result = BS_UnInitSDK();
  }
```

1.2.2. Using the DLL

To run applications compiled with the SDK, the BS_SDK.dll file should be in the system directory or in the same directory of the application.

1.2.3. Auxiliary DLL

BS_SDK.dll is dependent on libusb for accessing BioStation through USB. It is included in BioAdmin and BioStar packages. It is also included in the Lib directory of the SDK.

1.3. BioStar SDK vs. BioStation SDK

BioStar, Suprema’s new access control software will replace BioAdmin. BioStation SDK, on which BioAdmin is based, will also be superseded by BioStar SDK. From the viewpoint of developers, the differences between the two SDKs are incremental. You can think of BioStar SDK as an upgraded version of BioStation SDK. Most APIs of BioStation SDK will work in BioStar SDK without modification. However, the descriptions of the deprecated APIs of BioStation SDK are removed from this manual. For the general differences between BioAdmin and BioStar, refer to the *BioStar Migration Guide*.

To make use of new features of BioStar SDK, the firmware of BioStation, BioEntry Plus, and BioLite Net should meet the following requirements.

	D-Station	BioStation	BioEntry Plus	BioLite Net	X-Station
Firmware Version	V1.0 or later	V1.5 or later	V1.2 or later	V1.0 or later	V1.0 or later
	Xpass	BioStation T2	Xpass Slim	FaceStation	BioEntry W
Firmware Version	V1.0 or later	V1.0 or later	V1.0 or later	V1.0 or later	V1.0 or later

Table 2 Firmware Compatibility

1.4. BioEntry Plus vs. BioLite Net

BioLite Net has been incorporated into BioStar SDK since version 1.1. BioLite Net shares most of the APIs with BioEntry Plus. When there is a difference in the usage of an API between the two devices, it is explained explicitly in the corresponding section.

1.5. Xpass vs. Other devices

Xpass has been incorporated into BioStar SDK since version 1.26. Xpass shares most of the APIs with BioEntry Plus and BioLite Net. When there is a difference in the usage of an API between the two devices, it is explained explicity in the corresponding section.

1.6. D-Station

D-Station has been incorporated into BioStar SDK since version 1.3. D-Station shares many APIs with BioStation but has a lot of exclusive API with other device. When there is a difference in the usage of an API between the two devices, it is explained explicity in the corresponding section.

1.7. X-Station

X-Station has been incorporated into BioStar SDK since version 1.35. X-Station shares many APIs with D-Station but doesn't support fingerprint and face templates. When there is a difference in the usage of an API between the two devices, it is explained explicity in the corresponding section.

1.8. BioStation T2

BioStation T2 has been incorporated into BioStar SDK since version 1.5. BioStation T2 shares many APIs with D-Station but doesn't support face recognition. When there is a difference in the usage of an API between the three devices, it is explained explicity in the corresponding section.

1.9. Xpass Slim

Xpass Slim has been incorporated into BioStar SDK since version 1.52. Xpass Slim shares most of the APIs with Xpass. When there is a difference in the usage of an API between the two devices, it is explained explicity in the corresponding section.

1.10. FaceStation

FaceStation has been incorporated into BioStar SDK since version 1.6. FaceStation shares many APIs with D-Station but doesn't support fingerprint. FaceStation supports different face templates from D-Station. When there is a difference in the usage of an API between the two devices, it is explained explicity in the corresponding section.

1.11. BioEntry W

BioEntry W has been incorporated into BioStar SDK since version 1.61. BioEntry W shares most of the APIs with Xpass. When there is a difference in the usage of an API between the two devices, it is explained explicity in the corresponding section.

2. QuickStart Guide

This chapter is for developers who want to get started quickly with BioStar SDK. It shows how to do the most common tasks for writing BioStar applications. Only snippets of C++ source codes will be listed below. You can find out more detailed examples written in C++, C#, and Visual Basic in the **Example** directory of the SDK.

2.1. Initialization

First of all, you have to initialize the SDK. The **BS_InitSDK** should be called once before calling any other functions. To release the resource, use the **BS_UnInitSDK** at the end of usage.

2.2. Connect to Devices

The second task is to open a communication channel to the device. The available network options vary according to the device type. D-Station, X-Station, BioStation T2, FaceStation, BioStation, BioEntry Plus, BioEntry W, BioLite Net, Xpass and Xpass Slim support Ethernet and RS485, while USB, USB memory, RS232, and WLAN(optional) are available for BioStation, D-Station, BioStation T2, and FaceStation only.

2.2.1. Ethernet

The LAN connection between BioStar applications and devices has two modes – direct and server. As for the differences between the two modes, refer to the *BioStar Administrator Guide* and the *Ethernet Troubleshooting Guide*. To connect to a device using BioStar SDK, you have to use direct mode.

You also have to know the IP address and the TCP port of the device. If you do not know this information, you have to search the devices, first. The **BS_SearchDevicesInLAN** function is provided for this purpose. You can find multiple devices in a subnet using this function.

```
    // (1) Open a UDP port
    int udpHandle;
    BS_OpenInternalUDP( &udpHandle );

    // (2) Search devices in a subnet
    int numOfDevice;
    unsigned deviceID[MAX_DEVICE];
    int deviceType[MAX_DEVICE];
    unsigned ipAddress[MAX_DEVICE];
    BS_RET_CODE result = BS_SearchDeviceInLAN( udpHandle, &numOfDevice,
deviceID, deviceType, ipAddress );

    // (3) Connect to devices
    for( int i = 0; i < numOfDevice; i++ )
    {
        int tcpHandle;
        int port = 1470;

        if (deviceType[i] == BS_DEVICE_BIOSTATION ||
            deviceType[i] == BS_DEVICE_DSTATION ||
            deviceType[i] == BS_DEVICE_XSTATION ||
            deviceType[i] == BS_DEVICE_BIOSTATION2 ||
            deviceType[i] == BS_DEVICE_FSTATION)
           port = 1470;
        else
            port = 1471;

        char ipAddrBuf[32];

        sprintf(ipAddrBuf, "%d.%d.%d.%d", ipAddress[i] & 0xff, (ipAddress[i]
        & 0xff00) >> 8, (ipAddress[i] & 0xff0000) >> 16, (ipAddress[i] &
        0xff000000) >> 24 );

        result = BS_OpenSocket( ipAddrBuf, port, &tcpHandle );

        result = BS_SetDeviceID( tcpHandle, deviceID[i], deviceType[i] );

        // do something
        // …

        BS_CloseSocket( tcpHandle );
    }
```

Of course, if you already know this information, you can call **BS_OpenSocket** directly. After acquiring a handle for a communication interface, you have to call **BS_SetDeviceID** before sending any other commands.

2.2.2. RS485

To communicate with a device connected to the host PC through RS485, the RS485 mode should be set as follows;

- For BioEntry Plus, BioLite Net, Xpass and Xpass Slim the **serialMod**e of

BEConfigData should be SERIAL_PC. See **BS_WriteConfig** for details.

- For BioStation, the **deviceType** of **BS485NetworkConfig** should be TYPE_CONN_PC. See **BS_Write485NetworkConfig** for details.
- For D-Station, the **baudRate** of **DS485NetworkConfig** should be equal to PC's. See **BS_WriteDS485NetworkConfig** for details.
- For X-Station, the **baudRate** of **XS485NetworkConfig** should be equal to PC's. See **BS_WriteXS485NetworkConfig** for details.
- For BioStation T2, the **baudRate** of **BS2485NetworkConfig** should be equal to PC's. See **BS_WriteBS2485NetworkConfig** for details.
- For FaceStation, the **baudRate** of **FS485NetworkConfig** should be equal to PC's. See **BS_WriteFS485NetworkConfig** for details

You can find devices in a RS485 network using **BS_SearchDevice**.

```
    // (1) Open a serial port
    int handle;
    BS_OpenSerial485( "COM1", 115200, &handle );

    // (2) Search devices
    int numOfDevice;
    unsigned deviceID[MAX_DEVICE];
    int deviceType[MAX_DEVICE];
    BS_RET_CODE result = BS_SearchDevice( handle, deviceID, deviceType,
&numOfDevice );

    // (3) Communicate with devices
    for( int i = 0; i < numOfDevice; i++ )
    {
        // you need not open another channel

        result = BS_SetDeviceID( handle, deviceID[i], deviceType[i] );

        // do something
        // …
    }
```

The RS485 port of a device can also be used for transferring data between devices. See **BS_OpenSerial485** and **BS_Search485Slaves** for details.

2.2.3. Miscellaneous

In addition to Ethernet and RS485, BioStation also provides USB, USB memory, RS232, and WLAN(only for wireless models). The connection procedure to the WLAN devices is same as that of Ethernet, as long as the wireless parameters are

configured correctly using **BS_WriteWLANConfig**.

As for USB, USB memory, and RS232, the connection procedure is much simpler. You only have to open the corresponding network interface using **BS_OpenUSB, BS_OpenUSBEx**, **BS_OpenUSBMemory**, and **BS_OpenSerial** respectively.

2.2.4. Wiegand

FaceStation, BioStation T2, D-Station, Biostation, BioLite Net, BioEntry Plus(H/W Rev.E and later), BioEntry W, X-Station, Xpass or Xpass Slim has a Wiegand Input interface so that it can accept Wiegand string from attached RF device. There are two operation modes for this Wiegand interface, one of which is called as 'legacy' mode and the other is 'extended' mode. In the previous version of BioStar SDK, only legacy mode was supported, and extended mode was newly added in BioStar SDK V1.2. The Suprema device configured as a legacy mode will treat a connected RF device as it's simple peripheral extending RF capability in essence, which means that data from RF device though Wiegand interface will be processed in exactly same way with data from RF module embedded in Suprema device.

```
if( deviceType == BS_DEVICE_BIOSTATION )
{
    // (1) Read the configuration first
    BSIOConfig ioConfig;
    result = BS_ReadIOConfig( handle, &ioConfig );
    // (2) Change the corresponding fields
    ioConfig.wiegandMode = BS_IO_WIEGAND_MODE_LEGACY;
    ioConfig.input[0] = BS_IO_INPUT_WIEGAND_CARD;
    ioConfig.input[1] = BS_IO_INPUT_WIEGAND_CARD;
    ioConfig.cardReaderID = 0;

    // (3) Write the configuration
    result = BS_WriteIOConfig( handle, &ioConfig );
}
else if( deviceType == BS_DEVICE_DSTATION)
{
    // (1) Read the configuration first
    DSWiegandConfig wiegandConfig;
    result = BS_ReadDSWiegand( handle, & wiegandConfig);
    // (2) Change the corresponding fields
    wiegandConfig.mode = DSWiegandConfig::MODE_LEGACY;
    wiegandConfig.InOut = DSWiegandConfig::CARD_IN;
    wiegandConfig.cardReaderID = 0;

    // (3) Write the configuration
    result = BS_WriteDSWiegand( handle, & wiegandConfig);
}
else if( deviceType == BS_DEVICE_XSTATION)
{
    // (1) Read the configuration first
```

```
        XSWiegandConfig wiegandConfig;
        result = BS_ReadXSWiegand( handle, & wiegandConfig);
        // (2) Change the corresponding fields
        wiegandConfig.mode = XSWiegandConfig::MODE_LEGACY;
        wiegandConfig.InOut = XSWiegandConfig::CARD_IN;
        wiegandConfig.cardReaderID = 0;

        // (3) Write the configuration
        result = BS_WriteXSWiegand( handle, & wiegandConfig);
    }
    else if( deviceType == BS_DEVICE_BIOSTATION2)
    {
        // (1) Read the configuration first
        BS2WiegandConfig wiegandConfig;
        result = BS_ReadBS2Wiegand( handle, & wiegandConfig);
        // (2) Change the corresponding fields
        wiegandConfig.mode = BS2WiegandConfig::MODE_LEGACY;
        wiegandConfig.InOut = BS2WiegandConfig::CARD_IN;
        wiegandConfig.cardReaderID = 0;

        // (3) Write the configuration
        result = BS_WriteBS2Wiegand( handle, & wiegandConfig);
    }
    else if( deviceType == BS_DEVICE_FSTATION)
    {
        // (1) Read the configuration first
        FSWiegandConfig wiegandConfig;
        result = BS_ReadFSWiegand( handle, & wiegandConfig);
        // (2) Change the corresponding fields
        wiegandConfig.mode = FSWiegandConfig::MODE_LEGACY;
        wiegandConfig.InOut = FSWiegandConfig::CARD_IN;
        wiegandConfig.cardReaderID = 0;

        // (3) Write the configuration
        result = BS_WriteFSWiegand( handle, & wiegandConfig);
    }
    else if( deviceType == BS_DEVICE_BIOENTRY_PLUS ||
             deviceType == BS_DEVICE_BIOENTRY_W ||
             deviceType == BS_DEVICE_XPASS ||
             deviceType == BS_DEVICE_XPASS_SLIM )
    {
        // (1) Read the configuration first
        BEConfigData config;
        int size;
        result = BS_ReadConfig( handle, BEPLUS_CONFIG, &size, &config );

        // (2) Change the corresponding fields
        config.wiegandMode = BEConfigData::WIEGAND_MODE_NORMAL;
        config.useWiegandInput = true;
        config.useWiegandOutput = false; //Don’t use both at the same time
        config.wiegandIdType = BEConfigData::WIEGAND_CARD;
        config.wiegandReaderID = 0;

        // (3) Write the configuration
```

```
        result = BS_WriteConfig( handle, BEPLUS_CONFIG, size, &config );
    }
    else if( deviceType == BS_DEVICE_BIOLITE)
    {
        // (1) Read the configuration first
        BEConfigDataBLN config;
        int size;
        result = BS_ReadConfig( handle, BIOLITE_CONFIG, &size, &config );

        // (2) Change the corresponding fields
        config.wiegandMode = BEConfigDataBLN::WIEGAND_MODE_NORMAL;
        config.useWiegandInput = true;
        config.useWiegandOutput = false; //Don't use both at the same time
        config.wiegandIdType = BEConfigDataBLN::WIEGAND_CARD;
        config.wiegandReaderID = 0;

        // (3) Write the configuration
        result = BS_WriteConfig( handle, BIOLITE_CONFIG, size, &config );
    }
```

But in extended mode, totally different view applies. Even if one RF device is attached to Suprema device via Wiegand interface as the case of legacy mode, that RF device is regarded as a independent device which will have it's own I/O port, door, and zone configuration. By SDK APIs added in V1.2, you can assign ID of RF device, configure input, output, and door for it and include it in a zone. Please note that RF device ID should be set as follows for proper operation.

RF device id = Wmaster ID × 16 + 14

where Wmaster means the Suprema device to which this RF device is attached

For example, if a RF device is attached to BioLite Net with ID 11578 should have its ID of 185262(11578 × 16 + 14 = 185262).

```
    if( deviceType == BS_DEVICE_BIOSTATION )
    {
        // (1) Read the configuration first
        BSIOConfig ioConfig;
        result = BS_ReadIOConfig( handle, &ioConfig );
        // (2) Change the corresponding fields
        ioConfig.wiegandMode = BS_IO_WIEGAND_MODE_EXTENDED;
        ioConfig.input[0] = BS_IO_INPUT_WIEGAND_CARD;
        ioConfig.input[1] = BS_IO_INPUT_WIEGAND_CARD;
        ioConfig.cardReaderID = (deviceID * 16 + 14);

        // (3) Write the configuration
        result = BS_WriteIOConfig( handle, &ioConfig );

        // (4) Configure input/output/door for RF device
```

```
        BSCardReaderConfigData rfConfig;
        result = BS_ReadCardReaderConfig( handle, &rfConfig );
        /* Setup parameters */
        /* Input : rfConfig.inputConfig */
        /* Output : rfConfig.outputConfig */
        /* Door : rfConfig.doorConfig */
        result = BS_WriteCardReaderConfig( handle, &rfConfig );
    }
    else if( deviceType == BS_DEVICE_DSTATION )
    {
        // (1) Read the configuration first
        DSWiegandConfig wiegandConfig;
        result = BS_ReadDSWiegand( handle, & wiegandConfig);
        // (2) Change the corresponding fields
        wiegandConfig.cardReaderID = (deviceID * 16 + 14);

        // (4) Write the configuration
        result = BS_WriteDSWiegand( handle, & wiegandConfig);
    }
    else if( deviceType == BS_DEVICE_XSTATION )
    {
        // (1) Read the configuration first
        XSWiegandConfig wiegandConfig;
        result = BS_ReadXSWiegand( handle, & wiegandConfig);
        // (2) Change the corresponding fields
        wiegandConfig.cardReaderID = (deviceID * 16 + 14);

        // (3) Write the configuration
        result = BS_WriteXSWiegand( handle, & wiegandConfig);
    }
    else if( deviceType == BS_DEVICE_BIOSTATION2 )
    {
        // (1) Read the configuration first
        BS2WiegandConfig wiegandConfig;
        result = BS_ReadBS2Wiegand( handle, & wiegandConfig);
        // (2) Change the corresponding fields
        wiegandConfig.cardReaderID = (deviceID * 16 + 14);

        // (3) Write the configuration
        result = BS_WriteBS2Wiegand( handle, & wiegandConfig);
    }
    else if( deviceType == BS_DEVICE_FSTATION )
    {
        // (1) Read the configuration first
        FSWiegandConfig wiegandConfig;
        result = BS_ReadFSWiegand( handle, & wiegandConfig);
        // (2) Change the corresponding fields
        wiegandConfig.cardReaderID = (deviceID * 16 + 14);

        // (3) Write the configuration
        result = BS_WriteFSWiegand( handle, & wiegandConfig);
    }
    else if( deviceType == BS_DEVICE_BIOENTRY_PLUS ||
             deviceType == BS_DEVICE_BIOENTRY_W ||
```

```
            deviceType == BS_DEVICE_XPASS ||
            deviceType == BS_DEVICE_XPASS_SLIM)
{
    // (1) Read the configuration first
    BEConfigData config;
    int size;
    result = BS_ReadConfig( handle, BEPLUS_CONFIG, &size, &config );

    // (2) Change the corresponding fields
    config.wiegandMode = BEConfigData::WIEGAND_MODE_EXTENDED;
    config.useWiegandInput = true;
    config.useWiegandOutput = false; //Don’t use both at the same time
    config.wiegandIdType = BEConfigData::WIEGAND_CARD;
    config.wiegandReaderID = (deviceID * 16 + 14);

    // (3) Write the configuration
    result = BS_WriteConfig( handle, BEPLUS_CONFIG, size, &config );

    // (4) Configure input/output/door for RF device
    BSCardReaderConfigData rfConfig;
    result = BS_ReadConfig( handle, BEPLUS_CONFIG_CARD_READER, &size,
&rfConfig );
    /* Setup parameters */
    /* Input : rfConfig.inputConfig */
    /* Output : rfConfig.outputConfig */
    /* Door : rfConfig.doorConfig */
    result = BS_WriteConfig( handle, BEPLUS_CONFIG_CARD_READER, size,
&rfConfig );
}
else if( deviceType == BS_DEVICE_BIOLITE )
{
    // (1) Read the configuration first
    BEConfigDataBLN config;
    int size;
    result = BS_ReadConfig( handle, BIOLITE_CONFIG, &size, &config );

    // (2) Change the corresponding fields
    config.wiegandMode = BEConfigDataBLN::WIEGAND_MODE_EXTENDED;
    config.useWiegandInput = true;
    config.useWiegandOutput = false; //Don’t use both at the same time
    config.wiegandIdType = BEConfigDataBLN::WIEGAND_CARD;
    config.wiegandReaderID = (deviceID * 16 + 14);

    // (3) Write the configuration
    result = BS_WriteConfig( handle, BIOLITE_CONFIG, size, &config );

    // (4) Configure input/output/door for RF device
    BSCardReaderConfigData rfConfig;
    result = BS_ReadConfig( handle, BIOLITE_CONFIG_CARD_READER, &size,
&rfConfig );
    /* Setup parameters */
    /* Input : rfConfig.inputConfig */
    /* Output : rfConfig.outputConfig */
    /* Door : rfConfig.doorConfig */
```

```
    result = BS_WriteConfig( handle, BIOLITE_CONFIG_CARD_READER, size,
&rfConfig );
}
```

2.3. Configure Devices

You can configure the settings of each device using **BS_WriteXXXConfig** functions. To prevent unwanted corruptions of device configuration, you are strongly advised to read **3.7 Configuration API** carefully. It is also a good practice to call **BS_ReadXXXConfig** first before **BS_WriteXXXConfig**. By modifying only the necessary fields, you can minimize the risk of corrupting the configuration.

```
// If you are to change the security level of a BioStation device
// (1) Read the configuration first
BSFingerprintConfig config;
result = BS_ReadFingerprintConfig( handle, &config );

// (2) Change the corresponding fields
config.security = BS_SECURITY_SECURE;

// (3) Write the configuration
result = BS_WriteFingerprintConfig( handle, &config );
```

2.4. Enroll Users

To enroll users to devices, you have to fill the header information correctly in addition to the fingerprint templates. The following table shows the APIs for managing users for FaceStation, BioStation T2, D-Station, X-Statation, BioStation, BioEntry Plus, BioEntry W, BioLite Net, Xpass and Xpass Slim.

	BioStation	BioEntry Plus/ BioLite Net/Xpass/Xpass Slim
User header	BSUserHdrEx	BEUserHdr
Enroll a user	BS_EnrollUserEx	BS_EnrollUserBEPlus
Enroll multiple users	BS_EnrollMultipleUserEx	BS_EnrollMultipleUserBEPlus
Get user header information	BS_GetUserInfoEx BS_GetAllUserInfoEx	BS_GetUserInfoBEPlus BS_GetAllUserInfoBEPlus

Get user information including template	BS_GetUserEx	BS_GetUserBEPlus
Delete a user	BS_DeleteUser	
Delete multiple users	BS_DeleteAllUser BS_DeleteMultipleUsers	
Get user DB information	BS_GetUserDBInfo	

Table 3-1 User Management APIs

The following table shows the APIs for managing users for D-Station.

	D-Station
User header	DSUserHdr
Enroll a user	BS_EnrollUserDStation
Enroll multiple users	BS_EnrollMultipleUserDStation
Enroll user face	BS_EnrollFace
Get user header information	BS_GetUserInfoDStation BS_GetAllUserInfoDStation
Get user information including template, face template	BS_GetUserDStation
Get user face template	BS_GetUserFaceInfo
Delete a user	BS_DeleteUser
Delete multiple users	BS_DeleteAllUser BS_DeleteMultipleUsers

Table 4-2 D-Station User Management APIs

The following table shows the APIs for managing users for X-Station.

	X-Station
User header	XSUserHdr
Enroll a user	BS_EnrollUserXStation
Enroll multiple users	BS_EnrollMultipleUserXStation
Get user header information	BS_GetUserInfoXStation BS_GetAllUserInfoXStation
Get user information	BS_GetUserXStation
Delete a user	BS_DeleteUser
Delete multiple users	BS_DeleteAllUser BS_DeleteMultipleUsers

Table 5-3 X-Station User Management APIs

The following table shows the APIs for managing users for BioStation T2.

	BioStation T2
User header	BS2UserHdr
Enroll a user	BS_EnrollUserBioStation2
Enroll multiple users	BS_EnrollMultipleUserBioStation2
Get user header information	BS_GetUserInfoBioStation2 BS_GetAllUserInfoBioStation2
Get user information	BS_GetUserBioStation2
Delete a user	BS_DeleteUser
Delete multiple users	BS_DeleteAllUser BS_DeleteMultipleUsers

Table 6-3 BioStation2 User Management APIs

The following table shows the APIs for managing users for FaceStation. If the FaceStation's firmware version is less than or equal to 1.1, use FSUserHdr, BS_EnrollUserFStation, BS_EnrollMultipleUserFStation, BS_GetUserInfoFStation, BS_GetAllUserInfoFStation, BS_GetUserFStation. If the firmware version is 1.2 or later, use FSUserHdrEx, BS_EnrollUserFStationEx, BS_EnrollMultipleUserFStationEx, BS_GetUserInfoFStationEx, BS_GetAllUserInfoFStationEx, BS_GetUserFStationEx.

	FaceStation (FW ver <= 1.1)	FaceStation(FW Ver >= 1.2)
User header	FSUserHdr	FSUserHdrEx
Enroll a user	BS_EnrollUserFStation	BS_EnrollUserFStationEx
Enroll multiple users	BS_EnrollMultipleUserFStation	BS_EnrollMultipleUserFStationEx
Get user header information	BS_GetUserInfoFStation BS_GetAllUserInfoFStation	BS_GetUserInfoFStationEx BS_GetAllUserInfoFStationEx
Get user information	BS_GetUserFStation	BS_GetUserFStationEx
Delete a user	BS_DeleteUser	
Delete multiple users	BS_DeleteAllUser BS_DeleteMultipleUsers	

Table 7-4 FaceStation User Management APIs

2.4.1. User Header

FaceStation, BioStation T2, D-Station, BioStation, BioEntry Plus, BioEntry W, BioLite Net, X-Station, Xpass and Xpass Slim have different header structures reflecting the capacity of each device. For example, BioStation has user name and password fields, while BioEntry Plus has only user ID field. FaceStation, X-Station, Xpass and Xpass Slim do not use template data because X-Station, Xpass and Xpass Slim only support card and FaceStation only support face. For detailed description of each field, refer to **BS_EnrollUserEx, BS_EnrollUserBEPlus , BS_EnrollUserDStation, BS_EnrollUserXStation**, **BS_EnrollUserBioStation2** and **BS_EnrollUserFStation(Ex).**

2.4.2. Scan templates

You can use SFR300, SFR400, SFR410, SFR500 USB reader for capturing fingerprint templates. You can also use BioStation T2, D-Station, BioStation, BioEntry Plus, or BioLite Net as an enroll station. For the latter case, **BS_ScanTemplate** function is provided.

```
    // If you are to enroll a user with one finger – two fingerprint
    // templates - to a BioEntry Plus device
    BEUserHdr userHdr;

    // fill other fields of userHdr
    // ..
    userHdr.numOfFinger = 1;
    unsigned char* templateBuf = (unsigned char*)malloc( 384 *
userHdr.numOfFinger * 2 );

    int bufPos = 0;
    for( int i = 0; i < userHdr.numOfFinger * 2; i++ )
    {
        BS_RET_CODE result = BS_ScanTemplate( handle, templateBuf + bufPos );
        bufPos += 384;
    }
```

2.4.3. Scan Face Template for D-Station

You can use D-Station for capturing face templates and images.

BS_ReadFaceData function is provided.

```
    // If you are to enroll a user with one’s face – three face
    // templates - to a D-Station device
    DSUserHdr userHdr;

    // fill other fields of userHdr
    // ..

    userHdr.numOfFace = 1;
    unsigned char* imageBuf = (unsigned char*)malloc( 50*1024 *
useHdr.numOfFace );
    unsigned char* templateBuf = (unsigned char*)malloc( 2284 *
userHdr.numOfFace );

    int imagePos = 0;
    int templatePos = 0;

    for( int i = 0; i < userHdr.numOfFace; i++ )
    {
    BS_RET_CODE result = BS_ReadFaceData( handle, imageLen, imageBuf +
imagePos, templateBuf + templatePos);

    imagePos += imageLen;
    templatePos += 2284;
```

```
    }
```

2.4.4. Scan Face Template for FaceStation

You can use FaceStation for capturing face templates and images.

BS_ScanFaceTemplate function is provided.

```
    // If you are to enroll a user with one's face – 25 face
    // templates - to a FaceStation device
    FSUserTemplateHdr userTemplateHdr;


    unsigned char* imageBuf = (unsigned char*)malloc( 100*1024);
    unsigned char* facetemplateBuf = (unsigned char*)malloc( 2000 *
FSUserTemplateHdr::MAX_FACE );    // MAX_FACE is 25

    BS_RET_CODE result = BS_ScanTemplate( handle, &userTemplateHdr, imageBuf,
facetemplateBuf);

    FSUserHdr userHdr;
    userHdr.numOfFace = userTemplateHdr.numOfFace;
    userHdr.numOfUpdatedFace = userTemplateHdr.numOfUpdatedFace;

    for( int i = 0; i < FSUserHdr::MAX_FACE; i++)
    {
        userHdr.faceLen[i] = userTemplateHdr.faceLen[i];
    }
```

2.4.5. Scan RF cards

One of major advantages of BioStar system is that you can combine diverse authentication modes. To assign a RF card to a user, you have to read it first using **BS_ReadCardIDEx** from Suprema device or using **BS_ReadRFCardIDEx** from 3rd party RF device. Then, you can assign 4 byte card ID and 1 byte custom ID to the user header structrure.

2.5. Get Log Records

FaceStation, BioStation T2, D-Station, X-Station and BioStation can store up to 1,000,000 and BioEntry Plus, BioEntry W, BioLite Net up and Xpass and Xpass Slim to 50,000 log records respectively. The log records are managed as a circular queue; when the log space is full, the oldest log records will be erased automatically. As for the event types, refer to **Table 9 Log Event Types**.

2.5.1. Read Log Records

There are two APIs for reading past log records; **BS_ReadLog** and

BS_ReadNextLog. In most cases, **BS_ReadLog** would suffice. However, the maximum number of log records to be returned by this function is limited to 32,768 for FaceStation, BioStation T2, D-Station, X-Station, BioStation and 8,192 for BioEntry Plus, Xpass, Xpass Slim, BioLite Net respectively. If it is the case, you can use **BS_ReadNextLog**, which reads log records from the point where the last reading ends. See the **Example** section of **BS_ReadNextLog** for details.

FaceStation, BioStation T2, D-Station and X-Station can store up to 5,000 image log that managed as a circular queue; when the log space is full, the oldest log records will be erased automatically. FaceStation, BioStation T2, D-Station and X-Station use **BS_ReadLogEx**, **BS_ReadNextLogEx** instead of **BS_ReadLog, BS_ReadNextLog**. The maximum number of log records to be returned by this function is limited to 21,845 for FaceStation, BioStation T2, D-Station and X-Station

FaceStation, BioStation T2, D-Station and X-Station supports image log APIs, you can use **BS_ReadImageLog**, which reads image log from start time to end time, **BS_GetImageLogCount,** which gets all count of image logs**.** **BS_ReadSpecificImageLog** reads image log with time and event.

2.5.2. Real-time Log Monitoring

Depending on your applications, you might have to read log records in real-time. For this purpose, FaceStation, BioStation T2, D-Station, BioStation, BioEntry Plus, BioEntry W, BioLite Net, X-Station, Xpass, Xpass Slim manage a log cache, which can store up to 128 log records.

```
// Clears the cache first
BS_RET_CODE result = BS_ClearLogCache( handle );

BSLogRecord logRecords[128];
int numOfLog;

// Monitoring loop
while( 1 ) {
     result = BS_ReadLogCache( handle, &numOfLog, logRecords );
     // do something with the log records
     // …
}
```

In case of FaceStation, BioStation T2, D-Station and X-Station, use Extended API as below.

```
// Clears the cache first
BS_RET_CODE result = BS_ClearLogCacheEx( handle );

BSLogRecordEx logRecords[128];
int numOfLog;

// Monitoring loop
while( 1 ) {
     result = BS_ReadLogCacheEx( handle, &numOfLog, logRecords );

     // do something with the log records
     // …
     if( logRecords.imageSlot > BSLogRecordEx::NO_IMAGE )
{
     int datalen = 0;
     int bufsize = 50*1024 + sizeof(BSImageLogHdr);
     unsigned char* imageLog = (unsigned char*)malloc(bufsize);

     result = BS_ReadSpecifiedImageLog( handle, logRecords.eventTime,
logRecords.event, &datalen, imageLog);

     // do something with the imageLog
}
```

2.6. Demo Project

The SDK includes simple examples written in C++, C#, and Visual Basic. You can compile and test them by yourselves. Inspecting the source codes would be the fastest way to be acquainted with the SDK.

The demo applications written in C++ and C# have the same user interface. You can test them as follows;

(1) Press **Search** button to discover devices using **BS_SearchDeviceInLAN**.

(2) Select a device in the **Device** list and press **Network Config** button.

(3) If necessary, change the network configuration of the device. Then, press **Connect** button to connect to the device. If connection succeeds, the device will be added to the **Connected Device** List.

(4) Select a device in the **Connected Device** list.

(5) Select one of the three buttons, **Time**, **User** and **Log** for further test.

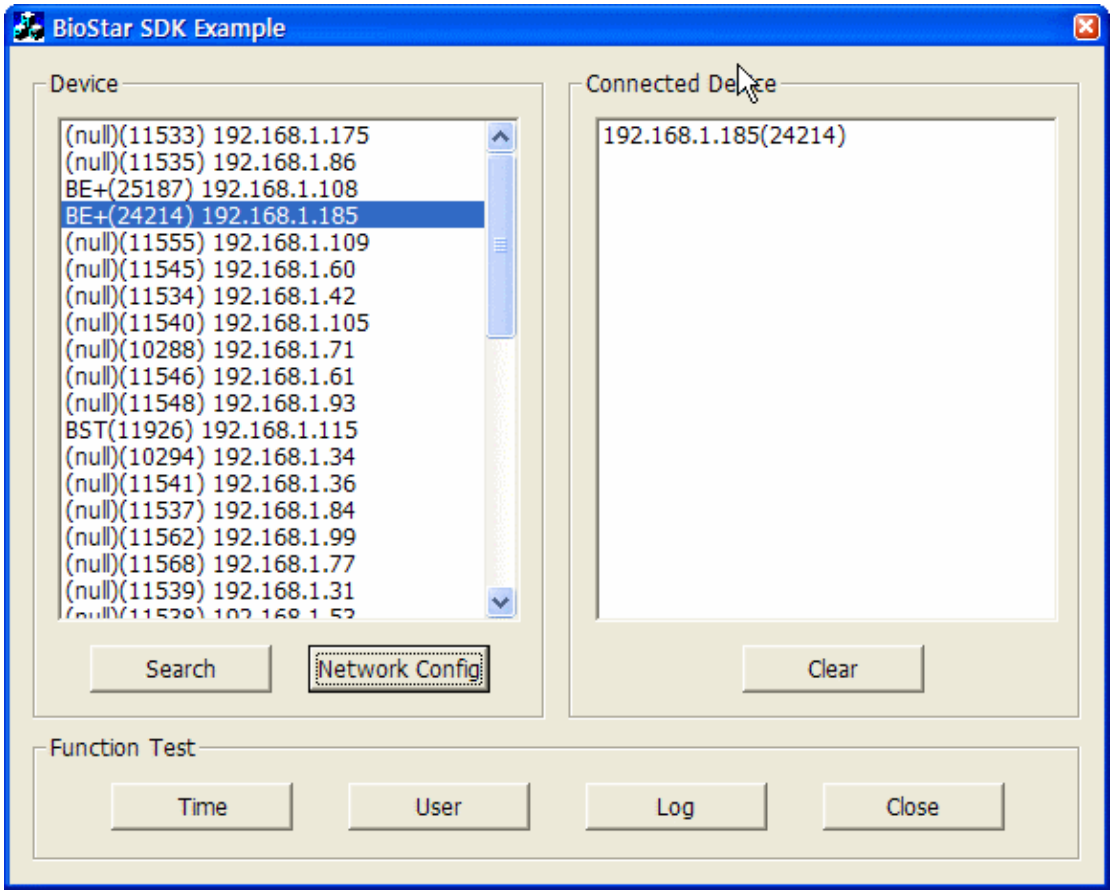


Figure 1 Demo Project

3. API Specification

3.1. Return Codes

Most APIs in the SDK return BS_RET_CODE. The return codes and their meanings are as follows;

Code	**Description**
BS_SUCCESS	The function succeeds.
BS_ERR_NO_AVAILABLE_CHANNEL	Communication handle is no more available.
BS_ERR_INVALID_COMM_HANDLE	The communication handle is invalid.
BS_ERR_CANNOT_WRITE_CHANNEL	Cannot write data to the communication channel.
BS_ERR_WRITE_CHANNEL_TIMEOUT	Write timeout.
BS_ERR_CANNOT_READ_CHANNEL	Cannot read data from the communication channel.
BS_ERR_READ_CHANNEL_TIMEOUT	Read timeout.
BS_ERR_CHANNEL_OVERFLOW	The data is larger than the channel buffer.
BS_ERR_CANNOT_INIT_SOCKET	Cannot initialize the WinSock library.
BS_ERR_CANNOT_OPEN_SOCKET	Cannot open the socket.
BS_ERR_CANNOT_CONNECT_SOCKET	Cannot connect to the specified IP address and the port.
BS_ERR_CANNOT_OPEN_SERIAL	Cannot open the RS232 port. Check if the serial port is already used by other applications.
BS_ERR_CANNOT_OPEN_USB	Cannot open the USB port. Check if

	the USB device driver is properly installed.
BS_ERR_BUSY	BioStation is processing another command.
BS_ERR_INVALID_PACKET	The packet has invalid header or trailer.
BS_ERR_CHECKSUM	The checksum of the packet is incorrect.
BS_ERR_UNSUPPORTED	The operation is not supported.
BS_ERR_FILE_IO	A file IO error is occurred during the operation.
BS_ERR_DISK_FULL	No more space is available.
BS_ERR_NOT_FOUND	The specified user is not found.
BS_ERR_INVALID_PARAM	The parameter is invalid.
BS_ERR_RTC	Real time clock cannot be set.
BS_ERR_MEM_FULL	Memory is full in the BioStation.
BS_ERR_DB_FULL	The user DB is full.
BS_ERR_INVALID_ID	The user ID is invalid. You cannot assign 0 as a user ID.
BS_ERR_USB_DISABLED	USB interface is disabled.
BS_ERR_COM_DISABLED	Communication channels are disabled.
BS_ERR_WRONG_PASSWORD	Wrong master password.
BS_ERR_INVALID_USB_MEMORY	The USB memory is not initialized.
BS_ERR_TRY_AGAIN	Scanning cards or fingerprints fails.
BS_ERR_EXIST_FINGER	The fingerprint template is already

	enrolled.

Table 8 Error Codes

3.2. Communication API

To communicate with a device, users should configure the communication channel first. There are six types of communication channels – TCP socket, UDP socket, RS232, RS485, USB, and USB memory stick. BioEntry Plus, BioEntry W, BioLite Net, Xpass and Xpass Slim provide only three of them – TCP socket, UDP socket, and RS485.

- BS_InitSDK: initializes the SDK.
- BS_UnInitSDK: release the resource.
- BS_OpenSocket: opens a TCP socket for LAN communication.
- BS_OpenSocketEx: opens a TCP socket for LAN communication with the specified host IP address.
- BS_CloseSocket: closes a TCP socket.
- BS_OpenInternalUDP: opens a UDP socket for administrative functions.
- BS_CloseInternalUDP: closes a UDP socket.
- BS_OpenSerial: opens a RS232 port.
- BS_CloseSerial: closes a RS232 port.
- BS_OpenSerial485: opens a RS485 port.
- BS_CloseSerial485: closes a RS485 port.
- BS_OpenUSB: opens a USB port with only BioStation.
- BS_OpenUSBEx: opens a USB port with FaceStation, BioStation T2, D-Station, X-Station and BioStation.
- BS_CloseUSB: closes a USB port.
- BS_OpenUSBMemory: opens a USB memory stick for communicating with virtual terminals.
- BS_CloseUSBMemory: closes a USB memory stick.

BS_InitSDK

Initializes the SDK. This function should be called once before any other functions are executed.

BS_RET_CODE BS_InitSDK()

Parameters

None

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/ D-Station/BioStation/BioEntry Plus/ BioEntry W/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

BS_UnInitSDK

Release the resource. This function should be called if you no longer needed to use SDK.

BS_RET_CODE BS_UnInitSDK()

Parameters

None

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/ D-Station/BioStation/BioEntry Plus/ BioEntry W/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

BS_OpenSocket

Opens a TCP socket with the specified IP address and port number. With FaceStation, BioStation T2, D-Station, BioStation, BioLite Net and X-Station, you can find out this information in the LCD menu of the device. With BioEntry Plus, BioEntry W, Xpass and Xpass Slim, Xpass S2, you have to search the device first by **BS_SearchDevicesInLAN**.

BS_RET_CODE BS_OpenSocket(const char* ipAddr, int port, int* handle)

Parameters

ipAddr

IP address of the device.

port

TCP port number. The default is 1470, 1471.

1470 for FaceStation, BioStation T2, D-Station, BioStation, X-Station.

1471 for BioEntry Plus, BioEntry W, BioLite Net, Xpass, Xpass Slim, Xpass S2.

handle

Pointer to the handle to be assigned.

Return Values

If a socket is opened successfully, return BS_SUCCESS with the assigned handle. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

BS_OpenSocketEx

This function accomplishes the same roll as BS_OpenSocket. But this function can assign the IP address of the local network interface which is required to communicate with devices.

BS_RET_CODE BS_OpenSocketEx(const char* deviceipAddr, int port, const char* hostipAddr, int* handle)

Parameters

deviceipAddr

IP address of the device.

port

TCP port number. The default is 1470, 1471.

1470 for FaceStation, BioStation T2, D-Station, BioStation, X-Station.

1471 for BioEntry Plus, BioEntry W, BioLite Net, Xpass, Xpass Slim, Xpass S2.

handle

Pointer to the handle to be assigned.

hostipAddr

IP address of the local network interface to be required.

Return Values

If a socket is opened successfully, return BS_SUCCESS with the assigned handle. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

BS_CloseSocket

Closes the socket.

BS_RET_CODE BS_CloseSocket(int handle)

Parameters

handle

Handle of the TCP socket acquired by **BS_OpenSocket**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

BS_OpenInternalUDP

FaceStation, BioStation T2, D-Station, X-Station, BioStation(V1.5 or later), BioEntry Plus, BioEntry W, Xpass, Xpass Slim, Xpass S2 and BioLite Net reserve a UDP port for internal communication. You can use this port for searching devices in a subnet. Or you can reset a device for troubleshooting purposes. See **BS_SearchDeviceInLAN** and **BS_ResetUDP**.

BS_RET_CODE BS_OpenInternalUDP(int* handle)

Parameters

handle

Pointer to the handle to be assigned.

Return Values

If a socket is opened successfully, return BS_SUCCESS with the assigned handle. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation(V1.5 or later)/BioEntry Plus/BioEntry W/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

BS_CloseInternalUDP

Closes the UDP socket.

BS_RET_CODE BS_CloseInternalUDP(int handle)

Parameters

handle

Handle of the UDP socket acquired by **BS_OpenInternalUDP**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation(V1.5 or later)/BioEntry Plus/BioEntry W/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

BS_OpenSerial

Opens a RS232 port with the specified baud rate.

BS_RET_CODE BS_OpenSerial(const char* port, int baudrate, int* handle)

Parameters

port

Pointer to a null-terminated string that specifies the name of the serial port.

baudrate

Specifies the baud rate at which the serial port operates. Available baud rates are 9600, 19200, 38400, 57600, and 115200bps. The default is 115200bps.

handle

Pointer to the handle to be assigned.

Return Values

If the function succeeds, return BS_SUCCESS with the assigned handle.
Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation

BS_CloseSerial

Closes the serial port.

BS_RET_CODE BS_CloseSerial(int handle)

Parameters

handle

Handle of the serial port acquired by **BS_OpenSerial**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation

BS_OpenSerial485

Opens a RS485 port with the specified baud rate. To communicate with a device connected to the host PC through RS485, the RS485 mode should be set as follows;

- For BioEntry Plus, BioEntry W, Xpass, Xpass Slim and Xpass S2 the **serialMod**e of **BEConfigData** should be SERIAL_PC. See **BS_WriteConfig** for details.
- For BioLite Net, the **serialMod**e of **BEConfigDataBLN** should be SERIAL_PC. See **BS_WriteConfig** for details.
- For BioStation, the **deviceType** of **BS485NetworkConfig** should be TYPE_CONN_PC. See **BS_Write485NetworkConfig** for details.
- For D-Station, the **baudRate** of **DS485NetworkConfig** should be equal to PC's. See **BS_WriteDS485NetworkConfig** for details.
- For X-Station, the **baudRate** of **XS485NetworkConfig** should be equal to PC's. See **BS_WriteXS485NetworkConfig** for details.
- For BioStation T2, the **baudRate** of **BS2485NetworkConfig** should be equal to PC's. See **BS_WriteBS2485NetworkConfig** for details.
- For FaceStation, the **baudRate** of **FS485NetworkConfig** should be equal to PC's. See **BS_WriteFS485NetworkConfig** for details.

In a half-duplex RS485 network, only one device should initiate all communication activity. We call this device 'host', and all the other devices 'slaves'. Each FaceStation, BioStation T2, D-Station, X-Station, BioStation, BioEntry Plus, BioEntry W, Xpass, Xpass Slim, Xpass S2 or BioLite Net has one RS485 port, which can be used for connection to PC or other devices. FaceStastion, BioStation T2, D-Station and X-Station has two RS485 port but RS485-0 port is only used.for PC connection, so RS485-1 port supports the host/slave connection. The **RS485 Mode** setting of the device should be configured to one of the following modes;

- ***PC Connection***: The RS485 port is used for connecting to the PC. Maximum 31 devices can be connected to the PC through a RS485 network. In this

case, the PC acts as the host device. Note that there is no zone support in this configuration.

- ***Host***: The device initiates all communication activity in a RS485 network. The host device can control up to 7 slave devices including maximum 4 Secure I/Os. For example, a BioStation host may have 7 BioEntry Plus slaves, or 3 BioStation slaves and 4 Secure I/Os. The host device also mediates packet transfers between the host PC and the slave devices. In other words, the host PC can transfer data to and from the slave devices even when only the host device is connected to the PC thorough LAN. As for searching slave devices attached to a host, refer to **BS_Search485Slaves**.
- ***Slave***: The slave device is connected to the host through RS485. It can communicate with the PC through the host device.

BS_RET_CODE BS_OpenSerial485(const char* port, int baudrate, int* handle)

Parameters

port

Pointer to a null-terminated string that specifies the name of the serial port.

baudrate

Specifies the baud rate at which the serial port operates. Available baud rates are 9600, 19200, 38400, 57600, and 115200bps. The default is 115200bps.

handle

Pointer to the handle to be assigned.

Return Values

If the function succeeds, return BS_SUCCESS with the assigned handle.
Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_CloseSerial485

Closes the serial port.

BS_RET_CODE BS_CloseSerial485(int handle)

Parameters

handle

Handle of the serial port acquired by **BS_OpenSerial485**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net /Xpass/Xpass Slim/Xpass S2

BS_OpenUSB

Open a USB communication channel with BioStation. To use the USB channel, libusb-win32 library and the device driver should be installed first. These are included in BioStar and BioAdmin packages.

BS_RET_CODE BS_OpenUSB(int* handle)

Parameters

handle

Pointer to the handle to be assigned.

Return Values

If the function succeeds, return BS_SUCCESS with the assigned handle. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_OpenUSBEx

Open a USB communication channel with D-Station, X-Station, BioStation T2, and FaceStation. To use the USB channel, libusb-win32 library and the device driver should be installed first. These are included in BioStar packages.

BS_RET_CODE BS_OpenUSBEx(int* handle, int type)

Parameters

handle

Pointer to the handle to be assigned.

type

device type

Return Values

If the function succeeds, return BS_SUCCESS with the assigned handle.
Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station

BS_CloseUSB

Closes the USB channel.

BS_RET_CODE BS_CloseUSB(int handle)

Parameters

handle

Handle of the USB channel acquired by **BS_OpenUSB**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation

BS_OpenUSBMemory

USB memory sticks can be used for transferring data between the host PC and BioStation terminals. After creating a virtual terminal in a memory stick, you can communicate with it in the same way as other communication channels. If the corresponding function is not supported for the virtual terminal, BS_ERR_UNSUPPORTED will be returned.

BS_RET_CODE BS_OpenUSBMemory(const char* driveLetter, int* handle)

Parameters

driveLetter

Drive letter in which the USB memory stick is inserted.

handle

Pointer to the handle to be assigned.

Return Values

If the function succeeds, return BS_SUCCESS with the assigned handle.
If the memory is not initialized, return BS_ERR_INVALID_USB_MEMORY. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_CloseUSBMemory

Closes the USB memory.

BS_RET_CODE BS_CloseUSBMemory(int handle)

Parameters

handle

Handle of the USB memory acquired by **BS_OpenUSBMemory**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

3.3. Device API

The following APIs provide functionalities for configuring basic features of FaceStation, BioStation T2, X-Station, D-Station, BioStation, BioEntry Plus, BioEntry W, BioLite Net, Xpass, Xpass Slim and Xpass S2 devices.

- BS_GetDeviceID: gets the ID and type of a device.
- BS_SetDeviceID: sets the ID and type of a device for further commands.
- BS_SearchDevice: searches devices in a RS485 network.
- BS_Search485Slaves: searches slave devices connected to a host device.
- BS_SearchDeviceInLAN: searches devices in a subnet.
- BS_GetTime: gets the time of a device.
- BS_SetTime: sets the time of a device.
- BS_CheckSystemStatus: checks the status of a device.
- BS_Reset: resets a device.
- BS_ResetUDP: resets a device using UDP protocol.
- BS_ResetLAN: reestablishes the IP configuration of BioStation.
- BS_UpgradeEx: upgrades firmware of a device.
- BS_Disable: disables a device.
- BS_Enable: re-enables a device.
- BS_DisableCommunication: disables communication channels.
- BS_EnableCommunication: enables communication channels.
- BS_ChangePasswordBEPlus: changes the master password of a BioEntry Plus, BioEntry W or BioLite Net.
- BS_FactoryDefault: resets system parameters to the default values.

BS_GetDeviceID

To communicate with a device, you have to know its ID and device type. In most cases, this is the first function to be called after a communication channel is opened. After acquiring the ID and type, you have to call **BS_SetDeviceID**.

BS_RET_CODE BS_GetDeviceID(int handle, unsigned* deviceID, int* deviceType)

Parameters

handle

Handle of the communication channel.

deviceID

Pointer to the ID to be returned.

deviceType

Pointer to the type to be returned. It is either BS_DEVICE_FSTATION, BS_DEVICE_BIOSTATION2, BS_DEVICE_DSTATION, BS_DEVICE_XSTATION, BS_DEVICE_BIOSTATION, BS_DEVICE_BIOENTRY_PLUS, BS_DEVICE_BIOLITE, BS_DEVICE_XPASS, BS_DEVICE_XPASS_SLIM, BS_DEVICE_XPASS_SLIM2.

Return Values

If the function succeeds, return BS_SUCCESS with the ID and type. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_SetDeviceID

After acquiring the ID and type of a device using **BS_GetDeviceID**, **BS_SearchDevice**, or **BS_SearchDeviceInLAN**, you have to call **BS_SetDeviceID**. It will initialize the device-related settings of the communication handle.

BS_RET_CODE BS_SetDeviceID(int handle, unsigned deviceID, int deviceType)

Parameters

handle

Handle of the communication channel.

deviceID

ID of the device.

deviceType

Type of the device. It is either BS_DEVICE_FSTATION, BS_DEVICE_BIOSTATION2, BS_DEVICE_DSTATION, BS_DEVICE_XSTATION BS_DEVICE_BIOSTATION, BS_DEVICE_BIOENTRY_PLUS, BS_DEVICE_BIOLITE, BS_DEVICE_XPASS, BS_DEVICE_XPASS_SLIM, BS_DEVICE_XPASS_SLIM2.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_SearchDevice

Searches devices in a RS485 network. Up to 31 devices can be connected to the PC through RS485.

BS_RET_CODE BS_SearchDevice(int handle, unsigned* deviceIDs, int* deviceTypes, int* numOfDevice)

Parameters

handle

Handle of the RS485 channel.

deviceIDs

Pointer to the device IDs to be returned.

deviceTypes

Pointer to the device types to be returned.

numOfDevice

Pointer to the number of devices to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_Search485Slaves

Searches slave devices connected to a host device by RS485. As for the general description of RS485 configuration, see **BS_OpenSerial485**. To search slave devices, the following conditions should be met.

(1) The host and slave devices should be connected by RS485.

(2) The host device should be connected to LAN.

(3) The RS485 mode of the host and slave devices should be set to **Host** and **Slave** respectively. Refer to **BS_WriteConfig** and **BS_Write485NetworkConfig** for details.

BS_RET_CODE BS_Search485Slaves(int handle, BS485SlaveInfo* slaveList, int* numOfSlaves)

Parameters

handle

Handle of the host device acquired by **BS_OpenSocket**.

slaveList

Pointer to the array of slave information. **BS485SlaveInfo** is defined as follows;

```
typedef struct{
    unsigned slaveID;
    int slaveType;
} BS485SlaveInfo;
```

The key fields and their available options are as follows;

Fields	Descriptions
slaveID[2]	ID of the device
slaveType	BS_DEVICE_FSTATION BS_DEVICE_BIOSTATION2 BS_DEVICE_DSTATION BS_DEVICE_XSTATION BS_DEVICE_BIOSTATION

[2] ID 0~3 are reserved for Secure I/Os. If the ID is 0, 1, 2, or 3, it represents a Secure I/O regardless of the slaveType.

	BS_DEVICE_BIOENTRY_PLUS BS_DEVICE_BIOLITE BS_DEVICE_XPASS BS_DEVICE_XPASS_SLIM BS_DEVICE_XPASS_SLIM2

numOfSlaves

Pointer to the number of slave devices to be returned.

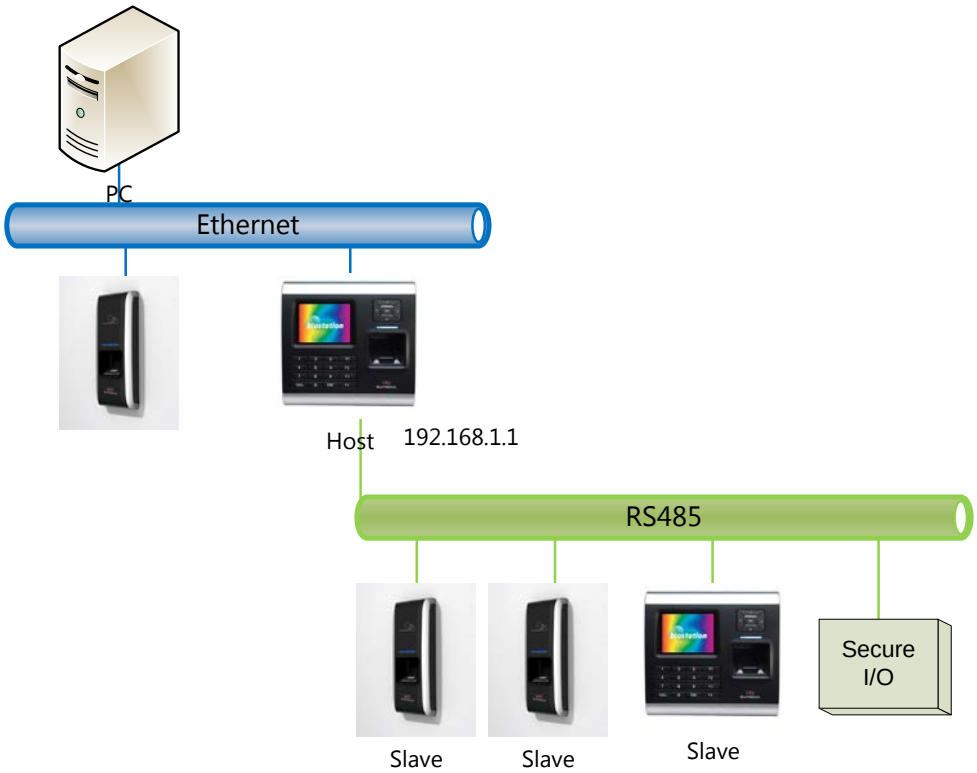
Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation(V1.5 or later)/BioEntry Plus(V1.2 or later)/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

Example



```
// Open a socket to the host device
int handle;

BS_RET_CODE result = BS_OpenSocket( “192.168.1.1”, 1470, &handle );

unsigned deviceID;
int deviceType;

result = BS_GetDeviceID( handle, &deviceID, &deviceType );
result = BS_SetDeviceID( handle, deviceID, deviceType );

// Search the slave devices attached to the host
BS485SlaveInfo slaveInfo[8]; // maximum 8 slave devices;
int numOfSlave;

result = BS_Search485Slaves( handle, slaveInfo, &numOfSlave );

for( int i = 0; i < numOfSlave; i++ )
{
     if( slaveInfo.slaveID < 4 ) // it is a Secure I/O
     {
         // do something to the Secure I/Os
         continue;
     }

     BS_SetDeviceID( handle, slaveInfo[i].slaveID,
    slaveInfo[i].slaveType );

     // do something to the slave device
}
```

BS_SearchDeviceInLAN

Searches devices in LAN environment by UDP protocol. It sends a UDP broadcast packet to all the devices in a subnet. To call this function, a UDP handle should be acquired by **BS_OpenInternalUDP**.

BS_RET_CODE BS_SearchDeviceInLAN(int handle, int* numOfDevice, unsigned* deviceIDs, int* deviceTypes, unsigned* deviceAddrs)

Parameters

handle

Handle of the UDP socket returned by **BS_OpenInternalUDP**.

numOfDevice

Pointer to the number of devices to be returned.

deviceIDs

Pointer to the device IDs to be returned.

deviceTypes

Pointer to the device types to be returned.

deviceAddrs

Pointer to the IP addresses of the devices to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation(V1.5 or later)/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

Example

```
// Open a UDP socket
int udpHandle;

BS_RET_CODE result = BS_OpenInternalUDP( &udpHandle );

int numOfDevice;
unsigned deviceIDs[64];
```

```
int deviceTypes[64];
unsigned deviceAddrs[64];

result = BS_SearchDeviceInLAN( udpHandle, &numOfDevice, deviceIDs,
deviceTypes, deviceAddrs );

for( int i = 0; i < numOfDevice; i++ )
{
     int tcpHandle;

     char buf[32];
     sprintf( buf, "%d.%d.%d.%d", deviceAddrs[i] & 0xff, (deviceAddrs[i] &
0xff00) >> 8, (deviceAddrs[i] & 0xff0000) >> 16, (deviceAddrs[i] &
0xff000000) >> 24 );

     if( deviceTypes[i] == BS_DEVICE_BIOSTATION ||
         deviceTypes[i] == BS_DEVICE_DSTATION ||
         deviceTypes[i] == BS_DEVICE_XSTATION ||
         deviceTypes[i] == BS_DEVICE_BIOSTATION2 ||
         deviceTypes[i] == BS_DEVICE_FSTATION)
     {
         result = BS_OpenSocket( buf, 1470, &tcpHandle );
     }
     else if( deviceTypes[i] == BS_DEVICE_BIOENTRY_PLUS ||
             deviceTypes[i] == BS_DEVICE_BIOLITE ||
             deviceTypes[i] == BS_DEVICE_XPASS ||
             deviceTypes[i] == BS_DEVICE_XPASS_SLIM)
     {
         Result = BS_OpenSocket( buf, 1471, &tcpHandle );
     }

     BS_SetDeviceID( tcpHandle, deviceIDs[i], deviceTypes[i] );

     // do something

     BS_CloseSocket( tcpHandle );
}
```

BS_GetTime

Gets the time of a device. All the time values in this SDK represent local time, not Coordinated Universal Time(UTC). To convert a UTC value into a local time, **BS_ConvertToLocalTime** can be used.

BS_RET_CODE BS_GetTime(int handle, time_t* timeVal)

Parameters

handle

Handle of the communication channel.

timeVal

Pointer to the number of seconds elapsed since midnight (00:00:00), January 1, 1970, according to the system clock. Please note that it is local time, not UTC.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_SetTime

Sets the time of a device.

BS_RET_CODE BS_SetTime(int handle, time_t timeVal)

Parameters

handle

Handle of the communication channel.

timeVal

Number of seconds elapsed since midnight (00:00:00), January 1, 1970.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

Example

```
// Synchronize the time of a device with that of PC
time_t currentTime = BS_ConvertToLocalTime( time( NULL ) );
BS_RET_CODE result = BS_SetTime( handle, currentTime );
```

BS_CheckSystemStatus

Checks if a device is connected to the channel.

Differently from other devices, FaceStation, BioStation T2, D-Station and X-Station keep the connection for only 10 minutes. Being timed with no action, the connection will be closed. So, in case of FaceStation, BioStation T2, D-Station and X-Station, **BS_CheckSystemStatus** should be called more frequently than every 10 minutes to prevent connection close.

BS_RET_CODE BS_CheckSystemStatus(int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_Reset

Resets a device.

BS_RET_CODE BS_Reset(int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_ResetUDP

Resets a device by UDP protocol. In some rare cases, you cannot connect to a device, even if you can search it in BioAdmin or BioStar. In those cases, you can reset it by this function.

BS_RET_CODE BS_ResetUDP(int handle, unsigned targetAddr, unsigned targetID)

Parameters

handle

Handle of the communication channel returned by **BS_OpenInternalUDP**.

targetAddr

IP address of the target device.

targetID

ID of the target device.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation(V1.5 or later)/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_ResetLAN

Reestablishes the IP configuration of BioStation. When you call **BS_WriteIPConfig**, the changes are not taken into account immediately. If you want to reassign the IP address using the new configuration, you have to call **BS_ResetLAN**. On the contrary, BioEntry Plus, BioEntry W or BioLite Net will reacquire the IP address automatically if its IP configuration is changed.

BS_RET_CODE BS_ResetLAN(int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation

BS_UpgradeEx

Upgrades the firmware of a device. The device should not be turned off when upgrade is in progress.

BS_RET_CODE BS_UpgradeEx(int handle, const char* upgradeFile)

Parameters

handle

Handle of the communication channel.

upgradeFile

Filename of the firmware, which will be provided by Suprema.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_Disable

When communicating with a BioStation terminal, data corruption may occur if users are manipulating it at the terminal simultaneously. For example, if a user is placing a finger while the terminal is deleting fingerprints, the result might be inconsistent. To prevent such cases, developers would be well advised to call **BS_Disable** before sending commands which will change the status of a terminal. After this function is called, the BioStation will ignore keypad and fingerprint inputs, and process only the commands delivered through communication channels. For the terminal to revert to normal status, **BS_Enable** should be called afterwards.

BS_RET_CODE BS_Disable(int handle, int timeout)

Parameters

handle

Handle of the communication channel.

timeout

If there is no command during this timeout interval, the terminal will get back to normal status automatically. The maximum timeout value is 60 seconds.

Return Values

If the terminal is processing another command, BS_ERR_BUSY will be returned.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioLite Net

Example

```
// Enroll users
BS_RET_CODE result = BS_Disable( handle, 20 ); // timeout is 20 seconds

if( result == BS_SUCCESS )
{
     result = BS_EnrollUserEx( … );
     // …
     BS_Enable( handle );
}
```

BS_Enable

Enables the terminal. See **BS_Disable** for details.

BS_RET_CODE BS_Enable(int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioLite Net

BS_DisableCommunication

Disables all communication channels. After this function is called, the device will return BS_ERR_COM_DISABLED to all functions except for **BS_EnableCommunication**, **BS_GetDeviceID**, and search functions.

BS_RET_CODE BS_DisableCommunication(int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_EnableCommunication

Re-enables all the communication channels.

BS_RET_CODE BS_EnableCommunication(int handle, const char* masterPassword)

Parameters

handle

Handle of the communication channel.

masterPassword

16 byte master password. The default password is a string of 16 NULL characters. To change the master password of a BioStation terminal, please refer to the BioStation User Guide. You can change the master password of a BioEntry Plus or BioLite Net using **BS_ChangePasswordBEPlus()**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_ChangePasswordBEPlus

Changes the master password of a BioEntry Plus or BioLite Net.

BS_RET_CODE BS_ChangePasswordBEPlus(int handle, const char* oldPassword, const char* newPassword)

Parameters

handle

Handle of the communication channel.

oldPassword

16 byte old password to be replaced. If it does not match, BS_ERR_WRONG_PASSWORD will be returned.

newPassword

16 byte new password.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_FactoryDefault

Resets the status of a FaceStation, BioStation T2, X-Station, D-Station, BioStation, BioEntry Plus, BioEntry W, BioLite Net, Xpass, Xpass Slim or Xpass S2 to the factory default.

BS_RET_CODE BS_FactoryDefault(int handle, unsigned mask)

Parameters

handle

Handle of the communication channel.

mask

Mask	Descriptions
BS_FACTORY_DEFAULT_CONFIG	Resets system parameters.
BS_FACTORY_DEFAULT_USER	Delete all users.
BS_FACTORY_DEFAULT_LOG	Delete all log records.
BS_FACTORY_DEFAULT_LED	Resets LED/Buzzer configuration.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

Example

```
// Resets system parameters and deletes all users and log records
BS_RET_CODE result = BS_FactoryDefault( handle, BS_FACTORY_DEFAULT_CONFIG |
                     BS_FACTORY_DEFAULT_USER | BS_FACTORY_DEFAULT_LOG );
```

3.4. Log Management API

A FaceStation, BioStation T2, D-Station, X-Station and BioStation terminal can store up to 1,000,000 log records, and a BioEntry Plus, BioEntry W, BioLite Net, Xpass, Xpass Slim and Xpass S2 up to 50,000 log records. FaceStation, BioStation T2, D-Station and X-Station can store up to 5,000 image log records. They also provide APIs for real-time monitoring.

- BS_GetLogCount: gets the number of log records.
- BS_GetImageLogCount: gets the number of image log records.
- BS_ClearLogCache: clears the log cache.
- BS_ClearLogCacheEx: clears the log cache for FaceStation, BioStation T2, D-Station and X-Station.
- BS_ReadLogCache: reads the log records in the cache.
- BS_ReadLogCacheEx: reads the log records in the cache forFaceStation, BioStation T2, D-Station and X-Station.
- BS_ReadLog: reads log records.
- BS_ReadLogEx: reads log records for FaceStation, BioStation T2, D-Station and X-Station.
- BS_ReadNextLog: reads log records in succession.
- BS_ReadNextLogEx: reads log records in succession for FaceStation, BioStation T2, D-Station and X-Staion.
- BS_DeleteLog: deletes log records.
- BS_DeleteAllLog: deletes all the log records.
- BS_GetImageLogCount: gets the number of image log recore for FaceStation, BioStation T2, D-Station and X-Station.
- BS_ReadImageLog: read image log records for FaceStation, BioStation T2, D-Station and X-Station.
- BS_ReadSpecificImageLog: read image log coupled with event log for FaceStation, BioStation T2, D-Station and X-Station.
- BS_DeleteImageLog: deletes image log records.
- BS_DeleteAllImageLog: deletes all the image log records.

BSLogRecord is defined as follows.

```
typedef struct {
     unsigned char event;
     unsigned char subEvent;
     unsigned short tnaEvent;
     time_t eventTime;         // 32 bits type
     unsigned userID;
     unsigned reserved2;
} BSLogRecord;

typedef struct {
     Enum {
         NO_IMAGE = -1;
         WRITE_ERROR = -2;
     };
     unsigned char event;
     unsigned char subEvent;
     unsigned short tnaKey;    // same BSLogRecord's tnaEvent
     time_t eventTime;         // 32 bits type
     unsigned userID;
     unsigned deviceID;
     short imageSlot;
     short reserved1;
     int reserved2;
} BSLogRecordEx;
```

1. *event*

   The type of log record. The event codes and their meanings are as follows.

Category	Event Code	Value	Description
System	SYS_STARTED	0x6A	Device is turned on.
	TIME_SET	0xD2	System time is set.
Door	RELAY_ON	0x80	Door is opened. It is superseded by 0x8A and 0x8B since BioStation V1.4.
	RELAY_OFF	0x81	Door is closed.
	DOOR0_OPEN	0x82	Door 0 is opened.
	DOOR1_OPEN	0x83	Door 1 is opened.
	DOOR0_CLOSED	0x84	Door 0 is closed.
	DOOR1_CLOSED	0x85	Door 1 is closed.
	DOOR0_FORCED_OPEN	0x86	Door 0 is opened by force.

	DOOR1_FORCED_OPEN	0x87	Door 1 is opened by force.
	DOOR0_HELD_OPEN	0x88	Door 0 is held open too long.
	DOOR1_HELD_OPEN	0x89	Door 1 is held open too long.
	DOOR0_RELAY_ON	0x8A	The relay for Door 0 is activated.
	DOOR1_RELAY_ON	0x8B	The relay for Door 1 is activated.
	DOOR_HELD_OPEN_ALARM	0xE0	Door is held open too long.
	DOOR_FORCED_OPEN _ALARM	0xE1	Door is opened by force.
	DOOR_HELD_OPEN_ALARM _CLEAR	0xE2	Held open alarm is released.
	DOOR_FORCED_OPEN_ALARM _CLEAR	0xE3	Forced open alarm is released.
I/O	TAMPER_SW_ON	0x64	The case is opened.
	TAMPER_SW_OFF	0x65	The case is closed.
	DETECT_INPUT0	0x54	These are superseded by 0xA0 and 0xA1.
	DETECT_INPUT1	0x55	
	INTERNAL_INPUT0	0xA0	Detect a signal at internal input ports.
	INTERNAL_INPUT1	0xA1	
	SECONDARY_INPUT0	0xA2	Detect a signal at input ports of the slave device.
	SECONDARY_INPUT1	0xA3	
	SIO0_INPUT0	0xB0	Detect a signal at input ports of Secure I/O 0.
	SIO0_INPUT1	0xB1	
	SIO0_INPUT2	0xB2	
	SIO0_INPUT3	0xB3	
	SIO1_INPUT0	0xB4	Detect a signal at input ports of Secure I/O 1.
	SIO1_INPUT1	0xB5	
	SIO1_INPUT2	0xB6	
	SIO1_INPUT3	0xB7	

	SIO2_INPUT0	0xB8	Detect a signal at input ports of Secure I/O 2.
	SIO2_INPUT1	0xB9	
	SIO2_INPUT2	0xBA	
	SIO2_INPUT3	0xBB	
	SIO3_INPUT0	0xBC	Detect a signal at input ports of Secure I/O 3.
	SIO3_INPUT1	0xBD	
	SIO3_INPUT2	0xBE	
	SIO3_INPUT3	0xBF	
Access Control	IDENTIFY_NOT_GRANTED	0x6D	Access is not granted at this time.
	VERIFY_NOT_GRANTED	0x6E	
	NOT_GRANTED	0x78	
	APB_FAIL	0x73	Anti-passback is violated.
	COUNT_LIMIT	0x74	The maximum entrance count is reached already.
	TIME_INTERVAL_LIMIT	0x75	Time interval limitation is violated.
	INVALID_AUTH_MODE	0x76	The authentication mode is not supported at this time.
	EXPIRED_USER	0x77	User is not valid any more.
1:1 matching	VERIFY_SUCCESS	0x27	1:1 matching succeeds.
	VERIFY_FAIL	0x28	1:1 matching fails.
	VERIFY_NOT_GRANTED	0x6E	Not allowed to enter.
	VERIFY_DURESS	0x62	Duress finger is detected.
1:N matching	IDENTIFY_SUCCESS	0x37	1:N matching succeeds.
	IDENTIFY_FAIL	0x38	1:N matching fails.
	IDENTIFY_NOT_GRANTED	0x6D	Not allowed to enter.
	IDENTIFY_DURESS	0x63	Duress finger is detected.
User	ENROLL_SUCCESS	0x17	A user is enrolled.

	ENROLL_FAIL	0x18	Cannot enroll a user.
	DELETE_SUCCESS	0x47	A user is deleted.
	DELETE_FAIL	0x48	Cannot delete a user.
	DELETE_ALL_SUCCESS	0x49	All users are deleted.
Mifare Card	CARD_ENROLL_SUCCESS	0x20	A Mifare card is written successfully.
	CARD_ENROLL_FAIL	0x21	Cannot write a Mifare card.
	CARD_VERIFY_DURESS	0x95	Duress finger is detected.
	CARD_VERIFY_SUCCESS	0x97	1:1 matching succeeds.
	CARD_VERIFY_FAIL	0x98	1:1 matching fails.
	CARD_APB_FAIL	0x99	Anti-passback is violated.
	CARD_COUNT_LIMIT	0x9A	The maximum entrance count is reached already.
	CARD_TIME_INTERVAL _LIMIT	0x9B	Time interval limitation is violated.
	CARD_INVALID_AUTH _MODE	0x9C	The authentication mode is not supported at this time.
	CARD_EXPIRED_USER	0x9D	User is not valid any more.
	CARD_NOT_GRANTED	0x9E	Not allowed to enter.
	BLACKLISTED	0xC2	User is blacklisted.
Zone	ARMED	0xC3	Alarm zone is armed.
	DISARMED	0xC4	Alarm zone is disarmed.
	ALARM_ZONE_INPUT	0xC5	An input point is activated in an armed zone.
	FIRE_ALARM_ZONE_INPUT	0xC6	An input point is activated in a fire alarm zone.

	ALARM_ZONE_INPUT _CLEAR	0xC7	The alarm is released.
	FIRE_ALARM_ZONE_INPUT _CLEAR	0xC8	The fire alarm is released.
	APB_ZONE_ALARM	0xC9	Anti-passback is violated.
	ENTLIMIT_ZONE_ALARM	0xCA	Entrance limitation is violated.
	APB_ZONE_ALARM_CLEAR	0xCB	Anti-passback alarm is released.
	ENTLIMIT_ZONE_ALARM _CLEAR	0xCC	Entrance limitation alarm is released.
Network	SOCK_CONN	0xD3	Connection is established from PC.
	SOCK_DISCONN	0xD4	Connection is closed.
	SERVER_SOCK_CONN	0xD5	Connected to BioStar server.
	SERVER_SOCK_DISCONN	0xD6	Disconnected from BioStar server.
	LINK_CONN	0xD7	Ethernet link is connected.
	LINK_DISCONN	0xD8	Ethernet link is disconnected.
	INIT_IP	0xD9	IP configuration is initialized.
	INIT_DHCP	0xDA	DHCP is initialized.
	DHCP_SUCCESS	0xDB	Acquired an IP address from the DHCP server.

Table 9 Log Event Types

2. *subEvent*

   The additional information which is meaningful only in case that *events* are VERIFY_SUCCESS and IDENTIFY_SUCCESS. The event codes and their meanings are as follows.

Event Code	Value	Description
VERIFY_FINGER	0x2B	User has been verified by (ID+Finger)
VERIFY_PIN	0x2C	User has been verified by (ID+PIN)
VERIFY_CARD_FINGER	0x2D	User has been verified by (Card+Finger)
VERIFY_CARD_PIN	0x2E	User has been verified by (Card+PIN)
VERIFY_CARD	0x2F	User has been verified by Card
VERIFY_CARD_FINGER_PIN	0x30	User has been verified by (Card+Finger+PIN)
VERIFY_FINGER_PIN	0x31	User has been verified by (ID+Finger+PIN)
VERIFY_FACE	0x32	User has been verified by (ID+Face)
VERIFY_CARD_FACE	0x33	User has been verified by (Card+Face)
VERIFY_CARD_FACE_PIN	0x34	User has been verified by (Card+Face+PIN)
VERIFY_FACE_PIN	0x35	User has been verified by (FACE+PIN)

Event Code	Value	Description
IDENTIFY_FINGER	0x3A	User has been verified by Finger
IDENTIFY_FINGER_PIN	0x3B	User has been verified by (Finger+PIN)
IDENTIFY_FACE	0x3D	User has been verified by Face
IDENTIFY_FACE_PIN	0x3E	User has been verified by (Face+PIN)

3. *tnaEvent*

   The index of TNA event, which is between BS_TNA_F1 and BS_TNA_ESC. See **BS_WriteTnaEventConfig** for details. It will be 0xffff if it is not a TNA event.

4. *eventTime*

   The local time at which the event occurred. It is represented by the number of seconds elapsed since midnight (00:00:00), January 1, 1970.

5. *userID*

   The user ID related to the log event. If it is not a user-related event, it will be 0.

6. *deviceID*

   The device ID is only for the BSLogRecordEx. It is stored with the device

ID.

7. *imageSlot*

   The imageSlot is only for the BSLogRecordEx. The imageSlot is managed as a circular queue (0 ~ 4999); when the image log space is full, the oldest image log records will be erased automatically.

   If there is no image log, then be BSLogRecordEx:NO_IMAGE (-1), and there is image log, but fail to write image log in terminal, then reture BSLogRecordEx:WRITE_ERROR (-2).

8. *reserved2*

   It is only for BSLogRecord. When the log synchronization option is on in a zone, the log records of the member devices will be stored in the master device, too. In this case, this field will be used for the device ID. Otherwise, this field should be 0.

BS_GetLogCount

Retrieves the number of log records.

BS_RET_CODE BS_GetLogCount(int handle, int* numOfLog)

Parameters

handle

Handle of the communication channel.

numOfLog

Pointer to the number of log records stored in a device.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_ClearLogCache

BioStation, BioEntry Plus, BioEntry W, BioLite Net, Xpass, Xpass Slim and Xpass S2 have a cache which keeps 128 latest log records. This is useful for real-time monitoring. **BS_ClearLogCache** clears this cache for initializing or restarting real-time monitoring.

BS_RET_CODE BS_ClearLogCache(int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

Example

```
// Clears the cache first
BS_RET_CODE result = BS_ClearLogCache( handle );

BSLogRecord logRecords[128];
int numOfLog;

// Monitoring loop
while( 1 ) {
     result = BS_ReadLogCache( handle, &numOfLog, logRecords );

     // do something
}
```

BS_ClearLogCacheEx

FaceStation, BioStation T2, D-Station and X-Station have a cache which keeps 128 latest log records. This is useful for real-time monitoring. **BS_ClearLogCacheEx** clears this cache for initializing or restarting real-time monitoring.

BS_RET_CODE BS_ClearLogCacheEx(int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station

Example

```
// Clears the cache first
BS_RET_CODE result = BS_ClearLogCacheEx( handle );

BSLogRecordEx logRecords[128];
int numOfLog;

// Monitoring loop
while( 1 ) {
     result = BS_ReadLogCacheEx( handle, &numOfLog, logRecords );

     // do something
}
```

BS_ReadLogCache

Reads the log records in the cache. After reading, the cache will be cleared.

BS_RET_CODE BS_ReadLogCache(int handle, int* numOfLog, BSLogRecord* logRecord)

Parameters

handle

Handle to the communication channel.

numOfLog

Pointer to the number of log records in the cache.

logRecord

Pointer to the log records to be returned. This pointer should be preallocated large enough to store the log records.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_ReadLogCacheEx

Reads the log records in the cache. After reading, the cache will be cleared.

BS_RET_CODE BS_ReadLogCacheEx(int handle, int* numOfLog, BSLogRecordEx* logRecord)

Parameters

handle

Handle to the communication channel.

numOfLog

Pointer to the number of log records in the cache.

logRecord

Pointer to the log records to be returned. This pointer should be preallocated large enough to store the log records.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceSatation/BioStation T2/D-Station/X-Station

BS_ReadLog

Reads log records which were written in the specified time interval. Although a BioStation terminal can store up to 1,000,000 log records, the maximum number of log records to be returned by this function is limited to 32,768. As for BioEntry Plus, BioEntry W, BioLite Net, Xpass, Xpass Slim and Xpass S2, which can store up to 50,000 log records, the maximum number is 8,192. Therefore, users should call **BS_ReadLog** repetitively if the number of log records in the time interval is larger than these limits.

BS_RET_CODE BS_ReadLog(int handle, time_t startTime, time_t endTime, int* numOfLog, BSLogRecord* logRecord)

Parameters

handle

Handle of the communication channel.

startTime

Start time of the interval. If it is set to 0, the log records will be read from the start.

endTime

End time of the interval. If it is set to 0, the log records will be read to the end.

numOfLog

Pointer to the number of log records to be returned.

logRecord

Pointer to the log records to be returned. This pointer should be preallocated large enough to store the log records.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

Example

```
int numOfLog;
```

```
BSLogRecord* logRecord = (BSLogRecord*)malloc( .. );

// Reads all the log records
BS_RET_CODE result = BS_ReadLog( handle, 0, 0, &numOfLog, logRecord );

// Reads the log records of latest 24 hours
time_t currentTime = BS_ConvertToLocalTime( time( NULL ) );

result = BS_ReadLog( handle, currentTime – 24 * 60 * 60, 0, &numOfLog,
logRecord );
```

BS_ReadLogEx

Reads log records which were written in the specified time interval. Although a FaceStation, BioStation T2, D-Station and X-Station terminals can store up to 1,000,000 log records, the maximum number of log records to be returned by this function is limited to 21,845. Therefore, users should call **BS_ReadLogEx** repetitively if the number of log records in the time interval is larger than these limits.

BS_RET_CODE BS_ReadLogEx(int handle, time_t startTime, time_t endTime, int* numOfLog, BSLogRecordEx* logRecord)

Parameters

handle

Handle of the communication channel.

startTime

Start time of the interval. If it is set to 0, the log records will be read from the start.

endTime

End time of the interval. If it is set to 0, the log records will be read to the end.

numOfLog

Pointer to the number of log records to be returned.

logRecord

Pointer to the log records to be returned. This pointer should be preallocated large enough to store the log records.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station

Example

```
int numOfLog;
BSLogRecordEx* logRecord = (BSLogRecordEx*)malloc( .. );
```

```
// Reads all the log records
BS_RET_CODE result = BS_ReadLogEx( handle, 0, 0, &numOfLog, logRecord );

// Reads the log records of latest 24 hours
time_t currentTime = BS_ConvertToLocalTime( time( NULL ) );

result = BS_ReadLogEx( handle, currentTime – 24 * 60 * 60, 0, &numOfLog,
logRecord );
```

BS_ReadNextLog

BS_ReadNextLog searches log records starting from the last record read by **BS_ReadLog** or **BS_ReadNextLog**. It is useful for reading lots of log records in succession.

BS_RET_CODE BS_ReadNextLog(int handle, time_t startTime, time_t endTime, int* numOfLog, BSLogRecord* logRecord)

Parameters

handle

Handle of the communication channel.

startTime

Start time of the interval. If it is set to 0, it will be ignored.

endTime

End time of the interval. If it is set to 0, it will be ignored.

numOfLog

Pointer to the number of log records to be returned.

logRecord

Pointer to the log records to be returned. This pointer should be preallocated large enough to store the log records.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

Example

```
// read all the log records from a BioEntry Plus
const int MAX_LOG = 1000000; // 1000000 for BioStation
const int MAX_READ_LOG = 8192; // 32768 for BioStation

int numOfReadLog = 0;
int numOfLog = 0;

BSLogRecord* logRecord = (BSLogRecord*)malloc( MAX_LOG );
```

```
BS_RET_CODE result = BS_ReadLog( handle, 0, 0, &numOfReadLog, logRecord +
numOfLog  );

while( result == BS_SUCCESS )
{
     numOfLog += numOfReadLog;

     if( numOfReadLog < MAX_READ_LOG ) // end of the log
     {
         break;
     }

     result = BS_ReadNextLog( handle, 0, 0, &numOfReadLog, logRecord +
     numOfLog );
}
```

BS_ReadNextLogEx

BS_ReadNextLogEx searches log records starting from the last record read by **BS_ReadLogEx** or **BS_ReadNextLogEx**. It is useful for reading lots of log records in succession.

BS_RET_CODE BS_ReadNextLogEx(int handle, time_t startTime, time_t endTime, int* numOfLog, BSLogRecordEx* logRecord)

Parameters

handle

Handle of the communication channel.

startTime

Start time of the interval. If it is set to 0, it will be ignored.

endTime

End time of the interval. If it is set to 0, it will be ignored.

numOfLog

Pointer to the number of log records to be returned.

logRecord

Pointer to the log records to be returned. This pointer should be preallocated large enough to store the log records.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station

Example

```
// read all the log records from a BioEntry Plus
const int MAX_LOG = 10000000; // 1000000 for BioStation T2
const int MAX_READ_LOG = 21845;

int numOfReadLog = 0;
int numOfLog = 0;

BSLogRecordEx* logRecord = (BSLogRecordEx*)malloc( MAX_LOG );
```

```
BS_RET_CODE result = BS_ReadLogEx( handle, 0, 0, &numOfReadLog, logRecord +
numOfLog  );

while( result == BS_SUCCESS )
{
     numOfLog += numOfReadLog;

     if( numOfReadLog < MAX_READ_LOG ) // end of the log
     {
         break;
     }

     result = BS_ReadNextLogEx( handle, 0, 0, &numOfReadLog, logRecord +
     numOfLog );
}
```

BS_DeleteLog

Deletes oldest log records. Please note that BioEntry Plus, BioEntry W, BioLite Net, Xpass, Xpass Slim and Xpass S2 support only **BS_DeleteAllLog()**.

BS_RET_CODE BS_DeleteLog(int handle, int numOfLog, int* numOfDeletedLog)

Parameters

handle

Handle of the communication channel.

numOfLog

Number of log records to be deleted.

numOfDeletedLog

Pointer to the number of deleted log records.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation

BS_DeleteAllLog

Deletes all log records.

BS_RET_CODE BS_DeleteAllLog(int handle, int numOfLog, int* numOfDeletedLog)

Parameters

handle

Handle of the communication channel.

numOfLog

This filed is ignored.

numOfDeletedLog

Pointer to the number of deleted log records.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_GetImageLogCount

Retrieves the number of image log records from FaceStation, BioStation T2, D-Station and X-Station.

BS_RET_CODE BS_GetImageLogCount(int handle, int* numOfLog)

Parameters

handle

Handle of the communication channel.

numOfLog

Pointer to the number of image log records stored in a device.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station

BS_ReadImageLog

Reads image log records which were written in the specified time interval. Although a FaceStation, BioStation T2, D-Station and X-Station terminals can store up to 5,000 image log records. Therefore, users will get all image log records by one call **BS_ReadImaeLog**.

BS_RET_CODE BS_ReadImageLog(int handle, time_t startTime, time_t endTime, int* numOfLog, unsigned char* imageLogData)

Parameters

handle

Handle of the communication channel.

startTime

Start time of the interval. If it is set to 0, the log records will be read from the start.

endTime

End time of the interval. If it is set to 0, the log records will be read to the end.

numOfLog

Pointer to the number of image log records to be returned.

imageLogData

Pointer to the image log records to be returned, numOfLog times repeated data, each consisted of (BSImageLogHdr + imageData). This pointer should be preallocated large enough to store the log records.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStationt T2/D-Station/X-Station

Example

```
int numOfLog=0;
BS_RET_CODE result = BS_GetImageLogCount( handle, &numOfLog );
int bufsize = numOfLog * (sizeof(BSImageLogHdr) +
```

```
unsigned char* pdataBuf = (unsigned char*)malloc( .. );

// Reads all the image log records
result = BS_ReadImageLog( handle, 0, 0, &numOfLog, pdataBuf );

// Reads the log records of latest 24 hours
time_t currentTime = BS_ConvertToLocalTime( time( NULL ) );

result = BS_ReadLogEx( handle, currentTime – 24 * 60 * 60, 0, &numOfLog,
pdataBuf );
```

BS_ReadSpecificImageLog

Reads image log records which were written in the specified time and event id from FaceStation, BioStation T2, D-Station and X-Station.

BS_RET_CODE BS_ReadSpecificImageLog(int handle, time_t logTime, int event, int* size, unsigned char* imageLogData)

Parameters

handle

Handle of the communication channel.

logTime

The time of the image log saved. You can get it from the BSLogRecordEx data, get from calling **BS_ReadLogEx** or **BS_ReadNextLogEx** API.

event

The log record's event id. You can get it from the BSLogRecordEx data, get from calling **BS_ReadLogEx** or **BS_ReadNextLogEx** API.

size

Size of packet to be returned. It is sum of BSImageLogHdr size and image data length.

imageLogData

Pointer to the image log records to be returned, numOfLog times repeated data, each consisted of (BSImageLogHdr + imageData). This pointer should be preallocated large enough to store the log records.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station

Example

```
// Reads the log records of latest 24 hours
time_t currentTime = BS_ConvertToLocalTime( time( NULL ) );
```

```
BS_RET_CODE result = BS_ReadLog( handle, currentTime – 24 * 60 * 60, 0,
&numOfLog, logRecord );
int size = 0;
unsigned char* imageLogData = (unsigned char*)malloc( sizeof(BSImageLogHdr)
+ BS_MAX_IMAGE_SIZE);

// Reads specific image log record
result = BS_GetSpecificImageLog( handle,logRecord[i].eventTime,
logRecord[i].event, &size, imageLogData );
```

BS_DeleteImageLog

Deletes oldest image log records of FaceStation, BioStation T2, D-Station and X-Station.

BS_RET_CODE BS_DeleteImageLog(int handle, int numOfLog, int* numOfDeletedLog)

Parameters

handle

Handle of the communication channel.

numOfLog

Number of log records to be deleted.

numOfDeletedLog

Pointer to the number of deleted image log records.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station

BS_DeleteAllImageLog

Deletes all image log records of FaceStation, BioStation T2, D-Station and X-Station.

BS_RET_CODE BS_DeleteAllImageLog(int handle, int numOfLog, int* numOfDeletedLog)

Parameters

handle

Handle of the communication channel.

numOfLog

This filed is ignored.

numOfDeletedLog

Pointer to the number of deleted image log records.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station

3.5. Display Setup API

Users can customize the background images and sound effects using the following functions. The size of an image or sound file should not exceed 512KB.

- BS_SetBackground: sets the background image.
- BS_SetSlideShow: sets the images of the slide show.
- BS_DeleteSlideShow: deletes all the images of the slide show.
- BS_SetSound: sets a wave file for sound effects.
- BS_DeleteSound: clears a sound effect.
- BS_SetLanguageFile: sets the language resource file.
- BS_SendNotice: sends the notice messages.
- BS_SendNoticeEx: sends the notice messages, altinative UTF16 or UTF8.

BS_SetBackground

BioStation has three types of background – logo, slide show, and notice. Users can customize these images using **BS_SetBackgroun**d and **BS_SetSlideShow**.

BS_SetBackground(int handle, int bgIndex, const char* fileName)

Parameters

handle

Handle of the communication channel.

bgIndex

Background index. It should be one of BS_BACKGROUND_LOGO, BS_BACKGROUND_NOTICE, and BS_BACKGROUND_PDF.

D-Station, BioStation support as below

BS_BACKGROUND_LOGO

BS_BACKGROUND_NOTICE

FaceStation, BioStation T2, X-Station support as below

BS_BACKGROUND_LOGO

BS_BACKGROUND_NOTICE

BS_BACKGROUND_PDF

fileName

Name of the image file or PDF file. If the file is an image file, it should be a 320x240 PNG file. If PDF file, the file size must be less than 512KB.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation

BS_SetSlideShow

Sets an image of the slide show. The maximum number of images is 16.

BS_RET_CODE BS_SetSlideShow(int handle, int numOfPicture, int imageIndex, const char* pngFile)

Parameters

handle

Handle of the communication channel.

numOfPicture

Total number of the images in the slide show.

imageIndex

Index of the image in the slide show.

pngFile

Name of the image file. It should be a 320x240 PNG file.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation

BS_DeleteSlideShow

Deletes all the images of the slide show.

BS_RET_CODE BS_DeleteSlideShow(int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation

BS_SetSound

There are 15 sound effects in BioStation. Users can replace these sounds using **BS_SetSound**.

BS_RET_CODE BS_SetSound(int handle, int soundIndex, const char* wavFile)

Parameters

handle

Handle of the communication channel.

soundIndex

Index of the sound effect.

The available sound effects of **D-Station, X-Station** and **BioStation** are as follows;

Index	**When to play**
BS_SOUND_START	When system starts
BS_SOUND_CLICK	When a keypad is pressed
BS_SOUND_SUCCESS	When authentication or other operations succeed
BS_SOUND_QUESTION	When displaying a dialog for questions or warnings
BS_SOUND_ERROR	When operations fail
BS_SOUND_SCAN	When a fingerprint is detected on the sensor
BS_SOUND_FINGER_ONLY	When waiting for fingerprint
BS_SOUND_PIN_ONLY	When waiting for password
BS_SOUND_CARD_ONLY	When waiting for card
BS_SOUND_FINGER_PIN	When waiting for fingerprint or password
BS_SOUND_FINGER_CARD	When waiting for fingerprint or card
BS_SOUND_TNA_F1	When authentication succeeds

	after F1 button is pressed
BS_SOUND_TNA_F2	When authentication succeeds after F2 button is pressed
BS_SOUND_TNA_F3	When authentication succeeds after F3 button is pressed
BS_SOUND_TNA_F4	When authentication succeeds after F4 button is pressed

The available sound effects of **FaceStation , BioStation T2** are as follows;

Index	**When to play**
BS2_SOUND_START	When system starts
BS2_SOUND_AUTH_SUCCESS	When authentication succeed.
BS2_SOUND_UNREGISTER_USER	When a user is not registered.
BS2_SOUND_SCAN_TIMEOUT	When scan is timeout.
BS2_SOUND_AUTH_FAIL	When authentication fail
BS2_SOUND_ENROLL_SUCCESS	When user enrollment succeed
BS2_SOUND_ENROLL_FAIL	When user enrollment fail
BS2_SOUND_TAKE_PHOTO	When take photo
BS2_SOUND_CONFIG_SUCCESS	When set config succeed
BS2_SOUND_CONFIG_FAIL	When set config fail
BS2_SOUND_TRANSFER	When data transfer
BS2_SOUND_KEY_0	When key0 is pressed
BS2_SOUND_KEY_1	When key1 is pressed
BS2_SOUND_KEY_2	When key2 is pressed
BS2_SOUND_KEY_3	When key3 is pressed
BS2_SOUND_KEY_4	When key4 is pressed
BS2_SOUND_KEY_5	When key5 is pressed
BS2_SOUND_KEY_6	When key6 is pressed
BS2_SOUND_KEY_7	When key7 is pressed
BS2_SOUND_KEY_8	When key8 is pressed
BS2_SOUND_KEY_9	When key9 is pressed
BS2_SOUND_TOUCH	When touch event is occurred
BS2_SOUND_CLICK	When click event is occurred
BS2_SOUND_FINGER_SCAN	When a fingerprint is detected on the sensor

BS2_SOUND_CARD_READ	When a card is read
BS2_SOUND_CONFRIM	When confirm is occurred
BS2_SOUND_ALARM	When alarm is occurred
BS2_SOUND_ARM_WAIT	When arm wait
BS2_SOUND_DISARM_WAIT	When disarm wait
BS2_SOUND_ARM_SUCCESS	When arm succeed
BS2_SOUND_ARM_FAIL	When arm fail
BS2_SOUND_DISARM_SUCCESS	When disarm succeed
BS2_SOUND_DISARM_FAIL	When disarm fail
BS2_SOUND_TRY_AUTH_IN_ARM	When try authentication in arm
BS2_SOUND_REQUEST_FINGER	When Finger is requested to scan
BS2_SOUND_REQUEST_CARD	When Card is requested to read
BS2_SOUND_REQUEST_ID	When ID is requested to input
BS2_SOUND_REQUEST_PIN	When PIN is requested to input
BS2_SOUND_REQUEST_FINGER_PIN	When Finger and PIN are requested
BS2_SOUND_REQUEST_FINGER_CARD_ID	When Finger, Card and ID are requested
BS2_SOUND_REQUEST_FINGER_CARD	When Finger and Card are requested
BS2_SOUND_REQUEST_FINGER_ID	When Finger and ID are requested
BS2_SOUND_REQUEST_CARD_ID	When Card and ID are requested

wavFile

Filename of the sound file. It should be a signed 16bit, 22050Hz, mono WAV file.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation

BS_DeleteSound

Clears the sound file set by **BS_SetSound**.

BS_RET_CODE BS_DeleteSound(int handle, int soundIndex)

Parameters

handle

Handle of the communication channel.

soundIndex

Index of the sound effect. See **BS_SetSound**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation

BS_SetLanguageFile

BioStation supports two languages - Korean and English. It also provides a custom language option to support other languages. For further details of custom language option, please contact sales@supremainc.com.

BS_RET_CODE BS_SetLanguageFile(int handle, int languageIndex, const char* languageFile)

Parameters

handle

Handle of the communication channel.

languageIndex

Available options are BS_LANG_ENGLISH, BS_LANG_KOREAN, and BS_LANG_CUSTOM.

languageFile

Name of the language resource file.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioLite Net

BS_SendNotice

Sends the notice message, which will be displayed on BioStation when the background is set to BS_UI_BG_NOTICE.

BS_SendNotice(int handle, const char* msg)

Parameters

handle

Handle of the communication channel.

msg

Pointer to the notice message. The maximum length is 1024 bytes.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_SendNoticeEx

Sends the notice message, which will be displayed on FaceStation, BioStation T2, D-Station, BioStation or X-Station when the background is set to BS_UI_BG_NOTICE.

BS_SendNoticeEx(int handle, const char* msg, bool bUTF16)

Parameters

handle

Handle of the communication channel.

msg

Pointer to the notice message. The maximum length is 1024 bytes.

bUTF16

Select encode type. D-Station uses UTF16 so true, and BioStation uses UTF8 so false.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation

3.6. User Management API

These APIs provide user management functions such as enroll and delete. Note that the user header structures of BioStation, BioEntry Plus, BioEntry W, BioLite Net, Xpass, and Xpass Slim are different. See the **Compatibility** section of each API to choose the right function.

- BS_GetUserDBInfo: gets the basic information of the user DB.
- BS_EnrollUserEx: enrolls a user to BioStation.
- BS_EnrollMultipleUserEx: enrolls multiples users to BioStation.
- BS_EnrollUserBEPlus: enrolls a user to BioEntry Plus, BioEntry W, BioLite Net, Xpass or Xpass Slim.
- BS_EnrollMultipleUserBEPlus: enrolls multiple users to BioEntry Plus, BioEntry W, BioLite Net, Xpass or Xpass Slim.
- BS_EnrollUserDStation: enrolls a user to D-Station.
- BS_EnrollMultipleUserDStation: enrolls multiples users to D-Station.
- BS_EnrollFace: enrolls a user's face template to D-Station.
- BS_EnrollUserXStation: enrolls a user to X-Station.
- BS_EnrollMultipleUserXStation: enrolls multiples users to X-Station.
- BS_EnrollUserBioStationT2: enrolls a user to BioStation T2.
- BS_EnrollMultipleUserBioStation2: enrolls multiple users to BioStation T2.
- BS_EnrollUserFStation: enrolls a user to FaceStation.
- BS_EnrollUserFStationEx: enrolls a user to FaceStation. It supports up to 5 faces for a user.
- BS_EnrollMultipleUserFStation: enrolls multiple users to FaceStation.
- BS_EnrollMultipleUserFStationEx: enrolls multiple users to FaceStation. It supports up to 5 faces for each user.
- BS_GetUserEx: gets the fingerprint templates and header information of a user from BioStation.
- BS_GetUserInfoEx: gets the header information of a user from BioStation.
- BS_GetAllUserInfoEx: gets the header information of all users from BioStation.
- BS_GetUserBEPlus: gets the fingerprint templates and header information of a user from BioEntry Plus, BioEntry W, BioLite Net, Xpass or Xpass Slim.
- BS_GetUserInfoBEPlus: gets the header information of a user from

BioEntry Plus, BioEntry W, BioLite Net, Xpass and Xpass Slim.

- BS_GetAllUserInfoBEPlus: gets the header information of all users from BioEntry Plus, BioEntry W, BioLite Net, Xpass and Xpass Slim.
- BS_GetUserDStation: gets the fingerprint templates, face templates and header information of a user from D-Station.
- BS_GetUserFaceInfo: gets the face template of a user from D-Station and FaceStation.
- BS_GetUserInfoDStation: gets the header information of a user from D-Station.
- BS_GetAllUserInfoDStation: gets the header information of all users from D-Station.
- BS_GetUserXStation: gets the information of a user from X-Station.
- BS_GetUserInfoXStation: gets the header information of a user from X-Station.
- BS_GetAllUserInfoXStation: gets the header information of all users from X-Statio
- .BS_GetUserBioStation2: gets the information of a user from BioStation2.
- BS_GetUserInfoBioStation2: gets the header information of a user from BioStation2.
- BS_GetAllUserInfoBioStation2: gets the header information of all users from BioStation2.
- BS_GetUserFStation: gets the information of a user from FaceStation.
- BS_GetUserFStationEx: gets the information of a user from FaceStation. It supports up to 5 faces for a user.
- BS_GetUserInfoFStation: gets the header information of a user from FaceStation.
- BS_GetUserInfoFStationEx: gets the header information of a user from FaceStation. It supports FSUserHdrEx.
- BS_GetAllUserInfoFStation: gets the header information of all users from FaceStation.
- BS_GetAllUserInfoFStationEx: gets the header information of all users from FaceStation. It supports FSUserHdrEx.
- BS_DeleteUser: deletes a user.
- BS_DeleteMultipleUsers: deletes multiple users.
- BS_DeleteAllUser: deletes all users.
- BS_SetPrivateInfo: sets the private information of a user.

- BS_GetPrivateInfo: gets the private information of a user.
- BS_GetAllPrivateInfo: gets the private information of all users.
- BS_SetUserImage: set the profile image of a user to FaceStation, BioStation T2, D-Station and X-Station.
- BS_GetUserImage: gets the profile image of a user from FaceStation, BioStation T2, D-Station and X-Station.
- BS_ScanTemplate: scans a fingerprint on a device and retrieves the template of it.
- BS_ScanTemplateEx: scans a fingerprint from selected sensor on a two sensor device as D-Station.
- BS_ScanFaceTemplate: capture a face template and image on a camera and retrieves the face template and image of it from FaceStation.
- BS_ReadFaceData: capture a face template and image on a camera and retrieves the face template and image of it from D-Station.
- BS_ReadCardIDEx: reads a RF card on a device and retrieves the id of it.
- BS_ReadImage: reads an image of the last scanned fingerprint.
- BS_ReadImageEx: reads an image of the scanned fingerprint by sensor index.

BS_GetUserDBInfo

Retrieves the number of enrolled users and fingerprint templates.

BS_RET_CODE BS_GetUserDBInfo(int handle, int* numOfUser, int* numOfTemplate)

Parameters

handle

Handle of the communication channel.

numOfUser

Pointer to the number of enrolled users.

numOfTemplate

Pointer to the number of enrolled templates.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2/D-Station/BioStation/X-Station/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_EnrollUserEx

Enrolls a user to BioStation. Maximum 5 fingers can be enrolled per user.

BS_RET_CODE BS_EnrollUserEx(int handle, BSUserHdrEx* hdr, unsigned char* templateData)

Parameters

handle

Handle of the communication channel.

Hdr

BSUserHdrEx is defined as follows.

```
typedef struct{
    unsigned ID;
    unsigned short reserved1;
    unsigned short adminLevel;
    unsigned short securityLevel;
    unsigned short statusMask; // internally used by BioStation
    unsigned accessGroupMask;
    char name[BS_MAX_NAME_LEN + 1];
    char department[BS_MAX_NAME_LEN + 1];
    char password[BS_MAX_PASSWORD_LEN + 1];
    unsigned short numOfFinger;
    unsigned short duressMask;
    unsigned short checksum[5];
    unsigned short authMode;
    unsigned short authLimitCount; // 0 for no limit
    unsigned short reserved;
    unsigned short timedAntiPassback; // in minutes. 0 for no limit
    unsigned cardID; // 0 for not used
    bool bypassCard;
    bool disabled;
    unsigned expireDateTime;
    unsigned customID; //card Custom ID
    int version; // card Info Version
    unsigned startDateTime;
} BSUserHdrEx;
```

The key fields and their available options are as follows.

Fields	Descriptions
adminLevel	BS_USER_ADMIN

	BS_USER_NORMAL
securityLevel	It specifies the security level used for 1:1 matching only. BS_USER_SECURITY_DEFAULT: same as the device setting BS_USER_SECURITY_LOWER: 1/1000 BS_USER_SECURITY_LOW: 1/10,000 BS_USER_SECURITY_NORMAL: 1/100,000 BS_USER_SECURITY_HIGH: 1/1,000,000 BS_USER_SECURITY_HIGHER: 1/10,000,000
accessGroupMask	A user can be a member of up to 4 access groups. For example, if the user is a member of Group 1 and Group 4, accessGroupMask will be 0xffff0104. If no access group is assigned to this user, it will be 0xffffffff.
duressMask	Under duress, users can authenticate with a duress finger to notify the threat. When duress finger is detected, the terminal will write a log record and output specified signals. The duressMask denotes which one of the enrolled finger is a duress one. For example, if the 3rd finger is a duress finger, duressMask will be 0x04.
checksum	Checksums of each enrolled finger. Since two templates are enrolled per finger, the checksum of a finger is calculated by summing all the bytes of the two template data.
authMode	Specify the authentication mode of this user. The **usePrivateAuthMode** of **BSOPModeConfig** should be true for this authentication mode to be effective. Otherwise, the authentication mode of the

	device will be applied to all users. BS_AUTH_MODE_DISABLED[3] BS_AUTH_FINGER_ONLY BS_AUTH_FINGER_N_PASSWORD BS_AUTH_FINGER_OR_PASSWORD BS_AUTH_PASS_ONLY BS_AUTH_CARD_ONLY
authLimitCount	Specifies how many times the user is permitted to access per day. If it is 0, there is no limit.
timedAntiPassback	Specifies the minimum time interval for which the user can access the device only once. If it is 0, there is no limit.
cardID	4 byte card ID. The RF card ID is comprised of 4 byte card ID and 1 byte custom ID.
bypassCard	If it is true, the user can access without fingerprint authentication.
disabled	If it is true, the user cannot access the device all the time.
expireDateTime	The date on which the user's authorization expires.
customID	In case Mifare 1 byte custom ID of the card . 4 byte custom ID which makes up the RF card ID with **cardID** in case iCLASS.
version	The version of the card information format.
startDateTime	The date from which the user's authorization takes effect.

templateData

Fingerprint templates of the user. Two templates should be enrolled per each finger.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the

[3] The authentication mode of the device will be applied to this user.

corresponding error code.

Compatibility

BioStation

Example

```
BSUserHdrEx userHeader;
// initialize header
memset( &userHdr, 0, sizeof( BSUserHdrEx ) );
userHdr.ID = 1; // 0 cannot be assigned as a user ID
userHdr.startDateTime = 0; // no check for start date
userHdr.expireDateTime = 0; // no check for expiry date
userHeader.adminLevel = BS_USER_NORMAL;
userHeader.securityLevel = BS_USER_SECURITY_DEFAULT;
userHeader.authMode = BS_AUTH_MODE_DISABLED; // use the authentication mode
                                             // of the device
userHeader.accessGroupMask = 0xffff0201; // a member of Group 1 and Group
2;
strcpy( userHeader.name, “John” );
strcpy( userHeader.departments, “RND” );
strcpy( userHeader.password, “” ); // no password is enrolled. Password
                                   // should be longer than 4 bytes.

// read card IDs
BS_RET_CODE result = BS_ReadCardIDEx( handle, &userHeader.cardID,
&userHdr.customID );
userHdr.version = CARD_INFO_VERSION;
userHdr.bypassCard = 0;

// scan templates
userHeader.numOfFinger = 2;
unsigned char* templateBuf = (unsigned char*)malloc( userHeader.numOfFinger
* 2 * BS_TEMPLATE_SIZE );

int bufPos = 0;
for( int i = 0; i < userHeader.numOfFinger * 2; i++ )
{
     result = BS_ScanTemplate( handle, templateBuf + bufPos );
     bufPos += BS_TEMPLATE_SIZE;
}
userHeader.duressMask = 0; // no duress finger

for( int i = 0; i < userHeader.numOfFinger * 2; i++ )
{
     if( i % 2 == 0 )
```

```
        {
            userHeader.checksum[i/2] = 0;
        }

        unsigned char* templateData = templateBuf + i * BS_TEMPLATE_SIZE;

        for( int j = 0; j < BS_TEMPLATE_SIZE; j++ )
        {
            userHeader.checksum[i/2] += templateData[j];
        }
    }

    // enroll the user
    result = BS_EnrollUserEx( handle, &userHeader, templateBuf );
```

BS_EnrollMultipleUserEx

Enrolls multiple users to BioStation. By combining user information, the enrollment time will be reduced.

BS_RET_CODE BS_EnrollMultipleUserEx(int handle, int numOfUser, BSUserHdrEx* hdr, unsigned char* templateData)

Parameters

handle

Handle of the communication channel.

numOfUser

Number of users to be enrolled.

hdr

Array of user headers to be enrolled.

templateData

Fingerprint templates of the all users.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

Example

```
int numOfUser = 2;
BSUserHdrEx hdr1, hdr2;
unsigned char *templateBuf1, *templateBuf2;

// fill the header and template data here
// …

BSUserHdrEx* hdr = (BSUserHdrEx*)malloc( numOfUser *
sizeof( BSUserHdrEx ) );
unsigned char* templateBuf = (unsigned char*)malloc( hdr1.numOfFinger * 2 *
BS_TEMPLATE_SIZE + hdr2.numOfFinger * 2 * BS_TEMPLATE_SIZE );
```

```
memcpy( hdr, &hdr1, sizeof( BSUserHdrEx ) );
memcpy( hdr + sizeof( BSUserHdrEx ), &hdr2, sizeof( BSUserHdrEx ) );

memcpy( templateBuf, templateBuf1, hdr1.numOfFinger * 2 *
BS_TEMPLATE_SIZE );
memcpy( templateBuf + hdr1.numOfFinger * 2 * BS_TEMPLATE_SIZE, templateBuf2,
hdr2.numOfFinger * 2 * BS_TEMPLATE_SIZE );

BS_RET_CODE result = BS_EnrollMultipleUserEx( handle, numOfUser, hdr,
templateBuf );
```

BS_EnrollUserBEPlus

Enroll a user to BioEntry Plus, BioEntry W, BioLite Net, Xpass or Xpass Slim.
In using BioEntry Plus and BioLite Net, Maximum 2 fingers can be enrolled per user. The only difference between BioEntry Plus and BioLite Net is that only the latter uses the password field.
In using Xpass, numOfFinger field of BEUserHdr and templateData parameter are ignored because Xpass has been designed for the card only product.

BS_RET_CODE BS_EnrollUserBEPlus(int handle, BEUserHdr* hdr, unsigned char* templateData)

Parameters

handle

Handle of the communication channel.

Hdr

BEUserHdr is defined as follows.

```
typedef struct {
        // card Flag
        NORMAL_CARD = 0x00,
        BYPASS_CARD = 0x01,

        // card Version
        CARD_VERSION_1 = 0x13,

        // Admin level
        USER_LEVEL_NORMAL = 0,
        USER_LEVEL_ADMIN = 1,

        // Security leve
        USER_SECURITY_DEFAULT = 0,
        USER_SECURITY_LOWER = 1,
        USER_SECURITY_LOW = 2,
        USER_SECURITY_NORMAL = 3,
        USER_SECURITY_HIGH = 4,
        USER_SECURITY_HIGHER = 5,
    };

    int version;
    unsigned userID;
    time_t startTime;
```

```
    time_t expiryTime;
    unsigned cardID;
    unsigned char cardCustomID;
    unsigned char commandCardFlag;
    unsigned char cardFlag;
    unsigned char cardVersion;
    unsigned short adminLevel;
    unsigned short securityLevel;
    unsigned accessGroupMask;
    unsigned short numOfFinger; // 0, 1, 2
    unsigned short fingerChecksum[2];
    unsigned char isDuress[2];
    int disabled;
    int opMode;
    int dualMode;
    char password[16]; // for BioLite Net only
    unsigned fullCardCustomID;
    int reserved2[14];
} BEUserHdr;
```

The key fields and their available options are as follows.

Fields	**Descriptions**
version	0x01.
userID	User ID.
startTime	The time from which the user's authorization takes effect.
expiryTime	The time on which the user's authorization expires.
cardID	4 byte card ID. The RF card ID is comprised of 4 byte card ID and 1 byte custom ID.
cardCustomID	1 byte custom ID which makes up the RF card ID with **cardID**.
commandCardFlag	Reserved for future use.
cardFlag	NORMAL_CARD BYPASS_CARD
cardVersion	CARD_VERSION_1
adminLevel	USER_LEVEL_NORMAL USER_LEVEL_ADMIN
securityLevel	It specifies the security level used for 1:1 matching only.

	USER_SECURITY_DEFAULT: same as the device setting. USER_SECURITY_LOWER: 1/1000 USER_SECURITY_LOW: 1/10,000 USER_SECURITY_NORMAL: 1/100,000 USER_SECURITY_HIGH: 1/1,000,000 USER_SECURITY_HIGHER: 1/10,000,000
accessGroupMask	A user can be a member of up to 4 access groups. For example, if the user is a member of Group 1 and Group 4, accessGroupMask will be 0xffff0104. If no access group is assigned to this user, it will be 0xffffffff.
numOfFinger	The number of enrolled fingers.
fingerChecksum	Checksums of each enrolled finger. Since two templates are enrolled per finger, the checksum of a finger is calculated by summing all the bytes of the two template data.
isDuress	Under duress, users can authenticate with a duress finger to notify the threat. When duress finger is detected, the device will write a log record and output specified signals.
disabled	If it is true, the user cannot access the device all the time. It is useful for disabling users temporarily.
opMode	Specify the authentication mode of this user. The **opModePerUser** of **BEConfigData** should be true for this authentication mode to be effective. Otherwise, the authentication mode of the device will be applied. BS_AUTH_MODE_DISABLED[4]

[4] The authentication mode of the device will be applied to this user.

	BS_AUTH_FINGER_ONLY BS_AUTH_FINGER_N_PASSWORD BS_AUTH_FINGER_OR_PASSWORD BS_AUTH_PASS_ONLY BS_AUTH_CARD_ONLY
dualMode	Reserved for future use.
password	16 byte password for BioLite only.
fullCardCustomID	4 byte custom ID which makes up the RF card ID with **cardID** in case iCLASS.

templateData

Fingerprint templates of the user. Two templates should be enrolled per each finger.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

Example

```
BEUserHdr userHeader;

// initialize header
memset( &userHeader, 0, sizeof( BEUserHdr ) );

userHeader.version = 0x01;
userHeader.userID = 0x01;
userHeader.startTime = 0; // no start time check
userHeader.expiryTime = US_ConvertToLocalTime( time( NULL ) ) + 365 * 24 *
60 * 60; // 1 year from today
userHeader.adminLevel = BEUserHdr::USER_LEVEL_NOMAL;
userHeader.securityLevel = BEUserHdr::USER_SECURITY_DEFAULT;
userHeader.accessGroupMask = 0xffff0201; // a member of Group 1 and Group
2;
userHeader.opMode = BS_AUTH_MODE_DISABLED; // use the authentication mode
                                           // of the device

// read card IDs
```

```
BS_RET_CODE result = BS_ReadCardIDEx( handle, &userHeader.cardID,
&userHdr.cardCustomID );
userHdr.cardVersion = BEUserHdr::CARD_VERSION_1;
userHdr.cardFlag = BEUserHdr::NORMAL_CARD;

// scan templates
userHeader.numOfFinger = 2;
unsigned char* templateBuf = (unsigned char*)malloc( userHeader.numOfFinger
* 2 * BS_TEMPLATE_SIZE );

int bufPos = 0;
for( int i = 0; i < userHeader.numOfFinger * 2; i++ )
{
     result = BS_ScanTemplate( handle, templateBuf + bufPos );
     bufPos += BS_TEMPLATE_SIZE;
}

for( int i = 0; i < userHeader.numOfFinger * 2; i++ )
{
     if( i % 2 == 0 )
     {
         userHeader.fingerChecksum[i/2] = 0;
     }

     unsigned char* templateData = templateBuf + i * BS_TEMPLATE_SIZE;

     for( int j = 0; j < BS_TEMPLATE_SIZE; j++ )
     {
         userHeader.checksum[i/2] += templateData[j];
     }
}

result = BS_EnrollUserBEPlus( handle, &userHeader, templateBuf );
```

BS_EnrollMultipleUserBEPlus

Enrolls multiple users to BioEntry Plus or BioLite Net. By combining user information, you can reduce the enrollment time. You can transfer up to 64 users at a time.

BS_RET_CODE BS_EnrollMultipleUserBEPlus(int handle, int numOfUser, BEUserHdr* hdr, unsigned char* templateData)

Parameters

handle

Handle of the communication channel.

numOfUser

Number of users to be enrolled.

hdr

Array of user headers to be enrolled.

templateData

Fingerprint templates of the all users.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioEntry Plus/BioEntry W/BioLite Net

Example

See the Example of BS_EnrollMultipleUserEx.

BS_EnrollUserDStation

Enrolls a user to D-Station. Maximum 10 fingers and 3 face can be enrolled per user.

BS_RET_CODE BS_EnrollUserDStation(int handle, DSUserHdr* hdr, unsigned char* templateData, unsigned char* faceTemplate)

Parameters

handle

Handle of the communication channel.

Hdr

DSUserHdr is defined as follows.

```
typedef struct{
    enum{
        DS_MAX_NAME_LEN = 48,
        DS_MAX_PASSWORD_LEN = 16,
        DS_MIN_PASSWORD_LEN = 4,
        DS_TEMPLATE_SIZE = 384,
        DS_FACE_TEMPLATE_SIZE = 2284,
        MAX_FINGER = 10,
        MAX_FINGER_TEMPLATE = 20,
        MAX_FACE = 5,
        MAX_FACE_TEMPLATE = 5,
        USER_NORMAL = 0,
        USER_ADMIN = 1,
    }
    unsigned ID;
    unsigned short headerVersion;
    unsigned short adminLevel;
    unsigned short securityLevel;
    unsigned short statusMask; // internally used by BioStation
    unsigned accessGroupMask;
    unsigned short name[DS_MAX_NAME_LEN];
    unsigned short department[DS_MAX_NAME_LEN];
    unsigned short password[DS_MAX_PASSWORD_LEN];
    unsigned short numOfFinger;
    unsigned short numOfFace;
    unsigned char duress[MAX_FINGER];
    unsigned char reserved1[2];
    unsigned char fingerType[MAX_FINGER];
    unsigned fingerChecksum[MAX_FINGER];
    unsigned faceChecksum[MAX_FACE_TEMPLATE];
```

```
    unsigned short authMode;
    unsigned char bypassCard;
    unsigned char disabled;
    unsigned cardID;
    unsigned customID;
    unsigned startDateTime;
    unsigned expireDateTime;
    unsigned reserved2[10];
} DSUserHdr;
```

The key fields and their available options are as follows.

Fields	**Descriptions**
adminLevel	USER_ADMIN USER_NORMAL
securityLevel	It specifies the security level used for 1:1 matching only. BS_USER_SECURITY_DEFAULT: same as the device setting BS_USER_SECURITY_LOWER: 1/1000 BS_USER_SECURITY_LOW: 1/10,000 BS_USER_SECURITY_NORMAL: 1/100,000 BS_USER_SECURITY_HIGH: 1/1,000,000 BS_USER_SECURITY_HIGHER: 1/10,000,000
accessGroupMask	A user can be a member of up to 4 access groups. For example, if the user is a member of Group 1 and Group 4, accessGroupMask will be 0xffff0104. If no access group is assigned to this user, it will be 0xffffffff.
duress	Under duress, users can authenticate with a duress finger to notify the threat. When duress finger is detected, the terminal will write a log record and output specified signals. The duress denotes that each enrolled finger is a duress one. For example, if the 3rd finger is a duress finger, duress[2] will be 1.
fingerType	Enrolled 10 fingers are tagged by sequecial values. This values represent the order of 10

	fingers. Left thumb is 0 and index finger 1, middle finger 2, ring finger 3, little finger 4. Right thumb is 5 and index finger 6, middle finger 7, ring finger 8, little finger 9.
fingerchecksum	Checksums of each enrolled finger. Since two templates are enrolled per finger, the checksum of a finger is calculated by summing all the bytes of the two template data.
facechecksum	Checksums of each enrolled face. Since three templates are enrolled per user, the checksum of a facer is calculated by summing all the bytes of the three template data.
authMode	Specify the authentication mode of this user. The **usePrivateAuthMode** of **DSOPModeConfig** should be true for this authentication mode to be effective. Otherwise, the authentication mode of the device will be applied to all users. BS_AUTH_MODE_DISABLED[5] BS_AUTH_FINGER_ONLY BS_AUTH_FINGER_N_PASSWORD BS_AUTH_FINGER_OR_PASSWORD BS_AUTH_PASS_ONLY BS_AUTH_CARD_ONLY
bypassCard	If it is true, the user can access without fingerprint authentication.
disabled	If it is true, the user cannot access the device all the time.
cardID	4 byte card ID. The RF card ID is comprised of 4 byte card ID and 1 byte custom ID.
customID	4 byte custom ID of the card.
startDateTime	The date from which the user's authorization takes effect.

[5] The authentication mode of the device will be applied to this user.

expireDateTime	The date on which the user's authorization expires.

templateData

Fingerprint templates of the user. Two templates should be enrolled per each finger.

faceTemplate

Face templates of the user. Three templates should be enrolled per each user.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

Example

```
DSUserHdr userHeader;
// initialize header
memset( &userHdr, 0, sizeof( DSUserHdr ) );
userHdr.ID = 1; // 0 cannot be assigned as a user ID
userHdr.startDateTime = 0; // no check for start date
userHdr.expireDateTime = 0; // no check for expiry date
userHeader.adminLevel = BS_USER_NORMAL;
userHeader.securityLevel = BS_USER_SECURITY_DEFAULT;
userHeader.authMode = BS_AUTH_MODE_DISABLED; // use the authentication mode
                                             // of the device
userHeader.accessGroupMask = 0xffff0201; // a member of Group 1 and Group
2;
strcpy( userHeader.name, "John" );
strcpy( userHeader.departments, "RND" );
strcpy( userHeader.password, "" ); // no password is enrolled. Password
                                   // should be longer than 4 bytes.

// read card IDs
BS_RET_CODE result = BS_ReadCardIDEx( handle, &userHeader.cardID,
&userHdr.customID );
userHdr.bypassCard = 0;

// scan finger templates
```

```
userHeader.numOfFinger = 2;
unsigned char* templateBuf = (unsigned char*)malloc( userHeader.numOfFinger
* 2 * BS_TEMPLATE_SIZE );

int bufPos = 0;
for( int i = 0; i < userHeader.numOfFinger * 2; i++ )
{
     result = BS_ScanTemplate( handle, templateBuf + bufPos );
     bufPos += BS_TEMPLATE_SIZE;
}

for( int i = 0; i < userHeader.numOfFinger; i++ )
{
     userHeader.duress[i] = 0; // no duress finger
}

for( int i = 0; i < userHeader.numOfFinger * 2; i++ )
{
     if( i % 2 == 0 )
     {
         userHeader.fingerChecksum[i/2] = 0;
     }

     unsigned char* templateData = templateBuf + i * BS_TEMPLATE_SIZE;

     for( int j = 0; j < BS_TEMPLATE_SIZE; j++ )
     {
         userHeader.fingerChecksum[i/2] += templateData[j];
     }
}

// capture face template
userHeader.numofFace = 3;
unsigned char* faceTemplateBuf = (unsigned
char*)malloc(userHeader.numOfFace * BS_FACE_TEMPLATE_SIZE );
unsigned char* imageData = (unsigned char*)malloc(userHeader.numOfFace *
BS_MAX_IMAGE_SIZE );

int imgPos = 0;
int bufPos2 = 0;
for( int i = 0; i < userHeader.numOfFace; i++ )
{
     Result = BS_ReadFaceData( handle, imageLen, imageData + imgPos,
faceTemplateBuf + bufPos2 );

     imgPos += imageLen;
```

```
        bufPos += BS_FACE_TEMPLATE_SIZE;
    }

    // enroll the user
    result = BS_EnrollUserDStation( handle, &userHeader, templateBuf,
    faceTemplateBuf );
```

BS_EnrollMultipleUserDStation

Enrolls multiple users to D-Station. By combining user information, the enrollment time will be reduced.

BS_RET_CODE BS_EnrollMultipleUserDStation(int handle, int numOfUser, DSUserHdr* hdr, unsigned char* templateData, unsigned char* faceTemplate)

Parameters

handle

Handle of the communication channel.

numOfUser

Number of users to be enrolled.

hdr

Array of user headers to be enrolled.

templateData

Fingerprint templates of the all users.

faceTemplate

Face templates of the all users.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

Example

```
int numOfUser = 2;
DSUserHdr hdr1, hdr2;
unsigned char *templateBuf1, *templateBuf2;
unsigned char *faceTemplate1, *faceTemplate2;

// fill the header and template data here
// …

DSUserHdr* hdr = (DSUserHdr*)malloc( numOfUser * sizeof( DSUserHdr ) );
```

```
// header
unsigned char* templateBuf = (unsigned char*)malloc( hdr1.numOfFinger * 2 *
BS_TEMPLATE_SIZE + hdr2.numOfFinger * 2 * BS_TEMPLATE_SIZE );

memcpy( hdr, &hdr1, sizeof( DSUserHdr ) );
memcpy( hdr + sizeof( DSUserHdr ), &hdr2, sizeof( DSUserHdr ) );

// fingerprint template
memcpy( templateBuf, templateBuf1, hdr1.numOfFinger * 2 *
BS_TEMPLATE_SIZE );
memcpy( templateBuf + hdr1.numOfFinger * 2 * BS_TEMPLATE_SIZE, templateBuf2,
hdr2.numOfFinger * 2 * BS_TEMPLATE_SIZE );

// face template
unsigned char* faceTemplateBuf = (unsigned char*)malloc( hdr1.numOfFace *
BS_FACE_TEMPLATE_SIZE + hdr2.numOfFace * BS_FACE_TEMPLATE_SIZE );

memcpy( faceTemplateBuf, faceTemplateBuf1, hdr1.numOfFace *
BS_FACE_TEMPLATE_SIZE );
memcpy( faceTemplateBuf + hdr1.numOfFace * BS_FACE_TEMPLATE_SIZE,
faceTemplateBuf2, hdr2.numOfFace * BS_FACE_TEMPLATE_SIZE );

// enroll multiple
BS_RET_CODE result = BS_EnrollMultipleUserDStation( handle, numOfUser, hdr,
templateBuf, faceTemplate );
```

BS_EnrollFace

Enrolls users face template to D-Station. By combining user id, maximum 3 faces can be enrolled pre user.

BS_RET_CODE BS_EnrollFace(int handle, unsigned int userID, int numOfFace, unsigned char* faceTemplate)

Parameters

handle

Handle of the communication channel.

userID

ID of user to be enrolled.

numOfFace

Number of faces to be enrolled.

faceTemplate

Face templates of the user.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

Example

```
int userID = 0;
int numOfFace = 3;
unsigned char *face1, *face2, *face3;

// fill the user id and face template data here
// …

// face template
unsigned char* faceTemplate = (unsigned char*)malloc(numOfFace *
BS_FACE_TEMPLATE_SIZE);
```

```
int bufPos = 0;

memcpy( faceTemplate + bufPos, face1, BS_FACE_TEMPLATE_SIZE );
bufPos += BS_FACE_TEMPLATE_SIZE;

memcpy( faceTemplate + bufPos, face2, BS_FACE_TEMPLATE_SIZE );
bufPos += BS_FACE_TEMPLATE_SIZE;

memcpy( faceTemplate + bufPos, face3, BS_FACE_TEMPLATE_SIZE );
bufPos += BS_FACE_TEMPLATE_SIZE;

// enroll multiple
BS_RET_CODE result = BS_EnrollFace( handle, userID, numOfFace,
faceTemplate );
```

BS_EnrollUserXStation

Enrolls a user to X-Station. In using X-Station, numOfFinger field of XSUserHdr and templateData parameter are ignored because XStation has been designed for the card only product.

BS_RET_CODE BS_EnrollUserXStation(int handle, XSUserHdr* hdr)

Parameters

handle

Handle of the communication channel.

Hdr

XSUserHdr is defined as follows.

```
typedef struct{
    enum{
        DS_MAX_NAME_LEN = 48,
        DS_MAX_PASSWORD_LEN = 16,
        DS_MIN_PASSWORD_LEN = 4,
        DS_TEMPLATE_SIZE = 384,
        DS_FACE_TEMPLATE_SIZE = 2284,
        MAX_FINGER = 10,
        MAX_FINGER_TEMPLATE = 20,
        MAX_FACE = 5,
        MAX_FACE_TEMPLATE = 5,
        USER_NORMAL = 0,
        USER_ADMIN = 1,
    }
    unsigned ID;
    unsigned short headerVersion;
    unsigned short adminLevel;
    unsigned short securityLevel;
    unsigned short statusMask; // internally used by BioStation
    unsigned accessGroupMask;
    unsigned short name[DS_MAX_NAME_LEN];
    unsigned short department[DS_MAX_NAME_LEN];
    unsigned short password[DS_MAX_PASSWORD_LEN];
    unsigned short numOfFinger;
    unsigned short numOfFace;
    unsigned char duress[MAX_FINGER];
    unsigned char reserved1[2];
    unsigned char fingerType[MAX_FINGER];
    unsigned fingerChecksum[MAX_FINGER];
```

```
    unsigned faceChecksum[MAX_FACE_TEMPLATE];
    unsigned short authMode;
    unsigned char bypassCard;
    unsigned char disabled;
    unsigned cardID;
    unsigned customID;
    unsigned startDateTime;
    unsigned expireDateTime;
    unsigned reserved2[10];
} XSUserHdr;
```

The key fields and their available options are as follows.

Fields	**Descriptions**
adminLevel	USER_ADMIN USER_NORMAL
securityLevel	It specifies the security level used for 1:1 matching only. BS_USER_SECURITY_DEFAULT: same as the device setting BS_USER_SECURITY_LOWER: 1/1000 BS_USER_SECURITY_LOW: 1/10,000 BS_USER_SECURITY_NORMAL: 1/100,000 BS_USER_SECURITY_HIGH: 1/1,000,000 BS_USER_SECURITY_HIGHER: 1/10,000,000
accessGroupMask	A user can be a member of up to 4 access groups. For example, if the user is a member of Group 1 and Group 4, accessGroupMask will be 0xffff0104. If no access group is assigned to this user, it will be 0xffffffff.
duress	Under duress, users can authenticate with a duress finger to notify the threat. When duress finger is detected, the terminal will write a log record and output specified signals. The duress denotes that each enrolled finger is a duress one. For example, if the 3rd finger is a duress finger, duress[2] will be 1.
fingerType	Enrolled 10 fingers are tagged by sequecial values. This values represent the order of 10

	fingers. Left thumb is 0 and index finger 1, middle finger 2, ring finger 3, little finger 4. Right thumb is 5 and index finger 6, middle finger 7, ring finger 8, little finger 9.
fingerchecksum	Checksums of each enrolled finger. Since two templates are enrolled per finger, the checksum of a finger is calculated by summing all the bytes of the two template data.
facechecksum	Checksums of each enrolled face. Since three templates are enrolled per user, the checksum of a facer is calculated by summing all the bytes of the three template data.
authMode	Specify the authentication mode of this user. The **usePrivateAuthMode** of **DSOPModeConfig** should be true for this authentication mode to be effective. Otherwise, the authentication mode of the device will be applied to all users. BS_AUTH_MODE_DISABLED[6] BS_AUTH_FINGER_ONLY BS_AUTH_FINGER_N_PASSWORD BS_AUTH_FINGER_OR_PASSWORD BS_AUTH_PASS_ONLY BS_AUTH_CARD_ONLY
bypassCard	If it is true, the user can access without fingerprint authentication.
disabled	If it is true, the user cannot access the device all the time.
cardID	4 byte card ID. The RF card ID is comprised of 4 byte card ID and 1 byte custom ID.
customID	4 byte custom ID of the card.
startDateTime	The date from which the user's authorization takes effect.

[6] The authentication mode of the device will be applied to this user.

expireDateTime	The date on which the user's authorization expires.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

X-Station

Example

```
XSUserHdr userHeader;
// initialize header
memset( &userHdr, 0, sizeof( XSUserHdr ) );
userHdr.ID = 1; // 0 cannot be assigned as a user ID
userHdr.startDateTime = 0; // no check for start date
userHdr.expireDateTime = 0; // no check for expiry date
userHeader.adminLevel = BS_USER_NORMAL;
userHeader.securityLevel = BS_USER_SECURITY_DEFAULT;
userHeader.authMode = BS_AUTH_MODE_DISABLED; // use the authentication mode
                                             // of the device
userHeader.accessGroupMask = 0xffff0201; // a member of Group 1 and Group
2;
strcpy( userHeader.name, "John" );
strcpy( userHeader.departments, "RND" );
strcpy( userHeader.password, "" ); // no password is enrolled. Password
                                   // should be longer than 4 bytes.

// read card IDs
BS_RET_CODE result = BS_ReadCardIDEx( handle, &userHeader.cardID,
&userHdr.customID );
userHdr.bypassCard = 0;

// enroll the user
result = BS_EnrollUserXStation( handle, &userHeader );
```

BS_EnrollMultipleUserXStation

Enrolls multiple users to X-Station. By combining user information, the enrollment time will be reduced.

BS_RET_CODE BS_EnrollMultipleUserXStation(int handle, int numOfUser, XSUserHdr* hdr,)

Parameters

handle

Handle of the communication channel.

numOfUser

Number of users to be enrolled.

hdr

Array of user headers to be enrolled.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

X-Station

Example

```
int numOfUser = 2;
XSUserHdr hdr1, hdr2;
unsigned char *templateBuf1, *templateBuf2;
unsigned char *faceTemplate1, *faceTemplate2;

// fill the header and template data here
// …

XSUserHdr* hdr = (XSUserHdr*)malloc( numOfUser * sizeof( XSUserHdr ) );
// header

memcpy( hdr, &hdr1, sizeof( XSUserHdr ) );
memcpy( hdr + sizeof( XSUserHdr ), &hdr2, sizeof( XSUserHdr ) );
```

```
// enroll multiple
BS_RET_CODE result = BS_EnrollMultipleUserXStation( handle, numOfUser,
hdr );
```

BS_EnrollUserBioStation2

Enrolls a user to BioStation T2. Maximum 10 fingers per user.

BS_RET_CODE BS_EnrollUserBioStation2(int handle, BS2UserHdr* hdr, unsigned char* templateData)

Parameters

handle

Handle of the communication channel.

Hdr

BS2UserHdr is defined as follows.

```
typedef struct{
    enum{
        DS_MAX_NAME_LEN = 48,
        DS_MAX_PASSWORD_LEN = 16,
        DS_MIN_PASSWORD_LEN = 4,
        DS_TEMPLATE_SIZE = 384,
        DS_FACE_TEMPLATE_SIZE = 2284,
        MAX_FINGER = 10,
        MAX_FINGER_TEMPLATE = 20,
        MAX_FACE = 5,
        MAX_FACE_TEMPLATE = 5,
        USER_NORMAL = 1,
        USER_ADMIN = 1,
    }
    unsigned ID;
    unsigned short headerVersion;
    unsigned short adminLevel;
    unsigned short securityLevel;
    unsigned short statusMask; // internally used by BioStation
    unsigned accessGroupMask;
    unsigned short name[DS_MAX_NAME_LEN];
    unsigned short department[DS_MAX_NAME_LEN];
    unsigned short password[DS_MAX_PASSWORD_LEN];
    unsigned short numOfFinger;
    unsigned short numOfFace;
    unsigned char duress[MAX_FINGER];
    unsigned char reserved1[2];
    unsigned char fingerType[MAX_FINGER];
    unsigned fingerChecksum[MAX_FINGER];
    unsigned faceChecksum[MAX_FACE_TEMPLATE];
```

```
    unsigned short authMode;
    unsigned char bypassCard;
    unsigned char disabled;
    unsigned cardID;
    unsigned customID;
    unsigned startDateTime;
    unsigned expireDateTime;
    unsigned reserved2[10];
} BS2UserHdr;
```

The key fields and their available options are as follows.

Fields	**Descriptions**
adminLevel	BS_USER_ADMIN BS_USER_NORMAL
securityLevel	It specifies the security level used for 1:1 matching only. BS_USER_SECURITY_DEFAULT: same as the device setting BS_USER_SECURITY_LOWER: 1/1000 BS_USER_SECURITY_LOW: 1/10,000 BS_USER_SECURITY_NORMAL: 1/100,000 BS_USER_SECURITY_HIGH: 1/1,000,000 BS_USER_SECURITY_HIGHER: 1/10,000,000
accessGroupMask	A user can be a member of up to 4 access groups. For example, if the user is a member of Group 1 and Group 4, accessGroupMask will be 0xffff0104. If no access group is assigned to this user, it will be 0xffffffff.
duress	Under duress, users can authenticate with a duress finger to notify the threat. When duress finger is detected, the terminal will write a log record and output specified signals. The duress denotes that each enrolled finger is a duress one. For example, if the 3rd finger is a duress finger, duress[2] will be 1.
fingerType	Enrolled 10 fingers are tagged by sequecial values. This values represent the order of 10

	fingers. Left thumb is 0 and index finger 1, middle finger 2, ring finger 3, little finger 4. Right thumb is 5 and index finger 6, middle finger 7, ring finger 8, little finger 9.
fingerchecksum	Checksums of each enrolled finger. Since two templates are enrolled per finger, the checksum of a finger is calculated by summing all the bytes of the two template data.
authMode	Specify the authentication mode of this user. The **usePrivateAuthMode** of **DSOPModeConfig** should be true for this authentication mode to be effective. Otherwise, the authentication mode of the device will be applied to all users. BS_AUTH_MODE_DISABLED[7] BS_AUTH_FINGER_ONLY BS_AUTH_FINGER_N_PASSWORD BS_AUTH_FINGER_OR_PASSWORD BS_AUTH_PASS_ONLY BS_AUTH_CARD_ONLY
bypassCard	If it is true, the user can access without fingerprint authentication.
disabled	If it is true, the user cannot access the device all the time.
cardID	4 byte card ID. The RF card ID is comprised of 4 byte card ID and 1 byte custom ID.
customID	4 byte custom ID of the card.
startDateTime	The date from which the user's authorization takes effect.
expireDateTime	The date on which the user's authorization expires.

templateData

[7] The authentication mode of the device will be applied to this user.

Fingerprint templates of the user. Two templates should be enrolled per each finger.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

Example

```
BS2UserHdr userHeader;
// initialize header
memset( &userHdr, 0, sizeof( BS2UserHdr ) );
userHdr.ID = 1; // 0 cannot be assigned as a user ID
userHdr.startDateTime = 0; // no check for start date
userHdr.expireDateTime = 0; // no check for expiry date
userHeader.adminLevel = BS_USER_NORMAL;
userHeader.securityLevel = BS_USER_SECURITY_DEFAULT;
userHeader.authMode = BS_AUTH_MODE_DISABLED; // use the authentication mode
                                             // of the device
userHeader.accessGroupMask = 0xffff0201; // a member of Group 1 and Group
2;
strcpy( userHeader.name, “John” );
strcpy( userHeader.departments, “RND” );
strcpy( userHeader.password, “” ); // no password is enrolled. Password
                                   // should be longer than 4 bytes.

// read card IDs
BS_RET_CODE result = BS_ReadCardIDEx( handle, &userHeader.cardID,
&userHdr.customID );
userHdr.bypassCard = 0;

// scan finger templates
userHeader.numOfFinger = 2;
unsigned char* templateBuf = (unsigned char*)malloc( userHeader.numOfFinger
* 2 * BS_TEMPLATE_SIZE );

int bufPos = 0;
for( int i = 0; i < userHeader.numOfFinger * 2; i++ )
{
     result = BS_ScanTemplate( handle, templateBuf + bufPos );
```

```
        bufPos += BS_TEMPLATE_SIZE;
    }

    for( int i = 0; i < userHeader.numOfFinger; i++ )
    {
        userHeader.duress[i] = 0; // no duress finger
    }

    for( int i = 0; i < userHeader.numOfFinger * 2; i++ )
    {
        if( i % 2 == 0 )
        {
            userHeader.fingerChecksum[i/2] = 0;
        }

        unsigned char* templateData = templateBuf + i * BS_TEMPLATE_SIZE;

        for( int j = 0; j < BS_TEMPLATE_SIZE; j++ )
        {
            userHeader.fingerChecksum[i/2] += templateData[j];
        }
    }

    // enroll the user
    result = BS_EnrollUserBioStation2( handle, &userHeader, templateBuf,
    faceTemplateBuf );
```

BS_EnrollMultipleUserBioStation2

Enrolls multiple users to BioStation T2. By combining user information, the enrollment time will be reduced.

BS_RET_CODE BS_EnrollMultipleUserBioStation2(int handle, int numOfUser, BS2UserHdr* hdr, unsigned char* templateData)

Parameters

handle

Handle of the communication channel.

numOfUser

Number of users to be enrolled.

hdr

Array of user headers to be enrolled.

templateData

Fingerprint templates of the all users.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

Example

```
int numOfUser = 2;
BS2UserHdr hdr1, hdr2;
unsigned char *templateBuf1, *templateBuf2;

// fill the header and template data here
// …

BS2UserHdr* hdr = (BS2UserHdr*)malloc( numOfUser * sizeof( BS2UserHdr ) );
// header
unsigned char* templateBuf = (unsigned char*)malloc( hdr1.numOfFinger * 2 *
BS_TEMPLATE_SIZE + hdr2.numOfFinger * 2 * BS_TEMPLATE_SIZE );
```

```
memcpy( hdr, &hdr1, sizeof( BS2UserHdr ) );
memcpy( hdr + sizeof( BS2UserHdr ), &hdr2, sizeof( BS2UserHdr ) );

// fingerprint template
memcpy( templateBuf, templateBuf1, hdr1.numOfFinger * 2 *
BS_TEMPLATE_SIZE );
memcpy( templateBuf + hdr1.numOfFinger * 2 * BS_TEMPLATE_SIZE, templateBuf2,
hdr2.numOfFinger * 2 * BS_TEMPLATE_SIZE );

// enroll multiple
BS_RET_CODE result = BS_EnrollMultipleUserBioStation2( handle, numOfUser,
hdr, templateBuf);
```

BS_EnrollUserFStation

Enrolls a user to FaceStation Maximum 25 facetemplates per user. The FSUserHdr::MAX_FACE is sum of numOfFace and numOfUpdatedFace.
FSUserHdr::MAX_FACE = numOfFace(20) + numOfUpdatedFace(5)

BS_RET_CODE BS_EnrollUserFStation(int handle, FSUserHdr* hdr, unsigned char* faceTemplate)

Parameters

handle

Handle of the communication channel.

Hdr

FSUserHdr is defined as follows.

```
typedef struct{
    enum{
        MAX_NAME_LEN   = 48,
        MAX_PASSWORD_LEN   = 16,
        MIN_PASSWORD_LEN   = 4,

        MAX_FACE   = 25,
        FACE_TEMPLATE_SIZE = 2000,
        MAX_FACE_RAW   = 20,
        FACE_RAW_TEMPLATE_SIZE = 37500,
        MAX_IMAGE_SIZE = 8*1024,
        USER_NORMAL= 0,
        USER_ADMIN = 1,
        USER_SECURITY_DEFAULT  = 0,
        USER_SECURITY_LOWER    = 1,
        USER_SECURITY_LOW  = 2,
        USER_SECURITY_NORMAL   = 3,
        USER_SECURITY_HIGH = 4,
        USER_SECURITY_HIGHER   = 5,
    };
```

```
        unsigned ID;
        unsigned short headerVersion;
        unsigned short adminLevel;
        unsigned short securityLevel;
        unsigned short statusMask;
        unsigned accessGroupMask;
        unsigned short name[MAX_NAME_LEN];
        unsigned short department[MAX_NAME_LEN];
        unsigned short password[MAX_PASSWORD_LEN];
        unsigned short numOfFace;
        unsigned short numOfUpdatedFace;
        unsigned short faceLen[MAX_FACE];
        unsigned char faceTemp[256];
        unsigned faceChecksum[MAX_FACE];
        short authMode;
        unsigned char bypassCard;
        unsigned char disabled;
        unsigned cardID;
        unsigned customID;
        unsigned startDateTime;
        unsigned expireDateTime;
        unsigned short faceUpdatedIndex;
        unsigned short reserved[40];
    } FSUserHdr;

    typedef struct{
        enum{
            MAX_FACE   = 25,
            MAX_FACE_RAW   = 20,
        };

        unsigned short imageSize;
        unsigned short numOfFace;
        unsigned short numOfUpdatedFace;
        unsigned short faceLen[MAX_FACE];
        unsigned char faceTemp[256];
```

```
    unsigned short numOfRawFace;
    unsigned short rawfaceLen[MAX_FACE_RAW];
} FSUserTemplateHdr;
```

The key fields and their available options are as follows.

Fields	**Descriptions**
adminLevel	USER_ADMIN USER_NORMAL
securityLevel	It specifies the security level used for 1:1 matching only. USER_SECURITY_DEFAULT: same as the device setting USER_SECURITY_LOWER USER_SECURITY_LOW USER_SECURITY_NORMAL USER_SECURITY_HIGH USER_SECURITY_HIGHER
accessGroupMask	A user can be a member of up to 4 access groups. For example, if the user is a member of Group 1 and Group 4, accessGroupMask will be 0xffff0104. If no access group is assigned to this user, it will be 0xffffffff.
numOfFace	The numOfFace per user. is upto 25, which it includes numOfUpdatedFace.
numOfUpdatedFace	The number of updated face templates. When user authentication Succeed and the input face score is higher than FaceStation has, the new face template replaces the old one. The numOfUpdatedFace has maximum 5 per user.
faceLen	faceLen array has each face template's length.
faceTemp	faceTemp has Temporary data.
faceChecksum	Checksums of each enrolled face template. Since 25 templates are enrolled per user, the checksum of a face template is calculated by summing all the bytes of the each template

	data.
authMode	Specify the authentication mode of this user. The **usePrivateAuthMode** of **FSOPModeConfig** should be true for this authentication mode to be effective. Otherwise, the authentication mode of the device will be applied to all users. BS_AUTH_MODE_DISABLED[8] BS_AUTH_FACE_ONLY BS_AUTH_FACE_N_PASSWORD BS_AUTH_FACE_OR_PASSWORD BS_AUTH_PASS_ONLY BS_AUTH_CARD_ONLY
bypassCard	If it is true, the user can access without fingerprint authentication.
disabled	If it is true, the user cannot access the device all the time.
cardID	4 byte card ID. The RF card ID is comprised of 4 byte card ID and 1 byte custom ID.
customID	4 byte custom ID of the card.
startDateTime	The date from which the user's authorization takes effect.
expireDateTime	The date on which the user's authorization expires.
faceUpdatedIndex	The updated face template's index. There is no need to manage.

faceTemplate

Face templates of the user. 25 templates should be enrolled per each user.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

[8] The authentication mode of the device will be applied to this user.

Compatibility

FaceStation, Firmware version less than or equal to 1.1.

Example

```
FSUserHdr userHdr;
// initialize header
memset( &userHdr, 0, sizeof( FSUserHdr ) );
userHdr.ID = 1; // 0 cannot be assigned as a user ID
userHdr.startDateTime = 0; // no check for start date
userHdr.expireDateTime = 0; // no check for expiry date
userHdr.adminLevel = FSUserHdr::USER_NORMAL;
userHdr.securityLevel = FSUserHdr::USER_SECURITY_DEFAULT;
userHdr.authMode = BS_AUTH_MODE_DISABLED; // use the authentication mode
                                          // of the device
userHdr.accessGroupMask = 0xffff0201; // a member of Group 1 and Group 2;
BS_ConvertToUTF16("John", userHdr.name, sizeof(userHdr.name)-1 );
BS_ConvertToUTF16("RND", userHdr.departments, sizeof(userHdr.departments)-
1 );
BS_ConvertToUTF16("", userHdr.password, sizeof(userHdr.password-1 ); // no
password is enrolled. Password
                                  // should be longer than 4 bytes.

// read card IDs
BS_RET_CODE result = BS_ReadCardIDEx( handle, & userHdr.cardID,
&userHdr.customID );
userHdr.bypassCard = 0;

// scan face templates
unsigned char* imageBuf =(unsigned char*)malloc(FSUserHdr::MAX_IMAGE_SIZE);
unsigned char* faceTemplateBuf = (unsigned char*)malloc(FSUserHdr::MAX_FACE
* FSUserHdr::FACE_TEMPLATE_SIZE);

FSUserTemplateHdr userTemplateHdr;
result = BS_ScanFaceTemplate( handle, &userTemplateHdr, imageBuf,
faceTemplateBuf );

userHdr.numOfFace = userTemplateHdr.numOfFace;
userHdr.numOfUpdatedFace = userTemplateHdr.numOfUpdatedFace;

for( int i = 0; i < FSUserHdr::MAX_FACE; i++ )
{
     userHdr.faceLen[i] = userTemplateHdr.faceLen[i];
}

int nOffset = 0;
```

```
for( int i = 0; i < FSUserHdr::MAX_FACE; i++ )
{
     unsigned char* templateData = faceTemplateBuf + nOffset;
     for( int j = 0; j < userHdr.faceLen[i]; j++ )
     {
         userHdr.faceChecksum[i] += templateData[j];
     }
     nOffset += userHdr.faceLen[i];
}

// enroll the user
result = BS_EnrollUserFStation( handle, &userHdr, faceTemplateBuf );

free( imageBuf );
free( faceTemplateBuf );
```

BS_EnrollUserFStationEx

BS_EnrollUserFStationEx can enroll a user to FaceStation Maximum 5 faces. Each face has 20 ~ 25 face templates. A user can have Maximum 125 face templates.
125 = FSUserHdrEx::MAX_FACE_TYPE * FSUserHdrEx ::MAX_FACE.
FSUserHdrEx::MAX_FACE_TYPE = 5
FSUserHdrEx::MAX_FACE = numOfFace(20) + numOfUpdatedFace(5).

BS_RET_CODE BS_EnrollUserFStationEx(int handle, FSUserHdrEx* hdr, unsigned char* imageData, unsigned char* faceTemplate)

Parameters

handle

Handle of the communication channel.

Hdr

FSUserHdrEx is defined as follows.

```
typedef struct{
enum
{
    MAX_NAME_LEN   = 48,
    MAX_PASSWORD_LEN   = 16,
    MIN_PASSWORD_LEN   = 4,

    MAX_FACE_TYPE  = 5,
    MAX_FACE   = 25,
    FACE_TEMPLATE_SIZE = 2000,
    MAX_FACE_RAW   = 20,
    FACE_RAW_TEMPLATE_SIZE = 37500,
    MAX_IMAGE_SIZE = 8*1024,

    USER_NORMAL= 0,
    USER_ADMIN = 1,

    USER_SECURITY_DEFAULT  = 0,
    USER_SECURITY_LOWER   = 1,
```

```
        USER_SECURITY_LOW  = 2,
        USER_SECURITY_NORMAL   = 3,
        USER_SECURITY_HIGH = 4,
        USER_SECURITY_HIGHER   = 5,
    };

    unsigned ID;
    unsigned short headerVersion;
    unsigned short adminLevel;
    unsigned short securityLevel;
    unsigned short statusMask;
    unsigned accessGroupMask;

    unsigned short name[MAX_NAME_LEN];
    unsigned short department[MAX_NAME_LEN];
    unsigned short password[MAX_PASSWORD_LEN];

    unsigned short numOfFaceType; //0~5
    unsigned short numOfFace[MAX_FACE_TYPE];
    unsigned short numOfUpdatedFace[MAX_FACE_TYPE];
    unsigned short faceLen[MAX_FACE_TYPE][MAX_FACE];
    unsigned faceChecksum[MAX_FACE_TYPE][MAX_FACE];
    unsigned short faceUpdatedIndex[MAX_FACE_TYPE];
    unsigned short faceStillcutLen[MAX_FACE_TYPE];
    unsigned short faceTemp[10];

    short authMode;
    unsigned char bypassCard;
    unsigned char disabled;

    unsigned cardID;
    unsigned customID;

    unsigned startDateTime;
    unsigned expireDateTime;
```

```
    unsigned reserved[10];

    } FSUserHdrEx;
    typedef struct{
        enum{
            MAX_FACE   = 25,
            MAX_FACE_RAW   = 20,
        };

        unsigned short imageSize;
        unsigned short numOfFace;
        unsigned short numOfUpdatedFace;
        unsigned short faceLen[MAX_FACE];
        unsigned char faceTemp[256];
        unsigned short numOfRawFace;
        unsigned short rawfaceLen[MAX_FACE_RAW];
    } FSUserTemplateHdr;
```

The key fields and their available options are as follows.

Fields	**Descriptions**
adminLevel	USER_ADMIN USER_NORMAL
securityLevel	It specifies the security level used for 1:1 matching only. USER_SECURITY_DEFAULT: same as the device setting USER_SECURITY_LOWER USER_SECURITY_LOW USER_SECURITY_NORMAL USER_SECURITY_HIGH USER_SECURITY_HIGHER
accessGroupMask	A user can be a member of up to 4 access groups. For example, if the user is a member of Group 1 and Group 4, accessGroupMask will be 0xffff0104. If no access group is assigned to this user, it will be 0xffffffff.

numOfFaceType	The numOfFaceType is up to 5. A user can enroll 5 different faces. Face type and Sub-Id are the same thing.
numOfFace	numOfFace array has each face's facetemplate count. The numOfFace of each face. is up to 25, which it includes numOfUpdatedFace.
numOfUpdatedFace	The number of updated face templates. When user authentication Succeed and the input face score is higher than FaceStation has, the new face template replaces the old one. The numOfUpdatedFace has maximum 5 per user.
faceLen	faceLen array has each face template's length.
faceChecksum	Checksums of each enrolled face template. The checksum of a face template is calculated by summing all the bytes of the each template data. A user has maximum 125 face template.
faceUpdatedIndex	The updated face template's index. There is no need to manage.
faceStillcutLen	faceStillcutLen has each Face Image length.
faceTemp	faceTemp has Temporary data.
authMode	Specify the authentication mode of this user. The **usePrivateAuthMode** of **FSOPModeConfig** should be true for this authentication mode to be effective. Otherwise, the authentication mode of the device will be applied to all users. BS_AUTH_MODE_DISABLED[9] BS_AUTH_FACE_ONLY BS_AUTH_FACE_N_PASSWORD BS_AUTH_FACE_OR_PASSWORD BS_AUTH_PASS_ONLY

[9] The authentication mode of the device will be applied to this user.

	BS_AUTH_CARD_ONLY
bypassCard	If it is true, the user can access without fingerprint authentication.
disabled	If it is true, the user cannot access the device all the time.
cardID	4 byte card ID. The RF card ID is comprised of 4 byte card ID and 1 byte custom ID.
customID	4 byte custom ID of the card.
startDateTime	The date from which the user's authorization takes effect.
expireDateTime	The date on which the user's authorization expires.

imageData

Face images which represent the face templates. Maximum 5 face images can be enrolled per each user.

faceTemplate

Face templates of the user. Maximum 125 templates can be enrolled per each user.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation, Firmware version 1.2 or later

Example

```
FSUserHdrEx userHdr;
// initialize header
memset( &userHdr, 0, sizeof( FSUserHdrEx ) );
userHdr.ID = 1; // 0 cannot be assigned as a user ID
userHdr.startDateTime = 0; // no check for start date
userHdr.expireDateTime = 0; // no check for expiry date
userHdr.adminLevel = FSUserHdrEx::USER_NORMAL;
userHdr.securityLevel = FSUserHdrEx::USER_SECURITY_DEFAULT;
userHdr.authMode = BS_AUTH_MODE_DISABLED; // use the authentication mode
```

```
                                        // of the device
userHdr.accessGroupMask = 0xffff0201; // a member of Group 1 and Group 2;
BS_ConvertToUTF16(“John”, userHdr.name, sizeof(userHdr.name)-1 );
BS_ConvertToUTF16(“RND”, userHdr.departments, sizeof(userHdr.departments)-
1 );
BS_ConvertToUTF16(“”, userHdr.password, sizeof(userHdr.password-1 ); // no
password is enrolled. Password
                                // should be longer than 4 bytes.

// read card IDs
BS_RET_CODE result = BS_ReadCardIDEx( handle, & userHdr.cardID,
&userHdr.customID );
userHdr.bypassCard = 0;

// scan face templates
FSUserTemplateHdr templateHdr[2] = {0};

// 1’st face
unsigned char* image =(unsigned char*)malloc(FSUserHdrEx::MAX_IMAGE_SIZE);
unsigned char* template =(unsigned char*)malloc(FSUserHdrEx::MAX_FACE *
FSUserHdr::FACE_TEMPLATE_SIZE);

result = BS_ScanFaceTemplate( handle, &templateHdr[0], image, template );

// 2’nd face
unsigned char* image2 =(unsigned char*)malloc(FSUserHdrEx::MAX_IMAGE_SIZE);
unsigned char* template2 =(unsigned char*)malloc(FSUserHdr::MAX_FACE *
FSUserHdr::FACE_TEMPLATE_SIZE);

result = BS_ScanFaceTemplate( handle, &templateHdr[1], image2, template2 );

// fill the FSUserHdrEx struct
userHdr.numOfFaceType = 2; //up to 5
userHdr.numOfFace[0] = templateHdr[0].numOfFace;
userHdr.numOfFace[1] = templateHdr[1].numOfFace;

userHdr.numOfUpdatedFace[0] = templateHdr[0].numOfUpdatedFace;
userHdr.numOfUpdatedFace[1] = templateHdr[1].numOfUpdatedFace;

for( int i = 0; i < FSUserHdrEx::MAX_FACE; i++ )
{
     userHdr.faceLen[0][i] = templateHdr[0].faceLen[i];
     userHdr.faceLen[1][i] = templateHdr[1].faceLen[i];
}

int nOffset = 0;
```

```
int nOffset2 = 0;
for( int i = 0; i < FSUserHdrEx::MAX_FACE; i++ )
{
     // 1'st face
     unsigned char* templateData = templateBuf + nOffset;
     for( int j = 0; j < templateHdr[0].faceLen[i]; j++ )
     {
         userHdr.fingerChecksum[0][i] += templateData[j];
     }
     nOffset += templateHdr[0].faceLen[i];

     // 2'nd face
     unsigned char* templateData2 = templateBuf2 + nOffset2;
     for( int j = 0; j < templateHdr[1].faceLen[i]; j++ )
     {
         userHdr.faceChecksum[1][i] += templateData2[j];
     }
     nOffset2 += templateHdr[1].faceLen[i];
}

userHdr.faceStillcutLen[0] = templateHdr.imageSize;
userHdr.faceStillcutLen[1] = templateHdr2.imageSize;

unsigned char* imageBuf =(unsigned char*)malloc(FSUserHdrEx::MAX_FACE_TYPE
* FSUserHdrEx::MAX_IMAGE_SIZE);
unsigned char* faceTemplateBuf =(unsigned
char*)malloc(FSUserHdrEx::MAX_FACE_TYPE * FSUserHdrEx::MAX_FACE *
FSUserHdr::FACE_TEMPLATE_SIZE);

memset(imageBuf,0, FSUserHdrEx::MAX_FACE_TYPE*FSUserHdrEx::MAX_IMAGE_SIZE);
memset(faceTemplateBuf,0, FSUserHdrEx::MAX_FACE_TYPE *
FSUserHdrEx::MAX_FACE * FSUserHdr::FACE_TEMPLATE_SIZE);

//fill the Stillcut image data
nOffset = 0;
memcpy( imageBuf + nOffset, image, templateHdr[0].imageSize);
nOffset += templateHdr.imageSize;

memcpy( imageBuf + nOffset, image2, templateHdr[1].imageSize);
nOffset += templateHdr.imageSize;

//fill the facetemplate data
nOffset = 0;
int nPos = 0;

for( int i = 0; i < FSUserHdrEx::MAX_FACE; i++ )
```

```
{
     memcpy( faceTemplateBuf + nOffset, template + nPos,
templateHdr[0].faceLen[i]);

     nOffset += templateHdr[0].faceLen[i];
     nPos += templateHdr[0].faceLen[i];
}

int nPos2 = 0;
for( int i = 0; i < FSUserHdrEx::MAX_FACE; i++ )
{
     memcpy( faceTemplateBuf + nOffset, template2 + nPos2,
templateHdr[1].faceLen[i]);

     nOffset += templateHdr[1].faceLen[i];
     nPos2 += templateHdr[1].faceLen[i];
}

// enroll the user
result = BS_EnrollUserFStationEx( handle, &userHdr, imageBuf,
faceTemplateBuf );

free( image );
free( image2 );

free( template );
free( template2 );

free( imageBuf );
free( faceTemplateBuf );
```

BS_EnrollMultipleUserFStation

Enrolls multiple users to FStation. By combining user information, the enrollment time will be reduced.

BS_RET_CODE BS_EnrollMultipleUserFStation(int handle, int numOfUser, FSUserHdr* hdr, unsigned char* faceTemplate)

Parameters

handle

Handle of the communication channel.

numOfUser

Number of users to be enrolled.

hdr

Array of user headers to be enrolled.

faceTemplate

Face templates of the all users.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation, Firmware version less than or equal to 1.1.

Example

```
int numOfUser = 2;
FSUserHdr hdr1, hdr2;
unsigned char *faceTemplate1, *faceTemplate2;

// fill the header and template data here
// …

FSUserHdr* hdr = (FSUserHdr*)malloc( numOfUser * sizeof( FSUserHdr ) );

// header
int nSize1 = 0;
int nSize2 = 0;
```

```
for( int i= 0; i < FSUserHdr::MAX_FACE; i++)
     nSize1 += hdr1.faceLen[i];

for( int i= 0; i < FSUserHdr::MAX_FACE; i++)
     nSize2 += hdr2.faceLen[i];

unsigned char* faceTemplate = (unsigned char*)malloc((nSize1 + nSize2)*
FSUserHdr::FACE_TEMPLATE_SIZE);

memcpy( hdr, &hdr1, sizeof( FSUserHdr ) );
memcpy( hdr + sizeof( FSUserHdr ), &hdr2, sizeof( FSUserHdr ) );

// face template
memcpy( faceTemplate, faceTemplate1, nSize1);
memcpy( faceTemplate + nSize1, faceTemplate2, nSize2);

// enroll multiple
BS_RET_CODE result = BS_EnrollMultipleUserFStation( handle, numOfUser, hdr,
faceTemplate);
```

BS_EnrollMultipleUserFStationEx

Enrolls multiple users to FStation. By combining user information, the enrollment time will be reduced. It support up to 5 face type per a user.

BS_RET_CODE BS_EnrollMultipleUserFStationEx(int handle, int numOfUser, FSUserHdrEx* hdr, unsigned char* imageData, unsigned char* faceTemplate)

Parameters

handle

Handle of the communication channel.

numOfUser

Number of users to be enrolled.

hdr

Array of user headers to be enrolled.

imageData

Face images of the all users' face templates, which represent each face templates.

faceTemplate

Face templates of the all users.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation, Firmware version 1.2 or later.

Example

```
int numOfUser = 2;

//
FSUserHdrEx hdr1, hdr2;
unsigned char *image1, *image2;
unsigned char *faceTemplate1, *faceTemplate2;
```

```
// fill the header and template data here
// …

FSUserHdrEx* hdr = (FSUserHdrEx*)malloc( numOfUser * sizeof( FSUserHdrEx));

// get image data size
int nImgeSize1 = 0;
int nImgeSize2 = 0;

for( int i = 0; hdr1.numOfFaceType; i++ )
     nImgeSize1 = hdr1.faceStillcutLen[i];

for( int i = 0; hdr2.numOfFaceType; i++ )
     nImgeSize2 = hdr2.faceStillcutLen[i];


// get face template size
int nSize1 = 0;
int nSize2 = 0;

for( int nType = 0; nType < hdr1.numOfFaceType; nType++ )
     for( int i= 0; i < FSUserHdrEx::MAX_FACE; i++)
         nSize1 += hdr1.faceLen[nType][i];

for( int nType = 0; nType < hdr1.numOfFaceType; nType++ )
     for( int i= 0; i < FSUserHdrEx::MAX_FACE; i++)
         nSize2 += hdr2.faceLen[nType][i];

// alloc buffer
unsigned char* imageData = (unsigned char*)malloc((nImgSize1 + nImgSize2)*
FSUserHdrEx::MAX_IMAGE_SIZE);

unsigned char* faceTemplate = (unsigned char*)malloc((nSize1 + nSize2)*
FSUserHdrEx::MAX_FACE_TYPE * FSUserHdrEx::FACE_TEMPLATE_SIZE);

// header
int hdrOffset = 0;
memcpy( hdr + hdrOffset, &hdr1, sizeof( FSUserHdrEx ) );
hdrOffset += sizeof( FSUserHdrEx );

memcpy( hdr + hdrOffset, &hdr2, sizeof( FSUserHdrEx ) );
hdrOffset += sizeof( FSUserHdrEx );

// stillcut image
int imageOffset = 0;
memcpy( imageData + imageOffset, image1, nImageSize1);
```

```
imageOffset += nImageSize1;

memcpy( imageData + imageOffset, image2, nImageSize2);
imageOffset += nImageSize2;

// face template
int nTemplateOffset = 0;
memcpy( faceTemplate + nTemplateOffset, faceTemplate1, nSize1);
nTemplateOffset += nSize1;

memcpy( faceTemplate + nTemplateOffset, faceTemplate2, nSize2);
nTemplateOffset += nSize2;

// enroll multiple
BS_RET_CODE result = BS_EnrollMultipleUserFStationEx( handle, numOfUser,
hdr, imageData, faceTemplate);
```

BS_GetUserEx

Retrieves the header information and template data of a user from BioStation.

BS_RET_CODE BS_GetUserEx(int handle, unsigned userID, BSUserHdrEx* hdr, unsigned char* templateData)

Parameters

handle

Handle of the communication channel.

userID

User ID.

hdr

Pointer to the user header to be returned.

templateData

Pointer to the template data to be returned. This pointer should be preallocated large enough to store the template data.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_GetUserInfoEx

Retrieves the header information of a user from BioStation.

BS_GetUserInfoEx(int handle, unsigned userID, BSUserHdrEx* hdr)

Parameters

handle

Handle of the communication channel.

userID

User ID.

hdr

Pointer to the user header to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_GetAllUserInfoEx

Retrieves the header information of all enrolled users from BioStation.

BS_RET_CODE BS_GetAllUserInfo(int handle, BSUserHdrEx* hdr, int *numOfUser)

Parameters

handle

Handle of the communication channel.

hdr

Pointer to the **BSUserHdrEx** array to be returned. It should be preallocated large enough.

numOfUser

Pointer to the number of enrolled users.

Return Values

If the function succeeds, return BS_SUCCESS. If there is no user, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_GetUserBEPlus

Retrieves the header information and template data of a user from BioEntry Plus or BioLite Net.

BS_RET_CODE BS_GetUserBEPlus(int handle, unsigned userID, BEUserHdr* hdr, unsigned char* templateData)

Parameters

handle

Handle of the communication channel.

userID

User ID.

hdr

Pointer to the user header to be returned.

templateData

Pointer to the template data to be returned. This pointer should be preallocated large enough to store the template data.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_GetUserInfoBEPlus

Retrieves the header information of a user from BioEntry Plus or BioLite Net.

BS_RET_CODE BS_GetUserInfoBEPlus(int handle, unsigned userID, BEUserHdr* hdr)

Parameters

handle

Handle of the communication channel.

userID

User ID.

hdr

Pointer to the user header to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_GetAllUserInfoBEPlus

Retrieves the header information of all enrolled users from BioEntry Plus or BioLite Net.

BS_RET_CODE BS_GetAllUserInfoBEPlus(int handle, BEUserHdr* hdr, int *numOfUser)

Parameters

handle

Handle of the communication channel.

hdr

Pointer to the **BEUserHdr** array to be returned. It should be preallocated large enough.

numOfUser

Pointer to the number of enrolled users.

Return Values

If the function succeeds, return BS_SUCCESS. If there is no user, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_GetUserDStation

Retrieves the header information, fingerprint template data and face template data of a user from D-Station.

BS_RET_CODE BS_GetUserDStation(int handle, unsigned userID, DSUserHdr* hdr, unsigned char* templateData , unsigned char* faceTemplate)

Parameters

handle

Handle of the communication channel.

userID

User ID.

hdr

Pointer to the user header to be returned.

templateData

Pointer to the fingerprint template data to be returned. This pointer should be preallocated large enough to store the template data.

faceTemplate

Pointer to the face template data to be returned. This pointer should be preallocated large enough to store the template data.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

D-Station

BS_GetUserFaceInfo

Retrieves the number of enrolled users and face templates.

BS_RET_CODE BS_GetUserFaceInfo(int handle, int* numOfUser, int* numOfFaceTemplate)

Parameters

handle

Handle of the communication channel.

numOfUser

Pointer to the number of enrolled users.

numOfFaceTemplate

Pointer to the number of enrolled face templates.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station/FaceStation

BS_GetUserInfoDStation

Retrieves the header information of a user from D-Station.

BS_RET_CODE BS_GetUserInfoDStation(int handle, unsigned userID, DSUserHdr* hdr)

Parameters

handle

Handle of the communication channel.

userID

User ID.

hdr

Pointer to the user header to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

D-Station

BS_GetAllUserInfoDStation

Retrieves the header information of all enrolled users from D-Station.

BS_RET_CODE BS_GetAllUserInfoDStation(int handle, DSUserHdr* hdr, int *numOfUser)

Parameters

handle

Handle of the communication channel.

hdr

Pointer to the **DSUserHdr** array to be returned. It should be preallocated large enough.

numOfUser

Pointer to the number of enrolled users.

Return Values

If the function succeeds, return BS_SUCCESS. If there is no user, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

D-Station

BS_GetUserXStation

Retrieves the header information of a user from X-Station.

BS_RET_CODE BS_GetUserXStation(int handle, unsigned userID, XSUserHdr* hdr)

Parameters

handle

Handle of the communication channel.

userID

User ID.

hdr

Pointer to the user header to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

X-Station

BS_GetUserInfoXStation

Retrieves the header information of a user from X-Station.

BS_RET_CODE BS_GetUserInfoXStation(int handle, unsigned userID, XSUserHdr* hdr)

Parameters

handle

Handle of the communication channel.

userID

User ID.

hdr

Pointer to the user header to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

X-Station

BS_GetAllUserInfoXStation

Retrieves the header information of all enrolled users from X-Station.

BS_RET_CODE BS_GetAllUserInfoXStation(int handle, XSUserHdr* hdr, int *numOfUser)

Parameters

handle

Handle of the communication channel.

hdr

Pointer to the **XSUserHdr** array to be returned. It should be preallocated large enough.

numOfUser

Pointer to the number of enrolled users.

Return Values

If the function succeeds, return BS_SUCCESS. If there is no user, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

X-Station

BS_GetUserBioStation2

Retrieves the header information, fingerprint template data and face template data of a user from BioStation T2.

BS_RET_CODE BS_GetUserBioStation2(int handle, unsigned userID, BS2UserHdr* hdr, unsigned char* templateData)

Parameters

handle

Handle of the communication channel.

userID

User ID.

hdr

Pointer to the user header to be returned.

templateData

Pointer to the fingerprint template data to be returned. This pointer should be preallocated large enough to store the template data.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

BS_GetUserInfoBioStation2

Retrieves the header information of a user from BioStation T2.

BS_RET_CODE BS_GetUserInfoBioStation2(int handle, unsigned userID, BS2UserHdr* hdr)

Parameters

handle

Handle of the communication channel.

userID

User ID.

hdr

Pointer to the user header to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

BS_GetAllUserInfoBioStation2

Retrieves the header information of all enrolled users from BioStation T2.

BS_RET_CODE BS_GetAllUserInfoBioStation2(int handle, BS2UserHdr* hdr, int *numOfUser)

Parameters

handle

Handle of the communication channel.

hdr

Pointer to the **BS2UserHdr** array to be returned. It should be preallocated large enough.

numOfUser

Pointer to the number of enrolled users.

Return Values

If the function succeeds, return BS_SUCCESS. If there is no user, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

BS_GetUserFStation

Retrieves the header information, face template of a user from FaceStation.

BS_RET_CODE BS_GetUserFStation(int handle, unsigned userID, FSUserHdr* hdr, unsigned char* faceTemplate)

Parameters

handle

Handle of the communication channel.

userID

User ID.

hdr

Pointer to the user header to be returned.

faceTemplate

Pointer to the face template data to be returned. This pointer should be preallocated large enough to store the template data.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

FaceStation, Firmware version less than or equal to 1.1.

BS_GetUserFStationEx

Retrieves the header information, face template of a user from FaceStation. It supports FSUserHdrEx.

BS_RET_CODE BS_GetUserFStationEx(int handle, unsigned userID, FSUserHdrEx* hdr, unsigned char* faceTemplate)

Parameters

handle

Handle of the communication channel.

userID

User ID.

hdr

Pointer to the user header to be returned.

faceTemplate

Pointer to the face template data to be returned. This pointer should be preallocated large enough to store the template data.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

FaceStation, Firmware version 1.2 or later.

BS_GetUserInfoFStation

Retrieves the header information of a user from FaceStation.

BS_RET_CODE BS_GetUserInfoFStation(int handle, unsigned userID, FSUserHdr* hdr)

Parameters

handle

Handle of the communication channel.

userID

User ID.

hdr

Pointer to the user header to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

FaceStation, Firmware version less than or equal to 1.1.

BS_GetUserInfoFStationEx

Retrieves the header information of a user from FaceStation. It supports FSUserHdrEx.

BS_RET_CODE BS_GetUserInfoFStationEx(int handle, unsigned userID, FSUserHdrEx* hdr)

Parameters

handle

Handle of the communication channel.

userID

User ID.

hdr

Pointer to the user header to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

FaceStation, Firmware version 1.2 or later.

BS_GetAllUserInfoFStation

Retrieves the header information of all enrolled users from FaceStation.

BS_RET_CODE BS_GetAllUserInfoFaceStation(int handle, FSUserHdr* hdr, int *numOfUser)

Parameters

handle

Handle of the communication channel.

hdr

Pointer to the **FSUserHdr** array to be returned. It should be preallocated large enough.

numOfUser

Pointer to the number of enrolled users.

Return Values

If the function succeeds, return BS_SUCCESS. If there is no user, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

FaceStation, Firmware version less than or equal to 1.1.

BS_GetAllUserInfoFStationEx

Retrieves the header information of all enrolled users from FaceStation. It supports FSUserHdrEx.

BS_RET_CODE BS_GetAllUserInfoFaceStationEx(int handle, FSUserHdrEx* hdr, int *numOfUser)

Parameters

handle

Handle of the communication channel.

hdr

Pointer to the **FSUserHdr** array to be returned. It should be preallocated large enough.

numOfUser

Pointer to the number of enrolled users.

Return Values

If the function succeeds, return BS_SUCCESS. If there is no user, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

FaceStation, Firmware version 1.2 or later.

BS_DeleteUser

Deletes a user.

BS_RET_CODE BS_DeleteUser(int handle, unsigned userID)

Parameters

handle

Handle of the communication channel.

userID

ID of the user to be deleted.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BoStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_DeleteMultipleUsers

Deletes multiple users.

BS_RET_CODE BS_DeleteMultipleUsers(int handle, int numberOfUser, unsigned* userID)

Parameters

handle

Handle of the communication channel.

numberOfUser

Number of users to be deleted.

userID

Array of user IDs to be deleted.

Return Values

If the function succeeds, return BS_SUCCESS. If no user is enrolled with the ID, return BS_ERR_NOT_FOUND. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BoStation T2/D-Station/X-Station/BioStation(V1.5 or later)/BioEntry Plus(V1.2 or later)/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_DeleteAllUser

Deletes all enrolled users.

BS_RET_CODE BS_DeleteAllUser(int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BoStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_SetPrivateInfo

Set the private information of the specified user. The private information includes greeting messages and customized images

BS_RET_CODE BS_SetPrivateInfo(int handle, int type, const BSPrivateInfo* privateInfo, const char* imagePath)

Parameters

handle

Handle of the communication channel.

privateInfo

BSPrivateInfo is defined as follows.

```
typedef struct{
    unsigned ID;
    char department[BS_MAX_NAME_LEN + 1];
    char greetingMsg[BS_MAX_PRIVATE_MSG_LEN + 1];
    int useImage;
    unsigned duration;
    unsigned countPerDay;
    unsigned imageChecksum;
    int reserved[4];
} BSPrivateInfo;
```

The key fields and their available options are as follows.

Fields	Descriptions
ID	User ID
department	Department name
greetingMsg	The greeting message to be shown when the user is authenticated.
useImage	If it is true, the specified image will be shown with the greeting message.
duration	The duration for which the private information is displayed.
countPerDay	The maximum display count per day.
imageChecksum	The checksum of the private image.

imagePath

Path of the private image.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_GetPrivateInfo

Get the private information of the specified user.

BS_RET_CODE BS_GetPrivateInfo(int handle, BSPrivateInfo* privateInfo)

Parameters

handle

Handle of the communication channel.

privateInfo

Pointer to the private information to be returned.

Return Values

If the function is successful, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_GetAllPrivateInfo

Get the private information of all users.

BS_RET_CODE BS_GetAllPrivateInfo(int handle, BSPrivateInfo* privateInfo, int* numOfUser)

Parameters

handle

Handle of the communication channel.

privateInfo

Pointer to the **BSPrivateInfo** array to be returned. It should be preallocated large enough.

numOfUser

Pointer to the number of users having the private information.

Return Values

If the function is successful, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_SetUserImage

Set the customiszed profile image of a user to FaceStation, BoStation T2, D-Station or X-Station.

BS_RET_CODE BS_SetUserImage(int handle, int userID, int imageLen, unsigned char* imageData)

Parameters

handle

Handle of the communication channel.

userID

UserID.

imageLen

Length of the image data.

imageData

The user profile image data.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BoStation T2/D-Station/X-Station

BS_GetUserImage

Get the profile image of the specified user from FaceStation, BoStation T2, D-Station or X-Staion.

BS_RET_CODE BS_GetUserImage(int handle, int userID, int * imageLen, unsigned char* imageData)

Parameters

handle

Handle of the communication channel.

userID

UserID.

imageLen

Pointer to the length of enrolled user image to be returned.

imageData

Pointer to the profile image data to be returned.

Return Values

If the function is successful, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BoStation T2/D-Station/X-Station

BS_ScanTemplate

Scans a fingerprint on a BioStation T2, D-Station, BioStation, BioEntry Plus, or BioLite Net and retrieves the template of it. This function is useful when the device is used as an enroll station. If it called on D-Station, the left scan is used.

BS_RET_CODE BS_ScanTemplate(int handle, unsigned char* templateData)

Parameters

handle

Handle of the communication channel.

templateData

Pointer to the 384 byte template data to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BoStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net

BS_ScanTemplateEx

Scans a fingerprint with selected sensor on a D-Station and retrieves the template of it. This function is useful when the device is used as an enroll station.

BS_RET_CODE BS_ScanTemplateEx(int handle, int sensorID, int unsigned char* templateData)

Parameters

handle

Handle of the communication channel.

sensorID

Index of sensor ID between two sensor. The value 0 is lefte sensor and 1 is the right one.

templateData

Pointer to the 384 byte template data to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

BS_ReadFaceData

Captures a user face on a D-Station camera and retrieves the face image and face template of it. This function is useful when the device is used as an enroll station.

BS_RET_CODE BS_ReadFaceData(int handle, int imageLen, unsigned char* imageData, unsigned char* faceTemplate)

Parameters

handle

Handle of the communication channel.

imageLen

Pointer to the length of captured face image to be returned.

imageData

Pointer to the face image data to be returned.

faceTemplate

Pointer to the 2284 byte face template data to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

BS_ScanFaceTemplate

Captures a user face on a FaceStation camera and retrieves the face image and face template of it. This function is useful when the device is used as an enroll station.

BS_RET_CODE BS_ScanFaceTemplate(int handle, FSUserTemplateHdr* userTemplateHdr, unsigned char* imageData, unsigned char* faceTemplate)

Parameters

handle

Handle of the communication channel.

userTemplateHdr

Pointer to the FSUserTemplateHdr to be returned.

imageData

Pointer to the face image data to be returned.

faceTemplate

Pointer to the face template data to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation

BS_ReadCardIDEx

Read a card on a FaceStation, BioStation T2, D-Station, BioStation, BioEntry Plus, BioLite Net, X-Station, Xpass or Xpass Slim and retrieve the ID of it.
This function is useful when the device is used as an enrollment station.

BS_RET_CODE BS_ReadCardIDEx(int handle, unsigned int* cardID, int* customID)

Parameters

handle

Handle of the communication channel.

cardID

Pointer to the 4 byte card ID to be returned.

customID

Pointer to the 1 byte custom ID to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_ReadRFCardIDEx

Read a card and retrieve the ID of it on a 3rd party RF device attached toaceStation, BioStation T2, D-Station, X-Stationm BioStation, BioEntry Plus, BioEntry W, BioLite Net, Xpass or Xpass Slim via Wiegand I/F. This function only works when the FaceStation, BioStation T2, D-Station, X-Station, BioStation, BioEntry Plus, BioEntry W, BioLite Net, Xpass or Xpass Slim is configured as 'extended' Wiegand mode and an appropriate ID is assigned to that RF device.
This function is useful when the RF device is used as an enrollment station.
Refer to 2.2.4 for configuration of 'extended' Wiegand mode.

BS_RET_CODE BS_ReadRFCardIDEx(int handle, unsigned readerID, unsigned int* cardID, int* customID)

Parameters

handle

Handle of the communication channel.

readerID

Pre-assigned ID of attached 3rd party RF device

cardID

Pointer to the 4 byte card ID to be returned.

customID

Pointer to the 1 byte custom ID to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_ReadImage

Reads an image of the last scanned fingerprint. This function is useful when the device is used as an enroll station.

BS_RET_CODE BS_ReadImage(int handle, int imageType, unsigned char* bitmapImage, int* imageLen)

Parameters

handle

Handle of the communication channel.

imageType

This field plays different roles depending on the device type. For BioStation, it specifies the image type as follows;

0 - binary image, 1 - gray image.

For BioEntry Plus or BioLite Net, it specifies whether to scan new image or not. If it is 0xff, BioEntry Plus or BioLite Net returns the last scanned image in gray format. Otherwise, it waits for new fingerprint scan and returns the image of it in gray format.

bitmapImage

Pointer to the image data to be returned. The bitmapImage should be allocated before calling this function.

imageLen

Pointer to the length of the image data to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net

BS_ReadImageEx

Reads an image of the last scanned fingerprint by sensor index. This function is useful when the device is used as an enroll station for the two sensor device as D-Station.

BS_RET_CODE BS_ReadImageEx(int handle, int imageType, int index, unsigned char* bitmapImage, int* imageLen)

Parameters

handle

Handle of the communication channel.

imageType

This field plays different roles depending on the device type. For BioStation, it specifies the image type as follows;

0 - binary image, 1 - gray image.

For BioEntry Plus or BioLite Net, it specifies whether to scan new image or not. If it is 0xff, BioEntry Plus or BioLite Net returns the last scanned image in gray format. Otherwise, it waits for new fingerprint scan and returns the image of it in gray format.

index

Index of the sensor for two sensor Device as D-Station. The value 0 is left sensor, 1 is right one.

bitmapImage

Pointer to the image data to be returned. The bitmapImage should be allocated before calling this function.

imageLen

Pointer to the length of the image data to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

3.7. Configuration API

These APIs provide functionalities for reading/writing system configurations. As for BioStation, each configuration has separate data structure. On the contrary, BioEntry Plus and BioLite have much smaller number of data structures. See the **Compatibility** section of each API to choose the right function.

- BS_ReadSysInfoConfig: reads the system information of BioStation.
- BS_WriteDisplayConfig: configures the display settings of BioStation.
- BS_ReadDisplayConfig
- BS_WriteDSDisplayConfig: configures the display settings of D-Station.
- BS_ReadDSDisplayConfig
- BS_WriteXSDisplayConfig: configures the display settings of X-Station.
- BS_ReadXSDisplayConfig
- BS_WriteBS2DisplayConfig: configures the display settings of BioStation.T2
- BS_ReadBS2DisplayConfig
- BS_WriteFSDisplayConfig: configures the display settings of FaceStation
- BS_ReadFSDisplayConfig
- BS_WriteOPModeConfig: configures the authentication mode of BioStation.
- BS_ReadOPModeConfig
- BS_WriteDSOPModeConfig: configures the authentication mode of D-Station.
- BS_ReadDSOPModeConfig
- BS_WriteXSOPModeConfig: configures the authentication mode of X-Station.
- BS_ReadXSOPModeConfig
- BS_WriteBS2OPModeConfig: configures the authentication mode of BioStation T2.
- BS_ReadBS2OPModeConfig
- BS_WriteFSOPModeConfig: configures the authentication mode of FaceStation.
- BS_ReadFSOPModeConfig
- BS_WriteTnaEventConfig: customizes the TNA event settings of BioStation.
- BS_ReadTnaEventConfig
- BS_WriteTnaEventExConfig: customizes the TNA mode settings of BioStation.

- BS_ReadTnaEventExConfig
- BS_WriteDSTnaEventConfig: customizes the TNA event settings of D-Station.
- BS_ReadDSTnaEventConfig
- BS_WriteDSTnaEventExConfig: customizes the TNA mode settings of D-Station.
- BS_ReadDSTnaEventExConfig
- BS_WriteXSTnaEventConfig: customizes the TNA event settings of X-Station.
- BS_ReadXSTnaEventConfig
- BS_WriteXSTnaEventExConfig: customizes the TNA mode settings of X-Station.
- BS_ReadXSTnaEventExConfig
- BS_WriteBS2TnaEventConfig: customizes the TNA event settings of BioStation.T2
- BS_ReadBS2TnaEventConfig
- BS_WriteBS2TnaEventExConfig: customizes the TNA mode settings of BioStation.T2
- BS_ReadBS2TnaEventExConfig
- BS_WriteFSTnaEventConfig: customizes the TNA event settings of FaceStation
- BS_ReadFSTnaEventConfig
- BS_WriteFSTnaEventExConfig: customizes the TNA mode settings of FaceStation
- BS_ReadFSTnaEventExConfig
- BS_WriteIPConfig: configures the IP parameters of BioStation.
- BS_ReadIPConfig
- BS_WriteWLANConfig: configures the wireless LAN parameters of BioStation.
- BS_ReadWLANConfig
- BS_WriteDSWLANConfig: configures the wireless LAN parameters of D-Station.
- BS_ReadDSWLANConfig
- BS_WriteBS2WLANConfig: configures the wireless LAN parameters of BioStation.T2
- BS_ReadBS2WLANConfig

- BS_WriteFSWLANConfig: configures the wireless LAN parameters of FaceStation
- BS_ReadFSWLANConfig
- BS_WriteFingerprintConfig: configures the settings related to fingerprint matching.
- BS_ReadFingerprintConfig
- BS_WriteDSFingerprintConfig: configures the settings related to fingerprint matching of D-Station.
- BS_ReadDSFingerprintConfig
- BS_WriteBS2FingerprintConfig: configures the settings related to fingerprint matching of BioStation.T2
- BS_ReadBS2FingerprintConfig
- BS_WriteIOConfig: configures the input and output ports of BioStation.
- BS_ReadIOConfig
- BS_WriteSerialConfig: configures the serial mode of BioStation.
- BS_ReadSerialConfig
- BS_WriteDSSerialConfig: configures the serial mode of D-Station.
- BS_ReadDSSerialConfig
- BS_WriteXSSerialConfig: configures the serial mode of X-Station.
- BS_ReadXSSerialConfig
- BS_WriteBS2SerialConfig: configures the serial mode of BioStation T2.
- BS_ReadBS2SerialConfig
- BS_WriteFSSerialConfig: configures the serial mode of FaceStation.
- BS_ReadFSSerialConfig
- BS_Write485NetworkConfig: configures the RS485 mode of BioStation.
- BS_Read485NetworkConfig
- BS_WriteDS485NetworkConfig: configures the RS485 mode of D-Station.
- BS_ReadDS485NetworkConfig
- BS_WriteXS485NetworkConfig: configures the RS485 mode of X-Station.
- BS_ReadXS485NetworkConfig
- BS_WriteBS2485NetworkConfig: configures the RS485 mode of BSStation T2.
- BS_ReadBS2485NetworkConfig
- BS_WriteFS485NetworkConfig: configures the RS485 mode of FaceStation.
- BS_ReadFS485NetworkConfig
- BS_WriteUSBConfig: configures the USB mode of BioStation.

- BS_ReadUSBConfig
- BS_WriteBS2USBConfig: configures the USB mode of BioStation T2.
- BS_ReadBS2USBConfig
- BS_WriteFSUSBConfig: configures the USB mode of FaceStation.
- BS_ReadFSUSBConfig
- BS_WriteEncryptionConfig: configures the encryption setting of BioStation.
- BS_ReadEncryptionConfig
- BS_WriteWiegandConfig: configures the Wiegand format of BioStation.
- BS_ReadWiegandConfig
- BS_WriteDSWiegandConfig: configures the Wiegand format of D-Station.
- BS_ReadDSWiegandConfig
- BS_WriteXSWiegandConfig: configures the Wiegand format of X-Station.
- BS_ReadXSWiegandConfig
- BS_WriteBS2WiegandConfig: configures the Wiegand format of BioStation.T2
- BS_ReadBS2WiegandConfig
- BS_WriteFSWiegandConfig: configures the Wiegand format of FaceStation
- BS_ReadFSWiegandConfig
- BS_WriteZoneConfigEx: configures the zones.
- BS_ReadZoneConfigEx
- BS_WriteCardReaderZoneConfig : configures the zones of 3rd party RF device
- BS_ReadCardReaderZoneConfig
- BS_WriteDoorConfig: configures the doors.
- BS_ReadDoorConfig
- BS_WriteInputConfig: configures the input ports.
- BS_ReadInputConfig
- BS_WriteDSInputConfig: configures the input ports of D-Station.
- BS_ReadDSInputConfig
- BS_WriteXSInputConfig: configures the input ports of X-Station.
- BS_ReadXSInputConfig
- BS_WriteBS2InputConfig: configures the input ports of BioStation T2.
- BS_ReadBS2InputConfig
- BS_WriteFSInputConfig: configures the input ports of FaceStation.
- BS_ReadFSInputConfig
- BS_WriteOutputConfig: configures the output ports.

- BS_ReadOutputConfig
- BS_WriteEntranceLimitConfig: configures the entrance limitation settings.
- BS_ReadEntranceLimitConfig
- BS_WriteDSSaveImageEventConfig: configures the settings of camera action event of D-Station.
- BS_ReadDSSaveImageEventConfig
- BS_WriteXSSaveImageEventConfig: configures the settings of camera action event of X-Station.
- BS_ReadXSSaveImageEventConfig
- BS_WriteBS2SaveImageEventConfig: configures the settings of camera action event of BioStation T2.
- BS_ReadBS2SaveImageEventConfig
- BS_WriteFSSaveImageEventConfig: configures the settings of camera action event of FaceStation.
- BS_ReadFSSaveImageEventConfig
- BS_WriteDSFaceConfig: configures the settings of face of D-Station.
- BS_ReadDSFaceConfig
- BS_WriteFSFaceConfig: configures the settings of face of FaceStation.
- BS_ReadFSFaceConfig
- BS_WriteConfig: configures the settings of BioEntry Plus or BioLite Net.
- BS_ReadConfig
- BS_GetAvailableSpace: calculates the available space of a device.
- BS_WriteCardReaderConfig : configures the input/output/door of 3rd party RF device
- BS_ReadCardReaderConfig
- BS_WriteBS2InterphoneConfig: configures the setting of interphone of BioStation T2.
- BS_ReadBS2InterphoneConfig
- BS_WriteFSInterphoneConfig: configures the setting of interphone of FaceStation.
- BS_ReadFSInterphoneConfig
- BS_WriteBSVideoPhoneConfig: configures the setting of videophone of BioStation T2 and FaceStation.
- BS_ReadVideoPhoneConfig.

Corruption of some configurations might result in serious consequence – it might

make the device unbootable. To minimize the risk, you had better follow the guidelines shown below;

(1) Read the configuration first before overwriting it. Then, change only the required fields.

(2) Read carefully the description of each field in a structure. If you are not sure what the field is about, do not change it.

BS_ReadSysInfoConfig

Reads the system information of D-Station / BioStation.

BS_RET_CODE BS_ReadSysInfoConfig(int handle, BSSysInfoConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSSysInfoConfig is defined as follows;

```
typedef struct {
    unsigned ID;
    char macAddr[32];
    char productName[32];
    char boardVer[16];
    char firmwareVer[16];
    char blackfinVer[16];
    char kernelVer[16];
    int language;
    char reserved[32];
} BSSysInfoConfig;
```

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation

BS_WriteDisplayConfig / BS_ReadDisplayConfig

Write/read the display configurations.

BS_RET_CODE BS_WriteDisplayConfig(int handle, BSDisplayConfig* config)
BS_RET_CODE BS_ReadDisplayConfig(int handle, BSDisplayConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSDisplayConfig is defined as follows;

```
typedef struct {
    int language;
    int background;
    int bottomInfo;
    int reserved1;
    int timeout; // menu timeout in seconds, 0 for infinite
    int volume; // 0(mute) ~ 100
    int msgTimeout;
    int usePrivateAuth; // private authentication : 1 – use, 0 – don't use
    int dateType;
    int disableAuthResult;
    int reserved2[6];
} BSDisplayConfig;
```

The key fields and their available options are as follows;

Fields	Options
language	BS_UI_LANG_KOREAN BS_UI_LANG_ENGLISH BS_UI_LANG_CUSTOM
background	BS_UI_BG_LOGO – shows logo image. BS_UI_BG_NOTICE – shows notice message. BS_UI_BG_PICTURE – shows slide show.
bottomInfo	BS_UI_INFO_NONE – shows nothing. BS_UI_INFO_TIME – shows current time.
msgTimeout	BS_MSG_TIMEOUT_500MS – 0.5 sec

	BS_MSG_TIMEOUT_1000MS – 1 sec BS_MSG_TIMEOUT_2000MS – 2 sec BS_MSG_TIMEOUT_3000MS – 3 sec BS_MSG_TIMEOUT_4000MS – 4 sec BS_MSG_TIMEOUT_5000MS – 5 sec
dateType	BS_UI_DATE_TYPE_AM – DD/MM BS_UI_DATE_TYPE_EU – MM/DD
disableAuthResult	If it is true, BioStation dosen't display pop-up window which is result of the authentication.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

Example

```
BSDisplayConfig dispConfig;

BS_RET_CODE result = BS_ReadDisplayConfig( handle, &dispConfig );

// modify the configuration if necessary

result = BS_Disable( handle, 10 ); // communication-only mode

if( result == BS_SUCCESS )
{
     result = BS_WriteDisplayConfig( handle, &dispConfig );
}

BS_Enable( handle );
```

BS_WriteDSDisplayConfig / BS_ReadDSDisplayConfig

Write/read the display configurations.

BS_RET_CODE BS_WriteDSDisplayConfig(int handle, DSDisplayConfig* config)
BS_RET_CODE BS_ReadDSDisplayConfig(int handle, DSDisplayConfig* config)

Parameters

handle

Handle of the communication channel.

config

DSDisplayConfig is defined as follows;

```
typedef struct {
    enum
    {
        // background
        BG_LOGO = 0,
        BG_NOTICE = 1,
        BG_PICTURE = 2,

        // timeout
        TIMEOUT_INDEFINITE = 0,

        // date type
        DATE_TYPE_AM = 0,
        DATE_TYPE_EU = 1,
    };
    int background;
    int theme;
    int timeout;
    int volume;
    int msgTimeout;
    int dateType;
    int backlightTimeout;
    unsigned char timeFormat;
    unsigned char reserved[78];
} DSDisplayConfig;
```

The key fields and their available options are as follows;

Fields	Options

background	BS_UI_BG_LOGO – shows logo image. BS_UI_BG_NOTICE – shows notice message.
theme	Select background theme, 0 – Default, 1 ~ 20 – theme index, 22 – custom theme.
timeout	Menu time out. BS_UI_INFO_TIME – shows current time.
volume	You can set volume 10 level, 0 ~ 100. The value means 0 ~ 100% sound volume. Example, 0, 10, 20, 30, 40, …, 90, 100.
msgTimeout	BS_MSG_TIMEOUT_500MS – 0.5 sec BS_MSG_TIMEOUT_1000MS – 1 sec BS_MSG_TIMEOUT_2000MS – 2 sec BS_MSG_TIMEOUT_3000MS – 3 sec BS_MSG_TIMEOUT_4000MS – 4 sec BS_MSG_TIMEOUT_5000MS – 5 sec
dateType	BS_UI_DATE_TYPE_AM – DD/MM BS_UI_DATE_TYPE_EU – MM/DD
backlightTimeout	You can choose one between 10, 20, 30, 40, 50 and 60 sec Timeout. If 0 then infinite timeout.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

Example

```
DSDisplayConfig dispConfig;

BS_RET_CODE result = BS_ReadDSDisplayConfig( handle, &dispConfig );

// modify the configuration if necessary

result = BS_Disable( handle, 10 ); // communication-only mode
```

```
if( result == BS_SUCCESS )
{
     result = BS_WriteDSDisplayConfig( handle, &dispConfig );
}

BS_Enable( handle );
```

BS_WriteXSDisplayConfig / BS_ReadXSDisplayConfig

Write/read the display configurations.

BS_RET_CODE BS_WriteXSDisplayConfig(int handle, XSDisplayConfig* config)
BS_RET_CODE BS_ReadXSDisplayConfig(int handle, XSDisplayConfig* config)

Parameters

handle

Handle of the communication channel.

config

XSDisplayConfig is defined as follows;

```
typedef struct {
    enum
    {
        //language
        KOREAN = 0,
        ENGLISH = 1,
        CUSTOM = 2,

        //background
        BG_LOGO = 0,
        BG_NOTICE = 1,
        BG_SLIDE = 2,

        //bgTheme
        BG_THEME_01 = 0,
        BG_THEME_02 = 1,

        //timeout
        TIMEOUT_INDEFINITE = 0,

        //dateType
        DATE_TYPE_AM = 0,
        DATE_TYPE_EU = 1,

        //displayDateTime
        NOT_USE = 0,
        USE = 1,
    };
```

```
    unsigned char language;
    unsigned char background;
    unsigned char timeout; //0 ~ 255 (sec)
    unsigned char volume; // 0 ~ 100
    unsigned short msgTimeout; // 500~5000(ms)
    unsigned char dateType;
    unsigned short backlightTimeout; //sec
    unsigned char bgTheme;// 0 ~ 1
    unsigned char displayDateTime;
    unsigned char timeFormat;
    unsigned char reserved[76];
} XSDisplayConfig;
```

The key fields and their available options are as follows;

Fields	**Options**
Language background	Language type, KOREAN, ENGLISH, CUSTOM. BS_UI_BG_LOGO – shows logo image. BS_UI_BG_NOTICE – shows notice message.
timeout	Menu time out. BS_UI_INFO_TIME – shows current time.
volume	You can set volume 10 level, 0 ~ 100. The value means 0 ~ 100% sound volume. Example, 0, 10, 20, 30, 40, …, 90, 100.
msgTimeout	BS_MSG_TIMEOUT_500MS – 0.5 sec BS_MSG_TIMEOUT_1000MS – 1 sec BS_MSG_TIMEOUT_2000MS – 2 sec BS_MSG_TIMEOUT_3000MS – 3 sec BS_MSG_TIMEOUT_4000MS – 4 sec BS_MSG_TIMEOUT_5000MS – 5 sec
dateType	BS_UI_DATE_TYPE_AM – DD/MM BS_UI_DATE_TYPE_EU – MM/DD
backlightTimeout	You can choose one between 10, 20, 30, 40, 50 and 60 sec Timeout. If 0 then infinite timeout.
bgTheme	Select background theme, BG_THEME_01 BG_THEME_02
displayDateTime	Show Date and Time

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

X-Station

Example

```
XSDisplayConfig dispConfig;

BS_RET_CODE result = BS_ReadXSDisplayConfig( handle, &dispConfig );

// modify the configuration if necessary

result = BS_Disable( handle, 10 ); // communication-only mode

if( result == BS_SUCCESS )
{
     result = BS_WriteXSDisplayConfig( handle, &dispConfig );
}

BS_Enable( handle );
```

BS_WriteBS2DisplayConfig / BS_ReadBS2DisplayConfig

Write/read the display configurations.

BS_RET_CODE BS_WriteBS2DisplayConfig(int handle, BS2DisplayConfig* config)
BS_RET_CODE BS_ReadBS2DisplayConfig(int handle, BS2DisplayConfig* config)

Parameters

handle

Handle of the communication channel.

config

BS2DisplayConfig is defined as follows;

```
typedef struct {
    enum
    {
        //language
        KOREAN = 0,
        ENGLISH = 1,
        CUSTOM = 2,

        //background
        BG_LOGO = 0,
        BG_NOTICE = 1,
        BG_PDF = 2,

        //bgTheme
        BG_THEME_01 = 0,
        BG_THEME_02 = 1,
        BG_THEME_03 = 2,
        BG_THEME_04 = 3,

        //timeout
        TIMEOUT_INDEFINITE = 0,

        //dateType
        DATE_TYPE_AM = 0,
        DATE_TYPE_EU = 1,

        //displayDateTime
        NOT_USE = 0,
```

```
        USE = 1,
    };
    unsigned char language;
    unsigned char background;
    unsigned char timeout; //0 ~ 255 (sec)
    unsigned char volume; // 0 ~ 100
    unsigned short msgTimeout; // 500~5000(ms)
    unsigned char dateType;
    unsigned short backlightTimeout; //sec
    unsigned char bgTheme;// 0 ~ 1
    unsigned char displayDateTime;
    unsigned char useVoice;
    unsigned char timeFormat;
    unsigned char reserved[75];
} BS2DisplayConfig;
```

The key fields and their available options are as follows;

Fields	**Options**
Language	Language type, KOREAN, ENGLISH, CUSTOM.
background	BG_LOGO – shows logo image. BG_NOTICE – shows notice message. BG_PDF – shows pdf document
timeout	Menu time out. BS_UI_INFO_TIME – shows current time.
volume	You can set volume 10 level, 0 ~ 100. The value means 0 ~ 100% sound volume. Example, 0, 10, 20, 30, 40, …, 90, 100.
msgTimeout	BS_MSG_TIMEOUT_500MS – 0.5 sec BS_MSG_TIMEOUT_1000MS – 1 sec BS_MSG_TIMEOUT_2000MS – 2 sec BS_MSG_TIMEOUT_3000MS – 3 sec BS_MSG_TIMEOUT_4000MS – 4 sec BS_MSG_TIMEOUT_5000MS – 5 sec
dateType	BS_UI_DATE_TYPE_AM – DD/MM BS_UI_DATE_TYPE_EU – MM/DD
backlightTimeout	You can choose one between 10, 20, 30, 40, 50 and 60 sec Timeout. If 0 then infinite timeout.
bgTheme	Select background theme, BG_THEME_01 BG_THEME_02

	BG_THEME_03 BG_THEME_04
displayDateTime	Show Date and Time
useVoice	Use voice instruction

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

Example

```
BS2DisplayConfig dispConfig;

BS_RET_CODE result = BS_ReadBS2DisplayConfig( handle, &dispConfig );

// modify the configuration if necessary

result = BS_Disable( handle, 10 ); // communication-only mode

if( result == BS_SUCCESS )
{
     result = BS_WriteBS2DisplayConfig( handle, &dispConfig );
}

BS_Enable( handle );
```

BS_WriteFSDisplayConfig / BS_ReadFSDisplayConfig

Write/read the display configurations.

BS_RET_CODE BS_WriteFSDisplayConfig(int handle, FSDisplayConfig* config)
BS_RET_CODE BS_ReadFSDisplayConfig(int handle, FSDisplayConfig* config)

Parameters

handle

Handle of the communication channel.

config

FSDisplayConfig is defined as follows;

```
typedef struct {
    enum
    {
        //language
        KOREAN = 0,
        ENGLISH = 1,
        CUSTOM = 2,

        //background
        BG_LOGO = 0,
        BG_NOTICE = 1,
        BG_PDF = 2,

        //bgTheme
        BG_THEME_01 = 0,
        BG_THEME_02 = 1,
        BG_THEME_03 = 2,
        BG_THEME_04 = 3,

        //timeout
        TIMEOUT_INDEFINITE = 0,

        //dateType
        DATE_TYPE_AM = 0,
        DATE_TYPE_EU = 1,

        //displayDateTime
        NOT_USE = 0,
```

```
        USE = 1,
    };
    unsigned char language;
    unsigned char background;
    unsigned char timeout; //0 ~ 255 (sec)
    unsigned char volume; // 0 ~ 100
    unsigned short msgTimeout; // 500~5000(ms)
    unsigned char dateType;
    unsigned short backlightTimeout; //sec
    unsigned char bgTheme; // 0 ~ 1
    unsigned char displayDateTime;
    unsigned char useVoice;
    unsigned char reserved[76];
} FSDisplayConfig;
```

The key fields and their available options are as follows;

Fields	**Options**
Language background	Language type, KOREAN, ENGLISH, CUSTOM. BG_LOGO – shows logo image. BG_NOTICE – shows notice message. BG_PDF – shows pdf document
timeout	Menu time out. BS_UI_INFO_TIME – shows current time.
volume	You can set volume 10 level, 0 ~ 100. The value means 0 ~ 100% sound volume. Example, 0, 10, 20, 30, 40, …, 90, 100.
msgTimeout	BS_MSG_TIMEOUT_500MS – 0.5 sec BS_MSG_TIMEOUT_1000MS – 1 sec BS_MSG_TIMEOUT_2000MS – 2 sec BS_MSG_TIMEOUT_3000MS – 3 sec BS_MSG_TIMEOUT_4000MS – 4 sec BS_MSG_TIMEOUT_5000MS – 5 sec
dateType	BS_UI_DATE_TYPE_AM – DD/MM BS_UI_DATE_TYPE_EU – MM/DD
backlightTimeout	You can choose one between 10, 20, 30, 40, 50 and 60 sec Timeout. If 0 then infinite timeout.
bgTheme	Select background theme, BG_THEME_01 BG_THEME_02

	BG_THEME_03 BG_THEME_04
displayDateTime	Show Date and Time
useVoice	Use voice instruction

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation

Example

```
FS2DisplayConfig dispConfig;

BS_RET_CODE result = BS_ReadFSDisplayConfig( handle, &dispConfig );

// modify the configuration if necessary

result = BS_Disable( handle, 10 ); // communication-only mode

if( result == BS_SUCCESS )
{
     result = BS_WriteFSDisplayConfig( handle, &dispConfig );
}

BS_Enable( handle );
```

BS_WriteOPModeConfig / BS_ReadOPModeConfig

Write/read the operation mode configurations.

BS_RET_CODE BS_WriteOPModeConfig(int handle, BSOPModeConfig* config)
BS_RET_CODE BS_ReadOPModeConfig(int handle, BSOPModeConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSOPModeConfig is defined as follows;

```
typedef struct {
    int authMode;
    int identificationMode;
    int tnaMode;
    unsigned short tnaChange;
    unsigned char useWiegandCardBypass; // 1 - use, 0 - not use
    unsigned char dualModeOption; //1 - use, 0 - not use
    unsigned char authSchedule[MAX_AUTH_COUNT];
    unsigned char identificationSchedule;
    unsigned char dualMode;
    unsigned char dualSchedule;
    unsigned char version;
    unsigned short cardMode;
    unsigned char useFastIDMatching;
    unsigned char cardIdFormatType;
    unsigned char authScheduleEx[MAX_AUTH_EX_COUNT];
    unsigned char usePrivateAuthMode;
    unsigned char cardIdByteOrder;
    unsigned char cardIdBitOrder;
} BSOPModeConfig;
```

The key fields and their available options are as follows;

Fields	Options
authMode	Sets 1:1 matching mode. BS_AUTH_FINGER_ONLY – only the fingerprint authentication is allowed. BS_AUTH_FINGER_N_PASSWORD – both the

	fingerprint and password authentication are required. BS_AUTH_FINGER_OR_PASSWORD – both the fingerprint and password authentication are allowed. BS_AUTH_PASS_ONLY – only the password authentication is allowed. BS_AUTH_CARD_ONLY – only the card authentication is allowed.
identificationMode	Specifies 1:N matching mode. BS_1TON_FREESCAN – identification process starts automatically after detecting a fingerprint on the sensor. BS_1TON_BUTTON – identification process starts manually by pressing OK button. BS_1TON_DISABLE – identification is disabled.
tnaMode	BS_TNA_DISABLE – TNA is disabled. BS_TNA_FUNCTION_KEY – TNA function keys are enabled.
tnaChange	BS_TNA_AUTO_CHANGE – TNA event is changed automatically according to the schedule defined in **BSTnaEventExConfig**. BS_TNA_MANUAL_CHANGE – TNA event is changed manually by function keys. BS_TNA_FIXED – TNA event is fixed to the **fixedTnaIndex** of **BSTnaEventExConfig**.
authSchedule	The schedule of each authentication mode, during which the mode is effective. For example, authSchedule[FINGER_INDEX] specifies the schedule, during which BS_AUTH_FINGER_ONLY mode is enabled. Note that you have to use **authScheduleEx** for BS_AUTH_FINGER_N_PASSWORD mode.
identificationSchedule	Specifies the schedule, during which the 1:N mode is enabled.

dualMode	If it is true, two users should be authenticated before the door is opened.
dualSchedule	Specifies the schedule, during which the **dualMode** is enabled.
version	Reserved for future use.
cardMode	Specifies the operation mode of Mifare models.
useFastIDMatching	If this field is true, a biostation use 'Fast ID Matching'. 'Fast ID Matching' means that identify is processed in users whose id is started with the inserted id.
cardIdFormatType	BS_COMMON_DISABLE – Ignores Mifare cards. BS_OP_CARD_CSN – Reads only the 4 byte CSN of Mifare cards. BS_OP_CARD_TEMPLATE – Reads templates from Mifare cards. Specifies the type of preprocessing of card ID. CARD_ID_FORMAT_NORMAL – No preprocessing. CARD_ID_FORMAT_WIEGAND – Format card ID as specified in Wiegand format.
authScheduleEx	The schedule of BS_AUTH_FINGER_N_PASSWORD.
usePrivateAuthMode	If true, the **authMode** field of **BSUserHdrEx** will be applied to user authentication. Otherwise, the **authMode** of the **BSOPModeConfig** will be applied to all users.
cardIdByteOrder	Specifies whether to swap byte order of the card ID during preprocessing. CARD_ID_MSB – Byte order will not be swapped. CARD_ID_LSB – Byte order will be swapped.
cardIdBitOrder	Specifies whether to swap bit order of the card ID during preprocessing. CARD_ID_MSB – Bit order will not be

	swapped. CARD_ID_LSB – Bit order will be swapped.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_WriteDSOPModeConfig / BS_ReadDSOPModeConfig

Write/read the operation mode configurations.

BS_RET_CODE BS_WriteDSOPModeConfig(int handle, DSOPModeConfig* config)
BS_RET_CODE BS_ReadDSOPModeConfig(int handle, DSOPModeConfig* config)

Parameters

handle

Handle of the communication channel.

config

DSOPModeConfig is defined as follows;

```
typedef struct {
    enum
    {
        NOT_USE = 0,
        USE = 1,
        //Auth Schedule
        DS_PRIVATE_AUTH_DISABLE = -1,
        DS_MAX_AUTH_COUNT = 5,
        DS_FINGER_INDEX = 0,
        DS_PIN_INDEX = 1,
        DS_FINGER_PIN_INDEX = 2,
        DS_CARD_INDEX = 3,
        DS_FINGER_N_PIN_INDEX = 4,

        //identificationMode
        IDENTIFY_DISABLE = 0,
        IDENTIFY_FREESCAN = 1,
        IDENTIFY_BUTTON = 2,

        //tnaMode
        TNA_DISABLE = 0,
        TNA_FUNCTION_KEY = 1,
        TNA_AUTO_CHANGE = 2,
        TNA_MANUAL_CHANGE = 3,
        TNA_FIXED = 4,

        // cardMode
        CARD_DISABLE = 0,
```

```
        CARD_CSN = 1,
        CARD_TEMPLATE = 2,

        //cardIdFormatType
        CARD_ID_FORMAT_NORMAL = 0,
        CARD_ID_FORMAT_WIEGAND = 1,

        // cardIdByteOrder, cardIdBitOrder
        CARD_ID_MSB = 0,
        CARD_ID_LSB = 1,

        // enhancedMode
        FUSION_NOT_USE = 0,
        FUSION_FINGER_FINGER = 1,
        FUSION_FINGER_FACE = 2,
    };
    unsigned char identificationMode;
    unsigned char tnaMode;
    unsigned char cardMode;
    unsigned char authSchedule[DS_MAX_AUTH_COUNT];
    unsigned char identificationSchedule;
    unsigned char dualSchedule;
    unsigned char usePrivateAuthMode;
    unsigned char cardIdFormatType;
    unsigned char cardIdByteOrder;
    unsigned char cardIdBitOrder;
    unsigned char enhancedMode;
    unsigned char fusionType;
    unsigned char fusionTimeout;
    unsigned char useDetectFace;
    unsigned char useWiegandCardBypass; // 1 - use, 0 - not use
    unsigned char dualModeOption; //1 - use, 0 - not use
    unsigned char reserved[80];
} DSOPModeConfig;
```

The key fields and their available options are as follows;

Fields	**Options**
identificationMode	Specifies 1:N matching mode. IDENTIFY_FREESCAN – identification process starts automatically after detecting a fingerprint on the sensor. IDENTIFY_BUTTON – identification process starts manually by pressing OK button. IDENTIFY_DISABLE – identification is

	disabled.
tnaMode	TNA_DISABLE – TNA is disabled. TNA_FUNCTION_KEY – TNA function keys are enabled.
cardMode	Specifies the operation mode of Mifare models.
authSchedule	The schedule of each authentication mode, during which the mode is effective. For example, authSchedule[FINGER_INDEX] specifies the schedule, during which BS_AUTH_FINGER_ONLY mode is enabled. Note that you have to use **authScheduleEx** for BS_AUTH_FINGER_N_PASSWORD mode.
identificationSchedule	Specifies the schedule, during which the 1:N mode is enabled.
dualSchedule	Specifies the schedule, during which the **dualMode** is enabled.
usePrivateAuthMode	If true, the **authMode** field of **DSUserHdr** will be applied to user authentication. Otherwise, the **authMode** of the **DSOPModeConfig** will be applied to all users.
cardIdFormatType	BS_COMMON_DISABLE – Ignores Mifare cards. BS_OP_CARD_CSN – Reads only the 4 byte CSN of Mifare cards. BS_OP_CARD_TEMPLATE – Reads templates from Mifare cards. Specifies the type of preprocessing of card ID. CARD_ID_FORMAT_NORMAL – No preprocessing. CARD_ID_FORMAT_WIEGAND – Format card ID as specified in Wiegand format.
cardIdByteOrder	Specifies whether to swap byte order of the card ID during preprocessing. CARD_ID_MSB – Byte order will not be swapped.

	CARD_ID_LSB – Byte order will be swapped.
cardIdBitOrder	Specifies whether to swap bit order of the card ID during preprocessing. CARD_ID_MSB – Bit order will not be swapped. CARD_ID_LSB – Bit order will be swapped.
enhancedMode	EnhancedMode is concern with the 2 sensor using mode. MODE_FAST = 0 MODE_FUSION = 1 MODE_TWIN = 2 MODE_FAST mode uses 2-senosor as normally and fast more than twice, two sensor cpus' parallel processing. MODE_FUSION pemits two fingers' fusion to autentication . In MODE_TWIN mode, two users can autenticate on one Terminal, simultaneously.
fusionType	Specifies whether to use face fusion during authentication preprocessing. 1 is use, 0 not use.
fusionTimeout	Set timeout value in seconds, for which Terminal waits until user face input.
useDetectFace	1 is use, 0 not use. In useDetectFace mode, if a user succeeds authentication, then ther terminal forcelly requires a face image to write log. If detecting face failed, the door would not open.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

BS_WriteXSOPModeConfig / BS_ReadXSOPModeConfig

Write/read the operation mode configurations.

BS_RET_CODE BS_WriteXSOPModeConfig(int handle, XSOPModeConfig* config)
BS_RET_CODE BS_ReadXSOPModeConfig(int handle, XSOPModeConfig* config)

Parameters

handle

Handle of the communication channel.

config

XSOPModeConfig is defined as follows;

```
typedef struct {
    enum
    {
        NOT_USE = 0,
        USE = 1,

        //Auth Schedule
        DS_MAX_AUTH_COUNT = 2,
        AUTH_DISABLE = -1,
        DS_CARD_INDEX = 0, //card bypass
        DS_PIN_INDEX = 1, //card + pin

        //tnaMode
        TNA_DISABLE = 0,
        TNA_FUNCTION_KEY = 1,
        TNA_AUTO_CHANGE = 2,
        TNA_MANUAL_CHANGE = 3,
        TNA_FIXED = 4,

        // cardMode
        CARD_DISABLE = 0,
        CARD_CSN = 1,
        CARD_DATA = 2,

     //cardIdFormatType
        CARD_ID_FORMAT_NORMAL = 0,
        CARD_ID_FORMAT_WIEGAND = 1,
```

```
            // cardIdByteOrder, cardIdBitOrder
            CARD_ID_MSB = 0,
            CARD_ID_LSB = 1,
        };
        unsigned char reserved1;
        unsigned char tnaMode;
        unsigned char cardMode;
        unsigned char authSchedule[MAX_AUTH_COUNT];
        unsigned char reserved2[4];
        unsigned char dualSchedule;
        unsigned char usePrivateAuthMode;
        nsigned char cardIdFormatType;

        unsigned char cardIdByteOrder;
        unsigned char cardIdBitOrder;
        nsigned char reserved3[3];
        unsigned char useDetectFace;
        unsigned char useServerMatching;
        unsigned char matchTimeout;
        unsigned char useWiegandCardBypass; // 1 - use, 0 - not use
        unsigned char dualModeOption;      //1 - use, 0 - not use
        unsigned char reserved[78];
    } XSOPModeConfig;
```

The key fields and their available options are as follows;

Fields	**Options**
tnaMode	TNA_DISABLE – TNA is disabled. TNA_FUNCTION_KEY – TNA function keys are enabled.
cardMode	Specifies the operation mode of Mifare models.
authSchedule	The schedule of each authentication mode, during which the mode is effective. For example, authSchedule[FINGER_INDEX] specifies the schedule, during which BS_AUTH_FINGER_ONLY mode is enabled. Note that you have to use **authScheduleEx** for BS_AUTH_FINGER_N_PASSWORD mode.
dualSchedule	Specifies the schedule, during which the **dualMode** is enabled.
usePrivateAuthMode	If true, the **authMode** field of **XSUserHdr** will be applied to user authentication.

	Otherwise, the **authMode** of the **XSOPModeConfig** will be applied to all users.
cardIdFormatType	BS_COMMON_DISABLE – Ignores Mifare cards. BS_OP_CARD_CSN – Reads only the 4 byte CSN of Mifare cards. BS_OP_CARD_TEMPLATE – Reads templates from Mifare cards. Specifies the type of preprocessing of card ID. CARD_ID_FORMAT_NORMAL – No preprocessing. CARD_ID_FORMAT_WIEGAND – Format card ID as specified in Wiegand format.
cardIdByteOrder	Specifies whether to swap byte order of the card ID during preprocessing. CARD_ID_MSB – Byte order will not be swapped. CARD_ID_LSB – Byte order will be swapped.
cardIdBitOrder	Specifies whether to swap bit order of the card ID during preprocessing. CARD_ID_MSB – Bit order will not be swapped. CARD_ID_LSB – Bit order will be swapped.
useDetectFace	1 is use, 0 not use. In useDetectFace mode, if a user succeeds authentication, then ther terminal forcelly requires a face image to write log. If detecting face failed, the door would not open.
userServerMatching	In server matching mode, user authentication is handled by BioStar server, not each device. To use server matching, the useServer of BSIPConfig should be greater than 0.
matchTimeout	Matching timeout in seconds.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the

corresponding error code.

Compatibility

X-Station

BS_WriteBS2OPModeConfig / BS_ReadBS2OPModeConfig

Write/read the operation mode configurations.

BS_RET_CODE BS_WriteBS2OPModeConfig(int handle, BS2OPModeConfig* config)
BS_RET_CODE BS_ReadBS2OPModeConfig(int handle, BS2OPModeConfig* config)

Parameters

handle

Handle of the communication channel.

config

BS2OPModeConfig is defined as follows;

```
typedef struct {
    enum
    {
        NOT_USE = 0,
        USE = 1,
        //Auth Type
        AUTH_TYPE_FINGER = 0,
        AUTH_TYPE_CARD = 1,
        AUTH_TYPE_ID = 2,

        //Auth Schedule
        FINGER_AUTH_COUNT = 4,
        CARD_AUTH_COUNT = 5,
        ID_AUTH_COUNT = 4,

        AUTH_FINGER_ONLY = 0,
        AUTH_FINGER_PIN = 1,
        AUTH_KEY_FINGER = 2,
        AUTH_KEY_FINGER_PIN = 3,

        AUTH_CARD_ONLY = 0,
        AUTH_CARD_PIN = 1,
        AUTH_CARD_FINGER = 2,
        AUTH_CARD_FINGER_PIN = 3,
        AUTH_CARD_FINGER_N_PIN = 4,

        AUTH_ID_PIN = 0,
        AUTH_ID_FINGER = 1,
```

```
        AUTH_ID_FINGER_PIN = 2,
        AUTH_ID_FINGER_N_PIN = 3,

        //Private Auth
        PAUTH_FINGER_ONLY = 0,
        PAUTH_FINGER_PIN = 1,
        PAUTH_CARD_ONLY = 2,
        PAUTH_CARD_PIN = 3,
        PAUTH_CARD_FINGER = 4,
        PAUTH_CARD_FINGER_PIN = 5,
        PAUTH_CARD_FINGER_N_PIN = 6,
        PAUTH_ID_PIN = 7,
        PAUTH_ID_FINGER = 8,
        PAUTH_ID_FINGER_PIN = 9,
        PAUTH_ID_FINGER_N_PIN = 10,

        //tnaMode
        TNA_DISABLE = 0,
        TNA_FUNCTION_KEY = 1,
        TNA_AUTO_CHANGE = 2,
        TNA_MANUAL_CHANGE = 3,
        TNA_FIXED = 4,

        // cardMode
        CARD_DISABLE = 0,
        CARD_CSN = 1,
        CARD_TEMPLATE = 2,

        //cardIdFormatType
        CARD_ID_FORMAT_NORMAL = 0,
        CARD_ID_FORMAT_WIEGAND = 1,

        // cardIdByteOrder, cardIdBitOrder
        CARD_ID_MSB = 0,
        CARD_ID_LSB = 1,

    };
    unsigned char fingerAuthSchedule[FINGER_AUTH_COUNT];
    unsigned char cardAuthSchedule[CARD_AUTH_COUNT];
    unsigned char idAuthSchedule[ID_AUTH_COUNT];
    unsigned char tnaMode;
    unsigned char cardMode;
    unsigned char dualSchedule;
    unsigned char usePrivateAuthMode;
    unsigned char cardIdFormatType;
    unsigned char cardIdByteOrder;
```

```
    unsigned char cardIdBitOrder;
    unsigned char useDetectFace;
    unsigned char useServerMatching;
    unsigned char matchTimeout;
    unsigned char useWiegandCardBypass; // 1 - use, 0 - not use
    unsigned char dualModeOption; //1 - use, 0 - not use
    unsigned char reserved[75];
} BS2OPModeConfig;
```

The key fields and their available options are as follows;

Fields	**Options**
`fingerAuthSchedule`	Specifies the Finger Auth Schedule for 1:N matching mode. fingerAuthSchedule[FINGER_AUTH_COUNT] has the schedule of each index as below. AUTH_FINGER_ONLY: Fingerprint AUTH_FINGER_PIN: Fingerpritnt and Password AUTH_KEY_FINGER: Func Key and Fingerprint AUTH_KEY_FINGER_PIN: Func Key and Fingerprint and Password
`cardAuthSchedule`	Specifies the Card Auth schedule for 1:N matching mode. cardAuthSchedule [CARD_AUTH_COUNT] has the schedule of each index as below. AUTH_CARD_ONLY: Card Only AUTH_CARD_PIN: Card and Password AUTH_CARD_FINGER: Card and Fingerprint AUTH_CARD_FINGER_PIN: Card and Fingerprint or Password AUTH_CARD_FINGER_N_PIN: Card and Fingerprint and Password
`idAuthSchedule`	Specifies the ID Auth schedule for 1:N matching mode. idAuthSchedule [ID_AUTH_COUNT] has the schedule of each index as below. AUTH_ID_PIN: ID and Password AUTH_ID_FINGER: ID and Fingerprint

	AUTH_ID_FINGER_PIN: ID and Fingerprint or Password AUTH_ID_FINGER_N_PIN: ID and Fingerprint and Password
tnaMode	TNA_DISABLE – TNA is disabled. TNA_FUNCTION_KEY – TNA function keys are enabled.
cardMode	Specifies the operation mode of Mifare models.
dualSchedule	Specifies the schedule, during which the **dualMode** is enabled.
usePrivateAuthMode	If true, the **authMode** field of **BS2UserHdr** will be applied to user authentication. Otherwise, the **authMode** of the **BS2OPModeConfig** will be applied to all users.
cardIdFormatType	BS_COMMON_DISABLE – Ignores Mifare cards. BS_OP_CARD_CSN – Reads only the 4 byte CSN of Mifare cards. BS_OP_CARD_TEMPLATE – Reads templates from Mifare cards. Specifies the type of preprocessing of card ID. CARD_ID_FORMAT_NORMAL – No preprocessing. CARD_ID_FORMAT_WIEGAND – Format card ID as specified in Wiegand format.
cardIdByteOrder	Specifies whether to swap byte order of the card ID during preprocessing. CARD_ID_MSB – Byte order will not be swapped. CARD_ID_LSB – Byte order will be swapped.
cardIdBitOrder	Specifies whether to swap bit order of the card ID during preprocessing. CARD_ID_MSB – Bit order will not be swapped.

	CARD_ID_LSB – Bit order will be swapped.
useDetectFace	1 is use, 0 not use. In useDetectFace mode, if a user succeeds authentication, then ther terminal forcelly requires a face image to write log. If detecting face failed, the door would not open.
userServerMatching	In server matching mode, user authentication is handled by BioStar server, not each device. To use server matching, the useServer of BSIPConfig should be greater than 0.
matchTimeout	Matching timeout in seconds.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

BS_WriteFSOPModeConfig / BS_ReadFSOPModeConfig

Write/read the operation mode configurations.

BS_RET_CODE BS_WriteFSOPModeConfig(int handle, FSOPModeConfig* config)
BS_RET_CODE BS_ReadFSOPModeConfig(int handle, FSOPModeConfig* config)

Parameters

handle

Handle of the communication channel.

config

FSOPModeConfig is defined as follows;

```
typedef struct{
    enum{
      NOT_USE = 0,
      USE = 1,

      AUTH_TYPE_FACE = 0,
      AUTH_TYPE_CARD = 1,
      AUTH_TYPE_ID = 2,

      AUTH_DISABLE = -1,

      //Auth Schedule
      FACE_AUTH_COUNT = 6,
      CARD_AUTH_COUNT = 5,
      ID_AUTH_COUNT = 4,

      AUTH_FACE_ONLY = 0,
      AUTH_FACE_PIN = 1,
      AUTH_KEY_FACE = 2,
      AUTH_KEY_FACE_PIN = 3,
      AUTH_FACE_KEY = 4,
      AUTH_FACE_PIN_KEY = 5,
```

```
AUTH_CARD_ONLY = 0,
AUTH_CARD_PIN = 1,
AUTH_CARD_FACE = 2,
AUTH_CARD_FACE_PIN = 3,
AUTH_CARD_FACE_N_PIN = 4,

AUTH_ID_PIN = 0,
AUTH_ID_FACE = 1,
AUTH_ID_FACE_PIN = 2,
AUTH_ID_FACE_N_PIN= 3,

//Private Auth
PAUTH_FACE_ONLY = 0,
PAUTH_FACE_PIN = 1,
PAUTH_CARD_ONLY = 2,
PAUTH_CARD_PIN = 3,
PAUTH_CARD_FACE = 4,
PAUTH_CARD_FACE_PIN = 5,
PAUTH_CARD_FACE_N_PIN = 6,
PAUTH_ID_PIN = 7,
PAUTH_ID_FACE = 8,
PAUTH_ID_FACE_PIN = 9,
PAUTH_ID_FACE_N_PIN = 10,
PAUTH_FACE_KEY = 11,
PAUTH_FACE_PIN_KEY = 12,

//tnaMode
TNA_DISABLE = 0,
TNA_FUNCTION_KEY = 1,
TNA_AUTO_CHANGE = 2,
TNA_MANUAL_CHANGE = 3,
TNA_FIXED = 4,

// cardMode
CARD_DISABLE = 0,
```

```
        CARD_CSN = 1,
        CARD_DATA = 2,

        //cardIdFormatType
        CARD_ID_FORMAT_NORMAL = 0,
        CARD_ID_FORMAT_WIEGAND = 1,

        // cardIdByteOrder, cardIdBitOrder
        CARD_ID_MSB = 0,
        CARD_ID_LSB = 1,
    };

    unsigned char faceAuthSchedule[FACE_AUTH_COUNT];
    unsigned char cardAuthSchedule[CARD_AUTH_COUNT];
    unsigned char idAuthSchedule[ID_AUTH_COUNT];

    unsigned char tnaMode;
    unsigned char cardMode;
    unsigned char dualSchedule;
    unsigned char usePrivateAuthMode;
    unsigned char cardIdFormatType;

    unsigned char cardIdByteOrder;
    unsigned char cardIdBitOrder;
    unsigned char useDetectFace;
    unsigned char useServerMatching;
    unsigned char matchTimeout;
    unsigned char useWiegandCardBypass; // 1 - use, 0 - not use
    unsigned char dualModeOption; //1 - use, 0 - not use
    unsigned char reserved[75];
} FSOPModeConfig;
```

The key fields and their available options are as follows;

Fields	**Options**
`faceAuthSchedule`	Specifies the Face Auth Schedule for 1:N matching mode.

	faceAuthSchedule[FACE_AUTH_COUNT] has the schedule of each index as below. PAUTH_FACE_ONLY: Face PAUTH_FACE_PIN: Face and Password PAUTH_KEY_FACE: Func Key and Face PAUTH_KEY_FACE_PIN: Func Key and Face and Password
`cardAuthSchedule`	Specifies the Card Auth schedule for 1:N matching mode. cardAuthSchedule [CARD_AUTH_COUNT] has the schedule of each index as below. PAUTH_CARD_ONLY: Card Only PAUTH_CARD_PIN: Card and Password PAUTH_CARD_FACE: Card and Face PAUTH_CARD_FACE_PIN: Card and Face or Password AUTH_CARD_FINGER_N_PIN: Card and Face and Password
`idAuthSchedule`	Specifies the ID Auth schedule for 1:N matching mode. idAuthSchedule [ID_AUTH_COUNT] has the schedule of each index as below. PAUTH_ID_PIN: ID and Password PAUTH_ID_FACE: ID and Face PAUTH_ID_FACE_PIN: ID and Face or Password PAUTH_ID_FACE_N_PIN: ID and Face and Password
tnaMode	TNA_DISABLE – TNA is disabled. TNA_FUNCTION_KEY – TNA function keys are enabled.
cardMode	Specifies the operation mode of Mifare models.
dualSchedule	Specifies the schedule, during which the **dualMode** is enabled.
usePrivateAuthMode	If true, the **authMode** field of **BS2UserHdr**

	will be applied to user authentication. Otherwise, the **authMode** of the **BS2OPModeConfig** will be applied to all users.
cardIdFormatType	BS_COMMON_DISABLE – Ignores Mifare cards. BS_OP_CARD_CSN – Reads only the 4 byte CSN of Mifare cards. BS_OP_CARD_TEMPLATE – Reads templates from Mifare cards. Specifies the type of preprocessing of card ID. CARD_ID_FORMAT_NORMAL – No preprocessing. CARD_ID_FORMAT_WIEGAND – Format card ID as specified in Wiegand format.
cardIdByteOrder	Specifies whether to swap byte order of the card ID during preprocessing. CARD_ID_MSB – Byte order will not be swapped. CARD_ID_LSB – Byte order will be swapped.
cardIdBitOrder	Specifies whether to swap bit order of the card ID during preprocessing. CARD_ID_MSB – Bit order will not be swapped. CARD_ID_LSB – Bit order will be swapped.
useDetectFace	1 is use, 0 not use. In useDetectFace mode, if a user succeeds authentication, then ther terminal forcelly requires a face image to write log. If detecting face failed, the door would not open.
userServerMatching	In server matching mode, user authentication is handled by BioStar server, not each device. To use server matching, the useServer of BS2IPConfig should be greater than 0.
matchTimeout	Matching timeout in seconds.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation

BS_WriteTnaEventConfig / BS_ReadTnaEventConfig

Writes/reads the TNA event configurations.

BS_RET_CODE BS_WriteTnaEventConfig(int handle, BSTnaEventConfig* config)
BS_RET_CODE BS_ReadTnaEventConfig(int handle, BSTnaEventConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSTnaEventConfig is defined as follows;

```
#define BS_TNA_F1   0
#define BS_TNA_F2   1
#define BS_TNA_F3   2
#define BS_TNA_F4   3
#define BS_TNA_1    4
#define BS_TNA_2    5
#define BS_TNA_3    6
#define BS_TNA_4    7
#define BS_TNA_5    8
#define BS_TNA_6    9
#define BS_TNA_7    10
#define BS_TNA_8    11
#define BS_TNA_9    12
#define BS_TNA_CALL 13
#define BS_TNA_0    14
#define BS_TNA_ESC  15
#define BS_MAX_TNA_FUNCTION_KEY 16
```

```
typedef struct {
    unsigned char enabled[BS_MAX_TNA_FUNCTION_KEY];
    unsigned char useRelay[BS_MAX_TNA_FUNCTION_KEY];
    unsigned short reserved[BS_MAX_TNA_FUNCTION_KEY];
    char eventStr[BS_MAX_TNA_FUNCTION_KEY][BS_MAX_TNA_EVENT_LEN];
} BSTnaEventConfig;
```

The key fields and their available options are as follows;

Fields	Options

enabled	Specifies if this function key is used.
useRelay	If true, turn on the relay after authentication succeeds.
eventStr	Event string which will be used for showing log records

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

Example

```
BSTnaEventConfig tnaConfig;

tnaConfig.enabled[BS_TNA_F1] = true;
tnaConfig.useRelay[BS_TNA_F1] = true;
strcpy( tnaConfig.eventStr[BS_TNA_F1], “In” );

tnaConfig.enabled[BS_TNA_F2] = true;
tnaConfig.useRelay[BS_TNA_F2] = false;
strcpy( tnaConfig.eventStr[BS_TNA_F2], “Out” );
```

BS_WriteTnaEventExConfig / BS_ReadTnaEventExConfig

Writes/reads the TNA mode configurations. Refer to **BS_WriteTnaEventConfig** for the related settings.

BS_RET_CODE BS_WriteTnaEventExConfig(int handle, BSTnaEventExConfig* config)
BS_RET_CODE BS_ReadTnaEventExConfig(int handle, BSTnaEventExConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSTnaEventExConfig is defined as follows;

```
typedef struct {
    int fixedTnaIndex;
    int manualTnaIndex;
    int timeSchedule[BS_MAX_TNA_FUNCTION_KEY];
} BSTnaEventExConfig;
```

The key fields and their available options are as follows;

Fields	Options
fixedTnaIndex	Specifies the fixed TNA event. It is effective only if the **tnaChange** field of **BSOPModeConfig** is BS_TNA_FIXED.
manualTnaIndex	Reserved for future use.
timeSchedule	Schedules for each TNA event. It is effective only if the **tnaChange** field of **BSOPModeConfig** is BS_TNA_AUTO_CHANGE.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_WriteDSTnaEventConfig / BS_ReadDSTnaEventConfig

Writes/reads the TNA event configurations.

BS_RET_CODE BS_WriteDSTnaEventConfig(int handle, DSTnaEventConfig* config)
BS_RET_CODE BS_ReadDSTnaEventConfig(int handle, DSTnaEventConfig* config)

Parameters

handle

Handle of the communication channel.

config

DSTnaEventConfig is defined as follows;

```
#define BS_TNA_F1   0
#define BS_TNA_F2   1
#define BS_TNA_F3   2
#define BS_TNA_F4   3
#define BS_TNA_1    4
#define BS_TNA_2    5
#define BS_TNA_3    6
#define BS_TNA_4    7
#define BS_TNA_5    8
#define BS_TNA_6    9
#define BS_TNA_7    10
#define BS_TNA_8    11
#define BS_TNA_9    12
#define BS_TNA_CALL 13
#define BS_TNA_0    14
#define BS_TNA_ESC  15
#define BS_MAX_TNA_FUNCTION_KEY 16
```

```
typedef struct {
    unsigned char enabled[BS_MAX_TNA_FUNCTION_KEY];
    unsigned char useRelay[BS_MAX_TNA_FUNCTION_KEY];
    unsigned short reserved[BS_MAX_TNA_FUNCTION_KEY];
    char eventStr[BS_MAX_TNA_FUNCTION_KEY][BS_MAX_TNA_EVENT_LEN];
} DSTnaEventConfig;
```

The key fields and their available options are as follows;

Fields	Options

enabled	Specifies if this function key is used.
useRelay	If true, turn on the relay after authentication succeeds.
eventStr	Event string which will be used for showing log records

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

Example

```
DSTnaEventConfig tnaConfig;

tnaConfig.enabled[BS_TNA_F1] = true;
tnaConfig.useRelay[BS_TNA_F1] = true;
strcpy( tnaConfig.eventStr[BS_TNA_F1], “In” );

tnaConfig.enabled[BS_TNA_F2] = true;
tnaConfig.useRelay[BS_TNA_F2] = false;
strcpy( tnaConfig.eventStr[BS_TNA_F2], “Out” );
```

BS_WriteDSTnaEventExConfig / BS_ReadDSTnaEventExConfig

Writes/reads the TNA mode configurations. Refer to **BS_WriteDSTnaEventConfig** for the related settings.

BS_RET_CODE BS_WriteDSTnaEventExConfig(int handle, DSTnaEventExConfig* config)
BS_RET_CODE BS_ReadDSTnaEventExConfig(int handle, DSTnaEventExConfig* config)

Parameters

handle

Handle of the communication channel.

config

DSTnaEventExConfig is defined as follows;

```
typedef struct {
    unsigned char fixedTnaIndex;
    unsigned char leftFixedTnaIndex;
    unsigned char rightFixedTnaIndex;
    unsigned char reserved[1];
    unsigned char manulTnaIndex;
    unsigned char reserved2[3];
    int timeSchedule[BS_MAX_TNA_FUNCTION_KEY];
} DSTnaEventExConfig;
```

The key fields and their available options are as follows;

Fields	Options
fixedTnaIndex	Specifies the fixed TNA event. It is effective only if the **tnaChange** field of **DSOPModeConfig** is BS_TNA_FIXED.
leftFixedTnaIndex	When the **enhancedMode** field of **DSOPModeConfig** is MODE_TWIN, Specifies the fixed TNA event of left sensor.
rightFixedTnaIndex	When the **enhancedMode** field of **DSOPModeConfig** is MODE_TWIN, Specifies the fixed TNA event of right sensor.
manualTnaIndex	Reserved for future use.
timeSchedule	Schedules for each TNA event. It is effective only

	if the **tnaChange** field of **DSOPModeConfig** is BS_TNA_AUTO_CHANGE.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

BS_WriteXSTnaEventConfig / BS_ReadXSTnaEventConfig

Writes/reads the TNA event configurations.

BS_RET_CODE BS_WriteXSTnaEventConfig(int handle, XSTnaEventConfig* config)
BS_RET_CODE BS_ReadXSTnaEventConfig(int handle, XSTnaEventConfig* config)

Parameters

handle

Handle of the communication channel.

config

XSTnaEventConfig is defined as follows;

```
#define BS_TNA_F1   0
#define BS_TNA_F2   1
#define BS_TNA_F3   2
#define BS_TNA_F4   3
#define BS_TNA_1    4
#define BS_TNA_2    5
#define BS_TNA_3    6
#define BS_TNA_4    7
#define BS_TNA_5    8
#define BS_TNA_6    9
#define BS_TNA_7    10
#define BS_TNA_8    11
#define BS_TNA_9    12
#define BS_TNA_CALL 13
#define BS_TNA_0    14
#define BS_TNA_ESC  15
#define BS_MAX_TNA_FUNCTION_KEY 16
```

```
typedef struct {
    unsigned char enabled[BS_MAX_TNA_FUNCTION_KEY];
    unsigned char useRelay[BS_MAX_TNA_FUNCTION_KEY];
    unsigned short reserved[BS_MAX_TNA_FUNCTION_KEY];
    char eventStr[BS_MAX_TNA_FUNCTION_KEY][BS_MAX_TNA_EVENT_LEN];
} XSTnaEventConfig;
```

The key fields and their available options are as follows;

Fields	Options

enabled	Specifies if this function key is used.
useRelay	If true, turn on the relay after authentication succeeds.
eventStr	Event string which will be used for showing log records

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

X-Station

Example

```
XSTnaEventConfig tnaConfig;

tnaConfig.enabled[BS_TNA_F1] = true;
tnaConfig.useRelay[BS_TNA_F1] = true;
strcpy( tnaConfig.eventStr[BS_TNA_F1], “In” );

tnaConfig.enabled[BS_TNA_F2] = true;
tnaConfig.useRelay[BS_TNA_F2] = false;
strcpy( tnaConfig.eventStr[BS_TNA_F2], “Out” );
```

BS_WriteXSTnaEventExConfig / BS_ReadXSTnaEventExConfig

Writes/reads the TNA mode configurations. Refer to **BS_WriteXSTnaEventConfig** for the related settings.

BS_RET_CODE BS_WriteXSTnaEventExConfig(int handle, XSTnaEventExConfig* config)
BS_RET_CODE BS_ReadXSTnaEventExConfig(int handle, XSTnaEventExConfig* config)

Parameters

handle

Handle of the communication channel.

config

XSTnaEventExConfig is defined as follows;

```
typedef struct {
    unsigned char fixedTnaIndex;
    unsigned char reserved[3];
    unsigned char manulTnaIndex;
    unsigned char reserved2[3];
    int timeSchedule[BS_MAX_TNA_FUNCTION_KEY];
} XSTnaEventExConfig;
```

The key fields and their available options are as follows;

Fields	Options
fixedTnaIndex	Specifies the fixed TNA event. It is effective only if the **tnaChange** field of **XSOPModeConfig** is BS_TNA_FIXED.
manualTnaIndex	Reserved for future use.
timeSchedule	Schedules for each TNA event. It is effective only if the **tnaChange** field of **XSOPModeConfig** is BS_TNA_AUTO_CHANGE.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

X-Station

BS_WriteBS2TnaEventConfig / BS_ReadBS2TnaEventConfig

Writes/reads the TNA event configurations.

BS_RET_CODE BS_WriteBS2TnaEventConfig(int handle, BS2TnaEventConfig* config)
BS_RET_CODE BS_ReadBS2TnaEventConfig(int handle, BS2TnaEventConfig* config)

Parameters

handle

Handle of the communication channel.

config

BS2TnaEventConfig is defined as follows;

```
#define BS_TNA_F1   0
#define BS_TNA_F2   1
#define BS_TNA_F3   2
#define BS_TNA_F4   3
#define BS_TNA_1    4
#define BS_TNA_2    5
#define BS_TNA_3    6
#define BS_TNA_4    7
#define BS_TNA_5    8
#define BS_TNA_6    9
#define BS_TNA_7    10
#define BS_TNA_8    11
#define BS_TNA_9    12
#define BS_TNA_CALL 13
#define BS_TNA_0    14
#define BS_TNA_ESC  15
#define BS_MAX_TNA_FUNCTION_KEY 16
```

```
typedef struct {
    unsigned char enabled[BS_MAX_TNA_FUNCTION_KEY];
    unsigned char useRelay[BS_MAX_TNA_FUNCTION_KEY];
    unsigned short reserved[BS_MAX_TNA_FUNCTION_KEY];
    char eventStr[BS_MAX_TNA_FUNCTION_KEY][BS_MAX_TNA_EVENT_LEN];
} BS2TnaEventConfig;
```

The key fields and their available options are as follows;

Fields	Options

enabled	Specifies if this function key is used.
useRelay	If true, turn on the relay after authentication succeeds.
eventStr	Event string which will be used for showing log records

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

Example

```
BS2TnaEventConfig tnaConfig;

tnaConfig.enabled[BS_TNA_F1] = true;
tnaConfig.useRelay[BS_TNA_F1] = true;
strcpy( tnaConfig.eventStr[BS_TNA_F1], “In” );

tnaConfig.enabled[BS_TNA_F2] = true;
tnaConfig.useRelay[BS_TNA_F2] = false;
strcpy( tnaConfig.eventStr[BS_TNA_F2], “Out” );
```

BS_WriteFSTnaEventConfig / BS_ReadFSTnaEventConfig

Writes/reads the TNA event configurations.

BS_RET_CODE BS_WriteFSTnaEventConfig(int handle, FSTnaEventConfig* config)
BS_RET_CODE BS_ReadFSTnaEventConfig(int handle, FSTnaEventConfig* config)

Parameters

handle

Handle of the communication channel.

config

FSTnaEventConfig is defined as follows;

```
#define BS_TNA_F1   0
#define BS_TNA_F2   1
#define BS_TNA_F3   2
#define BS_TNA_F4   3
#define BS_TNA_1    4
#define BS_TNA_2    5
#define BS_TNA_3    6
#define BS_TNA_4    7
#define BS_TNA_5    8
#define BS_TNA_6    9
#define BS_TNA_7    10
#define BS_TNA_8    11
#define BS_TNA_9    12
#define BS_TNA_CALL 13
#define BS_TNA_0    14
#define BS_TNA_ESC  15
#define BS_MAX_TNA_FUNCTION_KEY 16
```

```
typedef struct {
    unsigned char enabled[BS_MAX_TNA_FUNCTION_KEY];
    unsigned char useRelay[BS_MAX_TNA_FUNCTION_KEY];
    unsigned short reserved[BS_MAX_TNA_FUNCTION_KEY];
    char eventStr[BS_MAX_TNA_FUNCTION_KEY][BS_MAX_TNA_EVENT_LEN];
} BS2TnaEventConfig;
```

The key fields and their available options are as follows;

Fields	Options
enabled	Specifies if this function key is used.

useRelay	If true, turn on the relay after authentication succeeds.
eventStr	Event string which will be used for showing log records

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation

Example

```
FSTnaEventConfig tnaConfig;

tnaConfig.enabled[BS_TNA_F1] = true;
tnaConfig.useRelay[BS_TNA_F1] = true;
strcpy( tnaConfig.eventStr[BS_TNA_F1], “In” );

tnaConfig.enabled[BS_TNA_F2] = true;
tnaConfig.useRelay[BS_TNA_F2] = false;
strcpy(tnaConfig.eventStr[BS_TNA_F2], “Out” );
```

BS_WriteBS2TnaEventExConfig / BS_ReadBS2TnaEventExConfig

Writes/reads the TNA mode configurations. Refer to **BS_WriteBS2TnaEventConfig** for the related settings.

BS_RET_CODE BS_WriteBS2TnaEventExConfig(int handle, BS2TnaEventExConfig* config)
BS_RET_CODE BS_ReadBS2TnaEventExConfig(int handle, BS2TnaEventExConfig* config)

Parameters

handle

Handle of the communication channel.

config

BS2TnaEventExConfig is defined as follows;

```
typedef struct {
    unsigned char fixedTnaIndex;
    unsigned char reserved[3];
    unsigned char manulTnaIndex;
    unsigned char reserved2[3];
    int timeSchedule[BS_MAX_TNA_FUNCTION_KEY];
} BS2TnaEventExConfig;
```

The key fields and their available options are as follows;

Fields	Options
fixedTnaIndex	Specifies the fixed TNA event. It is effective only if the **tnaChange** field of **BS2OPModeConfig** is BS_TNA_FIXED.
manualTnaIndex	Reserved for future use.
timeSchedule	Schedules for each TNA event. It is effective only if the **tnaChange** field of **BS2OPModeConfig** is BS_TNA_AUTO_CHANGE.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

BS_WriteFSTnaEventExConfig / BS_ReadFSTnaEventExConfig

Writes/reads the TNA mode configurations. Refer to **BS_WriteFSTnaEventConfig** for the related settings.

BS_RET_CODE BS_WriteFSTnaEventExConfig(int handle, FSTnaEventExConfig* config)
BS_RET_CODE BS_ReadFSTnaEventExConfig(int handle, FSTnaEventExConfig* config)

Parameters

handle

Handle of the communication channel.

config

FSTnaEventExConfig is defined as follows;

```
typedef struct {
    unsigned char fixedTnaIndex;
    unsigned char reserved[3];
    unsigned char manulTnaIndex;
    unsigned char reserved2[3];
    int timeSchedule[BS_MAX_TNA_FUNCTION_KEY];
} FSTnaEventExConfig;
```

The key fields and their available options are as follows;

Fields	Options
fixedTnaIndex	Specifies the fixed TNA event. It is effective only if the **tnaChange** field of **FSOPModeConfig** is BS_TNA_FIXED.
manualTnaIndex	Reserved for future use.
timeSchedule	Schedules for each TNA event. It is effective only if the **tnaChange** field of **FSOPModeConfig** is BS_TNA_AUTO_CHANGE.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation

BS_WriteIPConfig / BS_ReadIPConfig

Writes/reads the IP configuration. Before configuring parameters, you have to decide on two important options.

(1) DHCP: There are two ways to assign an IP address to a device – DHCP or static IP. DHCP makes network configuration much easier. You don't have to configure other parameters such as subnet mask and gateway. If your LAN has a DHCP server, all you have to do is to plug an Ethernet cable to the device. By default, each device is set to use DHCP mode.

However, DHCP has its own problem. The IP address of a device can be changed. When an IP address is assigned by a DHCP server, it has limited lease time. Before the lease time expires, the device has to reacquire an IP address. Depending on the configuration of DHCP server, the new IP address can be different from the old one. Since the application doesn't know this change, it will result in connection loss.

(2) Server/Direct mode: The connection between applications and devices has two modes – direct and server. The server mode is only for BioStar server. Therefore, you have to use direct mode if you want to connect to the device in your applications.

BS_RET_CODE BS_WriteIPConfig(int handle, BSIPConfig* config)
BS_RET_CODE BS_ReadIPConfig(int handle, BSIPConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSIPConfig is defined as follows;

```
#define BS_IP_DISABLE 0
#define BS_IP_ETHERNET 1
#define BS_IP_WLAN 2 // for Wireless version only

typedef struct {
     int lanType;
     bool useDHCP;
     unsigned port;
```

```
    char ipAddr[BS_MAX_NETWORK_ADDR_LEN];
    char gateway[BS_MAX_NETWORK_ADDR_LEN];
    char subnetMask[BS_MAX_NETWORK_ADDR_LEN];
    char serverIP[BS_MAX_NETWORK_ADDR_LEN];
    int  maxConnection;
    unsigned char useServer;
    unsigned serverPort;
    bool syncTimeWithServer;
    char reserved[48];
} BSIPConfig;
```

The key fields and their available options are as follows;

Fields	**Options**
lanType	BS_IP_DISABLE BS_IP_ETHERNET BS_IP_WLAN
useDHCP	If it is true, the **ipAddr**, **gateway**, and **subnetMask** fields will be ignored.
port	The default value is 1470. You don't have to change it in most cases.
ipAddr	IP address of the device.
subnetMask	Subnet mask.
serverIP	If **useServer** greather than 0, you have to configure the IP address and port of the server.
maxConnection	The maximum number of TCP sockets you can connect to.
useServer	With BioStation BS_SERVER_DISABLE 0 BS_SERVER_ADMIN 1 BS_SERVER_STAR 2 Except for BioStation (DST, XST, BST2, FST) BS_SERVER_DISABLE 0 BS_SERVER_STAR 1
serverPort	The port number of the server.
syncTimeWithServer	If **useServer** greater than 0, the device will synchronize its time with that of the server.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the

corresponding error code.

Compatibility

BioStation, D-Station, X-Station, BioStation T2, FaceStation

BS_WriteWLANConfig / BS_ReadWLANConfig

Writes/reads Wireless LAN configuration.

BS_RET_CODE BS_WriteWLANConfig(int handle, BSWLANConfig* config)
BS_RET_CODE BS_ReadWLANConfig(int handle, BSWLANConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSWLANConfig is defined as follows;

```
typedef struct {
    char name[BS_MAX_NETWORK_ADDR_LEN];
    int operationMode;
    short authType;
    short encryptionType;
    int keyType;
    char essid[BS_MAX_NETWORK_ADDR_LEN];
    char key1[BS_MAX_NETWORK_ADDR_LEN];
    char key2[BS_MAX_NETWORK_ADDR_LEN];
    char wpaPassphrase[64];
} BSWLANPreset;

typedef struct {
    int selected;
    BSWLANPreset preset[BS_MAX_WLAN_PRESET];
} BSWLANConfig;
```

The key fields and their available options are as follows;

Fields	Options
operationMode	Only infrastructure network – managed mode – is supported. BS_WLAN_MANAGED
authType	There are 3 types of authentication. BS_WLAN_AUTH_OPEN: no authentication. BS_WLAN_AUTH_SHARED: shared-key WEP authentication. BS_WLAN_AUTH_WPA_PSK: WPA authentication

	using a pre-shared master key.
encryptionType	Available encryption options are determined by authentication type. BS_WLAN_NO_ENCRYPTION: no data encryption. This option should not be used as far as possible. For securing wireless channels, you should use WEP or WPA encryption. BS_WLAN_WEP: 64 and 128 bit encryption are supported. BS_WLAN_TKIP_AES: WPA TKIP and WPA2 AES encryption are supported. BioStation will detect the appropriate encryption algorithm automatically. Authentication: AUTH_OPEN — Supported encryption: NO_ENCRYPTION, WEP Authentication: AUTH_SHARED — Supported encryption: WEP Authentication: WPA_PSK — Supported encryption: TKIP_AES
keyType	You can specify WEP keys either in plain ascii text or in binary hex format. BS_WLAN_KEY_ASCII BS_WLAN_KEY_HEX
essid	Network ID of the access point to which the BioStation will be connected.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

Example

```
BSWLANConfig wlanConfig;
```

```
// (1) AP1
//     essid: biostation_wep
//     encryption: wep128 bit
//     WEP key: _suprema_wep_
strcpy( wlanConfig.preset[0].name, “Preset WEP” );
strcpy( wlanConfig.preset[0].essid, “biostation_wep” );
wlanConfig.preset[0].operationMode = BS_WLAN_MANAGED;
wlanConfig.preset[0].authType = BS_WLAN_AUTH_OPEN;
wlanConfig.preset[0].encryptionType = BS_WLAN_WEP;
wlanConfig.preset[0].keyType = BS_WLAN_KEY_ASCII;
strcpy( wlanConfig.preset[0].key1, “_suprema_wep_” );

// (2) AP2
//     essid: biostation_wpa
//     encryption: AES
//     WPS_PSK passphrase: _suprema_wpa_
strcpy( wlanConfig.preset[1].name, “Preset WPA” );
strcpy( wlanConfig.preset[1].essid, “biostation_wpa” );
wlanConfig.preset[1].operationMode = BS_WLAN_MANAGED;
wlanConfig.preset[1].authType = BS_WLAN_AUTH_WPA_PSK;
wlanConfig.preset[1].encryptionType = BS_WLAN_TKIP_AES;
strcpy( wlanConfig.preset[1].wpaPassphrase, “_suprema_wpa_” );
```

BS_WriteDSWLANConfig / BS_ReadDSWLANConfig

Writes/reads Wireless LAN configuration.

BS_RET_CODE BS_WriteDSWLANConfig(int handle, DSWLANConfig* config)
BS_RET_CODE BS_ReadDSWLANConfig(int handle, DSWLANConfig* config)

Parameters

handle

Handle of the communication channel.

config

DSWLANConfig is defined as follows;

```
typedef struct {
    enum
    {
        WLAN_MANAGED = 0,
        WLAN_AD_HOC = 1,

        AUTH_OPEN = 0,
        AUTH_SHARED = 1,
        AUTH_WPA_PSK = 2,

        NO_ENCRYPTION = 0,
        ENC_WEP = 1,
        ENC_TKIP_AES = 2,
        ENC_AES = 3,
        ENC_TKIP = 4,

        KEY_ASCII = 0,
        KEY_HEX = 1,
    };
    char name[BS_MAX_NETWORK_ADDR_LEN];
    unsigned char operationMode;
    unsigned char authType;
    unsigned char encryptionType;
    unsigned char keyType;
    char essid[BS_MAX_NETWORK_ADDR_LEN];
    char key1[BS_MAX_NETWORK_ADDR_LEN];
    char key2[BS_MAX_NETWORK_ADDR_LEN];
    char wpa_key[64];
```

```
    unsigned char reserved[40];
} DSWLANPreset;

typedef struct {
    int selected;
    DSWLANPreset preset[BS_MAX_WLAN_PRESET];
} DSWLANConfig;
```

The key fields and their available options are as follows;

<table>
<tr><th>Fields</th><th>Options</th></tr>
<tr><td>operationMode</td><td>Only infrastructure network – managed mode – is supported.
BS_WLAN_MANAGED</td></tr>
<tr><td>authType</td><td>There are 3 types of authentication.
BS_WLAN_AUTH_OPEN: no authentication.
BS_WLAN_AUTH_SHARED: shared-key WEP authentication.
BS_WLAN_AUTH_WPA_PSK: WPA authentication using a pre-shared master key.</td></tr>
<tr><td>encryptionType</td><td>Available encryption options are determined by authentication type.
BS_WLAN_NO_ENCRYPTION: no data encryption. This option should not be used as far as possible. For securing wireless channels, you should use WEP or WPA encryption.
BS_WLAN_WEP: 64 and 128 bit encryption are supported.
BS_WLAN_TKIP_AES: WPA TKIP and WPA2 AES encryption are supported. BioStation will detect the appropriate encryption algorithm automatically.
<table><tr><td>Authentication</td><td>Supported encryption</td></tr><tr><td>AUTH_OPEN</td><td>NO_ENCRYPTION
WEP</td></tr><tr><td>AUTH_SHARED</td><td>WEP</td></tr><tr><td>WPA_PSK</td><td>TKIP_AES</td></tr></table></td></tr>
<tr><td>keyType</td><td>You can specify WEP keys either in plain ascii text or</td></tr>
</table>

	in binary hex format. BS_WLAN_KEY_ASCII BS_WLAN_KEY_HEX
essid	Network ID of the access point to which the BioStation will be connected.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

Example

```
DSWLANConfig wlanConfig;

// (1) AP1
//     essid: biostation_wep
//     encryption: wep128 bit
//     WEP key: _suprema_wep_
strcpy( wlanConfig.preset[0].name, “Preset WEP” );
strcpy( wlanConfig.preset[0].essid, “biostation_wep” );
wlanConfig.preset[0].operationMode = BS_WLAN_MANAGED;
wlanConfig.preset[0].authType = BS_WLAN_AUTH_OPEN;
wlanConfig.preset[0].encryptionType = BS_WLAN_WEP;
wlanConfig.preset[0].keyType = BS_WLAN_KEY_ASCII;
strcpy( wlanConfig.preset[0].key1, “_suprema_wep_” );

// (2) AP2
//     essid: biostation_wpa
//     encryption: AES
//     WPS_PSK passphrase: _suprema_wpa_
strcpy( wlanConfig.preset[1].name, “Preset WPA” );
strcpy( wlanConfig.preset[1].essid, “biostation_wpa” );
wlanConfig.preset[1].operationMode = BS_WLAN_MANAGED;
wlanConfig.preset[1].authType = BS_WLAN_AUTH_WPA_PSK;
wlanConfig.preset[1].encryptionType = BS_WLAN_TKIP_AES;
strcpy( wlanConfig.preset[1].wpa_key, “_suprema_wpa_” );
```

BS_WriteBS2WLANConfig / BS_ReadBS2WLANConfig

Writes/reads Wireless LAN configuration.

BS_RET_CODE BS_WriteBS2WLANConfig(int handle, BS2WLANConfig* config)
BS_RET_CODE BS_ReadBS2WLANConfig(int handle, BS2WLANConfig* config)

Parameters

handle

Handle of the communication channel.

config

BS2WLANConfig is defined as follows;

```
typedef struct {
    enum
    {
        WLAN_MANAGED = 0,
        WLAN_AD_HOC = 1,

        AUTH_OPEN = 0,
        AUTH_SHARED = 1,
        AUTH_WPA_PSK = 2,

        NO_ENCRYPTION = 0,
        ENC_WEP = 1,
        ENC_TKIP_AES = 2,
        ENC_AES = 3,
        ENC_TKIP = 4,

        KEY_ASCII = 0,
        KEY_HEX = 1,
    };
    char name[BS_MAX_NETWORK_ADDR_LEN];
    unsigned char operationMode;
    unsigned char authType;
    unsigned char encryptionType;
    unsigned char keyType;
    char essid[BS_MAX_NETWORK_ADDR_LEN];
    char key1[BS_MAX_NETWORK_ADDR_LEN];
    char key2[BS_MAX_NETWORK_ADDR_LEN];
    char wpa_key[64];
```

```
    unsigned char reserved[40];
} BS2WLANPreset;

typedef struct {
    int selected;
    BS2WLANPreset preset[BS_MAX_WLAN_PRESET];
} BS2WLANConfig;
```

The key fields and their available options are as follows;

<table>
<tr><th>Fields</th><th>Options</th></tr>
<tr><td>operationMode</td><td>Only infrastructure network – managed mode – is supported.
BS_WLAN_MANAGED</td></tr>
<tr><td>authType</td><td>There are 3 types of authentication.
BS_WLAN_AUTH_OPEN: no authentication.
BS_WLAN_AUTH_SHARED: shared-key WEP authentication.
BS_WLAN_AUTH_WPA_PSK: WPA authentication using a pre-shared master key.</td></tr>
<tr><td>encryptionType</td><td>Available encryption options are determined by authentication type.
BS_WLAN_NO_ENCRYPTION: no data encryption. This option should not be used as far as possible. For securing wireless channels, you should use WEP or WPA encryption.
BS_WLAN_WEP: 64 and 128 bit encryption are supported.
BS_WLAN_TKIP_AES: WPA TKIP and WPA2 AES encryption are supported. BioStation will detect the appropriate encryption algorithm automatically.
<table><tr><td>Authentication</td><td>Supported encryption</td></tr><tr><td>AUTH_OPEN</td><td>NO_ENCRYPTION
WEP</td></tr><tr><td>AUTH_SHARED</td><td>WEP</td></tr><tr><td>WPA_PSK</td><td>TKIP_AES</td></tr></table></td></tr>
<tr><td>keyType</td><td>You can specify WEP keys either in plain ascii text or</td></tr>
</table>

	in binary hex format. BS_WLAN_KEY_ASCII BS_WLAN_KEY_HEX
essid	Network ID of the access point to which the BioStation T2 will be connected.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

Example

```
BS2WLANConfig wlanConfig;

// (1) AP1
//     essid: biostation_wep
//     encryption: wep128 bit
//     WEP key: _suprema_wep_
strcpy( wlanConfig.preset[0].name, “Preset WEP” );
strcpy( wlanConfig.preset[0].essid, “biostation_wep” );
wlanConfig.preset[0].operationMode = BS_WLAN_MANAGED;
wlanConfig.preset[0].authType = BS_WLAN_AUTH_OPEN;
wlanConfig.preset[0].encryptionType = BS_WLAN_WEP;
wlanConfig.preset[0].keyType = BS_WLAN_KEY_ASCII;
strcpy( wlanConfig.preset[0].key1, “_suprema_wep_” );

// (2) AP2
//     essid: biostation_wpa
//     encryption: AES
//     WPS_PSK passphrase: _suprema_wpa_
strcpy( wlanConfig.preset[1].name, “Preset WPA” );
strcpy( wlanConfig.preset[1].essid, “biostation_wpa” );
wlanConfig.preset[1].operationMode = BS_WLAN_MANAGED;
wlanConfig.preset[1].authType = BS_WLAN_AUTH_WPA_PSK;
wlanConfig.preset[1].encryptionType = BS_WLAN_TKIP_AES;
strcpy( wlanConfig.preset[1].wpa_key, “_suprema_wpa_” );
```

BS_WriteFSWLANConfig / BS_ReadFSWLANConfig

Writes/reads Wireless LAN configuration.

BS_RET_CODE BS_WriteFSWLANConfig(int handle, FSWLANConfig* config)
BS_RET_CODE BS_ReadFSWLANConfig(int handle, FSWLANConfig* config)

Parameters

handle

Handle of the communication channel.

config

FS2WLANConfig is defined as follows;

```
typedef struct {
    enum
    {
        WLAN_MANAGED = 0,
        WLAN_AD_HOC = 1,

        AUTH_OPEN = 0,
        AUTH_SHARED = 1,
        AUTH_WPA_PSK = 2,

        NO_ENCRYPTION = 0,
        ENC_WEP = 1,
        ENC_TKIP_AES = 2,
        ENC_AES = 3,
        ENC_TKIP = 4,

        KEY_ASCII = 0,
        KEY_HEX = 1,
    };
    char name[BS_MAX_NETWORK_ADDR_LEN];
    unsigned char operationMode;
    unsigned char authType;
    unsigned char encryptionType;
    unsigned char keyType;
    char essid[BS_MAX_NETWORK_ADDR_LEN];
    char key1[BS_MAX_NETWORK_ADDR_LEN];
    char key2[BS_MAX_NETWORK_ADDR_LEN];
    char wpa_key[64];
```

```
    unsigned char reserved[40];
} BS2WLANPreset;

typedef struct {
    int selected;
    BS2WLANPreset preset[BS_MAX_WLAN_PRESET];
} BS2WLANConfig;
```

The key fields and their available options are as follows;

<table>
<tr><th>Fields</th><th>Options</th></tr>
<tr><td>operationMode</td><td>Only infrastructure network – managed mode – is supported.
BS_WLAN_MANAGED</td></tr>
<tr><td>authType</td><td>There are 3 types of authentication.
BS_WLAN_AUTH_OPEN: no authentication.
BS_WLAN_AUTH_SHARED: shared-key WEP authentication.
BS_WLAN_AUTH_WPA_PSK: WPA authentication using a pre-shared master key.</td></tr>
<tr><td>encryptionType</td><td>Available encryption options are determined by authentication type.
BS_WLAN_NO_ENCRYPTION: no data encryption. This option should not be used as far as possible. For securing wireless channels, you should use WEP or WPA encryption.
BS_WLAN_WEP: 64 and 128 bit encryption are supported.
BS_WLAN_TKIP_AES: WPA TKIP and WPA2 AES encryption are supported. BioStation will detect the appropriate encryption algorithm automatically.
<table><tr><td>Authentication</td><td>Supported encryption</td></tr><tr><td>AUTH_OPEN</td><td>NO_ENCRYPTION
WEP</td></tr><tr><td>AUTH_SHARED</td><td>WEP</td></tr><tr><td>WPA_PSK</td><td>TKIP_AES</td></tr></table></td></tr>
<tr><td>keyType</td><td>You can specify WEP keys either in plain ascii text or</td></tr>
</table>

	in binary hex format. BS_WLAN_KEY_ASCII BS_WLAN_KEY_HEX
essid	Network ID of the access point to which the FaceStation will be connected.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation

Example

```
FSWLANConfig wlanConfig;

// (1) AP1
//     essid: biostation_wep
//     encryption: wep128 bit
//     WEP key: _suprema_wep_
strcpy( wlanConfig.preset[0].name, “Preset WEP” );
strcpy( wlanConfig.preset[0].essid, “biostation_wep” );
wlanConfig.preset[0].operationMode = BS_WLAN_MANAGED;
wlanConfig.preset[0].authType = BS_WLAN_AUTH_OPEN;
wlanConfig.preset[0].encryptionType = BS_WLAN_WEP;
wlanConfig.preset[0].keyType = BS_WLAN_KEY_ASCII;
strcpy( wlanConfig.preset[0].key1, “_suprema_wep_” );

// (2) AP2
//     essid: biostation_wpa
//     encryption: AES
//     WPS_PSK passphrase: _suprema_wpa_
strcpy( wlanConfig.preset[1].name, “Preset WPA” );
strcpy( wlanConfig.preset[1].essid, “biostation_wpa” );
wlanConfig.preset[1].operationMode = BS_WLAN_MANAGED;
wlanConfig.preset[1].authType = BS_WLAN_AUTH_WPA_PSK;
wlanConfig.preset[1].encryptionType = BS_WLAN_TKIP_AES;
strcpy( wlanConfig.preset[1].wpa_key, “_suprema_wpa_” );
```

BS_WriteFingerprintConfig / BS_ReadFingerprintConfig

Write/read the configurations associated with fingerprint authentication.

BS_RET_CODE BS_WriteFingerprintConfig(int handle, BSFingerprintConfig* config)
BS_RET_CODE BS_ReadFingerprintConfig(int handle, BSFingerprintConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSFingerprintConfig is defined as follows;

```
typedef struct {
    int security;
    int userSecurity;
    int fastMode;
    int sensitivity; // 0(Least) ~ 7(Most)
    int timeout; // 0 for indefinite, 1 ~ 20 sec
    int imageQuality;
    bool viewImage;
    int freeScanDelay;
    int useCheckDuplicate;
    int matchTimeout;
    short useSIF;
    short useFakeDetect;
    bool useServerMatching;
    char reserved[3];
} BSFingerprintConfig;
```

The key fields and their available options are as follows;

Fields	Options
security	Sets the security level. BS_SECURITY_NORMAL – FAR(False Acceptance Ratio) is 1/10,000 BS_SECURITY_SECURE – FAR is 1/100,000 BS_SECURITY_MORE_SECURE - FAR is 1/1,000,000
userSecurity	BS_USER_SECURITY_READER – security level for

	1:1 matching is same as the above security setting. BS_USER_SECURITY_USER – security level for 1:1 matching is defined by the **securityLevel** of **BSUserHdrEx** per each user.
fastMode	BS_FAST_MODE_NORMAL BS_FAST_MODE_FAST BS_FAST_MODE_FASTER BS_FAST_MODE_AUTO
sensitivity	Specifies the sensitivity level of the sensor.
timeout	Specifies the timeout for fingerprint input in seconds.
imageQuality	When a fingerprint is scanned, BioStation will check if the quality of the image is adequate for further processing. The **imageQuality** specifies the strictness of this quality check. BS_IMAGE_QUALITY_WEAK BS_IMAGE_QUALITY_MODERATE BS_IMAGE_QUALITY_STRONG
freeScanDelay	Specifies the delay in seconds between consecutive identification processes. BS_FREESCAN_0 BS_FREESCAN_1 BS_FREESCAN_2 BS_FREESCAN_3 BS_FREESCAN_4 BS_FREESCAN_5 BS_FREESCAN_6 BS_FREESCAN_7 BS_FREESCAN_8 BS_FREESCAN_9 BS_FREESCAN_10
useCheckDuplicate	If true, the device will check if the same fingerprint was registered already before enrolling new users.
matchTimeout	Matching timeout in seconds.

templateType	Specifies the template type to be used. TEMPLATE_TYPE_SUPREMA is Suprema's template format, TEMPLATE_TYPE_ISO is ISO 19794-2 template format and TEMPLATE_TYPE_ANSI is ANSI378 template format. The default value is TEMPLATE_TYPE_SUPREMA.
useFakeDetect	If true, the device will try to detect fake fingers.
useServerMatching	In server matching mode, user authentication is handled by BioStar server, not each device. To use server matching, the **useServer** of **BSIPConfig** should be greater than 0.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_WriteDSFingerprintConfig / BS_ReadDSFingerprintConfig

Write/read the configurations associated with fingerprint authentication.

BS_RET_CODE BS_WriteDSFingerprintConfig(int handle, DSFingerprintConfig* config)
BS_RET_CODE BS_ReadDSFingerprintConfig(int handle, DSFingerprintConfig* config)

Parameters

handle

Handle of the communication channel.

config

DSFingerprintConfig is defined as follows;

```
typedef struct {
    enum
    {
        NOT_USE = 0,
        USE = 1,

        //security
        SECURITY_NORMAL = 0,
        SECURITY_SECURE = 1,
        SECURITY_MORE_SECURE = 2,

        //userSecurity
        USER_SECURITY_READER = 0,
        USER_SECURITY_USER = 1,

        //fastMode
        FAST_MODE_NORMAL = 0,
        FAST_MODE_FAST = 1,
        FAST_MODE_FASTER = 2,
        FAST_MODE_AUTO = 3,

        //imageQuality
        IMAGE_QUALITY_WEAK = 0,
        IMAGE_QUALITY_MODERATE = 1,
        IMAGE_QUALITY_STRONG = 2,

        //templateType
        TEMPLATE_TYPE_SUPREMA = 0,
```

```
        TEMPLATE_TYPE_ISO = 1,
        TEMPLATE_TYPE_ANSI = 2,

    };
    unsigned char security;
    unsigned char userSecurity;
    unsigned char fastMode;
    unsigned char sensitivity; // 0(Least) ~ 7(Most)
    unsigned char timeout; // 0 for indefinite, 1 ~ 20 sec
    unsigned char imageQuality;
    unsigned char viewImage;  // NOT_USE, USE
    unsigned char freeScanDelay;  // 0~10
    unsigned char useCheckDuplicate;  // NOT_USE, USE
    unsigned char matchTimeout;   //1~20
    unsigned char useSIF;  // NOT_USE, USE
    unsigned char useFakeDetect;  //NOT_USE, USE
    unsigned char useServerMatching;  //NOT_USE, USE
    unsigned char reserved[83];
} DSFingerprintConfig;
```

The key fields and their available options are as follows;

Fields	**Options**
security	Sets the security level. BS_SECURITY_NORMAL – FAR(False Acceptance Ratio) is 1/10,000 BS_SECURITY_SECURE – FAR is 1/100,000 BS_SECURITY_MORE_SECURE - FAR is 1/1,000,000
userSecurity	BS_USER_SECURITY_READER – security level for 1:1 matching is same as the above security setting. BS_USER_SECURITY_USER – security level for 1:1 matching is defined by the **securityLevel** of **BSUserHdrEx** per each user.
fastMode	BS_FAST_MODE_NORMAL BS_FAST_MODE_FAST BS_FAST_MODE_FASTER BS_FAST_MODE_AUTO
sensitivity	Specifies the sensitivity level of the sensor.
timeout	Specifies the timeout for fingerprint input in seconds.

imageQuality	When a fingerprint is scanned, BioStation will check if the quality of the image is adequate for further processing. The **imageQuality** specifies the strictness of this quality check. BS_IMAGE_QUALITY_WEAK BS_IMAGE_QUALITY_MODERATE BS_IMAGE_QUALITY_STRONG
freeScanDelay	Specifies the delay in seconds between consecutive identification processes. BS_FREESCAN_0 BS_FREESCAN_1 BS_FREESCAN_2 BS_FREESCAN_3 BS_FREESCAN_4 BS_FREESCAN_5 BS_FREESCAN_6 BS_FREESCAN_7 BS_FREESCAN_8 BS_FREESCAN_9 BS_FREESCAN_10
useCheckDuplicate	If true, the device will check if the same fingerprint was registered already before enrolling new users.
matchTimeout	Matching timeout in seconds.
templateType	Specifies the template type to be used. TEMPLATE_TYPE_SUPREMA is Suprema's template format, TEMPLATE_TYPE_ISO is ISO 19794-2 template format and TEMPLATE_TYPE_ANSI is ANSI378 template format. The default value is TEMPLATE_TYPE_SUPREMA.
useFakeDetect	If true, the device will try to detect fake fingers.
useServerMatching	In server matching mode, user authentication is handled by BioStar server, not each device. To use server matching, the **useServer** of **BSIPConfig** should be greater than 0.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

BS_WriteBS2FingerprintConfig / BS_ReadBS2FingerprintConfig

Write/read the configurations associated with fingerprint authentication.

BS_RET_CODE BS_WriteBS2FingerprintConfig(int handle, BS2FingerprintConfig* config)
BS_RET_CODE BS_ReadBS2FingerprintConfig(int handle, BS2FingerprintConfig* config)

Parameters

handle

Handle of the communication channel.

config

BS2FingerprintConfig is defined as follows;

```
typedef struct {
    enum
    {
        NOT_USE = 0,
        USE = 1,

        //security
        SECURITY_NORMAL = 0,
        SECURITY_SECURE = 1,
        SECURITY_MORE_SECURE = 2,

        //userSecurity
        USER_SECURITY_READER = 0,
        USER_SECURITY_USER = 1,

        //fastMode
        FAST_MODE_NORMAL = 0,
        FAST_MODE_FAST = 1,
        FAST_MODE_FASTER = 2,
        FAST_MODE_AUTO = 3,

        TEMPLATE_TYPE_SUPREMA = 0,
        TEMPLATE_TYPE_ISO = 1,
        TEMPLATE_TYPE_ANSI = 2,
    };
    unsigned char security;
    unsigned char userSecurity;
    unsigned char fastMode;
```

```
    unsigned char sensitivity; // 0(Least) ~ 7(Most)
    unsigned char timeout; // 0 for indefinite, 1 ~ 20 sec
    unsigned char viewImage;  // NOT_USE, USE
    unsigned char reserved2;
    unsigned char reserved3;
    unsigned char reserved4;
    unsigned char matchTimeout;   //1~20
    unsigned char templateType;   //NOT_USE, USE
    unsigned char useFakeDetect;  //NOT_USE, USE
    unsigned char useProtection;  //NOT_USE, USE
    unsigned char reserved[84];
} DSFingerprintConfig;
```

The key fields and their available options are as follows;

Fields	**Options**
security	Sets the security level. BS_SECURITY_NORMAL – FAR(False Acceptance Ratio) is 1/10,000 BS_SECURITY_SECURE – FAR is 1/100,000 BS_SECURITY_MORE_SECURE - FAR is 1/1,000,000
userSecurity	BS_USER_SECURITY_READER – security level for 1:1 matching is same as the above security setting. BS_USER_SECURITY_USER – security level for 1:1 matching is defined by the **securityLevel** of **BSUserHdrEx** per each user.
fastMode	BS_FAST_MODE_NORMAL BS_FAST_MODE_FAST BS_FAST_MODE_FASTER BS_FAST_MODE_AUTO
sensitivity	Specifies the sensitivity level of the sensor.
timeout	Specifies the timeout for fingerprint input in seconds.
viewImage	If true, the device will show the fingerprint image when you scan template.
matchTimeout	Matching timeout in seconds.
templateType	Specifies the template type to be used. TEMPLATE_TYPE_SUPREMA is Suprema's template

	format, TEMPLATE_TYPE_ISO is ISO 19794-2 template format and TEMPLATE_TYPE_ANSI is ANSI378 template format. The default value is TEMPLATE_TYPE_SUPREMA.
useFakeDetect	If true, the device will try to detect fake fingers.
useServerMatching	In server matching mode, user authentication is handled by BioStar server, not each device. To use server matching, the **useServer** of **BSIPConfig** should be greater than 0.
useProtection	If true, the encryption mode is on. Other devices save this value to BSEncryptionConfig's useProtection

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

BS_WriteFSFaceConfig / BS_ReadFSFaceConfig

Write/read the configurations associated with face authentication.

BS_RET_CODE BS_WriteFSFaceConfig(int handle, FSFaceConfig* config)
BS_RET_CODE BS_ReadFSFaceConfig(int handle, FSFaceConfig* config)

Parameters

handle

Handle of the communication channel.

config

FSFaceConfig is defined as follows;

```
typedef struct{
    enum{
        NOT_USE = 0,
        USE = 1,

        // security
        SECURITY_NORMAL = 0,
        SECURITY_SECURE = 1,
        SECURITY_MORE_SECURE = 2,

        // Mode
        FACE_MODE_SINGLE = 0,
        FACE_MODE_CONTINUE = 1,
    };

    unsigned char security;             // 0~2,0
    unsigned char sensitivity;          // 0~3,3
    unsigned char searchRange;          // 0~3,2
    unsigned char sizeRange;            // 0~3,8
    unsigned char authMode;             // 0~1,0
    unsigned char brightThreshold;      // 0~255,64
    unsigned char lpfGain;              // 0~255,255

    int calPosX;                        // -208~208,0
```

```
    int calPosY;                        // -272~272,0
    int motionThreshold;                // 0~4896000,30000
    int fakeThreshold;                  // 0~1024,50
    unsigned char enrollSensitivity;    // 0~9,4
    unsigned char authFailSpeed;        // 0~255,30
    unsigned char enableIRCaptureLed;   // 0~1,1
    unsigned char reserved1;
    unsigned char reserved2;
    unsigned char reserved3;
    unsigned char reserved4;
    unsigned char reserved5;
    unsigned char reserved6;
    unsigned char reserved7[64];
} FSFaceConfig;
```

The key fields and their available options are as follows;

Fields	**Options**
security	Sets the security level. SECURITY_NORMAL SECURITY_SECURE BS_SECURITY_MORE_SECURE
enrollSensitivity	Set the enroll sensitivity. The Value range is 0 ~ 9 Default value is 4.
The others	The other fields value is used by FaceStaion iternally, so there is no need to manage it.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation

BS_WriteIOConfig / BS_ReadIOConfig

BioStation has two input ports, two output ports, and a tamper switch. These functions write/read the configurations of these IO ports.

BS_RET_CODE BS_WriteIOConfig(int handle, BSIOConfig* config)
BS_RET_CODE BS_ReadIOConfig(int handle, BSIOConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSIOConfig is defined as follows;

```
typedef struct {
    int input[BS_NUM_OF_INPUT];
    int output[BS_NUM_OF_OUTPUT];
    int tamper;
    int outputDuration;
    int inputDuration[BS_NUM_OF_INPUT];
    int inputSchedule[BS_NUM_OF_INPUT];
    short inputType[BS_NUM_OF_INPUT];
    int reserved1;
    int wiegandMode;
    unsigned cardReaderID;
    int reserved2[55];
} BSIOConfig;
```

The key fields and their available options are as follows;

Fields	Options
input	Assigns an action to the input port. BS_IO_INPUT_DISABLED – no action BS_IO_INPUT_EXIT – turn on the relay. BS_IO_INPUT_WIEGAND_CARD – use two inputs ports as Wiegand input. Input data is processed as card id. BS_IO_INPUT_WIEGAND_USER – use two inputs ports as Wiegand input. Input data is processed as user id.
output	Assigns an event to the output port. The output port

	will be activated when the specified event occurs. BS_IO_OUTPUT_DISABLED BS_IO_OUTPUT_DURESS – activate when a duress finger is detected. BS_IO_OUTPUT_TAMPER – activate when the tamper switch is on. BS_IO_OUTPUT_AUTH_SUCCESS – activate when authentication succeeds. BS_IO_OUTPUT_AUTH_FAIL – activate when authentication fails. BS_IO_OUTPUT_WIEGAND_USER – outputs user id as Wiegand string when authentication succeeds. BS_IO_OUTPUT_WIEGAND_CARD – outputs card id as Wiegand string when authentication succeeds.
tamper	Specifies what to do when the tamper switch is on. BS_IO_TAMPER_NONE - do nothing. BS_IO_TAMPER_LOCK_SYSTEM - lock the BioStation terminal. To unlock, master password should be entered.
outputDuration	Specifies the duration of output signal in milliseconds.
inputDuration inputSchedule inputType wiegandMode	These fields are deprecated. You have to use **BSInputConfig** instead. See **BS_WriteInputConfig**. Specifies operation mode for an attached RF device via Wiegand interface. BS_IO_WIEGAND_MODE_LEGACY – legacy mode. BS_IO_WIEGAND_MODE_EXTENDED – extended mode. Refer to 2.2.4 for details.
cardReaderID	Specifies ID of attached RF device. Note that this should be calculated based on Wmaster ID. Refer to 2.2.4 for details.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_WriteSerialConfig / BS_ReadSerialConfig

Specifies the baud rate of the RS232 and RS485 ports.

BS_RET_CODE BS_WriteSerialConfig(int handle, BSSerialConfig* config)
BS_RET_CODE BS_ReadSerialConfig(int handle, BSSerialConfig* config)

Parameters

handle

Pointer to the communication channel.

config

BSSerialConfig is defined as follows;

```
typedef struct {
    int rs485;
    int rs232;
    int useSecureIO;
    char activeSecureIO[4]; // 0 ~ 3 - byte[0] ~ byte[3]
    unsigned slaveID;
    int deviceType;
    int reserved[2];
} BSSerialConfig;
```

The key fields and their available options are as follows;

Fields	Options
rs485	BS_CHANNEL_DISABLED or the baudrate of RS485 port. The default value is 115,200bps.
rs232	BS_CHANNEL_DISABLED or the baudrate of RS232 port. The default value is 115,200bps.
useSecureIO activeSecureIO slaveID deviceType	These fields are deprecated. You have to use **BS485NetworkConfig** instead. See **BS_Write485NetworkConfig** for details.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_WriteDSSerialConfig / BS_ReadDSSerialConfig

Specifies the baud rate of the RS232 and RS485 ports.

BS_RET_CODE BS_WriteDSSerialConfig(int handle, DSSerialConfig* config)
BS_RET_CODE BS_ReadDSSerialConfig(int handle, DSSerialConfig* config)

Parameters

handle

Pointer to the communication channel.

config

DSSerialConfig is defined as follows;

```
typedef struct {
    enum {
        NOT_USE = 0,
    };
    int rs485;
    int rs232;
    int reserved[6];
} DSSerialConfig;
```

The key fields and their available options are as follows;

Fields	Options
rs485	BS_CHANNEL_DISABLED or the baudrate of RS485 port. The default value is 115,200bps.
rs232	BS_CHANNEL_DISABLED or the baudrate of RS232 port. The default value is 115,200bps.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

BS_WriteXSSerialConfig / BS_ReadXSSerialConfig

Specifies the baud rate of the RS232 and RS485 ports.

BS_RET_CODE BS_WriteXSSerialConfig(int handle, XSSerialConfig* config)
BS_RET_CODE BS_ReadXSSerialConfig(int handle, XSSerialConfig* config)

Parameters

handle

Pointer to the communication channel.

config

XSSerialConfig is defined as follows;

```
typedef struct {
    enum {
        NOT_USE = 0,
    };
    int rs485;
    int rs232;
    int reserved[6];
} XSSerialConfig;
```

The key fields and their available options are as follows;

Fields	Options
rs485	BS_CHANNEL_DISABLED or the baudrate of RS485 port. The default value is 115,200bps.
rs232	BS_CHANNEL_DISABLED or the baudrate of RS232 port. The default value is 115,200bps.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

X-Station

BS_WriteBS2SerialConfig / BS_ReadBS2SerialConfig

Specifies the baud rate of the RS232 and RS485 ports.

BS_RET_CODE BS_WriteBS2SerialConfig(int handle, BS2SerialConfig* config)
BS_RET_CODE BS_ReadBS2SerialConfig(int handle, BS2SerialConfig* config)

Parameters

handle

Pointer to the communication channel.

config

BS2SerialConfig is defined as follows;

```
typedef struct {
    enum {
        NOT_USE = 0,
    };
    int rs485;
    int rs232;
    int reserved[6];
} BS2SerialConfig;
```

The key fields and their available options are as follows;

Fields	Options
rs485	BS_CHANNEL_DISABLED or the baudrate of RS485 port. The default value is 115,200bps.
rs232	BS_CHANNEL_DISABLED or the baudrate of RS232 port. The default value is 115,200bps.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

BS_WriteFSSerialConfig / BS_ReadFSSerialConfig

Specifies the baud rate of the RS232 and RS485 ports.

BS_RET_CODE BS_WriteFSSerialConfig(int handle, FSSerialConfig* config)
BS_RET_CODE BS_ReadFSSerialConfig(int handle, FSSerialConfig* config)

Parameters

handle

Pointer to the communication channel.

config

FSSerialConfig is defined as follows;

```
typedef struct {
    enum {
        NOT_USE = 0,
    };
    int rs485;
    int rs232;
    int reserved[6];
} FSSerialConfig;
```

The key fields and their available options are as follows;

Fields	Options
rs485	BS_CHANNEL_DISABLED or the baudrate of RS485 port. The default value is 115,200bps.
rs232	BS_CHANNEL_DISABLED or the baudrate of RS232 port. The default value is 115,200bps.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation

BS_Write485NetworkConfig / BS_Read485NetworkConfig

Specifies the RS485 mode of BioStation. For the general concept of RS485 communication, refer to **BS_OpenSerial485**.

BS_RET_CODE BS_Write485NetworkConfig(int handle, BS485NetworkConfig* config)
BS_RET_CODE BS_Read485NetworkConfig(int handle, BS485NetworkConfig* config)

Parameters

handle

Pointer to the communication channel.

config

BS485NetworkConfig is defined as follows;

```
typedef struct {
     unsigned short deviceType;
     unsigned short useIO;
     char activeSIO[MAX_NUM_OF_SIO];
     BS485SlaveInfo slaveInfo[MAX_NUM_OF_SLAVE];
     int reserved[18];
} BS485NetworkConfig;

typedef struct{
     unsigned slaveID;
     int slaveType;
} BS485SlaveInfo;
```

The key fields and their available options are as follows;

Fields	Options
deviceType	TYPE_DISABLE TYPE_CONN_PC – 485 port is used for PC connection. TYPE_HOST – The device plays the role of the host. TYPE_SLAVE – The device is connected to the host device.
useIO	It should be true.
activeSIO slaveInfo	These fields are filled by the device when **BS_Search485Slaves** is done successfully. You

	should not change these fields manually.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_WriteDS485NetworkConfig / BS_ReadDS485NetworkConfig

Specifies the RS485 mode of D-Station. For the general concept of RS485 communication, refer to **BS_OpenSerial485**.

BS_RET_CODE BS_WriteDS485NetworkConfig(int handle, DS485NetworkConfig* config)
BS_RET_CODE BS_ReadDS485NetworkConfig(int handle, DS485NetworkConfig* config)

Parameters

handle

Pointer to the communication channel.

config

DS485NetworkConfig is defined as follows;

```
typedef struct {
     enum
     {
       TYPE_DISABLE = 0,

       TYPE_HOST = 4,
       TYPE_SLAVE = 5,

       MAX_NUM_OF_SIO = 4,
       MAX_NUM_OF_SLAVE = 7,
     };
     int baudRate;
     unsigned short deviceType;
     unsigned short reserved;
     char activeSIO[MAX_NUM_OF_SIO];
     BS485SlaveInfo slaveInfo[MAX_NUM_OF_SLAVE];
     int reserved[17];
} DS485NetworkConfig;

typedef struct{
     unsigned slaveID;
     int slaveType;
} BS485SlaveInfo;
```

The key fields and their available options are as follows;

Fields	Options

deviceType	TYPE_DISABLE TYPE_CONN_PC – 485 port is used for PC connection. TYPE_HOST – The device plays the role of the host. TYPE_SLAVE – The device is connected to the host device.
activeSIO slaveInfo	These fields are filled by the device when **BS_Search485Slaves** is done successfully. You should not change these fields manually.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

BS_WriteXS485NetworkConfig / BS_ReadXS485NetworkConfig

Specifies the RS485 mode of X-Station. For the general concept of RS485 communication, refer to **BS_OpenSerial485**.

BS_RET_CODE BS_WriteXS485NetworkConfig(int handle, XS485NetworkConfig* config)
BS_RET_CODE BS_ReadXS485NetworkConfig(int handle, XS485NetworkConfig* config)

Parameters

handle

Pointer to the communication channel.

config

XS485NetworkConfig is defined as follows;

```
typedef struct {
     enum
     {
       TYPE_DISABLE = 0,

       TYPE_HOST = 4,
       TYPE_SLAVE = 5,

       MAX_NUM_OF_SIO = 4,
       MAX_NUM_OF_SLAVE = 7,
     };
     int baudRate;
     unsigned short deviceType;
     unsigned short reserved;
     char activeSIO[MAX_NUM_OF_SIO];
     BS485SlaveInfo slaveInfo[MAX_NUM_OF_SLAVE];
     int reserved[17];
} XS485NetworkConfig;

typedef struct{
     unsigned slaveID;
     int slaveType;
} BS485SlaveInfo;
```

The key fields and their available options are as follows;

Fields	Options

deviceType	TYPE_DISABLE TYPE_CONN_PC – 485 port is used for PC connection. TYPE_HOST – The device plays the role of the host. TYPE_SLAVE – The device is connected to the host device.
activeSIO slaveInfo	These fields are filled by the device when **BS_Search485Slaves** is done successfully. You should not change these fields manually.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

X-Station

BS_WriteBS2485NetworkConfig / BS_ReadBS2485NetworkConfig

Specifies the RS485 mode of BioStation T2. For the general concept of RS485 communication, refer to **BS_OpenSerial485**.

BS_RET_CODE BS_WriteBS2485NetworkConfig(int handle, BS2485NetworkConfig* config)
BS_RET_CODE BS_ReadBS2485NetworkConfig(int handle, BS2485NetworkConfig* config)

Parameters

handle

Pointer to the communication channel.

config

BS2485NetworkConfig is defined as follows;

```
typedef struct {
     enum
     {
       TYPE_DISABLE = 0,

       TYPE_HOST = 4,
       TYPE_SLAVE = 5,

       MAX_NUM_OF_SIO = 4,
       MAX_NUM_OF_SLAVE = 7,
     };
     int baudRate;
     unsigned short deviceType;
     unsigned short reserved;
     char activeSIO[MAX_NUM_OF_SIO];
     BS485SlaveInfo slaveInfo[MAX_NUM_OF_SLAVE];
     int reserved[17];
} BS2485NetworkConfig;

typedef struct{
     unsigned slaveID;
     int slaveType;
} BS485SlaveInfo;
```

The key fields and their available options are as follows;

Fields	Options

deviceType	TYPE_DISABLE TYPE_CONN_PC – 485 port is used for PC connection. TYPE_HOST – The device plays the role of the host. TYPE_SLAVE – The device is connected to the host device.
activeSIO slaveInfo	These fields are filled by the device when **BS_Search485Slaves** is done successfully. You should not change these fields manually.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

BS_WriteFS485NetworkConfig / BS_ReadFS485NetworkConfig

Specifies the RS485 mode of FaceStation. For the general concept of RS485 communication, refer to **BS_OpenSerial485**.

BS_RET_CODE BS_WriteFS485NetworkConfig(int handle, FS485NetworkConfig* config)
BS_RET_CODE BS_ReadFS485NetworkConfig(int handle, FS485NetworkConfig* config)

Parameters

handle

Pointer to the communication channel.

config

FS485NetworkConfig is defined as follows;

```
typedef struct {
     enum
     {
       TYPE_DISABLE = 0,

       TYPE_HOST = 4,
       TYPE_SLAVE = 5,

       MAX_NUM_OF_SIO = 4,
       MAX_NUM_OF_SLAVE = 7,
     };
     int baudRate;
     unsigned short deviceType;
     unsigned short reserved;
     char activeSIO[MAX_NUM_OF_SIO];
     BS485SlaveInfo slaveInfo[MAX_NUM_OF_SLAVE];
     int reserved[17];
} FS485NetworkConfig;

typedef struct{
     unsigned slaveID;
     int slaveType;
} BS485SlaveInfo;
```

The key fields and their available options are as follows;

Fields	Options

deviceType	TYPE_DISABLE TYPE_CONN_PC – 485 port is used for PC connection. TYPE_HOST – The device plays the role of the host. TYPE_SLAVE – The device is connected to the host device.
activeSIO slaveInfo	These fields are filled by the device when **BS_Search485Slaves** is done successfully. You should not change these fields manually.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation

BS_WriteUSBConfig / BS_ReadUSBConfig

Enables or disables the USB device interface.

BS_RET_CODE BS_WriteUSBConfig(int handle, BSUSBConfig* config)
BS_RET_CODE BS_ReadUSBConfig(int handle, BSUSBConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSUSBConfig is defined as follows;

```
typedef struct {
    bool connectToPC;
    int reserved[7];
} BSUSBConfig;
```

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_WriteBS2USBConfig / BS_ReadBS2USBConfig

Enables or disables the USB device interface.

BS_RET_CODE BS_WriteBS2USBConfig(int handle, BS2USBConfig* config)
BS_RET_CODE BS_ReadBS2USBConfig(int handle, BS2USBConfig* config)

Parameters

handle

Handle of the communication channel.

config

BS2USBConfig is defined as follows;

```
typedef struct {
    unsigned char connectToPC;
    unsigned char connectToMemory;
    int reserved[2];
} BS2USBConfig;
```

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

BS_WriteFSUSBConfig / BS_ReadFSUSBConfig

Enables or disables the USB device interface.

BS_RET_CODE BS_WriteFSUSBConfig(int handle, FSUSBConfig* config)
BS_RET_CODE BS_ReadFSUSBConfig(int handle, FSUSBConfig* config)

Parameters

handle

Handle of the communication channel.

config

FSUSBConfig is defined as follows;

```
typedef struct {
    unsigned char connectToPC;
    unsigned char connectToMemory;
    int reserved[2];
} FSUSBConfig;
```

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation

BS_WriteEncryptionConfig / BS_ReadEncryptionConfig

For higher security, users can turn on the encryption mode. When the mode is on, all the fingerprint templates are transferred and saved in encrypted form. To change the encryption mode, all the enrolled users should be deleted first. And a 256 bit encryption key should be sent, too.

BS_RET_CODE BS_WriteEncryptionConfig(int handle, BSEncryptionConfig* config)
BS_RET_CODE BS_ReadEncryptionConfig(int handle, BSEncryptionConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSEncryptionConfig is defined as follows;

```
typedef struct {
    bool useEncryption;
    unsigned char password[BS_ENCRYPTION_PASSWORD_LEN];
                            // 256bit encryption key
    int reserved[3];
} BSEncryptionConfig;
```

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_WriteWiegandConfig / BS_ReadWiegandConfig

Configures Wiegand format. Up to 64 bit Wiegand formats are supported. The only constraint is that each field is limited to 32 bits.

BS_RET_CODE BS_WriteWiegandConfig(int handle, BSWiegandConfig* config)
BS_RET_CODE BS_ReadWiegandConfig(int handle, BSWiegandConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSWiegandConfig is defined as follows;

```
typedef enum {
    BS_WIEGAND_26BIT   = 0x01,
    BS_WIEGAND_PASS_THRU  = 0x02,
    BS_WIEGAND_CUSTOM  = 0x03,
} BS_WIEGAND_FORMAT;

typedef enum {
    BS_WIEGAND_EVEN_PARITY = 0,
    BS_WIEGAND_ODD_PARITY  = 1,
} BS_WIEGAND_PARITY_TYPE;

typedef struct {
    int bitIndex;
    int bitLength;
} BSWiegandField;

typedef struct {
    int bitIndex;
    BS_WIEGAND_PARITY_TYPE type;
    BYTE bitMask[8];
} BSWiegandParity;

typedef struct {
    BS_WIEGAND_FORMAT format;
    int totalBits;
} BSWiegandFormatHeader;
```

```
typedef struct {
    int numOfIDField;
    BSWiegandField field[MAX_WIEGAND_FIELD];
} BSWiegandPassThruData;

typedef struct {
    int numOfField;
    UINT32 idFieldMask;
    BSWiegandField field[MAX_WIEGAND_FIELD];
    int numOfParity;
    BSWiegandParity parity[MAX_WIEGAND_PARITY];
} BSWiegandCustomData;

typedef union {
    BSWiegandPassThruData passThruData;
    BSWiegandCustomData customData;
} BSWiegandFormatData;

typedef struct {
    unsigned short outWidth;
    unsigned short reserved;
    unsigned short outInterval;
    unsigned char useFailCode;       //use failcode 0:not-use 1:use
    unsigned char failCodeValue;    // 0-0000.. 1-FFFF..
    BSWiegandFormatHeader header;
    BSWiegandFormatData data;
    unsigned fieldValue[MAX_WIEGAND_FIELD];
} BSWiegandConfig;
```

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_WriteDSWiegandConfig / BS_ReadDSWiegandConfig

Configures Wiegand format. Up to 64 bit Wiegand formats are supported. The only constraint is that each field is limited to 32 bits.

BS_RET_CODE BS_WriteDSWiegandConfig(int handle, DSWiegandConfig* config)
BS_RET_CODE BS_ReadDSWiegandConfig(int handle, DSWiegandConfig* config)

Parameters

handle

Handle of the communication channel.

config

DSWiegandConfig is defined as follows;

```
typedef enum {
    BS_WIEGAND_26BIT   = 0x01,
    BS_WIEGAND_PASS_THRU  = 0x02,
    BS_WIEGAND_CUSTOM  = 0x03,
} BS_WIEGAND_FORMAT;

typedef enum {
    BS_WIEGAND_EVEN_PARITY = 0,
    BS_WIEGAND_ODD_PARITY  = 1,
} BS_WIEGAND_PARITY_TYPE;

typedef struct {
    int bitIndex;
    int bitLength;
} BSWiegandField;

typedef struct {
    int bitIndex;
    BS_WIEGAND_PARITY_TYPE type;
    BYTE bitMask[8];
} BSWiegandParity;

typedef struct {
    BS_WIEGAND_FORMAT format;
    int totalBits;
} BSWiegandFormatHeader;
```

```
typedef struct {
    int numOfIDField;
    BSWiegandField field[MAX_WIEGAND_FIELD];
} BSWiegandPassThruData;

typedef struct {
    int numOfField;
    UINT32 idFieldMask;
    BSWiegandField field[MAX_WIEGAND_FIELD];
    int numOfParity;
    BSWiegandParity parity[MAX_WIEGAND_PARITY];
} BSWiegandCustomData;

typedef union {
    BSWiegandPassThruData passThruData;
    BSWiegandCustomData customData;
} BSWiegandFormatData;

typedef struct {
`   enum {
        USER_IN = 0,
        CARD_IN = 1,
        USER_OUT = 2,
        CARD_OUT = 3,

        MODE_LEGACY = 0,
        MODE_EXTENDED = 1,

        MAX_NUM_OF_READER = 9,
    };

    unsigned short outWidth;
    unsigned short outInterval;
    unsigned short InOut;
    unsigned short mode;
    unsigned int cardReaderID[MAX_NUM_OF_READER];
    unsigned char useFailCode;   //use failcode 0:not-use 1:use
    unsigned char failCodeValue; // 0-0000.. 1-FFFF..
    unsigned short reserved;
    int  reserved2[7];
    BSWiegandFormatHeader header;
    BSWiegandFormatData  data;
    unsigned int fieldValue[MAX_WIEGAND_FIELD];
} DSWiegandConfig;
```

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

BS_WriteXSWiegandConfig / BS_ReadXSWiegandConfig

Configures Wiegand format. Up to 64 bit Wiegand formats are supported. The only constraint is that each field is limited to 32 bits.

BS_RET_CODE BS_WriteXSWiegandConfig(int handle, XSWiegandConfig* config)
BS_RET_CODE BS_ReadXSWiegandConfig(int handle, XSWiegandConfig* config)

Parameters

handle

Handle of the communication channel.

config

XSWiegandConfig is defined as follows;

```
typedef enum {
    BS_WIEGAND_26BIT   = 0x01,
    BS_WIEGAND_PASS_THRU  = 0x02,
    BS_WIEGAND_CUSTOM  = 0x03,
} BS_WIEGAND_FORMAT;

typedef enum {
    BS_WIEGAND_EVEN_PARITY = 0,
    BS_WIEGAND_ODD_PARITY  = 1,
} BS_WIEGAND_PARITY_TYPE;

typedef struct {
    int bitIndex;
    int bitLength;
} BSWiegandField;

typedef struct {
    int bitIndex;
    BS_WIEGAND_PARITY_TYPE type;
    BYTE bitMask[8];
} BSWiegandParity;

typedef struct {
    BS_WIEGAND_FORMAT format;
    int totalBits;
} BSWiegandFormatHeader;
```

```
typedef struct {
    int numOfIDField;
    BSWiegandField field[MAX_WIEGAND_FIELD];
} BSWiegandPassThruData;

typedef struct {
    int numOfField;
    UINT32 idFieldMask;
    BSWiegandField field[MAX_WIEGAND_FIELD];
    int numOfParity;
    BSWiegandParity parity[MAX_WIEGAND_PARITY];
} BSWiegandCustomData;

typedef union {
    BSWiegandPassThruData passThruData;
    BSWiegandCustomData customData;
} BSWiegandFormatData;

typedef struct {
`   enum {
        USER_IN = 0,
        CARD_IN = 1,
        USER_OUT = 2,
        CARD_OUT = 3,

        MODE_LEGACY = 0,
        MODE_EXTENDED = 1,

        MAX_NUM_OF_READER = 9,
    };

    unsigned short outWidth;
    unsigned short outInterval;
    unsigned short InOut;
    unsigned short mode;
    unsigned int cardReaderID[MAX_NUM_OF_READER];
    unsigned char useFailCode;   //use failcode 0:not-use 1:use
    unsigned char failCodeValue; // 0-0000.. 1-FFFF..
    unsigned short reserved;
    int  reserved2[7];
    BSWiegandFormatHeader header;
    BSWiegandFormatData  data;
    unsigned int fieldValue[MAX_WIEGAND_FIELD];
} XSWiegandConfig;
```

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

X-Station

BS_WriteBS2WiegandConfig / BS_ReadBS2WiegandConfig

Configures Wiegand format. Up to 64 bit Wiegand formats are supported. The only constraint is that each field is limited to 32 bits.

BS_RET_CODE BS_WriteBS2WiegandConfig(int handle, BS2WiegandConfig* config)
BS_RET_CODE BS_ReadBS2WiegandConfig(int handle, BS2WiegandConfig* config)

Parameters

handle

Handle of the communication channel.

config

BS2WiegandConfig is defined as follows;

```
typedef enum {
    BS_WIEGAND_26BIT   = 0x01,
    BS_WIEGAND_PASS_THRU  = 0x02,
    BS_WIEGAND_CUSTOM  = 0x03,
} BS_WIEGAND_FORMAT;

typedef enum {
    BS_WIEGAND_EVEN_PARITY = 0,
    BS_WIEGAND_ODD_PARITY  = 1,
} BS_WIEGAND_PARITY_TYPE;

typedef struct {
    int bitIndex;
    int bitLength;
} BSWiegandField;

typedef struct {
    int bitIndex;
    BS_WIEGAND_PARITY_TYPE type;
    BYTE bitMask[8];
} BSWiegandParity;

typedef struct {
    BS_WIEGAND_FORMAT format;
    int totalBits;
} BSWiegandFormatHeader;
```

```
typedef struct {
    int numOfIDField;
    BSWiegandField field[MAX_WIEGAND_FIELD];
} BSWiegandPassThruData;

typedef struct {
    int numOfField;
    UINT32 idFieldMask;
    BSWiegandField field[MAX_WIEGAND_FIELD];
    int numOfParity;
    BSWiegandParity parity[MAX_WIEGAND_PARITY];
} BSWiegandCustomData;

typedef union {
    BSWiegandPassThruData passThruData;
    BSWiegandCustomData customData;
} BSWiegandFormatData;

typedef struct {
`   enum {
        USER_IN = 0,
        CARD_IN = 1,
        USER_OUT = 2,
        CARD_OUT = 3,

        MODE_LEGACY = 0,
        MODE_EXTENDED = 1,

        MAX_NUM_OF_READER = 9,
    };

    unsigned short outWidth;
    unsigned short outInterval;
    unsigned short InOut;
    unsigned short mode;
    unsigned int cardReaderID[MAX_NUM_OF_READER];
    unsigned char useFailCode;   //use failcode 0:not-use 1:use
    unsigned char failCodeValue; // 0-0000.. 1-FFFF..
    unsigned short reserved;
    int  reserved2[7];
    BSWiegandFormatHeader header;
    BSWiegandFormatData  data;
    unsigned int fieldValue[MAX_WIEGAND_FIELD];
} BS2WiegandConfig;
```

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

BS_WriteFSWiegandConfig / BS_ReadFSWiegandConfig

Configures Wiegand format. Up to 64 bit Wiegand formats are supported. The only constraint is that each field is limited to 32 bits.

BS_RET_CODE BS_WriteFSWiegandConfig(int handle, FSWiegandConfig* config)
BS_RET_CODE BS_ReadFSWiegandConfig(int handle, FSWiegandConfig* config)

Parameters

handle

Handle of the communication channel.

config

FSWiegandConfig is defined as follows;

```
typedef enum {
    BS_WIEGAND_26BIT   = 0x01,
    BS_WIEGAND_PASS_THRU  = 0x02,
    BS_WIEGAND_CUSTOM  = 0x03,
} BS_WIEGAND_FORMAT;

typedef enum {
    BS_WIEGAND_EVEN_PARITY = 0,
    BS_WIEGAND_ODD_PARITY  = 1,
} BS_WIEGAND_PARITY_TYPE;

typedef struct {
    int bitIndex;
    int bitLength;
} BSWiegandField;

typedef struct {
    int bitIndex;
    BS_WIEGAND_PARITY_TYPE type;
    BYTE bitMask[8];
} BSWiegandParity;

typedef struct {
    BS_WIEGAND_FORMAT format;
    int totalBits;
} BSWiegandFormatHeader;
```

```
typedef struct {
    int numOfIDField;
    BSWiegandField field[MAX_WIEGAND_FIELD];
} BSWiegandPassThruData;

typedef struct {
    int numOfField;
    UINT32 idFieldMask;
    BSWiegandField field[MAX_WIEGAND_FIELD];
    int numOfParity;
    BSWiegandParity parity[MAX_WIEGAND_PARITY];
} BSWiegandCustomData;

typedef union {
    BSWiegandPassThruData passThruData;
    BSWiegandCustomData customData;
} BSWiegandFormatData;

typedef struct {
`   enum {
        USER_IN = 0,
        CARD_IN = 1,
        USER_OUT = 2,
        CARD_OUT = 3,

        MODE_LEGACY = 0,
        MODE_EXTENDED = 1,

        MAX_NUM_OF_READER = 9,
    };

    unsigned short outWidth;
    unsigned short outInterval;
    unsigned short InOut;
    unsigned short mode;
    unsigned int cardReaderID[MAX_NUM_OF_READER];
    unsigned char useFailCode;   //use failcode 0:not-use 1:use
    unsigned char failCodeValue; // 0-0000.. 1-FFFF..
    unsigned short reserved;
    int  reserved2[7];
    BSWiegandFormatHeader header;
    BSWiegandFormatData  data;
    unsigned int fieldValue[MAX_WIEGAND_FIELD];
} FSWiegandConfig;
```

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation

BS_WriteZoneConfigEx / BS_ReadZoneConfigEx

Zones are used to group a number of devices to have a specific function. A zone consists of a master device, which plays a role similar to that of a legacy controller, and the other member devices. Any device – FaceStation, BioStation T2, D-Station, X-Station, BioStation, BioEntry Plus, BioEntry W, BioLite Net, Xpass or Xpass Slim. - can be a master device. The maximum number of devices in a group is 64.

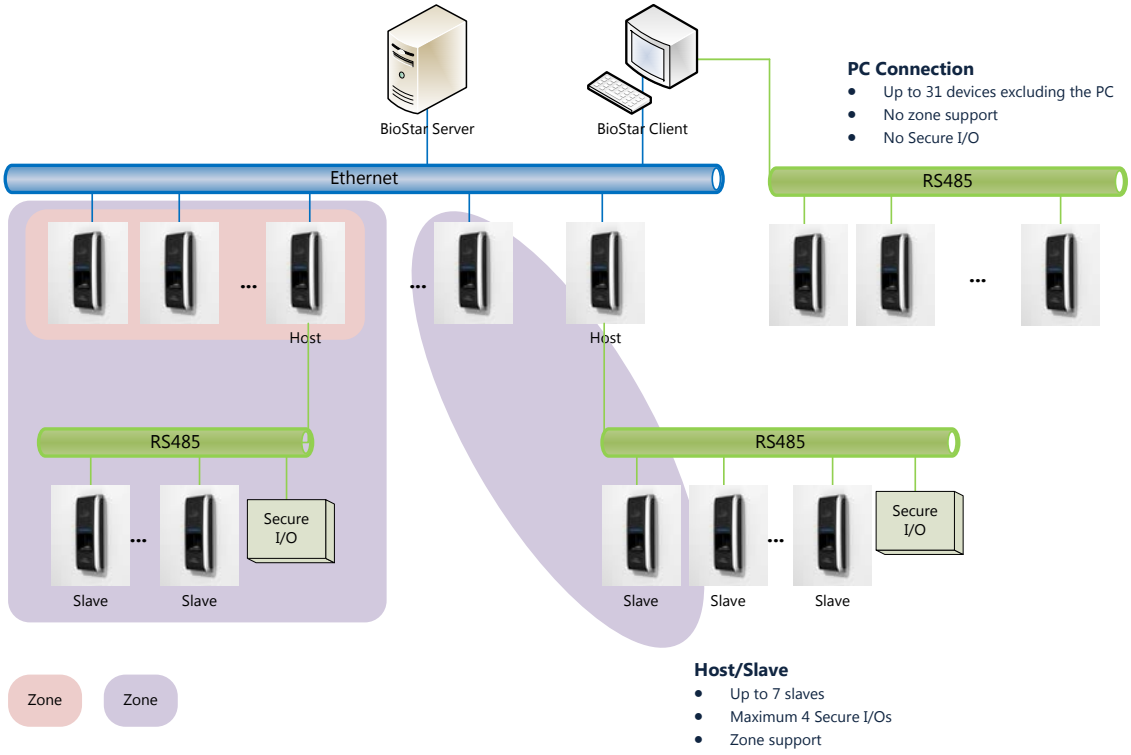


Figure 2 Zone Configuration of BioStar

In total, the BioStar system supports five types of zones:

• **Access zone** - Use this zone to synchronize user or log information. If you select the user synchronization option, user data enrolled at the devices will be automatically propagated to other connected devices. If you select the log synchronization option, all log records will be written to the master device, so that you can check log records of member devices.

• **Anti-passback zone** - Use this zone to prevent a user from passing his or her card back to another person or using his or her fingerprint to allow someone else to

gain entry. The zone supports two types of anti-passback restrictions: soft and hard. When a user violates the anti-passback protocol, the soft restriction will record the action in the user's log. The hard restriction will deny access and record the event in the log when the antipassback protocol is violated.

• **Entrance limit zone** - Use this zone to restrict the number of times a user can enter an area. The entrance limit can be tied to a timezone, so that a user is restricted to a maximum number of entries during a specified time span. You can also set time limits for reentry to enforce a timed anti-passback restriction.

• **Alarm zone** - Use this zone to group inputs from multiple devices into a single alarm zone. Devices in the alarm zone can be simultaneously armed or disarmed via an arm or disarm card or a key or input port.

• **Fire alarm zone** - Use this zone to control how doors will respond during a fire. External inputs can be fed into the BioStar system to automatically trigger door releases or perform other actions.

BS_RET_CODE BS_WriteZoneConfigEx(int handle, BSZoneConfigEx* config)
BS_RET_CODE BS_ReadZoneConfigEx(int handle, BSZoneConfigEx* config)

Parameters

handle

Handle of the communication channel.

config

BSZoneConfigEx is defined as follows;

```
typedef struct {
    //Common
    int numOfMember; //includes master node itself...
    unsigned memberId[BS_MAX_NODE_PER_ZONE_EX];
    unsigned memberIpAddr[BS_MAX_NODE_PER_ZONE_EX];
    int memberStatus[BS_MAX_NODE_PER_ZONE_EX];
    int memberInfo[BS_MAX_NODE_PER_ZONE_EX];
    int reserved1[8];

    //Alarm zone
    int zoneStatus;
    int alarmStatus;  // 0 : disabled, 1 : enabled

    int reserved2[3];
```

```
} BSZoneMasterEx;

typedef struct {
    //Common
    unsigned masterIpAddr;
    unsigned masterId;
    int reserved1[1];

    //APB zone
    int authMode;
    int ioMode;

    //Alarm zone
    int armType;
    int useSound;
    int armKey;
    int disarmKey;

    // Card for arm/disarm
    int cardID[8];
    unsigned char customID[8];

    int disconnProcessType;
    int needAuth;
    int reserved2[1];
} BSZoneMemberEx;

typedef struct {
     int fallbackMode;
     bool synchTime;
     bool synchUser;
     bool synchLog;
     int reserved[4];
} BSAccessZoneProperty;

typedef struct {
     int apbType;
     int apbResetInterval; // 0 for no limit
     int bypassGroupId;
} BSAPBZonePropertyEx;

typedef struct {
     int minEntryInterval; // 0 for no limit
     int numOfEntranceLimit; // MAX 4
     int maxEntry[BE_MAX_ENTRANCE_LIMIT_PER_DAY]; // 0 (no limit) ~ 16
     unsigned entryLimitInterval[BE_MAX_ENTRANCE_LIMIT_PER_DAY];
```

```
        int bypassGroupId;
    } BSEntranceLimitationZonePropertyEx;

    typedef struct {
        int accessGroupId;
        int armDelay;
        int disarmDelay;
        int reserved[8];
    } BSAlarmZoneProperty;

    typedef struct {
        int reserved[8];
    } BSFireAlarmZoneProperty;

    typedef struct {
        union
        {
            BSAccessZoneProperty accessZoneProperty;
            BSAPBZonePropertyEx apbZoneProperty;
            BSEntranceLimitationZonePropertyEx entLimitZoneProperty;
            BSAlarmZoneProperty alarmZoneProperty;
            BSFireAlarmZoneProperty fireAlarmZoneProperty;
        };
    } BSZonePropertyEx;

    typedef struct {
        unsigned zoneId;    //0 ~ 255
        int zoneType;
        int nodeType;
        BSZoneMasterEx master;
        BSZoneMemberEx member;
        BSZonePropertyEx ZoneProperty;
    } BSZoneEx;

    typedef struct {
        int numOfZones; //0 ~ BS_MAX_ZONE_PER_NODE
        BSZoneEx zone[BS_MAX_ZONE_PER_NODE];
    } BSZoneConfigEx;
```

The key fields and their available options are as follows;

BSZoneMasterEx	
Fields	**Options**
numOfMember	The number of devices in the zone including the master device.

memberId	The IDs of the device in the zone.
memberIpAddr	The IP addresses of the devices in the zone.
memberStatus	NORMAL DISCONNECTED
memberInfo	In an anti-passback zone, it is one of the followings; IN_READER OUT_READER In an alarm zone, it is an mask consists of the following values; DUMMY_READER ARM_READER DISARM_READER
zoneStatus	Specifies the status of an alarm zone; ARMED DISARMED
alarmStatus	Specifies whether an alarm is active in an alarm zone.

BSZoneMemberEx	
Fields	**Options**
masterIpAddr masterId	The IP address of the master device. The ID of the master device.
authMode	It should be BS_AUTH_DEFERRED.
ioMode	Reserved for future use.
armType	Specifies arming method in an alarm zone. ARM_BY_KEYPAD ARM_BY_CARD
useSound	Specifies whether the device should emit alarm sounds when a violation is detected in an armed zone.
armKey	If armType is ARM_BY_KEYPAD, specifies the key code for arming. One of the following four function keys can be used. BS_KEY_F1 BS_KEY_F2

	BS_KEY_F3 BS_KEY_F4
disarmKey	If armType is ARM_BY_KEYPAD, specifies the key code for disarming.
cardID	If armType is ARM_BY_CARD, specifies the 4 byte cardID for arming or disarming.
customID	If armType is ARM_BY_CARD, specifies the 1 byte custom cardID for arming or disarming.
disconnProcessType	This value determins that the result of APB or EntranceLimit is success or fail, when connection with the master is disconnected. SUCCESS_PROCESS – The result is success FAIL_PROCESS – The result is fail

BSAccessZoneProperty	
Fields	**Options**
fallbackMode	Reserved for future use.
synchTime	If true, the system clock of member devices will be synchronized with that of the master.
synchUser	If true, enrolling/deleting users will be propagated to all the other devices.
synchLog	If true, all the log records of member devices will be stored to the master, too.

BSAPBZonePropertyEx	
Fields	**Options**
apbType	BS_APB_NONE BS_APB_SOFT BS_APB_HARD
apbResetInterval	If it is not 0, anti-passback violation will be reset after this interval. For example, if it is 120, users are able to enter a door twice after 120 seconds.
bypassGroupId	The ID of an access group, the members of which can bypass the anti-passback zone.

BSEntranceLimitationZonePropertyEx	
Fields	**Options**
minEntryInterval	If it is not 0, re-entrance to the zone will be prohibited until this interval elapses. For example, if user A entered the zone at 10:00 with **minEntryInterval** 60, he'll not able to access the zone again until 11:00.

numOfEntranceLimit	The number of entries for specified time intervals can be limited by **maxEntry** and **entryLimitSchedule**. For example, if users are allowed to access a zone 3 times for AM10:00 ~AM11:30 and 1 time for PM2:20~PM6:00, these variables should be set as follows;
	`numOfEntranceLimit = 2;`
	`maxEntry[0] = 3;`
	`entryLimitInterval[0] = (10 * 60) | ((11 * 60 + 30) << 16);`
	`maxEntry[1] = 1;`
	`entryLimitInterval[1] = (14 * 60 + 20) | ((18 * 60) << 16);`
	If **numOfEntranceLimit** is 0, no limitation is applied. If **numOfEntranceLimit** is larger than 0, users can access only during the specified time intervals.

maxEntry	The maximum number of entries for the specified time interval.
entryLimitInterval	The time interval to which the entrance limitation is applied. It is defined as follows; (start time in minute) | (end time in minute << 16).
bypassGroupId	The ID of an access group, the members of which can bypass the entrance limitation zone.

BSAlarmZoneProperty

Fields	Options
accessGroupId	The ID of an access group, the members of which can arm or disarm the zone.
armDelay	Specifies the length of time to delay before arming the zone.
disarmDelay	Specifies the length of time to delay before disarming the zone.
BSZoneEx	
Fields	**Options**
zoneId	The ID of the zone. It should be between 0 and 255.
zoneType	BS_ZONE_TYPE_ACCESS BS_ZONE_TYPE_APB BS_ZONE_TYPE_ENTRANCE_LIMIT BS_ZONE_TYPE_ALARM BS_ZONE_TYPE_FIRE_ALARM.
nodeType	BS_STANDALONE_NODE BS_MASTER_NODE BS_MEMBER_NODE
master	The information of the master device.
member	The information of the member device.
ZoneProperty	The property of the zone.
BSZoneConfigEx	
Fields	**Options**
numOfZones	The number of zones, of which this device is a member.
zone	The zone data structure.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation(V1.5 or later)/BioEntry

Plus(V1.2 or later)/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_WriteCardReaderZoneConfig / BS_ReadCardReaderZoneConfig

Since BioStar V1.2 SDK, 3rd party RF device can join a BioStar zone as a member. For that, Wmaster which can be a BioStation, BioEntry Plus, BioEntry W, or BioLite Net should be configured as appropriate. Refer to 2.2.4 for details of integration of 3rd party RF devices.

BS_RET_CODE BS_WriteCardReaderZoneConfig(int handle, BSCardReaderZoneConfig* config)
BS_RET_CODE BS_ReadCardReaderZoneConfig(int handle, BSCardReaderZoneConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSCardReaderZoneConfig is defined as follows;

```
typedef struct {
    int numOfCardReader;
    unsigned readerID[MAX_READER];
    BSZoneConfigEx zoneConfigEx[MAX_READER];
} BSCardReaderZoneConfig;
```

The key fields and their available options are as follows;

BSCardReaderZoneConfig	
Fields	**Options**
numOfCardReader	Specifies the number of attached RF devices. (Currently, only one supported)
readerID	Specifies list of IDs of attached RF devices.
zoneConfigEx	Specifies list of zone configurations. See **BSZoneConfigEx**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_WriteDoorConfig / BS_ReadDoorConfig

Up to two device can be attached to a door. You can specify which I/O ports are used for the relay, RTE, and door sensor. You can also configure the actions for forced open and held open alarms.

BS_RET_CODE BS_WriteDoorConfig(int handle, BSDoorConfig* config)
BS_RET_CODE BS_ReadDoorConfig(int handle, BSDoorConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSDoorConfig is defined as follows;

```
struct BSDoor {
     int relay;
     int useRTE;
     int useDoorSensor;
     unsigned short openEvent;
     unsigned char unlockTriggerOption; //0: Not use, 1: Normal/Admin User,
                                        //2: Admin User
     unsigned char inputDelayOn; //Door Input Delay - 0: Off, 1: On
     int openTime;
     int heldOpenTime;
     int forcedOpenSchedule;
     int forcedCloseSchedule;
     int RTEType;
     int sensorType;
     short reader[2];
     unsigned char useRTEEx;
     unsigned char useSoundForcedOpen;
     unsigned char useSoundHeldOpen;
     unsigned char openOnce;
     int RTE;
     unsigned char useDoorSensorEx;
     unsigned char alarmStatus;
     unsigned char reserved2[2];
     int doorSensor;
     int relayDeviceId;
};
```

```
struct BSDoorConfig {
     BSDoor door[MAX_DOOR];
     int apbType;
     int apbResetTime;
     int doorMode;
};
```

The key fields and their available options are as follows;

BSDoor	
Fields	**Options**
relay	RELAY_DISABLED PRIMARY_RELAY: its own relay SECONDARY_RELAY: the relay of another device, whose ID is **relayDeviceId**. Both devices should be connected by RS485. SECUREIO0_RELAY0 SECUREIO0_RELAY1 SECUREIO1_RELAY0 SECUREIO1_RELAY1 SECUREIO2_RELAY0 SECUREIO2_RELAY1 SECUREIO3_RELAY0 SECUREIO3_RELAY1
useRTE	Not used. See useRTEEx.
useDoorSensor	Not used. See useDoorSensorEx.
openEvent	Specifies when the relay is activated in BioStation. This field is ignored by BioEntry Plus and BioLite Net. BS_RELAY_EVENT_ALL - relay is on whenever authentication succeeds. BS_RELAY_EVENT_AUTH_TNA – relay is activated when the useRelay field of the TNA event is true, or no TNA event is selected. BS_RELAY_EVENT_NONE – relay is disabled. BS_RELAY_EVENT_AUTH - relay is activated only when no TNA event is selected. BS_RELAY_EVENT_TNA - relay is activated only when the useRelay field of the TNA event

	is true.
openTime	Specifies the duration in seconds for which the relay is on. After this duration, the relay will be turned off.
heldOpenTime	If a door is held open beyond **heldOpenTime**, BE_EVENT_DOOR_HELD_OPEN_ALARM event will be generated. To detect this and BE_EVENT_DOOR_FORCED_OPEN_ALARM events, a door sensor should be configured first.
forcedOpenSchedule	Specifies the schedule in which the relay should be held on.
forcedCloseSchedule	Specifies the schedule in which the relay should be held off.
RTEType	The switch type of the RTE input. NORMALLY_OPEN NORMALLY_CLOSED
sensorType	The switch type of the door sensor. NORMALLY_OPEN NORMALLY_CLOSED
reader	Specifies whether the reader is a host device or a slave device. NO_READER = 0x00 HOST_READER = 0x01 SLAVE_READER = 0x02
useRTEEx	Specifies whether an input is used for RTE. If it is true, the **RTE** field denotes the input port for RTE.
useSoundForcedOpen	If true, emits an alarm sound when forced open alarm occurs.
useSoundHeldOpen	If true, emits an alarm sound when held open alarm occurs.
RTE	Specifies an input port for RTE. If **useRTEEx** is not true, this field will be ignored. HOST_INPUT0

	HOST_INPUT1 SECUREIO0_INPUT0 SECUREIO0_INPUT1 SECUREIO0_INPUT2 SECUREIO0_INPUT3 SECUREIO1_INPUT0 SECUREIO1_INPUT1 SECUREIO1_INPUT2 SECUREIO1_INPUT3 SECUREIO2_INPUT0 SECUREIO2_INPUT1 SECUREIO2_INPUT2 SECUREIO2_INPUT3 SECUREIO3_INPUT0 SECUREIO3_INPUT1 SECUREIO3_INPUT2 SECUREIO3_INPUT3
openOnce	If it is true, the door is locked immediately after the door was opened and closed once.
useDoorSensorEx	Specifies whether an input is used for door sensor. If it is true, the **doorSensor** field denotes the input port for door sensor.
alarmStatus	Specifies whether forced open or held open alarm is active.
doorSensor	Specifies an input port for door sensor. If **useDoorSensorEx** is not true, this field will be ignored. For available options, see **RTE** field above.
relayDeviceId	The ID of another device, whose relay will be used for the door. Both devices should be connected by RS485. And, the **relay** field should be set to SECONDARY_RELAY.

BSDoorConfig	
Fields	**Options**

doorMode	Specifies whether a door is set up. NO_DOOR = 0 ONE_DOOR = 1 TWO_DOOR = 2
door	Only door[0] will be used.
apbType	Not used.
apbResetTime	Not used.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_WriteInputConfig / BS_ReadInputConfig

A BioStation, BioEntry Plus, BioEntry W, or BioLite Net can control up to 4 Secure I/O devices through RS485 connection. A Secure I/O device has 4 SW inputs. A BioStation, BioEntry Plus, BioEntry W, BioLite Net, Xpass, or Xpass Slim has 2 SW inputs.

BS_RET_CODE BS_WriteInputConfig(int handle, BSInputConfig* config)
BS_RET_CODE BS_ReadInputConfig(int handle, BSInputConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSInputConfig is defined as follows;

```
struct BSInputFunction {
     int functionType;
     short minimumDuration;
     short switchType;
     int timeSchedule;
     unsigned deviceID;
     int reserved[4];
};

struct BSInputConfig {
     // host inputs
     BSInputFunction hostTamper;
     BSInputFunction hostInput[NUM_OF_HOST_INPUT];
     // secure I/O
     BSInputFunction secureIO[NUM_OF_SECURE_IO][NUM_OF_SECURE_INPUT];
     // slave
     BSInputFunction slaveTamper;
     BSInputFunction slaveInput[NUM_OF_SLAVE_INPUT];
     int reserved[32];
};
```

The key fields and their available options are as follows;

BSInputFunction	
Fields	**Options**

functionType	If an input port is activated, the assigned function will be executed. DISALBED GENERIC_OPEN: BE_EVENT_XXXX_INPUT(0xA0 ~ 0xBF) log record is written and assigned output events are generated if any. EMERGENCY_OPEN: open all the doors defined in **BSDoorConfig**. ALL_ALARM_OFF: turn off all the non-door relays under the control of this device. RESET_READER: reset the device. LOCK_READER: lock the device. ALARM_ZONE_INPUT: the port is used for alarm zone. FIRE_ALARM_ZONE_INPUT: the port is used for fire alarm zone. ALARM_ZONE_SENSOR_STATUS_INPUT: the port is used for alarm zone. When this input on, to arm is not allowed. ALARM_ZONE_ARM_DISARM_INPUT: the port is used for alarm zone to arm or disarm. LED_GREEN_INPUT : The LED light flashes green once. LED_RED_INPUT : The LED light flashes red once. BUZZER_INPUT : The device makes a beep sound. ACCESS_GRANTED_INPUT : The device shows a response of successful authentication. ACCESS_DENIED_INPUT : The device shows a response of unsuccessful authentication.
minimumDuration	To filter out noise, input signals with shorter duration than this minimum will be ignored. The unit is milliseconds.
switchType	The switch type of this input. NORMALLY_OPEN

	NORMALLY_CLOSED
timeSchedule	Specifies the time schedule in which this input is enabled.
deviceID	Specifies the owner of this input function. If the id of specific 3rd party card reader is set, this input function operates as the input of the specific 3rd party card reader. If '0' is set, this input function operates as the specified suprema device's input

BSInputConfig	
Fields	**Options**
internalTamper	Specifies the function which will be executed when the tamper switch of the host device is turned on.
internal	Specifies the input functions of the host device.
secureIO	Specifies the input functions of Secure I/O devices connected to the host.
slaveTamper	Not used.
slave	Not used.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

Example

```
// (1) Lock the device when the internal tamper is on
// (2) Open all doors when the input port 1 of Secure I/O 0 is activated
BSInputConfig inputConfig;
memset( &inputConfig, 0, sizeof( BSInputConfig ) );

inputConfig.internalTamper.functionType = BSInputFunction::LOCK_READER;
inputConfig.internalTamper.minimumDuration = 100; // 100 ms
inputConfig.internalTamper.switchType = BSDoor::NORMALLY_OPEN;
```

```
inputConfig.internalTamper.timeSchedule =
BSTimeScheduleEx::ALL_TIME_SCHEDULE; // enabled always

inputConfig.secureIO[0][1].functionType = BSInputFunction::EMERGENCY_OPEN;
inputConfig.secureIO[0][1].minimumDuration = 1000; // 1000 ms
inputConfig.secureIO[0][1].switchType = BSDoor::NORMALLY_OPEN;
inputConfig.secureIO[0][1].timeSchedule =
BSTimeScheduleEx::ALL_TIME_SCHEDULE; // enabled always
```

BS_WriteDSInputConfig/BS_ReadDSInputConfig

A D-Station/BioStation, BioEntry Plus, BioEntry W, or BioLite Net can control up to 4 Secure I/O devices through RS485 connection. A Secure I/O device has 4 SW inputs. A BioStation, BioEntry Plus, BioEntry W, or BioLite Net has 2 SW inputs.

BS_RET_CODE BS_WriteDSInputConfig(int handle, DSInputConfig* config)
BS_RET_CODE BS_ReadDSInputConfig(int handle, DSInputConfig* config)

Parameters

handle

Handle of the communication channel.

config

DSInputConfig is defined as follows;

```
struct BSInputFunction {
     int functionType;
     short minimumDuration;
     short switchType;
     int timeSchedule;
     unsigned deviceID;
     int reserved[4];
};

struct BSInputConfig {
     enum {
         NUM_OF_INTERNAL_INPUT = 4,
         NUM_OF_SECURE_IO = 4,
         NUM_OF_SECURE_INPUT = 4,
     };
     // host inputs
     BSInputFunction hostTamper;
     BSInputFunction hostInput[NUM_OF_HOST_INPUT];

     // secure I/O
     BSInputFunction secureIO[NUM_OF_SECURE_IO][NUM_OF_SECURE_INPUT];

     int reserved[48];
};
```

The key fields and their available options are as follows;

BSInputFunction	
Fields	**Options**
functionType	If an input port is activated, the assigned function will be executed. DISALBED GENERIC_OPEN: BE_EVENT_XXXX_INPUT(0xA0 ~ 0xBF) log record is written and assigned output events are generated if any. EMERGENCY_OPEN: open all the doors defined in **BSDoorConfig**. ALL_ALARM_OFF: turn off all the non-door relays under the control of this device. RESET_READER: reset the device. LOCK_READER: lock the device. ALARM_ZONE_INPUT: the port is used for alarm zone. FIRE_ALARM_ZONE_INPUT: the port is used for fire alarm zone. ALARM_ZONE_SENSOR_STATUS_INPUT: the port is used for alarm zone. When this input on, to arm is not allowed. ALARM_ZONE_ARM_DISARM_INPUT: the port is used for alarm zone to arm or disarm. LED_GREEN_INPUT : The LED light flashes green once. LED_RED_INPUT : The LED light flashes red once. BUZZER_INPUT : The device makes a beep sound. ACCESS_GRANTED_INPUT : The device shows a response of successful authentication. ACCESS_DENIED_INPUT : The device shows a response of unsuccessful authentication.
minimumDuration	To filter out noise, input signals with shorter duration than this minimum will be ignored. The

	unit is milliseconds.
switchType	The switch type of this input. NORMALLY_OPEN NORMALLY_CLOSED
timeSchedule	Specifies the time schedule in which this input is enabled.
deviceID	Specifies the owner of this input function. If the id of specific 3rd party card reader is set, this input function operates as the input of the specific 3rd party card reader. If '0' is set, this input function operates as the specified suprema device's input

DSInputConfig	
Fields	**Options**
internalTamper	Specifies the function which will be executed when the tamper switch of the host device is turned on.
internal	Specifies the input functions of the host device.
secureIO	Specifies the input functions of Secure I/O devices connected to the host.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

Example

```
// (1) Lock the device when the internal tamper is on
// (2) Open all doors when the input port 1 of Secure I/O 0 is activated
DSInputConfig inputConfig;
memset( &inputConfig, 0, sizeof( BSInputConfig ) );

inputConfig.internalTamper.functionType = BSInputFunction::LOCK_READER;
inputConfig.internalTamper.minimumDuration = 100; // 100 ms
```

```
inputConfig.internalTamper.switchType = BSDoor::NORMALLY_OPEN;
inputConfig.internalTamper.timeSchedule =
BSTimeScheduleEx::ALL_TIME_SCHEDULE; // enabled always

inputConfig.secureIO[0][1].functionType = BSInputFunction::EMERGENCY_OPEN;
inputConfig.secureIO[0][1].minimumDuration = 1000; // 1000 ms
inputConfig.secureIO[0][1].switchType = BSDoor::NORMALLY_OPEN;
inputConfig.secureIO[0][1].timeSchedule =
BSTimeScheduleEx::ALL_TIME_SCHEDULE; // enabled always
```

BS_WriteXSInputConfig / BS_ReadXSInputConfig

A D-Station/BioStation, BioEntry Plus, BioEntry W, BioLite Net or X-Station can control up to 4 Secure I/O devices through RS485 connection. A Secure I/O device has 4 SW inputs. A BioStation, BioEntry Plus, BioEntry W, or BioLite Net has 2 SW inputs.

BS_RET_CODE BS_WriteXSInputConfig(int handle, XSInputConfig* config)
BS_RET_CODE BS_ReadXSInputConfig(int handle, XSInputConfig* config)

Parameters

handle

Handle of the communication channel.

config

XSInputConfig is defined as follows;

```
struct BSInputFunction {
     int functionType;
     short minimumDuration;
     short switchType;
     int timeSchedule;
     unsigned deviceID;
     int reserved[4];
};

struct BSInputConfig {
     enum {
         NUM_OF_INTERNAL_INPUT = 4,
         NUM_OF_SECURE_IO = 4,
         NUM_OF_SECURE_INPUT = 4,
     };
     // host inputs
     BSInputFunction hostTamper;
     BSInputFunction hostInput[NUM_OF_HOST_INPUT];

     // secure I/O
     BSInputFunction secureIO[NUM_OF_SECURE_IO][NUM_OF_SECURE_INPUT];

     int reserved[48];
```

```
};
```

The key fields and their available options are as follows;

BSInputFunction	
Fields	**Options**
functionType	If an input port is activated, the assigned function will be executed. DISALBED GENERIC_OPEN: BE_EVENT_XXXX_INPUT(0xA0 ~ 0xBF) log record is written and assigned output events are generated if any. EMERGENCY_OPEN: open all the doors defined in **BSDoorConfig**. ALL_ALARM_OFF: turn off all the non-door relays under the control of this device. RESET_READER: reset the device. LOCK_READER: lock the device. ALARM_ZONE_INPUT: the port is used for alarm zone. FIRE_ALARM_ZONE_INPUT: the port is used for fire alarm zone. ALARM_ZONE_SENSOR_STATUS_INPUT: the port is used for alarm zone. When this input on, to arm is not allowed. ALARM_ZONE_ARM_DISARM_INPUT: the port is used for alarm zone to arm or disarm. LED_GREEN_INPUT : The LED light flashes green once. LED_RED_INPUT : The LED light flashes red once. BUZZER_INPUT : The device makes a beep sound. ACCESS_GRANTED_INPUT : The device shows a response of successful authentication. ACCESS_DENIED_INPUT : The device shows a response of unsuccessful authentication.

minimumDuration	To filter out noise, input signals with shorter duration than this minimum will be ignored. The unit is milliseconds.
switchType	The switch type of this input. NORMALLY_OPEN NORMALLY_CLOSED
timeSchedule	Specifies the time schedule in which this input is enabled.
deviceID	Specifies the owner of this input function. If the id of specific 3rd party card reader is set, this input function operates as the input of the specific 3rd party card reader. If '0' is set, this input function operates as the specified suprema device's input

XSInputConfig	
Fields	**Options**
internalTamper	Specifies the function which will be executed when the tamper switch of the host device is turned on.
internal	Specifies the input functions of the host device.
secureIO	Specifies the input functions of Secure I/O devices connected to the host.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

X-Station

Example

```
// (1) Lock the device when the internal tamper is on
// (2) Open all doors when the input port 1 of Secure I/O 0 is activated
XSInputConfig inputConfig;
memset( &inputConfig, 0, sizeof( BSInputConfig ) );
```

```
inputConfig.internalTamper.functionType = BSInputFunction::LOCK_READER;
inputConfig.internalTamper.minimumDuration = 100; // 100 ms
inputConfig.internalTamper.switchType = BSDoor::NORMALLY_OPEN;
inputConfig.internalTamper.timeSchedule =
BSTimeScheduleEx::ALL_TIME_SCHEDULE; // enabled always

inputConfig.secureIO[0][1].functionType = BSInputFunction::EMERGENCY_OPEN;
inputConfig.secureIO[0][1].minimumDuration = 1000; // 1000 ms
inputConfig.secureIO[0][1].switchType = BSDoor::NORMALLY_OPEN;
inputConfig.secureIO[0][1].timeSchedule =
BSTimeScheduleEx::ALL_TIME_SCHEDULE; // enabled always
```

BS_WriteBS2InputConfig / BS_ReadBS2InputConfig

A BioStation T2/D-Station/BioStation, BioEntry Plus, BioEntry W, BioLite Net or X-Station can control up to 4 Secure I/O devices through RS485 connection. A Secure I/O device has 4 SW inputs. A BioStation, BioEntry Plus, BioEntry W or BioLite Net has 2 SW inputs.

BS_RET_CODE BS_WriteBS2InputConfig(int handle, BS2InputConfig* config)
BS_RET_CODE BS_ReadBS2InputConfig(int handle, BS2InputConfig* config)

Parameters

handle

Handle of the communication channel.

config

BS2InputConfig is defined as follows;

```
struct BSInputFunction {
     int functionType;
     short minimumDuration;
     short switchType;
     int timeSchedule;
     unsigned deviceID;
     int reserved[4];
};

struct BS2InputConfig {
     enum {
         NUM_OF_INTERNAL_INPUT = 4,
         NUM_OF_SECURE_IO = 4,
         NUM_OF_SECURE_INPUT = 4,
     };
     // host inputs
     BSInputFunction hostTamper;
     BSInputFunction hostInput[NUM_OF_HOST_INPUT];

     // secure I/O
     BSInputFunction secureIO[NUM_OF_SECURE_IO][NUM_OF_SECURE_INPUT];

     int reserved[48];
```

```
};
```

The key fields and their available options are as follows;

BSInputFunction	
Fields	**Options**
functionType	If an input port is activated, the assigned function will be executed. DISALBED GENERIC_OPEN: BE_EVENT_XXXX_INPUT(0xA0 ~ 0xBF) log record is written and assigned output events are generated if any. EMERGENCY_OPEN: open all the doors defined in **BSDoorConfig**. ALL_ALARM_OFF: turn off all the non-door relays under the control of this device. RESET_READER: reset the device. LOCK_READER: lock the device. ALARM_ZONE_INPUT: the port is used for alarm zone. FIRE_ALARM_ZONE_INPUT: the port is used for fire alarm zone. ALARM_ZONE_SENSOR_STATUS_INPUT: the port is used for alarm zone. When this input on, to arm is not allowed. ALARM_ZONE_ARM_DISARM_INPUT: the port is used for alarm zone to arm or disarm. LED_GREEN_INPUT : The LED light flashes green once. LED_RED_INPUT : The LED light flashes red once. BUZZER_INPUT : The device makes a beep sound. ACCESS_GRANTED_INPUT : The device shows a response of successful authentication. ACCESS_DENIED_INPUT : The device shows a response of unsuccessful authentication.

minimumDuration	To filter out noise, input signals with shorter duration than this minimum will be ignored. The unit is milliseconds.
switchType	The switch type of this input. NORMALLY_OPEN NORMALLY_CLOSED
timeSchedule	Specifies the time schedule in which this input is enabled.
deviceID	Specifies the owner of this input function. If the id of specific 3rd party card reader is set, this input function operates as the input of the specific 3rd party card reader. If '0' is set, this input function operates as the specified suprema device's input

BS2InputConfig	
Fields	**Options**
internalTamper	Specifies the function which will be executed when the tamper switch of the host device is turned on.
internal	Specifies the input functions of the host device.
secureIO	Specifies the input functions of Secure I/O devices connected to the host.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

Example

```
// (1) Lock the device when the internal tamper is on
// (2) Open all doors when the input port 1 of Secure I/O 0 is activated
BS2InputConfig inputConfig;
memset( &inputConfig, 0, sizeof( BSInputConfig ) );
```

```
inputConfig.internalTamper.functionType = BSInputFunction::LOCK_READER;
inputConfig.internalTamper.minimumDuration = 100; // 100 ms
inputConfig.internalTamper.switchType = BSDoor::NORMALLY_OPEN;
inputConfig.internalTamper.timeSchedule =
BSTimeScheduleEx::ALL_TIME_SCHEDULE; // enabled always

inputConfig.secureIO[0][1].functionType = BSInputFunction::EMERGENCY_OPEN;
inputConfig.secureIO[0][1].minimumDuration = 1000; // 1000 ms
inputConfig.secureIO[0][1].switchType = BSDoor::NORMALLY_OPEN;
inputConfig.secureIO[0][1].timeSchedule =
BSTimeScheduleEx::ALL_TIME_SCHEDULE; // enabled always
```

BS_WriteFSInputConfig / BS_ReadFSInputConfig

A FacerStation can control up to 4 Secure I/O devices through RS485 connection. A Secure I/O device has 4 SW inputs. A BioStation, BioEntry Plus, BioEntry W, or BioLite Net has 2 SW inputs.

BS_RET_CODE BS_WriteFSInputConfig(int handle, FSInputConfig* config)
BS_RET_CODE BS_ReadFSInputConfig(int handle, FSInputConfig* config)

Parameters

handle

Handle of the communication channel.

config

FSInputConfig is defined as follows;

```
struct BSInputFunction {
     int functionType;
     short minimumDuration;
     short switchType;
     int timeSchedule;
     unsigned deviceID;
     int reserved[4];
};

struct FSInputConfig {
     enum {
         NUM_OF_INTERNAL_INPUT = 4,
         NUM_OF_SECURE_IO = 4,
         NUM_OF_SECURE_INPUT = 4,
     };
     // host inputs
     BSInputFunction hostTamper;
     BSInputFunction hostInput[NUM_OF_HOST_INPUT];

     // secure I/O
     BSInputFunction secureIO[NUM_OF_SECURE_IO][NUM_OF_SECURE_INPUT];

     int reserved[48];
};
```

The key fields and their available options are as follows;

BSInputFunction	
Fields	**Options**
functionType	If an input port is activated, the assigned function will be executed. DISALBED GENERIC_OPEN: BE_EVENT_XXXX_INPUT(0xA0 ~ 0xBF) log record is written and assigned output events are generated if any. EMERGENCY_OPEN: open all the doors defined in **BSDoorConfig**. ALL_ALARM_OFF: turn off all the non-door relays under the control of this device. RESET_READER: reset the device. LOCK_READER: lock the device. ALARM_ZONE_INPUT: the port is used for alarm zone. FIRE_ALARM_ZONE_INPUT: the port is used for fire alarm zone. ALARM_ZONE_SENSOR_STATUS_INPUT: the port is used for alarm zone. When this input on, to arm is not allowed. ALARM_ZONE_ARM_DISARM_INPUT: the port is used for alarm zone to arm or disarm. LED_GREEN_INPUT : The LED light flashes green once. LED_RED_INPUT : The LED light flashes red once. BUZZER_INPUT : The device makes a beep sound. ACCESS_GRANTED_INPUT : The device shows a response of successful authentication. ACCESS_DENIED_INPUT : The device shows a response of unsuccessful authentication.
minimumDuration	To filter out noise, input signals with shorter duration than this minimum will be ignored. The

	unit is milliseconds.
switchType	The switch type of this input. NORMALLY_OPEN NORMALLY_CLOSED
timeSchedule	Specifies the time schedule in which this input is enabled.
deviceID	Specifies the owner of this input function. If the id of specific 3rd party card reader is set, this input function operates as the input of the specific 3rd party card reader. If '0' is set, this input function operates as the specified suprema device's input

FSInputConfig	
Fields	**Options**
internalTamper	Specifies the function which will be executed when the tamper switch of the host device is turned on.
internal	Specifies the input functions of the host device.
secureIO	Specifies the input functions of Secure I/O devices connected to the host.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation

Example

```
// (1) Lock the device when the internal tamper is on
// (2) Open all doors when the input port 1 of Secure I/O 0 is activated
FSInputConfig inputConfig;
memset( &inputConfig, 0, sizeof( BSInputConfig ) );

inputConfig.internalTamper.functionType = BSInputFunction::LOCK_READER;
inputConfig.internalTamper.minimumDuration = 100; // 100 ms
```

```
inputConfig.internalTamper.switchType = BSDoor::NORMALLY_OPEN;
inputConfig.internalTamper.timeSchedule =
BSTimeScheduleEx::ALL_TIME_SCHEDULE; // enabled always

inputConfig.secureIO[0][1].functionType = BSInputFunction::EMERGENCY_OPEN;
inputConfig.secureIO[0][1].minimumDuration = 1000; // 1000 ms
inputConfig.secureIO[0][1].switchType = BSDoor::NORMALLY_OPEN;
inputConfig.secureIO[0][1].timeSchedule =
BSTimeScheduleEx::ALL_TIME_SCHEDULE; // enabled always
```

BS_WriteOutputConfig / BS_ReadOutputConfig

A BioStation, BioEntry Plus, BioEntry W, or BioLite Net can control up to 4 Secure I/O devices through RS485 connection. A Secure I/O device has 2 relay outputs. A BioStation, BioEntry Plus, BioEntry W, or BioLite Net has 1 relay output. Users can assign multiple output events to each replay port. If one of the given events occurs, the configured signal will be output to the relay port.

BS_RET_CODE BS_WriteOutputConfig(int handle, BSOutputConfig* config)
BS_RET_CODE BS_ReadOutputConfig(int handle, BSOutputConfig* config)

Parameters

handle

Handle of the communication channel.

config

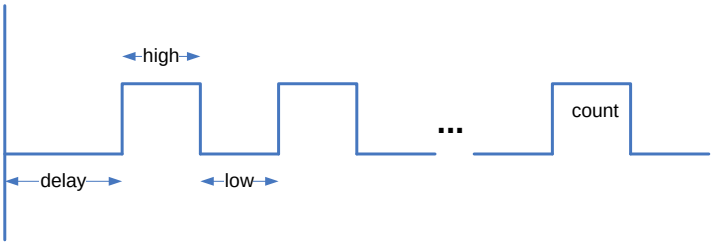
BSOutputConfig is defined as follows;

```
struct BSOutputEvent {
     unsigned event; // (8 bit input device ID << 16) | 16 bit event ID
     unsigned char outputDeviceID;
     unsigned char outputRelayID;
     unsigned char relayOn;
     unsigned char reserved1;
     unsigned short delay;
     unsigned short high;
     unsigned short low;
     unsigned short count;
     int priority; // 1(highest) ~ 99(lowest)
     unsigned deviceID;
     int reserved2[2];
};

struct BSEMOutputEvent {
     unsigned short inputType;
     unsigned short outputRelayID;
     unsigned short inputDuration;
     unsigned short high;
     unsigned short low;
     unsigned short count;
```

```
    int reserved3[5];
};

struct BSOutputConfig {
    int numOfEvent;
    BSOutputEvent outputEvent[MAX_OUTPUT];
    BSEMOutputEvent
emergencyEvent[BSInputConfig::NUM_OF_SECURE_IO][BSInputConfig::NUM_OF_SECUR
E_INPUT];
    int reserved[31];
};
```

The key fields and their available options are as follows;

BSOutputEvent	
Fields	**Options**
event	The event which will trigger the output signal. It consists of an event ID and a device ID in which the event occurs. The available events are as follows; AUTH_SUCCESS AUTH_FAIL AUTH_DURESS ACCESS_NOT_GRANTED ADMIN_AUTH_SUCCESS TAMPER_ON DOOR_OPEN DOOR_CLOSED INPUT0_ON INPUT1_ON INPUT2_ON INPUT3_ON ALARM_ZONE_EVENT FIRE_ALARM_ZONE_EVENT APB_ZONE_EVENT ENTLIMIT_ZONE_EVENT DOOR_HELD_OPEN_EVENT DOOR_FORCED_OPEN_EVENT The available device IDs are as follows;

	BS_DEVICE_PRIMARY BS_DEVICE_SECUREIO0 BS_DEVICE_SECUREIO1 BS_DEVICE_SECUREIO2 BS_DEVICE_SECUREIO3 BS_DEVICE_ALL For example, when the input SW 0 of Secure IO 0 is activated, INPUT0_ON | (BS_DEVICE_SECUREIO0 << 16)
outputDeviceID	Specifies the device which will generate the output signal. BS_DEVICE_PRIMARY BS_DEVICE_SECUREIO0 BS_DEVICE_SECUREIO1 BS_DEVICE_SECUREIO2 BS_DEVICE_SECUREIO3
outputRelayID	Specifies the relay port from which the output signal will be generated. BS_PORT_RELAY0 BS_PORT_RELAY1
relayOn	If true, turn on the relay. If false, turn off the relay.
delay	These four fields define the waveform of output signal. If **relayOn** is false, these fields are ignored.  The unit is milliseconds. If count is 0, the signal will be repeated indefinitely.
high	
low	
count	
priority	The priority of the event between 1(highest) and 99(lowest). When a relay is generating the signal of previous event, only events with same or higher priority can replace it.
deviceID	Specifies the owner of this output.

	If the id of specific 3rd party card reader is set, this output is operated by the event of the specific 3rd party card reader. If '0' is set, this output is operated by the specified suprema device's event.

BSEMOutputEvent In normal condition, the host device handles all inputs of Secure I/O devices. However, when RS485 connection is disconnected, Secure I/O devices should process their own inputs by themselves. This configuration defines how to handle Secure I/O inputs in this case.	
Fields	**Options**
inputType	The switch type of this input. NORMALLY_OPEN NORMALLY_CLOSED
outputRelayID	Specifies the relay port from which the output signal will be generated. BS_PORT_RELAY0 BS_PORT_RELAY1
inputDuration	To filter out noise, input signals with shorter duration than this minimum will be ignored. The unit is milliseconds.
high	These three fields define the waveform of output signal.
low	
count	

BSOutputConfig	
Fields	**Options**
numOfEvent	The number of output events defined in this device.
outputEvent	The array of **BSOutputEvent**.
emergencyEvent	**BSEMOutputEvent**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStaton T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

Example

```
// (1) Generate alarm signal to the relay 0 of Secure I/O 0 when
//     anti-passback is violated.
// (2) Turn off the above alarm when the input 0 of Secure I/O 0 is
//     activated.
BSOutputConfig outputConfig;
memset( &outputConfig, 0, sizeof( BSOutputConfig ) );

outputConfig.numOfEvent = 2;

outputConfig.outputEvent[0].event = BSOutputEvent::APB_ZONE_EVENT |
(BS_DEVICE_ALL << 16);
outputConfig.outputEvent[0].outputDeviceID = BS_DEVICE_SECUREIO0;
outputConfig.outputEvent[0].outputRelayID = BS_PORT_RELAY0;
outputConfig.outputEvent[0].relayOn = true;
outputConfig.outputEvent[0].delay = 0;
outputConfig.outputEvent[0].high = 100; // 100 ms
outputConfig.outputEvent[0].low = 100; // 100 ms
outputConfig.outputEvent[0].count = 0; // indefinite
outputConfig.outputEvent[0].priority = 1;

outputConfig.outputEvent[1].event = BSOutputEvent::INPUT0_ON |
(BS_DEVICE_SECUREIO0 << 16);
outputConfig.outputEvent[0].outputDeviceID = BS_DEVICE_SECUREIO0;
outputConfig.outputEvent[0].outputRelayID = BS_PORT_RELAY0;
outputConfig.outputEvent[0].relayOn = false;
outputConfig.outputEvent[0].priority = 1;
```

BS_WriteEntranceLimitConfig / BS_ReadEntranceLimitConfig

You can apply entrance limitation rules to each device.

BS_RET_CODE BS_WriteEntranceLimitConfig(int handle, BSEntranceLimit* config)
BS_RET_CODE BS_ReadEntranceLimitConfig(int handle, BSEntranceLimit* config)

Parameters

handle

Handle of the communication channel.

config

BSEntranceLimit is defined as follows;

```
typedef struct {
    int minEntryInterval; // 0 for no limit
    int numOfEntranceLimit; // MAX 4
    int maxEntry[4]; // 0 (no limit) ~ 16
    unsigned entryLimitInterval[4];
    int defaultAccessGroup;
    int bypassGroupId;
    int entranceLimitReserved[6];
} BSEntranceLimit;
```

The key fields and their available options are as follows;

BSOutputEvent	
Fields	**Options**
minEntryInterval	See the descriptions of **BSEntranceLimitationZonePropertyEx**.
numOfEntranceLimit maxEntry entryLimitInterval bypassGroupId	
defaultAccessGroup	The default access group of users. It is either BSAccessGroupEx::NO_ACCESS_GROUP or BSAccessGroupEx::FULL_ACCESS_GROUP. This access group is applied to the following cases. (1) When a user has no access group. For example, if **defaultAccessGroup** is

	NO_ACCESS_GROUP, users without access groups are not allowed to enter. (2) When a user has invalid access group. (3) When enrolling users by command card

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation

BS_WriteDSSaveImageEventConfig / BS_ReadDSSaveImageEventConfig

You can write/read the event and shcedule of a D-Station using **BS_WriteDSSaveImageConfig / BS_ReadDSSaveImageConfig**.

BS_RET_CODE BS_WriteDSSaveImageEventConfig(int handle, DSSaveImageEventConfig* config)
BS_RET_CODE BS_ReadDSSaveImageConfig(int handle, DSSaveImageEventConfig * config)

Parameters

handle

Handle of the communication channel.

config

DSSaveImageEventConfig is defined as follows;

```
typedef struct {
    enum
    {
        NUM_OF_IMG_EVENT = 256,
    };

    unsigned short event[NUM_OF_IMG_EVENT];
    unsigned short reserved[64];
    unsigned short schedule[NUM_OF_IMG_EVENT];
    unsigned short reserved2[64];
} DSSaveImageEventConfig;
```

The key fields and their available options are as follows;

DSSaveImageEventConfig	
Fields	**Options**
event	User can choose several events, the time when event occurs, the camera captures user's face. you can see detail contents on the Table 5. Log Event Types at page 71 ~ 75.
schedule	Select proper Time zone.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the

corresponding error code.

Compatibility

D-Station

BS_WriteXSSaveImageEventConfig / BS_ReadXSSaveImageEventConfig

You can write/read the event and shcedule of a D-Station using **BS_WriteXSSaveImageConfig / BS_ReadXSSaveImageConfig**.

BS_RET_CODE BS_WriteXSSaveImageEventConfig(int handle, XSSaveImageEventConfig* config)
BS_RET_CODE BS_ReadXSSaveImageConfig(int handle, XSSaveImageEventConfig * config)

Parameters

handle

Handle of the communication channel.

config

XSSaveImageEventConfig is defined as follows;

```
typedef struct {
    enum
    {
        NUM_OF_IMG_EVENT = 256,
    };

    unsigned short event[NUM_OF_IMG_EVENT];
    unsigned short reserved[64];
    unsigned short schedule[NUM_OF_IMG_EVENT];
    unsigned short reserved2[64];
} DSSaveImageEventConfig;
```

The key fields and their available options are as follows;

XSSaveImageEventConfig	
Fields	**Options**
event	User can choose several events, the time when event occurs, the camera captures user's face. you can see detail contents on the Table 5. Log Event Types at page 71 ~ 75.
schedule	Select proper Time zone.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the

corresponding error code.

Compatibility

X-Station

BS_WriteBS2SaveImageEventConfig/BS_ReadBS2SaveImageEventConfig

You can write/read the event and shcedule of a BioStation T2 using **BS_WriteBS2SaveImageConfig/BS_ReadBS2SaveImageConfig**.

BS_RET_CODE BS_WriteBS2SaveImageEventConfig(int handle, BS2SaveImageEventConfig* config)
BS_RET_CODE BS_ReadBS2SaveImageConfig(int handle, BS2SaveImageEventConfig * config)

Parameters

handle

Handle of the communication channel.

config

BS2SaveImageEventConfig is defined as follows;

```
typedef struct {
    enum
    {
        NUM_OF_IMG_EVENT = 256,
    };

    unsigned short event[NUM_OF_IMG_EVENT];
    unsigned short reserved[64];
    unsigned short schedule[NUM_OF_IMG_EVENT];
    unsigned short reserved2[64];
} BS2SaveImageEventConfig;
```

The key fields and their available options are as follows;

BS2SaveImageEventConfig	
Fields	**Options**
event	User can choose several events, the time when event occurs, the camera captures user's face. you can see detail contents on the Table 5. Log Event Types at page 71 ~ 75.
schedule	Select proper Time zone.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the

corresponding error code.

Compatibility

BioStation T2

BS_WriteFSSaveImageEventConfig / BS_ReadFSSaveImageEventConfig

You can write/read the event and shcedule of a FaceStation using **BS_WriteFSSaveImageConfig / BS_ReadFSSaveImageConfig**.

BS_RET_CODE BS_WriteFSSaveImageEventConfig(int handle, FSSaveImageEventConfig* config)
BS_RET_CODE BS_ReadFSSaveImageConfig(int handle, FSSaveImageEventConfig * config)

Parameters

handle

Handle of the communication channel.

config

FSSaveImageEventConfig is defined as follows;

```
typedef struct {
    enum
    {
        NUM_OF_IMG_EVENT = 256,
    };

    unsigned short event[NUM_OF_IMG_EVENT];
    unsigned short reserved[64];
    unsigned short schedule[NUM_OF_IMG_EVENT];
    unsigned short reserved2[64];
} FSSaveImageEventConfig;
```

The key fields and their available options are as follows;

FSSaveImageEventConfig	
Fields	**Options**
event	User can choose several events, the time when event occurs, the camera captures user's face. you can see detail contents on the Table 5. Log Event Types at page 71 ~ 75.
schedule	Select proper Time zone.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the

corresponding error code.

Compatibility

FaceStation

BS_WriteDSInterphoneConfig / BS_ReadDSInterphoneConfig

You can write/read the interphone configuration of a D-Station using **BS_WriteDSInterphoneConfig / BS_ReadDSInterphoneConfig**.

BS_RET_CODE BS_WriteDSInterphoneConfig(int handle, DSInterphoneConfig* config)
BS_RET_CODE BS_ReadDSInterphoneConfig(int handle, DSInterphoneConfig * config)

Parameters

handle

Handle of the communication channel.

config

DSInterphoneConfig is defined as follows;

```
typedef struct {
    enum
    {
        NOT_USE = 0,
        AN_INTERPHONE = 1,
        IP_INTERPHONE = 2,

        MAX_NETWORK_ADDR_LEN = 32,
        MAX_SIP_SERVER_ID_LEN = 16,
        MAX_SIP_SERVER_PASSWORD_LEN = 16
        MAX_SIP_PHONE_NO_LEN = 32,
        MAX_SIP_DISPLAY_NAME_LEN = 32,
    };

    unsigned int type;
    char videoIpAddress[MAX_NETWORK_ADDR_LEN];
    unsigned int videoPort;
    char sipServerAddress[MAX_NETWORK_ADDR_LEN];
    unsigned int sipServerPort;
    char sipServerId[MAX_SIP_SERVER_ID_LEN];
    char sipServerPassword[MAX_SIP_SERVER_PASSWORD_LEN];
    char sipPhoneNo[MAX_SIP_PHONE_NO_LEN];
    char sipDisplayName[MAX_SIP_DISPLAY_NAME_LEN];
    unsigned char speakerGain;
    unsigned char micGain;
    unsigned int reserved[14];
} DSInterphoneConfig;
```

The key fields and their available options are as follows;

DSInterphoneConfig	
Fields	**Options**
type	User can choose interphone type to disable the interphone feature or enable this feature and decide which interface to use: analogue video phone or IP-based AV interface (NOT_USE, AN_INTERPHONE, or IP_INTERPHONE).
videoIPAddress	Specify an IP address for the Video Server.
videoPort	specify a port number for the Video server.
sipServerAddress	specify an IP address for the VoIP server
sipServerPort	specify a port number for the VoIP server
sipServerId	specify a user name to access the VoIP server
sipServerPassword	specify a password to access the VoIP server.
sipPhoneNo	specify a phone number for the interphone
sipDisplayName	specify a name to use for communication through the interphone
speakerGain	specify the volume of the speaker
micGain	specify the volume of the microphone

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station

BS_WriteXSInterphoneConfig / BS_ReadXSInterphoneConfig

You can write/read the interphone configuration of a X-Station using **BS_WriteXSInterphoneConfig / BS_ReadXSInterphoneConfig**.

BS_RET_CODE BS_WriteXSInterphoneConfig(int handle, XSInterphoneConfig* config)
BS_RET_CODE BS_ReadXSInterphoneConfig(int handle, XSInterphoneConfig * config)

Parameters

handle

Handle of the communication channel.

config

XSInterphoneConfig is defined as follows;

```
typedef struct {
    enum
    {
        NOT_USE = 0,
        AN_INTERPHONE = 1,
        IP_INTERPHONE = 2,

        MAX_NETWORK_ADDR_LEN = 32,
        MAX_SIP_SERVER_ID_LEN = 16,
        MAX_SIP_SERVER_PASSWORD_LEN = 16
        MAX_SIP_PHONE_NO_LEN = 32,
        MAX_SIP_DISPLAY_NAME_LEN = 32,
    };

    unsigned int type;
    char videoIpAddress[MAX_NETWORK_ADDR_LEN];
    unsigned int videoPort;
    char sipServerAddress[MAX_NETWORK_ADDR_LEN];
    unsigned int sipServerPort;
    char sipServerId[MAX_SIP_SERVER_ID_LEN];
    char sipServerPassword[MAX_SIP_SERVER_PASSWORD_LEN];
    char sipPhoneNo[MAX_SIP_PHONE_NO_LEN];
    char sipDisplayName[MAX_SIP_DISPLAY_NAME_LEN];
    unsigned char speakerGain;
    unsigned char micGain;
    unsigned int reserved[14];
} XSInterphoneConfig;
```

The key fields and their available options are as follows;

XSInterphoneConfig	
Fields	**Options**
type	User can choose interphone type to disable the interphone feature or enable this feature and decide which interface to use: analogue video phone or IP-based AV interface (NOT_USE, AN_INTERPHONE, or IP_INTERPHONE).
videoIPAddress	Specify an IP address for the Video Server.
videoPort	specify a port number for the Video server.
sipServerAddress	specify an IP address for the VoIP server
sipServerPort	specify a port number for the VoIP server
sipServerId	specify a user name to access the VoIP server
sipServerPassword	specify a password to access the VoIP server.
sipPhoneNo	specify a phone number for the interphone
sipDisplayName	specify a name to use for communication through the interphone
speakerGain	specify the volume of the speaker
micGain	specify the volume of the microphone

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

X-Station

BS_WriteBS2InterphoneConfig/BS_ReadBS2InterphoneConfig

You can write/read the interphone configuration of a BioStation T2 using **BS_WriteBS2InterphoneConfig/BS_ReadBS2InterphoneConfig**.

BS_RET_CODE BS_WriteBS2InterphoneConfig(int handle, BS2InterphoneConfig* config)
BS_RET_CODE BS_ReadBS2InterphoneConfig(int handle, BS2InterphoneConfig * config)

Parameters

handle

Handle of the communication channel.

config

BS2InterphoneConfig is defined as follows;

```
typedef struct {
    enum
    {
        NOT_USE = 0,
        AN_INTERPHONE = 1,
        IP_INTERPHONE = 2,

        MAX_NETWORK_ADDR_LEN = 32,
        MAX_SIP_SERVER_ID_LEN = 16,
        MAX_SIP_SERVER_PASSWORD_LEN = 16
        MAX_SIP_PHONE_NO_LEN = 32,
        MAX_SIP_DISPLAY_NAME_LEN = 32,
    };

    unsigned int type;
    char videoIpAddress[MAX_NETWORK_ADDR_LEN];
    unsigned int videoPort;
    char sipServerAddress[MAX_NETWORK_ADDR_LEN];
    unsigned int sipServerPort;
    char sipServerId[MAX_SIP_SERVER_ID_LEN];
    char sipServerPassword[MAX_SIP_SERVER_PASSWORD_LEN];
    char sipPhoneNo[MAX_SIP_PHONE_NO_LEN];
    char sipDisplayName[MAX_SIP_DISPLAY_NAME_LEN];
    unsigned char speakerGain;
    unsigned char micGain;
    unsigned int reserved[14];
} BS2InterphoneConfig;
```

The key fields and their available options are as follows;

BS2InterphoneConfig	
Fields	**Options**
type	User can choose interphone type to disable the interphone feature or enable this feature and decide which interface to use: analogue video phone or IP-based AV interface (NOT_USE, AN_INTERPHONE, or IP_INTERPHONE).
videoIPAddress	Specify an IP address for the Video Server.
videoPort	specify a port number for the Video server.
sipServerAddress	specify an IP address for the VoIP server
sipServerPort	specify a port number for the VoIP server
sipServerId	specify a user name to access the VoIP server
sipServerPassword	specify a password to access the VoIP server.
sipPhoneNo	specify a phone number for the interphone
sipDisplayName	specify a name to use for communication through the interphone
speakerGain	specify the volume of the speaker
micGain	specify the volume of the microphone

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2

BS_WriteFSInterphoneConfig / BS_ReadFSInterphoneConfig

You can write/read the interphone configuration of a FaceStation using **BS_WriteFSInterphoneConfig / BS_ReadFSInterphoneConfig**.

BS_RET_CODE BS_WriteFSInterphoneConfig(int handle, FSInterphoneConfig* config)
BS_RET_CODE BS_ReadFSInterphoneConfig(int handle, FSInterphoneConfig * config)

Parameters

handle

Handle of the communication channel.

config

FSInterphoneConfig is defined as follows;

```
typedef struct {
    enum
    {
        NOT_USE = 0,
        AN_INTERPHONE = 1,
        IP_INTERPHONE = 2,

        MAX_NETWORK_ADDR_LEN = 32,
        MAX_SIP_SERVER_ID_LEN = 16,
        MAX_SIP_SERVER_PASSWORD_LEN = 16
        MAX_SIP_PHONE_NO_LEN = 32,
        MAX_SIP_DISPLAY_NAME_LEN = 32,
    };

    unsigned int type;
    char videoIpAddress[MAX_NETWORK_ADDR_LEN];
    unsigned int videoPort;
    char sipServerAddress[MAX_NETWORK_ADDR_LEN];
    unsigned int sipServerPort;
    char sipServerId[MAX_SIP_SERVER_ID_LEN];
    char sipServerPassword[MAX_SIP_SERVER_PASSWORD_LEN];
    char sipPhoneNo[MAX_SIP_PHONE_NO_LEN];
    char sipDisplayName[MAX_SIP_DISPLAY_NAME_LEN];
    unsigned char speakerGain;
    unsigned char micGain;
    unsigned int reserved[14];
} FSInterphoneConfig;
```

The key fields and their available options are as follows;

FSInterphoneConfig	
Fields	**Options**
type	User can choose interphone type to disable the interphone feature or enable this feature and decide which interface to use: analogue video phone or IP-based AV interface (NOT_USE, AN_INTERPHONE, or IP_INTERPHONE).
videoIPAddress	Specify an IP address for the Video Server.
videoPort	specify a port number for the Video server.
sipServerAddress	specify an IP address for the VoIP server
sipServerPort	specify a port number for the VoIP server
sipServerId	specify a user name to access the VoIP server
sipServerPassword	specify a password to access the VoIP server.
sipPhoneNo	specify a phone number for the interphone
sipDisplayName	specify a name to use for communication through the interphone
speakerGain	specify the volume of the speaker
micGain	specify the volume of the microphone

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation

BS_WriteXSPINOnlyModeConfig / BS_ReadXSPINOnlyModeConfig

You can write/read the PIN Only mode configuration of a X-Station using **BS_WriteXSPINOnlyModeConfig / BS_ReadXSPINOnlyModeConfig**.

BS_RET_CODE BS_WriteXSPINOnlyModeConfig(int handle, XSPINOnlyModeConfig* config)
BS_RET_CODE BS_ReadFSInterphoneConfig(int handle, XSPINOnlyModeConfig* config)

Parameters

handle

Handle of the communication channel.

config

XSPINOnlyConfig is defined as follows;

```
typedef struct {
    enum
    {
        NOT_USE = 0,
        USE = 1,

        MAX_GLOBAL_PIN_LEN = 8,
};

    unsigned char usePINOnlyMode;

    char globalPIN1[MAX_GLOBAL_PIN_LEN];
    char globalPIN2[MAX_GLOBAL_PIN_LEN];
    char globalPIN3[MAX_GLOBAL_PIN_LEN];
} XSPINOnlyModeConfig;
```

The key fields and their available options are as follows;

XSPINOnlyModeConfig	
Fields	**Options**
usePINOnlyMode	User can choose PIN Only Mode to disable or enable (NOT_USE or USE).
`globalPIN1`	Specify a password1.
`globalPIN2`	specify a password2.
`globalPIN3`	specify a password3

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

X-Station

BS_WriteConfig / BS_ReadConfig for BioEntry Plus

You can write/read the configuration of a BioEntry Plus, BioEntry W or BioLite Net using **BS_WriteConfig / BS_ReadConfig**. The structures related to BioEntry Plus are described in this section. Those related to BioLite Net will be explained in the next section.

BS_RET_CODE BS_WriteConfig(int handle, int configType, int size, void* data)
BS_RET_CODE BS_ReadConfig(int handle, int configType, int* size, void* data)

Parameters

handle

Handle of the communication channel.

configType

The configuration types and their corresponding data structures are as follows.

Device	Configuration Type	Structure
Xpass,	BEPLUS_CONFIG	BEConfigData
	BEPLUS_CONFIG_SYS_INFO	BESysInfoData
	BEPLUS_CONFIG_CARD_READER	BSCardReaderConfigData
Xpass Slim	BEPLUS_CONFIG	BEConfigData
	BEPLUS_CONFIG_SYS_INFO	BESysInfoData
	BEPLUS_CONFIG_CARD_READER	BSCardReaderConfigData
BioEntry Plus	BEPLUS_CONFIG	BEConfigData
	BEPLUS_CONFIG_SYS_INFO	BESysInfoData
	BEPLUS_CONFIG_CARD_READER	BSCardReaderConfigData
BioEntry W	BEPLUS_CONFIG	BEConfigData
	BEPLUS_CONFIG_SYS_INFO	BESysInfoData
	BEPLUS_CONFIG_CARD_READER	BSCardReaderConfigData
BioLite Net	BIOLITE_CONFIG	BEConfigDataBLN
	BIOLITE_CONFIG_SYS_INFO	BESysInfoDataBLN
	BIOLITE_CONFIG_CARD_READER	BSCardReaderConfigData

Please note that BEPLUS_CONFIG_SYS_INFO and BIOLITE_CONFIG_SYS_INFO are read-only. You cannot change the system information using

BS_WriteConfig.

size

Size of the configuration data.

data

Pointer to the configuration data. **BEConfigData**, **BESysInfoData,** and **BSCardReaderConfigData** are defined as follows;

```
struct BEOutputPattern {
    int repeat; // 0: indefinite, -1: don't user
    int arg[MAX_ARG]; // color for LED, frequency for Buzzer, -1 for last
    short high[MAX_ARG]; // msec
    short low[MAX_ARG]; // msec
};

struct BELEDBuzzerConfig {
    int reserved[4];
    BEOutputPattern ledPattern[MAX_SIGNAL];
    BEOutputPattern buzzerPattern[MAX_SIGNAL];
    unsigned short signalReserved[MAX_SIGNAL];
};

typedef struct {
    unsigned cardID;
    unsigned char customID;
    unsigned char commandType;
    unsigned char needAdminFinger;
    unsigned char reserved;
    unsigned fullCardCustomID;
} BECommandCard;

typedef struct {
    // header
    unsigned magicNo;
    int version;
    unsigned timestamp;
    unsigned checksum;
    int headerReserved[4];
    // operation mode
    int opMode[4];
    int opModeSchedule[4];
    unsigned char opDualMode[4];
    int opModePerUser; /* PROHIBITED, ALLOWED */
    unsigned char useWiegandCardBypass; // 1 - use, 0 - not use
    unsigned char dualModeOption; //1 - use, 0 - not use
    unsigned char opReserved1[2];
```

```
int opReserved[6];
bool useDHCP;
unsigned ipAddr;
unsigned gateway;
unsigned subnetMask;
unsigned serverIpAddr;
int port;
bool useServer;
bool synchTime;
int support100BaseT;
int ipReserved[7];
// fingerprint
int securityLevel;
int fastMode;
int fingerReserved1
int timeout; // 1 ~ 20 sec
int matchTimeout; // Infinite(0) ~ 10 sec
int templateType;
int fakeDetection;
bool useServerMatching;
int fingerReserved[8];
// I/O
BSInputConfig inputConfig;
BSOutputConfig outputConfig;
BSDoorConfig doorConfig;
int liftRelayDuration; // 1 ~ 20 sec
unsigned char ioReserved1[2];
unsigned char isFireAlarm;
unsigned char ioReserved2;
int ioReserved;
//extended serial
unsigned hostID;
unsigned slaveIDEx[MAX_485_DEVICE];
unsigned slaveType;   // 0 : BST, 1 : BEPL
// serial
int serialMode;
int serialBaudrate;
unsigned char serialReserved1;
unsigned char secureIO; // 0x01 - Secure I/O 0, 0x02, 0x04, 0x08
unsigned char useTermination;
unsigned char serialReserved2[5];
unsigned slaveID; // 0 for no slave
int reserved1[17];
// entrance limit
int minEntryInterval; // 0 for no limit
int numOfEntranceLimit; // MAX 4
```

```
        int maxEntry[4]; // 0 (no limit) ~ 16
        unsigned entryLimitInterval[4];
        int bypassGroupId;
        int entranceLimitReserved[7];
        // command card
        int numOfCommandCard;
        BECommandCard commandCard[MAX_COMMAND_CARD];
        int commandCardReserved[3];
        // tna
        int tnaMode;
        int autoInSchedule;
        int autoOutSchedule;
        int tnaReserved[5];
        // user
        int defaultAG;
        int userReserved[7];
        int reserved2[22];
        // wiegand
        bool useWiegandOutput;
        int useWiegandInput;
        int wiegandMode;
        unsigned wiegandReaderID;
        int wiegandReserved[3];
        int wiegandIdType;
        BSWiegandConfig wiegandConfig;
        // LED/Buzzer
        BELEDBuzzerConfig ledBuzzerConfig;
        int reserved3[38];
        int cardIdFormatType;
        int cardIdByteOrder;
        int cardIdBitOrder;
        int padding[174];
    } BEConfigData;

    typedef struct {
        unsigned magicNo;
        int version;
        unsigned timestamp;
        unsigned checksum;
        int headerReserved[4];
        unsigned ID;
        unsigned char macAddr[8];
        char boardVer[16];
        char firmwareVer[16];
        char productName[32];
        int reserved[32];
```

```
} BESysInfoData

struct BSCardReaderDoorConfig {
    int numOfCardReader;
    unsigned readerID[MAX_READER];
    BSDoor door[MAX_READER];
    int apbType;
    int apbResetTime;
};

struct BSCardReaderInputConfig {
    int numOfCardReader;
    unsigned readerID[MAX_READER];
    BSInputConfig input[MAX_READER];
};

struct BSCardReaderOutputConfig {
    int numOfCardReader;
    unsigned readerID[MAX_READER];
    BSOutputConfig output[MAX_READER];
};

struct BSCardReaderConfigData {
   BSCardReaderInputConfig inputConfig;
   BSCardReaderOutputConfig outputConfig;
   BSCardReaderDoorConfig doorConfig;
};
```

The key fields and their available options are as follows;

BEOutputPattern You can define the output patterns, which will be used in **BELEDBuzzerConfig**.	
Fields	**Options**
repeat	The number of output signal to be emitted. 0 – indefinite -1 – not used
arg	For the LED, it specifies one of the following colors; RED, YELLOW, GREEN, CYAN, BLUE, MAGENTA, WHITE. For the buzzer, it specifies one of the following frequencies; HIGH_FREQ, MIDDLE_FREQ, LOW_FREQ.

high	The duration of high signal in milliseconds.
low	The duration of low signal in milliseconds.

BELEDBuzzerConfig

You can define the output patterns of LED or buzzer for specific events. Refer to the enumerations of **BELEDBuzzerConfig** in BS_BEPlus.h for the pre-defined event types. For example, the default patterns for normal status and authenticaion fail are defined as follows;

```
    // Normal
    // LED: Indefinitely blinking Blue(2sec)/Light Blue(2sec)
    // Buzzer: None
    ledPattern[BELEDBuzzerConfig::STATUS_NORMAL].repeat = 0;
    ledPattern[BELEDBuzzerConfig::STATUS_NORMAL].arg[0] =
BEOutputPattern::BLUE;
    ledPattern[BELEDBuzzerConfig::STATUS_NORMAL].high[0] = 2000;
    ledPattern[BELEDBuzzerConfig::STATUS_NORMAL].arg[1] =
BEOutputPattern::CYAN;
    ledPattern[BELEDBuzzerConfig::STATUS_NORMAL].high[1] = 2000;
    ledPattern[BELEDBuzzerConfig::STATUS_NORMAL].arg[2] = -1;
    buzzerPattern[BELEDBuzzerConfig::STATUS_NORMAL].repeat = -1;
    // Authentication Fail
    // LED: Red for 1 second
    // Buzzer: Three high-tone beeps
    ledPattern[BELEDBuzzerConfig::AUTH_FAIL].repeat = 1;
    ledPattern[BELEDBuzzerConfig::AUTH_FAIL].arg[0] =
BEOutputPattern::RED;
    ledPattern[BELEDBuzzerConfig::AUTH_FAIL].high[0] = 1000;
    ledPattern[BELEDBuzzerConfig::AUTH_FAIL].arg[1] = -1;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].repeat = 1;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].arg[0] =
BEOutputPattern::HIGH_FREQ;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].high[0] = 100;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].low[0] = 20;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].arg[1] =
BEOutputPattern::HIGH_FREQ;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].high[1] = 100;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].low[1] = 20;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].arg[2] =
BEOutputPattern::HIGH_FREQ;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].high[2] = 100;
```

Fields	**Options**
ledPattern	The LED output patterns for pre-defined events.

buzzerPattern	The buzzer output patterns for pre-defined events.
BECommandCard BioEntry Plus supports command cards with which you can enroll/delete users at devices directly.	
Fields	**Options**
cardID	4 byte card ID. The RF card ID is comprised of 4 byte card ID and 1 byte custom ID.
customID	1 byte custom ID of the card.
commandType	There are three types of command cards. ● ENROLL_CARD ● DELETE_CARD ● DELETE_ALL_CARD
needAdminFinger	If this option is true, an administrator should be authenticated first before enrolling/deleting users.
fullCardCustomID	4 byte custom ID which makes up the RF card ID with cardID in case iCLASS.

BEConfigData	
Fields	**Options**
magicNo version timestamp checksum	These 4 fields are for internal-use only. Users should not update these values.
Operation Mode	
opMode	Available authentication modes are as follows; CARD_OR_FINGER: Both 1:1(card + fingerprint) and 1:N(fingerprint) authentications are allowed. CARD_N_FINGER: Only 1:1(card + fingerprint) authentication is allowed. CARD_ONLY: If an enrolled card is read, access is allowed without fingerprint authentication. FINGER_ONLY: Only 1:N(fingerprint) authentication is allowed. Bypass cards are also denied in this mode.

	The default mode is CARD_OR_FINGER.
opModeSchedule	You can mix up to 4 authentication modes based on time schedules. If more than one authentication modes are used, the time schedules of them should not be overlapped.
opDualMode	If it is true, two users should be authenticated before a door is opened.
opModePerUser	If true, the **opMode** field of **BEUserHdr** will be applied to user. Otherwise, the **opMode** field of **BEConfigData** will be applied.
Ethernet	
useDHCP	Specifies if DHCP is used.
ipAddr	IP address of the device.
gateway	Gateway address.
subnetMask	Subnet mask.
port	Port number of the TCP connection.
useServer	If true, connect to the server with **serverIPAddr** and **port**. If false, open the TCP port and wait for incoming connections.
serverIPAddr	IP address of the server.
synchTime	If it is true, synchronize system clock with server when connecting to it.
Support100BaseT	If it is true, the device supports Fast Ethernet(100BASE-T).
Fingerprint	
securityLevel	Sets the security level. AUTOMATIC_NORMAL – FAR(False Acceptance Ratio) is 1/10,000 AUTOMATIC_SECURE – FAR is 1/100,000 AUTOMATIC_MORE_SECURE - FAR is 1/1,000,000
fastMode	**fastMode** can be used to shorten the 1:N matching time with little degradation of authentication performance. If it is set to FAST_MODE_AUTO, the matching speed will be adjusted automatically according to the number of enrolled templates.

	FAST_MODE_AUTO FAST_MODE_NORMAL FAST_MODE_FAST FAST_MODE_FASTER
timeout	Specifies the timeout for fingerprint input in seconds.
matchTimeout	If 1:N matching is not finished until this period, NOT_FOUND error will be returned. The default value is 3 seconds.
templateType	TEMPLATE_SUPREMA TEMPLATE_SIF – ISO 19794-2 TEMPLATE_ANSI378
fakeDetection	If true, the device will try to detect fake fingers.
useServerMatching	In server matching mode, user authentication is handled by BioStar server, not each device. To use server matching, the **useServer** of **BEConfigData** should be true.
I/O	
inputConfig	See BSWriteInputConfig.
outputConfig	See BSWriteOutputConfig.
doorConfig	See BSWriteDoorConfig.
Serial	
hostID	The ID of the host device. Note that **hostID**, **slaveIDEx**, **slaveType,** and **secureIO** will be set automatically by the device after calling **BS_Search485Slaves**. You should not set these values manually.
slaveIDEx	The IDs of slave devices connected to the RS485 network.
slaveType	The types of slave devices.
serialMode	RS485 connection of a BioEntry Plus can be used as one of the followings; SERIAL_DISABLED: not used. SERIAL_IO_HOST_EX: acts as a host device and controls all the I/O operations of Secure I/O devices and slave devices connected to the same RS485 connection. SERIAL_IO_SLAVE_EX: acts as a slave device.

	SERIAL_PC: used as a communication channel to host PC.
serialBaudrate	Specifies the baudrate of RS485 connection when serialMode is SERIAL_PC. In other cases, it is ignored.
secureIO	A Secure I/O device has an index between 0 and 3. This flag specifies which Secure I/O devices are connected to the RS485 connection. 0x01: Secure I/O 0 0x02: Secure I/O 1 0x04: Secure I/O 2 0x08: Secure I/O 3 If it is 0x07, it means that Secure I/O 0, 1, and 2 are connected. This field will be set automatically by the device after **BS_Search485Slaves** succeeds.
slaveID	Not used.
Entrance Limitation	
minEntryInterval	Entrance limitation can be applied to a single device. See **BSEntrnaceLimitationZoneProperty** for details.
numOfEntranceLimit	
maxEntry	
entryLimitInterval	
bypassGroupId	The ID of a group, the members of which can bypass the restriction of entrance limitation settings.
Command Card	
numOfCommandCard	The number of command cards enrolled to the device.
commandCard	See **BECommandCard**.
TNA	
tnaMode	The **tnaEvent** field of a log record is determined by **tnaMode** as follows;

tnaMode	tnaEvent
TNA_NONE	0xffff
TNA_FIX_IN	BS_TNA_F1
TNA_FIX_OUT	BS_TNA_F2

	TNA_AUTO: If it is in **autoInSchedule**, BS_TNA_F1. If it is in **autoOutSchedule**, BS_TNA_F2. Otherwise, 0xffff.
autoInSchedule	Specifies a schedule in which the **tnaEvent** field of a log record will be set BS_TNA_F1.
autoOutSchedule	Specifies a schedule in which the **tnaEvent** field of a log record will be set BS_TNA_F2.
User	
defaultAG	The default access group of users. It is either BSAccessGroupEx::NO_ACCESS_GROUP or BSAccessGroupEx::FULL_ACCESS_GROUP. This access group is applied to the following cases. (1) When a user has no access group. For example, if **defaultAG** is NO_ACCESS_GROUP, users without access groups are not allowed to enter. (2) When a user has invalid access group. (3) When enrolling users by command card.
Wiegand	
useWiegandOutput	If it is true, Wiegand signal will be output when authentication succeeds.
useWiegandInput	If it is true, Wiegand signal will be accepted by the BioEntry Plus.
wiegandMode	Specifies operation mode for an attached RF device via Wiegand interface. BS_IO_WIEGAND_MODE_LEGACY – legacy mode. BS_IO_WIEGAND_MODE_EXTENDED – extended mode. Refer to 2.2.4 for details.
wiegandReaderID	Specifies ID of attached RF device. Note that this should be calculated based on Wmaster ID. Refer to 2.2.4 for details.
wiegandIdType	Specifies whether the Wiegand bitstream should be interpreted as a user ID or a cardID. WIEGAND_USER

	WIEGAND_CARD
wiegandConfig	See **BS_WriteWiegandConfig**.
LED/Buzzer	
ledBuzzerConfig	See **BELEDBuzzerConfig**.
Card ID Format	
cardIdFormatType	Specifies the type of preprocessing of card ID. CARD_ID_FORMAT_NORMAL – No preprocessing. CARD_ID_FORMAT_WIEGAND – Format card ID as specified in Wiegand format.
cardIdByteOrder	Specifies whether to swap byte order of the card ID during preprocessing. CARD_ID_MSB – Byte order will not be swapped.
cardIdBitOrder	Specifies whether to swap bit order of the card ID during preprocessing. CARD_ID_MSB – Bit order will not be swapped.

BSCardReaderDoorConfig	
Fields	**Options**
numOfCardReader	Specifies the number of attached RF devices. (Currently, only one supported)
readerID	Specifies list of IDs of attached RF devices.
door	Specifies list door configurations of attached RF devices. See the descriptions of **BSDoor**.
apbType	Not used.
apbResetTime	Not used.

BSCardReaderInputConfig	
Fields	**Options**
numOfCardReader	Specifies the number of attached RF devices. (Currently, only one supported)
readerID	Specifies list of IDs of attached RF devices.
input	Specifies list input configurations of attached RF devices. See the descriptions of **BSInputConfig**.

BSCardReaderOutputConfig	
Fields	**Options**
numOfCardReader	Specifies the number of attached RF devices.

	(Currently, only one supported)
readerID	Specifies list of IDs of attached RF devices.
output	Specifies list output configurations of attached RF devices. See the descriptions of **BSOutputConfig**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioEntry Plus/BioEntry W/Xpass/Xpass Slim/Xpass S2

BS_WriteConfig / BS_ReadConfig for BioLite Net

You can write/read the configuration of a BioEntry Plus or BioLite Net using **BS_WriteConfig / BS_ReadConfig**. The structures related to BioLite Net are described in this section. For those related to BioEntry Plus, refer to the previous section.

BS_RET_CODE BS_WriteConfig(int handle, int configType, int size, void* data)
BS_RET_CODE BS_ReadConfig(int handle, int configType, int* size, void* data)

Parameters

handle

Handle of the communication channel.

configType

The configuration types and their corresponding data structures are as follows.

Device	Configuration Type	Structure
Xpass	BEPLUS_CONFIG	BEConfigData
	BEPLUS_CONFIG_SYS_INFO	BESysInfoData
	BEPLUS_CONFIG_CARD_READER	BSCardReaderConfigData
Xpass Slim	BEPLUS_CONFIG	BEConfigData
	BEPLUS_CONFIG_SYS_INFO	BESysInfoData
	BEPLUS_CONFIG_CARD_READER	BSCardReaderConfigData
BioEntry Plus	BEPLUS_CONFIG	BEConfigData
	BEPLUS_CONFIG_SYS_INFO	BESysInfoData
	BEPLUS_CONFIG_CARD_READER	BSCardReaderConfigData
BioEntry W	BEPLUS_CONFIG	BEConfigData
	BEPLUS_CONFIG_SYS_INFO	BESysInfoData
	BEPLUS_CONFIG_CARD_READER	BSCardReaderConfigData
BioLite Net	BIOLITE_CONFIG	BEConfigDataBLN
	BIOLITE_CONFIG_SYS_INFO	BESysInfoDataBLN
	BIOLITE_CONFIG_CARD_READER	BSCardReaderConfigData

Please note that BEPLUS_CONFIG_SYS_INFO and BIOLITE_CONFIG_SYS_INFO are read-only. You cannot change the system information using

BS_WriteConfig.

size

Size of the configuration data.

data

Pointer to the configuration data. **BEConfigDataBLN** and **BESysInfoDataBLN,** and **BSCardReaderConfigData** are defined as follows;

```
struct BEOutputPatternBLN {
    int repeat; // 0: indefinite, -1: don't user
    int priority; // not used
    int arg[MAX_ARG]; // color for LED, frequency for Buzzer, -1 for last
    short high[MAX_ARG]; // msec
    short low[MAX_ARG]; // msec
};

struct BELEDBuzzerConfigBLN {
    int reserved[4];
    BEOutputPatternBLN ledPattern[MAX_SIGNAL];
    BEOutputPatternBLN buzzerPattern[MAX_SIGNAL];
    BEOutputPatternBLN lcdLedPattern[MAX_SIGNAL];
    BEOutputPatternBLN keypadLedPattern[MAX_SIGNAL];
    unsigned short signalReserved[MAX_SIGNAL];
};

#define MAX_TNA_FUNCTION_KEY 16
#define MAX_TNA_EVENT_LEN 16

struct BETnaEventConfig {
    unsigned char enabled[MAX_TNA_FUNCTION_KEY];
    unsigned char useRelay[MAX_TNA_FUNCTION_KEY];
    unsigned short key[MAX_TNA_FUNCTION_KEY];  // not used
    char eventStr[MAX_TNA_FUNCTION_KEY][MAX_TNA_EVENT_LEN];
};

struct BETnaEventExConfig {
    int fixedTnaIndex;
    int manualTnaIndex;
    int timeSchedule[MAX_TNA_FUNCTION_KEY];
};

typedef struct {
    // header
    unsigned magicNo;
    int version;
    unsigned timestamp;
    unsigned checksum;
```

```
int headerReserved[4];
// operation mode
int opMode[MAX_OPMODE];
int opModeSchedule[MAX_OPMODE];
unsigned char opDualMode[MAX_OPMODE]; // DoubleMode[4];
unsigned char useWiegandCardBypass;   // 1 - use, 0 - not use
unsigned char dualModeOption; //1 - use, 0 - not use
unsigned char opReserved1;
int opModePerUser; /* PROHIBITED, ALLOWED */
int identificationMode[MAX_IDENTIFYMODE];
int identificationModeSchedule[MAX_IDENTIFYMODE];
int opReserved2[1];
// ip
bool useDHCP;
unsigned ipAddr;
unsigned gateway;
unsigned subnetMask;
unsigned serverIpAddr;
int port;
bool useServer;
bool synchTime;
int support100BaseT;
int mtuSize; // 1024 ~ 1460 byte
int ipReserved[5];
// fingerprint
int imageQuality;
int securityLevel;
int fastMode;
int fingerReserved1;
int timeout; // 1 ~ 20 sec
int matchTimeout; // Infinite(0) ~ 10 sec
int templateType;
int fakeDetection;
bool useServerMatching;
bool useCheckDuplicate;
int fingerReserved[7];
// I/O
BSInputConfig inputConfig;
BSOutputConfig outputConfig;
BSDoorConfig doorConfig;
int ioReserved1;
unsigned char ioReserved2[2];
unsigned char isFireAlarm;
unsigned char ioReserved3;
int ioReserved4;      //extended serial
unsigned hostID;
```

```
unsigned slaveIDEx[MAX_485_DEVICE];
unsigned slaveType;   // 0 : BST, 1 : BEPL
// serial
int serialMode;
int serialBaudrate;
unsigned char serialReserved1;
unsigned char secureIO; // 0x01 - Secure I/O 0, 0x02, 0x04, 0x08
unsigned char serialReserved2[6];
unsigned slaveID; // 0 for no slave
int reserved1[17];
// entrance limit
int minEntryInterval; // 0 for no limit
int numOfEntranceLimit; // MAX 4
int maxEntry[4]; // 0 (no limit) ~ 16
unsigned entryLimitInterval[4];
int bypassGroupId;
int entranceLimitReserved[7];
// command card: NOT USED for BioLite Net
int numOfCommandCard;
BECommandCard commandCard[MAX_COMMAND_CARD];
int commandCardReserved[3];
// tna
int tnaMode;
int autoInSchedule; // not used
int autoOutSchedule; // not used
int tnaChange;
int tnaReserved[4];
// user
int defaultAG;
int userReserved[7];
int reserved2[22];
// wiegand
bool useWiegandOutput;
bool useWiegandInput;
int wiegandMode;
unsigned wiegandReaderID;
int wiegandReserved[3];
int wiegandIdType;
BSWiegandConfig wiegandConfig;
// LED/Buzzer
BELEDBuzzerConfigBLN ledBuzzerConfig;
int reserved3[38];
int backlightMode;
int soundMode;
// Tna Event
BETnaEventConfig tnaEventConfig;
```

```
        BETnaEventExConfig tnaEventExConfig;
        int reserved4[3];
        int cardIdFormatType;
        int cardIdByteOrder;
        int cardIdBitOrder;
        int padding[57];
    } BEConfigDataBLN;

    typedef struct {
        unsigned magicNo;
        int version;
        unsigned timestamp;
        unsigned checksum;
        int headerReserved[4];
        unsigned ID;
        unsigned char macAddr[8];
        char boardVer[16];
        char firmwareVer[16];
        char productName[32];
        int language;
        int reserved[31];
    } BESysInfoDataBLN;

    struct BSCardReaderDoorConfig {
        int numOfCardReader;
        unsigned readerID[MAX_READER];
        BSDoor door[MAX_READER];
        int apbType;
        int apbResetTime;
    };

    struct BSCardReaderInputConfig {
        int numOfCardReader;
        unsigned readerID[MAX_READER];
        BSInputConfig input[MAX_READER];
    };

    struct BSCardReaderOutputConfig {
        int numOfCardReader;
        unsigned readerID[MAX_READER];
        BSOutputConfig output[MAX_READER];
    };

    struct BSCardReaderConfigData {
       BSCardReaderInputConfig inputConfig;
       BSCardReaderOutputConfig outputConfig;
```

```
    BSCardReaderDoorConfig doorConfig;
};
```

The key fields and their available options are as follows;

BEOutputPatternBLN You can define the output patterns, which will be used in **BELEDBuzzerConfigBLN**.	
Fields	**Options**
repeat	The number of output signal to be emitted. 0 – indefinite -1 – not used
arg	For the LED, it specifies one of the following colors; RED, YELLOW, GREEN, CYAN, BLUE, MAGENTA, WHITE. For the buzzer, it specifies one of the following frequencies; HIGH_FREQ, MIDDLE_FREQ, LOW_FREQ. For the LCD, it specifies wheter the background LED is turned on or off; OFF, ON For the keypad, it specifies which background of the keys are turned on; NUMERIC, OK_ARROW
high	The duration of high signal in milliseconds.
low	The duration of low signal in milliseconds.

BELEDBuzzerConfigBLN

You can define the output patterns of LED or buzzer for specific events. Refer to the enumerations of **BELEDBuzzerConfigBLN** in BS_BEPlus.h for the pre-defined event types. For example, the default patterns for normal status and authenticaion fail are defined as follows;

```
    // Normal
    // LED: Indefinitely blinking Blue(2sec)/Light Blue(2sec)
    // Buzzer: None
    ledPattern[BELEDBuzzerConfigBLN::STATUS_NORMAL].repeat = 0;
    ledPattern[BELEDBuzzerConfigBLN::STATUS_NORMAL].arg[0] =
BEOutputPatternBLN::BLUE;
    ledPattern[BELEDBuzzerConfigBLN::STATUS_NORMAL].high[0] =
2000;
```

```
    ledPattern[BELEDBuzzerConfigBLN::STATUS_NORMAL].arg[1] =
BEOutputPatternBLN::CYAN;
    ledPattern[BELEDBuzzerConfigBLN::STATUS_NORMAL].high[1] =
2000;
    ledPattern[BELEDBuzzerConfigBLN::STATUS_NORMAL].arg[2] = -1;
    buzzerPattern[BELEDBuzzerConfigBLN::STATUS_NORMAL].repeat = -
1;
    // Authentication Fail
    // LED: Red for 1 second
    // Buzzer: Three high-tone beeps
    ledPattern[BELEDBuzzerConfigBLN::AUTH_FAIL].repeat = 1;
    ledPattern[BELEDBuzzerConfigBLN::AUTH_FAIL].arg[0] =
BEOutputPatternBLN::RED;
    ledPattern[BELEDBuzzerConfigBLN::AUTH_FAIL].high[0] = 1000;
    ledPattern[BELEDBuzzerConfigBLN::AUTH_FAIL].arg[1] = -1;
    buzzerPattern[BELEDBuzzerConfigBLN::AUTH_FAIL].repeat = 1;
    buzzerPattern[BELEDBuzzerConfigBLN::AUTH_FAIL].arg[0] =
BEOutputPatternBLN::HIGH_FREQ;
    buzzerPattern[BELEDBuzzerConfigBLN::AUTH_FAIL].high[0] = 100;
    buzzerPattern[BELEDBuzzerConfigBLN::AUTH_FAIL].low[0] = 20;
    buzzerPattern[BELEDBuzzerConfigBLN::AUTH_FAIL].arg[1] =
BEOutputPatternBLN::HIGH_FREQ;
    buzzerPattern[BELEDBuzzerConfigBLN::AUTH_FAIL].high[1] = 100;
    buzzerPattern[BELEDBuzzerConfigBLN::AUTH_FAIL].low[1] = 20;
    buzzerPattern[BELEDBuzzerConfigBLN::AUTH_FAIL].arg[2] =
BEOutputPatternBLN::HIGH_FREQ;
    buzzerPattern[BELEDBuzzerConfigBLN::AUTH_FAIL].high[2] = 100;
```

Fields	**Options**
ledPattern	The LED output patterns for pre-defined events.
buzzerPattern	The buzzer output patterns for pre-defined events.
lcdLedPattern	The LCD background patterns for pre-defined events.
keypadLedPattern	The keypad background patterns for pre-defined events.

BETnaEventConfig	
Fields	**Options**
enabled	Specifies if this TNA evet is used.
useRelay	If true, turn on the relay after authentication succeeds.
eventStr	Event string which will be used for showing log

	records. It should be in UTF-16 format.

BETnaEventExConfig The settings are effective only if the **tnaMode** of **BEConfigDataBLN** is set to BS_TNA_FUNCTION_KEY.	
Fields	**Options**
fixedTnaIndex	Specifies the fixed TNA event. It is effective only if the **tnaChange** field of **BEConfigDataBLN** is BS_TNA_FIXED.
manualTnaIndex	Reserved for future use.
timeSchedule	Schedules for each TNA event. It is effective only if the **tnaChange** field of **BEConfigDataBLN** is BS_TNA_AUTO_CHANGE.

BEConfigDataBLN	
Fields	**Options**
magicNo version timestamp checksum	These 4 fields are for internal-use only. Users should not update these values.
<u>Operation Mode</u>	
opMode	The semantics of operation modes are different from those of BioEntry Plus and BioStation. Available authentication modes are as follows; FINGER_ONLY: users have to authenticate his fingerprint. PASSWORD_ONLY: users have to authenticate his password. FINGER_OR_PASSWORD: users have to authenticate his fingerprint or password. FINGER_AND_PASSWORD: users have to authenticate his fingerprint and password. CARD_ONLY: If an enrolled card is read, access is allowed without fingerprint or password authentication. The default mode is FINGER_ONLY.
opModeSchedule	You can mix up to 4 authentication modes based on

	time schedules. If more than one authentication modes are used, the time schedules of them should not be overlapped.
opDualMode	If it is true, two users should be authenticated before a door is opened.
opModePerUser	If true, the **opMode** field of **BEUserHdr** will be applied to user. Otherwise, the **opMode** field of **BEConfigDataBLN** will be applied.
identificationMode	It specifies how to initiate 1:N authentication. OP_1TON_FREESCAN: 1:N mode is started as soon as user place his finger on the sensor. OP_1TON_OK_KEY: User has to press the OK button first before scanning his finger. OP_1TON_NONE: 1:N mode is disabled.
identificationMode Schedule	You can mix up to 3 identification modes based on time schedules. If more than one identification modes are used, the time schedules of them should not be overlapped.
Ethernet	
useDHCP	Specifies if DHCP is used.
ipAddr	IP address of the device.
gateway	Gateway address.
subnetMask	Subnet mask.
port	Port number of the TCP connection.
useServer	If true, connect to the server with **serverIPAddr** and **port**. If false, open the TCP port and wait for incoming connections.
serverIPAddr	IP address of the server.
synchTime	If true, synchronize system clock with server when connecting to it.
Support100BaseT	If it is true, the device supports Fast Ethernet(100BASE-T).
Fingerprint	
securityLevel	Sets the security level. AUTOMATIC_NORMAL – FAR(False Acceptance Ratio) is 1/10,000

	AUTOMATIC_SECURE – FAR is 1/100,000 AUTOMATIC_MORE_SECURE - FAR is 1/1,000,000
fastMode	**fastMode** can be used to shorten the 1:N matching time with little degradation of authentication performance. If it is set to FAST_MODE_AUTO, the matching speed will be adjusted automatically according to the number of enrolled templates. FAST_MODE_AUTO FAST_MODE_NORMAL FAST_MODE_FAST FAST_MODE_FASTER
timeout	Specifies the timeout for fingerprint input in seconds.
matchTimeout	If 1:N matching is not finished until this period, NOT_FOUND error will be returned. The default value is 3 seconds.
templateType	TEMPLATE_SUPREMA TEMPLATE_SIF – ISO 19794-2 TEMPLATE_ANSI378
fakeDetection	If true, the device will try to detect fake fingers.
useServerMatching	In server matching mode, user authentication is handled by BioStar server, not each device. To use server matching, the **useServer** of **BEConfigData** should be true.
useCheckDuplicate	If true, the device will check if the same fingerprint was registered already before enrolling new users.
I/O	
inputConfig	See BSWriteInputConfig.
outputConfig	See BSWriteOutputConfig.
doorConfig	See BSWriteDoorConfig.
Serial	
hostID	The ID of the host device. Note that **hostID**, **slaveIDEx**, **slaveType,** and **secureIO** will be set automatically by the device after calling **BS_Search485Slaves**. You should not set these values manually.

slaveIDEx	The IDs of slave devices connected to the RS485 network.
slaveType	The types of slave devices.
serialMode	RS485 connection of a BioEntry Plus can be used as one of the followings; SERIAL_DISABLED: not used. SERIAL_IO_HOST_EX: acts as a host device and controls all the I/O operations of Secure I/O devices and slave devices connected to the same RS485 connection. SERIAL_IO_SLAVE_EX: acts as a slave device. SERIAL_PC: used as a communication channel to host PC.
serialBaudrate	Specifies the baudrate of RS485 connection when serialMode is SERIAL_PC. In other cases, it is ignored.
secureIO	A Secure I/O device has an index between 0 and 3. This flag specifies which Secure I/O devices are connected to the RS485 connection. 0x01: Secure I/O 0 0x02: Secure I/O 1 0x04: Secure I/O 2 0x08: Secure I/O 3 If it is 0x07, it means that Secure I/O 0, 1, and 2 are connected. This field will be set automatically by the device after **BS_Search485Slaves** succeeds.
slaveID	Not used.
useTermination	If it is true, the device uses the termination resistance for RS485.
Entrance Limitation	
minEntryInterval	Entrance limitation can be applied to a single device. See **BSEntrnaceLimitationZoneProperty** for details.
numOfEntranceLimit	
maxEntry	
entryLimitInterval	
bypassGroupId	The ID of a group, the members of which can bypass the restriction of entrance limitation settings.
TNA	

tnaMode	BS_TNA_DISABLE – TNA is disabled. BS_TNA_FUNCTION_KEY – TNA function keys are enabled. With this mode, the **tnaChange** field is effective. BS_TNA_AUTO – TNA events are selected by left and right arrow keys.
tnaChange	BS_TNA_AUTO_CHANGE – TNA event is changed automatically according to the schedule defined in **BETnaEventExConfig**. BS_TNA_MANUAL_CHANGE – TNA event is changed manually by arrow keys. BS_TNA_FIXED – TNA event is fixed to the **fixedTnaIndex** of **BETnaEventExConfig**.
User	
defaultAG	The default access group of users. It is either BSAccessGroupEx::NO_ACCESS_GROUP or BSAccessGroupEx::FULL_ACCESS_GROUP. This access group is applied to the following cases. (1) When a user has no access group. For example, if **defaultAG** is NO_ACCESS_GROUP, users without access groups are not allowed to enter. (2) When a user has invalid access group. (3) When enrolling users by command card.
Wiegand	
useWiegandOutput	If it is true, Wiegand signal will be output when authentication succeeds.
useWiegandInput	If it is true, Wiegand signal will be accepted by the BioLite Net.
wiegandMode	Specifies operation mode for an attached RF device via Wiegand interface. BS_IO_WIEGAND_MODE_LEGACY – legacy mode. BS_IO_WIEGAND_MODE_EXTENDED – extended mode. Refer to 2.2.4 for details.
wiegandReaderID	Specifies ID of attached RF device. Note that this should be calculated based on Wmaster ID. Refer to 2.2.4 for details.

wiegandIdType	Specifies whether the Wiegand bitstream should be interpreted as a user ID or a cardID. WIEGAND_USER WIEGAND_CARD
wiegandConfig	See **BS_WriteWiegandConfig**.
LED/Buzzer	
ledBuzzerConfig	See **BELEDBuzzerConfigBLN**.
Misc.	
backlightMode	ALWAYS_ON ALWAYS_OFF ON_AT_USE – triggered by user input
soundMode	ALWAYS_ON ALWAYS_OFF
TNA Ex.	
tnaEventConfig	See **BETnaEventConfig**.
tnaEventExConfig **Card ID Format** cardIdFormatType cardIdByteOrder cardIdBitOrder	See **BETnaEventExConfig**. Specifies the type of preprocessing of card ID. CARD_ID_FORMAT_NORMAL – No preprocessing. CARD_ID_FORMAT_WIEGAND – Format card ID as specified in Wiegand format. Specifies whether to swap byte order of the card ID during preprocessing. CARD_ID_MSB – Byte order will not be swapped. Specifies whether to swap bit order of the card ID during preprocessing. CARD_ID_MSB – Bit order will not be swapped.

BSCardReaderDoorConfig	
Fields	**Options**
numOfCardReader	Specifies the number of attached RF devices. (Currently, only one supported)
readerID	Specifies list of IDs of attached RF devices.
door	Specifies list door configurations of attached RF devices. See the descriptions of **BSDoor**.
apbType	Not used.

apbResetTime	Not used.
BSCardReaderInputConfig	
Fields	**Options**
numOfCardReader readerID input	Specifies the number of attached RF devices. (Currently, only one supported) Specifies list of IDs of attached RF devices. Specifies list input configurations of attached RF devices. See the descriptions of **BSInputConfig**.
BSCardReaderOutputConfig	
Fields	**Options**
numOfCardReader readerID output	Specifies the number of attached RF devices. (Currently, only one supported) Specifies list of IDs of attached RF devices. Specifies list output configurations of attached RF devices. See the descriptions of **BSOutputConfig**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioLite Net

BS_WriteConfig / BS_ReadConfig for Xpass and Xpass Slim

You can write/read the configuration of a BioEntry Plus or BioLite Net using **BS_WriteConfig / BS_ReadConfig**. The structures related to BioEntry Plus are described in this section. Those related to BioLite Net will be explained in the next section.

BS_RET_CODE BS_WriteConfig(int handle, int configType, int size, void* data)
BS_RET_CODE BS_ReadConfig(int handle, int configType, int* size, void* data)

Parameters

handle

Handle of the communication channel.

configType

The configuration types and their corresponding data structures are as follows.

Device	Configuration Type	Structure
Xpass	BEPLUS_CONFIG	BEConfigData
	BEPLUS_CONFIG_SYS_INFO	BESysInfoData
	BEPLUS_CONFIG_CARD_READER	BSCardReaderConfigData
Xpass Slim	BEPLUS_CONFIG	BEConfigData
	BEPLUS_CONFIG_SYS_INFO	BESysInfoData
	BEPLUS_CONFIG_CARD_READER	BSCardReaderConfigData
BioEntry Plus	BEPLUS_CONFIG	BEConfigData
	BEPLUS_CONFIG_SYS_INFO	BESysInfoData
	BEPLUS_CONFIG_CARD_READER	BSCardReaderConfigData
BioEntry W	BEPLUS_CONFIG	BEConfigData
	BEPLUS_CONFIG_SYS_INFO	BESysInfoData
	BEPLUS_CONFIG_CARD_READER	BSCardReaderConfigData
BioLite Net	BIOLITE_CONFIG	BEConfigDataBLN
	BIOLITE_CONFIG_SYS_INFO	BESysInfoDataBLN
	BIOLITE_CONFIG_CARD_READER	BSCardReaderConfigData

Please note that BEPLUS_CONFIG_SYS_INFO and BIOLITE_CONFIG_SYS_INFO are read-only. You cannot change the system information using

BS_WriteConfig.

size

Size of the configuration data.

data

Pointer to the configuration data. **BEConfigData**, **BESysInfoData,** and **BSCardReaderConfigData** are defined as follows;

```
struct BEOutputPattern {
    int repeat; // 0: indefinite, -1: don't user
    int arg[MAX_ARG]; // color for LED, frequency for Buzzer, -1 for last
    short high[MAX_ARG]; // msec
    short low[MAX_ARG]; // msec
};

struct BELEDBuzzerConfig {
    int reserved[4];
    BEOutputPattern ledPattern[MAX_SIGNAL];
    BEOutputPattern buzzerPattern[MAX_SIGNAL];
    unsigned short signalReserved[MAX_SIGNAL];
};

typedef struct {
    unsigned cardID;
    unsigned char customID;
    unsigned char commandType;
    unsigned char needAdminFinger;
    unsigned char reserved[5];
} BECommandCard;

typedef struct {
    // header
    unsigned magicNo;
    int version;
    unsigned timestamp;
    unsigned checksum;
    int headerReserved[4];
    // operation mode
    int opMode[4];
    int opModeSchedule[4];
    unsigned char opDualMode[4];
    int opModePerUser; /* PROHIBITED, ALLOWED */
    unsigned char useWiegandCardBypass; // 1 - use, 0 - not use
    unsigned char dualModeOption; //1 - use, 0 - not use
    unsigned char opReserved1[2];
    int opReserved2[6];
```

```
int opReserved[6];
bool useDHCP;
unsigned ipAddr;
unsigned gateway;
unsigned subnetMask;
unsigned serverIpAddr;
int port;
bool useServer;
bool synchTime;
int support100BaseT;
int mtuSize; // 1024 ~ 1460 byte
int ipReserved[6];
// fingerprint
char reserved3[1];
int reserved4[15];
// I/O
BSInputConfig inputConfig;
BSOutputConfig outputConfig;
BSDoorConfig doorConfig;
int liftRelayDuration; // 1 ~ 20 sec
unsigned char ioReserved1[2];
unsigned char isFireAlarm;
unsigned char ioReserved2;
int ioReserved;
//extended serial
unsigned hostID;
unsigned slaveIDEx[MAX_485_DEVICE];
unsigned slaveType;   // 0 : BST, 1 : BEPL
// serial
int serialMode;
int serialBaudrate;
unsigned char serialReserved1;
unsigned char secureIO; // 0x01 - Secure I/O 0, 0x02, 0x04, 0x08
unsigned char useTermination;
unsigned char serialReserved2[5];
unsigned slaveID; // 0 for no slave
int reserved1[17];
// entrance limit
int minEntryInterval; // 0 for no limit
int numOfEntranceLimit; // MAX 4
int maxEntry[4]; // 0 (no limit) ~ 16
unsigned entryLimitInterval[4];
int bypassGroupId;
int entranceLimitReserved[7];
// command card
int numOfCommandCard;
```

```
        BECommandCard commandCard[MAX_COMMAND_CARD];
        int commandCardReserved[3];
        // tna
        int tnaMode;
        int autoInSchedule;
        int autoOutSchedule;
        int tnaReserved[5];
        // user
        int defaultAG;
        int userReserved[7];
        int reserved2[22];
        // wiegand
        bool useWiegandOutput;
        int useWiegandInput;
        int wiegandMode;
        unsigned wiegandReaderID;
        int wiegandReserved[3];
        int wiegandIdType;
        BSWiegandConfig wiegandConfig;
        // LED/Buzzer
        BELEDBuzzerConfig ledBuzzerConfig;
        int reserved3[38];
        int cardIdFormatType;
        int cardIdByteOrder;
        int cardIdBitOrder;
        int padding[174];
    } BEConfigData;

    typedef struct {
        unsigned magicNo;
        int version;
        unsigned timestamp;
        unsigned checksum;
        int headerReserved[4];
        unsigned ID;
        unsigned char macAddr[8];
        char boardVer[16];
        char firmwareVer[16];
        char productName[32];
        int reserved[32];
    } BESysInfoData

    struct BSCardReaderDoorConfig {
        int numOfCardReader;
        unsigned readerID[MAX_READER];
        BSDoor door[MAX_READER];
```

```
    int apbType;
    int apbResetTime;
};

struct BSCardReaderInputConfig {
    int numOfCardReader;
    unsigned readerID[MAX_READER];
    BSInputConfig input[MAX_READER];
};

struct BSCardReaderOutputConfig {
    int numOfCardReader;
    unsigned readerID[MAX_READER];
    BSOutputConfig output[MAX_READER];
};

struct BSCardReaderConfigData {
   BSCardReaderInputConfig inputConfig;
   BSCardReaderOutputConfig outputConfig;
   BSCardReaderDoorConfig doorConfig;
};
```

The key fields and their available options are as follows;

BEOutputPattern You can define the output patterns, which will be used in **BELEDBuzzerConfig**.	
Fields	**Options**
repeat	The number of output signal to be emitted. 0 – indefinite -1 – not used
arg	For the LED, it specifies one of the following colors; RED, YELLOW, GREEN, CYAN, BLUE, MAGENTA, WHITE. For the buzzer, it specifies one of the following frequencies; HIGH_FREQ, MIDDLE_FREQ, LOW_FREQ.
high	The duration of high signal in milliseconds.
low	The duration of low signal in milliseconds.

BELEDBuzzerConfig You can define the output patterns of LED or buzzer for specific

events. Refer to the enumerations of **BELEDBuzzerConfig** in BS_BEPlus.h for the pre-defined event types. For example, the default patterns for normal status and authenticaion fail are defined as follows;

```
    // Normal
    // LED: Indefinitely blinking Blue(2sec)/Light Blue(2sec)
    // Buzzer: None
    ledPattern[BELEDBuzzerConfig::STATUS_NORMAL].repeat = 0;
    ledPattern[BELEDBuzzerConfig::STATUS_NORMAL].arg[0] =
BEOutputPattern::BLUE;
    ledPattern[BELEDBuzzerConfig::STATUS_NORMAL].high[0] = 2000;
    ledPattern[BELEDBuzzerConfig::STATUS_NORMAL].arg[1] =
BEOutputPattern::CYAN;
    ledPattern[BELEDBuzzerConfig::STATUS_NORMAL].high[1] = 2000;
    ledPattern[BELEDBuzzerConfig::STATUS_NORMAL].arg[2] = -1;
    buzzerPattern[BELEDBuzzerConfig::STATUS_NORMAL].repeat = -1;
    // Authentication Fail
    // LED: Red for 1 second
    // Buzzer: Three high-tone beeps
    ledPattern[BELEDBuzzerConfig::AUTH_FAIL].repeat = 1;
    ledPattern[BELEDBuzzerConfig::AUTH_FAIL].arg[0] =
BEOutputPattern::RED;
    ledPattern[BELEDBuzzerConfig::AUTH_FAIL].high[0] = 1000;
    ledPattern[BELEDBuzzerConfig::AUTH_FAIL].arg[1] = -1;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].repeat = 1;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].arg[0] =
BEOutputPattern::HIGH_FREQ;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].high[0] = 100;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].low[0] = 20;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].arg[1] =
BEOutputPattern::HIGH_FREQ;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].high[1] = 100;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].low[1] = 20;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].arg[2] =
BEOutputPattern::HIGH_FREQ;
    buzzerPattern[BELEDBuzzerConfig::AUTH_FAIL].high[2] = 100;
```

Fields	Options
ledPattern	The LED output patterns for pre-defined events.
buzzerPattern	The buzzer output patterns for pre-defined events.

BECommandCard

Xpass supports command cards with which you can enroll/delete users

at devices directly.	
Fields	**Options**
cardID	4 byte card ID. The RF card ID is comprised of 4 byte card ID and 1 byte custom ID.
customID	1 byte custom ID of the card.
commandType	There are three types of command cards. ● ENROLL_CARD ● DELETE_CARD ● DELETE_ALL_CARD
needAdminFinger	If this option is true, an administrator should be authenticated first before enrolling/deleting users.

BEConfigData	
Fields	**Options**
magicNo version timestamp checksum	These 4 fields are for internal-use only. Users should not update these values.
Operation Mode	
opMode	Available authentication modes are as follows; CARD_ONLY: If an enrolled card is read, access is allowed.
opModeSchedule	You can mix up to 4 authentication modes based on time schedules. If more than one authentication modes are used, the time schedules of them should not be overlapped.
opDualMode	If it is true, two users should be authenticated before a door is opened.
opModePerUser	Not used.
Ethernet	
useDHCP	Specifies if DHCP is used.
ipAddr	IP address of the device.
gateway	Gateway address.
subnetMask	Subnet mask.

port	Port number of the TCP connection.
useServer	If true, connect to the server with **serverIPAddr** and **port**. If false, open the TCP port and wait for incoming connections.
serverIPAddr	IP address of the server.
synchTime	If true, synchronize system clock with server when connecting to it.
Support100BaseT	If it is true, the device supports Fast Ethernet(100BASE-T).
Fingerprint	
securityLevel	Not used.
fastMode	Not used.
timeout	Not used.
matchTimeout	Not used.
templateType	Not used.
fakeDetection	Not used.
useServerMatching	Not used.
I/O	
inputConfig	See BSWriteInputConfig.
outputConfig	See BSWriteOutputConfig.
doorConfig	See BSWriteDoorConfig.
Serial	
hostID	The ID of the host device. Note that **hostID**, **slaveIDEx**, **slaveType,** and **secureIO** will be set automatically by the device after calling **BS_Search485Slaves**. You should not set these values manually.
slaveIDEx	The IDs of slave devices connected to the RS485 network.
slaveType	The types of slave devices.
serialMode	RS485 connection of a BioEntry Plus can be used as one of the followings; SERIAL_DISABLED: not used. SERIAL_IO_HOST_EX: acts as a host device and controls all the I/O operations of Secure I/O devices and

	slave devices connected to the same RS485 connection. SERIAL_IO_SLAVE_EX: acts as a slave device. SERIAL_PC: used as a communication channel to host PC.
serialBaudrate	Specifies the baudrate of RS485 connection when serialMode is SERIAL_PC. In other cases, it is ignored.
secureIO	A Secure I/O device has an index between 0 and 3. This flag specifies which Secure I/O devices are connected to the RS485 connection. 0x01: Secure I/O 0 0x02: Secure I/O 1 0x04: Secure I/O 2 0x08: Secure I/O 3 If it is 0x07, it means that Secure I/O 0, 1, and 2 are connected. This field will be set automatically by the device after **BS_Search485Slaves** succeeds.
slaveID	Not used.
Entrance Limitation	
minEntryInterval	Entrance limitation can be applied to a single device. See **BSEntrnaceLimitationZoneProperty** for details.
numOfEntranceLimit	
maxEntry	
entryLimitInterval	
bypassGroupId	The ID of a group, the members of which can bypass the restriction of entrance limitation settings.
Command Card	
numOfCommandCard	The number of command cards enrolled to the device.
commandCard	See **BECommandCard**.
TNA	
tnaMode	The **tnaEvent** field of a log record is determined by **tnaMode** as follows; tnaMode: TNA_NONE — tnaEvent: 0xffff

	TNA_FIX_IN: BS_TNA_F1 TNA_FIX_OUT: BS_TNA_F2 TNA_AUTO: If it is in **autoInSchedule**, BS_TNA_F1. If it is in **autoOutSchedule**, BS_TNA_F2. Otherwise, 0xffff.
autoInSchedule	Specifies a schedule in which the **tnaEvent** field of a log record will be set BS_TNA_F1.
autoOutSchedule	Specifies a schedule in which the **tnaEvent** field of a log record will be set BS_TNA_F2.
User	
defaultAG	The default access group of users. It is either BSAccessGroupEx::NO_ACCESS_GROUP or BSAccessGroupEx::FULL_ACCESS_GROUP. This access group is applied to the following cases. (1) When a user has no access group. For example, if **defaultAG** is NO_ACCESS_GROUP, users without access groups are not allowed to enter. (2) When a user has invalid access group. (3) When enrolling users by command card.
Wiegand	
useWiegandOutput	If it is true, Wiegand signal will be output when authentication succeeds.
useWiegandInput	If it is true, Wiegand signal will be accepted by the BioEntry Plus.
wiegandMode	Specifies operation mode for an attached RF device via Wiegand interface. BS_IO_WIEGAND_MODE_LEGACY – legacy mode. BS_IO_WIEGAND_MODE_EXTENDED – extended mode. Refer to 2.2.4 for details.
wiegandReaderID	Specifies ID of attached RF device. Note that this should be calculated based on Wmaster ID. Refer to 2.2.4 for details.
wiegandIdType	Specifies whether the Wiegand bitstream should be

	interpreted as a user ID or a cardID. WIEGAND_USER WIEGAND_CARD
wiegandConfig	See **BS_WriteWiegandConfig**.
LED/Buzzer	
ledBuzzerConfig	See **BELEDBuzzerConfig**.
Card ID Format	
cardIdFormatType	Specifies the type of preprocessing of card ID. CARD_ID_FORMAT_NORMAL – No preprocessing. CARD_ID_FORMAT_WIEGAND – Format card ID as specified in Wiegand format.
cardIdByteOrder	Specifies whether to swap byte order of the card ID during preprocessing. CARD_ID_MSB – Byte order will not be swapped.
cardIdBitOrder	Specifies whether to swap bit order of the card ID during preprocessing. CARD_ID_MSB – Bit order will not be swapped.

BSCardReaderDoorConfig	
Fields	**Options**
numOfCardReader	Specifies the number of attached RF devices. (Currently, only one supported)
readerID	Specifies list of IDs of attached RF devices.
door	Specifies list door configurations of attached RF devices. See the descriptions of **BSDoor**.
apbType	Not used.
apbResetTime	Not used.

BSCardReaderInputConfig	
Fields	**Options**
numOfCardReader	Specifies the number of attached RF devices. (Currently, only one supported)
readerID	Specifies list of IDs of attached RF devices.
input	Specifies list input configurations of attached RF devices. See the descriptions of **BSInputConfig**.

BSCardReaderOutputConfig

Fields	Options
numOfCardReader	Specifies the number of attached RF devices. (Currently, only one supported)
readerID	Specifies list of IDs of attached RF devices.
output	Specifies list output configurations of attached RF devices. See the descriptions of **BSOutputConfig**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

Xpass/Xpass Slim/Xpass S2

BS_GetAvailableSpace

Checks how much space is available in flash memory.

BS_RET_CODE BS_GetAvailableSpace(int handle, int* availableSpace, int* totalSpace)

Parameters

handle

Handle of the communication channel.

availableSpace

Pointer to the available space in bytes.

totalSpace

Pointer to the total space in bytes.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_WriteCardReaderConfig / BS_ReadCardReaderConfig

You can write/read configurations of the input/output/door of attached 3rd party RF device.

BS_RET_CODE BS_WriteCardReaderConfig(int handle, BSCardReaderConfigData* config)
BS_RET_CODE BS_ReadCardReaderConfig(int handle, BSCardReaderConfigData* config)

Parameters

handle

Handle of the communication channel.

config

BSCardReaderConfigData is defined as follows;

```
struct BSCardReaderDoorConfig {
    int numOfCardReader;
    unsigned readerID[MAX_READER];
    BSDoor door[MAX_READER];
    int apbType;
    int apbResetTime;
};

struct BSCardReaderInputConfig {
    int numOfCardReader;
    unsigned readerID[MAX_READER];
    BSInputConfig input[MAX_READER];
};

struct BSCardReaderOutputConfig {
    int numOfCardReader;
    unsigned readerID[MAX_READER];
    BSOutputConfig output[MAX_READER];
};

struct BSCardReaderConfigData {
   BSCardReaderInputConfig inputConfig;
   BSCardReaderOutputConfig outputConfig;
   BSCardReaderDoorConfig doorConfig;
};
```

The key fields and their available options are as follows;

BSCardReaderDoorConfig	
Fields	**Options**
numOfCardReader	Specifies the number of attached RF devices. (Currently, only one supported)
readerID	Specifies list of IDs of attached RF devices.
door	Specifies list door configurations of attached RF devices. See the descriptions of **BSDoor**.
apbType	Not used.
apbResetTime	Not used.

BSCardReaderInputConfig	
Fields	**Options**
numOfCardReader	Specifies the number of attached RF devices. (Currently, only one supported)
readerID	Specifies list of IDs of attached RF devices.
input	Specifies list input configurations of attached RF devices. See the descriptions of **BSInputConfig**.

BSCardReaderOutputConfig	
Fields	**Options**
numOfCardReader	Specifies the number of attached RF devices. (Currently, only one supported)
readerID	Specifies list of IDs of attached RF devices.
output	Specifies list output configurations of attached RF devices. See the descriptions of **BSOutputConfig**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

D-Station/BioStation

3.8. Access Control API

These APIs provide access control features such as time schedule and access group.

- BS_AddTimeScheduleEx: adds a time schedule.
- BS_GetAllTimeScheduleEx: reads all time schedules.
- BS_SetAllTimeScheduleEx: writes all time schedules.
- BS_DeleteTimeScheduleEx: deletes a time schedule.
- BS_DeleteAllTimeScheduleEx: deletes all time schedules.
- BS_AddHolidayEx: adds a holiday schedule.
- BS_GetAllHolidayEx: reads all holiday schedules.
- BS_SetAllHolidayEx: writes all holiday schedules.
- BS_DeleteHolidayEx: deletes a holiday schedule.
- BS_DeleteAllHolidayEx: deletes all holiday schedules.
- BS_AddAccessGroupEx: adds an access group.
- BS_GetAllAccessGroupEx: reads all access groups.
- BS_SetAllAccessGroupEx: writes all access groups.
- BS_DeleteAccessGroupEx: deletes an access group.
- BS_DeleteAllAccessGroupEx: deletes all access groups.
- BS_RelayControlEx: controls the relay of a device.
- BS_DoorControl: controls the door relay of a device.
- BS_CardReaderDoorControl : controls the door relay associated with 3rd party RF device.

BS_AddTimeScheduleEx

Up to 128 time schedules can be stored to a device. Each time schedule consists of 7 daily schedules and two optional holiday schedules. And each daily schedule may have up to 5 time segments. There are also two pre-defined schedules, NO_TIME_SCHEDULE and ALL_TIME_SCHEDULE, which cannot be updated nor deleted.

BS_RET_CODE BS_AddTimeScheduleEx(int handle, BSTimeScheduleEx* schedule)

Parameters

handle

Handle of the communication channel.

schedule

Pointer to the time schedule to be added. BSTimeScheduleEx is defined as follows;

```
struct BSTimeCodeElemEx {
     unsigned short startTime;
     unsigned short endTime;
};

struct BSTimeCodeEx {
     BSTimeCodeElemEx codeElement[BS_TIMECODE_PER_DAY_EX];
};

struct BSTimeScheduleEx {
     enum {
         // pre-defined schedule ID
         NO_TIME_SCHEDULE   = 0xFD,
         ALL_TIME_SCHEDULE  = 0xFE,

         NUM_OF_DAY = 9,
         NUM_OF_HOLIDAY = 2,

         SUNDAY     = 0,
         MONDAY     = 1,
         TUESDAY    = 2,
         WEDNESDAY  = 3,
         THURSDAY   = 4,
```

```
            FRIDAY     = 5,
            SATURDAY   = 6,
            HOLIDAY1   = 7,
            HOLIDAY2   = 8,
        };

        int scheduleID; // 1 ~ 128
        char name[BS_MAX_ACCESS_NAME_LEN];
        int holiday[2]; // 0 for unused
        BSTimeCodeEx timeCode[NUM_OF_DAY]; // 0 - Sunday, 1 - Monday, ...
        int reserved[2];
    };
```

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

Example

```
BSTimeScheduleEx timeSchedule;

memset( &timeSchedule, 0, sizeof(BSTimeScheduleEx) );

timeSchedule.scheduleID = 1;
timeSchedule.holiday[0] = 1;

// Monday- 09:00 ~ 18:00
timeSchedule.timeCode[BSTimeScheduleEx::MONDAY].codeElement[0].startTime =
9 * 60;
timeSchedule.timeCode[BSTimeScheduleEx::MONDAY].codeElement[0].endTime = 18
* 60;

// Tuesday- 08:00 ~ 12:00 and 14:30 ~ 20:00
timeSchedule.timeCode[BSTimeScheduleEx::TUESDAY].codeElement[0].startTime =
8 * 60;
timeSchedule.timeCode[BSTimeScheduleEx::TUESDAY].codeElement[0].endTime =
12 * 60;
timeSchedule.timeCode[BSTimeScheduleEx::TUESDAY].codeElement[1].startTime =
14 * 60 + 30;
timeSchedule.timeCode[BSTimeScheduleEx::TUESDAY].codeElement[1].endTime =
```

```
20 * 60;

// Holiday 1- 10:00 ~ 14:00
timeSchedule.timeCode[BSTimeScheduleEx::HOLIDAY1].codeElement[0].startTime
= 10 * 60;
timeSchedule.timeCode[BSTimeScheduleEx::HOLIDAY1].codeElement[0].endTime =
14 * 60;

strcpy( timeSchedule.name, “Schedule 1” );

// …

BS_RET_CODE result = BS_AddTimeScheduleEx( handle, &timeSchedule );
```

BS_GetAllTimeScheduleEx

Reads all the registered time schedules.

BS_RET_CODE BS_GetAllTimeScheduleEx(int handle, int* numOfSchedule, BSTimeScheduleEx* schedule)

Parameters

handle

Handle of the communication channel.

numOfSchedule

Pointer to the number of enrolled schedules.

schedule

Pointer to the time schedule array to be read.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

BS_SetAllTimeScheduleEx

Writes time schedules.

BS_RET_CODE BS_SetAllTimeScheduleEx(int handle, int numOfSchedule, BSTimeScheduleEx* schedule)

Parameters

handle

Handle of the communication channel.

numOfSchedule

Number of schedules to be written.

schedule

Pointer to the time schedule array to be written.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

BS_DeleteTimeScheduleEx

Deletes the specified time schedule.

BS_RET_CODE BS_DeleteTimeScheduleEx(int handle, int ID)

Parameters

handle

Handle of the communication channel.

ID

ID of the time schedule.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

BS_DeleteAllTimeScheduleEx

Deletes all the time schedules stored in a device.

BS_RET_CODE BS_DeleteAllTimeScheduleEx(int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/X-Station/Xpass S2

BS_AddHolidayEx

Adds a holiday list. Up to 32 holiday lists can be stored to a device.

BS_RET_CODE BS_AddHolidayEx(int handle, BSHolidayEx* holiday)

Parameters

handle

Handle of the communication channel.

holiday

Pointer to the holiday list to be added. BSHolidayEx is defined as follows;

```
struct BSHolidayElemEx {
     enum {
         // flag
         ONCE = 0x01,
     };

     unsigned char flag;
     unsigned char year; // since 2000
     unsigned char month; // 1 ~ 12
     unsigned char startDay; // 1 ~ 31
     unsigned char duration; // 1 ~ 100
     unsigned char reserved[3];
};


struct BSHolidayEx {
     enum {
         MAX_HOLIDAY = 32,
     };

     int holidayID; // 1 ~ 32
     char name[BS_MAX_ACCESS_NAME_LEN];
     int numOfHoliday;
     BSHolidayElemEx holiday[MAX_HOLIDAY];
     int reserved[2];
};
```

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the

corresponding error code.

Compatibility

FaceStation/Biostation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/X-Station/Xpass S2

Example

```
BSHolidayEx holiday;

memset( &holiday, 0, sizeof(BSHolidayEx) );

holiday.holidayID = 1;
holiday.numOfHoliday = 10;

// Jan. 1 ~ 3 are holidays in every year
holiday.holiday[0].year = 7;
holiday.holiday[0].month = 1;
holiday.holiday[0].startDate = 1;
holiday.holiday[0].duration = 3;

// 2007 Mar. 5 is holiday
Holiday.holiday[1].flag = BSHolidayElemEx::ONCE;
holiday.holiday[1].year = 7;
holiday.holiday[1].month = 3;
holiday.holiday[1].startDate = 5;
holiday.holiday[1].duration = 1;

// …

strcpy( holiday.name, “Holiday 1” );

BS_RET_CODE result = BS_AddHolidayEx( handle, &holiday );
```

BS_GetAllHolidayEx

Reads all the registered holiday lists.

BS_RET_CODE BS_GetAllHolidayEx(int handle, int* numOfHoliday, BSHolidayEx* holiday)

Parameters

handle

Handle of the communication channel.

numOfHoliday

Pointer to the number of enrolled holiday lists.

holiday

Pointer to the holiday lists to be read.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/X-Station/Xpass S2

BS_SetAllHolidayEx

Writes holiday lists.

BS_RET_CODE BS_SetAllHolidayEx(int handle, int numOfHoliday, BSHolidayEx* holiday)

Parameters

handle

Handle of the communication channel.

numOfHoliday

Number of holiday lists to be written.

holiday

Pointer to the holiday lists to be written.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

BS_DeleteHolidayEx

Deletes the specified holiday list.

BS_RET_CODE BS_DeleteHolidayEx(int handle, int ID)

Parameters

handle

Handle of the communication channel.

ID

ID of the holiday list.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

BS_DeleteAllHolidayEx

Deletes all the holiday lists stored in a device.

BS_RET_CODE BS_DeleteAllHolidayEx(int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

BS_AddAccessGroupEx

An access group defines which doors users have access to, and during which hours they have access to these doors. Up to 128 access groups can be stored to a device. There are also two pre-defined access groups, NO_ACCESS_GROUP and FULL_ACCESS_GROUP, which cannot be updated nor deleted.

BS_RET_CODE BS_AddAccessGroupEx(int handle, BSAccessGroupEx* group)

Parameters

handle

Handle of the communication channel.

group

Pointer to the access group to be added. BSAccessGroupEx is defined as follows;

```
struct BSAccessGroupEx {
    enum {
        // pre-defined group
        NO_ACCESS_GROUP= 0xFD,
        FULL_ACCESS_GROUP  = 0xFE,
        // pre-defined door
        ALL_DOOR   = 0x00,
        MAX_READER = 32,
    };

    int groupID; // 1 ~ 128
    char name[BS_MAX_ACCESS_NAME_LEN];
    int numOfReader;
    unsigned readerID[MAX_READER];
    int scheduleID[MAX_READER];
    unsigned userID;
    int reserved[3];
};
```

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/Xpass

Example

```
// Access Group 1 has access to
// - device 1001 at all time
// - device 1002 at schedule 1
// - device 1003 at schedule 2

BSAccessGroupEx accessGroup;

memset( &accessGroup, 0, sizeof(BSAccessGroupEx) );

accessGroup.groupID = 1;
accessGroup.numOfReader = 3;

accessGroup.readerID[0] = 1001;
accessGroup.scheduleID[0] = BSTimeScheduleEx::ALL_TIME_SCHEDULE;

accessGroup.readerID[1] = 1002;
accessGroup.scheduleID[1] = 1;

accessGroup.readerID[2] = 1003;
accessGroup.scheduleID[2] = 2;
```

BS_GetAllAccessGroupEx

Reads all the registered access groups.

BS_RET_CODE BS_GetAllAccessGroupEx(int handle, int* numOfAccessGroup, BSAccessGroupEx* group)

Parameters

handle

Handle of the communication channel.

numOfAccessGroup

Pointer to the number of registered access groups.

group

Pointer to the access groups to be read.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

BS_SetAllAccessGroupEx

Writes access groups.

BS_RET_CODE BS_SetAllAccessGroupEx(int handle, int numOfAccessGroup, BSAccessGroupEx* group)

Parameters

handle

Handle of the communication channel.

numOfAccessGroup

Number of access groups to be written.

group

Pointer to the access groups to be written.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/ Xpass/Xpass Slim/Xpass S2

BS_DeleteAccessGroupEx

Deletes the specified access group.

BS_RET_CODE BS_DeleteAccessGroupEx(int handle, int ID)

Parameters

handle

Handle of the communication channel.

ID

ID of the access group.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/ Xpass/Xpass Slim/Xpass S2

BS_DeleteAllAccessGroupEx

Deletes all the access groups stored in a device.

BS_RET_CODE BS_DeleteAllAccessGroupEx(int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/ Xpass/Xpass Slim/Xpass S2

BS_RelayControlEx

Controls the relays under the control of a device.

BS_RET_CODE BS_RelayControlEx(int handle, int deviceIndex, int relayIndex, bool onoff)

Parameters

handle

Handle of the communication channel.

deviceIndex

Device index between BS_DEVICE_PRIMARY and BS_DEVICE_SECUREIO3.

relayIndex

BS_PORT_RELAY0 or BS_PORT_RELAY1.

onoff

If true, turn on the relay, and vice versa.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/ Xpass/Xpass Slim/Xpass S2

BS_DoorControl

Turn on or off a door. See BSDoorConfig for configuration of doors.

BS_RET_CODE BS_DoorControl(int handle, int doorIndex, bool onoff)

Parameters

handle

Handle of the communication channel.

doorIndex

0 – Door 1

1 – Door 2

2 - Both

onoff

If true, turn on the relay, and vice versa.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/ Xpass/Xpass Slim/Xpass S2

BS_CardReaderDoorControl

Turn on or off a door which is controlled by 3rd party RF device. See BSCardReaderDoorConfig for configuration of doors. Refer to 2.4.4 for details.

BS_RET_CODE BS_CardReaderDoorControl(int handle, unsigned readerID, bool onoff)

Parameters

handle

Handle of the communication channel.

readerID

Pre-assigned ID of attached 3rd party RF device

onoff

If true, turn on the relay, and vice versa.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/X-Station/ Xpass/Xpass Slim/Xpass S2

3.9. Smartcard API

BioStation Mifare, BioEntry Plus Mifare, and BioLite Net support Mifare types of smart cards[10]. These functions provide basic functionalities such as read, write, and format smartcards.

- BS_WriteMifareConfiguration: writes Mifare configuration.
- BS_ReadMifareConfiguration: reads Mifare configuration.
- BS_ChangeMifareKey: changes site keys for encrypting cards.
- BS_WriteMifareCard: writes user information into a Mifare card.
- BS_ReadMifareCard: reads user information from a Mifare card.
- BS_FormatMifareCard: formats a Mifare card.
- BS_AddBlacklist: adds a user ID or card CSN to the blacklist.
- BS_DeleteBlacklist: deletes a user ID or card CSN from the blacklist.
- BS_DeleteAllBlacklist: clears the blacklist.
- BS_ReadBlacklist: reads the blacklist.

BioEntry Plus iCLASS support iCLASS types of smart cards[11] These functions provide basic functionalities such as read, write, and format smartcards.

- BS_WriteiClassConfiguration: writes iCLASS configuration.
- BS_ReadiClassConfiguration: reads iCLASS configuration.
- BS_ChangeiClassKey: changes site keys for encrypting cards.
- BS_WriteiClassCard: writes user information into a iCLASS card.
- BS_ReadiClassCard: reads user information from a iCLASS card.
- BS_FormatiClassCard: formats a iCLASS card.
- BS_AddBlacklistEx: adds a user ID or card CSN to the blacklist.
- BS_DeleteBlacklistEx: deletes a user ID or card CSN from the blacklist.
- BS_DeleteAllBlacklist: clears the blacklist.
- BS_ReadBlacklistEx: reads the blacklist.

[10] Note that BioLite Net supports Mifare cards as default.
[11] Note that BioEntry Plus – iCLASS supports iCLASS cards as default.

BS_WriteMifareConfiguration / BS_ReadMifareConfiguration

Writes/reads the Mifare configuration. The configuration is divided into three parts – operation option, key option, and the card layout. BioStation Mifare, BioEntry Plus Mifare, and BioLite Net devices can handle both 1K and 4K Mifare cards. Maximum 2 templates can be stored into a 1K card, and 4 templates into a 4K card. Changing card layout should be handled with utmost caution. If you are not sure what to do, contact to support@supremainc.com before trying yourself.

BS_RET_CODE BS_WriteMifareConfiguration(int handle, BSMifareConfig* config)
BS_RET_CODE BS_ReadMifareConfiguration(int handle, BSMifareConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSMifareConfig is defined as follows;

```
struct BSMifareConfig {
     enum {
         MIFARE_KEY_SIZE = 6,
         MIFARE_MAX_TEMPLATE = 4,
     };

     // Options
     int magicNo;   // read-only
     int disabled;
     int useCSNOnly;
     int bioentryCompatible;// not used

     // Keys
     Int useSecondaryKey;
     int reserved1;
     unsigned char  reserved2[8];
     unsigned char  reserved3[8];

     // Layout
     int cisIndex;
```

```
    int numOfTemplate;
    int templateSize;
    int templateStartBlock[MIFARE_MAX_TEMPLATE];

    int reserve4[15];
};
```

The key fields and their available options are as follows;

Fields	Options
disabled	If true, the device will ignore Mifare cards. The default value is false.
useCSNOnly	If true, the device reads only the 4 byte CSN(Card Serial Number) of a Mifare card. Then, the fingerprint input will be verified with the templates stored in the device. This mode is identical to the operation flow of general RF cards. The default value is false.
useSecondaryKey	When changing the site key, a device has to handle cards with new site key and cards with old site key at the same time. In that case, useSecondaryKey option can be used. If this option is true and the secondary key is set to the old site key, the device is able to handle both types of cards. The default value is false.
cisIndex	The first block index of the user header information. The size of the header is 48 bytes – 3 blocks. And cisIndex should be the first block of any sector. The default value is 4.
numOfTemplate	The number of templates to be stored into a Mifare card. The maximum value is 2 for a 1K card and 4 for a 4K card. The default value is 2.
templateSize	The size of one template. Since the last two bytes are used for checksum, it should be a multiple of 16 minus 2. The default value is 334 – 21 blocks.
templateStartBlock	The first block index of each template. These values should be selected so that there is no overlap between each template. The default

	values are {8, 36} for 1K Mifare card.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation Mifare/BioEntry Plus Mifare/BioEntry W Mifare/BioLite Net/X-Station/Xpass/Xpass Slim/Xpass S2

BS_ChangeMifareKey

To prevent illegal access, Mifare cards are protected by 48 bit site key. The site key should be handled with utmost caution. If it is disclosed, the data on the smartcard will not be secure any more. **BS_ChangeMifareKey** is used to change the primary and secondary site keys. The default primary key is 0xffffffffffff.

BS_RET_CODE BS_ChangeMifareKey(int handle, unsigned char* oldPrimaryKey, unsigned char* newPrimaryKey, unsigned char* newSecondaryKey)

Parameters

handle

Handle of the communication channel.

oldPrimaryKey

Pointer to the 6 byte old primary key. If it is not matched with the one stored in the device, BS_ERR_WRONG_PASSWORD will be returned.

newPrimaryKey

Pointer to the 6 byte new primary key.

newSecondaryKey

Pointer to the 6 byte new secondary key. See useSecondaryKey option in **BS_WriteMifareConfiguration**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation Mifare/BioEntry Plus Mifare/BioEntry W Mifare/BioLite Net/X-Station

BS_WriteMifareCard

Writes user information into a Mifare card.

BS_RET_CODE BS_WriteMifareCard(int handle, BSMifareCardHeader* header, unsigned char* templateData, int templateSize)

Parameters

handle

Handle of the communication channel.

header

BSMifareCardHeader is defined as follows;

```
struct BSMifareCardHeader {
    enum {
        MAX_TEMPLATE   = 4,
        MAX_ACCESS_GROUP   = 4,
        MAX_NAME_LEN   = 16,
        PASSWORD_LEN   = 8,

        MIFARE_VER_1_0 = 0x10,

        // security level
        USER_SECURITY_DEFAULT  = 0,
        USER_SECURITY_LOWER    = 1,
        USER_SECURITY_LOW      = 2,
        USER_SECURITY_NORMAL   = 3,
        USER_SECURITY_HIGH     = 4,
        USER_SECURITY_HIGHER   = 5,

        // admin level
        USER_LEVEL_NORMAL  = 0,
        USER_LEVEL_ADMIN   = 1,
    };

    unsigned int   CSN;
    unsigned int   userID;
    unsigned int   reserved1;
    unsigned char  version;
    unsigned char  numOfTemplate;
    unsigned char  adminLevel;
    unsigned char  securityLevel;
    unsigned char  duress[MAX_TEMPLATE];
```

```
    unsigned char  isBypassCard;
    unsigned char  reserved2[3];
    unsigned char  accessGroup[MAX_ACCESS_GROUP];
    unsigned char  userName[MAX_NAME_LEN];
    unsigned char  password[PASSWORD_LEN];
    time_t  startTime;
    time_t  expiryTime;
    unsigned int   reserved3[8];
};
```

The key fields and their available options are as follows;

Fields	**Descriptions**
CSN	4 byte card serial number. It is read-only.
userID	4 byte user ID.
version	Card version. It is read-only.
numOfTemplate	The number of templates to be written into the card. The maximum value is limited by numOfTemplate field in **BSMifareConfig**.
adminLevel	USER_LEVE_NORMAL USER_LEVEL_ADMIN
securityLevel	USER_SECURITY_DEFAULT: same as the device setting USER_SECURITY_LOWER: 1/1000 USER_SECURITY_LOW: 1/10,000 USER_SECURITY_NORMAL: 1/100,000 USER_SECURITY_HIGH: 1/1,000,000 USER_SECURITY_HIGHER: 1/10,000,000
duress	Under duress, users can authenticate with a duress finger to notify the threat. When duress finger is detected, the terminal will write a log record and output specified signals. The duress field denotes which of the enrolled templates is a duress one. For example, if the 1st templates is of a duress finger, duress[0] will be 1.
isBypassCard	If it is true, the user can access without fingerprint authentication.

accessGroup	A user can be a member of up to 4 access groups. For example, if the user is a member of Group 1 and Group 4, this array should be initialized as {1, 4, 0xff, 0xff}.
userName	Pointer to the user name.
password	Pointer to the password of the user. It is effective only if the authMode field of **BSOPModeConfig** is set for password authentication.
startTime	The time from which the user's authorization takes effect.
expiryTime	The time on which the user's authorization expires.

templateData

Fingerprint templates of the user.

templateSize

The size of one template. If it is different from that of **BSMifareConfig**, the device will truncate or pad the template data according to the latter.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation Mifare/BioEntry Plus Mifare/BioEntry W Mifare/BioLite Net/X-Station

Example

```
BSMifareCardHeader userHeader;

memset( &userHeader, 0, sizeof( BSMifareCardHeader ) );

userHeader.userID = 1; // 0 cannot be assigned as a user ID.
userHeader.numOfTemplate = 2;

userHeader.adminLevel = BSMifareCardHeader::USER_LEVEL_NORMAL;
userHeader.securityLevel = BSMifareCardHeader::USER_SECURITY_DEFAULT;
```

```
userHeader.accessGroup[0] = 0xFE; // Full Access group
userHeader.accessGroup[1] = 0xFF;
userHeader.accessGroup[2] = 0xFF;
userHeader.accessGroup[3] = 0xFF;

strcpy( userHeader.name, “John” );
strcpy( userHeader.password, NULL ); // no password

userHeader.startTime = 0; // no start time check
userHeader.expiryTime = US_ConvertToLocalTime( time( NULL ) ) + 365 * 24 *
60 * 60; // 1 year from today

unsigned char* templateBuf = (unsigned
char*)malloc( userHeader.numOfTemplate * BS_TEMPLATE_SIZE );

// fill template data
for( int i = 0; i < userHeader.numOfTemplate; i++ )
{
     unsigned char* templateData = templateBuf + i * BS_TEMPLATE_SIZE;

     // fill data here
}

BS_RET_CODE result = BS_WriteMifareCard( handle, &userHeader, templateBuf,
BS_TEMPLATE_SIZE );
```

BS_ReadMifareCard

Reads user information from a Mifare card.

BS_RET_CODE BS_ReadMifareCard(int handle, BSMifareCardHeader* header, unsigned char* templateData, int* templateSize)

Parameters

handle

Handle of the communication channel.

header

Pointer to the card header to be returned.

templateData

Pointer to the template data to be returned. This pointer should be allocated large enough to store the template data.

templateSize

Pointer to the size of one template to be returned. It is identical to that of **BSMifareConfig**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation Mifare/BioEntry Plus Mifare/BioEntry W Mifare/BioLite Net

BS_FormatMifareCard

Formats a Mifare card.

BS_RET_CODE BS_FormatMifareCard(int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/BioStation Mifare/BioEntry Plus Mifare/BioEntry W Mifare/BioLite Net/X-Station

BS_AddBlacklist

When a user ID or card CSN is added to the blacklist, the device will reject the corresponding Mifare card. The blacklist can store up to 1000 user IDs or card CSNs.

BS_RET_CODE BS_AddBlacklist(int handle, int numOfItem, BSBlacklistItem* item)

Parameters

handle

Handle of the communication channel.

numOfItem

Number of items to be added.

Item

Arrays of blacklist items to be added.

BSBlacklistItem is defined as follows;

```
struct BSBlacklistItem {
    enum {
        // blacklist type
        BLACKLIST_USER_ID  = 0x01,
        BLACKLIST_CSN  = 0x02,

        MAX_BLACKLIST      = 1000,
    };

    unsigned char itemType;
    unsigned char reserved[3];
    unsigned itemData;
};
```

The key fields and their available options are as follows;

Fields	Options
itemType	BLACKLIST_USER_ID: the itemData is userID. BLACKLIST_CSN: the itemData is 4 byte CSN of a card.
itemData	UserID or CSN according to the itemType.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2/D-Station/BioStation Mifare/BioEntry Plus Mifare/BioEntry W Mifare/BioLite Net/X-Station/XPass

BS_DeleteBlacklist

Deletes Mifare cards from the blacklist.

BS_DeleteBlacklist(int handle, int numOfItem, BSBlacklistItem* item)

Parameters

handle

Handle of the communication channel.

numOfItem

Number of items to be deleted.

Item

Arrays of blacklist items to be deleted.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2/D-Station/BioStation Mifare/BioEntry Plus Mifare/BioEntry W Mifare/BioLite Net/X-Station

BS_DeleteAllBlacklist

Clear the blacklist.

BS_DeleteAllBlacklist(int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2/D-Station/BioStation Mifare/BioEntry Plus Mifare/BioEntry W Mifare/BioLite Net/BioEntry Plus iCLASS/X-Station

BS_ReadBlacklist

Read the contents of the blacklist.

BS_ReadBlacklist(int handle, int* numOfItem, BSBlacklistItem* item)

Parameters

handle

Handle of the communication channel.

numOfItem

Pointer to the number of items to be returned.

item

Arrays of white list items to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation T2/D-Station/BioStation Mifare/BioEntry Plus Mifare/BioEntry W Mifare/BioLite Net/X-Station

BS_WriteiClassConfiguration / BS_ReadiClassConfiguration

Writes/reads the iCLASS configuration. The configuration is divided into three parts – operation option, key option, and the card layout. BioEntry Plus iCLASS device can handle both 2K and 4K iCLASS cards. Maximum 2 templates can be stored into a 2K card, and 4 templates into a 4K card. Changing card layout should be handled with utmost caution. If you are not sure what to do, contact to support@supremainc.com before trying yourself.

BS_RET_CODE BS_WriteiClassConfiguration(int handle, BSiClassConfig* config)
BS_RET_CODE BS_ReadMifareConfiguration(int handle, BSiClassConfig* config)

Parameters

handle

Handle of the communication channel.

config

BSiClassConfig is defined as follows;

```
struct BSiClassConfig {
    enum {
        ICLASS_KEY_SIZE = 6,
        ICLASS_MAX_TEMPLATE = 4,
    };

    // Options
    int magicNo;   // read-only
    int disabled;
    int useCSNOnly;
    int bioentryCompatible;// not used

    // Keys
    int useSecondaryKey;
    int reserved1;
    unsigned char  reserved2[8];
    unsigned char  reserved3[8];

    // Layout
    int cisIndex;
```

```
    int numOfTemplate;
    int templateSize;
    int templateStartBlock[ICLASS_MAX_TEMPLATE];
    int reserve4[15];
};
```

The key fields and their available options are as follows;

Fields	**Options**
disabled	If true, the device will ignore iCLASS cards. The default value is false.
useCSNOnly	If 1 (iCLASS CSN Only), the device reads only the 4 byte CSN(Card Serial Number) of a iCLASS card. If 2 (Felica Mode), the device reads only the 4 byte CSN of a Felica card. Then, the fingerprint input will be verified with the templates stored in the device. This mode is identical to the operation flow of general RF cards. The default value is 0 (iCLASS Template).
useSecondaryKey	When changing the site key, a device has to handle cards with new site key and cards with old site key at the same time. In that case, useSecondaryKey option can be used. If this option is true and the secondary key is set to the old site key, the device is able to handle both types of cards. The default value is false.
cisIndex	The first block index of the user header information. The size of the header is 48 bytes – 6 blocks. And cisIndex should be the first block of any sector. The default value is 13.
numOfTemplate	The number of templates to be stored into a iCLASS card. The maximum value is 2 for a 2K card and 4 for a 4K card. The default value is 2.
templateSize	The size of one template. Since the last two bytes are used for checksum, it should be a multiple of 16 minus 2. The default value is 382– 48 blocks.
templateStartBlock	The first block index of each template. These

	values should be selected so that there is no overlap between each template. The default values are {19, 67} for 2K iCLASS card.

Remarks

The iCLASS supports 2001 and 2002 Card, and uses Virtual Address for Mifare Layout compatibility. You can use between 0 to 249 Virtual Address with 2001 Card, and between 0 to 207 Virtual Address with 2002 Card. Users can access physical address by the size of calculation, (size = Virtual Address x 8). If the card has HID Application, 13 block is reserved to HID Application. The 13 block is start address for normal case.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioEntry Plus iCLASS

BS_ChangeiClassKey

To prevent illegal access, iCLASS cards are protected by 48 bit site key. The site key should be handled with utmost caution. If it is disclosed, the data on the smartcard will not be secure any more. **BS_ChangeiClassKey** is used to change the primary and secondary site keys. The default primary key is 0xF0E1D2C3B4A5.

BS_RET_CODE BS_ChangeiClassKey(int handle, unsigned char* oldPrimaryKey, unsigned char* newPrimaryKey, unsigned char* newSecondaryKey)

Parameters

handle

Handle of the communication channel.

oldPrimaryKey

Pointer to the 6 byte old primary key. If it is not matched with the one stored in the device, BS_ERR_WRONG_PASSWORD will be returned.

newPrimaryKey

Pointer to the 6 byte new primary key.

newSecondaryKey

Pointer to the 6 byte new secondary key. See useSecondaryKey option in **BS_WriteiClassConfiguration**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioEntry Plus iCLASS

BS_WriteiClassCard

Writes user information into a iCLASS card.

BS_RET_CODE BS_WriteiClassCard(int handle, BSiClassCardHeader* header, unsigned char* templateData, int templateSize)

Parameters

handle

Handle of the communication channel.

header

BSiClassCardHeader is defined as follows;

```
struct BSiClassCardHeader {
    enum {
        MAX_TEMPLATE   = 4,
        MAX_ACCESS_GROUP   = 4,
        MAX_NAME_LEN   = 16,
        PASSWORD_LEN   = 8,

        ICLASS_VER_1_0 = 0x10,

        // security level
        USER_SECURITY_DEFAULT  = 0,
        USER_SECURITY_LOWER    = 1,
        USER_SECURITY_LOW      = 2,
        USER_SECURITY_NORMAL   = 3,
        USER_SECURITY_HIGH     = 4,
        USER_SECURITY_HIGHER   = 5,

        // admin level
        USER_LEVEL_NORMAL  = 0,
        USER_LEVEL_ADMIN   = 1,
    };

    unsigned int   CSN;
    unsigned int   userID;
    unsigned int   customID;
    unsigned char  version;
    unsigned char  numOfTemplate;
    unsigned char  adminLevel;
    unsigned char  securityLevel;
    unsigned char  duress[MAX_TEMPLATE];
```

```
    unsigned char  isBypassCard;
    unsigned char  reserved2[3];
    unsigned char  accessGroup[MAX_ACCESS_GROUP];
    unsigned char  userName[MAX_NAME_LEN];
    unsigned char  password[PASSWORD_LEN];
    time_t  startTime;
    time_t  expiryTime;
    unsigned int   reserved3[8];
};
```

The key fields and their available options are as follows;

Fields	**Descriptions**
CSN	4 byte card serial number. It is read-only.
userID	4 byte user ID.
customID	4 byte custom ID which makes up the RF card ID with **cardID** in case iCLASS.
version	Card version. It is read-only.
numOfTemplate	The number of templates to be written into the card. The maximum value is limited by numOfTemplate field in **BSiClassConfig**.
adminLevel	USER_LEVE_NORMAL USER_LEVEL_ADMIN
securityLevel	USER_SECURITY_DEFAULT: same as the device setting USER_SECURITY_LOWER: 1/1000 USER_SECURITY_LOW: 1/10,000 USER_SECURITY_NORMAL: 1/100,000 USER_SECURITY_HIGH: 1/1,000,000 USER_SECURITY_HIGHER: 1/10,000,000
duress	Under duress, users can authenticate with a duress finger to notify the threat. When duress finger is detected, the terminal will write a log record and output specified signals. The duress field denotes which of the enrolled templates is a duress one. For example, if the 1st templates is of a duress finger, duress[0] will be 1.

isBypassCard	If it is true, the user can access without fingerprint authentication.
accessGroup	A user can be a member of up to 4 access groups. For example, if the user is a member of Group 1 and Group 4, this array should be initialized as {1, 4, 0xff, 0xff}.
userName	Pointer to the user name.
password	Pointer to the password of the user. It is effective only if the authMode field of **BSOPModeConfig** is set for password authentication.
startTime	The time from which the user's authorization takes effect.
expiryTime	The time on which the user's authorization expires.

templateData

Fingerprint templates of the user.

templateSize

The size of one template. If it is different from that of **BSiClassConfig**, the device will truncate or pad the template data according to the latter.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioEntry Plus iCLASS

Example

```
BSiClassCardHeader userHeader;

memset( &userHeader, 0, sizeof( BSiClassCardHeader ) );

userHeader.userID = 1; // 0 cannot be assigned as a user ID.
userHeader.numOfTemplate = 2;

userHeader.adminLevel = BSiClassCardHeader::USER_LEVEL_NORMAL;
userHeader.securityLevel = BSiClassCardHeader::USER_SECURITY_DEFAULT;
```

```
userHeader.accessGroup[0] = 0xFE; // Full Access group
userHeader.accessGroup[1] = 0xFF;
userHeader.accessGroup[2] = 0xFF;
userHeader.accessGroup[3] = 0xFF;

strcpy( userHeader.name, “John” );
strcpy( userHeader.password, NULL ); // no password

userHeader.startTime = 0; // no start time check
userHeader.expiryTime = US_ConvertToLocalTime( time( NULL ) ) + 365 * 24 *
60 * 60; // 1 year from today

unsigned char* templateBuf = (unsigned
char*)malloc( userHeader.numOfTemplate * BS_TEMPLATE_SIZE );

// fill template data
for( int i = 0; i < userHeader.numOfTemplate; i++ )
{
     unsigned char* templateData = templateBuf + i * BS_TEMPLATE_SIZE;

     // fill data here
}

BS_RET_CODE result = BS_WriteiClassCard( handle, &userHeader, templateBuf,
BS_TEMPLATE_SIZE );
```

BS_ReadiClassCard

Reads user information from a iCLASS card.

BS_RET_CODE BS_ReadiClassCard(int handle, BSiClassCardHeader* header, unsigned char* templateData, int* templateSize)

Parameters

handle

Handle of the communication channel.

header

Pointer to the card header to be returned.

templateData

Pointer to the template data to be returned. This pointer should be allocated large enough to store the template data.

templateSize

Pointer to the size of one template to be returned. It is identical to that of **BSiClassConfig**.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioEntry Plus iCLASS

BS_FormatiClassCard

Formats a iCLASS card.

BS_RET_CODE BS_FormatiClassCard(int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioEntry Plus iCLASS

BS_AddBlacklistEx

When a user ID or card CSN is added to the blacklist, the device will reject the corresponding iCLASS card. The blacklist can store up to 1000 user IDs or card CSNs.

BS_RET_CODE BS_AddBlacklistEx(int handle, int numOfItem, BSBlacklistItemEx* item)

Parameters

handle

Handle of the communication channel.

numOfItem

Number of items to be added.

Item

Arrays of blacklist items to be added.

BSBlacklistItem is defined as follows;

```
struct BSBlacklistItemEx {
    enum {
        // blacklist type
        BLACKLIST_USER_ID  = 0x01,
        BLACKLIST_CSN  = 0x02,

        MAX_BLACKLIST      = 1000,
    };

    unsigned char itemType;
    unsigned char reserved[3];
    unsigned itemData;
    unsigned customID;
};
```

The key fields and their available options are as follows;

Fields	Options
itemType	BLACKLIST_USER_ID: the itemData is userID. If itemType is this, then the customID is ignored. BLACKLIST_CSN: the itemData is 4 byte CSN of a card. If itemType is this, then cardID and

	customID must be input..
itemData	UserID or CSN according to the itemType.
customID	4 byte custom ID which makes up the RF card ID with **cardID** in case iCLASS.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioEntry Plus iCLASS

BS_DeleteBlacklistEx

Deletes iCLASS cards from the blacklist.

BS_DeleteBlacklistEx(int handle, int numOfItem, BSBlacklistItemEx* item)

Parameters

handle

Handle of the communication channel.

numOfItem

Number of items to be deleted.

Item

Arrays of blacklist items to be deleted.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioEntry Plus iCLASS

BS_ReadBlacklistEx

Read the contents of the blacklist.

BS_ReadBlacklistEx(int handle, int* numOfItem, BSBlacklistItemEx* item)

Parameters

handle

Handle of the communication channel.

numOfItem

Pointer to the number of items to be returned.

item

Arrays of white list items to be returned.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioEntry Plus iCLASS

3.10. Miscellaneous API

These APIs do not interact with devices directly. They provide miscellaneous functionalities which are helpful for using this SDK.

- BS_ConvertToUTF8: converts a wide-character string into a UTF8 string.
- BS_ConvertToUTF16: converts a wide-character string into a UTF16 string.
- BS_UTF8ToString: convert a UTF8 string into a string.
- BS_UTF16ToString: convert a UTF16 string into a string.
- BS_ConvertToLocalTime: converts a UTC value into a local time
- BS_SetKey: sets 256 bit key for decrypting/encrypting fingerprint templates.
- BS_EncryptTemplate: encrypts a fingerprint template.
- BS_DecryptTemplate: decrypts a fingerprint template.
- BS_EncryptSHA256: encrypts a key by SHA256(Secure Hash Algorithm).

BS_ConvertToUTF8

BioStation supports UTF8 strings. To display non-western characters in BioStation, it should be converted to UTF8 first.

int BS_ConvertToUTF8(const char* msg, char* utf8Msg, int limitLen)

Parameters

msg

String to be converted.

utf8Msg

Pointer to the buffer for new string.

limitLen

Maximum size of utf8Msg buffer.

Return Values

If the function succeeds, return the number of bytes written to the utf8Msg buffer. Otherwise, return 0.

Compatibility

BioStation

BS_ConvertToUTF16

D-Station, BioLite Net and X-Station supports UTF16 strings. To display any characters in D-Station, BioLite Net and X-Station, it should be converted to UTF16 first.

int BS_ConvertToUTF16(const char* msg, char* utf16Msg, int limitLen)

Parameters

msg

String to be converted.

utf8Msg

Pointer to the buffer for new string.

limitLen

Maximum size of utf16Msg buffer.

Return Values

If the function succeeds, return the number of bytes written to the utf16Msg buffer. Otherwise, return 0.

Compatibility

FaceStation/BioStation T2/D-Station/BioLite Net/X-Station

BS_UTF8ToString

BS_UTF8ToStaring converts a UTF8 string into a general string.

int BS_UTF8ToString(const char* szUTF8, char* szOutput)

Parameters

szUTF8

String to be converted.

szOutput

Pointer to the buffer for new string.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return -1.

Compatibility

Device Independent

BS_UTF16ToString

BS_UTF16ToStaring converts a UTF16 string into a general string.

int BS_UTF16ToString(const char* szUTF16, char* szOutput)

Parameters

szUTF16

String to be converted.

szOutput

Pointer to the buffer for new string.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return -1.

Compatibility

Device Independent

BS_ConvertToLocalTime

All time values for the SDK should be local time. BS_ConvertToLocalTime converts a UTC time into local time.

time_t BS_ConvertToLocalTime(time_t utcTime)

Parameters

utcTime

Number of seconds elapsed since midnight (00:00:00), January 1, 1970.

Return Values

The time value converted for the local time zone.

Compatibility

Device independent

BS_SetKey

When the encryption mode is on, all the fingerprint templates are transferred and saved in encrypted form. If you want to decrypt/encrypt templates manually, you should use **BS_SetKey**, **BS_DecryptTemplate**, and **BS_EncryptTemplate**. Note that these functions are only applicable to D-Station and BioStation. X-Station, BioEntry Plus and BioLite Net transfer and save templates in encrypted form always.

void BS_SetKey(unsigned char *key)

Parameters

key

32 byte – 256bit – encryption key.

Return Values

None

Compatibility

FaceStation/BioStation T2/D-Station/BioStation

BS_EncryptTemplate

Encrypts a fingerprint template with the key set by **BS_SetKey**.

int BS_EncryptTemplate(unsigned char *input, unsigned char *output, int length)

Parameters

input

Pointer to the fingerprint template to be encrypted.

output

Pointer to the buffer for encrypted template.

length

Length of the template data.

Return Values

Return the length of encrypted template.

Compatibility

BioStation T2/D-Station/BioStation

BS_DecryptTemplate

Decrypts an encrypted template with the key set by **BS_SetKey**.

void BS_DecryptTemplate(unsigned char *input, unsigned char *output, int length)

Parameters

input

Pointer to the encrypted template.

output

Pointer to the buffer for decrypted template.

length

Length of the encrypted template.

Return Values

None.

Compatibility

BioStation T2/D-Station/BioStation

BS_EncryptSHA256

The user password is encrypted and saved on FaceStation. The password should be encrypted with SHA256(Secure Hash Algorithm).

int BS_EncryptSHA256(unsigned char *input, int length, unsigned char *output)

Parameters

input

Pointer to the data to be encrypted.

length

Length of the data

output

Pointer to the buffer for encrypted data.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return error code.

Compatibility

FaceStation

3.11. Server API

Suprema's devices have two connection modes with PC. One is Direct Mode, another is Server Mode. Direct Mode means that a PC connects to a device. And Server Mode means that a device connects to a PC.
Previous BioStar SDK could support only Direct Mode by using TCP APIs such as 'BS_OpenSocket'. But BioStar SDK V1.25 or later version can support Server Mode. When using Server Mode, each device has two connections, one is Command Connection and other is Request Connection. Command Connection is used to control devices or get devices's configuration or get log of devices etc. In Command Connection, request signal starts from a PC. But Request Connection is used to recieve realtime log or server matching request. In Request Connection, request signal starts from devices.
A server application such as BioStar Server can be made by using these APIs.

The typical usage of Server API is the same as follows

Step1. APIs to set callback functions should be called.
Step2. 'BS_SetSynchronousOperation' shold be called.
Step3. 'BS_StartServerApp' shoulde be called.
Step4. Wait for Command Connection from devices.
Step5. After Command Connection is connected, read all logs which are not exist in a PC from devices
Step6. 'BS_StartRequest' should be called to receive realtime logs and server matching request.
Step7. Wait for Request Connection from devices.
Step8. 'BS_StopServerApp' should be called before closing application.

- BS_StartServerApp: starts threads to accept connections from devices and receive data form devices.
- BS_StopServerApp: stops threads which are started by 'BS_StartServerApp'.
- BS_SetConnectedCallback: sets a callback function which occurs when Command Connection from devices is accepted.
- BS_SetDisconnectedCallback: sets a callback function which occurs when the connection between a PC and a device is disconnected.

- BS_SetRequestStartedCallback: sets a callback function which occurs when Request Connection from devices is accepted.
- BS_SetLogCallback: sets a callback function which occurs when a realtime log from a device is received.
- BS_SetImageLogCallback: sets a callback function which occurs when a realtime image log from a device is received.
- BS_SetRequestUserInfoCallback: sets a callback function which occurs when User Info Request from devices which use the server matching is received. User Info Request must be reiceived before the verify request.
- BS_SetRequestMatchingCallback: sets a callback function which occurs when Fingerprint Matching Request from devices which use the server matching is received.
- BS_SetSynchronousOperation: determines if received data from devices should be treated synchronously or not.
- BS_IssueCertificate: issues the SSL certificate to a biostation.
- BS_DeleteCertificate: deletes the SSL certificate from a biostation.
- BS_StartRequest: makes devices try Request Connection to a PC.
- BS_GetConnectedList: gets the list of the IDs of the connected devices.
- BS_CloseConnection: closes the connection of a specified device.

BS_StartServerApp

This API starts threads to accept connections from devices and receive data from devices. And this API allocates memory to be used for server APIs.
So this API shoud be called to accept connections and receive data from devices.

BS_RET_CODE BS_StartServerApp(int port, int maxConnection, char* sslPath, char* sslPassword, int connCheckDuration)

Parameters

port

Port number to be bound with the server socket.

maxConnection

Number of maximum connection which can be allowed.

sslPath

Path of OpenSSL Utility which is installed by 'Win32OpenSSL-0_9_8d.exe'. This parameter is needed to issue a SSL certificate.

sslPassword

Password to make a SSL certificate.

connCheckDuration

Duration to determin if a connection is valid or not. *connCheckDuration* can have the numeric value as seconds.
While this duration, if the connection receives no packet, the connection can be regard as invalid.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_StopServerApp

This API stops all threads which are made by 'BS_StartServerApp' and frees all allocate memory. This API should be called before exiting the server application.

BS_RET_CODE BS_StopServerApp ()

Parameters

None

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_SetConnectedCallback

This API sets the callback function which notifies accepting Command Connection.

BS_RET_CODE BS_SetConnectedCallback(BS_ConnectionProc proc, bool syncOp, bool autoResponse)

Parameters

proc

Pointer to the callback function.

This function pointer is called by BioStar SDK when Command Connection is accepted.

The prototype is same as follows.

BS_RET_CODE (*BS_ConnectionProc)(int handle, unsigned deviceID, int deviceType, int connectionType, int functionType, char* ipAddress)

The parameters are explained in follows.

handle

Handle of the communication channel.

deviceID

Device ID of the connected device.

deviceType

Type of the connected device.

BS_DEVICE_BIOSTATION	0x00
BS_DEVICE_BIOENTRY_PLUS	0x01
BS_DEVICE_BIOLITE	0x02
BS_DEVICE_XPASS	0x03
BS_DEVICE_DSTATION	0x04
BS_DEVICE_XSTATION	0x05
BS_DEVICE_BIOSTATION2	0x06
BS_DEVICE_XPASS_SLIM	0x07
BS_DEVICE_FSTATION	0x0A

connectionType

connectionType determins nomal TCP/IP connection or SSL connection.

0 – normal TCP/IP

1 - SSL

functionType

Type of this callback function to be called by BioStar SDK.

BS_SERVER_CB_CONN	0
BS_SERVER_CB_DISCONN	1
BS_SERVER_CB_REQUEST_STARTED	2

ipAddress

IPAddress of the connected devices.

syncOp

syncOp determins if this callback function is called synchronously or not. *syncOp* can be 'true'(1) or 'false'(0). 'true' means synchronous using.

autoResponse

autoResponse determines if the response signal from a PC to a device is sent before the function pointer is called or after it is called. When autoResponse is 'true'(1), the response signal is always 'BS_SUCCESS'. Whereas *autoResponse* is 'false'(0), the response signal is determined according to the return value of this callback function.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_SetDisconnectedCallback

This API sets the callback function which notifies the occuring of disconnected connection.

BS_RET_CODE BS_SetDisconnectedCallback(BS_ConnectionProc proc, bool syncOp)

Parameters

proc

Pointer to the callback function.

This function pointer is called by BioStar SDK when disconnection occurs.

The prototype is the same as follows.

BS_RET_CODE (*BS_ConnectionProc)(int handle, unsigned deviceID, int deviceType, int connectionType, int functionType, char* ipAddress)

syncOp

syncOp determins if this callback function is called synchronously or not.

syncOp can be ‘true’(1) or ‘false’(0). ‘true’ means synchronous using.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/X-Station/Xpass S2

BS_SetRequestStartedCallback

This API sets the callback function which notifies accepting Request Connection.

BS_RET_CODE BS_SetRequestStartedCallback (BS_ConnectionProc proc, bool syncOp, bool autoResponse)

Parameters

proc

Pointer to the callback function.

This function pointer is called by BioStar SDK when Request Connection is accepted.

The prototype is the same as follows.

BS_RET_CODE (*BS_ConnectionProc)(int handle, unsigned deviceID, int deviceType, int connectionType, int functionType, char* ipAddress);

syncOp

syncOp determins if this callback function is called synchronously or not.

syncOp can be 'true'(1) or 'false'(0). 'true' means synchronous using.

autoResponse

autoResponse determines if the response signal form a PC to a device is sent before the function pointer is called or after it is called. When *autoResponse* is 'true'(1), the response signal is always 'BS_SUCCESS'. When *autoResponse* is 'false'(0), the response signal is determined according to the return value of this callback function.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_SetLogCallback

This API sets the callback function which notifies recieving a realtime log.

BS_RET_CODE BS_SetLogCallback (BS_LogProc proc, bool syncOp, bool autoResponse)

Parameters

proc

Pointer to the callback function.

This function pointer is called by BioStar SDK when a realtime log is received.

The prototype is the same as follows.

BS_RET_CODE (*BS_LogProc)(int handle, unsigned deviceID, int deviceType, int connectionType, BSLogRecord* data)

The parameters are explained in follows.

handle

Handle of the communication channel.

deviceID

Device ID of the connected device.

deviceType

Type of the connected device.

BS_DEVICE_BIOSTATION	0x00
BS_DEVICE_BIOENTRY_PLUS	0x01
BS_DEVICE_BIOLITE	0x02
BS_DEVICE_XPASS	0x03
BS_DEVICE_DSTATION	0x04
BS_DEVICE_XSTATION	0x05
BS_DEVICE_BIOSTATION2	0x06
BS_DEVICE_XPASS SLIM	0x07
BS_DEVICE_FSTATION	0x0A

connectionType

connectionType determins nomal TCP/IP connection or SSL connection.

0 – normal TCP/IP

1 - SSL

data

Pointer of the log buffer.

syncOp

syncOp determins if this callback function is called synchronously or not.

syncOp can be 'true'(1) or 'false'(0). 'true' means synchronous using.

autoResponse

autoResponse determins if the response signal form a PC to a device is sended before the function pointer is called or after the function pointer is called.

When *autoResponse* is 'true'(1), the response signal is always 'BS_SUCCESS'.

When *autoResponse* is 'false'(0), the response signal is determined according to the return value of this callback function.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_SetImageLogCallback

This API sets the callback function which notifies recieving a realtime image log.

BS_RET_CODE BS_SetImageLogCallback (BS_ImageLogProc proc, bool syncope, bool autoResponse)

Parameters

proc

Pointer to the callback function.

This function pointer is called by BioStar SDK when a realtime image log is received.

The prototype is the same as follows.

BS_RET_CODE (*BS_ImageLogProc)(int handle, unsigned deviceID, int deviceType, int connectionType, void* data, int dataLen)

The parameters are explained in follows.

handle

Handle of the communication channel.

deviceID

Device ID of the connected device.

deviceType

Type of the connected device.

BS_DEVICE_DSTATION	0x04
BS_DEVICE_XSTATION	0x05
BS_DEVICE_BIOSTATION2	0x06
BS_DEVICE_FSTATION	0x0A

connectionType

connectionType determins nomal TCP/IP connection or SSL connection.

0 – normal TCP/IP

1 - SSL

data

Pointer of the image data.

dataLen

Length of the image data.

syncOp

syncOp determins if this callback function is called synchronously or not. *syncOp* can be ‘true’(1) or ‘false’(0). ‘true’ means synchronous using.

autoResponse

autoResponse determins if the response signal form a PC to a device is sended before the function pointer is called or after the function pointer is called. When *autoResponse* is ‘true’(1), the response signal is always ‘BS_SUCCESS’. When *autoResponse* is ‘false’(0), the response signal is determined according to the return value of this callback function.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station

BS_SetRequestUserInfoCallback

This API sets the callback function which notifies receiving User Info Request. User Info Request occurs to get a user header such as 'BSUserHdrEx', 'BEUserHdr' when 1:1 verifycation is processed on a device.

BS_RET_CODE BS_SetRequestUserInfoCallback (BS_RequestUserInfoProc proc, bool syncOp)

Parameters

proc

Pointer to the callback function.

This function pointer is called by BioStar SDK when User Info Request is received.

The prototype is the same as follows.

BS_RET_CODE (*BS_RequestUserInfoProc)(int handle, unsigned deviceID, int deviceType, int connectionType, int idType, unsigned ID, unsigned customID, void* userHdr)

The parameters are explained in follows.

handle

Handle of the communication channel.

deviceID

Device ID of the connected device.

deviceType

Type of the connected device.

BS_DEVICE_BIOSTATION	0x00
BS_DEVICE_BIOENTRY_PLUS	0x01
BS_DEVICE_BIOLITE	0x02
BS_DEVICE_XPASS	0x03
BS_DEVICE_DSTATION	0x04
BS_DEVICE_XSTATION	0x05
BS_DEVICE_BIOSTATION2	0x06
BS_DEVICE_XPASS SLIM	0x07
BS_DEVICE_FSTATION	0x0A

connectionType

connectionType determins nomal TCP/IP connection or SSL connection.

0 – normal TCP/IP

1 – SSL

idType

idType determins if the ID is user ID or card ID.

ID_USER 1

ID_CARD 2

ID

The value of ID.

customID

The value of custom ID. This is valid when idType is ID_CARD.

userHdr

The user header information to be sent to a device.

The result of User Info Request is determined by the return value of this function. If the user has the ID exists, the return value should be 'BS_SUCCESS'. If the user has the ID don't exists, the return value shoud be 'BS_ERR_NOT_FOUND'.

If the return value of this function is 'BS_SUCCESS', *userHdr* should be filled? with a user header information.

syncOp

syncOp determines if this callback function is called synchronously or not. *syncOp* can be 'true'(1) or 'false'(0). 'true' means synchronous using.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStaion/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_SetRequestMatchingCallback

This API sets the callback function which notifies recieving Fingerprint Matching Request. Fingerprint Matching Request occurs to verify or identify a scanned fingerprint template with saved fingerprint templates.

BS_RET_CODE BS_SetRequestMatchingCallback (BS_RequestMatchingProc proc, bool syncOp)

Parameters

proc

Pointer to the callback function.

This function pointer is called by BioStar SDK when Fingerprint Matching Request is received.

The prototype is the same as follows.

BS_RET_CODE (__stdcall *BS_RequestMatchingProc)(int handle, unsigned deviceID, int deviceType, int connectionType, int matchingType, unsigned ID, unsigned char* templateData, void* userHdr, int* isDuress)

The parameters are explained in follows.

handle

Handle of the communication channel.

deviceID

Device ID of the connected device.

deviceType

Type of the connected device.

BS_DEVICE_BIOSTATION	0x00
BS_DEVICE_BIOENTRY_PLUS	0x01
BS_DEVICE_BIOLITE	0x02
BS_DEVICE_XPASS	0x03
BS_DEVICE_DSTATION	0x04
BS_DEVICE_XSTATION	0x05
BS_DEVICE_BIOSTATION2	0x06
BS_DEVICE_XPASS SLIM	0x07
BS_DEVICE_FSTATION	0x0A

connectionType

connectionType determines nomal TCP/IP connection or SSL connection.

0 – normal TCP/IP

1 – SSL

matchingType

matchingType determins identification or verification.

REQUEST_IDENTIFY 1

REQUEST_VERIFY 2

ID

The value of ID.

templateData

Pointer of the scanned fingerprint template buffers from a device.

userHdr

User header information to be sent to a device.

isDuress

Result of checking duress.

NORMAL_FINGER 1

DURESS_FINGER 2

To perform identification or verification, **UFE SDK** should be used.

The result of Fingerprint Matching Request is determined by the return value of this function. If the result of matching is success, the return value should be 'BS_SUCCESS'. If the result of matching is fail, the return value shoud be 'BS_ERR_NOT_FOUND'.

If the return value of this function is 'BS_SUCCESS', *userHdr* should be filled with user header information and *isDuress* should be set.

syncOp

syncOp determines if this callback function is called synchronously or not. *syncOp* can be 'true'(1) or 'false'(0). 'true' means synchronous using.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_SetSynchronousOperation

This API determines if all received datas from devieces should be treated synchronously or not

BS_RET_CODE BS_SetSynchronousOperation(bool syncOp)

Parameters

syncOp

syncOp can be ‘true’(1) or ‘false’(0). ‘true’ means synchronous using.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStaion/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_IssueCertificate

This API issues a SSL certificate to a BioStation device.

BS_RET_CODE BS_IssueCertificate (int handle, unsigned int deviceID)

Parameters

handle

Handle of the communication channel.

deviceID

Device ID of the connected BioStation.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_DeleteCertificate

This API deletes a SSL certificatie from a BioStation device.

BS_RET_CODE BS_DeleteCertificate (int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation

BS_StartRequest

This API makes devices try Request Connection to a PC.

BS_RET_CODE BS_StartRequest (int handle, int deviceType, int port)

Parameters

handle

Handle of the communication channel.

deviceType

Type of the connected device.

deviceType can be BS_DEVICE_BIOSTATION(0) or

BS_DEVICE_BIOENTRY_PLUS(1),

BS_DEVICE_BIOLITE(2),.

BS_DEVICE_XPASS(3)

BS_DEVICE_DSTATION(4)

BS_DEVICE_XSTATION(5)

BS_DEVICE_BIOSTATION2(6)

BS_DEVICE_XPASS_SLIM(7)

BS_DEVICE_FSTATION(10)

port

Port to be bound with a server socket.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Staion/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_GetConnectedList

This API gets connected device list.

BS_RET_CODE BS_GetConnectedList (unsigned int* deviceList, int* count)

Parameters

deviceList

Pointer to the array of connected device IDs.

count

Pointer to the number of connected devices.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

BS_CloseConnection

This API closes the connection of the specified device.

BS_RET_CODE BS_CloseConnection (unsigned int deviceID)

Parameters

deviceID

Device ID of the connected device.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

FaceStation/BioStation T2/D-Station/X-Station/BioStation/BioEntry Plus/BioEntry W/BioLite Net/Xpass/Xpass Slim/Xpass S2

3.1. Interactive API

Interactive API means displaying messages, images which are defined by customers and playing sounds which are defined by customers.
In previous version of BioStar SDK, the display of devices can be controlled by itself. But in BioStar SDK V1.25 or later version, the display of devices can be controlled by a PC with an application which is made of BioStar SDK.
Theses APIs can be applied for the case of follows

1. When additional popup messages or sounds are required after authentication.
2. When displaying message or alarm sound is required without event of a deivce.
3. When additional key input is required after authentication.

- BS_DisplayCustomInfo: displays the message and the image which are defined by a customer.
- BS_CancelDisplayCustomInfo: cancels the operation of 'BS_DisplayCustomInfo'.
- BS_PlayCustomSound: plays the sound which is defined by a customer.
- BS_PlaySound: plays the sound which is pointed by the sound ID.
- BS_WaitCustomKeyInput: waits to get key value which is put on a device.

BS_DisplayCustomInfo

This API makes a BioStation device display the message and the image which are defined by a customer.

BS_RET_CODE BS_DisplayCustomInfo (int handle, int displayTime, char* text, char* imageFile)

Parameters

handle

Handle of the communication channel.

displayTime

Time in which displaying popup should be continued in seconds.

text

Message to be displayed on a device.

imageFile

Path of an image file to be displayed on a device.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation(V1.8 or Later)

BS_CancelDisplayCustomInfo

This API hides the popup which is made by 'BS_DisplayCustomInfo' regardless of remain time.

BS_RET_CODE BS_CancelDisplayCustomInfo (int handle)

Parameters

handle

Handle of the communication channel.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation(V1.8 or Later)

BS_PlayCustomSound

This API makes a BioStation device play a sound which is defined by a customer.

BS_RET_CODE BS_PlayCustomSound (int handle, char* waveFile)

Parameters

handle

Handle of the communication channel.

waveFile

Path of a wave file, which should have sampling rate of 11k or over.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation(V1.8 or Later)

BS_PlaySound

This API makes a BioStatin device play previous saved sound with sound ID.

BS_RET_CODE BS_PlaySound (int handle, int soundID)

Parameters

handle

Handle of the communication channel.

soundID

Sound ID is the same as follows.

BS_SOUND_START	0
BS_SOUND_CLICK	1
BS_SOUND_SUCCESS	2
BS_SOUND_QUESTION	3
BS_SOUND_ERROR	4
BS_SOUND_SCAN	5
BS_SOUND_FINGER_ONLY	6
BS_SOUND_PIN_ONLY	7
BS_SOUND_CARD_ONLY	8
BS_SOUND_FINGER_PIN	9
BS_SOUND_FINGER_CARD	10
BS_SOUND_TNA_F1	11
BS_SOUND_TNA_F2	12
BS_SOUND_TNA_F3	13
BS_SOUND_TNA_F4	14

Sound ID 0~5 only are saved at factory default.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation(V1.8 or Later)

BS_WaitCustomKeyInput

This API makes a BioStation device display the message and the image which are defined by a customer and wait key input while specified seconds and return key array to a PC after keys is input.

BS_RET_CODE BS_WaitCustomKeyInput (int handle, int waitTime, char* title, char* imageFile, char* keyOut, int* numOfKey)

Parameters

handle

Handle of the communication channel.

waitTime

Seconds in which waiting key should be continued.

title

Message to be displayed on a device.

imageFile

Path of an image file to be displayed on a device.

keyOut

Pointer to the buffer having returned key output.

numOfKey

Pointer to the number of returned keys.

Return Values

If the function succeeds, return BS_SUCCESS. Otherwise, return the corresponding error code.

Compatibility

BioStation(V1.8 or Later)

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