User's Manual

Bluetooth® Low Energy Protocol Stack

API Reference Manual: ScPP

Renesas MCU

Target Device

RL78/G1D

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General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Handling of Unused Pins

   Handle unused pins in accordance with the directions given under Handling of Unused Pins in the manual.

   — The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.

2. Processing at Power-on

   The state of the product is undefined at the moment when power is supplied.

   — The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.
   In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed.
   In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.

3. Prohibition of Access to Reserved Addresses

   Access to reserved addresses is prohibited.

   — The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.

4. Clock Signals

   After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has stabilized.

   — When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.

5. Differences between Products

   Before changing from one product to another, i.e. to a product with a different part number, confirm that the change will not lead to problems.

   — The characteristics of an MPU or MCU in the same group but having a different part number may differ in terms of the internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

How to Use This Manual

1. Purpose and Target Readers

This manual describes the API (Application Program Interface) of the Scan Parameters profile (ScPP) of the Bluetooth Low Energy protocol stack (BLE software), which is used to develop Bluetooth applications that incorporate the Renesas Bluetooth low energy microcontroller RL78/G1D. It is intended for users designing application systems incorporating this software. A basic knowledge of microcontrollers and Bluetooth low energy is necessary in order to use this manual.

Related documents

The related documents indicated in this publication may include preliminary versions. However, preliminary versions are not marked as such.

Document Name	Document No.
Bluetooth Low Energy Protocol Stack	
User's Manual	R01UW0095E
API Reference Manual: Basics	R01UW0088E
API Reference Manual: FMP	R01UW0089E
API Reference Manual: PXP	R01UW0090E
API Reference Manual: HTP	R01UW0091E
API Reference Manual: BLP	R01UW0092E
API Reference Manual: HOGP	R01UW0093E
API Reference Manual: ScPP	This manual
API Reference Manual: HRP	R01UW0097E
API Reference Manual: CSCP	R01UW0098E
API Reference Manual: CPP	R01UW0099E
API Reference Manual: GLP	R01UW0103E
API Reference Manual: TIP	R01UW0106E
API Reference Manual: RSCP	R01UW0107E
API Reference Manual: ANP	R01UW0108E
API Reference Manual: PASP	R01UW0109E
API Reference Manual: LNP	R01UW0113E
Application Note: Sample Program	R01AN1375E
Application Note: rBLE Command Specification	R01AN1376E

List of Abbreviations and Acronyms

Abbreviation	Full Form	Remark
ANP	Alert Notification Profile	
ANS	Alert Notification Service	
API	Application Programming Interface	
ATT	Attribute Protocol	
BAS	Battery Service	
BB	Base Band	
BD_ADDR	Bluetooth Device Address	
BLE	Bluetooth low energy	
BLP	Blood Pressure Profile	
BLS	Blood Pressure Service	
CPP	Cycling Power Profile	
CPS	Cycling Power Service	
CSCP	Cycling Speed and Cadence Profile	
CSCS	Cycling Speed and Cadence Service	
CSRK	Connection Signature Resolving Key	
CTS	Current Time Service	
DIS	Device Information Service	
EDIV	Encrypted Diversifier	
FMP	Find Me Profile	
GAP	Generic Access Profile	
GATT	Generic Attribute Profile	
GLP	Glucose Profile	
GLS	Glucose Service	
HCI	Host Controller Interface	
HID	Human Interface Device	
HIDS	HID Service	
HOGP	HID over GATT Profile	
HRP	Heart Rate Profile	
HRS	Heart Rate Service	
HTP	Health Thermometer Profile	
HTS	Health Thermometer Service	
IAS	Immediate Alert Service	
IRK	Identity Resolving Key	
L2CAP	Logical Link Control and Adaptation Protocol	
LE	Low Energy	

Abbreviation	Full Form	Remark
LL	Link Layer	
LLS	Link Loss Service	
LNP	Location and Navigation Profile	
LNS	Location and Navigation Service	
LTK	Long Term Key	
MCU	Micro Controller Unit	
MITM	Man-in-the-middle	
MTU	Maximum Transmission Unit	
NDCS	Next DST Change Service	
OOB	Out of Band	
OS	Operating System	
PASP	Phone Alert Status Profile	
PASS	Phone Alert Status Service	
PXP	Proximity Profile	
RF	Radio Frequency	
RSCP	Running Speed and Cadence Profile	
RSCS	Running Speed and Cadence Service	
RSSI	Received Signal Strength Indication	
RTUS	Reference Time Update Service	
ScPP	Scan Parameters Profile	
ScPS	Scan Parameters Service	
SM	Security Manager	
SMP	Security Manager Protocol	
STK	Short Term Key	
TIP	Time Profile	
TK	Temporary Key	
TPS	Tx Power Service	
UART	Universal Asynchronous Receiver Transmitter	
UUID	Universal Unique Identifier	

Abbreviation	Full Form	Remark
APP	Application	
CSI	Clocked Serial Interface	
IIC	Inter-Integrated Circuit	
RSCIP	Renesas Serial Communication Interface Protocol	
VS	Vendor Specific	

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API Reference Manual: ScPP

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1. Overview

This manual describes the API (Application Program Interface) of the Scan Parameters profile (ScPP) of the Bluetooth Low Energy protocol stack (BLE software), which is used to develop Bluetooth applications that incorporate Renesas Bluetooth low energy microcontroller RL78/G1D.

For details about the organization and features of BLE software, see the Bluetooth Low Energy Protocol Stack User's Manual.

2. Common Definitions

This section describes the definitions common to the API of each profile.

2.1 Service Definitions

This section describes the common definitions of services used by the API of multiple profiles.

- Declaration of enumerated type for alert level

```
enum RBLE_SVC_ALT_LVL_enum {
   RBLE_SVC_ALERT_NONE = 0x00,              No alert
   RBLE_SVC_ALERT_MILD,                     Mild alert
   RBLE_SVC_ALERT_HIGH                      High alert
};
```

- Declaration of enumerated type for PnP ID characteristic vendor ID field

```
enum RBLE_SVC_PNP_VENDOR_ID_enum {
   RBLE_SVC_SIG_ASSIGNED_ID = 0x01,         Vendor ID assigned by Bluetooth SIG
   RBLE_SVC_USB_ASSIGNED_ID                 Vendor ID assigned by USB Implementer’s
                                            Forum
};
```

- Declaration of enumerated type for Name Space field of Characteristic Presentation Format descriptor

```
enum RBLE_SVC_PRESEN_NAMESPASE_enum {
   RBLE_SVC_NAMESPACE_SIG = 0x01,           Defined by Bluetooth SIG
};
```

- Declaration of enumerated type for security level of Service

```
enum RBLE_SVC_SEC_LVL_enum {
   RBLE_SVC_SEC_NONE = 0x01,                No security
   RBLE_SVC_SEC_UNAUTH = 0x02,              Require unauthenticated pairing
   RBLE_SVC_SEC_AUTH = 0x04,                Require authenticated pairing
   RBLE_SVC_SEC_AUTZ = 0x08,                Require authorization
   RBLE_SVC_SEC_ENC = 0x10                  Require encryption
};
```

- Declaration of enumerated type for connection types

```
enum RBLE_PRF_CON_enum {
    RBLE_PRF_CON_DISCOVERY = 0x00,          Configuration connection performed
                                            when connecting for the first time

    RBLE_PRF_CON_NORMAL                     Normal connection performed when
                                            connecting for the second and
                                            subsequent times
};
```

- Declaration of enumerated type for client configuration characteristic value

```
enum RBLE_PRF_CLIENT_CONFIG_enum {
    RBLE_PRF_STOP_NTFIND = 0x00,                Stop notification or indication of
                                                characteristic value.
    RBLE_PRF_START_NTF,                         Start notification of
                                                characteristic value.
    RBLE_PRF_START_IND                          Start indication of
                                                characteristic value.
};
```

- Declaration of enumerated type for server configuration characteristic value

```
enum RBLE_PRF_SERVER_CONFIG_enum {
    RBLE_PRF_STOP_BRD = 0x00,                   Stop broadcast of characteristic value.
    RBLE_PRF_START_BRD                          Start broadcast of characteristic value.
};
```

2.2 Status Definitions

This section describes the status definitions used by the API of each profile.

- Declaration of enumerated type for rBLE status

```
enum RBLE_STATUS_enum {
    RBLE_OK = 0x00,                               Normal operation
    RBLE_PRF_ERR_INVALID_PARAM = 0x90,            Invalid parameter specified for
                                                  setting or acquiring a characteristic
                                                  value
    RBLE_PRF_ERR_INEXISTENT_HDL,                  Invalid handle specified for setting
                                                  or acquiring a characteristic value
    RBLE_PRF_ERR_STOP_DISC_CHAR_MISSING,          The characteristic value is missing.
    RBLE_PRF_ERR_MULTIPLE_IAS,                    Multiple IASs exist.
    RBLE_PRF_ERR_INCORRECT_PROP,                  Incorrect property
    RBLE_PRF_ERR_MULTIPLE_CHAR,                   Multiple characteristic values exist.
    RBLE_PRF_ERR_NOT_WRITABLE,                    Writing is not permitted.
    RBLE_PRF_ERR_NOT_READABLE,                    Reading is not permitted.
    RBLE_PRF_ERR_REQ_DISALLOWED,                  Requesting is not permitted.
    RBLE_PRF_ERR_NTF_DISABLED,                    Notification is disabled.
    RBLE_PRF_ERR_IND_DISABLED,                    Indication is disabled.
    RBLE_PRF_ERR_ATT_NOT_SUPPORTED,               The characteristic value is not
                                                  supported.
};
```

Note: Statuses other than the above are described in *API Reference Manual: Basics*.

3. Scan Parameters Profile

This section describes the API of the Scan Parameters profile. The Scan Parameters profile is used to provide devices with information to assist them in managing their connection idle timeout and advertising parameters to optimize power consumption and/or reconnection latency.

3.1 Definitions

This section describes the definitions used by the API of the Scan Parameters profile.

- Declaration of enumerated type for ScPP event types

```
enum RBLE_SPP_EVENT_TYPE_enum {
    RBLE_SPP_EVENT_SERVER_ENABLE_COMP = 0x01,        Scan Server enable completion
                                                     event
                                                     (Parameter: server_enable)
    RBLE_SPP_EVENT_SERVER_DISABLE_COMP,              Scan Server disable completion
                                                     event
                                                     (Parameter: server_disable)
    RBLE_SPP_EVENT_SERVER_CFG_INDNTF_IND,            Configured value change
                                                     indication event
                                                     (Parameter: scans_cfg_indntf_ind)
    RBLE_SPP_EVENT_SERVER_INTERVAL_CHG_EVT,          Scan interval window notification
                                                     event
                                                     (Parameter: interval_chg_evt)
    RBLE_SPP_EVENT_SERVER_SEND_REFRESH_COMP,         Scan refresh request send
                                                     completion event
                                                     (Parameter: send_refresh)
    RBLE_SPP_EVENT_SERVER_COMMAND_DISALLOWED_IND,
                                                     Command disallowed indication
                                                     event
                                                     (Parameter: cmd_disallowed_ind)
    RBLE_SPP_EVENT_CLIENT_ENABLE_COMP = 0x81,        Scan Client enable completion
                                                     event
                                                     (Parameter: client_enable)
    RBLE_SPP_EVENT_CLIENT_DISABLE_COMP,              Scan Client disable completion
                                                     event
                                                     (Parameter: client_disable)
    RBLE_SPP_EVENT_CLIENT_ERROR_IND,                 Scan Client error indication
                                                     event
                                                     (Parameter: error_ind)
    RBLE_SPP_EVENT_CLIENT_WRITE_CHAR_RESPONSE,       Characteristic write request
                                                     response event
                                                     (Parameters wr_char_resp)
    RBLE_SPP_EVENT_CLIENT_COMMAND_DISALLOWED_IND,
                                                     Command disallowed indication
                                                     event
                                                     (Parameter: cmd_disallowed_ind)
};
```

- Declaration of data type for ScPP event types

```
typedef uint8_t RBLE_SPP_EVENT_TYPE;
```

- Declaration of data type for Scan Server event callback function

```
typedef void ( *RBLE_SPPS_EVENT_HANDLER )( RBLE_SPPS_EVENT *event );
```

- Declaration of data type for Scan Client event callback function

```
typedef void ( *RBLE_SPPC_EVENT_HANDLER )( RBLE_SPPC_EVENT *event );
```

- Declaration of enumerated type for scan refresh characteristic value

```
enum RBLE_SCANS_REFRESH_enum {
    RBLE_SCANS_MODE_REFRESH_REQ = 0x00                    Scan refresh request
};
```

- Scan Server characteristic information structures

```
typedef struct RBLE_SPP_SERVER_PARAM_t {
    uint16_t    s_refresh_ntf_en;                         Scan refresh notification
                                                          configuration value
}RBLE_SPP_SERVER_PARAM;
```

- Scan interval window characteristic parameter structures

```
typedef struct RBLE_SCANS_INTV_WINDOW_PARAM_t {
    uint16_t    le_scan_interval;                         Scan interval
    uint16_t    le_scan_window;                           Scan window
}RBLE_SCANS_INTV_WINDOW_PARAM;
```

- Scan parameters service content structures

```
typedef struct RBLE_SPS_CONTENT_t {
    uint16_t    shdl;                       Scan parameters service start handle
    uint16_t    ehdl;                       Scan parameters service end handle
    uint16_t    intv_window_char_hdl;       Scan interval window characteristic
                                            handle
    uint16_t    intv_window_val_hdl;        Scan interval window characteristic
                                            value handle
    uint8_t     intv_window_prop;           Scan interval window characteristic
                                            property
    uint8_t     reserved1;                  Reserved
    uint16_t    refresh_char_hdl;           Scan refresh characteristic handle
    uint16_t    refresh_val_hdl;            Scan refresh characteristic value handle
    uint16_t    refresh_cfg_hdl;            Scan refresh characteristic
                                            Configuration descriptor handle
    uint8_t     refresh_prop;               Scan refresh characteristic property
    uint8_t     reserved2;                  Reserved
}RBLE_SPS_CONTENT;
```

- Scan Server event parameter structures

```
typedef struct RBLE_SPPS_EVENT_t {
    RBLE_SPP_EVENT_TYPE               type;               Event type
    uint8_t                           reserved;           Reserved
    union Event_Scans_Parameter_u {
        Generic event
        RBLE_STATUS                   status;             Status

        Scan Server enable completion event
        struct RBLE_SPP_Server_Enable_t{
            uint16_t                  conhdl;             Connection handle
            RBLE_STATUS               status;             Status
            uint8_t                   reserved;           Reserved
        }server_enable;

        Scan Server disable completion event
        struct RBLE_SPP_Server_Disable_t{
            uint16_t                  conhdl;             Connection handle
            RBLE_STATUS               status;             Status
            uint8_t                   reserved;           Reserved
            RBLE_SPP_SERVER_PARAM     device_info;        Scan Server characteristic
                                                          information
        }server_disable;
        Configured value change indication event
        struct RBLE_SPP_Server_Cfg_Indntf_Ind_t{
            uint16_t                  conhdl;             Connection handle
            uint16_t                  cfg_val;            Configuration value
        }scans_cfg_indntf_ind;

        Scan interval window notification event
        struct RBLE_SPP_Server_Interval_Chg_Evt_t{
            uint16_t                      conhdl;               Connection handle
            RBLE_SCANS_INTV_WINDOW_PARAM  scan_param;           Scan interval window
                                                                characteristic
                                                                information
        }interval_chg_evt;

        Scan refresh request send completion event
        struct RBLE_SPP_Server_Send_Refresh_t{
            uint16_t                  conhdl;             Connection handle
            RBLE_STATUS               status;             Status
            uint8_t                   reserved;           Reserved
        }send_refresh;

        Command disallowed indication event
        struct RBLE_SPP_Server_Command_Disallowed_Ind_t{
            RBLE_STATUS               status;             Status
            uint8_t                   reserved;           Reserved
            uint16_t                  opcode;             Opcode
        }cmd_disallowed_ind;
    }param;
}RBLE_SPPS_EVENT;
```

- Scan Client event parameter structures

```
typedef struct RBLE_SPPC_EVENT_t {
    RBLE_SPP_EVENT_TYPE                   type;               Event type
    uint8_t                               reserved;           Reserved
    union Event_Scanc_Parameter_u {
        Generic event
        RBLE_STATUS                       status;             Status

        Scan Client enable completion event
        struct RBLE_SPP_Client_Enable_t{
            uint16_t                      conhdl;             Connection handle
            RBLE_STATUS                   status;             Status
            uint8_t                       reserved;           Reserved
            RBLE_SPS_CONTENT              sps;                Scan parameters service
                                                              content
        }client_enable;
        Scan Client disable completion event
        struct RBLE_SPP_Client_Disable_t{
            uint16_t                    conhdl;             Connection handle
            RBLE_STATUS                 status;             Status
            uint8_t                     reserved;           Reserved
        }client_disable;

        Scan Client error indication event
        struct RBLE_SPP_Client_Error_Ind_t{
            uint16_t                    conhdl;             Connection handle
            RBLE_STATUS                 status;             Status
            uint8_t                     reserved;           Reserved
        }error_ind;

        Characteristic write request response event
        struct RBLE_SPP_Client_Write_Char_Response_t{
            uint16_t                    conhdl;             Connection handle
            uint8_t                     att_code;           Characteristic setting
                                                            result
            uint8_t                     reserved;           Reserved
        }wr_char_resp;

        Command disallowed indication event
        struct RBLE_SPP_Client_Command_Disallowed_Ind_t{
            RBLE_STATUS                 status;             Status
            uint8_t                     reserved;           Reserved
            uint16_t                    opcode;             Opcode
        }cmd_disallowed_ind;
    }param;
}RBLE_SPPC_EVENT;
```

3.2 Functions

The following table shows the API functions defined for the ScPP of rBLE and the following sections describe the API functions in detail.

Table 3-1 API Functions Used by the ScPP

RBLE_SPP_Server_Enable	Enables Scan Server.
RBLE_SPP_Server_Disable	Disables Scan Server.
RBLE_SPP_Server_Send_Refresh	Sends scan refresh request.
RBLE_SPP_Client_Enable	Enables Scan Client.
RBLE_SPP_Client_Disable	Disables Scan Client.
RBLE_SPP_Client_Write_Char	Writes characteristic.
RBLE_SPP_Client_Write_Interval	Sends scan interval window value.

3.2.1 RBLE_SPP_Server_Enable

RBLE_STATUS RBLE_SPP_Server_Enable(uint16_t conhdl, uint8_t sec_lvl, uint8_t con_type,
    RBLE_SPP_SERVER_PARAM *param, RBLE_SPPS_EVENT_HANDLER call_back)

This function enables the ScPP Scan Server role.

If the scan refresh notification setting has not been specified from the Scan Client, set the notification setting parameter to 0 to configure the connection. If the scan refresh notification setting has been specified from the Scan Client, perform a normal connection in accordance with the value stored in the Scan Server.

The result is reported by using the Scan Server enable completion event RBLE_SPP_EVENT_SERVER_ENABLE_COMP.

Parameters:

conhdl	Connection handle	
sec_lvl	Security level	
con_type	RBLE_PRF_CON_DISCOVERY	Configuration connection
	RBLE_PRF_CON_NORMAL	Normal connection
**param*	*s_refresh_ntf_en*	Scan refresh notification configuration value
call_back	Specify the callback function that reports the Scan Server role event.	

Return:

RBLE_OK	Success
RBLE_ERR	Error occurred in Scan Server enable processing
RBLE_PARAM_ERR	Invalid parameter
RBLE_STATUS_ERROR	Not executable because the rBLE mode is other than RBLE_MODE_ACTIVE.

3.2.2 RBLE_SPP_Server_Disable

RBLE_STATUS RBLE_SPP_Server_Disable(uint16_t conhdl)

This function disables the ScPP Scan Server role.

The result is reported by using the Scan Server disable completion event RBLE_SPP_EVENT_SERVER_DISABLE_COMP.

Parameters:

conhdl	Connection handle

Return:

RBLE_OK	Success
RBLE_STATUS_ERROR	Not executable because the rBLE mode is other than RBLE_MODE_ACTIVE.

3.2.3 RBLE_SPP_Server_Send_Refresh

RBLE_STATUS RBLE_SPP_Server_Send_Refresh(uint16_t conhdl, uint8_t s_refresh_val)		
This function sends a scan refresh request to the Scan Client. The result is reported by using the scan refresh request send completion event RBLE_SPP_EVENT_SERVER_SEND_REFRESH_COMP.		
Parameters:		
conhdl	Connection handle	
s_refresh_val	RBLE_SCANS_MODE_REFRESH_REQ	Scan refresh request
Return:		
RBLE_OK	Success	
RBLE_STATUS_ERROR	Not executable because the rBLE mode is other than RBLE_MODE_ACTIVE.	

3.2.4 RBLE_SPP_Client_Enable

RBLE_SPP_Client_Enable(uint16_t conhdl, uint8_t con_type, RBLE_SPS_CONTENT *sps,
RBLE_SCANS_INTV_WINDOW_PARAM *s_intv_window, RBLE_SPPC_EVENT_HANDLER call_back)

This function enables the ScPP Scan Client role and start access to the service exposed by the ScPP Scan Server. The result is reported by using the Scan Client enable completion event RBLE_SPP_EVENT_CLIENT_ENABLE_COMP.

When starting access to the service exposed by a Scan Server for the first time, set 0 to the parameter of the service to configure the connection and to discover the service for the Scan Server. After the service has been discovered, save the service handle information. If the information about the discovered service is saved and is used when a known HID device is connected for a second or subsequent time, detecting the service is skipped, which enables a high-speed access to the service.
While the Scan Client role is enabled, the service exposed by only one Scan Server is accessible. To connect to more than one Scan Servers at the same time and access the services exposed by each Scan Server, repeat enable (by using RBLE_SPP_Client_Enable) and disable (by using RBLE_SPP_Client_Disable) of the ScPP Scan Client role in order to switch access to them. At that time, perform normal connection by using the connection handle (which was obtained when connecting to each Server) and the handle information (which was saved when starting access to the service for the first time) as parameters.

Parameters:

conhdl	Connection handle	
con_type	RBLE_PRF_CON_DISCOVERY	Configuration connection
	RBLE_PRF_CON_NORMAL	Normal connection
**sps*	*shdl*	Start handle
	ehdl	End handle
	intv_window_char_hdl	Scan interval window characteristic handle
	intv_window_val_hdl	Scan interval window characteristic value handle
	intv_window_prop	Scan interval window characteristic property
	refresh_char_hdl	Scan refresh characteristic handle
	refresh_val_hdl	Scan refresh characteristic value handle
	refresh_cfg_hdl	Scan refresh characteristic configuration descriptor handle
	refresh_prop	Scan refresh characteristic property
**s_intv_window*	*le_scan_interval*	Scan interval
	le_scan_window	Scan window
call_back	Specify the callback function that reports the Scan Client role event.	

Return:

RBLE_OK	Success
RBLE_ERR	Error occurred in Scan Client enable processing
RBLE_PARAM_ERR	Invalid parameter
RBLE_STATUS_ERROR	Not executable because the rBLE mode is other than RBLE_MODE_ACTIVE.

3.2.5 RBLE_SPP_Client_Disable

RBLE_STATUS RBLE_SPP_Client_Disable (uint16_t conhdl)		
This function disables the ScPP Scan Client role and terminates access to the service exposed by the ScPP Scan Server. The result is reported by using the Scan Client disable completion event RBLE_SPP_EVENT_CLIENT_DISABLE_COMP.		
Parameters:		
	conhdl	Connection handle
Return:		
	RBLE_OK	Success
	RBLE_STATUS_ERROR	Not executable because the rBLE mode is other than RBLE_MODE_ACTIVE.

3.2.6 RBLE_SPP_Client_Write_Char

RBLE_STATUS RBLE_SPP_Client_Write_Char(uint16_t conhdl, uint16_t cfg_val)			
This function writes the scan refresh characteristic configuration descriptor of the scan parameters service. The result is reported by using the characteristic write request response event RBLE_SPP_EVENT_CLIENT_WRITE_CHAR_RESPONSE.			
Parameters:			
	conhdl	Connection handle	
	cfg_val	RBLE_PRF_STOP_NTFIND	Stop notification/indication of scan refresh.
		RBLE_PRF_START_NTF	Start notification of scan refresh.
Return:			
	RBLE_OK	Success	
	RBLE_STATUS_ERROR	Not executable because the rBLE mode is other than RBLE_MODE_ACTIVE.	

3.2.7 RBLE_SPP_Client_Write_Interval

RBLE_STATUS RBLE_SPP_Client_Write_Interval(uint16_t conhdl, RBLE_SCANS_INTV_WINDOW_PARAM *s_intv_window)			
This function sends the scan interval window value.			
Parameters:			
	conhdl	Connection handle	
	**s_intv_window*	*le_scan_interval*	Scan interval
		le_scan_window	Scan window
Return:			
	RBLE_OK	Success	
	RBLE_STATUS_ERROR	Not executable because the rBLE mode is other than RBLE_MODE_ACTIVE.	

3.3 Events

The following table shows the events defined for the ScPP of rBLE and the following sections describe the events in detail.

Table 3-2 Events Defined for the ScPP

RBLE_SPP_EVENT_SERVER_ENABLE_COMP	Scan Server enable completion event
RBLE_SPP_EVENT_SERVER_DISABLE_COMP	Scan Server disable completion event
RBLE_SPP_EVENT_SERVER_CFG_INDNTF_IND	Configured value change indication event
RBLE_SPP_EVENT_SERVER_INTERVAL_CHG_EVT	Scan interval window notification event
RBLE_SPP_EVENT_SERVER_SEND_REFRESH_COMP	Scan refresh request send completion event
RBLE_SPP_EVENT_SERVER_COMMAND_DISALLOWED_IND	Command disallowed indication event
RBLE_SPP_EVENT_CLIENT_ENABLE_COMP	Scan Client enable completion event
RBLE_SPP_EVENT_CLIENT_DISABLE_COMP	Scan Client disable completion event
RBLE_SPP_EVENT_CLIENT_ERROR_IND	Scan Client error indication event
RBLE_SPP_EVENT_CLIENT_WRITE_CHAR_RESPONSE	Characteristic write request response event
RBLE_SPP_EVENT_CLIENT_COMMAND_DISALLOWED_IND	Command disallowed indication event

3.3.1 RBLE_SPP_EVENT_SERVER_ENABLE_COMP

RBLE_SPP_EVENT_SERVER_ENABLE_COMP		
This event reports the result of enabling the ScPP Scan Server (RBLE_SPP_Server_Enable).		
Parameters:		
	conhdl	Connection handle
	status	Result of enabling the Scan Server (See *2.2* and *Bluetooth Low Energy Protocol Stack API Reference Manual: Basics*, *3.2, Declaration of enumerated type for rBLE status*.)

3.3.2 RBLE_SPP_EVENT_SERVER_DISABLE_COMP

RBLE_SPP_EVENT_SERVER_DISABLE_COMP				
This event reports the result of disabling the ScPP Scan Server (RBLE_SPP_Server_Disable).				
Parameters:				
	conhdl	Connection handle		
	status	Result of disabling the Scan Server (See *2.2* and *Bluetooth Low Energy Protocol Stack API Reference Manual: Basics*, *3.2, Declaration of enumerated type for rBLE status*.)		
	device_info	*s_refresh_ntf_en*	RBLE_PRF_STOP_NTFIND	Stop notification/indication of scan refresh.
			RBLE_PRF_START_NTF	Start notification of scan refresh.

3.3.3 RBLE_SPP_EVENT_SERVER_CFG_INDNTF_IND

RBLE_SPP_EVENT_SERVER_CFG_INDNTF_IND			
This event indicates that the value of the client characteristic configuration descriptor of the scan refresh characteristic has been written.			
Parameters:			
	conhdl	Connection handle	
	cfg_val	RBLE_PRF_STOP_NTFIND	Stop notification/indication of scan refresh.
		RBLE_PRF_START_NTF	Start notification of scan refresh.

3.3.4 RBLE_SPP_EVENT_SERVER_INTERVAL_CHG_EVT

RBLE_SPP_EVENT_SERVER_INTERVAL_CHG_EVT			
This event reports that the scan interval window value has been received from the Scan Client.			
Parameters:			
	conhdl	Connection handle	
	scan_param	*le_scan_interval*	Scan interval
		le_scan_window	Scan window

3.3.5 RBLE_SPP_EVENT_SERVER_SEND_REFRESH_COMP

RBLE_SPP_EVENT_SERVER_SEND_REFRESH_COMP		
This event reports that sending a scan refresh request to the Scan Client is complete.		
Parameters:		
	conhdl	Connection handle
	status	Scan refresh request send completion result (See *2.2* and *Bluetooth Low Energy Protocol Stack API Reference Manual: Basics*, *3.2, Declaration of enumerated type for rBLE status*.)

3.3.6 RBLE_SPP_EVENT_SERVER_COMMAND_DISALLOWED_IND

RBLE_SPP_EVENT_SERVER_COMMAND_DISALLOWED_IND			
This event indicates the error that occurs when a command executed by the Scan Server role cannot be accepted.			
Parameters:			
	status	Result of command execution (See *2.2* and *Bluetooth Low Energy Protocol Stack API Reference Manual: Basics*, *3.2, Declaration of enumerated type for rBLE status*.)	
	opcode	RBLE_CMD_SPP_SERVER_ENABLE	Scan Server enable command
		RBLE_CMD_SPP_SERVER_DISABLE	Scan Server disable command
		RBLE_CMD_SPP_SERVER_SEND_REFRESH	Scan refresh request send command

3.3.7 RBLE_SPP_EVENT_CLIENT_ENABLE_COMP

RBLE_SPP_EVENT_SERVER_ENABLE_COMP			
This event reports the result of enabling the ScPP Scan Client (RBLE_SPP_Client_Enable). Save the obtained handle information about the discovered service, to enable a high-speed access to the service without service detection when restarting access to the service.			
Parameters:			
	conhdl	Connection handle	
	status	Result of enabling the Scan Client (See *2.2* and *Bluetooth Low Energy Protocol Stack API Reference Manual: Basics*, *3.2, Declaration of enumerated type for rBLE status*.)	
	sps	*shdl*	Scan parameters service start handle
		ehdl	Scan parameters service end handle
		intv_window_char_hdl	Scan interval window characteristic handle
		intv_window_val_hdl	Scan interval window characteristic value handle
		intv_window_prop	Scan interval window characteristic property
		refresh_char_hdl	Scan refresh characteristic handle
		refresh_val_hdl	Scan refresh characteristic value handle
		refresh_cfg_hdl	Scan refresh characteristic configuration descriptor handle
		refresh_prop	Scan refresh characteristic property

3.3.8 RBLE_SPP_EVENT_CLIENT_DISABLE_COMP

RBLE_SPP_EVENT_CLIENT_DISABLE_COMP		
This event reports the result of disabling the ScPP Scan Client (RBLE_SPP_Client_Disable).		
Parameters:		
	conhdl	Connection handle
	status	Result of disabling the Scan Client (See *2.2* and *Bluetooth Low Energy Protocol Stack API Reference Manual: Basics*, *3.2, Declaration of enumerated type for rBLE status*.)

3.3.9 RBLE_SPP_EVENT_CLIENT_ERROR_IND

RBLE_SPP_EVENT_CLIENT_ERROR_IND		
This event indicates an error code unique to the Scan Client role.		
Parameters:		
	conhdl	Connection handle
	status	Error code (See *2.2* and *Bluetooth Low Energy Protocol Stack API Reference Manual: Basics*, *3.2, Declaration of enumerated type for rBLE status*.)

3.3.10 RBLE_SPP_EVENT_CLIENT_WRITE_CHAR_RESPONSE

RBLE_SPP_EVENT_CLIENT_WRITE_CHAR_RESPONSE			
This event reports the response to the characteristic value write request (RBLE_SPP_Client_Write_Char).			
Parameters:			
	conhdl	Connection handle	
	att_code	0x00	Characteristic value successfully written
		Other than 0x00	Error occurred when writing characteristic value

3.3.11 RBLE_SPP_EVENT_CLIENT_COMMAND_DISALLOWED_IND

RBLE_SPP_EVENT_CLIENT_COMMAND_DISALLOWED_IND			
This event indicates the error that occurs when a command executed by the Scan Client role cannot be accepted.			
Parameters:			
	status	Result of command execution (See *2.2* and *Bluetooth Low Energy Protocol Stack API Reference Manual: Basics*, *3.2, Declaration of enumerated type for rBLE status*.)	
	opcode	RBLE_CMD_SPP_CLIENT_ENABLE	Scan Client enable command
		RBLE_CMD_SPP_CLIENT_DISABLE	Scan Client disable command
		RBLE_CMD_SPP_CLIENT_WRITE_CHAR	Characteristic write command
		RBLE_CMD_SPP_CLIENT_SET_INTERVAL	Scan interval window send command

3.4 Message Sequence Chart

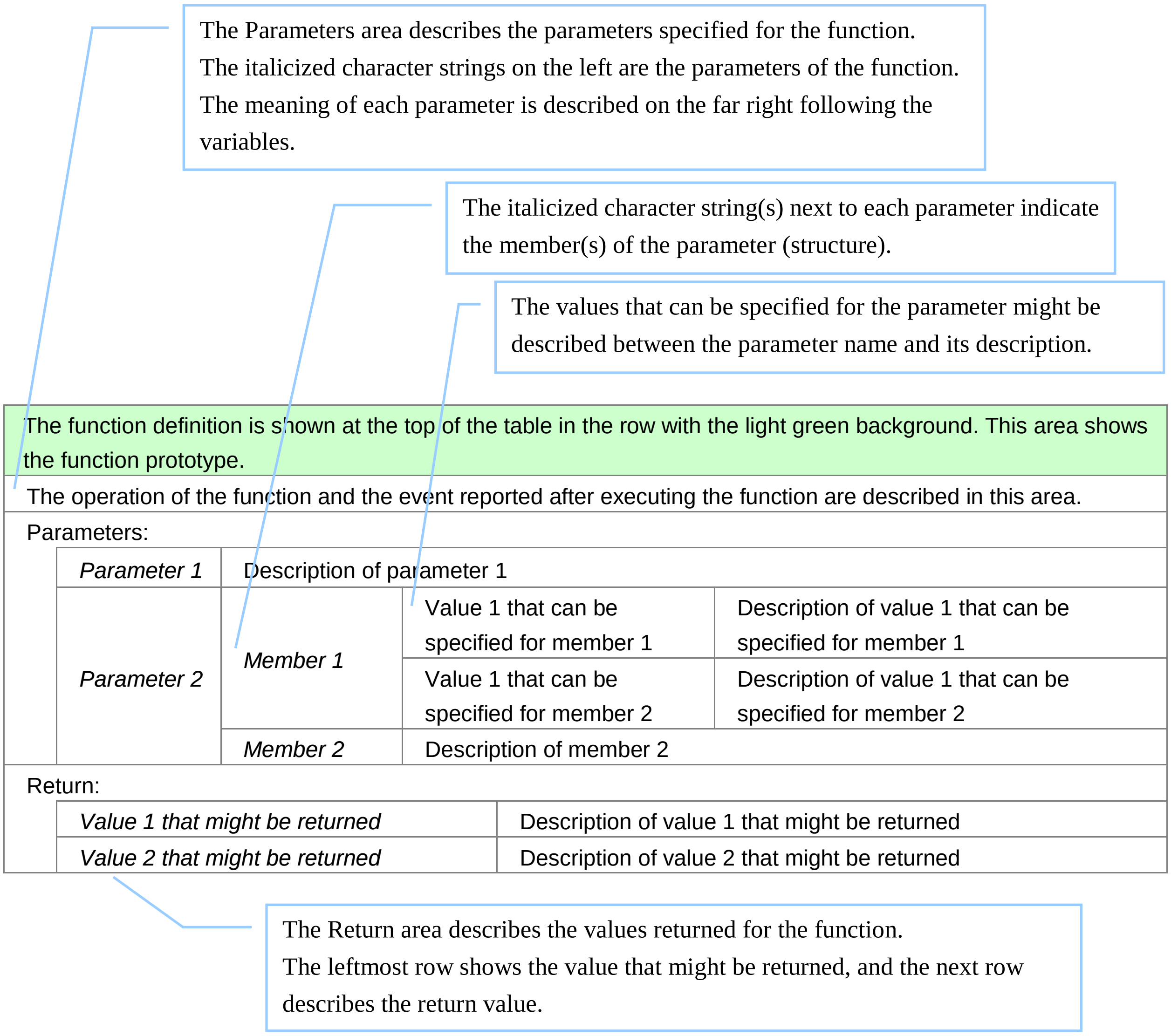
4. Notes

Appendix A How to Read Definition Tables

This section shows how to read the tables that describes the rBLE API functions and events shown in this document.

A.1 How to Read Function Definition Tables

The following contents are included in the function definition tables:



The Parameters area describes the parameters specified for the function. The italicized character strings on the left are the parameters of the function. The meaning of each parameter is described on the far right following the variables.

The italicized character string(s) next to each parameter indicate the member(s) of the parameter (structure).

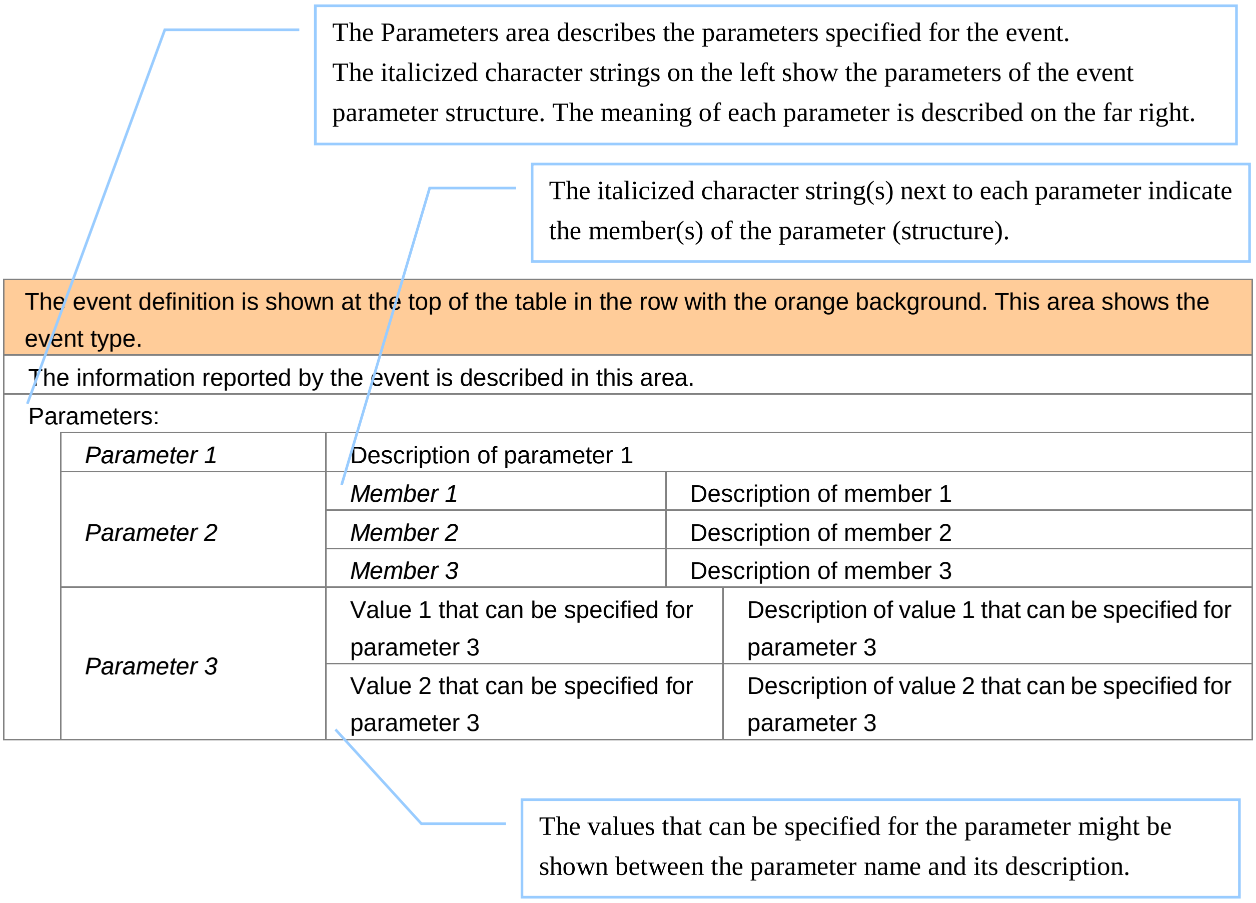
The values that can be specified for the parameter might be described between the parameter name and its description.

The function definition is shown at the top of the table in the row with the light green background. This area shows the function prototype.				
The operation of the function and the event reported after executing the function are described in this area.				
Parameters:				
	Parameter 1	Description of parameter 1		
	Parameter 2	*Member 1*	Value 1 that can be specified for member 1	Description of value 1 that can be specified for member 1
			Value 1 that can be specified for member 2	Description of value 1 that can be specified for member 2
		Member 2	Description of member 2	
Return:				
	Value 1 that might be returned	Description of value 1 that might be returned		
	Value 2 that might be returned	Description of value 2 that might be returned		

The Return area describes the values returned for the function. The leftmost row shows the value that might be returned, and the next row describes the return value.

A.2 How to Read Event Definition Tables

The following contents are included in the event definition tables:



The Parameters area describes the parameters specified for the event.
The italicized character strings on the left show the parameters of the event parameter structure. The meaning of each parameter is described on the far right.

The italicized character string(s) next to each parameter indicate the member(s) of the parameter (structure).

The event definition is shown at the top of the table in the row with the orange background. This area shows the event type.			
The information reported by the event is described in this area.			
Parameters:			
	Parameter 1	Description of parameter 1	
	Parameter 2	*Member 1*	Description of member 1
		Member 2	Description of member 2
		Member 3	Description of member 3
	Parameter 3	Value 1 that can be specified for parameter 3	Description of value 1 that can be specified for parameter 3
		Value 2 that can be specified for parameter 3	Description of value 2 that can be specified for parameter 3

The values that can be specified for the parameter might be shown between the parameter name and its description.

Appendix B Referenced Documents

1. Bluetooth Core Specification v4.0, Bluetooth SIG
2. Find Me Profile Specification v1.0, Bluetooth SIG
3. Immediate Alert Service Specification v1.0, Bluetooth SIG
4. Proximity Profile Specification v1.0, Bluetooth SIG
5. Link Loss Service Specification v1.0, Bluetooth SIG
6. Tx Power Service Specification v1.0, Bluetooth SIG
7. Health Thermometer Profile Specification v1.0, Bluetooth SIG
8. Health Thermometer Service Specification v1.0, Bluetooth SIG
9. Device Information Service Specification v1.1, Bluetooth SIG
10. Blood Pressure Profile Specification v1.0, Bluetooth SIG
11. Blood Pressure Service Specification v1.0, Bluetooth SIG
12. HID over GATT Profile Specification v1.0, Bluetooth SIG
13. HID Service Specification v1.0, Bluetooth SIG
14. Battery Service Specification v1.0, Bluetooth SIG
15. Scan Parameters Profile Specification v1.0, Bluetooth SIG
16. Scan Parameters Service Specification v1.0, Bluetooth SIG
17. Bluetooth SIG Assigned Numbers https://www.bluetooth.org/Technical/AssignedNumbers/home.htm
18. Services & Characteristics UUID http://developer.bluetooth.org/gatt/Pages/default.aspx
19. Personal Health Devices Transcoding White Paper v1.2, Bluetooth SIG

Appendix C Terminology

Term	Description
Service	A service is provided from a GATT server to a GATT client. The GATT server exposes some characteristics as the interface. The service prescribes how to access the exposed characteristics.
Profile	A profile enables implementation of a use case by using one or more services. The services used are defined in the specifications of each profile.
Characteristic	A characteristic is a value used to identify services. The characteristics to be exposed and their formats are defined by each service.
Role	Each device takes the role prescribed by the profile or service in order to implement the specified use case.
Client Characteristic Configuration Descriptor	A descriptor is used to control notifications or indications of characteristic values that include the client characteristic configuration descriptor sent from the GATT server.
Connection Handle	The handle determined by the controller stack and is used to identify connection with a remote device. The valid handle range is between 0x0000 and 0x0EFF.

REVISION HISTORY	Bluetooth Low Energy Protocol Stack API Reference Manual: ScPP

Rev.	**Date**	**Description**	
		Page	**Summary**
1.00	Feb 15, 2013	---	First Edition issued
1.01	Mar 27, 2013	---	The description about the high-speed access to the service for a second or subsequent time is added.
1.02	Jun 28, 2013	---	Bookmark is added.
1.03	Sep 19, 2014	2	The common definitions of profile are added.
		5	Definitions of client configuration characteristic value and connection type are deleted.
		---	Parameter description is changed to use the common definitions of profile.
1.04	Apr 17, 2015	2	The service definitions are updated.

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