User's Manual

Bluetooth® Low Energy Protocol Stack

API Reference Manual: RSCP

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 Running Speed and Cadence profile (RSCP) 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	R01UW0094E
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	This manual
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	

Contents

1. Overview

This manual describes the API (Application Program Interface) of the Running Speed and Cadence profile (RSCP) 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. Running Speed and Cadence Profile

This section describes the API of the Running Speed and Cadence profile. The Running Speed and Cadence profile is used to enable a data collection device to obtain data from a Running Speed and Cadence sensor.

3.1 Definitions

This section describes the definitions used by the API of the Running Speed and Cadence profile.

- Declaration of macro definition for supported maximum number of sensor location information

```
#define RBLE_RSCP_SENSORE_LOCATION_MAX    17
```

- Declaration of enumerated type for RSCP event types

```
enum RBLE_RSCP_EVENT_TYPE_enum {
    RBLE_RSCP_EVENT_SENSOR_ENABLE_COMP = 0x01,   Sensor enable completion event
                                                 (Parameter: sensor_enable)
    RBLE_RSCP_EVENT_SENSOR_DISABLE_COMP,         Sensor disable completion event
                                                 (Parameter: sensor_disable)
    RBLE_RSCP_EVENT_SENSOR_ERROR_IND,            Sensor error indication event
                                                 (Parameter: error_ind)
    RBLE_RSCP_EVENT_SENSOR_SEND_MEASUREMENTS_COMP,
                                                 Sensor send measurements completion event
                                                 (Parameter: send_measurements)
    RBLE_RSCP_EVENT_SENSOR_SEND_SC_CP_COMP,      Sensor send SC Control Point
                                                 completion event
                                                 (Parameter: send_sc_cp)
    RBLE_RSCP_EVENT_SENSOR_CHG_SC_CP_IND,        SC Control Point change indication event
                                                 (Parameter: chg_sc_cp_ind)
    RBLE_RSCP_EVENT_SENSOR_CFG_INDNTF_IND,       Characteristic configuration change
                                                 indication event
                                                 (Parameter: cfg_indntf_ind)
    RBLE_RSCP_EVENT_SENSOR_COMMAND_DISALLOWED_IND, Command disallowed indication event
                                                 (Parameter: cmd_disallowed_ind)
    RBLE_RSCP_EVENT_COLLECTOR_ENABLE_COMP = 0x81, Collector enable completion event
                                                 (Parameter: collector_enable)
    RBLE_RSCP_EVENT_COLLECTOR_DISABLE_COMP,      Collector disable completion event
                                                 (Parameter: collector_disable)
    RBLE_RSCP_EVENT_COLLECTOR_ERROR_IND,         Collector error indication event
                                                 (Parameter: error_ind)
    RBLE_RSCP_EVENT_COLLECTOR_MEASUREMENTS_NTF,  Measured value notification event
                                                 (Parameter: measurements_ntf)
    RBLE_RSCP_EVENT_COLLECTOR_SC_CP_IND,         SC Control Point indication event
                                                 (Parameter: sc_cp_ind)
    RBLE_RSCP_EVENT_COLLECTOR_READ_CHAR_RESPONSE,
                                                 Characteristic value read request
                                                 response event
                                                 (Parameter: rd_char_resp)
```

```
    RBLE_RSCP_EVENT_COLLECTOR_WRITE_CHAR_RESPONSE,
                                                Characteristic value write request
                                                response event
                                                (Parameter: wr_char_resp)
    RBLE_RSCP_EVENT_COLLECTOR_COMMAND_DISALLOWED_IND
                                                Command disallowed indication event
                                                (Parameter: cmd_disallowed_ind)
};
```

- Declaration of data type for RSCP event types

```
typedef uint8_t RBLE_RSCP_EVENT_TYPE;
```

- Declaration of data type for RSCP Sensor event callback function

```
typedef void ( *RBLE_RSCPS_EVENT_HANDLER )( RBLE_RSCPS_EVENT *event );
```

- Declaration of data type for RSCP Collector event callback function

```
typedef void ( *RBLE_RSCPC_EVENT_HANDLER )( RBLE_RSCPC_EVENT *event );
```

- Declaration of enumerated type for running speed and cadence service/device information service characteristic codes

```
enum RBLE_RSCPC_RD_CHAR_CODE_enum {
    RBLE_RSCPC_RD_RSCS_RM_CFG = 0x00,           Measurement value notification
    RBLE_RSCPC_RD_RSCS_SCCP_CFG,                SC Control Point
    RBLE_RSCPC_RD_RSCS_RSC_FEATURE,             Supported features of the RSC Sensor
    RBLE_RSCPC_RD_RSCS_SL,                      Sensor location
    RBLE_RSCPC_RD_DIS_MANUF,                    Sensor manufacturer name
    RBLE_RSCPC_RD_DIS_MODEL,                    Sensor model number
    RBLE_RSCPC_RD_DIS_SERNB,                    Sensor serial number
    RBLE_RSCPC_RD_DIS_HWREV,                    Sensor hardware revision
    RBLE_RSCPC_RD_DIS_FWREV,                    Sensor firmware revision
    RBLE_RSCPC_RD_DIS_SWREV,                    Sensor software revision
    RBLE_RSCPC_RD_DIS_SYSID,                    Sensor system ID
    RBLE_RSCPC_RD_DIS_IEEE,                     Sensor IEEE certification
                                                information
};
```

- Declaration of enumerated type for running speed and cadence service characteristic value settings

```
enum RBLE_RSCPC_WR_CHAR_CODE_enum {
    RBLE_RSCPC_RSC_MEAS_CODE = 0x01,            Measurement value notification setting
    RBLE_RSCPC_SC_CONTROL_POINT_CODE            SC Control Point indication setting
};
```

- Declaration of enumerated type for running speed and cadence sensor location characteristic value

```
enum RBLE_RSCPC_SENSOR_LOCATION_enum {
    RBLE_RSCPC_SENSOR_OTHER = 0x00,             Other
    RBLE_RSCPC_SENSOR_TOP_OF_SHOE,              Top of shoe
    RBLE_RSCPC_SENSOR_IN_SHOE,                  In shoe
```

```
    RBLE_RSCPC_SENSOR_HIP,                      Hip
    RBLE_RSCPC_SENSOR_FRONT_WHEEL,              Front Wheel
    RBLE_RSCPC_SENSOR_LEFT_CRANK,               Left Crank
    RBLE_RSCPC_SENSOR_RIGHT_CRANK,              Right Crank
    RBLE_RSCPC_SENSOR_LEFT_PEDAL,               Left Pedal
    RBLE_RSCPC_SENSOR_RIGHT_PEDAL,              Right Pedal
    RBLE_RSCPC_SENSOR_FRONT_HUB,                Front Hub
    RBLE_RSCPC_SENSOR_REAR_DROPOUT,             Rear Dropout
    RBLE_RSCPC_SENSOR_CHAINSTAY,                Chainstay
    RBLE_RSCPC_SENSOR_REAR_WHEEL,               Rear Wheel
    RBLE_RSCPC_SENSOR_REAR_HUB,                 Rear Hub
    RBLE_RSCPC_SENSOR_CHEST                     Chest
};
```

- Declaration of enumerated type for SC Control Point procedures (Op Codes)

```
enum RBLE_RSCP_SCCP_OP_CODE_enum {
    RBLE_RSCP_OP_SET_CUMULATIVE_CODE = 0x01,    Set Total Distance Value
    RBLE_RSCP_OP_START_SC_CODE,                 Start Sensor Calibration
    RBLE_RSCP_OP_UPDATE_SL_CODE,                Update Sensor Location
    RBLE_RSCP_OP_REQ_SUPPORTED_SL_CODE,         Request Supported Sensor Locations
    RBLE_RSCP_OP_RESPONSE_CODE = 0x10           Response code
};
```

- Declaration of enumerated type for Response code of SC Control Point procedures

```
enum RBLE_RSCP_SCCP_RES_CODE_enum {
    RBLE_RSCP_RES_SUCCESS_CODE = 0x01,          Success
    RBLE_RSCP_RES_NOT_SUPPORTED_CODE,           Op Code Not Supported
    RBLE_RSCP_RES_INVALID_PARAM_CODE,           Invalid Parameter
    RBLE_RSCP_RES_OP_FAILED_CODE                Operation Failed
};
```

- Running speed and cadence service characteristic information structures

```
typedef struct RBLE_RSCP_SENSOR_PARAM_t {
    uint16_t      rsc_meas_ntf_en;              Measurement value
                                                notification configuration value
    uint16_t      sc_cp_ind_en;                 SC Control Point
                                                indication configuration value
    uint8_t       sensor_location;              Sensor location value
    uint8_t       reserved;                     Reserved
} RBLE_RSCP_SENSOR_PARAM;
```

- Running speed and cadence Measurements information structures

```
typedef struct RBLE_RSCP_MEASUREMENTS_INFO_t{
    uint8_t       flags;                        Data field flag
    uint8_t       instant_cadence;              Instantaneous cadence value
    uint16_t      instant_speed;                Instantaneous speed value
```

```
    uint16_t      instant_stride_len;          Instantaneous stride length value
    uint32_t      total_distance;              Total distance value
} RBLE_RSCP_MEASUREMENTS_INFO;
```

- SC Control Point information structures

```
typedef struct RBLE_RSCP_SC_CONTROL_POINT_INFO_t{
    uint8_t       OpCode;                      Op Code
    uint8_t       reserved1;                   Reserved
    uint32_t      cumulative_value;            Total distance value
    uint8_t       sensor_location;             Sensor location
    uint8_t       request_op_code;             Request Op Code
    uint8_t       response_value;              Response value
    uint8_t       reserved2;                   Reserved
} RBLE_RSCP_SC_CONTROL_POINT_INFO;
```

- Running speed and cadence service content structures

```
typedef struct RBLE_RSCS_CONTENT_t {
    uint16_t       shdl;                   RSC service start handle
    uint16_t       ehdl;                   RSC service end handle
    uint16_t       rsc_meas_char_hdl;      RSC measurement characteristic handle
    uint16_t       rsc_meas_val_hdl;       RSC measurement characteristic value handle
    uint16_t       rsc_meas_cfg_hdl;       RSC measurement characteristic
                                           configuration descriptor handle
    uint8_t        rsc_meas_prop;          RSC measurement characteristic property
    uint8_t        reserved1;              Reserved
    uint16_t       rsc_feature_char_hdl;   RSC supported feature characteristic handle
    uint16_t       rsc_feature_val_hdl;    RSC supported feature characteristic value
                                           handle
    uint8_t        rsc_feature_prop;       RSC supported feature characteristic
                                           property
    uint8_t        reserved2;              Reserved
    uint16_t       sensor_loc_char_hdl;    Sensor Location characteristic handle
    uint16_t       sensor_loc_val_hdl;     Sensor Location characteristic value handle
    uint8_t        sensor_loc_prop;        Sensor Location characteristic property
    uint8_t        reserved3;              Reserved
    uint16_t       sc_cp_char_hdl;         SC Control Point characteristic handle
    uint16_t       sc_cp_val_hdl;          SC Control Point characteristic value handle
    uint16_t       sc_cp_cfg_hdl;          SC Control Point characteristic
                                           configuration descriptor handle
    uint8_t        sc_cp_prop;             SC Control Point characteristic property
    uint8_t        reserved4;              Reserved
} RBLE_RSCS_CONTENT;
```

- Device information service content structures

```
typedef struct RBLE_DIS_CONTENT_t {
    uint16_t        shdl;                   Device information service start
                                            handle
    uint16_t        ehdl;                   Device information service end
                                            handle
    uint16_t        sys_id_char_hdl;        System ID characteristic handle
    uint16_t        sys_id_val_hdl;         System ID characteristic value
                                            handle
    uint8_t         sys_id_prop;            System ID characteristic property
    uint8_t         reserved;               Reserved
    uint16_t        model_nb_char_hdl;      Model number characteristic handle
    uint16_t        model_nb_val_hdl;       Model number characteristic value
                                            handle
    uint8_t         model_nb_prop;          Model number characteristic
                                            property
    uint8_t         reserved2;              Reserved
    uint16_t        serial_nb_char_hdl;     Serial number characteristic handle
    uint16_t        serial_nb_val_hdl;      Serial number characteristic value
                                            handle
    uint8_t         serial_nb_prop;         Serial number characteristic
                                            property
    uint8_t         reserved3;              Reserved
    uint16_t        fw_rev_char_hdl;        Firmware revision characteristic
                                            handle
    uint16_t        fw_rev_val_hdl;         Firmware revision characteristic
                                            value handle
    uint8_t         fw_rev_prop;            Firmware revision characteristic
                                            property
    uint8_t         reserved4;              Reserved
    uint16_t        hw_rev_char_hdl;        Hardware revision characteristic
                                            handle
    uint16_t        hw_rev_val_hdl;         Hardware revision characteristic
                                            value handle
    uint8_t         hw_rev_prop;            Hardware revision characteristic
                                            property
    uint8_t         reserved5;              Reserved
    uint16_t        sw_rev_char_hdl;        Software revision characteristic
                                            handle
    uint16_t        sw_rev_val_hdl;         Software revision characteristic
                                            value handle
    uint8_t         sw_rev_prop;            Software revision characteristic
                                            property
    uint8_t         reserved6;              Reserved
    uint16_t        manuf_name_char_hdl;    Manufacturer name characteristic
                                            handle
    uint16_t        manuf_name_val_hdl;     Manufacturer name characteristic
                                            value handle
    uint8_t         manuf_name_prop;        Manufacturer name characteristic
                                            property
```

```
    uint8_t         reserved7;              Reserved
    uint16_t        ieee_certif_char_hdl;   IEEE certification characteristic
                                            handle
    uint16_t        ieee_certif_val_hdl;    IEEE certification characteristic
                                            value handle
    uint8_t         ieee_certif_prop;       IEEE certification characteristic
                                            property
    uint8_t         reserved8;              Reserved
} RBLE_DIS_CONTENT;
```

- RSCP Sensor event parameter structures

```
typedef struct RBLE_RSCPS_EVENT_t {
    RBLE_RSCP_EVENT_TYPE            type;               RSCP event type
    uint8_t                         reserved;           Reserved
    union Event_Rscs_Parameter_u {
        Generic event
        RBLE_STATUS                 status;             Status

        Sensor enable completion event
        struct RBLE_RSCP_Sensor_Enable_t{
            RBLE_STATUS             status;             Status
            uint8_t                 reserved;           Reserved
            uint16_t                conhdl;             Connection handle
        }sensor_enable;

        Sensor disable completion event
        struct RBLE_RSCP_Sensor_Disable_t{
            uint16_t                conhdl;             Connection handle
            RBLE_RSCP_SENSOR_PARAM  sensor_info;        Running speed and cadence service
                                                        information
        }sensor_disable;

        Sensor error indication event
        struct RBLE_RSCP_Sensor_Error_Ind_t{
            uint16_t                conhdl;             Connection handle
            RBLE_STATUS             status;             Status
        }error_ind;

        Sensor measured value send completion event
        struct RBLE_RSCP_Sensor_Send_Measurements_t{
            uint16_t                conhdl;             Connection handle
            RBLE_STATUS             status;             Status
        }send_measurements;

        SC Control Point send completion event
        struct RBLE_RSCP_Sensor_Send_SC_Control_Point_t{
            uint16_t                conhdl;             Connection handle
            RBLE_STATUS             status;             Status
        }send_sc_cp;

        SC Control Point change indication event
        struct RBLE_RSCP_Sensor_Chg_Sc_Cp_Ind_t{
            uint16_t                        conhdl;     Connection handle
            RBLE_RSCP_SC_CONTROL_POINT_INFO sc_cp_info; SC Control Point information
        }chg_sc_cp_ind;
```

```
        Sensor configuration characteristic value indication event
        struct RBLE_RSCP_Sensor_Cfg_indntf_Ind_t{
            uint16_t                conhdl;             Connection handle
            uint8_t                 char_code;          Characteristic value code
            uint8_t                 reserved;           Reserved
            uint16_t                cfg_val;            Configuration characteristic
                                                        value
        }cfg_indntf_ind;

        Sensor command disallowed indication event
        struct RBLE_RSCP_Sensor_Command_Disallowed_Ind_t{
            RBLE_STATUS             status;             Status
            uint8_t                 reserved;           Reserved
            uint16_t                opcode;             Opcode
        }cmd_disallowed_ind;
    } param;
} RBLE_RSCPS_EVENT;
```

- RSCP Collector event parameter structures

```
typedef struct RBLE_RSCPC_EVENT_t {
    RBLE_RSCP_EVENT_TYPE            type;               RSCP event type
    uint8_t                         reserved;           Reserved
    union Event_Rscc_Parameter_u {
        Generic event
        RBLE_STATUS                 status;             Status

        Collector enable completion event
        struct RBLE_RSCP_Collector_Enable_t{
            RBLE_STATUS             status;             Status
            uint8_t                 reserved;           Reserved
            uint16_t                conhdl;             Connection handle
            RBLE_RSCS_CONTENT       rscs;               Running speed and cadence service
                                                        content
            RBLE_DIS_CONTENT        dis;                Device information service
                                                        content
        }collector_enable;

        Collector disable completion event
        struct RBLE_RSCP_Collector_Disable_t{
            RBLE_STATUS             status;             Status
            uint8_t                 reserved;           Reserved
            uint16_t                conhdl;             Connection handle
        }collector_disable;
```

```
        Collector error indication event
        struct RBLE_RSCP_Collector_Error_Ind_t{
            RBLE_STATUS             status;             Status
            uint8_t                 reserved;           Reserved
            uint16_t                conhdl;             Connection handle
        }error_ind;

        Collector sensor measurement information notification event
        struct RBLE_RSCP_Collector_Measurements_Ntf_t{
            uint16_t                      conhdl;        Connection handle
            RBLE_RSCP_MEASUREMENTS_INFO   measure_info;  Sensor measurement information
        }measurements_ntf;

        Collector SC Control Point indication event
        struct RBLE_RSCP_Collector_SC_CP_Ind_t{
            uint16_t                conhdl;                Connection handle
            RBLE_RSCP_SC_CONTROL_POINT_INFO  sc_cp_info;   SC Control Point information
            uint8_t                 location_num;          number of valid response values
            uint8_t                 response_param[RBLE_RSCP_SENSORE_LOCATION_MAX];
                                                           Sensor Locations of available
        }sc_cp_ind;

        Collector characteristic value read request response event
        struct RBLE_RSCP_Collector_Read_Char_Response_t{
            uint16_t                conhdl;             Connection handle
            uint8_t                 att_code;           Status
            uint8_t                 reserved;           Reserved
            RBLE_ATT_INFO_DATA      data;               Acquired characteristic data
        }rd_char_resp;

        Collector characteristic value write request response event
        struct RBLE_RSCP_Collector_Write_Char_Response_t{
            uint16_t                conhdl;             Connection handle
            uint8_t                 att_code;           Status
        }wr_char_resp;

        Collector command disallowed indication event
        struct RBLE_RSCP_Collector_Command_Disallowed_Ind_t{
            RBLE_STATUS             status;             Status
            uint8_t                 reserved;           Reserved
            uint16_t                opcode;             Opcode
        }cmd_disallowed_ind;
    } param;
} RBLE_RSCPC_EVENT;
```

3.2 Functions

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

Table 3-1 API Functions Used by the RSCP

RBLE_RSCP_Sensor_Enable	Enables the Sensor role.
RBLE_RSCP_Sensor_Disable	Disables the Sensor role.
RBLE_RSCP_Sensor_Send_Measurements	Sends sensor measurement information.
RBLE_RSCP_Sensor_Send_SC_Control_Point	Sends the SC Control Point.
RBLE_RSCP_Collector_Enable	Enables the Collector role.
RBLE_RSCP_Collector_Disable	Disables the Collector role.
RBLE_RSCP_Collector_Read_Char	Reads the characteristic value.
RBLE_RSCP_Collector_Write_SC_Control_Point	Sets the SC Control Point.
RBLE_RSCP_Collector_Write_Char	Writes the characteristic value.

3.2.1 RBLE_RSCP_Sensor_Enable

RBLE_STATUS RBLE_RSCP_Sensor_Enable(uint16_t conhdl, uint8_t sec_lvl, uint8_t con_type, RBLE_RSCP_SENSOR_PARAM *param, RBLE_RSCPS_EVENT_HANDLER call_back)

This function enables the RSCP Sensor role.
If the measurement result notification, SC Control Point information indication and the sensor location setting has been specified from the Collector, set the indication/notification/sensor location setting parameter to 0 to configure the connection. If this setting or information has been specified from the Sensor, perform a normal connection in accordance with the indication/notification/sensor location setting parameter.
The result is reported by using the Sensor role enable completion event RBLE_RSCP_EVENT_SENSOR_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	*rsc_meas_ntf_en*	RBLE_PRF_STOP_NTFIND	Stop notification of sensor measurements information.
		RBLE_PRF_START_NTF	Start notification of sensor measurements information.
	sc_cp_ind_en	RBLE_PRF_STOP_NTFIND	Stop indication of SC Control Point information.
		RBLE_PRF_START_IND	Start indication of SC Control Point information.
	sensor_location	Sensor Location which has been specified from previous connected Collector.	
call_back	Specify the callback function that reports the RSCP event.		

Return:

RBLE_OK	Success
RBLE_ERR	Error occurred in Sensor role 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_RSCP_Sensor_Disable

RBLE_STATUS RBLE_RSCP_Sensor_Disable(uint16_t conhdl)		
This function disables the RSCP Sensor role. The result is reported by using the Sensor role disable completion event RBLE_RSCP_EVENT_SENSOR_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_RSCP_Sensor_Send_Measurements

RBLE_STATUS RBLE_RSCP_Sensor_Send_Measurements (uint16_t conhdl, RBLE_RSCP_MEASUREMENTS_INFO * measurements_info)		
This function sends the measured value data from the Sensor. The result is reported by using the Sensor role measured value send completion event RBLE_RSCP_EVENT_SENSOR_SEND_MEASUREMENTS_COMP.		
Parameters:		
conhdl	Connection handle	
**measurements_info*	*flags*	Flag that defines whether there is a data field in the characteristic value or not
	instant_cadence	Instantaneous Cadence(1/minute or RPM)
	instant_speed	Instantaneous Speed(1/256[m/s])
	instant_stride_len	Instantaneous Stride Length(1/100[m])
	total_distance	Total Distance(1/10[m])
Return:		
RBLE_OK	Success	
RBLE_STATUS_ERROR	Not executable because the rBLE mode is other than RBLE_MODE_ACTIVE.	

3.2.4 RBLE_RSCP_Sensor_Send_SC_Control_Point

RBLE_STATUS RBLE_RSCP_Sensor_Send_SC_Control_Point (uint16_t conhdl,
RBLE_RSCP_SC_CONTROL_POINT_INFO *sc_cp_info)

This function sends the SC Control Point information from the Sensor.
When operation is written to the SC Control Point from the Collector, set RBLE_RSCP_OP_RESPONSE_CODE to the Parameters of *OpCode* and respond to the Collector.
Set the operation code from Collector to *request_op_code*, and set the status of requested operation to *response_value*.
When *request_op_code* is RBLE_RSCP_OP_REQ_SUPPORTED_SL_CODE, operable Sensor Location set by the initial value is sent.
The result is reported by using the Sensor role SC Control Point send completion event RBLE_RSCP_EVENT_SENSOR_SEND_SC_CP_COMP.

Parameters:

conhdl	Connection handle		
* *sc_cp_info*	*OpCode*	RBLE_RSCP_OP_RESPONSE_CODE	Response code
	cumulative_value	Not use	
	sensor_location	Not use	
	request_op_code	RBLE_RSCP_OP_SET_CUMULATIVE_CODE	Set Total Distance Value
		RBLE_RSCP_OP_START_CALIBRATION_CODE	Start Sensor Calibration
		RBLE_RSCP_OP_UPDATE_SL_CODE	Update Sensor Location
		RBLE_RSCP_OP_REQ_SUPPORTED_SL_CODE	Request Supported Sensor Locations
	response_value	RBLE_RSCP_RES_SUCCESS_CODE	Success
		RBLE_RSCP_RES_NOT_SUPPORTED_CODE	Op Code Not Supported
		RBLE_RSCP_RES_INVALID_PARAM_CODE	Invalid Parameter
		RBLE_RSCP_RES_OP_FAILED_CODE	Operation Failed

Return:

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

3.2.5 RBLE_RSCP_Collector_Enable

RBLE_STATUS RBLE_RSCP_Collector_Enable(uint16_t conhdl, uint8_t con_type,
RBLE_RSCS_CONTENT *rscs, RBLE_DIS_CONTENT *dis,
RBLE_RSCPC_EVENT_HANDLER call_back)

This function enables the RSCP Collector role and starts access to the service exposed by the RSCP Sensor. The result is reported by using the Collector role enable completion event RBLE_RSCP_EVENT_COLLECTOR_ENABLE_COMP.
When starting access to the service exposed by a Sensor to be connected for the first time, set 0 to the parameters of the service to configure the connection and to discover the service for the Sensor. If the handle information about the discovered service is saved and is used when the Sensor is connected normally for a second or subsequent time, detecting the service is skipped, which enables a high-speed access to the service.
While the Collector role is enabled, the service exposed by only one Sensor is accessible. To connect to more than one Sensor at the same time and access the services exposed by each Sensor, repeat enable/disable of the Collector 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 Sensor) 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 performed when connecting for the first time
	RBLE_PRF_CON_NORMAL	Normal connection performed when connecting for the second and subsequent times
**rscs*	*shdl*	Running speed and cadence service start handle
	ehdl	Running speed and cadence service end handle
	rsc_meas_char_hdl	RSC measurement characteristic handle
	rsc_meas_val_hdl	RSC measurement characteristic value handle
	rsc_meas_cfg_hdl	RSC measurement characteristic configuration descriptor handle
	rsc_meas_prop	RSC measurement characteristic property
	rsc_feature_char_hdl	RSC supported feature characteristic handle
	rsc_feature_val_hdl	RSC supported feature characteristic value handle
	rsc_feature_prop	RSC supported feature characteristic property
	sensor_loc_char_hdl	Sensor Location characteristic handle
	sensor_loc_val_hdl	Sensor Location characteristic value handle
	sensor_loc_prop	Sensor Location characteristic property
	sc_cp_char_hdl	SC Control Point characteristic handle
	sc_cp_val_hdl	SC Control Point characteristic value handle
	sc_cp_cfg_hdl	SC Control Point characteristic configuration descriptor handle
	sc_cp_prop	SC Control Point characteristic property
**dis*	*shdl*	Device information service start handle
	ehdl	Device information service end handle
	sys_id_char_hdl	System ID characteristic handle
	sys_id_val_hdl	System ID characteristic value handle
	sys_id_prop	System ID characteristic property
	model_nb_char_hdl	Model number characteristic handle
	model_nb_val_hdl	Model number characteristic value handle
	model_nb_prop	Model number characteristic property
	serial_nb_char_hdl	Serial number characteristic handle

		serial_nb_val_hdl	Serial number characteristic value handle
		serial_nb_prop	Serial number characteristic property
		fw_rev_char_hdl	Firmware revision characteristic handle
		fw_rev_val_hdl	Firmware revision characteristic value handle
		fw_rev_prop	Firmware revision characteristic property
		hw_rev_char_hdl	Hardware revision characteristic handle
		hw_rev_val_hdl	Hardware revision characteristic value handle
		hw_rev_prop	Hardware revision characteristic property
		sw_rev_char_hdl	Software revision characteristic handle
		sw_rev_val_hdl	Software revision characteristic value handle
		sw_rev_prop	Software revision characteristic property
		manuf_name_char_hdl	Manufacturer name characteristic handle
		manuf_name_val_hdl	Manufacturer name characteristic value handle
		manuf_name_prop	Manufacturer name characteristic property
		ieee_certif_char_hdl	IEEE certification characteristic handle
		ieee_certif_val_hdl	IEEE certification characteristic value handle
		ieee_certif_prop	IEEE certification characteristic property
	call_back	Callback	

Return:

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

3.2.6 RBLE_RSCP_Collector_Disable

RBLE_STATUS RBLE_RSCP_Collector_Disable(uint16_t conhdl)

This function disables the RSCP Collector role and terminates the access to the service exposed by RSCP Sensor. The result is reported by using the Collector role disable completion event RBLE_RSCP_EVENT_COLLECTOR_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.

3.2.7 RBLE_RSCP_Collector_Read_Char

RBLE_STATUS RBLE_RSCP_Collector_Read_Char (uint16_t conhdl, uint8_t char_code)

This function reads the characteristic value of the running speed and cadence service and the device information service.
The result is reported by using the characteristic value read request response event RBLE_RSCP_EVENT_COLLECTOR_READ_CHAR_RESPONSE.

Parameters:

conhdl	Connection handle	
char_code	RBLE_RSCPC_RD_RSCS_RM_CFG	Measurement value notification
	RBLE_RSCPC_RD_RSCS_SCCP_CFG	SC Control Point
	RBLE_RSCPC_RD_RSCS_RSC_FEATURE	Supported features of the RSC Sensor
	RBLE_RSCPC_RD_RSCS_SL	Sensor Location
	RBLE_RSCPC_RD_DIS_MANUF	Sensor manufacturer name
	RBLE_RSCPC_RD_DIS_MODEL	Sensor model number
	RBLE_RSCPC_RD_DIS_SERNB	Sensor serial number
	RBLE_RSCPC_RD_DIS_HWREV	Sensor hardware revision
	RBLE_RSCPC_RD_DIS_FWREV	Sensor firmware revision
	RBLE_RSCPC_RD_DIS_SWREV	Sensor software revision
	RBLE_RSCPC_RD_DIS_SYSID	Sensor system ID
	RBLE_RSCPC_RD_DIS_IEEE	Sensor IEEE certification information

Return:

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

3.2.8 RBLE_RSCP_Collector_Write_SC_Control_Point

RBLE_STATUS RBLE_RSCP_Collector_Write_SC_Control_Point (uint16_t conhdl, RBLE_RSCP_SC_CONTROL_POINT_INFO * sc_cp_info)				
This function writes SC Control Point characteristic of the running speed and cadence service. When specify RBLE_RSCP_OP_SET_CUMULATIVE_CODE to *OpCode*, set the Total Distance value to *cumulative_value*. When specify RBLE_RSCP_OP_UPDATE_SL_CODE to *OpCode*, set the Sensor Location value to *sensor_location*. *request_op_code* and *response_value* are not used in this function. The result is reported by using the characteristic value write request response event RBLE_RSCP_EVENT_COLLECTOR_WRITE_CHAR_RESPONSE.				
Parameters:				
conhdl	Connection handle			
** sc_cp_info*	*OpCode*	RBLE_RSCP_OP_SET_CUMULATIVE_CODE	Set Total Distance Value	
		RBLE_RSCP_OP_START_CALIBRATION_CODE	Start Sensor Calibration	
		RBLE_RSCP_OP_UPDATE_SL_CODE	Update Sensor Location	
		RBLE_RSCP_OP_REQ_SUPPORTED_SL_CODE	Request Supported Sensor Locations	
	cumulative_value	Cumulative Total Distance value		
	sensor_location	RBLE_RSCPC_SENSOR_OTHER	Other	
		RBLE_RSCPC_SENSOR_TOP_OF_SHOE	Top of shoe	
		RBLE_RSCPC_SENSOR_IN_SHOE	In shoe	
		RBLE_RSCPC_SENSOR_HIP	Hip	
		RBLE_RSCPC_SENSOR_CHEST	Chest	
	request_op_code	Not use		
	response_value	Not use		
Return:				
RBLE_OK	Success			
RBLE_STATUS_ERROR	Not executable because the rBLE mode is other than RBLE_MODE_ACTIVE.			

3.2.9 RBLE_RSCP_Collector_Write_Char

RBLE_STATUS RBLE_RSCP_Collector_Write_Char(uint16_t conhdl, uint8_t char_code, uint16_t cfg_val)			
This function writes each client characteristic configuration descriptor of the running speed and cadence service. The result is reported by using the characteristic value write request response event RBLE_RSCP_EVENT_COLLECTOR_WRITE_CHAR_RESPONSE.			
Parameters:			
	conhdl	Connection handle	
	char_code	RBLE_RSCPC_RSC_MEAS_CODE	Sensor measurement notification setting
		RBLE_RSCPC_SC_CONTROL_POINT_CODE	SC Control Point information indication setting
	cfg_val	RBLE_PRF_STOP_NTFIND	Stop notification or indication.
		RBLE_PRF_START_NTF	Start notification.
		RBLE_PRF_START_IND	Start indication.
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 RSCP of rBLE and the following sections describe the events in detail.

Table 3-2 Events Defined for the RSCP

RBLE_RSCP_EVENT_SENSOR_ENABLE_COMP	Sensor role enable completion event
RBLE_RSCP_EVENT_SENSOR_DISABLE_COMP	Sensor role disable completion event
RBLE_RSCP_EVENT_SENSOR_ERROR_IND	Sensor role error indication event
RBLE_RSCP_EVENT_SENSOR_SEND_MEASUREMENTS_COMP	Sensor measurements send completion event
RBLE_RSCP_EVENT_SENSOR_SEND_SC_CP_COMP	SC Control Point send completion event
RBLE_RSCP_EVENT_SENSOR_CHG_SC_CP_IND	SC Control Point change indication event
RBLE_RSCP_EVENT_SENSOR_CFG_INDNTF_IND	Characteristic configuration change indication event
RBLE_RSCP_EVENT_SENSOR_COMMAND_DISALLOWED_IND	Sensor role command disallowed indication event
RBLE_RSCP_EVENT_COLLECTOR_ENABLE_COMP	Collector role enable completion event
RBLE_RSCP_EVENT_COLLECTOR_DISABLE_COMP	Collector role disable completion event
RBLE_RSCP_EVENT_COLLECTOR_ERROR_IND	Collector role error indication event
RBLE_RSCP_EVENT_COLLECTOR_MEASUREMENTS_NTF	Measured value notification event
RBLE_RSCP_EVENT_COLLECTOR_SC_CP_IND	SC Control Point indication event
RBLE_RSCP_EVENT_COLLECTOR_READ_CHAR_RESPONSE	Characteristic value read request response event
RBLE_RSCP_EVENT_COLLECTOR_WRITE_CHAR_RESPONSE	Characteristic value write request response event
RBLE_RSCP_EVENT_COLLECTOR_COMMAND_DISALLOWED_IND	Collector role command disallowed indication event

3.3.1 RBLE_RSCP_EVENT_SENSOR_ENABLE_COMP

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

3.3.2 RBLE_RSCP_EVENT_SENSOR_DISABLE_COMP

RBLE_RSCP_EVENT_SENSOR_DISABLE_COMP				
This event reports the result of disabling the Sensor role (RBLE_RSCP_Sensor_Disable).				
Parameters:				
	conhdl	Connection handle		
	sensor_info	*rsc_meas_ntf_en*	RBLE_PRF_STOP_NTFIND	Stop notification of the measurement result.
			RBLE_PRF_START_NTF	Start notification of the measurement result.
		sc_cp_ind_en	RBLE_PRF_STOP_NTFIND	Stop indication of SC Control Point.
			RBLE_PRF_START_IND	Start indication of SC Control Point.
		sensor_location	Sensor Location set from Collector	

3.3.3 RBLE_RSCP_EVENT_SENSOR_ERROR_IND

RBLE_RSCP_EVENT_SENSOR_ERROR_IND		
This event indicates an error code unique to the Sensor 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*.)

3.3.4 RBLE_RSCP_EVENT_SENSOR_SEND_MEASUREMENTS_COMP

RBLE_RSCP_EVENT_SENSOR_SEND_MEASUREMENTS_COMP		
This event reports completion of sending the measured value (RBLE_RSCP_Sensor_Send_Measurements).		
Parameters:		
	conhdl	Connection handle
	status	Measured value 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*.)

3.3.5 RBLE_RSCP_EVENT_SENSOR_SEND_SC_CP_COMP

RBLE_RSCP_EVENT_SENSOR_SEND_SC_CP_COMP		
This event reports completion of sending the SC Control Point (RBLE_RSCP_Sensor_Send_SC_Control_Point).		
Parameters:		
	conhdl	Connection handle
	status	Measurement period indication 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_RSCP_EVENT_SENSOR_CHG_SC_CP_IND

RBLE_RSCP_EVENT_SENSOR_CHG_SC_CP_IND				
This event indicates that the value of the SC Control Point of the running speed and cadence service has been set by the Collector. When *OpCode* is RBLE_RSCP_OP_SET_CUMULATIVE_CODE, *cumulative_value* is available. When *OpCode* is RBLE_RSCP_OP_UPDATE_SL_CODE, *sensor_location* is available.				
Parameters:				
	conhdl	Connection handle		
	sc_cp_info	*OpCode*	RBLE_RSCP_OP_SET_CUMULATIVE_CODE	Set Total Distance Value
			RBLE_RSCP_OP_START_CALIBRATION_CODE	Start Sensor Calibration
			RBLE_RSCP_OP_UPDATE_SL_CODE	Update Sensor Location
			RBLE_RSCP_OP_REQ_SUPPORTED_SL_CODE	Request Supported Sensor Locations
		cumulative_value	Total Distance value	
		sensor_location	RBLE_RSCPC_SENSOR_OTHER	Other
			RBLE_RSCPC_SENSOR_TOP_OF_SHOE	Top of shoe
			RBLE_RSCPC_SENSOR_IN_SHOE	In shoe
			RBLE_RSCPC_SENSOR_HIP	Hip
			RBLE_RSCPC_SENSOR_CHEST	Chest
		request_op_code	Not use	
		response_value	Not use	

3.3.7 RBLE_RSCP_EVENT_SENSOR_CFG_INDNTF_IND

RBLE_RSCP_EVENT_SENSOR_CFG_INDNTF_IND			
This event indicates that the value of the client characteristic configuration descriptor of the running speed and cadence service has been set by the Collector.			
Parameters:			
	conhdl	Connection handle	
	char_code	RBLE_RSCPC_RSC_MEAS_CODE	Sensor measurement notification setting
		RBLE_RSCPC_SC_CONTROL_POINT_CODE	SC Control Point information indication setting
	cfg_val	RBLE_PRF_STOP_NTFIND	Stop notification or indication.
		RBLE_PRF_START_NTF	Start notification.
		RBLE_PRF_START_IND	Start indication.

3.3.8 RBLE_RSCP_EVENT_SENSOR_COMMAND_DISALLOWED_IND

RBLE_RSCP_EVENT_SENSOR_COMMAND_DISALLOWED_IND			
This event indicates the error that occurs when a command executed by the Sensor 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_RSCP_SENSOR_ENABLE	Sensor role enable command
		RBLE_CMD_RSCP_SENSOR_DISABLE	Sensor role disable command
		RBLE_CMD_RSCP_SENSOR_SEND_MEASUREMENTS	Sensor measured data send command
		RBLE_CMD_RSCP_SENSOR_SEND_SC_CONTROL_POINT	SC Control point send command

3.3.9 RBLE_RSCP_EVENT_COLLECTOR_ENABLE_COMP

RBLE_RSCP_EVENT_COLLECTOR_ENABLE_COMP		
This event reports the result of enabling the Collector role (RBLE_RSCP_Collector_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:		
status	Result of enabling the Collector role (See *2.2* and *Bluetooth Low Energy Protocol Stack API Reference Manual: Basics, 3.2, Declaration of enumerated type for rBLE status*.)	
conhdl	Connection handle	
rscs	*shdl*	Running speed and cadence service start handle
	ehdl	Running speed and cadence service end handle
	rsc_meas_char_hdl	RSC measurement characteristic handle
	rsc_meas_val_hdl	RSC measurement characteristic value handle
	rsc_meas_cfg_hdl	RSC measurement characteristic configuration descriptor handle
	rsc_meas_prop	RSC measurement characteristic property
	rsc_feature_char_hdl	RSC supported feature characteristic handle
	rsc_feature_val_hdl	RSC supported feature characteristic value handle
	rsc_feature_prop	RSC supported feature characteristic property
	sensor_loc_char_hdl	Sensor Location characteristic handle
	sensor_loc_val_hdl	Sensor Location characteristic value handle
	sensor_loc_prop	Sensor Location characteristic property
	sc_cp_char_hdl	SC Control Point characteristic handle
	sc_cp_val_hdl	SC Control Point characteristic value handle
	sc_cp_cfg_hdl	SC Control Point characteristic configuration descriptor handle
	sc_cp_prop	SC Control Point characteristic property
dis	*shdl*	Device information service start handle
	ehdl	Device information service end handle
	sys_id_char_hdl	System ID characteristic handle
	sys_id_val_hdl	System ID characteristic value handle
	sys_id_prop	System ID characteristic property
	model_nb_char_hdl	Model number characteristic handle
	model_nb_val_hdl	Model number characteristic value handle
	model_nb_prop	Model number characteristic property
	serial_nb_char_hdl	Serial number characteristic handle
	serial_nb_val_hdl	Serial number characteristic value handle
	serial_nb_prop	Serial number characteristic property
	fw_rev_nb_char_hdl	Firmware revision characteristic handle
	fw_rev_nb_val_hdl	Firmware revision characteristic value handle
	fw_rev_nb_prop	Firmware revision characteristic property
	hw_rev_nb_char_hdl	Hardware revision characteristic handle
	hw_rev_nb_val_hdl	Hardware revision characteristic value handle
	hw_rev_nb_prop	Hardware revision characteristic property
	sw_rev_nb_char_hdl	Software revision characteristic handle
	sw_rev_nb_val_hdl	Software revision characteristic value handle
	sw_rev_nb_prop	Software revision characteristic property
	manuf_name_char_hdl	Manufacturer name characteristic handle

		manuf_name_val_hdl	Manufacturer name characteristic value handle
		manuf_name_prop	Manufacturer name characteristic property
		ieee_certif_char_hdl	IEEE certification characteristic handle
		ieee_certif_val_hdl	IEEE certification characteristic value handle
		ieee_certif_prop	IEEE certification characteristic property

3.3.10 RBLE_RSCP_EVENT_COLLECTOR_DISABLE_COMP

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

3.3.11 RBLE_RSCP_EVENT_COLLECTOR_ERROR_IND

RBLE_RSCP_EVENT_COLLECTOR_ERROR_IND		
This event indicates an error code unique to the RSCP Collector role.		
Parameters:		
	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*.)
	conhdl	Connection handle

3.3.12 RBLE_RSCP_EVENT_COLLECTOR_MEASUREMENTS_NTF

RBLE_RSCP_EVENT_COLLECTOR_MEASUREMENTS_NTF			
This event indicates the measured value sent from the Sensor.			
Parameters:			
	conhdl	Connection handle	
	measure_info	*flags*	Flag that defines whether there is a data field in the characteristic value or not
		instant_cadence	Instantaneous Cadence(1/minute or RPM)
		instant_speed	Instantaneous Speed(1/256[m/s])
		instant_stride_len	Instantaneous Stride Length(1/100[m])
		total_distance	Total Distance(1/10[m])

3.3.13 RBLE_RSCP_EVENT_COLLECTOR_SC_CP_IND

RBLE_RSCP_EVENT_COLLECTOR_SC_CP_IND			
This event indicates response of SC Control Point procedure sent from the Sensor. Confirm response_value and request_op_code whether operation has been sent by function of Sets the SC Control Point (RBLE_RSCP_Collector_Write_SC_Control_Point). When *request_op_code* is RBLE_RSCP_OP_REQ_SUPPORTED_SL_CODE, parameters of *location_num* and *response_param* are available. The *location_num* elements of the *response_param* are valid.			
Parameters:			
conhdl	Connection handle		
sc_cp_info	*OpCode*	RBLE_RSCP_OP_RESPONSE_CODE	Response code
	cumulative_value	Not use	
	sensor_location	Not use	
	request_op_code	RBLE_RSCP_OP_SET_CUMULATIVE_CODE	Set Total Distance Value
		RBLE_RSCP_OP_START_CALIBRATION_CODE	Start Sensor Calibration
		RBLE_RSCP_OP_UPDATE_SL_CODE	Update Sensor Location
		RBLE_RSCP_OP_REQ_SUPPORTED_SL_CODE	Request Supported Sensor Locations
	response_value	RBLE_RSCP_RES_SUCCESS_CODE	Success
		RBLE_RSCP_RES_NOT_SUPPORTED_CODE	Op Code Not Supported
		RBLE_RSCP_RES_INVALID_PARAM_CODE	Invalid Parameter
		RBLE_RSCP_RES_OP_FAILED_CODE	Operation Failed
location_num	Valid number of Sensor Location		
response_param[RBLE_RSCP_SENSORE_LOCATION_MAX]	RBLE_RSCPC_SENSOR_OTHER	Other	
	RBLE_RSCPC_SENSOR_TOP_OF_SHOE	Top of shoe	
	RBLE_RSCPC_SENSOR_IN_SHOE	In shoe	
	RBLE_RSCPC_SENSOR_HIP	Hip	
	RBLE_RSCPC_SENSOR_CHEST	Chest	

3.3.14 RBLE_RSCP_EVENT_COLLECTOR_READ_CHAR_RESPONSE

RBLE_RSCP_EVENT_COLLECTOR_READ_CHAR_RESPONSE
This event reports the response to the characteristic value read request (RBLE_RSCP_Collector_Read_Char). Read out the read data in accordance with the contents of the request.

・RBLE_RSCPC_RD_RSCS_RM_CFG
・RBLE_RSCPC_RD_RSCS_SCCP_CFG

LSB	Octet0	Octet1	Octet2	Octet4	Octet5	Octet6	MSB
	client configuration (lower)	*client configuration (upper)*	-	-	-	-	

・RBLE_RSCPC_RD_RSCS_RSC_FEATURE

LSB	Octet0	Octet1	Octet2	Octet4	Octet5	Octet6	MSB
	RSC Feature (lower)	*RSC Feature (upper)*	-	-	-	-	

・RBLE_RSCPC_RD_RSCS_SL

LSB	Octet0	Octet1	Octet2	Octet4	Octet5	Octet6	MSB
	Sensor Location	-	-	-	-	-	

Parameters:

conhdl	Connection handle		
att_code	0x00	Characteristic value successfully acquired	
	Other than 0x00	Error occurred when acquiring characteristic value	
data	*each_len*		Length of each result
	len		Data length
	data[RBLE_ATTM_MAX_VALUE]		Read characteristic data

3.3.15 RBLE_RSCP_EVENT_COLLECTOR_WRITE_CHAR_RESPONSE

RBLE_RSCP_EVENT_COLLECTOR_WRITE_CHAR_RESPONSE
This event reports the response to the characteristic value write request (RBLE_RSCP_Collector_Write_Char).

Parameters:

conhdl	Connection handle	
att_code	0x00	Characteristic value successfully written
	Other than 0x00	Error occurred when writing characteristic value

3.3.16 RBLE_RSCP_EVENT_COLLECTOR_COMMAND_DISALLOWED_IND

RBLE_RSCP_EVENT_COLLECTOR_COMMAND_DISALLOWED_IND			
This event indicates the error that occurs when a command executed by the Collector 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_RSCP_COLLECTOR_ENABLE	Collector role enable command
		RBLE_CMD_RSCP_COLLECTOR_DISABLE	Collector role disable command
		RBLE_CMD_RSCP_COLLECTOR_READ_CHAR	Characteristic read command
		RBLE_CMD_RSCP_COLLECTOR_WRITE_SC_CONTROL_POINT	Write SC Control Point command
		RBLE_CMD_RSCP_COLLECTOR_WRITE_CHAR	Characteristic write command

3.4 Message Sequence Chart

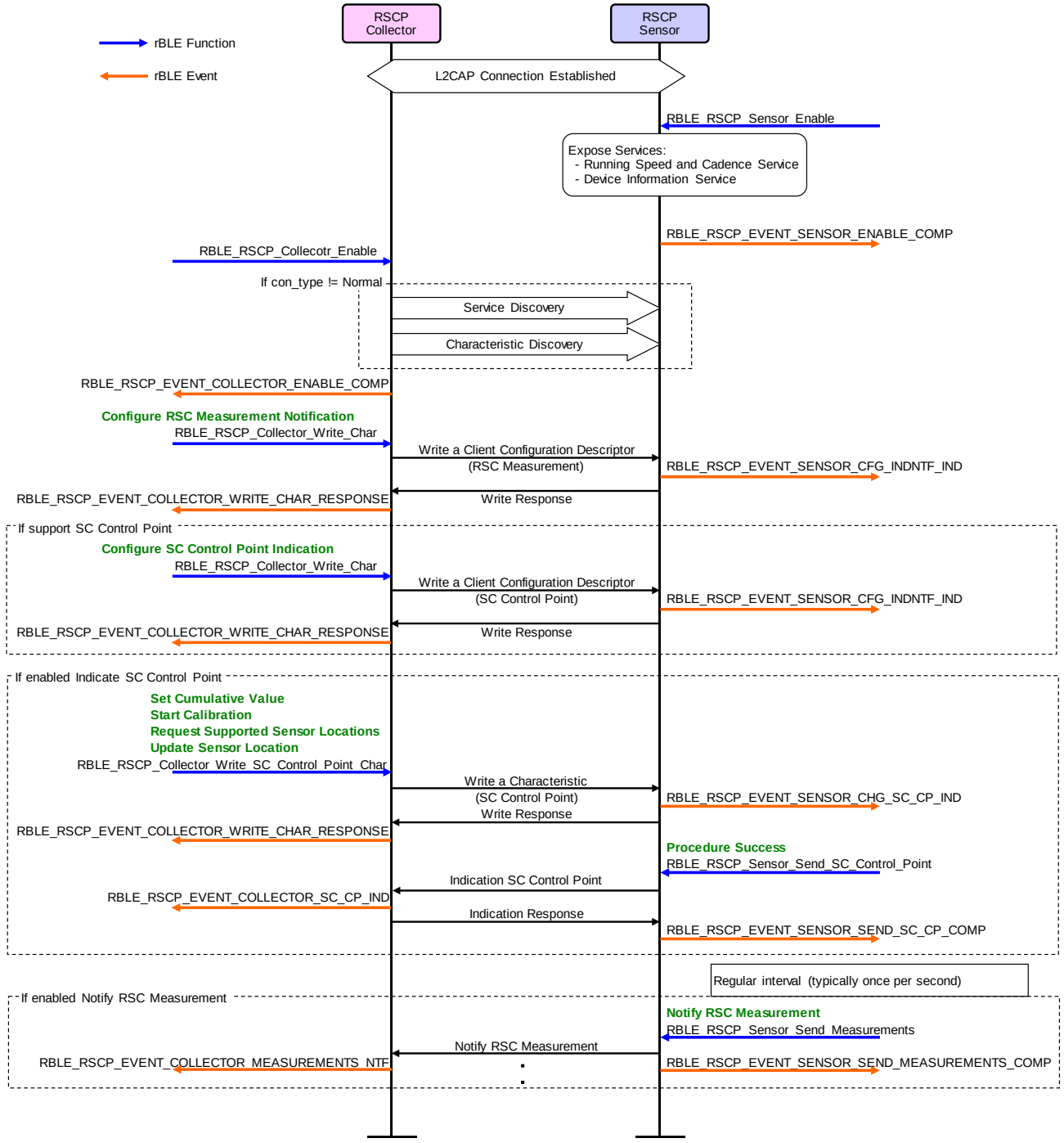

Figure 3-1 example of use case realization of RSCP by using rBLE API

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. Heart Rate Profile Specification v1.0, Bluetooth SIG
18. Heart Rate Service Specification v1.0, Bluetooth SIG
19. Cycling Speed and Cadence Profile Specification v1.0, Bluetooth SIG
20. Cycling Speed and Cadence Service Specification v1.0, Bluetooth SIG
21. Cycling Power Profile Specification v0.9, Bluetooth SIG
22. Cycling Power Service Specification v0.9, Bluetooth SIG
23. Glucose Profile Specification v1.0, Bluetooth SIG
24. Glucose Service Specification v1.0, Bluetooth SIG
25. Time Profile Specification v1.0, Bluetooth SIG
26. Current Time Service Specification v1.0, Bluetooth SIG
27. Next DST Change Service Specification v1.0, Bluetooth SIG
28. Reference Time Update Service Specification v1.0, Bluetooth SIG
29. Alert Notification Service Specification v1.0, Bluetooth SIG
30. Alert Notification Profile Specification v1.0, Bluetooth SIG
31. Location and Navigation Service Specification v1.0, Bluetooth SIG
32. Location and Navigation Profile Specification v1.0, Bluetooth SIG
33. Phone Alert Status Service Specification v1.0, Bluetooth SIG
34. Phone Alert Status Profile Specification v1.0, Bluetooth SIG
35. Running Speed and Cadence Service Specification v1.0, Bluetooth SIG
36. Running Speed and Cadence Profile Specification v1.0, Bluetooth SIG
37. Bluetooth SIG Assigned Numbers https://www.bluetooth.org/Technical/AssignedNumbers/home.htm
38. Services & Characteristics UUID http://developer.bluetooth.org/gatt/Pages/default.aspx
39. 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.
Server Characteristic Configuration Descriptor	A descriptor is used to control broadcast of characteristic values that include the server 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.

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Rev.	Date	Description	
		Page	Summary
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