

RW BLE Phone Alert Status Profile Interface Specification

Interface Specification

RW-BLE-PASP-IS

Version 8.0

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Revision History

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1 Overview

1.1 Document Overview

This document describes the non-standard interface of the RivieraWaves (RW) Bluetooth Low Energy (BLE) Phone Alert Status Profile (PASP) implementation. Along this document, the interface messages will be referred to as API messages for the profile block(s).

Their description will include their utility and reason for implementation for a better understanding of the user and the developer that may one day need to interface them from a higher application.

1.2 BLE Phone Alert Status Profile Overview

The Phone Alert Status Profile can be used by a phone to expose the current state of the alert procedure (vibrate mode, ringer mode ...). It can be used by a peripheral device (basically a watch) to configure the way a phone will alert a user.

This service has been implemented as a profile. Within this profile, two roles can be supported: Server role (PASPS) and Client role (PASPC). The Client role must support the GAP Peripheral Role and the Server role, the GAP Central role. The profile requires a connection to be established between the two devices for its functionality.

The various documents edited by the Bluetooth SIG present different use cases for this profile, their GATT, GAP and security, mandatory and optional requirements. The Phone Alert Status Profile specifications have been adopted by the Bluetooth SIG on September 15th 2011 ([1] and [3]). Their related Test Specifications have been released at the same time and are referenced in [2] and [4].

The profile is implemented in the RW-BLE software stack as two tasks, one for each role. Each task has an API decided after the study of the profile specifications and test specifications, and it is considered to be minimalistic and designed for a future application which would combine the profile functionality with the device connectivity and security procedures.

The structure of the Phone Alert Status service is defined in the table below:

Characteristic Name	Requirements	Properties	Security	Descriptors
Alert Status	Mandatory	Read/Notify	None	Client Characteristic Configuration
Ringer Setting	Mandatory	Read/Notify	None	Client Characteristic Configuration
Ringer Control Point	Mandatory	Write Without Response	None	None

The Alert Status Characteristic exposes the alerting status of the phone (Ringer state, vibrate state, display alert status). The Ringer Setting Characteristic provides the current value of the ringer setting (Ringer silent, ringer normal).

When the Ringer Control Point characteristic is written, the server device performs an action based on the value.

The server device implements a state machine with two states, “Ringer Silent” and “Ringer Normal”.

- The command “Set Silent Mode” sets the state to “Ringer Silent”.
- The command “Cancel Silent Mode” sets the state to “Ringer Normal”.
- The command “Mute Once” silences the server device’s ringer. If the ringer is not active, the “Mute Once” command shall have no effect.

The Alert Status and Ringer Setting characteristics expose the current alert settings of the server device. These settings may depends on external events (like incoming call or user interaction). Therefore, the client does not have direct control over the server’s Ringer Setting through the Ringer Control Point.

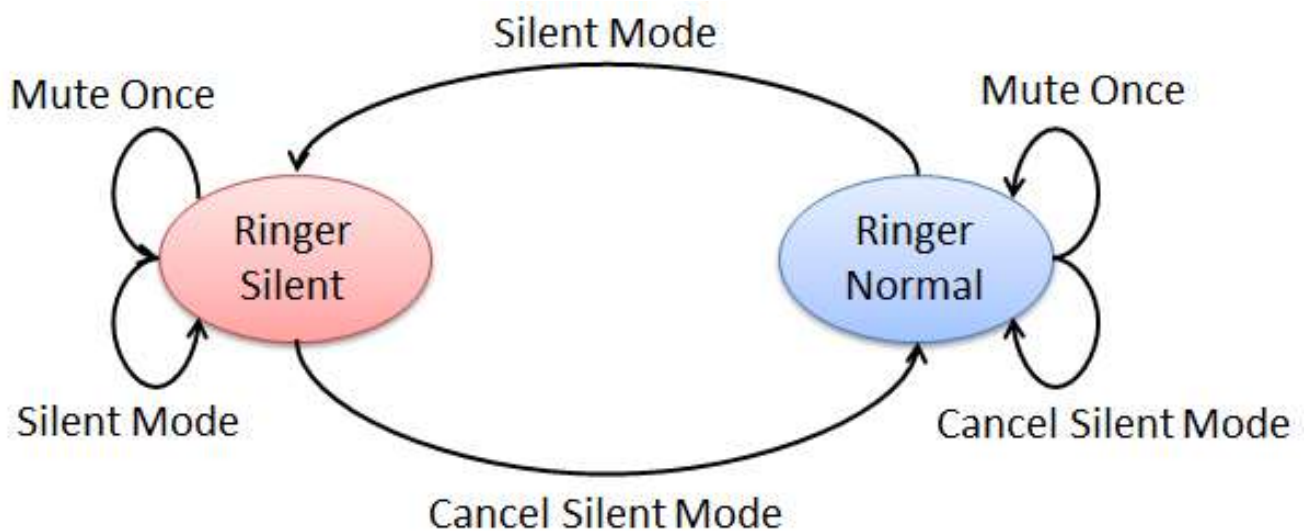


Figure 1 – Server State Machine

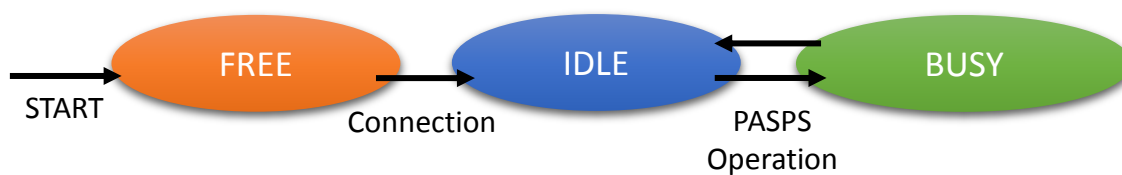
The Client Characteristic Configuration descriptor shall be written with the value 0x0001 (PRF_CLI_START_NTF) to enable or with the value 0x0000 (PRF_CLI_STOP_NTFIND) to disable sending of notifications.

2 PASP Server Role API

2.1 Environment

Within the PASPS task, three states are defined: FREE, IDLE and BUSY.

The busy state is used when a procedure is currently being processed by a connected device (read, write ...). When the state is busy, no command message sent by a higher layer can be handled; this message will be stored until the end of the procedure and handled once the procedure is over. Thus it can be considered as a connected state from an application point of view.



Important Note: The TASK_PASPS task is multi-instantiated, one instance is created for each connection for which the profile will be enabled and each of these instances will have a different task ID. Thus, it is very important for the application to keep the source task ID of the first received PASPS_CMP_EVT message to be able to communicate with the peer device linked to this task ID once it has been enabled.

The term TASK_PASPS_IDX will be used in the rest of the document to refer to any instance of the Phone Alert Status profile Server Role Task. The term TASK_PASPS will refer to the first instance of this task.

2.2 API Messages

2.2.1 Initialization/Database creation

During the initialization phase of the Blood Pressure Sensor, the memory for this task must be allocated using the message GAPM_PROFILE_TASK_ADD_CMD provided by the GAPM interface. Apart from the security level, the following parameters should be filled:

Parameters:

Type	Parameters	Description
uint8_t	alert_status	Alert Status Characteristic Value (see Table 1)
uint8_t	ringer_setting	Ringer Setting Characteristic Value (see Table 2)

Response: GAPM_PROFILE_TASK_ADDED_IND

Description: This API message shall be used to add one instance of the Phone Alert Status Service in the database.

The provided values are used to initialize the values of the Alert Status Characteristic and the Ringer Setting Characteristic.



2.2.2 PASPS_ENABLE_REQ

Source: TASK_APP

Destination: TASK_PASPS

Required State: FREE

Parameters:

Type	Parameters	Description
uint16_t	alert_status_ntf_cfg	Stored Alert Status notification configuration for a bonded device.
uint16_t	ringer_setting_ntf_cfg	Stored Ringer Setting notification configuration for bonded device.

Response: PASPS_ENABLE_RSP

Description: This API message shall be used after the connection with a peer device has been established in order to set the PASP Server bond data for the connection.

2.2.3 PASPS_ENABLE_RSP

Source: TASK_PASPS

Destination: TASK_APP

Parameters:

Type	Parameters	Description
uint8_t	status	Status of the operation

Description: This API message informs the application about the status of the operation

2.2.4 PASPS_UPDATE_CHAR_VAL_CMD

Source: TASK_APP

Destination: TASK_PASPS_IDX

Required State: IDLE

Parameters:

Type	Parameters	Description
uint8_t	operation	Operation code, indicate which characteristic value need to be updated: <ul style="list-style-type: none">PASPS_UPD_ALERT_STATUS_OP_CODEPASPS_UPD_RINGER_SETTING_OP_CODE
uint8_t	value	Alert Status characteristic value or Ringer Setting characteristic value. (see Table 1 or Table 2)

Description: This API message shall be used by the application to update the value of the Alert Status characteristic or the Ringer Setting characteristic stored in the database. The interpretation of the value depends of the operation value which is used to detect which one of these two characteristic shall be modified.



2.2.5 PASPS_WRITTEN_CHAR_VAL_IND

Source: TASK_PASPS_IDX

Destination: TASK_APP

Parameters:

Type	Parameters	Description
uint8_t	att_code	Attribute Code: <ul style="list-style-type: none">PASPS_ALERT_STATUS_NTF_CFGPASPS_RINGER_SETTING_NTF_CFGPASPS_RINGER_CTLN_PT_CHAR_VAL
union	value	
uint8_t	ringer_ctln_pt	Ringer Control Point Characteristic Value
uint16_t	alert_status_ntf_cfg	Alert Status Characteristic Notification Configuration Value
uint16_t	ringer_setting_ntf_cfg	Ringer Setting Characteristic Notification Configuration Value

Description: This API message is sent to the application to inform it that the value of one of the writable attribute has been successfully written by the peer device.

The content of the value parameter depends on the received attribute code.

When the ringer control point characteristic value is written, the task checks the current state of the device (Ringer Silent or Ringer Normal), if the state can be modified, the PASPC_WRITTEN_CHAR_VAL_IND message is sent to the application which decide if the state can be modified.

2.2.6 PASPS_CMP_EVT

Source: TASK_PASPS_IDX

Destination: TASK_APP

Parameters:

Type	Parameters	Description
uint8_t	operation	Operation Code: <ul style="list-style-type: none">PASPS_UPD_ALERT_STATUS_OP_CODEPASPS_UPD_RINGER_SETTING_OP_CODE
uint8_t	status	Status

Description: The API message is used by the PASPS task to inform the sender of a command that the procedure is over and contains the status of the procedure.



3 PASP Client Role API

3.1 Environment

Within the PASPC task, four states are defined: FREE, IDLE, DISCOVERING and BUSY.

Important Note: During the initialization phase of the Phone Alert Collector, the memory for this task must be allocated using the message GAPM_PROFILE_TASK_ADD_CMD provided by the GAPM interface.

The TASK_PASPC task is multi-instantiated, one instance is created for each connection for which the profile will be enabled and each of these instances will have a different task ID. Thus, it is very important for the application to keep the source task ID of the first received PASPC_CMP_EVT message to be able to communicate with the peer device linked to this task ID once it has been enabled.

The term TASK_PASPC_IDX will be used in the rest of the document to refer to any instance of the Phone Alert Status profile Client Role Task. The term TASK_PASPC will refer to the first instance of this task.

3.2 API Messages

3.2.1 PASPC_ENABLE_REQ

Source: TASK_APP

Destination: TASK_PASPC

Required State: FREE

Parameters:

Type	Parameters	Description
uint8_t	con_type	Connection Type
struct paspc_pass_content	pass	Service structure previously discovered in the database of the peer device.

Response: PASPC_ENABLE_RSP

Description: This API message is used for enabling the Client role of the PASP. This Application message contains BLE connection handle, the connection type and the previously saved discovered PASS details on peer.

The connection type may be PRF_CON_DISCOVERY (0x00) for discovery/initial configuration or PRF_CON_NORMAL (0x01) for a normal connection with a bonded device. Application shall save this information to reuse them for other connections. During normal connection, previously discovered device information can be reutilized.

For a normal connection, the response to this request is sent right away after saving the PASS content in the environment and registering PASPC in GATT to receive the notifications for the known attribute handles in PASS that would be notified.

For a discovery connection, discovery of the peer PASPS is started and the response will be sent at the end of the discovery with the discovered attribute details.

Once the content of the peer PASS has been stored, the PASPC will automatically read the content of the Alert Status Characteristic as required by the Phone Alert Status Profile specification.

The figure below exposes the different messages exchanged between an application layer the PASPC task after a connection has been established with a peer device.

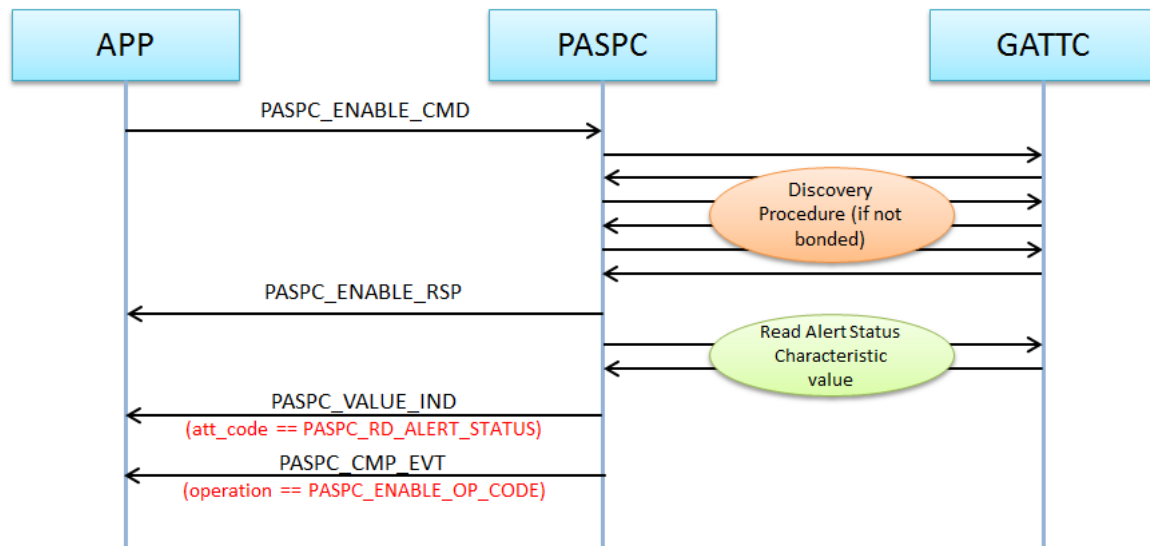


Figure 2 – Connection Establishment procedure

3.2.2 PASPC_ENABLE_RSP

Source: TASK_PASPC_IDX

Destination: TASK_APP

Parameters:

Type	Parameters	Description
uint8_t	status	Status of the operation
struct paspc_pass_content	pass	Service structure previously discovered in the database of the peer device.

Description: This API message is used by the PASP Client role to inform the application of a correct enable command.

3.2.3 PASPC_READ_CMD

Source: TASK_APP

Destination: TASK_PASPC_IDX

Required State: IDLE

Parameters:

Type	Parameters	Description
uint8_t	read_code	Read Code: <ul style="list-style-type: none"> PASPC_RD_ALERT_STATUS PASPC_RD_RINGER_SETTING PASPC_RD_WR_ALERT_STATUS_CFG PASPC_RD_WR_RINGER_SETTING_CFG

Response: PASPC_VALUE_IND and PASPC_CMP_EVT

Description: The API message shall be used to read the value of an attribute in the peer device database.



3.2.4 PASPC_WRITE_CMD

Source: TASK_APP

Destination: TASK_PASPC_IDX

Required State: IDLE

Parameters:

Type	Parameters	Description
uint8_t	Write_code	Write Code: <ul style="list-style-type: none"> PASPC_WR_RINGER_CTLN_PT PASPC_RD_WR_ALERT_STATUS_CFG PASPC_RD_WR_RINGER_SETTING_CFG
union	value	
uint8_t	ringer_ctln_pt	Ringer Control Point characteristic value (see Table 3)
uint16_t	alert_status_ntf_cfg	Alert Status characteristic client characteristic configuration value
uint16_t	ringer_setting_ntf_cfg	Ringer Setting characteristic client characteristic configuration value

Response: PASPC_CMP_EVT

Description: This API message shall be used by the application to write the value of one of the writable attribute in the peer device database.

3.2.5 PASPC_VALUE_IND

Source: TASK_PASPC_IDX

Destination: TASK_APP

Parameters:

Type	Parameters	Description
uint8_t	att_code	Attribute Code: <ul style="list-style-type: none"> PASPC_RD_ALERT_STATUS PASPC_RD_RINGER_SETTING PASPC_RD_WR_ALERT_STATUS_CFG PASPC_RD_WR_RINGER_SETTING_CFG
union	value	
uint8_t	alert_status	Alert Status characteristic value (see Table 1)
uint8_t	ringer_setting	Ringer Setting characteristic value (see Table 2)
uint16_t	alert_status_ntf_cfg	Alert Status characteristic client characteristic configuration value
uint16_t	ringer_setting_ntf_cfg	Ringer Setting characteristic client characteristic configuration value

Description: This API is sent to the application once an attribute value has been received from the peer device upon a notification or a read response message.

The content of the value parameter depends of the attribute code value which defines the attribute that has been updated.



3.2.6 PASPC_CMP_EVT

Source: TASK_PASPC_IDX

Destination: TASK_APP

Parameters:

Type	Parameters	Description
uint8_t	operation	Operation Code: <ul style="list-style-type: none">• PASPC_ENABLE_OP_CODE• PASPC_READ_OP_CODE• PASPC_WRITE_OP_CODE
uint8_t	status	Status

Description: The API message is used by the PASPS task to inform the sender of a command that the procedure is over and contains the status of the procedure.



4 Miscellaneous

Name	Value	Description
PASP_RINGER_ACTIVE	0x01	Ringer state active
PASP_VIBRATE_ACTIVE	0x02	Vibrate state active
PASP_DISP_ALERT_STATUS_ACTIVE	0x04	Display alert status active

Table 1 – Alert Status Characteristic value Flags

Name	Value	Description
PASP_RINGER_SILENT	0	Ringer silent
PASP_RINGER_NORMAL	1	Ringer normal

Table 2 – Ringer Setting Characteristic value Keys

Name	Value	Description
PASP_SILENT_MODE	1	Silent Mode
PASP_MUTE_ONCE	2	Mute Once
PASP_CANCEL_SILENT_MODE	3	Cancel Silent Mode

Table 3 – Ringer Control Point Characteristic value keys

Type	Parameters	Description
struct prf_svc	svc	Service Information (see Table 5)
struct prf_char_inf	chars[PASPC_CHAR_MAX]	Characteristic Information (see Table 6). Indexes are: <ul style="list-style-type: none"> PASPC_CHAR_ALERT_STATUS PASPC_CHAR_RINGER_SETTING PASPC_CHAR_RINGER_CTLN_PT
struct prf_char_desc_inf	descs[PASPC_DESC_MAX]	Descriptor Information (see Table 7). Indexes are: <ul style="list-style-type: none"> PASPC_DESC_ALERT_STATUS_CL_CFG PASPC_DESC_RINGER_SETTING_CL_CFG

Table 4 – Phone Alert Status Service content structure (struct paspc_pass_content)

Type	Parameters	Description
U16	shdl	Start handle of the HID Service.
U16	ehdl	End handle of the HID Service.

Table 5 - Service description structure (struct prf_svc)

Type	Parameters	Description
U16	char_hdl	Characteristic declaration attribute handle.
U16	val_hdl	Characteristic value attribute handle.
U8	prop	Properties
U8	char_ehdl_off	Number of attribute within the Characteristic.

Table 6 - Characteristic description structure (struct prf_char_inf)

Type	Parameters	Description
U16	desc_hdl	Descriptor attribute handle

Table 7 - Descriptor description structure (struct prf_char_desc_inf)



5 Abbreviations

Abbreviation	Original Terminology
API	Application Programming Interface
BLE	Bluetooth Low Energy
GAP	Generic Access Profile
GATT	Generic Attribute Profile
PASP	Phone Alert Status Profile
PASPS	Phone Alert Status Server Role
PASPC	Phone Alert Status Client Role
PASS	Phone Alert Status Service
RW	RivieraWaves



6 References

[1]	Title	PHONE ALERT STATUS PROFILE SPECIFICATION		
	Reference	PASP_SPEC_V10		
	Version	V10r00	Date	2011-09-15
	Source	Bluetooth SIG		

[2]	Title	PHONE ALERT STATUS PROFILE TEST SPECIFICATION		
	Reference	PASP.TS.1.0.0		
	Version	1.0.0	Date	2011-09-15
	Source	Bluetooth SIG		

[3]	Title	PHONE ALERT STATUS SERVICE SPECIFICATION		
	Reference	PASS_SPEC_V10		
	Version	V10r00	Date	2011-09-15
	Source	Bluetooth SIG		

[4]	Title	PHONE ALERT STATUS SERVICE TEST SPECIFICATION		
	Reference	PASS.TS.1.0.0		
	Version	1.0.0	Date	2011-09-15
	Source	Bluetooth SIG		