
STM32WB Bluetooth® Low Energy (BLE) wireless interface

Introduction

Bluetooth® Low Energy (BLE) is a wireless personal area network technology designed and marketed by the Bluetooth special interest group (Bluetooth SIG), aimed at novel applications in the healthcare, fitness, beacons, security and home entertainment industries.

Compared to standard Bluetooth, BLE considerably reduces power consumption and cost, while maintaining a similar communication range.

Standard HCI commands are defined in the "Bluetooth specification core V5.3", of which the BLE specification is a part.

All proprietary commands are described in this application note.

1 General information

This document applies to STM32WB Series microcontrollers, based on Arm® cores.

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The parameter "size" in the tables of this document is expressed in bytes.

2 ACI/HCI commands

2.1 HCI commands

In Table 1 "Y" means that the corresponding command applies to the dedicated BLE stack variant, namely LO / BO / PO / BF / LB, respectively, for Link layer only / Beacon only / Peripheral only / Basic feature / Link layer only basic.

Table 1. HCI commands list

Command	OpCode	LO	PO	BO	BF	LB
HCI_DISCONNECT	0x0406	Y	Y	-	Y	Y
HCI_READ_REMOTE_VERSION_INFORMATION	0x041D	Y	Y	-	Y	Y
HCI_SET_EVENT_MASK	0x0C01	Y	Y	Y	Y	Y
HCI_RESET	0x0C03	Y	Y	Y	Y	Y
HCI_READ_TRANSMIT_POWER_LEVEL	0x0C2D	Y	Y	-	Y	Y
HCI_SET_CONTROLLER_TO_HOST_FLOW_CONTROL	0x0C31	Y	-	-	-	Y
HCI_HOST_BUFFER_SIZE	0x0C33	Y	-	-	-	Y
HCI_HOST_NUMBER_OF_COMPLETED_PACKETS	0x0C35	Y	-	-	-	Y
HCI_READ_LOCAL_VERSION_INFORMATION	0x1001	Y	Y	Y	Y	Y
HCI_READ_LOCAL_SUPPORTED_COMMANDS	0x1002	Y	-	Y	-	Y
HCI_READ_LOCAL_SUPPORTED_FEATURES	0x1003	Y	-	Y	-	Y
HCI_READ_BD_ADDR	0x1009	Y	Y	Y	Y	Y
HCI_READ_RSSI	0x1405	Y	Y	Y	Y	Y
HCI_LE_SET_EVENT_MASK	0x2001	Y	Y	Y	Y	Y
HCI_LE_READ_BUFFER_SIZE	0x2002	Y	-	Y	-	Y
HCI_LE_READ_LOCAL_SUPPORTED_FEATURES	0x2003	Y	-	Y	-	Y
HCI_LE_SET_RANDOM_ADDRESS	0x2005	Y	-	Y	-	Y
HCI_LE_SET_ADVERTISING_PARAMETERS	0x2006	Y	-	Y	-	Y
HCI_LE_READ_ADVERTISING_PHYSICAL_CHANNEL_TX_POWER	0x2007	Y	-	Y	-	Y
HCI_LE_SET_ADVERTISING_DATA	0x2008	Y	Y	Y	Y	Y
HCI_LE_SET_SCAN_RESPONSE_DATA	0x2009	Y	Y	Y	Y	Y
HCI_LE_SET_ADVERTISE_ENABLE	0x200A	Y	-	Y	-	Y
HCI_LE_SET_SCAN_PARAMETERS	0x200B	Y	-	Y	-	Y
HCI_LE_SET_SCAN_ENABLE	0x200C	Y	-	Y	-	Y
HCI_LE_CREATE_CONNECTION	0x200D	Y	-	-	-	Y
HCI_LE_CREATE_CONNECTION_CANCEL	0x200E	Y	-	-	-	Y
HCI_LE_READ_WHITE_LIST_SIZE	0x200F	Y	-	Y	-	Y
HCI_LE_CLEAR_WHITE_LIST	0x2010	Y	-	Y	-	Y
HCI_LE_ADD_DEVICE_TO_WHITE_LIST	0x2011	Y	-	Y	-	Y
HCI_LE_REMOVE_DEVICE_FROM_WHITE_LIST	0x2012	Y	-	Y	-	Y
HCI_LE_CONNECTION_UPDATE	0x2013	Y	-	-	Y	Y
HCI_LE_SET_HOST_CHANNEL_CLASSIFICATION	0x2014	Y	-	-	-	Y
HCI_LE_READ_CHANNEL_MAP	0x2015	Y	Y	-	Y	Y

Command	OpCode	LO	PO	BO	BF	LB
HCI_LE_READ_REMOTE_FEATURES	0x2016	Y	Y	-	Y	Y
HCI_LE_ENCRYPT	0x2017	Y	Y	-	Y	Y
HCI_LE_RAND	0x2018	Y	Y	Y	Y	Y
HCI_LE_ENABLE_ENCRYPTION	0x2019	Y	-	-	-	Y
HCI_LE_LONG_TERM_KEY_REQUEST_REPLY	0x201A	Y	-	-	-	Y
HCI_LE_LONG_TERM_KEY_REQUEST_NEGATIVE_REPLY	0x201B	Y	-	-	-	Y
HCI_LE_READ_SUPPORTED_STATES	0x201C	Y	-	Y	-	Y
HCI_LE_SET_DATA_LENGTH	0x2022	Y	Y	-	Y	Y
HCI_LE_READ_SUGGESTED_DEFAULT_DATA_LENGTH	0x2023	Y	Y	-	Y	Y
HCI_LE_WRITE_SUGGESTED_DEFAULT_DATA_LENGTH	0x2024	Y	Y	-	Y	Y
HCI_LE_READ_LOCAL_P256_PUBLIC_KEY	0x2025	Y	Y	-	Y	Y
HCI_LE_GENERATE_DHKEY	0x2026	Y	-	-	-	Y
HCI_LE_ADD_DEVICE_TO_RESOLVING_LIST	0x2027	Y	-	-	-	Y
HCI_LE_REMOVE_DEVICE_FROM_RESOLVING_LIST	0x2028	Y	-	-	-	Y
HCI_LE_CLEAR_RESOLVING_LIST	0x2029	Y	-	-	-	Y
HCI_LE_READ_RESOLVING_LIST_SIZE	0x202A	Y	-	-	-	Y
HCI_LE_READ_PEER_RESOLVABLE_ADDRESS	0x202B	Y	Y	-	Y	Y
HCI_LE_READ_LOCAL_RESOLVABLE_ADDRESS	0x202C	Y	Y	-	Y	Y
HCI_LE_SET_ADDRESS_RESOLUTION_ENABLE	0x202D	Y	-	-	-	Y
HCI_LE_SET_RESOLVABLE_PRIVATE_ADDRESS_TIMEOUT	0x202E	Y	Y	-	Y	Y
HCI_LE_READ_MAXIMUM_DATA_LENGTH	0x202F	Y	Y	-	Y	Y
HCI_LE_READ_PHY	0x2030	Y	-	-	Y	Y
HCI_LE_SET_DEFAULT_PHY	0x2031	Y	-	-	Y	Y
HCI_LE_SET_PHY	0x2032	Y	-	-	Y	Y
HCI_LE_SET_ADVERTISING_SET_RANDOM_ADDRESS	0x2035	Y	-	-	-	Y
HCI_LE_SET_EXTENDED_ADVERTISING_PARAMETERS	0x2036	Y	-	-	-	-
HCI_LE_SET_EXTENDED_ADVERTISING_DATA	0x2037	Y	-	-	-	-
HCI_LE_SET_EXTENDED_SCAN_RESPONSE_DATA	0x2038	Y	-	-	-	-
HCI_LE_SET_EXTENDED_ADVERTISING_ENABLE	0x2039	Y	-	-	-	-
HCI_LE_READ_MAXIMUM_ADVERTISING_DATA_LENGTH	0x203A	Y	-	-	-	-
HCI_LE_READ_NUMBER_OF_SUPPORTED_ADVERTISING_SETS	0x203B	Y	-	-	-	-
HCI_LE_REMOVE_ADVERTISING_SET	0x203C	Y	-	-	-	-
HCI_LE_CLEAR_ADVERTISING_SETS	0x203D	Y	-	-	-	-
HCI_LE_SET_EXTENDED_SCAN_PARAMETERS	0x2041	Y	-	-	-	-
HCI_LE_SET_EXTENDED_SCAN_ENABLE	0x2042	Y	-	-	-	-
HCI_LE_EXTENDED_CREATE_CONNECTION	0x2043	Y	-	-	-	-
HCI_LE_READ_TRANSMIT_POWER	0x204B	Y	-	Y	-	Y
HCI_LE_READ_RF_PATH_COMPENSATION	0x204C	Y	-	-	-	-
HCI_LE_WRITE_RF_PATH_COMPENSATION	0x204D	Y	-	-	-	-
HCI_LE_SET_PRIVACY_MODE	0x204E	Y	Y	-	Y	Y

2.1.1 HCI_DISCONNECT

Description

The HCI_DISCONNECT is used to terminate an existing connection. The Connection_Handle command parameter indicates the connection to be disconnected. The Reason command parameter indicates the reason for ending the connection. The remote controller receives the Reason command parameter in the HCI_DISCONNECT_COMPLETE_EVENT event. All synchronous connections on a physical link must be disconnected before the ACL connection on the same physical connection is disconnected. It is important to leave a 100 ms blank window before sending any new command (including system hardware reset), since immediately after HCI_DISCONNECT_COMPLETE_EVENT event, the system could save important information in non-volatile memory

Input parameters

Table 2. HCI_DISCONNECT input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Reason	1	The reason for ending the connection.	0x05: Authentication failure 0x13: Remote user terminated connection 0x14: Remote device terminated connection due to low resources 0x15: Remote device terminated connection due to power off 0x1A: Unsupported remote feature 0x3B: Unacceptable connection parameters

Output parameters

Table 3. HCI_DISCONNECT output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [HCI_DISCONNECT_COMPLETE_EVENT](#)

2.1.2 HCI_READ_REMOTE_VERSION_INFORMATION

Description

This command obtains the values for the version information for the remote device identified by the Connection_Handle parameter. The Connection_Handle must be a Connection_Handle for an ACL or LE connection.

Input parameters

Table 4. HCI_READ_REMOTE_VERSION_INFORMATION input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Specifies the Connection_Handle version information to get.	0x0000 ... 0x0EFF

Output parameters

Table 5. HCI_READ_REMOTE_VERSION_INFORMATION output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [HCI_READ_REMOTE_VERSION_INFORMATION_COMPLETE_EVENT](#)

2.1.3
HCI_SET_EVENT_MASK
Description

The HCI_SET_EVENT_MASK command is used to control which events are generated by the HCI for the host. If the bit in the Event_Mask is set to 1, then the event associated with that bit is enabled. For an LE controller, the LE Meta event bit in the Event_Mask enables or disables all LE events in the LE Meta event. The host has to deal with each occurring event. The event mask allows the host to control how much it is interrupted.

Input parameters
Table 6. HCI_SET_EVENT_MASK input parameters

Parameter	Size	Description	Possible values
Event_Mask	8	Event mask. Default: 0x20001FFFFFFFFF	Bitmask of: • 0x0000000000000000: No events specified • 0x0000000000000010: Disconnection complete event • 0x0000000000000080: Encryption change event • 0x0000000000000800: Read remote version information complete event • 0x0000000000008000: Hardware error event • 0x0000080000000000: Encryption key refresh complete event • 0x2000000000000000: LE Meta-event

Output parameters
Table 7. HCI_SET_EVENT_MASK output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.4
HCI_RESET
Description

This command resets the link layer on an LE controller. It does not affect the used HCI transport layer since the HCI transport layers may have reset mechanisms of their own. After the reset is completed, the current operational state is lost, the controller enters standby mode and automatically reverts to the default values for the parameters for which default values are defined in the specification.

Note:

The Reset command not necessarily performs a hardware reset. This is defined implementation. The host does not send additional HCI commands before the command complete event related to the reset command has been received.

Input parameters

None

Output parameters

Table 8. HCI_RESET output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.5
HCI_READ_TRANSMIT_POWER_LEVEL
Description

This command reads the values for the Transmit_Power_Level parameter for the specified Connection_Handle. The Connection_Handle is a Connection_Handle for an ACL connection.

Input parameters
Table 9. HCI_READ_TRANSMIT_POWER_LEVEL input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Specifies which Connection_Handle transmit power level setting to read.	0x0000 ... 0x0EFF
Type	1	Current or maximum transmit power level.	• 0x00: Read current transmit power level • 0x01: Read maximum transmit power level

Output parameters
Table 10. HCI_READ_TRANSMIT_POWER_LEVEL output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Connection_Handle	2	Connection handle related to the response	0x0000 ... 0x0EFF
Transmit_Power_Level	1	Size: 1 octet (signed integer), in dBm	-30 ... 20

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.6
HCI_SET_CONTROLLER_TO_HOST_FLOW_CONTROL
Description

This command is used by the Host to turn flow control on or off for data and/or voice sent from the controller to the host. If flow control is turned off, the host does not send the Host_Number_Of_Completed_Packets command. That command is ignored by the controller if it is sent by the host and flow control is off.

If flow control is turned on for HCI ACL data packets and off for HCI synchronous data packets, Host_Number_Of_Completed_Packets commands sent by the host must only contain Connection_Handles for ACL connections. If flow control is turned off for HCI ACL data packets and on for HCI synchronous data packets, Host_Number_Of_Completed_Packets commands sent by the host must only contain Connection_Handles for synchronous connections.

If flow control is turned on for HCI ACL Data Packets and HCI synchronous data packets, the host sends Host_Number_Of_Completed_Packets commands both for ACL connections and synchronous connections. If no connections exist only the Flow_Control_Enable parameter is changed .

Input parameters

Table 11. HCI_SET_CONTROLLER_TO_HOST_FLOW_CONTROL input parameters

Parameter	Size	Description	Possible values
Flow_Control_Enable	1	Enable/Disable the flow control	0x00: Flow control off in direction from controller to host. Default 0x01: Flow control on for HCI ACL data packets and off for HCI synchronous. Data packets in direction from controller to host. 0x02: Flow control off for HCI ACL data packets and on for HCI synchronous. Data packets in direction from controller to host. 0x03: Flow control on both for HCI ACL data packets and HCI synchronous. Data packets in direction from controller to host

Output parameters

Table 12. HCI_SET_CONTROLLER_TO_HOST_FLOW_CONTROL output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.7

HCI_HOST_BUFFER_SIZE

Description

The Host_Buffer_Size command is used by the host to notify the controller about the maximum size of the data portion of HCI ACL and synchronous data packets sent from the controller to the host. The controller segments the data to be transmitted to the host according to their size, so that the HCI data packets contain data with up to these sizes.

The Host_Buffer_Size command also notifies the controller about the total number of HCI ACL and synchronous data packets stored in the data buffers of the host. If flow control from the controller to the host is turned off, and the Host_Buffer_Size command has not been issued by the host, this means that the controller sends HCI data packets to the host with any lengths the controller wants to use, and it is assumed that the data buffer sizes of the host are unlimited. If flow control from the controller to the host is turned on, the Host_Buffer_Size command, after a power-on or a reset, always is sent by the host before the first Host_Number_Of_Completed_Packets command is sent.

The set controller to host flow control command is used to turn flow control on or off.

The Host_ACL_Data_Packet_Length command parameter is used to determine the size of the L2CAP segments contained in ACL data packets, which are transferred from the controller to the host.

The Host_Synchronous_Data_Packet_Length command parameter is used to determine the maximum size of HCI synchronous data packets. Both the host and the controller support command and event packets, where the data portion (excluding header) contained in the packets is 255 octets in size.

The Host_Total_Num_ACL_Data_Packets command parameter contains the total number of HCI ACL data packets stored in the data buffers of the host. The controller determines how the buffers are to be divided between different Connection_Handles.

The Host_Total_Num_Synchronous_Data_Packets command parameter gives the same information for HCI synchronous Data Packets.

Note: *The Host_ACL_Data_Packet_Length and Host_Synchronous_Data_Packet_Length command parameters do not include the length of the HCI Data Packet header.*

Input parameters

Table 13. HCI_HOST_BUFFER_SIZE input parameters

Parameter	Size	Description	Possible values
Host_ACL_Data_Packet_Length	2	Maximum length (in octets) of the data portion of each HCI ACL data packet that the Host is able to accept. Must be greater or equal to 251 bytes	-
Host_Synchronous_Data_Packet_Length	1	Maximum length (in octets) of the data portion of each HCI synchronous data packet that the host is able to accept.	-
Host_Total_Num_ACL_Data_Packets	2	Total number of HCI ACL data packets that can be stored in the data buffers of the host.	-
Host_Total_Num_Synchronous_Data_Packets	2	Total number of HCI synchronous data packets that can be stored in the data buffers of the host.	-

Output parameters

Table 14. HCI_HOST_BUFFER_SIZE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.8

HCI_HOST_NUMBER_OF_COMPLETED_PACKETS

Description

The Host_Number_Of_Completed_Packets command is used by the host to indicate to the controller the number of HCI data packets that have been completed for each Connection_Handle since the previous Host_Number_Of_Completed_Packets command was sent to the controller. This means that the corresponding buffer space has been freed in the host.

Based on this information, and the Host_Total_Num_ACL_Data_Packets and Host_Total_Num_Synchronous_Data_Packets command parameters of the Host_Buffer_Size command, the controller determines for which Connection_Handles the following HCI data packets must be sent to the host. The command is issued only by the host if flow control in the direction from the controller to the host is on and there is at least one connection, or if the controller is in local loop-back mode. Otherwise, the command is ignored by the controller. When the host has completed one or more HCI data packet(s) it sends a Host_Number_Of_Completed_Packets command to the controller, until it finally reports that all pending HCI data packets have been completed. The frequency at which this command is sent is manufacturer specific.

The set controller to host flow control command is used to turn flow control on or off. If flow control from the controller to the host is turned on, the Host_Buffer_Size command always is sent by the host after a power-on or a reset before the first Host_Number_Of_Completed_Packets command is sent.

Note:

The Host_Number_Of_Completed_Packets command is a special command in the sense that no event is normally generated after the command has completed. The command may be sent at any time by the host when there is at least one connection, or if the controller is in local loopback mode independent of other commands. The normal flow control for commands is not used for the Host_Number_Of_Completed_Packets command.

Input parameters

Table 15. HCI_HOST_NUMBER_OF_COMPLETED_PACKETS input parameters

Parameter	Size	Description	Possible values
Number_Of_Handles	1	The number of Connection_Handles and Host_Num_Of_Completed_Packets parameters pairs contained in this command.	0 - 255
Connection_Handle[i]	Number_Of_Handles * 2	Connection_Handle	0x0000-0x0EFF
Host_Num_Of_Completed_Packets[i]	Number_Of_Handles * 2	The number of HCI data packets that have been completed for the associated Connection_Handle since the previous time the event was returned.	0x0000-0xFFFF

Output parameters

None

Events generated

Event(s) generated (unless masked away): normally, no event is generated after the Host_Number_Of_Completed_Packets command has completed. However, if the Host_Number_Of_Completed_Packets command contains one or more invalid parameters, the controller returns a command complete event with a failure status indicating the invalid HCI command parameters error code. The host may send the Host_Number_Of_Completed_Packets command at any time when there is at least one connection, or if the controller is in local loopback mode. The normal flow control for commands is not used for this command.

2.1.9

HCI_READ_LOCAL_VERSION_INFORMATION

Description

This command reads the values for the version information for the local controller. The HCI version information defines the version information of the HCI layer. The LMP/PAL version information defines the version of the LMP or PAL. The Manufacturer_Name information indicates the manufacturer of the local device. The HCI revision and LMP/PAL subversion are implementation dependent.

Input parameters

None

Output parameters

Table 16. HCI_READ_LOCAL_VERSION_INFORMATION output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
HCI_Version	1	See Bluetooth assigned numbers	-
HCI_Revision	2	Revision of the current HCI in the BR/EDR controller.	-
LMP_PAL_Version	1	Version of the current LMP or PAL in the controller.	-
Manufacturer_Name	2	Manufacturer name of the BR/EDR controller.	-
LMP_PAL_Subversion	2	Subversion of the current LMP or PAL in the controller. This value is implementation dependent.	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.10 HCI_READ_LOCAL_SUPPORTED_COMMANDS

Description

This command reads the list of HCI commands supported for the local controller. This command returns the Supported_Commands configuration parameter. It is implied that if a command is listed as supported, the feature underlying that command is also supported.

Input parameters

None

Output parameters

Table 17. HCI_READ_LOCAL_SUPPORTED_COMMANDS output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Supported_Commands	64	Bit mask for each HCI command. If a bit is 1, the controller supports the corresponding command and the features required for the command. Unsupported or undefined commands is set to 0.	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.11 HCI_READ_LOCAL_SUPPORTED_FEATURES

Description

This command requests a list of the supported features for the local controller. This command returns a list of the LMP features.

Input parameters

None

Output parameters

Table 18. HCI_READ_LOCAL_SUPPORTED_FEATURES output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
LMP_Features	8	Bit mask list of LMP features.	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.12 HCI_READ_BD_ADDR

Description

On an LE Controller, this command reads the public device address. If this controller does not have a public device address, the value 0x000000000000 is returned. On an LE controller, the public address is the same as the BD_ADDR.

Input parameters

None

Output parameters

Table 19. HCI_READ_BD_ADDR output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
BD_ADDR	6	BD_ADDR (Bluetooth device address) of the device	-

Events generated

HCI_COMMAND_COMPLETE_EVENT

2.1.13
HCI_READ_RSSI
Description

This command reads the received signal strength indication (RSSI) value from a controller. For an LE transport, a Connection_Handle is used as the handle command parameter and return parameter. The meaning of the RSSI metric is an absolute receiver signal strength value in dBm to ± 6 dB accuracy. If the RSSI cannot be read, the RSSI metric is set to 127.

Input parameters
Table 20. HCI_READ_RSSI input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF

Output parameters
Table 21. HCI_READ_RSSI output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF
RSSI	1	N Size: 1 octet (signed integer) Units: dBm	127: RSSI not available -127 ... 20

Events generated

HCI_COMMAND_COMPLETE_EVENT

2.1.14
HCI_LE_SET_EVENT_MASK
Description

The LE_Set_Event_Mask command is used to control which LE events are generated by the HCI for the host. If the bit in the LE_Event_Mask is set to 1, then the event associated with that bit is enabled. The host has to deal with each event generated by an LE controller. The event mask allows the host to control which events interrupt it. For LE events to be generated, the LE Meta-Event bit in the Event_Mask also is set. If that bit is not set, then LE events are not generated, regardless of how the LE_Event_Mask is set.

Input parameters

Table 22. HCI_LE_SET_EVENT_MASK input parameters

Parameter	Size	Description	Possible values
LE_Event_Mask	8	LE event mask. Default: 0x00000000000031A5F	Bitmask of: 0x0000000000000000: No LE events specified 0x0000000000000001: LE connection complete event 0x0000000000000002: LE advertising report event 0x0000000000000004: LE connection update complete event 0x0000000000000008: LE read remote used features complete event 0x0000000000000010: LE long term key request event 0x0000000000000020: LE remote connection parameter request event 0x0000000000000040: ILE data length change event 0x0000000000000080: LE read local P-256 public key complete event 0x0000000000000100: LE generate DHKey complete event 0x0000000000000200: LE enhanced connection complete event 0x0000000000000400: LE direct advertising report event 0x0000000000000800: LE PHY update complete event 0x0000000000001000: LE extended advertising report event 0x0000000000002000: LE periodic advertising sync established event 0x0000000000004000: LE periodic advertising report event 0x0000000000008000: LE periodic advertising sync lost event 0x0000000000010000: LE extended scan timeout event 0x0000000000020000: LE extended advertising set terminated event 0x0000000000040000: LE scan request received event 0x0000000000080000: LE channel selection algorithm event

Output parameters

Table 23. HCI_LE_SET_EVENT_MASK output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

HCI_COMMAND_COMPLETE_EVENT

2.1.15

HCI_LE_READ_BUFFER_SIZE

Description

The LE_Read_Buffer_Size command is used to read the maximum size of the data portion of HCI LE ACL data packets sent from the host to the controller. The host segments the data transmitted to the controller according to these values, so that the HCI data packets contain data with up to this size. The LE_Read_Buffer_Size command also returns the total number of HCI LE ACL data packets that is stored in the data buffers of the controller. The LE_Read_Buffer_Size command must be issued by the host before it sends any data to an LE controller. If the controller returns a length value of zero, the host uses the Read_Buffer_Size command to determine the size of the data buffers.

Note: Both the Read_Buffer_Size and LE_Read_Buffer_Size commands may return buffer length and number of packets parameter values that are non zero.

The `HC_LE_ACL_Data_Packet_Length` return parameter is used to determine the size of the L2CAP PDU segments contained in ACL data packets, which are transferred from the host to the controller to be broken up into packets by the link layer. Both the host and the controller support command and event packets, where the data portion (excluding header) contained in the packets is 255 octets in size. The `HC_Total_Num_LE_ACL_Data_Packets` return parameter contains the total number of HCI ACL data packets that is stored in the data buffers of the controller. The host determines how the buffers are to be divided between different connection handles.

Note: The `HC_LE_ACL_Data_Packet_Length` return parameter does not include the length of the HCI data packet header.

Input parameters

None

Output parameters

Table 24. HCI_LE_READ_BUFFER_SIZE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
HC_LE_ACL_Data_Packet_Length	2	0x0000 No dedicated LE buffer, use Read_Buffer_Size command. 0x0001 0xFFFF Maximum length (in octets) of the data portion of each HCI ACL data packet that the controller is able to accept	-
HC_Total_Num_LE_ACL_Data_Packets	1	0x00 No dedicated LE buffer, use Read_Buffer_Size command 0x01 - 0xFF total number of HCI ACL data packets that is stored in the data buffers of the controller	-

Events generated

`HCI_COMMAND_COMPLETE_EVENT`

2.1.16 HCI_LE_READ_LOCAL_SUPPORTED_FEATURES

Description

This command requests the list of the supported LE features for the controller.

Input parameters

None

Output parameters

Table 25. HCI_LE_READ_LOCAL_SUPPORTED_FEATURES output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
LE_Features	8	Bit mask list of LE features	-

Events generated

HCI_COMMAND_COMPLETE_EVENT

2.1.17 HCI_LE_SET_RANDOM_ADDRESS

Description

The LE_Set_Random_Address command is used by the host to set the LE random device address in the controller.

Input parameters

Table 26. HCI_LE_SET_RANDOM_ADDRESS input parameters

Parameter	Size	Description	Possible values
Random_Address	6	Random device address	-

Output parameters

Table 27. HCI_LE_SET_RANDOM_ADDRESS output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

HCI_COMMAND_COMPLETE_EVENT

2.1.18 HCI_LE_SET_ADVERTISING_PARAMETERS

Description

The LE_Set_Advertising_Parameters command is used by the host to set the advertising parameters. The Advertising_Interval_Min is lower than or equal to the Advertising_Interval_Max. The Advertising_Interval_Min and Advertising_Interval_Max must not be the same value to enable the controller to determine the best advertising interval given other activities.

For high duty cycle directed advertising, i.e. when Advertising_Type is 0x01 (ADV_DIRECT_IND, high duty cycle), the Advertising_Interval_Min and Advertising_Interval_Max parameters are not used and are ignored. The Advertising_Type is used to determine the packet type used for advertising when it is enabled.

The Advertising_Interval_Min and Advertising_Interval_Max is not set to less than 0x00A0 (100 ms) if the Advertising_Type is set to 0x02 (ADV_SCAN_IND) or 0x03 (ADV_NONCONN_IND).

The Own_Address_Type determines if the advertising packets are identified with the public device address of the device, or a random device address as written by the LE_Set_Random_Address command. If directed advertising is performed, i.e. when Advertising_Type is set to 0x01.

(ADV_DIRECT_IND, high duty cycle) or 0x04 (ADV_DIRECT_IND, low duty cycle mode), then the Direct_Address_Type and Direct_Address are valid, otherwise they are ignored by the controller and not used. The Advertising_Channel_Map is a bit field that indicates the advertising channels used when transmitting advertising packets. At least one channel bit is set in the Advertising_Channel_Map parameter. The Advertising_Filter_Policy parameter is ignored when directed advertising is enabled. The host not issues this command when advertising is enabled in the controller; if it is, the command disallowed error code is used.

Input parameters

Table 28. HCI_LE_SET_ADVERTISING_PARAMETERS input parameters

Parameter	Size	Description	Possible values
Advertising_Interval_Min	2	Minimum advertising interval. Time = N * 0.625 ms	0x0020 (20.000 ms) ... 0x4000 (10240.000 ms)
Advertising_Interval_Max	2	Maximum advertising interval. Time = N * 0.625 ms	0x0020 (20.000 ms) ... 0x4000 (10240.000 ms)
Advertising_Type	1	Advertising type	0x00: ADV_IND (connectable undirected advertising) 0x01: ADV_DIRECT_IND, high duty cycle (connectable high duty cycle directed advertising) 0x02: ADV_SCAN_IND (scannable undirected advertising) 0x03: ADV_NONCONN_IND (non-connectable undirected advertising) 0x04: ADV_DIRECT_IND, low duty cycle (connectable low duty cycle directed advertising)
Own_Address_Type	1	Own address type. 0x00: Public device address 0x01: Random device address 0x02: Controller generates resolvable private address based on the local IRK from resolving list. If resolving list contains no matching entry, use public address. 0x03: Controller generates resolvable private address based on the local IRK from resolving list. If resolving list contains no matching entry, use random address from LE_Set_Random_Address.	0x00: Public device address 0x01: Random device address 0x02: Resolvable private address or public address 0x03: Resolvable private address or random address
Peer_Address_Type	1	The address type of the peer device	0x00: Public device address 0x01: Random device address
Peer_Address	6	Public device address, random device address, public identity address or random (static) identity address of the device to be connected.	-
Advertising_Channel_Map	1	Advertising channel map. Default: 00000111b (all channels enabled).	Bitmask of: 0x01: ch 37 0x02: ch 38 0x04: ch 39
Advertising_Filter_Policy	1	Advertising filter policy.	0x00: Allow scan request from any, allow connect request from any 0x01: Allow scan request from white list only, allow connect request from any 0x02: Allow scan request from any, allow connect request from white list only 0x03: Allow scan request from white list only, allow connect request from white list only

Output parameters

Table 29. HCI_LE_SET_ADVERTISING_PARAMETERS output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

HCI_COMMAND_COMPLETE_EVENT

2.1.19
HCI_LE_READ_ADVERTISING_PHYSICAL_CHANNEL_TX_POWER
Description

This command is used by the host to read the transmit power level used for LE advertising channel packets.

Input parameters

None

Output parameters
Table 30. HCI_LE_READ_ADVERTISING_PHYSICAL_CHANNEL_TX_POWER output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Transmit_Power_Level	1	Size: 1 octet (signed integer) Units: dBm Accuracy: ± 4 dBm	-20 ... 10

Events generated

HCI_COMMAND_COMPLETE_EVENT

2.1.20
HCI_LE_SET_ADVERTISING_DATA
Description

The LE_Set_Advertising_Data command is used to set the data used in advertising packets that have a data field. Only the significant part of the Advertising_Data is transmitted in the advertising packets.

Input parameters
Table 31. HCI_LE_SET_ADVERTISING_DATA input parameters

Parameter	Size	Description	Possible values
Advertising_Data_Length	1	The number of significant octets in the following data field.	-
Advertising_Data	31	31 octets of data formatted.	-

Output parameters
Table 32. HCI_LE_SET_ADVERTISING_DATA output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

HCI_COMMAND_COMPLETE_EVENT

2.1.21
HCI_LE_SET_SCAN_RESPONSE_DATA
Description

This command is used to provide data used in scanning packets that have a data field. Only the significant part of the Scan_Response_Data is transmitted in the scanning packets.

Input parameters

Table 33. HCI_LE_SET_SCAN_RESPONSE_DATA input parameters

Parameter	Size	Description	Possible values
Scan_Response_Data_Length	1	The number of significant octets in the following data field	-
Scan_Response_Data	31	31 octets of data formatted	-

Output parameters

Table 34. HCI_LE_SET_SCAN_RESPONSE_DATA output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.22

HCI_LE_SET_ADVERTISE_ENABLE

Description

The LE_Set_Advertise_Enable command is used to request the controller to start or stop advertising. The controller manages the timing of advertisements according to the parameters given in the LE_Set_Advertising_Parameters command. The controller continues advertising until the host issues an LE_Set_Advertise_Enable command with Advertising_Enable set to 0x00 (advertising is disabled) or until a connection is created or until the advertising is timed out due to high duty cycle directed advertising. In these cases, advertising is then disabled.

Input parameters

Table 35. HCI_LE_SET_ADVERTISE_ENABLE input parameters

Parameter	Size	Description	Possible values
Advertising_Enable	1	Enable/disable advertise. Default is 0 (disabled).	• 0x00: Advertising is disabled • 0x01: Advertising is enabled

Output parameters

Table 36. HCI_LE_SET_ADVERTISE_ENABLE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)
- [HCI_LE_CONNECTION_COMPLETE_EVENT](#)

2.1.23 HCI_LE_SET_SCAN_PARAMETERS

Description

The LE_Set_Scan_Parameters command is used to set the scan parameters. The LE_Scan_Type parameter controls the type of scan to perform. The LE_Scan_Interval and LE_Scan_Window parameters are recommendations from the host on how long (LE_Scan_Window) and how frequently (LE_Scan_Interval) the controller must scan.

The LE_Scan_Window parameter always is set to a value smaller or equal to the value set for the LE_Scan_Interval parameter. If they are set to the same value scanning must be run continuously. The Own_Address_Type parameter determines the address used (public or random device address) when performing active scan. The host does not issue this command when scanning is enabled in the controller; if it is, the command disallowed error code is used.

Input parameters

Table 37. HCI_LE_SET_SCAN_PARAMETERS input parameters

Parameter	Size	Description	Possible values
LE_Scan_Type	1	Passive or active scanning. With active scanning SCAN_REQ packets are sent.	0x00: Passive scanning 0x01: Active scanning
LE_Scan_Interval	2	This is defined as the time interval from when the controller started its last LE scan until it begins the subsequent LE scan. Time = N * 0.625 ms	0x0004 (2.500 ms) ... 0x4000 (10240.000 ms)
LE_Scan_Window	2	Amount of time for the duration of the LE scan. LE_Scan_Window is less than or equal to LE_Scan_Interval. Time = N * 0.625 ms	0x0004 (2.500 ms) ... 0x4000 (10240.000 ms)
Own_Address_Type	1	Own address type. 0x00: Public device address 0x01: Random device address 0x02: Controller generates resolvable private address based on the local IRK from resolving list. If resolving list contains no matching entry, use public address. 0x03: Controller generates resolvable private address based on the local IRK from resolving list. If resolving list contains no matching entry, use random address from LE_Set_Random_Address	0x00: Public device address 0x01: Random device address 0x02: Resolvable private address or public address 0x03: Resolvable private address or random address
Scanning_Filter_Policy	1	0x00 Accept all advertisement packets. Directed advertising packets which are not addressed for this device is ignored. 0x01 ignore advertisement packets from devices not in the white list only. Directed advertising packets which are not addressed for this device is ignored 0x02 accept all undirected advertisement packets. Directed advertisement packets where initiator address is a RPA and directed advertisement packets addressed to this device is accepted. 0x03 Accept all undirected advertisement packets from devices that are in the white List. Directed advertisement packets where initiator address is RPA and directed advertisement packets addressed to this device is accepted.	0x00: Accept all 0x01: Ignore devices not in the white list 0x02: Accept all (use resolving list) 0x03: Ignore devices not in the white list (use resolving list)

Output parameters

Table 38. HCI_LE_SET_SCAN_PARAMETERS output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

HCI_COMMAND_COMPLETE_EVENT

2.1.24
HCI_LE_SET_SCAN_ENABLE
Description

The LE_Set_Scan_Enable command is used to start scanning. Scanning is used to discover advertising devices nearby. The Filter_Duplicates parameter controls whether the link layer filters duplicate advertising reports to the host, or if the link layer must generate advertising reports for each packet received.

Input parameters
Table 39. HCI_LE_SET_SCAN_ENABLE input parameters

Parameter	Size	Description	Possible values
LE_Scan_Enable	1	Enable/disable scan. Default is 0 (disabled)	0x00: Scanning disabled 0x01: Scanning enabled
Filter_Duplicates	1	Enable/disable duplicate filtering	0x00: Duplicate filtering disabled 0x01: Duplicate filtering enabled

Output parameters
Table 40. HCI_LE_SET_SCAN_ENABLE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_COMPLETE_EVENT
- HCI_LE_ADVERTISING_REPORT_EVENT

2.1.25
HCI_LE_CREATE_CONNECTION
Description

The LE_Create_Connection command is used to create a link layer connection to a connectable advertiser. The LE_Scan_Interval and LE_Scan_Window parameters are recommendations from the host on how long (LE_Scan_Window) and how frequently (LE_Scan_Interval) the controller must scan. The LE_Scan_Window parameter is set to a value smaller than or equal to the value set for the LE_Scan_Interval parameter. If both are set to the same value, scanning runs continuously. The Initiator_Filter_Policy is used to determine whether the white list is used. If the white list is not used, the Peer_Address_Type and the Peer_Address parameters specify the address type and address of the advertising device to connect to. The link layer sets the address in the CONNECT_REQ packets to either the public device address or the random device address based on the Own_Address_Type parameter. The Conn_Interval_Min and Conn_Interval_Max parameters define the minimum and maximum allowed connection interval. The Conn_Interval_Min parameter is not greater than the Conn_Interval_Max parameter. The Conn_Latency parameter defines the maximum allowed connection latency. The Supervision_Timeout parameter defines the link supervision timeout for the connection. The Supervision_Timeout in milliseconds is larger than $(1 + \text{Conn_Latency}) * \text{Conn_Interval_Max} * 2$, where Conn_Interval_Max is given in milliseconds. The Minimum_CE_Length and Maximum_CE_Length parameters are informative parameters providing the controller with the expected minimum and maximum length of the connection events. The Minimum_CE_Length parameter is less than or equal to the Maximum_CE_Length parameter. The host does not issue this command when another LE_Create_Connection is pending in the controller; if this occurs the controller returns the command disallowed error code is used.

Input parameters

Table 41. HCI_LE_CREATE_CONNECTION input parameters

Parameter	Size	Description	Possible values
LE_Scan_Interval	2	This is defined as the time interval from when the controller started its last LE scan until it begins the subsequent LE scan. Time = N * 0.625 ms	0x0004 (2.500 ms) ... 0x4000 (10240.000 ms)
LE_Scan_Window	2	Amount of time for the duration of the LE scan. LE_Scan_Window is less than or equal to LE_Scan_Interval. Time = N * 0.625 ms	0x0004 (2.500 ms) ... 0x4000 (10240.000 ms)
Initiator_Filter_Policy	1	0x00 white list is not used to determine which advertiser to connect to. Peer_Address_Type and Peer_Address is used 0x01 white list is used to determine which advertiser to connect to. Peer_Address_Type and Peer_Address is ignored	0x00: White list not used 0x01: White list used
Peer_Address_Type	1	0x00 Public device address 0x01 Random device address 0x02 Public identity address (corresponds to resolved private address) 0x03 Random (static) identity address (corresponds to resolved private address)	0x00: Public device address 0x01: Random device address 0x02: Public identity address 0x03: Random (static) identity address
Peer_Address	1	Public device address or random device address of the device to be connected.	-
Own_Address_Type	1	Own address type. 0x00: Public device address 0x01 Random device address 0x02: Controller generates resolvable private address based on the local IRK from resolving list. If resolving list contains no matching entry, use public address. 0x03: Controller generates resolvable private address based on the local IRK from resolving list. If resolving list contains no matching entry, use random address from LE_Set_Random_Address.	0x00: Public device address 0x01: Random device address 0x02: Resolvable private address or public address 0x03: Resolvable private address or random address
Conn_Interval_Min	2	Minimum value for the connection event interval. This is less than or equal to Conn_Interval_Max. Time = N * 1.25 ms	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)
Conn_Interval_Max	2	Maximum value for the connection event interval. This is greater than or equal to Conn_Interval_Min. Time = N * 1.25 ms	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)
Conn_Latency	2	Slave latency for the connection in number of connection events	0x0000 ... 0x01F3
Supervision_Timeout	2	Supervision timeout for the LE Link. It is a multiple of 10 ms and larger than (1 + connSlaveLatency) * connInterval * 2. Time = N * 10 ms	0x000A (100 ms) ... 0x0C80 (32000 ms)
Minimum_CE_Length	2	Information parameter about the minimum length of connection needed for this LE connection. Time = N * 0.625 ms	0x0000 (0.000 ms) ... 0xFFFF (40959.375 ms)
Maximum_CE_Length	2	Information parameter about the maximum length of connection needed for this LE connection. Time = N * 0.625 ms	0x0000 (0.000 ms) ... 0xFFFF (40959.375 ms)

Output parameters

Table 42. HCI_LE_CREATE_CONNECTION output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.26 HCI_LE_CREATE_CONNECTION_CANCEL

Description

The LE_Create_Connection_Cancel command is used to cancel the LE_Create_Connection command. This command is only issued after the LE_Create_Connection command has been issued, a command status event has been received for the LE create connection command and before the LE connection complete event.

Input parameters

None

Output parameters

Table 43. HCI_LE_CREATE_CONNECTION_CANCEL output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)
- [HCI_LE_CONNECTION_COMPLETE_EVENT](#)

2.1.27 HCI_LE_READ_WHITE_LIST_SIZE

Description

The LE_Read_White_List_Size command is used to read the total number of white list entries that can be stored in the controller.

Input parameters

None

Output parameters

Table 44. HCI_LE_READ_WHITE_LIST_SIZE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
White_List_Size	1	Total number of white list entries that can be stored in the controller.	-

Events generated

[HCI_COMMAND_COMPLETE_EVENT](#)

2.1.28 HCI_LE_CLEAR_WHITE_LIST

Description

The LE_Clear_White_List command is used to clear the white list stored in the controller. This command can be used at any time except when: - the advertising filter policy uses the white list and advertising is enabled. - the scanning filter policy uses the white list and scanning is enabled. - the initiator filter policy uses the white list and an LE_Create_Connection command is outstanding.

Input parameters

None

Output parameters

Table 45. HCI_LE_CLEAR_WHITE_LIST output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

HCI_COMMAND_COMPLETE_EVENT

2.1.29

HCI_LE_ADD_DEVICE_TO_WHITE_LIST

Description

The LE_Add_Device_To_White_List command is used to add a single device to the white list stored in the controller. This command can be used at any time except when:

- The advertising filter policy uses the white list and advertising is enabled
- The scanning filter policy uses the white list and scanning is enabled
- The initiator filter policy uses the white list and a create connection command is outstanding

Input parameters

Table 46. HCI_LE_ADD_DEVICE_TO_WHITE_LIST input parameters

Parameter	Size	Description	Possible values
Address_Type	1	Address type	• 0x00: Public device address • 0x01: Random device address
Address	6	Public device address or random device address of the device to be added to the white list.	-

Output parameters

Table 47. HCI_LE_ADD_DEVICE_TO_WHITE_LIST output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

HCI_COMMAND_COMPLETE_EVENT

2.1.30

HCI_LE_REMOVE_DEVICE_FROM_WHITE_LIST

Description

The LE_Remove_Device_From_White_List command is used to remove a single device from the white list stored in the controller. This command can be used at any time except when:

- The advertising filter policy uses the white list and advertising is enabled
- The scanning filter policy uses the white list and scanning is enabled
- The initiator filter policy uses the white list and a create connection command is outstanding

Input parameters

Table 48. HCI_LE_REMOVE_DEVICE_FROM_WHITE_LIST input parameters

Parameter	Size	Description	Possible values
Address_Type	1	Address type	0x00: Public device address 0x01: Random device address
Address	6	Public device address or random device address of the device to be removed from the white list	-

Output parameters

Table 49. HCI_LE_REMOVE_DEVICE_FROM_WHITE_LIST output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

HCI_COMMAND_COMPLETE_EVENT

2.1.31

HCI_LE_CONNECTION_UPDATE

Description

The LE_Connection_Update command is used to change the link layer connection parameters of a connection. This command is supported only on master side. The Conn_Interval_Min and Conn_Interval_Max parameters are used to define the minimum and maximum allowed connection interval. The Conn_Interval_Min parameter is not greater than the Conn_Interval_Max parameter. The Conn_Latency parameter defines the maximum allowed connection latency. The Supervision_Timeout parameter defines the link supervision timeout for the LE link. The Supervision_Timeout in milliseconds is larger than $(1 + \text{Conn_Latency}) * \text{Conn_Interval_Max} * 2$, where Conn_Interval_Max is given in milliseconds. The Minimum_CE_Length and Maximum_CE_Length are information parameters providing the controller with a hint about the expected minimum and maximum length of the connection events. The Minimum_CE_Length is less than or equal to the Maximum_CE_Length. The actual parameter values selected by the link layer may be different from the parameter values provided by the host through this command.

Input parameters

Table 50. HCI_LE_CONNECTION_UPDATE input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Conn_Interval_Min	2	Minimum value for the connection event interval. This is less than or equal to Conn_Interval_Max. Time = N * 1.25 ms	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)
Conn_Interval_Max	2	Maximum value for the connection event interval. This is greater than or equal to Conn_Interval_Min. Time = N * 1.25 ms	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)
Conn_Latency	2	Slave latency for the connection in number of connection events.	0x0000 ... 0x01F3
Supervision_Timeout	2	Supervision timeout for the LE Link. It is a multiple of 10 ms and larger than (1 + connSlaveLatency) * connInterval * 2. Time = N * 10 ms	0x000A (100 ms) ... 0x0C80 (32000 ms)
Minimum_CE_Length	2	Information parameter about the minimum length of connection needed for this LE connection. Time = N * 0.625 ms	0x0000 (0.000 ms) ... 0xFFFF (40959.375 ms)
Maximum_CE_Length	2	Information parameter about the maximum length of connection needed for this LE connection. Time = N * 0.625 ms	0x0000 (0.000 ms) ... 0xFFFF (40959.375 ms)

Output parameters

Table 51. HCI_LE_CONNECTION_UPDATE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [HCI_LE_CONNECTION_COMPLETE_EVENT](#)

2.1.32

HCI_LE_SET_HOST_CHANNEL_CLASSIFICATION

Description

The LE_Set_Host_Channel_Classification command allows the host to specify a channel classification for data channels based on its "local information".

This classification persists until overwritten with a subsequent LE_Set_Host_Channel_Classification command or until the controller is reset using the reset command. If this command is used, the host must send it within 10 seconds of knowing that the channel classification has changed. The interval between two successive commands sent is at least one second. This command is only used when the local device supports the master role.

Input parameters

Table 52. HCI_LE_SET_HOST_CHANNEL_CLASSIFICATION input parameters

Parameter	Size	Description	Possible values
LE_Channel_Map	5	This parameter contains 37 1-bit fields. The n^{th} such field (in the range 0 to 36) contains the value for the link layer channel index n . Channel n is bad = 0. Channel n is unknown = 1. The most significant bits are reserved and is set to 0. At least one channel is marked as unknown.	-

Output parameters

Table 53. HCI_LE_SET_HOST_CHANNEL_CLASSIFICATION output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

[HCI_COMMAND_COMPLETE_EVENT](#)

2.1.33

HCI_LE_READ_CHANNEL_MAP

Description

The LE_Read_Channel_Map command returns the current Channel_Map for the specified Connection_Handle. The returned value indicates the state of the Channel_Map specified by the last transmitted or received Channel_Map (in a CONNECT_REQ or LL_CHANNEL_MAP_REQ message) for the specified Connection_Handle, regardless of whether the Master has received an acknowledgement.

Input parameters

Table 54. HCI_LE_READ_CHANNEL_MAP input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF

Output parameters

Table 55. HCI_LE_READ_CHANNEL_MAP output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Connection_Handle	2	Connection handle related to the response	0x0000 ... 0x0EFF
LE_Channel_Map	5	This parameter contains 37 1-bit fields. The n^{th} such field (in the range 0 to 36) contains the value for the link layer channel index n . Channel n is unused = 0. Channel n is used = 1. The most significant bits are reserved and is set to 0.	-

Events generated

[HCI_COMMAND_COMPLETE_EVENT](#)

2.1.34

HCI_LE_READ_REMOTE_FEATURES

Description

This command requests a list of the used LE features from the remote device. This command returns a list of the used LE features. This command may be issued on both the master and slave.

Input parameters

Table 56. HCI_LE_READ_REMOTE_FEATURES input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF

Output parameters

Table 57. HCI_LE_READ_REMOTE_FEATURES output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)
- [HCI_LE_READ_REMOTE_FEATURES_COMPLETE_EVENT](#)

2.1.35

HCI_LE_ENCRYPT

Description

The LE_Encrypt command is used to request the controller to encrypt the Plaintext_Data in the command using the key given in the command and returns the Encrypted_Data to the host.

Input parameters

Table 58. HCI_LE_ENCRYPT input parameters

Parameter	Size	Description	Possible values
Key	16	128 bit key for the encryption of the data given in the command.	-
Plaintext_Data	16	128 bit data block that is requested to be encrypted.	-

Output parameters

Table 59. HCI_LE_ENCRYPT output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Encrypted_Data	16	128 bit encrypted data block.	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.36

HCI_LE_RAND

Description

The LE_Rand command is used to request the controller to generate eight octets of random data to be sent to the host.

Input parameters

None

Output parameters

Table 60. HCI_LE_RAND output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Random_Number	8	Random number	-

Events generated

HCI_COMMAND_COMPLETE_EVENT

2.1.37

HCI_LE_ENABLE_ENCRYPTION

Description

This command is used to authenticate the given encryption key associated with the remote device specified by the connection handle, and, once authenticated, encrypts the connection. If the connection is already encrypted the controller pauses connection encryption before attempting to authenticate the given encryption key, and then re-encrypts the connection. While encryption is paused no user data is transmitted. On an authentication failure, the connection is automatically disconnected by the link layer. If this command succeeds, then the connection is encrypted. This command is used only when the local device role is master.

Input parameters

Table 61. HCI_LE_ENABLE_ENCRYPTION input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given	0x0000 ... 0x0EFF
Random_Number	8	64-bit random number	-
Encrypted_Diversifier	2	16-bit encrypted diversifier	-
Long_Term_Key	16	128-bit long term key	-

Output parameters

Table 62. HCI_LE_ENABLE_ENCRYPTION output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- HCI_ENCRYPTION_CHANGE_EVENT

2.1.38

HCI_LE_LONG_TERM_KEY_REQUEST_REPLY

Description

The LE_Long_Term_Key_Request_Reply command is used to reply to an LE long term key request event from the controller, and specifies the Long_Term_Key parameter used for this Connection_Handle.

Input parameters

Table 63. HCI_LE_LONG_TERM_KEY_REQUEST_REPLY input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given	0x0000 ... 0x0EFF
Long_Term_Key	16	128 bit long term key	-

Output parameters

Table 64. HCI_LE_LONG_TERM_KEY_REQUEST_REPLY output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Connection_Handle	2	Connection handle related to the response	0x0000 ... 0x0EFF

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.39

HCI_LE_LONG_TERM_KEY_REQUEST_NEGATIVE_REPLY

Description

The LE_Long_Term_Key_Request_Negative_Reply command is used to reply to an LE long term key request event from the controller if the host cannot provide a long term key for this Connection_Handle.

Input parameters

Table 65. HCI_LE_LONG_TERM_KEY_REQUEST_NEGATIVE_REPLY input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given	0x0000 ... 0x0EFF

Output parameters

Table 66. HCI_LE_LONG_TERM_KEY_REQUEST_NEGATIVE_REPLY output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Connection_Handle	2	Connection handle related to the response	0x0000 ... 0x0EFF

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.40

HCI_LE_READ_SUPPORTED_STATES

Description

The LE_Read_Supported_States command reads the states and state combinations that the link layer supports. LE_States is an 8-octet bit field. If a bit is set to 1 then this state or state combination is supported by the controller. Multiple bits in LE_States may be set to 1 to indicate support for multiple state and state combinations. All the advertising type with the initiate state combinations are set only if the corresponding advertising types and master role combination are set. All the scanning types and the initial state combinations are set only if the corresponding scanning types and master role combination are set.

Input parameters

None

Output parameters

Table 67. HCI_LE_READ_SUPPORTED_STATES output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
LE_States	8	State or state combination is supported by the controller	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.41

HCI_LE_SET_DATA_LENGTH

Description

The LE_Set_Data_Length command allows the host to suggest maximum transmission packet size and maximum packet transmission time (connMaxTxOctets and connMaxTxTime) to be used for a given connection. The controller may use smaller or larger values based on local information.

Input parameters

Table 68. HCI_LE_SET_DATA_LENGTH input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
TxOctets	2	Preferred maximum number of payload octets that the local controller includes in a single link layer packet on this connection	0x001B ... 0x00FB
TxTime	2	Preferred maximum number of microseconds that the local controller must use to transmit a single link layer packet on this connection	0x0148 ... 0x4290

Output parameters

Table 69. HCI_LE_SET_DATA_LENGTH output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.42

HCI_LE_READ_SUGGESTED_DEFAULT_DATA_LENGTH

Description

The LE_Read_Suggested_Default_Data_Length command allows the host to read the host's suggested values (SuggestedMaxTxOctets and SuggestedMaxTxTime) for the controller's maximum transmitted number of payload octets and maximum packet transmission time to be used for new connections.

Input parameters

None

Output parameters

Table 70. HCI_LE_READ_SUGGESTED_DEFAULT_DATA_LENGTH output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
SuggestedMaxTxOctets	2	The host's suggested value for the controller's maximum transmitted number of payload octets to be used for new connections	0x001B ... 0x00FB
SuggestedMaxTxTime	2	The host's suggested value for the controller's maximum packet transmission time to be used for new connections	0x0148 ... 0x4290

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.43
HCI_LE_WRITE_SUGGESTED_DEFAULT_DATA_LENGTH
Description

The LE_Write_Suggested_Default_Data_Length command allows the host to specify its suggested values for the controller's maximum transmission number of payload octets and maximum packet transmission time to be used for new connections. The controller may use smaller or larger values for connInitialMaxTxOctets and connInitialMaxTxTime based on local information.

Input parameters
Table 71. HCI_LE_WRITE_SUGGESTED_DEFAULT_DATA_LENGTH input parameters

Parameter	Size	Description	Possible values
SuggestedMaxTxOctets	2	The host's suggested value for the controller's maximum transmitted number of payload octets to be used for new connections	0x001B ... 0x00FB
SuggestedMaxTxTime	2	The host's suggested value for the controller's maximum packet transmission time to be used for new connections	0x0148 ... 0x4290

Output parameters
Table 72. HCI_LE_WRITE_SUGGESTED_DEFAULT_DATA_LENGTH output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.44
HCI_LE_READ_LOCAL_P256_PUBLIC_KEY
Description

The LE_Read_Local_P-256_Public_Key command is used to return the local P-256 public key from the controller. The controller generates a new P- 256 public/private key pair upon receipt of this command.

Input parameters

None

Output parameters
Table 73. HCI_LE_READ_LOCAL_P256_PUBLIC_KEY output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [HCI_LE_READ_LOCAL_P256_PUBLIC_KEY_COMPLETE_EVENT](#)

2.1.45 HCI_LE_GENERATE_DHKEY

Description

The LE_Generate_DHKey command is used to initiate generation of a Diffie- Hellman key in the controller for use over the LE transport. This command takes the remote P-256 public key as input. The Diffie-Hellman key generation uses the private key generated by LE_Read_Local_P256_Public_Key command.

Input parameters

Table 74. HCI_LE_GENERATE_DHKEY input parameters

Parameter	Size	Description	Possible values
Remote_P256_Public_Key	64	The remote P-256 public key: X, Y format octets 31-0: X co-ordinate octets 63-32: Y co-ordinate little endian format	-

Output parameters

Table 75. HCI_LE_GENERATE_DHKEY output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [HCI_LE_GENERATE_DHKEY_COMPLETE_EVENT](#)

2.1.46 HCI_LE_ADD_DEVICE_TO_RESOLVING_LIST

Description

The LE_Add_Device_To_Resolving_List command is used to add one device to the list of address translations used to resolve resolvable private addresses in the controller.

This command cannot be used when address translation is enabled in the controller and:

- Advertising is enabled
- Scanning is enabled
- Create connection command is outstanding

This command can be used at any time when address translation is disabled in the controller. When a controller cannot add a device to the resolving list because the list is full, it responds with error code 0x07 (memory capacity exceeded).

Input parameters

Table 76. HCI_LE_ADD_DEVICE_TO_RESOLVING_LIST input parameters

Parameter	Size	Description	Possible values
Peer_Identity_Address_Type	1	Identity address type	• 0x00: Public identity address • 0x01: Random (static) identity address
Peer_Identity_Address	6	Public or random (static) identity address of the peer device	-
Peer_IRK	16	IRK of the peer device	-
Local_IRK	16	IRK of the local device	-

Output parameters

Table 77. HCI_LE_ADD_DEVICE_TO_RESOLVING_LIST output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.47

HCI_LE_REMOVE_DEVICE_FROM_RESOLVING_LIST

Description

The `LE_Remove_Device_From_Resolving_List` command is used to remove one device from the list of address translations used to resolve resolvable private addresses in the controller.

This command cannot be used when address translation is enabled in the controller and:

- Advertising is enabled
- Scanning is enabled
- Create connection command is outstanding

This command can be used at any time when address translation is disabled in the controller. When a controller cannot remove a device from the resolving list because it is not found, it shall respond with error code 0x02 (unknown connection identifier).

Input parameters

Table 78. HCI_LE_REMOVE_DEVICE_FROM_RESOLVING_LIST input parameters

Parameter	Size	Description	Possible values
Peer_Identity_Address_Type	1	Identity address type	• 0x00: Public identity address • 0x01: Random (static) identity address
Peer_Identity_Address	6	Public or random (static) identity address of the peer device	-

Output parameters

Table 79. HCI_LE_REMOVE_DEVICE_FROM_RESOLVING_LIST output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.48

HCI_LE_CLEAR_RESOLVING_LIST

Description

The `LE_Clear_Resolving_List` command is used to remove all devices from the list of address translations used to resolve resolvable private addresses in the controller.

This command cannot be used when address translation is enabled in the controller and:

- Advertising is enabled
- Scanning is enabled
- Create connection command is outstanding

This command can be used at any time when address translation is disabled in the controller.

Input parameters

None

Output parameters
Table 80. HCI_LE_CLEAR_RESOLVING_LIST output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.49
HCI_LE_READ_RESOLVING_LIST_SIZE
Description

The LE_Read_Resolving_List_Size command is used to read the total number of address translation entries in the resolving list that can be stored in the controller.

Input parameters

None

Output parameters
Table 81. HCI_LE_READ_RESOLVING_LIST_SIZE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Resolving_List_Size	1	Number of address translation entries in the resolving list	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.50
HCI_LE_READ_PEER_RESOLVABLE_ADDRESS
Description

The LE_Read_Peer_Resolvable_Address command is used to get the current peer resolvable private address being used for the corresponding peer public and random (static) identity address. The peer's resolvable address being used may change after the command is called. This command is used at any time. When a controller cannot find a resolvable private address associated with the peer identity address, it responds with error code 0x02 (unknown connection identifier).

Input parameters
Table 82. HCI_LE_READ_PEER_RESOLVABLE_ADDRESS input parameters

Parameter	Size	Description	Possible values
Peer_Identity_Address_Type	1	Identity address type	• 0x00: Public identity address • 0x01: Random (static) identity address
Peer_Identity_Address	6	Public or random (static) identity address of the peer device	-

Output parameters

Table 83. HCI_LE_READ_PEER_RESOLVABLE_ADDRESS output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Peer_Resolvable_Address	6	Resolvable private address being used by the peer device	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.51
HCI_LE_READ_LOCAL_RESOLVABLE_ADDRESS
Description

The LE_Read_Local_Resolvable_Address command is used to get the current local resolvable private address being used for the corresponding peer identity address. The local's resolvable address being used may change after the command is called. This command is used at any time. When a controller cannot find a resolvable private address associated with the peer identity address, it responds with error code 0x02 (unknown connection identifier).

Input parameters
Table 84. HCI_LE_READ_LOCAL_RESOLVABLE_ADDRESS input parameters

Parameter	Size	Description	Possible values
Peer_Identity_Address_Type	1	Identity address type	• 0x00: Public identity address • 0x01: Random (static) identity address
Peer_Identity_Address	6	Public or random (static) identity address of the peer device	-

Output parameters
Table 85. HCI_LE_READ_LOCAL_RESOLVABLE_ADDRESS output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Local_Resolvable_Address	6	Resolvable private address being used by the local device	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.52
HCI_LE_SET_ADDRESS_RESOLUTION_ENABLE
Description

The LE_Set_Address_Resolution_Enable command is used to enable resolution of resolvable private addresses in the controller. This causes the controller to use the resolving list whenever the controller receives a local or peer resolvable private address. This command can be used at any time except when:

- Advertising is enabled
- Scanning is enabled
- Create connection command is outstanding

Input parameters

Table 86. HCI_LE_SET_ADDRESS_RESOLUTION_ENABLE input parameters

Parameter	Size	Description	Possible values
Address_Resolution_Enable	1	Enable/disable address resolution in the controller. 0x00: Address resolution in controller disabled (default) 0x01: Address resolution in controller enabled	0x00: Address resolution in controller disabled (default) 0x01: Address resolution in controller enabled

Output parameters

Table 87. HCI_LE_SET_ADDRESS_RESOLUTION_ENABLE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_COMPLETE_EVENT

2.1.53

HCI_LE_SET_RESOLVABLE_PRIVATE_ADDRESS_TIMEOUT

Description

The LE_Set_Resolvable_Private_Address_Timeout command set the length of time the controller uses a resolvable private address before a new resolvable private address is generated and starts being used. This timeout applies to all addresses generated by the controller.

Input parameters

Table 88. HCI_LE_SET_RESOLVABLE_PRIVATE_ADDRESS_TIMEOUT input parameters

Parameter	Size	Description	Possible values
RPA_Timeout	2	RPA_Timeout measured in seconds. Range for N: 0x0001 - 0xA1B8 (1 s - approximately 11.5 hours) Default: N= 0x0384 (900 s or 15 minutes)	-

Output parameters

Table 89. HCI_LE_SET_RESOLVABLE_PRIVATE_ADDRESS_TIMEOUT output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_COMPLETE_EVENT

2.1.54 HCI_LE_READ_MAXIMUM_DATA_LENGTH

Description

The LE_Read_Maximum_Data_Length command allows the host to read the controller maximum supported payload octets and packet duration times for transmission and reception (supportedMaxTxOctets and supportedMaxTxTime, supportedMaxRxOctets, and supportedMaxRxTime).

Input parameters

None

Output parameters

Table 90. HCI_LE_READ_MAXIMUM_DATA_LENGTH output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
supportedMaxTxOctets	2	Maximum number of payload octets that the local controller supports for transmission of a single link layer packet on a data connection	0x001B ... 0x00FB
supportedMaxTxTime	2	Maximum time, in microseconds, that the local controller supports for transmission of a single link layer packet on a data connection	0x0148 ... 0x4290
supportedMaxRxOctets	2	Maximum number of payload octets that the local controller supports for reception of a single link layer packet on a data connection	0x001B ... 0x00FB
supportedMaxRxTime	2	Maximum time, in microseconds, that the local controller supports for reception of a single link layer packet on a data connection	0x0148 ... 0x4290

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.55 HCI_LE_READ_PHY

Description

1.1.55.1 Description

The LE_Read_PHY command is used to read the current transmitter PHY and receiver PHY on the connection identified by the Connection_Handle.

Input parameters

Table 91. HCI_LE_READ_PHY input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given	0x0000 ... 0x0EFF

Output parameters

Table 92. HCI_LE_READ_PHY output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Connection_Handle	2	Connection handle related to the response	0x0000 ... 0x0EFF
TX_PHY	1	Transmitter PHY in use	0x01: The transmitter PHY for the connection is LE 1M 0x02: The transmitter PHY for the connection is LE 2M 0x03: The transmitter PHY for the connection is LE coded (not supported by STM32WB)
RX_PHY	1	Receiver PHY in use	0x01: The receiver PHY for the connection is LE 1M 0x02: The receiver PHY for the connection is LE 2M 0x03: The receiver PHY for the connection is LE coded (not supported by STM32WB)

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.56
HCI_LE_SET_DEFAULT_PHY
Description

This command allows the host to specify its preferred values for the transmitter and receiver PHY, to be used for all subsequent connections over the LE transport. The ALL_PHYS parameter is a bit field that allows the host to specify, for each direction, whether it has no preference among the PHYs that the controller supports in a given direction, or whether it has specified particular PHYs that it prefers in the TX_PHYS or RX_PHYS parameter. The TX_PHYS parameter is a bit field that indicates the transmitter PHYs that the host prefers the controller to use. If the ALL_PHYS parameter specifies that the host has no preference, the TX_PHYS parameter is ignored; otherwise at least one bit is set to 1. The RX_PHYS parameter is a bit field that indicates the receiver PHYs that the host prefers the controller to use. If the ALL_PHYS parameter specifies that the host has no preference, the RX_PHYS parameter is ignored; otherwise at least one bit is set to 1.

Input parameters
Table 93. HCI_LE_SET_DEFAULT_PHY input parameters

Parameter	Size	Description	Possible values
ALL_PHYS	1	Host preferences for TX PHY and RX PHY	0x00 ... 0x03
TX_PHYS	1	Host preferences for TX PHY (no LE coded support)	0x00 ... 0x03
RX_PHYS	1	Host preferences for RX PHY (no LE coded support)	0x00 ... 0x03

Output parameters
Table 94. HCI_LE_SET_DEFAULT_PHY output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.57 HCI_LE_SET_PHY

Description

The LE_SET_PHY command is used to set the PHY preferences for the connection identified by the Connection_Handle. The controller might not be able to make the change (e.g. because the peer does not support the requested PHY) or may decide that the current PHY is preferable. The ALL_PHYS parameter is a bit field that allows the host to specify, for each direction, whether it has no preference among the PHYs that the controller supports in a given direction or whether it has specified particular PHYs that it prefers in the TX_PHYS or RX_PHYS parameter.

The TX_PHYS parameter is a bit field that indicates the transmitter PHYs that the Host prefers the controller to use. If the ALL_PHYS parameter specifies that the host has no preference, the TX_PHYS parameter is ignored, otherwise at least one bit is set to 1. The RX_PHYS parameter is a bit field that indicates the receiver PHYs that the Host prefers the controller to use. If the ALL_PHYS parameter specifies that the host has no preference the RX_PHYS parameter is ignored, otherwise at least one bit is set to 1. If, for at least one direction, the host has specified a preference and the current PHY is not one of those preferred, the controller requests a change, otherwise the controller may (not necessarily) request a change. The PHY preferences provided by the LE Set PHY command override those provided via the LE set default PHY command or any preferences previously set using the LE set PHY command on the same connection. The PHY_options parameter is a bit field that allows the host to specify options for PHYs. The default value for a new connection is all zero bits. The controller may override any preferred coding for transmitting on the LE coded PHY. The host may specify a preferred coding even if it prefers not to use the LE coded transmitter PHY since the controller may override the PHY preference.

Input parameters

Table 95. HCI_LE_SET_PHY input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given	0x0000 ... 0x0EFF
ALL_PHYS	1	Host preferences for TX PHY and RX PHY	0x00 ... 0x03
TX_PHYS	1	Host preferences for TX PHY (no LE coded support)	0x00 ... 0x03
RX_PHYS	1	Host preferences for RX PHY (no LE coded support)	0x00 ... 0x03
PHY_options	2	Not supported by STM32WB	0x00 ... 0x03

Output parameters

Table 96. HCI_LE_SET_PHY output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)

2.1.58 HCI_LE_SET_ADVERTISING_SET_RANDOM_ADDRESS

Description

This command is used by the Host to set the random device address specified by the Random_Address parameter. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.8.52].

Event parameters

Table 97. HCI_LE_SET_ADVERTISING_SET_RANDOM_ADDRESS input parameters

Parameter	Size	Description	Possible values
Advertising_Handle	1	Used to identify an advertising set	0x00 ... 0xEF

Parameter	Size	Description	Possible values
Random_Address	1	Random device address	-

Table 98. HCI_LE_SET_ADVERTISING_SET_RANDOM_ADDRESS output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.59
HCI_LE_SET_EXTENDED_ADVERTISING_PARAMETERS
Description

This command is used by the Host to set the extended advertising parameters. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.8.53].

Input parameters
Table 99. HCI_LE_SET_EXTENDED_ADVERTISING_PARAMETERS input parameters

Parameter	Size	Description	Possible values
Advertising_Handle	1	Used to identify an advertising set	0x00 ... 0xEF
Adv_Event_Properties	2	Type of advertising event.	Bitmask of: • 0x0001: Connectable advertising • 0x0002: Scannable advertising • 0x0004: Directed advertising • 0x0008: High duty-cycle directed connectable advertising • 0x0010: Use legacy advertising PDUs • 0x0020: Anonymous advertising • 0x0040: Include Tx Power in at least one advertising PDU
Primary_Adv_Interval_Min	3	Minimum advertising interval. Time = N * 0.625 ms	0x000020 (20.000 ms) ... 0xFFFFFFFF (10485759.375 ms)
Primary_Adv_Interval_Max	3	Maximum advertising interval. Time = N * 0.625 ms	0x000020 (20.000 ms) ... 0xFFFFFFFF (10485759.375 ms)
Primary_Adv_Channel_Map	1	Advertising channel map	Bitmask of: • 0x01: Use Channel 37 • 0x02: Use Channel 38 • 0x04: Use Channel 39
Own_Address_Type	1	Own address type	• 0x00: Public device address • 0x01: Random device address • 0x02: Resolvable private address if available, otherwise Public address • 0x03: Resolvable private address if available, otherwise Random address
Peer_Address_Type	1	Address type of the peer device	• 0x00: Public device address or Public identity address • 0x01: Random device address or Random (static) identity address

Parameter	Size	Description	Possible values
Peer_Address	6	Public device address, Random device address, Public identity address, or Random (static) identity address of the device to be connected.	-
Adv_Filter_Policy	1	Advertising filter policy	0x00: Process scan and connection requests from all devices (White list not in use) 0x01: Process connection requests from all devices and scan requests only from devices in the White list. - Process scan requests from all devices and connection requests only from devices in the White list. 0x03: Process scan and connection requests only from devices in the White List.
Adv_TX_Power	1	Advertising TX power. Units: dBm.	-127 ... 20
Primary_Adv_PHY	1	Primary advertising PHY	0x01: Primary advertisement PHY is LE 1M 0x03: Primary advertisement PHY is LE coded (not supported)
Secondary_Adv_Max_Skip	1	Secondary advertising maximum skip	0x00: AUX_ADV_IND must be sent prior to the next advertising event 0x01 ... 0xFF: Maximum advertising events that the controller can skip before sending the AUX_ADV_IND packets on the secondary advertising physical channel
Secondary_Adv_PHY	1	Secondary advertising PHY	0x01: Secondary advertisement PHY is LE 1M 0x02: Secondary advertisement PHY is LE 2M 0x03: Secondary advertisement PHY is LE coded (not supported)
Adv_SID	1	Value of the Advertising SID subfield in the ADI field of the PDU	0x00 ... 0x0F
Scan_Req_Notification_Enable	1	Scan request notifications	0x00: Scan request notifications disabled 0x01: Scan request notifications enabled

Table 100. HCI_LE_SET_EXTENDED_ADVERTISING_PARAMETERS output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Selected_TX_Power	1	Power level selected by the controller. Units: dBm.	-127 ... 20

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.60
HCI_LE_SET_EXTENDED_ADVERTISING_DATA
Description

This command is used to set the data used in extended advertising PDUs with a data field. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.8.54].

Input parameters

Table 101. HCI_LE_SET_EXTENDED_ADVERTISING_DATA input parameters

Parameter	Size	Description	Possible values
Advertising_Handle	1	Used to identify an advertising set	0x00 ... 0xEF
Operation	1	Advertising operation	0x00: intermediate fragment of fragmented extended advertising data 0x01: first fragment of fragmented extended advertising data 0x02: last fragment of fragmented extended advertising data 0x03: complete extended advertising data 0x04: unchanged data (just update the advertising DID)
Fragment_Preference	1	Fragment preference	0x00: the controller can fragment all data 0x02: the controller should not fragment data, or minimize fragmentation
Advertising_Data_Length	1	Length of Advertising_Data in octets	-
Advertising_Data	Advertising_Data_Length	Data formatted as defined in Bluetooth spec. v.5.2 [Vol 3, Part C, 11].	-

Table 102. HCI_LE_SET_EXTENDED_ADVERTISING_DATA output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.61
HCI_LE_SET_EXTENDED_SCAN_RESPONSE_DATA
Description

This command is used by to provide scan response data used in scanning response PDUs during extended advertising. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.8.55].

Input parameters
Table 103. HCI_LE_SET_EXTENDED_SCAN_RESPONSE_DATA input parameters

Parameter	Size	Description	Possible values
Advertising_Handle	1	Used to identify an advertising set	0x00 ... 0xEF
Operation	1	Scan response operation	0x00: intermediate fragment of fragmented scan response data 0x01: first fragment of fragmented scan response data 0x02: last fragment of fragmented scan response data

Parameter	Size	Description	Possible values
			0x03: complete scan response data
Fragment_Preference	1	Fragment preference	0x00: the controller can fragment all data 0x02: the controller should not fragment data, or minimize fragmentation
Scan_Response_Data_Length	1	Length of Scan_Response_Data in octets	-
Scan_Response_Data	Scan_Response_Data_Length	Data formatted as defined in Bluetooth spec. v.5.2 [Vol 3, Part C, 11].	-

Table 104. HCI_LE_SET_EXTENDED_SCAN_RESPONSE_DATA output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_COMPLETE_EVENT

2.1.62
HCI_LE_SET_EXTENDED_ADVERTISING_ENABLE
Description

This command is used to request the controller to enable/disable one or more advertising sets using those identified by the Advertising_Handle[i] parameter. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.8.56].

Input parameters
Table 105. HCI_LE_SET_EXTENDED_ADVERTISING_ENABLE input parameters

Parameter	Size	Description	Possible values
Enable	1	Enable/disable advertising	0x00: advertising disabled 0x01: advertising enabled
Num_Sets	1	Number of advertising sets	0x00: disable all advertising sets 0x00 ... 0x3F: number of advertising sets to enable/disable
Advertising_Handle[i]	1	Used to identify an advertising set	0x00 ... 0xEF
Duration[i]	2	Duration of advertising set. Time = N * 10 ms.	0x0000 (0 ms) : No advertising duration 0x0001 (10 ms) ... 0xFFFF (655350 ms): advertising duration
Max_Extended_Advertising_Events[i]	1	Maximum number of advertising events	0x00 (0 ms) : No maximum number 0x01 ... 0xFF: maximum number of events the controller must try to send before terminating the extended advertising

Table 106. HCI_LE_SET_EXTENDED_ADVERTISING_ENABLE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.63
HCI_LE_READ_MAXIMUM_ADVERTISING_DATA_LENGTH
Description

This command is used by the Host to set the random device address specified by the Random_Address parameter. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.8.57].

Input parameters

None

Table 107. HCI_LE_READ_MAXIMUM_ADVERTISING_DATA_LENGTH output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Max_Advertising_Data_Length	2	Maximum supported advertising data length	0x001F ... 0x0672

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.64
HCI_LE_READ_NUMBER_OF_SUPPORTED_ADVERTISING_SETS
Description

This command is used by the Host to set the random device address specified by the Random_Address parameter. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.8.52].

Input parameters

None

Table 108. HCI_LE_READ_NUMBER_OF_SUPPORTED_ADVERTISING_SETS output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Num_Supported_Advertising_Sets	1	Number of advertising sets supported at the same time	0x01 ... 0xF0

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.65
HCI_LE_REMOVE_ADVERTISING_SET
Description

This command is used to remove an advertising set from the controller. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.8.59].

Input parameters

Table 109. HCI_LE_REMOVE_ADVERTISING_SET input parameters

Parameter	Size	Description	Possible values
Advertising_Handle	1	Used to identify an advertising set	0x00 ... 0xEF

Table 110. HCI_LE_REMOVE_ADVERTISING_SET output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.66
HCI_LE_CLEAR_ADVERTISING_SETS
Description

This command is used to remove all existing advertising sets from the controller. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.8.60].

Input parameters

None

Table 111. HCI_LE_CLEAR_ADVERTISING_SETS output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.67
HCI_LE_SET_EXTENDED_SCAN_PARAMETERS
Description

This command is used to set the extended scan parameters to be used on the advertising physical channels. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.8.64].

Input parameters
Table 112. HCI_LE_SET_EXTENDED_SCAN_PARAMETERS input parameters

Parameter	Size	Description	Possible values
Own_Address_Type	1	Own address type	• 0x00: public device address • 0x01: random device address • 0x02: resolvable private address if available, otherwise public address • 0x03: resolvable private address if available, otherwise random address
Scanning_Filter_Policy	1	Scan filter policy	• 0x00: accept all advertising and scan response PDUs except directed advertising PDUs not addressed to this device. • 0x01: Accept only advertising and scan response PDUs from devices where the advertiser's address is in the White list. Directed advertising PDUs not addressed to this device are ignored. • 0x02: accept all advertising and scan response PDUs except directed advertising PDUs where the identity address corresponding to TargetA does not address this device. • 0x03: accept all advertising and scan response PDUs except advertising and scan response PDUs where the advertiser's identity address is not in the White list, and directed advertising PDUs where the identity address corresponding to TargetA does not address this device.

Parameter	Size	Description	Possible values
Scanning_PHYs	1	Scan PHYs	Bitmask of: 0x01: scan advertisements on the LE 1M PHY 0x04: Scan advertisements on the LE Coded PHY (not supported)
Scan_Type	1	Passive or active scanning. With passive scanning no scan request PDUs are sent.	0x00: passive scanning 0x01: active scanning
Scan_Interval	2	Time interval from when the controller started its last scan until it begins the subsequent scan on the primary advertising physical channel. Time = N * 0.625 ms.	0x0004 (2.500 ms) ... 0xFFFF (40959.375 ms)
Scan_Window	2	Duration of the scan on the primary advertising physical channel. Time = N * 0.625 ms.	0x0004 (2.500 ms) ... 0xFFFF (40959.375 ms)

Table 113. HCI_LE_SET_EXTENDED_SCAN_PARAMETERS output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_COMPLETE_EVENT

2.1.68
HCI_LE_SET_EXTENDED_SCAN_ENABLE
Description

This command is used to enable/disable extended scanning. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.8.65].

Input parameters
Table 114. HCI_LE_SET_EXTENDED_SCAN_ENABLE input parameters

Parameter	Size	Description	Possible values
Enable	1	Enable/disable scan	0x00: scanning disabled 0x01: scanning enabled
Filter_Duplicates	1	Duplicate filtering	0x00: duplicate filtering disabled 0x01: duplicate filtering enabled 0x02: duplicate filtering enabled, reset for each scan period
Duration	2	Scan duration. Time = N * 10 ms.	0x0000 (0 ms): scan continuously until explicitly disabled 0x0001 (10 ms) ... 0xFFFF (655350 ms)
Period	2	Scan period. Time = N * 1.28 s.	0x0000 (0 ms): scan continuously 0x0001 (1280 ms) ... 0xFFFF (83884800 ms): time interval from when the controller started its last Scan_Duration until it begins the subsequent one

Table 115. HCI_LE_SET_EXTENDED_SCAN_ENABLE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)
- [HCI_LE_EXTENDED_ADVERTISING_REPORT_EVENT](#)

2.1.69
HCI_LE_EXTENDED_CREATE_CONNECTION
Description

This command is used to create an ACL connection to a connectable advertiser by means of extended scanning. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.8.66].

Input parameters
Table 116. HCI_LE_EXTENDED_CREATE_CONNECTION input parameters

Parameter	Size	Description	Possible values
Initiator_Filter_Policy	1	Initiator filter policy	• 0x00: white list not used • 0x01: white list used
Own_Address_Type	1	Own address type	• 0x00: public device • 0x01: random device • 0x02: resolvable private address if available, otherwise public address • 0x03: resolvable public address if available, otherwise random address
Peer_Address_Type	1	Address type of the peer device	• 0x00: public device or public identity address • 0x01: random device or random (static) identity address
Peer_Address	6	Public or random device address, public or random (static) identity address of the device to connect	-
Initiating_PHYs	1	Initiating PHYs	Bitmask of: • 0x01: Scan connectable advertisements on the LE 1M PHY - Connection parameters for the LE 1M PHY • 0x02: Connection parameters for the LE 2M PHY • 0x04: Scan connectable advertisements on the LE coded PHY (not supported on STM32WB)
Scan_Interval	2	Time interval from when the controller started its last scan until it begins the subsequent scan on the primary advertising physical channel. Time = N * 0.625 ms.	0x0004 (2.50 ms) ... 0xFFFF (40959.375 ms)
Scan_Window	2	Duration of the scan on the primary advertising physical channel. Time = N * 0.625 ms.	0x0004 (2.50 ms) ... 0xFFFF (40959.375 ms)
Conn_Interval_Min	2	Minimum value of the connection event interval (must be lower than or equal to Conn_Interval_Max. Time = N * 1.25 ms).	0x0006 (7.5 ms) ... 0x0C80 (4000 ms)
Conn_Interval_Max	2	Maximum value of the connection event interval (must be higher than or equal to Conn_Interval_Min. Time = N * 1.25 ms).	0x0006 (7.5 ms) ... 0x0C80 (4000 ms)

Parameter	Size	Description	Possible values
Conn_Latency	2	Slave latency for the connection in number of connection events.	0x0000 ... 0x01F3
Supervision_Timeout	2	Supervision timeout for the LE Link. Must be a multiple of 10 ms and larger than $(1 + \text{connSlaveLatency}) * \text{connInterval} * 2$. Time = N * 10 ms.	0x000A (100 ms) ... 0x0C80 (32000 ms)
Min_CE_Length	2	Minimum length needed for this LE connection. Time = N * 0.625 ms.	0x0000 (0.0 ms) ... 0xFFFF (40959.375 ms)
Max_CE_Length	2	Maximum length needed for this LE connection. Time = N * 0.625 ms.	0x0000 (0.0 ms) ... 0xFFFF (40959.375 ms)

Table 117. HCI_LE_EXTENDED_CREATE_CONNECTION output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.70
HCI_LE_READ_TRANSMIT_POWER
Description

This command is used to read the minimum and maximum transmit power supported by the controller. See Bluetooth spec. v5.2 [Vol 4, Part E, 7.8.74].

Input parameters

None

Output parameters
Table 118. HCI_LE_READ_TRANSMIT_POWER output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Min_TX_Power	1	Signed integer. Units: dBm	-127 ... 20
Max_TX_Power	1	Signed integer. Units: dBm	-127 ... 20

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.71
HCI_LE_READ_RF_PATH_COMPENSATION
Description

This command is used to read the RF path compensation value parameters used in the Tx power level and RSSI calculation. See Bluetooth spec. v5.2 [Vol 4, Part E, 7.8.75].

Input parameters

None

Output parameters

Table 119. HCI_LE_READ_RF_PATH_COMPENSATION output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
RF_TX_Path_Compensation	2	RF TX path compensation value (16-bit signed integer). Units: 0.1 dB.	1280 ... 1280
RF_RX_Path_Compensation	2	RF TX path compensation value (16-bit signed integer). Units: 0.1 dB.	1280 ... 1280

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.72 HCI_LE_WRITE_RF_PATH_COMPENSATION

Description

This command is used to indicate the contribution of intermediate components in the RF path to the gain or loss between the RF transceiver and the antenna. A positive value means a net RF path gain, a negative value means a net RF path loss.

. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.8.76].

Input parameters
Table 120. HCI_LE_WRITE_RF_PATH_COMPENSATION input parameters

Parameter	Size	Description	Possible values
RF_TX_Path_Compensation	2	RF TX path compensation value (16-bit signed integer). Units: 0.1 dB.	1280 ... 1280
RF_RX_Path_Compensation	2	RF TX path compensation value (16-bit signed integer). Units: 0.1 dB.	1280 ... 1280

Output parameters
Table 121. HCI_LE_WRITE_RF_PATH_COMPENSATION output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.1.73 HCI_LE_SET_PRIVACY_MODE

Description

This command is used to allow the Host to specify the privacy mode to be used for a given entry on the resolving list. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.8.74].

Input parameters
Table 122. HCI_LE_SET_PRIVACY_MODE input parameters

Parameter	Size	Description	Possible values
Peer_Identity_Address_Type	1	Identity address type	• 0x00: Public identity address • 0x01: Random (static) identity address
Peer_Identity_Address	6	Public or Random (static) Identity address of the peer device	-
Privacy Mode	1	Privacy Mode	• 0x00: Use network privacy mode • 0x01: Use device privacy mode

Output parameters

Table 123. HCI_LE_SET_PRIVACY_MODE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.2 HCI testing commands

In Table 124 "Y" means that the corresponding command applies to the dedicated BLE stack variant, namely LO / BO / PO / BF / LB, respectively, for Link layer only / Beacon only / Peripheral only / Basic feature / Link layer only basic.

Table 124. HCI testing commands list

Command	OpCode	LO	PO	BO	BF	LB
HCI_LE_RECEIVER_TEST	0x201D	Y	Y	Y	Y	Y
HCI_LE_TRANSMITTER_TEST	0x201E	Y	Y	Y	Y	Y
HCI_LE_TEST_END	0x201F	Y	Y	Y	Y	Y
HCI_LE_RECEIVER_TEST_V2	0x2033	Y	-	-	Y	Y
HCI_LE_TRANSMITTER_TEST_V2	0x2034	Y	-	-	Y	Y

2.2.1 HCI_LE_RECEIVER_TEST

Description

This command is used to start a test where the DUT receives test reference packets at a fixed interval. The tester generates the test reference packets.

Input parameters

Table 125. HCI_LE_RECEIVER_TEST input parameters

Parameter	Size	Description	Possible values
RX_Frequency	1	$N = (F - 2402) / 2$ - Frequency range : 2402 MHz to 2480 MHz	0x00 ... 0x27

Output parameters

Table 126. HCI_LE_RECEIVER_TEST output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_COMPLETE_EVENT

2.2.2 HCI_LE_TRANSMITTER_TEST

Description

This command is used to start a test where the DUT generates test reference packets at a fixed interval. The controller transmits at maximum power. An LE controller supporting the LE_Transmitter_Test command supports Packet_Payload values 0x00, 0x01 and 0x02. An LE controller supports other values of Packet_Payload.

Input parameters

Table 127. HCI_LE_TRANSMITTER_TEST input parameters

Parameter	Size	Description	Possible values
TX_Frequency	1	$N = (F - 2402) / 2$ - Frequency range : 2402 to 2480 MHz	0x00 ... 0x27
Length_Of_Test_Data	1	Length in bytes of payload data in each packet.	0x00 ... 0x25: BO variant 0x00 ... 0xFF: otherwise
Packet_Payload	1	Type of packet payload.	0x00: Pseudo-random bit sequence 9 0x01: Pattern of alternating bits '11110000' 0x02: Pattern of alternating bits '10101010' 0x03: Pseudo-random bit sequence 15 0x04: Pattern of all '1' bits 0x05: Pattern of all '0' bits 0x06: Pattern of alternating bits '00001111' 0x07: Pattern of alternating bits '0101'

Output parameters

Table 128. HCI_LE_TRANSMITTER_TEST output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [HCI_DISCONNECTION_COMPLETE_EVENT](#)

2.2.3

HCI_LE_TEST_END

Description

This command is used to stop any test which is in progress. The Number_Of_Packets for a transmitter test is reported as 0x0000. The Number_Of_Packets is an unsigned number and contains the number of received packets.

Input parameters

None

Output parameters

Table 129. HCI_LE_TEST_END output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Number_Of_Packets	2	Number of packets received	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.2.4

HCI_LE_RECEIVER_TEST_V2

Description

This command is used to start a test where the DUT receives test reference packets at a fixed interval. The tester generates the test reference packets.

Input parameters

Table 130. HCI_LE_RECEIVER_TEST_V2 input parameters

Parameter	Size	Description	Possible values
RX_Frequency	1	$N = (F - 2402) / 2$ - Frequency range: 2402 to 2480 MHz	0x00 ... 0x27
PHY	1	PHY to use for test packet	0x00: Reserved for future use 0x01: Transmitter set to use the LE 1M PHY 0x02: Transmitter set to use the LE 2M PHY 0x03: Transmitter set to use the LE coded PHY with S = 8 data coding 0x04: Transmitter set to use the LE coded PHY with S = 2 data coding
Modulation_Index	1	Modulation index capability of the transmitter	0x00: Assume transmitter has a standard modulation index 0x01: Assume transmitter has a stable modulation index

Output parameters

Table 131. HCI_LE_RECEIVER_TEST_V2 output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.2.5

HCI_LE_TRANSMITTER_TEST_V2

Description

This command is used to start a test where the DUT generates test reference packets at a fixed interval. The controller transmits at maximum power. An LE controller supporting this command supports Packet_Payload values 0x00, 0x01 and 0x02. An LE controller supporting the LE coded PHY also supports Packet_Payload value 0x04 (not supported by STM32WB). An LE controller may support other values of Packet_Payload. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.8.51].

Input parameters

Table 132. HCI_LE_TRANSMITTER_TEST_V2 input parameters

Parameter	Size	Description	Possible values
TX_Frequency	1	$N = (F - 2402) / 2$ - Frequency range: 2402 to 2480 MHz	0x00 ... 0x27
Length_Of_Test_Data	1	Length in bytes of payload data in each packet.	0x00 ... 0x25
Packet_Payload	1	Type of packet payload.	0x00: Pseudo-random bit sequence 9 0x01: Pattern of alternating bits '11110000' 0x02: Pattern of alternating bits '10101010' 0x03: Pseudo-random bit sequence 15 0x04: Pattern of all '1' bits 0x05: Pattern of all '0' bits 0x06: Pattern of alternating bits '00001111' 0x07: Pattern of alternating bits '0101'
PHY	1	PHY to use for test packet	0x00: Reserved for future use 0x01: Transmitter set to use the LE 1M PHY 0x02: Transmitter set to use the LE 2M PHY 0x03: Transmitter set to use the LE coded PHY with S = 8 data coding 0x04: Transmitter set to use the LE coded PHY with S = 2 data coding

Output parameters

Table 133. HCI_LE_TRANSMITTER_TEST_V2 output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.3 HAL commands

In Table 134 "Y" means that the corresponding command applies to the dedicated BLE stack variant, namely LO / BO / PO / BF / LB, respectively, for Link layer only / Beacon only / Peripheral only / Basic feature / Link layer only basic.

Table 134. HAL commands list

Command	OpCode	LO	PO	BO	BF	LB
ACI_HAL_GET_FW_BUILD_NUMBER	0xFC00	Y	Y	Y	Y	Y
ACI_HAL_WRITE_CONFIG_DATA	0xFC0C	Y	Y	Y	Y	Y
ACI_HAL_READ_CONFIG_DATA	0xFC0D	Y	Y	Y	Y	Y
ACI_HAL_SET_TX_POWER_LEVEL	0xFC0F	Y	Y	Y	Y	Y
ACI_HAL_LE_TX_TEST_PACKET_NUMBER	0xFC14	Y	Y	-	Y	Y
ACI_HAL_TONE_START	0xFC15	Y	Y	Y	Y	Y
ACI_HAL_TONE_STOP	0xFC16	Y	Y	Y	Y	Y
ACI_HAL_GET_LINK_STATUS	0xFC17	Y	Y	-	Y	Y
ACI_HAL_SET_RADIO_ACTIVITY_MASK	0xFC18	Y	Y	Y	Y	Y
ACI_HAL_GET_ANCHOR_PERIOD	0xFC19	Y	Y	Y	Y	Y
ACI_HAL_SET_EVENT_MASK	0xFC1A	-	-	-	-	-
ACI_HAL_GET_PM_DEBUG_INFO	0xFC1C	-	-	-	-	-
ACI_HAL_SET_SLAVE_LATENCY	0xFC20	Y	-	-	Y	Y
ACI_HAL_READ_RADIO_REG	0xFC30	Y	-	-	-	-
ACI_HAL_WRITE_RADIO_REG	0xFC31	Y	-	-	-	-
ACI_HAL_READ_RAW_RSSI	0xFC32	Y	-	-	-	-
ACI_HAL_RX_START	0xFC33	Y	-	-	-	-
ACI_HAL_RX_STOP	0xFC34	Y	-	-	-	-
ACI_HAL_STACK_RESET	0xFC3B	Y	Y	Y	Y	Y

2.3.1 ACI_HAL_GET_FW_BUILD_NUMBER

Description

This command returns the build number associated with the firmware version currently running.

Input parameters

None

Output parameters

Table 135. ACI_HAL_GET_FW_BUILD_NUMBER output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Build_Number	2	Build number of the firmware.	-

Events generated

- HCI_COMMAND_COMPLETE_EVENT

2.3.2 ACI_HAL_WRITE_CONFIG_DATA

Description

This command writes a value to a low level configure data structure. It is useful to set up directly some low level parameters for the system in the runtime.

Note: The static random address set by this command is taken into account by the GAP only when it receives the ACI_GAP_INIT command.

Input parameters

Table 136. ACI_HAL_WRITE_CONFIG_DATA input parameters

Parameter	Size	Description	Possible values
Offset	1	Offset of the element in the configuration data structure that must be written.	0x00: CONFIG_DATA_PUBADDR_OFFSET, Bluetooth public address, 6 bytes 0x08: CONFIG_DATA_ER_OFFSET, Encryption root key used to derive LTK and CSRK, 16 bytes 0x18: CONFIG_DATA_IR_OFFSET, identity root key used to derive LTK and CSRK, 16 bytes 0x2E: CONFIG_DATA_RANDOM_ADDRESS_WR, static random address, 6 bytes 0xB0: CONFIG_DATA_SMP_MODE_OFFSET; SMP mode (0: normal, 1: bypass, 2: no blacklist), 1 byte 0xC0: CONFIG_DATA_LL_SCAN_CHAN_MAP_OFFSET, LL scan channel map (same format as Primary_Adv_Channel_Map), 1 byte
Length	1	Length of data to be written	-
Value	Length	Data to be written	-

Output parameters

Table 137. ACI_HAL_WRITE_CONFIG_DATA output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_COMPLETE_EVENT

2.3.3 ACI_HAL_READ_CONFIG_DATA

Description

This command requests the value in the low level configure data structure. The number of read bytes changes for different offset.

Input parameters

Table 138. ACI_HAL_READ_CONFIG_DATA input parameters

Parameter	Size	Description	Possible values
Offset	1	Offset of the element in the configuration data structure which has to be read. The valid offsets are: 0x00: Bluetooth public address, value length returned: 6 bytes 0x08: Encryption root key used to derive LTK and CSRK, value length returned: 16 bytes 0x18: Identity root key used to derive LTK and CSRK, value length returned: 16 bytes 0x80: Static random address. Value length returned: 6 bytes (read-only)	0x00: CONFIG_DATA_PUBADDR_OFFSET 0x08: CONFIG_DATA_ER_OFFSET 0x18: CONFIG_DATA_IR_OFFSET 0x80: CONFIG_DATA_RANDOM_ADDRESS

Output parameters

Table 139. ACI_HAL_READ_CONFIG_DATA output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Data_Length	1	Length of Data in octets	-
Data	Data_Length	Data field associated with Offset parameter	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.3.4

ACI_HAL_SET_TX_POWER_LEVEL

Description

This command sets the TX power level of the device. By controlling the PA_LEVEL, that determines the output power level (dBm) at the IC pin. When the system starts up or reboots, the default TX power level (the maximum value of 6 dBm) is used. Once this command is given, the output power is changed instantaneously, regardless if there is an ongoing Bluetooth communication or not. For example, for debugging purpose, the device can be set to advertise all the time. and use this command to observe the change of signal strength. The system keeps the last received TX power level from the command, i.e. the second command overwrites the previous TX power level. The new TX power level remains until another Set TX power command, or the system reboots.

Input parameters

Table 140. ACI_HAL_SET_TX_POWER_LEVEL input parameters

Parameter	Size	Description	Possible values
En_High_Power	1	Enable high power mode - deprecated and ignored on STM32WB	0x00: Standard power 0x01: High power
PA_Level	1	Power amplifier output level. Output power is indicative and it depends on the PCB layout and associated components. Here the values are given at the IC pin	0x00: -40 dBm 0x01: -20.85 dBm 0x02: -19.75 dBm 0x03: -18.85 dBm 0x04: -17.6 dBm 0x05: -16.5 dBm 0x06: -15.25 dBm 0x07: -14.1 dBm 0x08: -13.15 dBm 0x09: -12.05 dBm 0x0A: -10.9 dBm 0x0B: -9.9 dBm 0x0C: -8.85 dBm 0x0D: -7.8 dBm 0x0E: -6.9 dBm 0x0F: -5.9 dBm 0x10: -4.95 dBm 0x11: -4 dBm 0x12: -3.15 dBm 0x13: -2.45 dBm 0x14: -1.8 dBm 0x15: -1.3 dBm 0x16: -0.85 dBm 0x17: -0.5 dBm 0x18: -0.15 dBm 0x19: 0 dBm 0x1A: +1 dBm 0x1B: +2 dBm 0x1C: +3 dBm 0x1D: +4 dBm 0x1E: +5 dBm 0x1F: +6 dBm

Output parameters

Table 141. ACI_HAL_SET_TX_POWER_LEVEL output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.3.5

ACI_HAL_LE_TX_TEST_PACKET_NUMBER

Description

This command returns the number of packets sent in direct test mode. When the direct TX test is started, a 32-bit counter is used to count how many packets have been transmitted. This command can be used to check how many packets have been sent during the direct TX test. The counter starts from zero and counts upwards. The counter can wrap and start from zero again. The counter is not cleared until the next direct TX test starts.

Input parameters

None

Output parameters

Table 142. ACI_HAL_LE_TX_TEST_PACKET_NUMBER output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Number_Of_Packets	4	Number of packets sent during the last direct TX test.	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.3.6

ACI_HAL_TONE_START

Description

This command starts a carrier frequency, i.e. a tone, on a specific channel. The frequency sine wave at the specific channel may be used for debugging purpose only. The channel ID is a parameter from 0x00 to 0x27 for the 40 BLE channels, e.g. 0x00 for 2.402 GHz, 0x01 for 2.404 GHz etc. This command must not be used when normal Bluetooth activities are ongoing. The tone must be stopped by ACI_HAL_TONE_STOP command.

Input parameters

Table 143. ACI_HAL_TONE_START input parameters

Parameter	Size	Description	Possible values
RF_Channel	1	BLE Channel ID, from 0x00 to 0x27 meaning (2.402 + 2*0xXX) GHz device continuously emits 0 s, that means that the tone is at the channel center frequency less the maximum frequency deviation (250 kHz).	0x00 ... 0x27
Freq_offset	1	Frequency offset for tone channel	0x00 ... 0xFF

Output parameters

Table 144. ACI_HAL_TONE_START output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.3.7 ACI_HAL_TONE_STOP

Description

This command is used to stop the previously started ACI_HAL_TONE_START command.

Input parameters

None

Output parameters

Table 145. ACI_HAL_TONE_STOP output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.3.8 ACI_HAL_GET_LINK_STATUS

Description

This command returns the status of the eight Bluetooth Low Energy links managed by the device.

Input parameters

None

Output parameters

Table 146. ACI_HAL_GET_LINK_STATUS output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Link_Status	8	Array of link status (eight links). Each link status is 1 byte.	• 0x00: Idle • 0x01: Advertising • 0x02: Connected in slave role • 0x03: Scanning • 0x04: Reserved • 0x05: Connected in master role • 0x06: TX test mode • 0x07: RX test mode • 0x81: Advertising with additional beacon
Link_Connection_Handle	16	Array of connection handles (two bytes) for eight links.	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.3.9 ACI_HAL_SET_RADIO_ACTIVITY_MASK

Description

This command set the bitmask associated to ACI_HAL_END_OF_RADIO_ACTIVITY_EVENT. Only the radio activities enabled in the mask is reported to application by ACI_HAL_END_OF_RADIO_ACTIVITY_EVENT.

Input parameters

Table 147. ACI_HAL_SET_RADIO_ACTIVITY_MASK input parameters

Parameter	Size	Description	Possible values
Radio_Activity_Mask	2	Bitmask of radio events	Bitmask of: • 0x0001: Idle • 0x0002: Advertising • 0x0004: Connection event slave • 0x0008: Scanning • 0x0010: Connection request • 0x0020: Connection event master • 0x0040: TX test mode • 0x0080: RX test mode

Output parameters

Table 148. ACI_HAL_SET_RADIO_ACTIVITY_MASK output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)
- [ACI_HAL_END_OF_RADIO_ACTIVITY_EVENT](#)

2.3.10

ACI_HAL_GET_ANCHOR_PERIOD

Description

This command returns information about the Anchor Period to help application in selecting slot timings when operating in multi-link scenarios.

Input parameters

None

Output parameters

Table 149. ACI_HAL_GET_ANCHOR_PERIOD output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Anchor_Period	4	Current anchor period. $T = N * 0.625 \text{ ms}$	-
Max_Free_Slot	4	Maximum available time that can be allocated for a new slot. $T = N * 0.625 \text{ ms}$	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.3.11

ACI_HAL_SET_EVENT_MASK

Description

This command is used to enable/disable the generation of HAL events.

Input parameters

Table 150. ACI_HAL_SET_EVENT_MASK input parameters

Parameter	Size	Description	Possible values
Event_Mask	4	Mask to enable/disable generation of HAL events	Bitmask of: 0x00000000: No events specified (Default) 0x00000001: ACI_HAL_SCAN_REQ_REPORT_EVENT

Output parameters
Table 151. ACI_HAL_SET_EVENT_MASK output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.3.12
ACI_HAL_GET_PM_DEBUG_INFO
Description

This command is used to retrieve TX, RX and total buffer count allocated for ACL packets.

Input parameters

None

Output parameters
Table 152. ACI_HAL_GET_PM_DEBUG_INFO output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Allocated_For_TX	1	MBlocks allocated for TXing	-
Allocated_For_RX	1	MBlocks allocated for RXing	-
Allocated_MBlocks	1	Overall allocated MBlocks	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.3.13
ACI_HAL_SET_SLAVE_LATENCY
Description

This command is used to disable/enable the slave latency feature (by default enabled) during a connection.

Input parameters
Table 153. ACI_HAL_SET_SLAVE_LATENCY input parameters

Parameter	Size	Description	Possible values
Enable	1	Enable/disable slave latency	0x00: slave latency disabled 0x01: slave latency enabled

Table 154. ACI_HAL_SET_SLAVE_LATENCY output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

2.3.14 ACI_HAL_READ_RADIO_REG

Description

This command Reads Register value from the RF module

Input parameters

Table 155. ACI_HAL_READ_RADIO_REG input parameters

Parameter	Size	Description	Possible values
Register_Address	1	Address of the register to be read	-

Output parameters

Table 156. ACI_HAL_READ_RADIO_REG output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
reg_val	1	Register value	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.3.15 ACI_HAL_WRITE_RADIO_REG

Description

This command writes Register value to the RF module

Input parameters

Table 157. ACI_HAL_WRITE_RADIO_REG input parameters

Parameter	Size	Description	Possible values
Register_Address	1	Address of the register to be written	-
Register_Value	1	Value to be written	-

Output parameters

Table 158. ACI_HAL_WRITE_RADIO_REG output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.3.16 ACI_HAL_READ_RAW_RSSI

Description

This command returns the raw value of the RSSI

Input parameters

None

Output parameters
Table 159. ACI_HAL_READ_RAW_RSSI output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Value	3	Raw RSSI value	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.3.17
ACI_HAL_RX_START
Description

This command sets up the RF to listen to a specific RF channel

Input parameters
Table 160. ACI_HAL_RX_START input parameters

Parameter	Size	Description	Possible values
RF_Channel	1	BLE channel ID, from 0x00 to 0x27 meaning $(2.402 + 2 * 0xXX)$ GHz. The device continuously emits 0s, meaning that the tone is at the channel centre frequency less the maximum frequency deviation (250 kHz).	0x00 ... 0x27

Output parameters
Table 161. ACI_HAL_RX_START output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.3.18
ACI_HAL_RX_STOP
Description

This command stop a previous ACI_HAL_RX_START command

Input parameters

None

Output parameters
Table 162. ACI_HAL_RX_STOP output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.3.19 ACI_HAL_STACK_RESET

Description

This command is equivalent to HCI_RESET, but ensures that Sleep mode is entered immediately after its completion.

Input parameters

None

Output parameters

Table 163. ACI_HAL_STACK_RESET output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4 GAP commands

In Table 164 "Y" means that the corresponding command applies to the dedicated BLE stack variant, namely LO / BO / PO / BF / LB, respectively, for Link layer only / Beacon only / Peripheral only / Basic feature / Link layer only basic.

Table 164. GAP commands list

Command	OpCode	LO	PO	BO	BF	LB
ACI_GAP_SET_NON_DISCOVERABLE	0xFC81	-	Y	-	Y	-
ACI_GAP_SET_LIMITED_DISCOVERABLE	0xFC82	-	Y	-	Y	-
ACI_GAP_SET_DISCOVERABLE	0xFC83	-	Y	-	Y	-
ACI_GAP_SET_DIRECT_CONNECTABLE	0xFC84	-	Y	-	Y	-
ACI_GAP_SET_IO_CAPABILITY	0xFC85	-	Y	-	Y	-
ACI_GAP_SET_AUTHENTICATION_REQUIREMENT	0xFC86	-	Y	-	Y	-
ACI_GAP_SET_AUTHORIZATION_REQUIREMENT	0xFC87	-	Y	-	Y	-
ACI_GAP_PASS_KEY_RESP	0xFC88	-	Y	-	Y	-
ACI_GAP_AUTHORIZATION_RESP	0xFC89	-	Y	-	Y	-
ACI_GAP_INIT	0xFC8A	-	Y	-	Y	-
ACI_GAP_SET_NON_CONNECTABLE	0xFC8B	-	Y	-	Y	-
ACI_GAP_SET_UNDIRECTED_CONNECTABLE	0xFC8C	-	Y	-	Y	-
ACI_GAP_SLAVE_SECURITY_REQ	0xFC8D	-	Y	-	Y	-
ACI_GAP_UPDATE_ADV_DATA	0xFC8E	-	Y	-	Y	-
ACI_GAP_DELETE_AD_TYPE	0xFC8F	-	Y	-	Y	-
ACI_GAP_GET_SECURITY_LEVEL	0xFC90	-	Y	-	Y	-
ACI_GAP_SET_EVENT_MASK	0xFC91	-	Y	-	Y	-
ACI_GAP_CONFIGURE_WHITELIST	0xFC92	-	Y	-	Y	-
ACI_GAP_TERMINATE	0xFC93	-	Y	-	Y	-
ACI_GAP_CLEAR_SECURITY_DB	0xFC94	-	Y	-	Y	-
ACI_GAP_ALLOW_REBOND	0xFC95	-	Y	-	Y	-
ACI_GAP_START_LIMITED_DISCOVERY_PROC	0xFC96	-	-	-	Y	-
ACI_GAP_START_GENERAL_DISCOVERY_PROC	0xFC97	-	-	-	Y	-
ACI_GAP_START_AUTO_CONNECTION_ESTABLISH_PROC	0xFC99	-	-	-	Y	-
ACI_GAP_START_GENERAL_CONNECTION_ESTABLISH_PROC	0xFC9A	-	-	-	Y	-
ACI_GAP_START_SELECTIVE_CONNECTION_ESTABLISH_PROC	0xFC9B	-	-	-	Y	-
ACI_GAP_CREATE_CONNECTION	0xFC9C	-	-	-	Y	-
ACI_GAP_TERMINATE_GAP_PROC	0xFC9D	-	-	-	Y	-
ACI_GAP_START_CONNECTION_UPDATE	0xFC9E	-	-	-	Y	-
ACI_GAP_SEND_PAIRING_REQ	0xFC9F	-	-	-	Y	-
ACI_GAP_RESOLVE_PRIVATE_ADDR	0xFCA0	-	-	-	Y	-
ACI_GAP_SET_BROADCAST_MODE	0xFCA1	-	-	-	Y	-
ACI_GAP_START_OBSERVATION_PROC	0xFCA2	-	-	-	Y	-
ACI_GAP_GET_BONDED_DEVICES	0xFCA3	-	Y	-	Y	-
ACI_GAP_IS_DEVICE_BONDED	0xFCA4	-	Y	-	Y	-

Command	OpCode	LO	PO	BO	BF	LB
ACI_GAP_NUMERIC_COMPARISON_VALUE_CONFIRM_YESNO	0xFCA5	-	Y	-	Y	-
ACI_GAP_PASSKEY_INPUT	0xFCA6	-	Y	-	Y	-
ACI_GAP_GET_OOB_DATA	0xFCA7	-	Y	-	Y	-
ACI_GAP_SET_OOB_DATA	0xFCA8	-	Y	-	Y	-
ACI_GAP_ADD_DEVICES_TO_RESOLVING_LIST	0xFCA9	-	Y	-	Y	-
ACI_GAP_REMOVE_BONDED_DEVICE	0xFCAA	-	Y	-	Y	-
ACI_GAP_ADD_DEVICES_TO_LIST	0xFCAB	-	Y	-	Y	-
ACI_GAP_ADDITIONAL_BEACON_START	0xFCB0	-	Y	-	Y	-
ACI_GAP_ADDITIONAL_BEACON_STOP	0xFCB1	-	Y	-	Y	-
ACI_GAP_ADDITIONAL_BEACON_SET_DATA	0xFCB2	-	Y	-	Y	-
ACI_GAP_ADV_SET_CONFIGURATION	0xFCC0	-	-	-	-	-
ACI_GAP_ADV_SET_ENABLE	0xFCC1	-	-	-	-	-
ACI_GAP_ADV_SET_ADV_DATA	0xFCC2	-	-	-	-	-
ACI_GAP_ADV_SET_SCAN_RESP_DATA	0xFCC3	-	-	-	-	-
ACI_GAP_ADV_REMOVE_SET	0xFCC4	-	-	-	-	-
ACI_GAP_ADV_CLEAR_SETS	0xFCC5	-	-	-	-	-
ACI_GAP_ADV_SET_RANDOM_ADDRESS	0xFCC6	-	-	-	-	-

2.4.1 ACI_GAP_SET_NON_DISCOVERABLE

Description

Put the device in non-discoverable mode. This command disables the LL advertising.

Input parameters

None

Output parameters

Table 165. ACI_GAP_SET_NON_DISCOVERABLE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_COMPLETE_EVENT

2.4.2 ACI_GAP_SET_LIMITED_DISCOVERABLE

Description

Puts the device in limited discoverable mode, making it discoverable for a maximum period of TGAP (lim_adv_timeout) = 180 seconds (from errata). The advertising can be disabled at any time by issuing ACI_GAP_SET_NON_DISCOVERABLE command. The Adv_Interval_Min and Adv_Interval_Max parameters are optional. If both are set to 0, the GAP uses default values for adv intervals for limited discoverable mode (250 and 500 ms, respectively). To allow a fast connection, the host can set Local_Name, Service_Uuid_List, Slave_Conn_Interval_Min and Slave_Conn_Interval_Max. If provided, these data are inserted into the advertising packet payload as AD data: these parameters are optional, their values can be set in advertised data using GAP_Update_Adv_Data command separately. The total size of data in advertising packet cannot exceed 31 bytes. With this command, the BLE stack also adds automatically the following standard AD types:

- AD flags
- Power level when advertising timeout happens (i.e. limited discovery period has elapsed), controller generates ACI_GAP_LIMITED_DISCOVERABLE_EVENT event

Input parameters

Table 166. ACI_GAP_SET_LIMITED_DISCOVERABLE input parameters

Parameter	Size	Description	Possible values
Advertising_Type	1	Advertising type	0x00: ADV_IND (connectable undirected advertising) 0x02: ADV_SCAN_IND (scannable undirected advertising) 0x03: ADV_NONCONN_IND (non connectable undirected advertising)
Advertising_Interval_Min	2	Minimum advertising interval. Time = $N * 0.625$ ms	0x0020 (20 ms) ... 0x4000 (10240 ms)
Advertising_Interval_Max	2	Maximum advertising interval. Time = $N * 0.625$ ms	0x0020 (20 ms) ... 0x4000 (10240 ms)
Own_Address_Type	1	Own address type: if Privacy is disabled, the address can be public or static random, otherwise, it can be a resolvable or a non-resolvable private address.	0x00: Public device address 0x01: Random device address 0x02: Resolvable private address 0x03: Non resolvable private address
Advertising_Filter_Policy	1	Advertising filter policy: not applicable (the value of Advertising_Filter_Policy parameter is not used inside the Stack)	-
Local_Name_Length	1	Length of the local_name field in octets. If length is set to 0x00, Local_Name parameter is not used.	-
Local_Name	Local_Name_Length	Local name of the device. First byte must be 0x08 for shortened local name or 0x09 for complete local name. No NULL character at the end.	-
Service_Uuid_length	1	Length of the service uuid list in octets. If there is no service to be advertised, set this field to 0x00.	-
Service_Uuid_List	Service_Uuid_length	This is the list of the uuids. First byte is the AD Type.	-
Slave_Conn_Interval_Min	2	Slave connection interval minimum value suggested by peripheral. If Slave_Conn_Interval_Min and Slave_Conn_Interval_Max are not 0x0000, slave connection interval range AD structure is added in advertising data. Connection interval is defined in the following manner: $\text{connIntervalmin} = \text{Slave_Conn_Interval_Min} \times 1.25$ ms.	0x0000 (NaN) 0xFFFF (NaN): no specific minimum 0x0006 (7.50 ms) ... 0x0C80 (4000 ms)

Parameter	Size	Description	Possible values
Slave_Conn_Interval_Max	2	Slave connection interval maximum value suggested by peripheral. If Slave_Conn_Interval_Min and Slave_Conn_Interval_Max are not 0x0000, slave connection interval range AD structure is added in advertising data. Connection interval is defined in the following manner: connIntervalmax = Slave_Conn_Interval_Max x 1.25 ms	• 0x0000 (NaN) • 0xFFFF (NaN) : no specific maximum • 0x0006 (7.50 ms) ... 0x0C80 (4000 ms)

Output parameters

Table 167. ACI_GAP_SET_LIMITED_DISCOVERABLE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)
- [ACI_GAP_LIMITED_DISCOVERABLE_EVENT](#)

2.4.3

ACI_GAP_SET_DISCOVERABLE

Description

Puts the device in general discoverable mode. The device is discoverable until the host issues the ACI_GAP_SET_NON_DISCOVERABLE command. The Adv_Interval_Min and Adv_Interval_Max parameters are optional, if both are set to 0, the GAP uses the default values for general discoverable mode:

- when using connectable undirected advertising events:
 - Adv_Interval_Min = 30 ms
 - Adv_Interval_Max = 60 ms
- when using non-connectable advertising events or scannable undirected advertising events:
 - Adv_Interval_Min = 100 ms
 - Adv_Interval_Max = 150 ms

Host can set the local name, a service UUID list and the slave connection interval range. If provided, these data are inserted into the advertising packet payload as AD data. These parameters are optional in this command. These values can be also set using `aci_gap_update_adv_data()` separately. The total size of data in advertising packet cannot exceed 31 bytes. With this command, the BLE stack also adds automatically the following standard AD types:

- AD Flags
- TX power level

Input parameters

Table 168. ACI_GAP_SET_DISCOVERABLE input parameters

Parameter	Size	Description	Possible values
Advertising_Type	1	Advertising type.	0x00: ADV_IND (connectable undirected advertising) 0x02: ADV_SCAN_IND (scannable undirected advertising) 0x03: ADV_NONCONN_IND (non connectable undirected advertising)
Advertising_Interval_Min	2	Minimum advertising interval. Time = $N * 0.625$ ms	0x0020 (20 ms) ... 0x4000 (10240 ms)
Advertising_Interval_Max	2	Maximum advertising interval Time = $N * 0.625$ ms	0x0020 (20 ms) ... 0x4000 (10240 ms)
Own_Address_Type	1	Own address type: if Privacy is disabled, the address can be public or static random, otherwise, it can be a resolvable or a non-resolvable private address.	0x00: Public device address 0x01: Random device address 0x02: Resolvable private address 0x03: Non resolvable private address
Advertising_Filter_Policy	1	Advertising filter policy: not applicable (the value of Advertising_Filter_Policy parameter is not used inside the stack)	-
Local_Name_Length	1	Length of the local_name field in octets. If length is set to 0x00, Local_Name parameter is not used.	-
Local_Name	Local_Name_Length	Local name of the device. First byte must be 0x08 for shortened local name or 0x09 for complete local name. No NULL character at the end.	-
Service_Uuid_length	1	Length of the service UUID list in octets. If there is no service to be advertised, set this field to 0x00.	-
Service_Uuid_List	Service_Uuid_length	This is the list of the UUIDs . First byte is the AD type.	-
Slave_Conn_Interval_Min	2	Slave connection interval minimum value suggested by peripheral. If Slave_Conn_Interval_Min and Slave_Conn_Interval_Max are not 0x0000, slave connection interval range AD structure is added in advertising data. Connection interval is defined as: $\text{connIntervalmin} = \text{Slave_Conn_Interval_Min} \times 1.25$ ms.	0x0000 (NaN) 0xFFFF (NaN): no specific minimum 0x0006 (7.50 ms) ... 0x0C80 (4000 ms)
Slave_Conn_Interval_Max	2	Slave connection interval maximum value suggested by peripheral. If Slave_Conn_Interval_Min and Slave_Conn_Interval_Max are not 0x0000, slave connection interval range AD structure is added in advertising data. Connection interval is defined as: $\text{connIntervalmax} = \text{Slave_Conn_Interval_Max} \times 1.25$ ms.	0x0000 (NaN) 0xFFFF (NaN): no specific maximum 0x0006 (7.50 ms) ... 0x0C80 (4000 ms)

Output parameters

Table 169. ACI_GAP_SET_DISCOVERABLE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.4

ACI_GAP_SET_DIRECT_CONNECTABLE

Description

Sets the device in direct connectable mode. Device uses direct connectable mode to advertise using high duty cycle advertisement events or low duty cycle advertisement events and the address as either what is specified in the own address type parameter. The command specifies the type of the advertising used. If the privacy is enabled, the type parameter in reconnection address is used for advertising, otherwise the address of the type specified in OwnAddrType is used. The device is in directed connectable mode only for 1.28 seconds. If no connection is established within this duration, the device enters non discoverable mode and advertising must be again enabled explicitly. The controller generates a HCI_ADVERTISING_TIMEOUT_ERR_CODE if the connection was not established and BLE_STATUS_SUCCESS (0x00) if the connection was successfully established.

Input parameters

Table 170. ACI_GAP_SET_DIRECT_CONNECTABLE input parameters

Parameter	Size	Description	Possible values
Own_Address_Type	1	Own address type: if Privacy is disabled, the address can be public or static random, otherwise, it can be a resolvable private address.	• 0x00: Public device address • 0x01: Random device address • 0x02: Resolvable private address
Directed_Advertising_Type	1	Advertising type	• 0x01: High duty cycle directed advertising • 0x04: Low duty cycle directed advertising
Direct_Address_Type	1	The address type of the peer device.	• 0x00: Public device address • 0x01: Random device address
Direct_Address	6	Initiator Bluetooth address	-
Advertising_Interval_Min	2	Minimum advertising interval. Time = N * 0.625 ms	• 0x0006 (3.75 ms): for high duty cycle directed advertising • 0x0020 (20 ms) ... 0x4000 (10240 ms): for low duty cycle directed advertising
Advertising_Interval_Max	2	Maximum advertising interval. Time = N * 0.625 msec.	• 0x0006 (3.75 ms) : for high duty cycle directed advertising • 0x0020 (20 ms) ... 0x4000 (10240 ms) : for low duty cycle directed advertising

Output parameters

Table 171. ACI_GAP_SET_DIRECT_CONNECTABLE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

- [HCI_LE_CONNECTION_COMPLETE_EVENT](#)

2.4.5 ACI_GAP_SET_IO_CAPABILITY

Description

Set the IO capabilities of the device. This command has to be given only when the device is not in a connected state.

Input parameters

Table 172. ACI_GAP_SET_IO_CAPABILITY input parameters

Parameter	Size	Description	Possible values
IO_Capability	1	IO capability of the device.	• 0x00: IO_CAP_DISPLAY_ONLY • 0x01: IO_CAP_DISPLAY_YES_NO • 0x02: IO_CAP_KEYBOARD_ONLY • 0x03: IO_CAP_NO_INPUT_NO_OUTPUT • 0x04: IO_CAP_KEYBOARD_DISPLAY

Output parameters

Table 173. ACI_GAP_SET_IO_CAPABILITY output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.6 ACI_GAP_SET_AUTHENTICATION_REQUIREMENT

Description

Set the authentication requirements for the device. If the OOB_Enable is set to 0, the following 16 octets of OOB_Data are ignored on reception. This command has to be given only when the device is not in a connected state.

Input parameters

Table 174. ACI_GAP_SET_AUTHENTICATION_REQUIREMENT input parameters

Parameter	Size	Description	Possible values
Bonding_Mode	1	Bonding mode. Only if bonding is enabled (0x01), the bonding information is stored in flash	• 0x00: No-bonding mode • 0x01: Bonding mode
MITM_Mode	1	MITM mode	• 0x00: MITM protection not required • 0x01: MITM protection required
SC_Support	1	LE secure connections support	• 0x00: Secure connections pairing not supported • 0x01: Secure connections pairing supported but optional • 0x02: Secure connections pairing supported and mandatory (SC only mode)
KeyPress_Notification_Support	1	Keypress notification support	• 0x00: Keypress notification not supported

Parameter	Size	Description	Possible values
			0x01: Keypress notification supported
Min_Encryption_Key_Size	1	Minimum encryption key size to be used during pairing	-
Max_Encryption_Key_Size	1	Maximum encryption key size to be used during pairing	-
Use_Fixed_Pin	1	Use or not fixed pin. If set to 0x00, then during the pairing process the application is not requested for a pin (Fixed_Pin is used). If set to 0x01, then during pairing process if a passkey is required the application is notified	0x00: use a fixed pin 0x01: do not use a fixed pin
Fixed_Pin	4	Fixed pin to be used during pairing if MIMT protection is enabled. Any random value between 0 to 999999	0 ... 999999
Identity_Address_Type	1	Identity address type	0x00: Public identity address 0x01: Random (static) identity address

Output parameters

Table 175. ACI_GAP_SET_AUTHENTICATION_REQUIREMENT output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.7

ACI_GAP_SET_AUTHORIZATION_REQUIREMENT

Description

Set the authorization requirements of the device. This command has to be given when connected to a device if authorization is required to access services which require authorization.

Input parameters

Table 176. ACI_GAP_SET_AUTHORIZATION_REQUIREMENT input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Authorization_Enable	1	Enable the authorization in the device and when a remote device tries to read/write a characteristic with authorization requirements, the stack sends back an error response with "Insufficient authorization" error code. After pairing is complete a ACI_GAP_AUTHORIZATION_REQ_EVENT is sent to the host.	0x00: Authorization not required 0x01: Authorization required

Output parameters

Table 177. ACI_GAP_SET_AUTHORIZATION_REQUIREMENT output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- `HCI_COMMAND_COMPLETE_EVENT`

2.4.8
ACI_GAP_PASS_KEY_RESP
Description

This command is sent by the host in response to `ACI_GAP_PASS_KEY_REQ_EVENT` event. The command parameter contains the pass key which is used during the pairing process.

Input parameters
Table 178. ACI_GAP_PASS_KEY_RESP input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Pass_Key	4	Pass key that is used during the pairing process. Must be a six-digit decimal number.	0 ... 999999

Output parameters
Table 179. ACI_GAP_PASS_KEY_RESP output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- `HCI_COMMAND_COMPLETE_EVENT`

2.4.9
ACI_GAP_AUTHORIZATION_RESP
Description

Authorize a device to access attributes. This command is sent by the host in response to `ACI_GAP_AUTHORIZATION_REQ_EVENT` event.

Input parameters
Table 180. ACI_GAP_AUTHORIZATION_RESP input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Authorize	1	Authorization response.	• 0x01: Authorize • 0x02: Reject

Output parameters
Table 181. ACI_GAP_AUTHORIZATION_RESP output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- `HCI_COMMAND_COMPLETE_EVENT`

2.4.10

ACI_GAP_INIT

Description

Initialize the GAP layer. Register the GAP service with the GATT. All the standard GAP characteristics are added:

- Device name
- Appearance
- Peripheral preferred connection parameters (peripheral role only): if added, its handle is equal to the Appearance characteristic handle plus 2

If privacy is enabled, this command automatically unmask the HCI_LE_ENHANCED_CONNECTION_COMPLETE_EVENT event.

Input parameters

Table 182. ACI_GAP_INIT input parameters

Parameter	Size	Description	Possible values
Role	1	Bitmap of allowed roles	Bitmask of: • 0x01: Peripheral • 0x02: Broadcaster • 0x04: Central • 0x08: Observer
privacy_enabled	1	Specifies if privacy is enabled or not (only Controller privacy is supported)	• 0x00: Privacy disabled • 0x02: Privacy enabled
device_name_char_len	1	Length of the device name characteristic	-

Output parameters

Table 183. ACI_GAP_INIT output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Service_Handle	2	Handle of the GAP service	-
Dev_Name_Char_Handle	2	Device name characteristic handle	-
Appearance_Char_Handle	2	Appearance characteristic handle	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.11

ACI_GAP_SET_NON_CONNECTABLE

Description

Put the device into non connectable mode. This mode does not support connection. The privacy setting done in the ACI_GAP_INIT command plays a role in deciding the valid parameters for this command. Advertiser filter policy is internally set to 0x00.

Input parameters

Table 184. ACI_GAP_SET_NON_CONNECTABLE input parameters

Parameter	Size	Description	Possible values
Advertising_Event_Type	1	Advertising type.	0x02: ADV_SCAN_IND (scannable undirected advertising) 0x03: ADV_NONCONN_IND (non connectable undirected advertising)
Own_Address_Type	1	Own address type: if Privacy is disabled, the address can be public or static random, otherwise, it can be a resolvable or a non resolvable private address.	0x00: Public device address 0x01: Random device address 0x02: Resolvable private address 0x03: Non resolvable private address

Output parameters
Table 185. ACI_GAP_SET_NON_CONNECTABLE output parameters

Parameter	Size	Description	Possible values
Status	1	Status Error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.12
ACI_GAP_SET_UNDIRECTED_CONNECTABLE
Description

Put the device into undirected connectable mode. If privacy is enabled in the device, a resolvable private address is generated and used as the advertiser's address. If not, the address of the type specified in own_addr_type is used for advertising.

Input parameters
Table 186. ACI_GAP_SET_UNDIRECTED_CONNECTABLE input parameters

Parameter	Size	Description	Possible values
Advertising_Interval_Min	2	Minimum advertising interval. Time = N * 0.625 ms	0x0020 (20 ms) ... 0x4000 (10240 ms)
Advertising_Interval_Max	2	Maximum advertising interval. Time = N * 0.625 ms	0x0020 (20 ms) ... 0x4000 (10240 ms)
Own_Address_Type	1	Own address type: if Privacy is disabled, the address can be public or static random, otherwise, it can be a resolvable private address.	0x00: Public device address 0x01: Random device address 0x02: Resolvable private address
Adv_Filter_Policy	1	Advertising filter policy.	0x00: Allow scan request from any, allow connect request from any 0x03: Allow scan request from white list only, allow connect request from white list only

Output parameters
Table 187. ACI_GAP_SET_UNDIRECTED_CONNECTABLE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.13 ACI_GAP_SLAVE_SECURITY_REQ
Description

Send a slave security request to the master. This command has to be issued to notify the master of the security requirements of the slave. The master may encrypt the link, initiate the pairing procedure, or reject the request.

Input parameters
Table 188. ACI_GAP_SLAVE_SECURITY_REQ input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF

Output parameters
Table 189. ACI_GAP_SLAVE_SECURITY_REQ output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [ACI_GAP_SLAVE_SECURITY_INITIATED_EVENT](#)

2.4.14 ACI_GAP_UPDATE_ADV_DATA
Description

This command can be used to update the advertising data for a particular AD type. If the AD type specified does not exist, then it is added to the advertising data. If the overall advertising data length is more than 31 octets after the update, then the command is rejected and the old data is retained.

Input parameters
Table 190. ACI_GAP_UPDATE_ADV_DATA input parameters

Parameter	Size	Description	Possible values
AdvDataLen	1	Length of AdvData in octets	-
AdvData	AdvDataLen	Advertising data used by the device while advertising.	-

Output parameters
Table 191. ACI_GAP_UPDATE_ADV_DATA output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.15 ACI_GAP_DELETE_AD_TYPE
Description

This command can be used to delete the specified AD type from the advertisement data if present.

Input parameters

Table 192. ACI_GAP_DELETE_AD_TYPE input parameters

Parameter	Size	Description	Possible values
ADType	1	One of the AD types like in Bluetooth specification	-

Output parameters

Table 193. ACI_GAP_DELETE_AD_TYPE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.16

ACI_GAP_GET_SECURITY_LEVEL

Description

This command can be used to get the current security settings of the device.

Input parameters

Table 194. ACI_GAP_GET_SECURITY_LEVEL input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF

Output parameters

Table 195. ACI_GAP_GET_SECURITY_LEVEL output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Security_Mode	1	Security mode.	• 0x01: Security Mode 1 • 0x02: Security Mode 2
Security_Level	1	Security level.	• 0x01: Security Level 1 • 0x02: Security Level 2 • 0x03: Security Level 3 • 0x04: Security Level 4

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.17

ACI_GAP_SET_EVENT_MASK

Description

It allows masking events from the GAP. The default configuration is all the events masked.

Input parameters

Table 196. ACI_GAP_SET_EVENT_MASK input parameters

Parameter	Size	Description	Possible values
GAP_Evt_Mask	2	GAP event mask. Default: 0xFFFF	Bitmask of: 0x0000: No events 0x0001: ACI_GAP_LIMITED_DISCOVERABLE_EVENT 0x0002: ACI_GAP_PAIRING_COMPLETE_EVENT 0x0004: ACI_GAP_PASS_KEY_REQ_EVENT 0x0008: ACI_GAP_AUTHORIZATION_REQ_EVENT 0x0010: ACI_GAP_SLAVE_SECURITY_INITIATED_EVENT 0x0020: ACI_GAP_BOND_LOST_EVENT 0x0080: ACI_GAP_PROC_COMPLETE_EVENT 0x0100: ACI_L2CAP_CONNECTION_UPDATE_REQ_EVENT 0x0200: ACI_L2CAP_CONNECTION_UPDATE_RESP_EVENT 0x0400: ACI_L2CAP_PROC_TIMEOUT_EVENT 0x0800: ACI_GAP_ADDR_NOT_RESOLVED_EVENT

Output parameters

Table 197. ACI_GAP_SET_EVENT_MASK output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.18

ACI_GAP_CONFIGURE_WHITELIST

Description

Add addresses of bonded devices into the controller's white-list. The command returns an error if it was unable to add the bonded devices into the whitelist.

Input parameters

None

Output parameters

Table 198. ACI_GAP_CONFIGURE_WHITELIST output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.19

ACI_GAP_TERMINATE

Description

Command the controller to terminate the connection. A [HCI_DISCONNECTION_COMPLETE_EVENT](#) event is generated when the link is disconnected. It is important to leave an 100 ms blank window before sending any new command (including system hardware reset), since immediately after [HCI_DISCONNECTION_COMPLETE_EVENT](#) event, system save important information in non volatile memory.

Input parameters

Table 199. ACI_GAP_TERMINATE input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Reason	1	The reason for ending the connection.	0x05: Authentication failure 0x13: Remote user terminated connection 0x14: Remote device terminated connection due to low resources 0x15: Remote device terminated connection due to power-off 0x1A: Unsupported remote feature 0x3B: Unacceptable connection parameters

Output parameters

Table 200. ACI_GAP_TERMINATE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [HCI_DISCONNECTION_COMPLETE_EVENT](#)

2.4.20

ACI_GAP_CLEAR_SECURITY_DB

Description

Clear the security database. All devices in the security database are removed.

Input parameters

None

Output parameters

Table 201. ACI_GAP_CLEAR_SECURITY_DB output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.21

ACI_GAP_ALLOW_REBOND

Description

Allows the security manager to complete the pairing procedure and re-bond with the master. This command is given by the application when it receives the [ACI_GAP_BOND_LOST_EVENT](#) if it wants the re-bonding to happen successfully. If this command is not given on receiving the event, the bonding procedure timeouts.

Input parameters

Table 202. ACI_GAP_ALLOW_REBOND input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF

Output parameters

Table 203. ACI_GAP_ALLOW_REBOND output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.22

ACI_GAP_START_LIMITED_DISCOVERY_PROC

Description

Start the limited discovery procedure. The controller starts active scanning, only the devices in limited discoverable mode are returned to the upper layers. The procedure is terminated when either the upper layers issue a command to terminate the procedure by issuing the command `ACI_GAP_TERMINATE_GAP_PROC` with the procedure code set to 0x01, or a there is a timeout (the timeout value is fixed at 10.24 s). When the procedure is terminated for any of the above reasons, `ACI_GAP_PROC_COMPLETE_EVENT` event is returned with the procedure code set to 0x01. The device found when the procedure is ongoing is returned to the upper layers through the event `HCI_LE_ADVERTISING_REPORT_EVENT`.

Input parameters

Table 204. ACI_GAP_START_LIMITED_DISCOVERY_PROC input parameters

Parameter	Size	Description	Possible values
LE_Scan_Interval	2	This is defined as the time interval from when the Controller started its last LE scan until it begins the subsequent LE scan. Time = N * 0.625 ms	0x0004 (2.50 ms) ... 0x4000 (10240 ms)
LE_Scan_Window	2	Amount of time for the duration of the LE scan. LE_Scan_Window is less than or equal to LE_Scan_Interval. Time = N * 0.625 ms	0x0004 (2.50 ms) ... 0x4000 (10240 ms)
Own_Address_Type	1	Own address type: if Privacy is disabled, the address can be public or static random, otherwise, it can be a resolvable or a non-resolvable private address.	• 0x00: Public device address • 0x01: Random device address • 0x02: Resolvable private address • 0x03: Non resolvable private address
Filter_Duplicates	1	Enable/disable duplicate filtering.	• 0x00: Duplicate filtering disabled • 0x01: Duplicate filtering enabled

Output parameters

Table 205. ACI_GAP_START_LIMITED_DISCOVERY_PROC output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)

- HCI_LE_ADVERTISING_REPORT_EVENT
- ACI_GAP_PROC_COMPLETE_EVENT

2.4.23 ACI_GAP_START_GENERAL_DISCOVERY_PROC

Description

Start the general discovery procedure. The controller is commanded to start active scanning. The procedure is terminated when either the upper layers issue a command to terminate the procedure by issuing the command ACI_GAP_TERMINATE_GAP_PROC with the procedure code set to 0x02 or a timeout happens (the timeout value is fixed at 10.24 s). When the procedure is terminated due to any of the above reasons, ACI_GAP_PROC_COMPLETE_EVENT event is returned with the procedure code set to 0x02.

The device found when the procedure is ongoing is returned to HCI_LE_ADVERTISING_REPORT_EVENT.

Input parameters

Table 206. ACI_GAP_START_GENERAL_DISCOVERY_PROC input parameters

Parameter	Size	Description	Possible values
LE_Scan_Interval	2	This is defined as the time interval from when the controller started its last LE scan until it begins the subsequent LE scan. Time = N * 0.625 ms	0x0004 (2.50 ms) ... 0x4000 (10240 ms)
LE_Scan_Window	2	Amount of time for the duration of the LE scan. LE_Scan_Window is less than or equal to LE_Scan_Interval. Time = N * 0.625 ms	0x0004 (2.50 ms) ... 0x4000 (10240 ms)
Own_Address_Type	1	Own address type: if Privacy is disabled, the address can be public or static random, otherwise, it can be a resolvable or a non-resolvable private address.	• 0x00: Public device address • 0x01: Random device address • 0x02: Resolvable private address • 0x03: Non resolvable private address
Filter_Duplicates	1	Enable/disable duplicate filtering	• 0x00: Duplicate filtering disabled • 0x01: Duplicate filtering enabled

Output parameters

Table 207. ACI_GAP_START_GENERAL_DISCOVERY_PROC output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- HCI_LE_ADVERTISING_REPORT_EVENT
- ACI_GAP_PROC_COMPLETE_EVENT

2.4.24 ACI_GAP_START_AUTO_CONNECTION_ESTABLISH_PROC

Description

Start the auto connection establishment procedure. The devices specified are added to the white list of the controller and a LE_Create_Connection call is made to the controller by GAP with the initiator filter policy set to "use whitelist to determine which advertiser to connect to". When a command is issued to terminate the procedure by upper layer, a LE_Create_Connection_Cancel call is made to the controller by GAP. The procedure is terminated when either a connection is successfully established with one of the specified devices in the white list or the procedure is explicitly terminated by issuing the command ACI_GAP_TERMINATE_GAP_PROC with the procedure code set to 0x08. An ACI_GAP_PROC_COMPLETE_EVENT event is returned with the procedure code set to 0x08. If controller privacy is enabled and the peer device (advertiser) is in the resolving list then the link layer generates a RPA, if it is not then the RPA/NRPA generated by the host is used.

Input parameters

Table 208. ACI_GAP_START_AUTO_CONNECTION_ESTABLISH_PROC input parameters

Parameter	Size	Description	Possible values
LE_Scan_Interval	2	This is defined as the time interval from when the controller started its last LE scan until it begins the subsequent LE scan. Time = $N * 0.625 \text{ ms}$	0x0004 (2.50 ms) ... 0x4000 (10240 ms)
LE_Scan_Window	2	Amount of time for the duration of the LE scan. LE_Scan_Window is less than or equal to LE_Scan_Interval. Time = $N * 0.625 \text{ ms}$	0x0004 (2.50 ms) ... 0x4000 (10240 ms)
Own_Address_Type	1	Own address type: if Privacy is disabled, the address can be public or static random, otherwise, it can be a resolvable or a non-resolvable private address.	0x00: Public address 0x01: Static random address 0x02: Resolvable private address 0x03: Non resolvable private address
Conn_Interval_Min	2	Minimum value for the connection event interval. This is less than or equal to Conn_Interval_Max. Time = $N * 1.25 \text{ ms}$	0x0006 (7.50 ms) ... 0x0C80 (4000 ms)
Conn_Interval_Max	2	Maximum value for the connection event interval. This is greater than or equal to Conn_Interval_Min. Time = $N * 1.25 \text{ ms}$	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)
Conn_Latency	2	Slave latency for the connection in number of connection events.	0x0000 ... 0x01F3
Supervision_Timeout	2	Supervision timeout for the LE Link. It is a multiple of 10 ms and larger than $(1 + \text{connSlaveLatency}) * \text{connInterval} * 2$. Time = $N * 10 \text{ ms}$	0x000A (100 ms) ... 0x0C80 (32000 ms)
Minimum_CE_Length	2	Information parameter about the minimum length of connection needed for this LE connection. Time = $N * 0.625 \text{ ms}$	0x0000 (0.000 ms) ... 0xFFFF (40959.375 ms)
Maximum_CE_Length	2	Information parameter about the maximum length of connection needed for this LE connection. Time = $N * 0.625 \text{ ms}$	0x0000 (0.000 ms) ... 0xFFFF (40959.375 ms)
Num_of_Whitelist_Entries	1	Number of devices that have to be added to the white list.	-
Peer_Address_Type[i]	1	Address type.	0x00: Public device address 0x01: Random device address
Peer_Address[i]	6	Public device address or random device address of the device to be added to the white list.	-

Output parameters

Table 209. ACI_GAP_START_AUTO_CONNECTION_ESTABLISH_PROC output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [ACI_GAP_PROC_COMPLETE_EVENT](#)

2.4.25

ACI_GAP_START_GENERAL_CONNECTION_ESTABLISH_PROC

Description

Start a general connection establishment procedure. The host enables scanning in the controller with the scanner filter policy set to "accept all advertising packets" and from the scanning results, all the devices are sent to the upper layer using [HCI_LE_ADVERTISING_REPORT_EVENT](#). The upper layer then has to select the device to whom it wants to connect by issuing the command [ACI_GAP_CREATE_CONNECTION](#). If privacy is enabled, then either a private resolvable address or a non resolvable address, based on the address type specified in the command is set as the scanner address, but the gap create connection always uses a private resolvable address if the general connection establishment procedure is active. The procedure is terminated when a connection is established or the upper layer terminates it by issuing the command [ACI_GAP_TERMINATE_GAP_PROC](#) with the procedure code set to 0x10. On procedure completion a [ACI_GAP_PROC_COMPLETE_EVENT](#) event is generated with the procedure code set to 0x10. If controller privacy is enabled and the peer device (advertiser) is in the resolving list then the link layer generates a RPA, if it is not the RPA/NRPA generated by the host is used.

Input parameters

Table 210. ACI_GAP_START_GENERAL_CONNECTION_ESTABLISH_PROC input parameters

Parameter	Size	Description	Possible values
LE_Scan_Type	1	Passive or active scanning. With active scanning SCAN_REQ packets are sent.	• 0x00: Passive scanning • 0x01: Active scanning
LE_Scan_Interval	2	This is defined as the time interval from when the controller started its last LE scan until it begins the subsequent LE scan. Time = N * 0.625 ms	0x0004 (2.50 ms) ... 0x4000 (10240 ms)
LE_Scan_Window	2	Amount of time for the duration of the LE scan. LE_Scan_Window is less than or equal to LE_Scan_Interval. Time = N * 0.625 ms	0x0004 (2.50 ms) ... 0x4000 (10240 ms)
Own_Address_Type	1	Own address type: if Privacy is disabled, the address can be public or static random, otherwise, it can be a resolvable or a non-resolvable private address.	• 0x00: Public device address • 0x01: Random device address • 0x02: Resolvable private address • 0x03: Non resolvable private address
Scanning_Filter_Policy	1	Scanning filter policy: • 0x00 Accept all advertisement packets. Directed advertising packets which are not addressed for this device is ignored. • 0x01 Ignore advertisement packets from devices not in the white list Only. Directed advertising packets which are not addressed for this device is ignored.	• 0x00: Accept all • 0x01: Ignore devices not in the White List • 0x02: Accept all (use resolving list) • 0x03: Ignore devices not in the white list (use resolving list)

Parameter	Size	Description	Possible values
		0x02 Accept all undirected advertisement packets (it is allowed only if controller privacy is enabled). Directed advertisement packets where initiator address is an RPA and directed advertisement packets addressed to this device is accepted. 0x03 Accept all undirected advertisement packets from devices that are in the white list. Directed advertisement packets where initiator address is RPA and directed advertisement packets addressed to this device is accepted. <i>Note: If controller privacy is enabled Scanning_Filter_Policy can only assume values 0x00 or 0x02.</i>	
Filter_Duplicates	1	Enable/disable duplicate filtering.	0x00: Duplicate filtering disabled 0x01: Duplicate filtering enabled

Output parameters

Table 211. ACI_GAP_START_GENERAL_CONNECTION_ESTABLISH_PROC output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [ACI_GAP_PROC_COMPLETE_EVENT](#)

2.4.26

ACI_GAP_START_SELECTIVE_CONNECTION_ESTABLISH_PROC

Description

Start a selective connection establishment procedure. The GAP adds the specified device addresses into white list and enables scanning in the controller with the scanner filter policy set to "accept packets only from devices in white list". All the devices found are sent to the upper layer by the event [HCI_LE_ADVERTISING_REPORT_EVENT](#). The upper layer then has to select one of the devices to whom it wants to connect by issuing the command [ACI_GAP_CREATE_CONNECTION](#). On completion of the procedure a [ACI_GAP_PROC_COMPLETE_EVENT](#) event is generated with the procedure code set to 0x20. The procedure is terminated when a connection is established or the upper layer terminates the procedure by issuing the command [ACI_GAP_TERMINATE_GAP_PROC](#) with the procedure code set to 0x20. If controller privacy is enabled and the peer device (advertiser) is in the resolving list the link layer generates a RPA, if not the RPA/NRPA generated by the host is used.

Input parameters

Table 212. ACI_GAP_START_SELECTIVE_CONNECTION_ESTABLISH_PROC input parameters

Parameter	Size	Description	Possible values
LE_Scan_Type	1	Passive or active scanning. With active scanning SCAN_REQ packets are sent.	0x00: Passive scanning 0x01: Active scanning
LE_Scan_Interval	2	This is defined as the time interval from when the controller started its last LE scan until it begins the subsequent LE scan. Time = N * 0.625 ms	0x0004 (2.50 ms) ... 0x4000 (10240. ms)
LE_Scan_Window	2	Amount of time for the duration of the LE scan. LE_Scan_Window is less than or equal to LE_Scan_Interval.	0x0004 (2.50 ms) ... 0x4000 (10240 ms)

Parameter	Size	Description	Possible values
		Time = N * 0.625 ms	
Own_Address_Type	1	Own address type: if Privacy is disabled, the address can be public or static random, otherwise, it can be a resolvable or a non-resolvable private address.	0x00: Public device address 0x01: Random device address 0x02: Resolvable private address 0x03: Non resolvable private address
Scanning_Filter_Policy	1	Scanning filter policy: 0x00 Accept all advertisement packets. Directed advertising packets which are not addressed for this device is ignored. 0x01 Ignore advertisement packets from devices not in the white list Only. Directed advertising packets which are not addressed for this device is ignored. 0x02 Accept all undirected advertisement packets (it is allowed only if controller privacy is enabled). Directed advertisement packets where initiator address is a RPA and directed advertisement packets addressed to this device is accepted. 0x03 Accept all undirected advertisement packets from devices that are in the white list. Directed advertisement packets where initiator address is RPA and directed advertisement packets addressed to this device is accepted. <i>Note: if controller privacy is enabled Scanning_Filter_Policy can only assume values 0x01 or 0x03.</i>	0x00: Accept all 0x01: Ignore devices not in the white list 0x02: Accept all (use resolving list) 0x03: Ignore devices not in the white list (use resolving list)
Filter_Duplicates	1	Enable/disable duplicate filtering.	0x00: Duplicate filtering disabled 0x01: Duplicate filtering enabled
Num_of_Whitelist_Entries	1	Number of devices that have to be added to the white list.	-
Peer_Address_Type[i]	1	Address type.	0x00: Public device address 0x01: Random device address
Peer_Address[i]	6	Public device address or random device address of the device to be added to the white list.	-

Output parameters

Table 213. ACI_GAP_START_SELECTIVE_CONNECTION_ESTABLISH_PROC output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_GAP_PROC_COMPLETE_EVENT

2.4.27

ACI_GAP_CREATE_CONNECTION

Description

Start the direct connection establishment procedure. A LE_Create_Connection call is made to the controller by GAP with the initiator filter policy set to "ignore white list and process connectable advertising packets only for the specified device".

The procedure can be terminated explicitly by the upper layer by issuing the command ACI_GAP_TERMINATE_GAP_PROC. When a command is issued to terminate the procedure by upper layer, a HCI_LE_CREATE_CONNECTION_CANCEL call is made to the controller by GAP. On termination of the procedure, a HCI_LE_CONNECTION_COMPLETE_EVENT event is returned. The procedure can be explicitly terminated by the upper layer by issuing the command ACI_GAP_TERMINATE_GAP_PROC with the procedure_code set to 0x40. If controller privacy is enabled and the peer device (advertiser) is in the resolving list then the link layer generates a RPA, if it is not then the RPA/NRPA generated by the host is used.

Input parameters

Table 214. ACI_GAP_CREATE_CONNECTION input parameters

Parameter	Size	Description	Possible values
LE_Scan_Interval	2	This is defined as the time interval from when the controller started its last LE scan until it begins the subsequent LE scan. Time = $N * 0.625 \text{ ms}$	0x0004 (2.500 ms) ... 0x4000 (10240.000 ms)
LE_Scan_Window	2	Amount of time for the duration of the LE scan. LE_Scan_Window shall be less than or equal to LE_Scan_Interval. Time = $N * 0.625 \text{ ms}$	0x0004 (2.500 ms) ... 0x4000 (10240.000 ms)
Peer_Address_Type	1	The address type of the peer device.	0x00: Public device address 0x01: Random device address
Peer_Address	6	Public device address or random device address of the device to be connected.	-
Own_Address_Type	1	Own address type: if Privacy is disabled, the address can be public or static random, otherwise, it can be a resolvable private address.	0x00: Public device address 0x01: Random device address 0x02: Resolvable private address
Conn_Interval_Min	2	Minimum value for the connection event interval. This shall be less than or equal to Conn_Interval_Max. Time = $N * 1.25 \text{ ms}$	0x0006 (7.50 ms) ... 0x0C80 (4000 ms)
Conn_Interval_Max	2	Maximum value for the connection event interval. This shall be greater than or equal to Conn_Interval_Min. Time = $N * 1.25 \text{ ms}$	0x0006 (7.50 ms) ... 0x0C80 (4000 ms)
Conn_Latency	2	Slave latency for the connection in number of connection events.	0x0000 ... 0x01F3
Supervision_Timeout	2	Supervision timeout for the LE link. It shall be a multiple of 10 ms and larger than $(1 + \text{connSlaveLatency}) * \text{connInterval} * 2$. Time = $N * 10 \text{ ms}$	0x000A (100 ms) ... 0x0C80 (32000 ms)
Minimum_CE_Length	2	Information parameter about the minimum length of connection needed for this LE connection. Time = $N * 0.625 \text{ ms}$	0x0000 (0.000 ms) ... 0xFFFF (40959.375 ms)
Maximum_CE_Length	2	Information parameter about the maximum length of connection needed for this LE connection. Time = $N * 0.625 \text{ ms}$	0x0000 (0.000 ms) ... 0xFFFF (40959.375 ms)

Output parameters

Table 215. ACI_GAP_CREATE_CONNECTION output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [HCI_LE_CONNECTION_COMPLETE_EVENT](#)

2.4.28
ACI_GAP_TERMINATE_GAP_PROC
Description

Terminate the specified GATT procedure. An ACI_GAP_PROC_COMPLETE_EVENT event is returned with the procedure code set to the corresponding procedure.

Input parameters
Table 216. ACI_GAP_TERMINATE_GAP_PROC input parameters

Parameter	Size	Description	Possible values
Procedure_Code	1	GAP procedure bitmap.	• 0x00: No events • 0x01: GAP_LIMITED_DISCOVERY_PROC • 0x02: GAP_GENERAL_DISCOVERY_PROC • 0x04: GAP_NAME_DISCOVERY_PROC • 0x08: GAP_AUTO_CONNECTION_ESTABLISHMENT_PROC • 0x10: GAP_GENERAL_CONNECTION_ESTABLISHMENT_PROC • 0x20: GAP_SELECTIVE_CONNECTION_ESTABLISHMENT_PROC • 0x40: GAP_DIRECT_CONNECTION_ESTABLISHMENT_PROC • 0x80: GAP_OBSERVATION_PROC

Output parameters
Table 217. ACI_GAP_TERMINATE_GAP_PROC output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)
- [ACI_GAP_PROC_COMPLETE_EVENT](#)

2.4.29
ACI_GAP_START_CONNECTION_UPDATE
Description

Start the connection update procedure (only when role is Master). A HCI_LE_CONNECTION_UPDATE is called. On completion of the procedure, an HCI_LE_CONNECTION_UPDATE_COMPLETE_EVENT event is returned to the upper layer.

Input parameters
Table 218. ACI_GAP_START_CONNECTION_UPDATE input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Conn_Interval_Min	2	Minimum value for the connection event interval. This is less than or equal to Conn_Interval_Max.	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)

Parameter	Size	Description	Possible values
		Time = N * 1.25 ms	
Conn_Interval_Max	2	Maximum value for the connection event interval. This is greater than or equal to Conn_Interval_Min. Time = N * 1.25 ms	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)
Conn_Latency	2	Slave latency for the connection in number of connection events.	0x0000 ... 0x01F3
Supervision_Timeout	2	Supervision timeout for the LE link. It is a multiple of 10 ms and larger than (1 + connSlaveLatency) * connInterval * 2. Time = N * 10 msec.	0x000A (100 ms) ... 0x0C80 (32000 ms)
Minimum_CE_Length	2	Information parameter about the minimum length of connection needed for this LE connection. Time = N * 0.625 ms	0x0000 (0.000 ms) ... 0xFFFF (40959.375 ms)
Maximum_CE_Length	2	Information parameter about the maximum length of connection needed for this LE connection. Time = N * 0.625 ms	0x0000 (0.000 ms) ... 0xFFFF (40959.375 ms)

Output parameters

Table 219. ACI_GAP_START_CONNECTION_UPDATE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [HCI_LE_CONNECTION_UPDATE_COMPLETE_EVENT](#)

2.4.30

ACI_GAP_SEND_PAIRING_REQ

Description

Send the SM pairing request to start a pairing process. The authentication requirements and IO capabilities must be set before issuing this command using the ACI_GAP_SET_IO_CAPABILITY and ACI_GAP_SET_AUTHENTICATION_REQUIREMENT commands. A ACI_GAP_PAIRING_COMPLETE_EVENT event is returned after the pairing process is completed.

Input parameters

Table 220. ACI_GAP_SEND_PAIRING_REQ input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Force_Rebond	1	If 1, pairing request is sent even if the device was previously bonded, otherwise pairing request is not sent.	• 0x00: NO • 0x01: YES

Output parameters

Table 221. ACI_GAP_SEND_PAIRING_REQ output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)

- [ACI_GAP_PAIRING_COMPLETE_EVENT](#)

2.4.31

ACI_GAP_RESOLVE_PRIVATE_ADDR

Description

This command tries to resolve the address provided with the IRKs present in its database. If the address is resolved successfully with any one of the IRKs present in the database, it returns success and also the corresponding public/static random address stored with the IRK in the database.

Input parameters

Table 222. ACI_GAP_RESOLVE_PRIVATE_ADDR input parameters

Parameter	Size	Description	Possible values
Address	6	Address to be resolved	-

Output parameters

Table 223. ACI_GAP_RESOLVE_PRIVATE_ADDR output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Actual_Address	6	The public or static random address of the peer device, distributed during pairing phase.	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.32

ACI_GAP_SET_BROADCAST_MODE

Description

This command puts the device into broadcast mode. A privacy enabled device uses either a resolvable private address or a non-resolvable private address as specified in the Own_Addr_Type parameter of the command.

Input parameters

Table 224. ACI_GAP_SET_BROADCAST_MODE input parameters

Parameter	Size	Description	Possible values
Advertising_Interval_Min	2	Minimum advertising interval. Time = N * 0.625 ms	0x0020 (20 ms) ... 0x4000 (10240 ms)
Advertising_Interval_Max	2	Maximum advertising interval. Time = N * 0.625 ms	0x0020 (20ms) ... 0x4000 (10240 ms)
Advertising_Type	1	Non connectable advertising type	• 0x02: ADV_SCAN_IND (Scannable undirected advertising) • 0x03: ADV_NONCONN_IND (Non connectable undirected advertising)
Own_Address_Type	1	If privacy is disabled, then the address can be public or static random. Otherwise, it can be a resolvable or a non-resolvable private address.	• 0x00: Public address • 0x01: Static random address • 0x02: Resolvable private address • 0x03: Non-resolvable private address
Adv_Data_Length	1	Length of the advertising data in the advertising packet.	-

Parameter	Size	Description	Possible values
Adv_Data	Adv_Data_Length	Advertising data used by the device while advertising.	-
Num_of_Whitelist_Entries	1	Number of devices that have to be added to the white list.	-
Peer_Address_Type[i]	1	Address type.	0x00: Public device address 0x01: Random device address
Peer_Address[i]	6	Public device address or random device address of the device to be added to the white list.	-

Output parameters

Table 225. ACI_GAP_SET_BROADCAST_MODE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.33

ACI_GAP_START_OBSERVATION_PROC

Description

Starts an observation procedure, when the device is in observer role. The host enables scanning in the controller. The advertising reports are sent to the upper layer using standard LE advertising report event. If controller privacy is enabled and the peer device (advertiser) is in the resolving list the link layer generates an RPA, if not the RPA/NRPA generated by the host is used.

Input parameters

Table 226. ACI_GAP_START_OBSERVATION_PROC input parameters

Parameter	Size	Description	Possible values
LE_Scan_Interval	2	This is defined as the time interval from when the controller started its last LE scan until it begins the subsequent LE scan. Time = N * 0.625 ms	0x0004 (2.500 ms) ... 0x4000 (10240.000 ms)
LE_Scan_Window	2	Amount of time for the duration of the LE scan. LE_Scan_Window is less than or equal to LE_Scan_Interval. Time = N * 0.625 ms	0x0004 (2.500 ms) ... 0x4000 (10240.000 ms)
LE_Scan_Type	1	Passive or active scanning. With active scanning SCAN_REQ packets are sent.	0x00: Passive scanning 0x01: Active scanning
Own_Address_Type	1	Own address type: if Privacy is disabled, the address can be public or static random; otherwise, it can be a resolvable private address or a non-resolvable private address.	0x00: Public device address 0x01: Random device address 0x02: Resolvable private address 0x03: Non resolvable private address
Filter_Duplicates	1	Enable/disable duplicate filtering.	0x00: Duplicate filtering disabled 0x01: Duplicate filtering enabled
Scanning_Filter_Policy	1	Scanning filter policy: 0x00 Accept all advertisement packets (it is allowed only if controller privacy is enabled). Directed advertising packets which are not addressed for this device is ignored. 0x01 Ignore advertisement packets from devices not in the white list. Only. Directed advertising packets which are not addressed for this device is ignored. 0x02 Accept all undirected advertisement packets (it is allowed only if controller privacy is enabled). Directed advertisement packets where initiator address is a RPA and directed advertisement packets addressed to this device is accepted. 0x03 Accept all undirected advertisement packets from devices that are in the white list. Directed advertisement packets where initiator address is RPA and directed advertisement packets addressed to this device is accepted.	0x00: Accept all 0x01: Ignore devices not in the white list 0x02: Accept all (use resolving list) 0x03: Ignore devices not in the white list (use resolving list)

Output parameters

Table 227. ACI_GAP_START_OBSERVATION_PROC output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- HCI_LE_ADVERTISING_REPORT_EVENT

2.4.34

ACI_GAP_GET_BONDED_DEVICES

Description

This command gets the list of the devices which are bonded. It returns the number of addresses and the corresponding address types and values.

Input parameters

None

Output parameters

Table 228. ACI_GAP_GET_BONDED_DEVICES output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Num_of_Addresses	1	The number of bonded devices	-
Address_Type[i]	1	Address type.	0x00: Public device address 0x01: Random device address
Address[i]	6	Public device address or random device address of the device to be added to the white list.	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.35

ACI_GAP_IS_DEVICE_BONDED

Description

The command finds whether the device, whose address is specified in the command, is bonded. If the device is using a resolvable private address and it has been bonded, then the command returns BLE_STATUS_SUCCESS.

Input parameters

Table 229. ACI_GAP_IS_DEVICE_BONDED input parameters

Parameter	Size	Description	Possible values
Peer_Address_Type	1	Address type.	0x00: Public device address 0x01: Random device address
Peer_Address	6	Address used by the peer device while advertising	-

Output parameters

Table 230. ACI_GAP_IS_DEVICE_BONDED output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.36

ACI_GAP_NUMERIC_COMPARISON_VALUE_CONFIRM_YESNO

Description

This command allows the user to validate/confirm or not the Numeric Comparison value shown through the ACI_GAP_Numeric_Comparison_Value_Event.

Input parameters

Table 231. ACI_GAP_NUMERIC_COMPARISON_VALUE_CONFIRM_YESNO input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Confirm_Yes_No	1	0 : The Numeric values showed on both local and peer device are different 1 : The Numeric values showed on both local and peer device are equal!	0x00: No 0x01: Yes

Output parameters

Table 232. ACI_GAP_NUMERIC_COMPARISON_VALUE_CONFIRM_YESNO output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.37

ACI_GAP_PASSKEY_INPUT

Description

This command permits to signal to the stack the input type detected during passkey input.

Input parameters

Table 233. ACI_GAP_PASSKEY_INPUT input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Input_Type	1	Passkey input type detected	0x00: Passkey entry started 0x01: Passkey digit entered 0x02: Passkey digit erased 0x03: Passkey cleared 0x04: Passkey entry completed

Output parameters

Table 234. ACI_GAP_PASSKEY_INPUT output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.38

ACI_GAP_GET_OOB_DATA

Description

This command is sent by the ser to get (to extract from the stack) the OOB data generated by the stack itself.

Input parameters

Table 235. ACI_GAP_GET_OOB_DATA input parameters

Parameter	Size	Description	Possible values
OOB_Data_Type	1	OOB data type	0x00: TK 0x01: Random 0x02: Confirm

Output parameters
Table 236. ACI_GAP_GET_OOB_DATA output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Address_Type	1	Identity address type	0x00: Public identity address 0x01: Random (static) identity address
Address	6	Public or random (static) address of this device	
OOB_Data_Type	1	OOB data type	0x00: TK (LP v4.1) 0x01: Random (SC) 0x02: Confirm (SC)
OOB_Data_Len	1	Length of OOB data	-
OOB_Data	16	Local pairing data intended to the remote device to be sent via OOB	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.39
ACI_GAP_SET_OOB_DATA
Description

This command is sent (by the user) to input the OOB data arrived via OOB communication.

Input parameters
Table 237. ACI_GAP_SET_OOB_DATA input parameters

Parameter	Size	Description	Possible values
Device_Type	1	OOB device type	0x00: Local device 0x01: Remote device
Address_Type	1	Identity address type.	0x00: Public identity address 0x01: Random (static) identity address
Address	6	Public or random (static) address of the peer device	-
OOB_Data_Type	1	OOB data type	0x00: TK (LP v4.1) 0x01: Random (SC) 0x02: Confirm (SC)
OOB_Data_Len	1	Length of OOB data	-
OOB_Data	16	Pairing data received through OOB from remote device	-

Output parameters

Table 238. ACI_GAP_SET_OOB_DATA output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.40
ACI_GAP_ADD_DEVICES_TO_RESOLVING_LIST
Description

This command is used to add devices to the list of address translations used to resolve resolvable private addresses in the controller.

Input parameters
Table 239. ACI_GAP_ADD_DEVICES_TO_RESOLVING_LIST input parameters

Parameter	Size	Description	Possible values
Num_of_Resolving_list_Entries	1	Number of devices that have to be added to the resolving list.	-
Peer_Identity_Address_Type[i]	1	Identity address type.	• 0x00: Public identity address • 0x01: Random (static) identity address
Peer_Identity_Address[i]	6	Public or random (static) identity address of the peer device	-
Clear_Resolving_List	1	Clear the resolving list	• 0x00: Do not clear • 0x01: Clear before adding

Output parameters
Table 240. ACI_GAP_ADD_DEVICES_TO_RESOLVING_LIST output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.41
ACI_GAP_REMOVE_BONDED_DEVICE
Description

This command is used to remove a specified device from bonding table.

Input parameters
Table 241. ACI_GAP_REMOVE_BONDED_DEVICE input parameters

Parameter	Size	Description	Possible values
Peer_Identity_Address_Type	1	Identity address type.	• 0x00: Public identity address • 0x01: Random (static) identity address
Peer_Identity_Address	6	Public or random (static) identity address of the peer device	-

Output parameters

Table 242. ACI_GAP_REMOVE_BONDED_DEVICE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.42
ACI_GAP_ADD_DEVICES_TO_LIST
Description

This command is used by the Host to add specific device addresses to the white and/or resolving lists.

Input parameters
Table 243. ACI_GAP_ADD_DEVICES_TO_LIST input parameters

Parameter	Size	Description	Possible values
Num_of_Resolving_list_Entries	1	Number of devices to add to the list	-
Address_Type[i]	1	Address type	• 0x00: public device address • 0x01: random device address
Address[i]	6		-
Mode	1		• 0x00: append only to the resolving list • 0x01: clear and set only the resolving list • 0x02: append only to the white list • 0x03: clear and set only the white • 0x04: append to both lists • 0x05: clear and set both lists

Table 244. ACI_GAP_ADD_DEVICES_TO_LIST output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.43
ACI_GAP_ADDITIONAL_BEACON_START
Description

This command starts an advertising beacon: additional advertising packets can be transmitted independently from the packets transmitted with GAP advertising commands, such as ACI_GAP_SET_DISCOVERABLE or ACI_GAP_SET_LIMITED_DISCOVERABLE.

Input parameters

Table 245. ACI_GAP_ADDITIONAL_BEACON_START input parameters

Parameter	Size	Description	Possible values
Adv_Interval_Min	2	Minimum advertising interval. Time = N * 0.625 msec.	0x0020: 20 ms 0x4000: 10240 ms
Adv_Interval_Max	2	Maximum advertising interval. Time = N * 0.625 msec.	0x0020: 20 ms 0x4000: 10240 ms
Adv_Channel_Map	1	Advertising channel map. Default: 00000111b (all channels enabled).	Bitmask of 0x01: use Channel 37 0x02: use Channel 38 0x04: use Channel 39
Own_Address_Type	1	Own address type: public or static random	0x00: Public device address 0x01: Random device address
Own_Address	6	Public or random device address	-
PA_Level	1	Power amplifier output level. Output power is indicative and depends on the PCB layout and associated components. Here the values are given at the STM32WB output.	0x00: -40 dBm 0x01: -20.85 dBm 0x02: -19.75 dBm 0x03: -18.85 dBm 0x04: -17.6 dBm 0x05: -16.5 dBm 0x06: -15.25 dBm 0x07: -14.1 dBm 0x08: -13.15 dBm 0x09: -12.05 dBm 0x0A: -10.9 dBm 0x0B: -9.9 dBm 0x0C: -8.85 dBm 0x0D: -7.8 dBm 0x0E: -6.9 dBm 0x0F: -5.9 dBm 0x10: -4.95 dBm 0x11: -4 dBm 0x12: -3.15 dBm 0x13: -2.45 dBm 0x14: -1.8 dBm 0x15: -1.3 dBm 0x16: -0.85 dBm 0x17: -0.5 dBm 0x18: -0.15 dBm 0x19: 0 dBm 0x1A: +1 dBm 0x1B: +2 dBm 0x1C: +3 dBm 0x1D: +4 dBm 0x1E: +5 dBm 0x1F: +6 dBm

Output parameters

Table 246. ACI_GAP_ADDITIONAL_BEACON_START output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.44
ACI_GAP_ADDITIONAL_BEACON_STOP
Description

This command stops the advertising beacon started with ACI_GAP_ADDITIONAL_BEACON_START.

Input parameters

None

Output parameters
Table 247. ACI_GAP_REMOVE_BONDED_DEVICE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.45
ACI_GAP_ADDITIONAL_BEACON_SET_DATA
Description

This command sets the data transmitted by the advertising beacon started with ACI_GAP_ADDITIONAL_BEACON_START. If the advertising beacon is already started, the new data are used in subsequent beacon advertising events.

Input parameters
Table 248. ACI_GAP_ADDITIONAL_BEACON_SET_DATA input parameters

Parameter	Size	Description	Possible values
Adv_Data_Length	1	Length of Adv_Data in octets	-
Adv_Data	Adv_Data_Length	Advertising data used by the device while advertising.	-

Output parameters
Table 249. ACI_GAP_ADDITIONAL_BEACON_SET_DATA output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.46
ACI_GAP_ADV_SET_CONFIGURATION
Description

This command is used to set the extended advertising configuration for one advertising set. In association with ACI_GAP_ADV_SET_SCAN_RESP_DATA, ACI_GAP_ADV_SET_ADV_DATA and ACI_GAP_ADV_SET_ENABLE, it enables to start extended advertising.

These commands must be used to replace ACI_GAP_SET_DISCOVERABLE, ACI_GAP_SET_LIMITED_DISCOVERABLE, ACI_GAP_SET_DIRECT_CONNECTABLE, ACI_GAP_SET_NON_CONNECTABLE, ACI_GAP_SET_UNDIRECTED_CONNECTABLE, and ACI_GAP_SET_BROADCAST_MODE, supporting only legacy advertising.

If bit 0 of Adv_Mode is set, the Own_Address_Type parameter is ignored and Own_Address is set with the ACI_GAP_ADV_SET_RANDOM_ADDRESS command. This mode is valid only for non-connectable advertising.

Input parameters

Table 250. ACI_GAP_ADV_SET_CONFIGURATION input parameters

Parameter	Size	Description	Possible values
Adv_Mode	1	Bitmap of extended advertising modes	Bitmask of: • 0x01: use specific random address
Advertising_Handle	1	Used to identify an advertising set	0x00 ... 0xEF
Adv_Event_Properties	2	Type of advertising event	Bitmask of: • 0x0001: connectable advertising • 0x0002: scannable advertising • 0x0004: directed advertising • 0x0008: high duty cycle directed connectable advertising • 0x0010: use legacy advertising PDUs • 0x0020: anonymous advertising • 0x0040: include TxPower in at least one advertising PDU
Primary_Adv_Interval_Min	4	Minimum advertising interval. Time = N * 0.625 ms.	0x00000020 (20.0 ms) ... 0x00FFFFFF (10485759.375 ms)
Primary_Adv_Interval_Max	4	Maximum advertising interval. Time = N * 0.625 ms.	0x00000020 (20.0 ms) ... 0x00FFFFFF (10485759.375 ms)
Primary_Adv_Channel_Map	1	Advertising channel map.	Bitmask of: • 0x01: use channel 37 • 0x02: use channel 38 • 0x04: use channel 39
Own_Address_Type	1	Own address type: if Privacy is disabled, the address can be public or static random, otherwise, it can be a resolvable or a non-resolvable private address.	• 0x00: Public address • 0x01: Static random address • 0x02: Resolvable private address • 0x03: Non-resolvable private address
Peer_Address_Type	1	Address type of the peer device	• 0x00: public device or public identity address • 0x01: Static random address • 0x02: random device or random (static) identity address
Peer_Address	6	Public device, random device, public identity or random (static) identity address of the device to connect	-
Adv_Filter_Policy	1	Advertising filter policy	• 0x00: process scan and connection requests from all devices (i.e., the white list is not in use) • 0x01: process connection requests from all devices and scan requests only from devices in the white list • 0x02: process scan requests from all devices and connection requests only from devices in the white list • 0x03: process scan and connection requests only from devices in the white list
Adv_TX_Power	1	Advertising TX power. Units: dBm.	-127 ... 20

Parameter	Size	Description	Possible values
Secondary_Adv_Max_Skip	1	Secondary advertising maximum skip	0x00: AUX_ADV_IND must be sent prior to the next advertising event 0x01 ... 0xFF: maximum advertising events that the controller can skip before sending the AUX_ADV_IND packets on the secondary advertising physical channel
Secondary_Adv_PHY	1	Secondary advertising PHY	0x01: secondary advertisement PHY is LE 1M 0x02: secondary advertisement PHY is LE 2M 0x03: secondary advertisement PHY is LE coded (not supported)
Adv_SID	1	Value of the advertising SID subfield in the ADI field of PDU	0x00 ... 0x0F
Scan_Req_Notification_Enable	1	Scan request notifications	0x00: scan disabled 0x01: scan enabled

Table 251. ACI_GAP_ADV_SET_CONFIGURATION output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.47
ACI_GAP_ADV_SET_ENABLE
Description

This command is used to request the controller to enable/disable one or more extended advertising sets.

Input parameters
Table 252. ACI_GAP_ADV_SET_ENABLE input parameters

Parameter	Size	Description	Possible values
Enable	1	Enable/disable advertising	0x00: advertising disabled 0x01: advertising enabled
Num_Sets	1	Number of advertising sets	0x00: disable all advertising sets 0x01 ... 0x3F: number of advertising sets to enable/disable
Advertising_Handle[i]	1	Used to identify an advertising set	0x00 ... 0xEF
Duration[i]	2	Duration of advertising set. Time = N * 10 ms.	0x0000 (0 ms): no advertising duration 0x0001 (10 ms) ... 0xFFFF (655350 ms): advertising duration
Max_Extended_Advertising_Events[i]	1	Maximum number of advertising events	0x00: no maximum number of advertising events 0x01 ... 0xFF: maximum number of extended advertising events the controller attempts to send prior to terminate the extended advertising

Table 253. ACI_GAP_ADV_SET_ENABLE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.48
ACI_GAP_ADV_SET_ADV_DATA
Description

This command is used to request the controller to enable/disable one or more extended advertising sets.

Input parameters
Table 254. ACI_GAP_ADV_SET_ADV_DATA input parameters

Parameter	Size	Description	Possible values
Advertising_Handle	1	Used to identify an advertising set	0x00 ... 0xEF
Operation	1	Advertising operation	• 0x00: Intermediate fragment of fragmented extended advertising data • 0x01: first fragment of fragmented extended advertising data • 0x02: last fragment of fragmented extended advertising data • 0x03: complete extended advertising data • 0x04: unchanged data (just update the advertising DID)
Fragment_Preference	1	Fragment preference	• 0x00: the controller can fragment data • 0x01: the controller must not fragment data, or minimize fragmentation
Advertising_Data_Length	1	Length of Advertising_Data in octets	-
Advertising_Data	Advertising_Data_Length	Data formatted as defined in Bluetooth spec. v.5.2 [Vol 3, Part C, 11].	-

Table 255. ACI_GAP_ADV_SET_ADV_DATA output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.49
ACI_GAP_ADV_SET_SCAN_RESP_DATA
Description

This command is used to provide scan response data used during extended advertising.

Input parameters

Table 256. ACI_GAP_ADV_SET_SCAN_RESP_DATA input parameters

Parameter	Size	Description	Possible values
Advertising_Handle	1	Used to identify an advertising set	0x00 ... 0xEF
Operation	1	Advertising operation	0x00: intermediate fragment of fragmented extended advertising data 0x01: first fragment of fragmented extended advertising data 0x02: last fragment of fragmented extended advertising data 0x03: complete scan response data
Fragment_Preference	1	Fragment preference	0x00: the controller may fragment all data 0x01: the controller must not fragment data, or minimize fragmentation
Scan_Response_Data_Length	1	Length of Scan_Response_Data in octets	-
Scan_Response_Data	Scan_Response_Data_Length	Data formatted as defined in Bluetooth spec. v.5.2 [Vol 3, Part C, 11].	-

Table 257. ACI_GAP_ADV_SET_SCAN_RESP_DATA output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.50
ACI_GAP_ADV_REMOVE_SET
Description

This command is used to request the controller to enable/disable one or more extended advertising sets.

Input parameters
Table 258. ACI_GAP_ADV_REMOVE_SET input parameters

Parameter	Size	Description	Possible values
Advertising_Handle	1	Used to identify an advertising set	0x00 ... 0xEF

Table 259. ACI_GAP_ADV_REMOVE_SET output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.51 ACI_GAP_ADV_CLEAR_SETS

Description

This command is used to remove all existing advertising sets from the controller.

Input parameters

None

Table 260. ACI_GAP_ADV_CLEAR_SETS output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.4.52 ACI_GAP_ADV_SET_RANDOM_ADDRESS

Description

This command is used to set the random device address of an advertising set configured to use specific random address.

Input parameters

Table 261. ACI_GAP_ADV_SET_RANDOM_ADDRESS input parameters

Parameter	Size	Description	Possible values
Advertising_Handle	1	Used to identify an advertising set	0x00 ... 0xEF
Random_Address	6	Random device address	-

Table 262. ACI_GAP_ADV_SET_RANDOM_ADDRESS output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5 GATT/ATT commands

In Table 263 "Y" means that the corresponding command applies to the dedicated BLE stack variant, namely LO / BO / PO / BF / LB, respectively, for Link layer only / Beacon only / Peripheral only / Basic feature / Link layer only basic.

Table 263. GATT/ATT commands list

Command	OpCode	LO	PO	BO	BF	LB
ACI_GATT_INIT	0xFD01	-	Y	-	Y	-
ACI_GATT_ADD_SERVICE	0xFD02	-	Y	-	Y	-
ACI_GATT_INCLUDE_SERVICE	0xFD03	-	Y	-	Y	-
ACI_GATT_ADD_CHAR	0xFD04	-	Y	-	Y	-
ACI_GATT_ADD_CHAR_DESC	0xFD05	-	Y	-	Y	-
ACI_GATT_UPDATE_CHAR_VALUE	0xFD06	-	Y	-	Y	-
ACI_GATT_DEL_CHAR	0xFD07	-	Y	-	Y	-
ACI_GATT_DEL_SERVICE	0xFD08	-	Y	-	Y	-
ACI_GATT_DEL_INCLUDE_SERVICE	0xFD09	-	Y	-	Y	-
ACI_GATT_SET_EVENT_MASK	0xFD0A	-	Y	-	Y	-
ACI_GATT_EXCHANGE_CONFIG	0xFD0B	-	-	-	Y	-
ACI_ATT_FIND_INFO_REQ	0xFD0C	-	-	-	Y	-
ACI_ATT_FIND_BY_TYPE_VALUE_REQ	0xFD0D	-	-	-	Y	-
ACI_ATT_READ_BY_TYPE_REQ	0xFD0E	-	-	-	Y	-
ACI_ATT_READ_BY_GROUP_TYPE_REQ	0xFD0F	-	-	-	Y	-
ACI_ATT_PREPARE_WRITE_REQ	0xFD10	-	-	-	Y	-
ACI_ATT_EXECUTE_WRITE_REQ	0xFD11	-	-	-	Y	-
ACI_GATT_DISC_ALL_PRIMARY_SERVICES	0xFD12	-	-	-	Y	-
ACI_GATT_DISC_PRIMARY_SERVICE_BY_UUID	0xFD13	-	-	-	Y	-
ACI_GATT_FIND_INCLUDED_SERVICES	0xFD14	-	-	-	Y	-
ACI_GATT_DISC_ALL_CHAR_OF_SERVICE	0xFD15	-	-	-	Y	-
ACI_GATT_DISC_CHAR_BY_UUID	0xFD16	-	-	-	Y	-
ACI_GATT_DISC_ALL_CHAR_DESC	0xFD17	-	-	-	Y	-
ACI_GATT_READ_CHAR_VALUE	0xFD18	-	-	-	Y	-
ACI_GATT_READ_USING_CHAR_UUID	0xFD19	-	-	-	Y	-
ACI_GATT_READ_LONG_CHAR_VALUE	0xFD1A	-	-	-	Y	-
ACI_GATT_READ_MULTIPLE_CHAR_VALUE	0xFD1B	-	-	-	Y	-
ACI_GATT_WRITE_CHAR_VALUE	0xFD1C	-	-	-	Y	-
ACI_GATT_WRITE_LONG_CHAR_VALUE	0xFD1D	-	-	-	Y	-
ACI_GATT_WRITE_CHAR_RELIABLE	0xFD1E	-	-	-	Y	-
ACI_GATT_WRITE_LONG_CHAR_DESC	0xFD1F	-	-	-	Y	-
ACI_GATT_READ_LONG_CHAR_DESC	0xFD20	-	-	-	Y	-
ACI_GATT_WRITE_CHAR_DESC	0xFD21	-	-	-	Y	-
ACI_GATT_READ_CHAR_DESC	0xFD22	-	-	-	Y	-
ACI_GATT_WRITE_WITHOUT_RESP	0xFD23	-	-	-	Y	-

Command	OpCode	LO	PO	BO	BF	LB
ACI_GATT_SIGNED_WRITE_WITHOUT_RESP	0xFD24	-	-	-	Y	-
ACI_GATT_CONFIRM_INDICATION	0xFD25	-	-	-	Y	-
ACI_GATT_WRITE_RESP	0xFD26	-	Y	-	Y	-
ACI_GATT_ALLOW_READ	0xFD27	-	Y	-	Y	-
ACI_GATT_SET_SECURITY_PERMISSION	0xFD28	-	Y	-	Y	-
ACI_GATT_SET_DESC_VALUE	0xFD29	-	Y	-	Y	-
ACI_GATT_READ_HANDLE_VALUE	0xFD2A	-	Y	-	Y	-
ACI_GATT_UPDATE_CHAR_VALUE_EXT	0xFD2C	-	Y	-	Y	-
ACI_GATT_DENY_READ	0xFD2D	-	Y	-	Y	-
ACI_GATT_SET_ACCESS_PERMISSION	0xFD2E	-	Y	-	Y	-
ACI_GATT_STORE_DB	0xFD30	-	Y	-	Y	-

2.5.1 ACI_GATT_INIT

Description

Initialize the GATT layer for server and client roles. It adds also the GATT service with service changed characteristic. Until this command is issued the GATT channel not processes any commands even if the connection is opened. This command has to be given before using any of the GAP features.

Input parameters

None

Output parameters

Table 264. ACI_GATT_INIT output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_COMPLETE_EVENT

2.5.2 ACI_GATT_ADD_SERVICE

Description

Add a service to GATT Server. When a service is created in the server, the host needs to reserve the handle ranges for this service using Max_Attribute_Records parameter. This parameter specifies the maximum number of attribute records that can be added to this service (including the service attribute, include attribute, characteristic attribute, characteristic value attribute and characteristic descriptor attribute). Handle of the created service is returned in command complete event. Service declaration is taken from the service pool. The attributes for characteristics and descriptors are allocated from the attribute pool.

Input parameters

Table 265. ACI_GATT_ADD_SERVICE input parameters

Parameter	Size	Description	Possible values
Service_UUID_Type	1	UUID type: 0x01 = 16 bits UUID while 0x02 = 128 bits UUID	-
Service_UUID	2 or 16	16-bit UUID or 128-bit UUID	-
Service_Type	1	Service type	0x01: Primary service 0x02: Secondary service
Max_Attribute_Records	1	Maximum number of attribute records that can be added to this service	-

Output parameters

Table 266. ACI_GATT_ADD_SERVICE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Service_Handle	2	Handle of the Service. When this service is added, a handle is allocated by the server for this service. Server also allocates a range of handles for this service from serviceHandle to <serviceHandle + max_attr_records - 1>	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.3

ACI_GATT_INCLUDE_SERVICE

Description

Include a service given by Include_Start_Handle and Include_End_Handle to another service given by Service_Handle. Attribute server creates an "include" definition attribute and returns the handle of this attribute in Included_handle.

Input parameters

Table 267. ACI_GATT_INCLUDE_SERVICE input parameters

Parameter	Size	Description	Possible values
Service_Handle	2	Handle of the service to whom another service must be included	-
Include_Start_Handle	2	Start handle of the service that must be included in service	-
Include_End_Handle	2	End handle of the service that must be included in service	-
Include_UUID_Type	1	UUID type: 0x01 = 16 bits UUID while 0x02 = 128 bits UUID	-
Include_UUID	2 or 16	16-bit UUID or 128-bit UUID	-

Output parameters

Table 268. ACI_GATT_INCLUDE_SERVICE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Include_Handle	2	Handle of the included declaration	-

Events generated

- HCI_COMMAND_COMPLETE_EVENT

2.5.4

ACI_GATT_ADD_CHAR

Description

Add a characteristic to a service.

Input parameters

Table 269. ACI_GATT_ADD_CHAR input parameters

Parameter	Size	Description	Possible values
Service_Handle	2	Handle of the service to whom the characteristic is added	-
Char_UUID_Type	1	UUID type: 0x01 = 16 bits UUID while 0x02 = 128 bits UUID	-
Char_UUID	2 or 16	16-bit UUID or 128-bit UUID	-
Char_Value_Length	2	Maximum length of the characteristic value	-
Char_Properties	1	Characteristic properties	Bitmask of: • 0x00: CHAR_PROP_NONE • 0x01: CHAR_PROP_BROADCAST (Broadcast) • 0x02: CHAR_PROP_READ (Read) • 0x04: CHAR_PROP_WRITE_WITHOUT_RESP (Write without resp) • 0x08: CHAR_PROP_WRITE (Write) • 0x10: CHAR_PROP_NOTIFY (Notify) • 0x20: CHAR_PROP_INDICATE (Indicate) • 0x40: CHAR_PROP_SIGNED_WRITE (Authenticated signed writes) • 0x80: CHAR_PROP_EXT (Extended properties)
Security_Permissions	1	Security permission flags	Bitmask of: • 0x00: None • 0x01: AUTHEN_READ (need authentication to read) • 0x02: AUTHOR_READ (need authorization to read) • 0x04: ENCRY_READ (need encryption to read) • 0x08: AUTHEN_WRITE (need authentication to write) • 0x10: AUTHOR_WRITE (need authorization to write) • 0x20: ENCRY_WRITE (need encryption to write)
GATT_Evt_Mask	1	GATT event mask	Bitmask of: • 0x00: GATT_DONT_NOTIFY_EVENTS • 0x01: GATT_NOTIFY_ATTRIBUTE_WRITE • 0x02: GATT_NOTIFY_WRITE_REQ_AND_WAIT_FOR_APPL_RESP • 0x04: GATT_NOTIFY_READ_REQ_AND_WAIT_FOR_APPL_RESP
Enc_Key_Size	1	Minimum encryption key size required to read the characteristic	0x07 ... 0x10

Parameter	Size	Description	Possible values
Is_Variable	1	Specify if the characteristic value has a fixed or a variable length	0x00: Fixed length 0x01: Variable length

Output parameters

Table 270. ACI_GATT_ADD_CHAR output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Char_Handle	2	Handle of the Characteristic that has been added. It is the handle of the characteristic declaration. The attribute that holds the characteristic value is allocated at the next handle, followed by the client characteristic configuration descriptor if the characteristic has CHAR_PROP_NOTIFY or CHAR_PROP_INDICATE properties.	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.5

ACI_GATT_ADD_CHAR_DESC

Description

Add a characteristic descriptor to a service.

Input parameters

Table 271. ACI_GATT_ADD_CHAR_DESC input parameters

Parameter	Size	Description	Possible values
Service_Handle	2	Handle of service to whom the characteristic belongs	-
Char_Handle	2	Handle of the characteristic to whom description must be added	-
Char_Desc_Uuid_Type	1	UUID type: 0x01 = 16 bits 0x02 = 128 bits 0x03 = 128 bits 0x04 = 128 bits 0x05 = 128 bits 0x06 = 128 bits 0x07 = 128 bits 0x08 = 128 bits 0x09 = 128 bits 0x0A = 128 bits 0x0B = 128 bits 0x0C = 128 bits 0x0D = 128 bits 0x0E = 128 bits 0x0F = 128 bits 0x10 = 128 bits 0x11 = 128 bits 0x12 = 128 bits 0x13 = 128 bits 0x14 = 128 bits 0x15 = 128 bits 0x16 = 128 bits 0x17 = 128 bits 0x18 = 128 bits 0x19 = 128 bits 0x1A = 128 bits 0x1B = 128 bits 0x1C = 128 bits 0x1D = 128 bits 0x1E = 128 bits 0x1F = 128 bits 0x20 = 128 bits 0x21 = 128 bits 0x22 = 128 bits 0x23 = 128 bits 0x24 = 128 bits 0x25 = 128 bits 0x26 = 128 bits 0x27 = 128 bits 0x28 = 128 bits 0x29 = 128 bits 0x2A = 128 bits 0x2B = 128 bits 0x2C = 128 bits 0x2D = 128 bits 0x2E = 128 bits 0x2F = 128 bits 0x30 = 128 bits 0x31 = 128 bits 0x32 = 128 bits 0x33 = 128 bits 0x34 = 128 bits 0x35 = 128 bits 0x36 = 128 bits 0x37 = 128 bits 0x38 = 128 bits 0x39 = 128 bits 0x3A = 128 bits 0x3B = 128 bits 0x3C = 128 bits 0x3D = 128 bits 0x3E = 128 bits 0x3F = 128 bits 0x40 = 128 bits 0x41 = 128 bits 0x42 = 128 bits 0x43 = 128 bits 0x44 = 128 bits 0x45 = 128 bits 0x46 = 128 bits 0x47 = 128 bits 0x48 = 128 bits 0x49 = 128 bits 0x4A = 128 bits 0x4B = 128 bits 0x4C = 128 bits 0x4D = 128 bits 0x4E = 128 bits 0x4F = 128 bits 0x50 = 128 bits 0x51 = 128 bits 0x52 = 128 bits 0x53 = 128 bits 0x54 = 128 bits 0x55 = 128 bits 0x56 = 128 bits 0x57 = 128 bits 0x58 = 128 bits 0x59 = 128 bits 0x5A = 128 bits 0x5B = 128 bits 0x5C = 128 bits 0x5D = 128 bits 0x5E = 128 bits 0x5F = 128 bits 0x60 = 128 bits 0x61 = 128 bits 0x62 = 128 bits 0x63 = 128 bits 0x64 = 128 bits 0x65 = 128 bits 0x66 = 128 bits 0x67 = 128 bits 0x68 = 128 bits 0x69 = 128 bits 0x6A = 128 bits 0x6B = 128 bits 0x6C = 128 bits 0x6D = 128 bits 0x6E = 128 bits 0x6F = 128 bits 0x70 = 128 bits 0x71 = 128 bits 0x72 = 128 bits 0x73 = 128 bits 0x74 = 128 bits 0x75 = 128 bits 0x76 = 128 bits 0x77 = 128 bits 0x78 = 128 bits 0x79 = 128 bits 0x7A = 128 bits 0x7B = 128 bits 0x7C = 128 bits 0x7D = 128 bits 0x7E = 128 bits 0x7F = 128 bits 0x80 = 128 bits 0x81 = 128 bits 0x82 = 128 bits 0x83 = 128 bits 0x84 = 128 bits 0x85 = 128 bits 0x86 = 128 bits 0x87 = 128 bits 0x88 = 128 bits 0x89 = 128 bits 0x8A = 128 bits 0x8B = 128 bits 0x8C = 128 bits 0x8D = 128 bits 0x8E = 128 bits 0x8F = 128 bits 0x90 = 128 bits 0x91 = 128 bits 0x92 = 128 bits 0x93 = 128 bits 0x94 = 128 bits 0x95 = 128 bits 0x96 = 128 bits 0x97 = 128 bits 0x98 = 128 bits 0x99 = 128 bits 0x9A = 128 bits 0x9B = 128 bits 0x9C = 128 bits 0x9D = 128 bits 0x9E = 128 bits 0x9F = 128 bits 0xA0 = 128 bits 0xA1 = 128 bits 0xA2 = 128 bits 0xA3 = 128 bits 0xA4 = 128 bits 0xA5 = 128 bits 0xA6 = 128 bits 0xA7 = 128 bits 0xA8 = 128 bits 0xA9 = 128 bits 0xAA = 128 bits 0xAB = 128 bits 0xAC = 128 bits 0xAD = 128 bits 0xAE = 128 bits 0xAF = 128 bits 0xB0 = 128 bits 0xB1 = 128 bits 0xB2 = 128 bits 0xB3 = 128 bits 0xB4 = 128 bits 0xB5 = 128 bits 0xB6 = 128 bits 0xB7 = 128 bits 0xB8 = 128 bits 0xB9 = 128 bits 0xBA = 128 bits 0xBB = 128 bits 0xBC = 128 bits 0xBD = 128 bits 0xBE = 128 bits 0xBF = 128 bits 0xC0 = 128 bits 0xC1 = 128 bits 0xC2 = 128 bits 0xC3 = 128 bits 0xC4 = 128 bits 0xC5 = 128 bits 0xC6 = 128 bits 0xC7 = 128 bits 0xC8 = 128 bits 0xC9 = 128 bits 0xCA = 128 bits 0xCB = 128 bits 0xCC = 128 bits 0xCD = 128 bits 0xCE = 128 bits 0xCF = 128 bits 0xD0 = 128 bits 0xD1 = 128 bits 0xD2 = 128 bits 0xD3 = 128 bits 0xD4 = 128 bits 0xD5 = 128 bits 0xD6 = 128 bits 0xD7 = 128 bits 0xD8 = 128 bits 0xD9 = 128 bits 0xDA = 128 bits 0xDB = 128 bits 0xDC = 128 bits 0xDD = 128 bits 0xDE = 128 bits 0xDF = 128 bits 0xE0 = 128 bits 0xE1 = 128 bits 0xE2 = 128 bits 0xE3 = 128 bits 0xE4 = 128 bits 0xE5 = 128 bits 0xE6 = 128 bits 0xE7 = 128 bits 0xE8 = 128 bits 0xE9 = 128 bits 0xEA = 128 bits 0xEB = 128 bits 0xEC = 128 bits 0xED = 128 bits 0xEE = 128 bits 0xEF = 128 bits 0xF0 = 128 bits 0xF1 = 128 bits 0xF2 = 128 bits 0xF3 = 128 bits 0xF4 = 128 bits 0xF5 = 128 bits 0xF6 = 128 bits 0xF7 = 128 bits 0xF8 = 128 bits 0xF9 = 128 bits 0xFA = 128 bits 0xFB = 128 bits 0xFC = 128 bits 0xFD = 128 bits 0xFE = 128 bits 0xFF = 128 bits	-
Char_Desc_Uuid	2 or 16	16-bit UUID or 128-bit UUID	-
Char_Desc_Value_Max_Len	1	Maximum length of the descriptor value	-

Parameter	Size	Description	Possible values
Char_Desc_Value_Length	1	Current length of the characteristic descriptor value	-
Char_Desc_Value	Char_Desc_Value_Length	Value of the characteristic description	-
Security_Permissions	1	Security permission flags	Bitmask of: • 0x00: None • 0x01: AUTHEN_READ (Need authentication to read) • 0x02: AUTHOR_READ (Need authorization to read) • 0x04: ENCRY_READ (Need encryption to read) • 0x08: AUTHEN_WRITE (need authentication to write) • 0x10: AUTHOR_WRITE (need authorization to write) • 0x20: ENCRY_WRITE (need encryption to write)
Access_Permissions	1	Access permission	Bitmask of: • 0x00: None • 0x01: READ • 0x02: WRITE • 0x04: WRITE_WO_RESP • 0x08: SIGNED_WRITE
GATT_Evt_Mask	1	GATT event mask	Bitmask of: • 0x00: GATT_DONT_NOTIFY_EVENTS • 0x01: GATT_NOTIFY_ATTRIBUTE_WRITE • 0x02: GATT_NOTIFY_WRITE_REQ_AND_WAIT_FOR_APPL_RESP • 0x04: GATT_NOTIFY_READ_REQ_AND_WAIT_FOR_APPL_RESP
Enc_Key_Size	1	Minimum encryption key size required to read the characteristic.	0x07 ... 0x10
Is_Variable	1	Specify if the characteristic value has a fixed or a variable length.	• 0x00: Fixed length • 0x01: Variable length

Output parameters

Table 272. ACI_GATT_ADD_CHAR_DESC output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Char_Desc_Handle	2	Handle of the characteristic descriptor	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.6 ACI_GATT_UPDATE_CHAR_VALUE

Description

Updates a characteristic value in a service. If notifications (or indications) are enabled on that characteristic, a notification (or indication) is sent to the client after sending this command to the MCU. The command is queued into the STM32WB command queue. If the buffer is full (because previous commands have not been processed yet) the function returns `BLE_STATUS_INSUFFICIENT_RESOURCES`. This happens if notifications (or indications) are enabled and the application calls `ACI_GATT_UPDATE_CHAR_VALUE` at a rate higher than the one allowed by the link. Throughput on BLE link depends upon connection interval and connection length parameters (decided by the master, see [ACI_L2CAP_CONNECTION_PARAMETER_UPDATE_REQ](#) for more info on how to suggest new connection parameters from a slave). If the application does not want to lose notifications because the MCU buffer becomes full, it has to retry again until the function returns `BLE_STATUS_SUCCESS` or any other error code.

Note that the characteristic is updated only if the command returns `BLE_STATUS_SUCCESS`.

Input parameters

Table 273. ACI_GATT_UPDATE_CHAR_VALUE input parameters

Parameter	Size	Description	Possible values
Service_Handle	2	Handle of service to whom the characteristic belongs	-
Char_Handle	2	Handle of the characteristic declaration	-
Val_Offset	1	The offset from which the attribute value has to be updated. If this is set to 0 and the attribute value is of variable length, then the length of the attribute is set to the Char_Value_Length. If the Val_Offset is set to a value greater than 0, then the length of the attribute is set to the maximum length as specified for the attribute while adding the characteristic.	-
Char_Value_Length	1	Length of the characteristic value in octets	-
Char_Value	Char_Value_Length	Characteristic value	-

Output parameters

Table 274. ACI_GATT_UPDATE_CHAR_VALUE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- `HCI_COMMAND_COMPLETE_EVENT`

2.5.7 ACI_GATT_DEL_CHAR

Description

Delete the specified characteristic from the service.

Input parameters

Table 275. ACI_GATT_DEL_CHAR input parameters

Parameter	Size	Description	Possible values
Serv_Handle	2	Handle of service to whom the characteristic belongs	-
Char_Handle	2	Handle of the characteristic to be deleted	-

Output parameters

Table 276. ACI_GATT_DEL_CHAR output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.8
ACI_GATT_DEL_SERVICE
Description

Delete the specified service from the GATT server database.

Input parameters
Table 277. ACI_GATT_DEL_SERVICE input parameters

Parameter	Size	Description	Possible values
Serv_Handle	2	Handle of the service to be deleted	-

Output parameters
Table 278. ACI_GATT_DEL_SERVICE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.9
ACI_GATT_DEL_INCLUDE_SERVICE
Description

Delete the include definition from the service.

Input parameters
Table 279. ACI_GATT_DEL_INCLUDE_SERVICE input parameters

Parameter	Size	Description	Possible values
Serv_Handle	2	Handle of the service to whom the included service belongs	-
Include_Handle	2	Handle of the included service to be deleted	-

Output parameters
Table 280. ACI_GATT_DEL_INCLUDE_SERVICE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.10
ACI_GATT_SET_EVENT_MASK
Description

Mask events from the GATT. The default configuration is all the events masked.

Input parameters

Table 281. ACI_GATT_SET_EVENT_MASK input parameters

Parameter	Size	Description	Possible values
GATT_Evt_Mask	4	GATT/ATT event mask.	0x00000001: ACI_GATT_ATTRIBUTE_MODIFIED_EVENT 0x00000002: ACI_GATT_PROC_TIMEOUT_EVENT 0x00000004: ACI_ATT_EXCHANGE_MTU_RESP_EVENT 0x00000008: ACI_ATT_FIND_INFO_RESP_EVENT 0x00000010: ACI_ATT_FIND_BY_TYPE_VALUE_RESP_EVENT 0x00000020: ACI_ATT_READ_BY_TYPE_RESP_EVENT 0x00000040: ACI_ATT_READ_RESP_EVENT 0x00000080: ACI_ATT_READ_BLOB_RESP_EVENT 0x00000100: ACI_ATT_READ_MULTIPLE_RESP_EVENT 0x00000200: ACI_ATT_READ_BY_GROUP_TYPE_RESP_EVENT 0x00000800: ACI_ATT_PREPARE_WRITE_RESP_EVENT 0x00001000: ACI_ATT_EXEC_WRITE_RESP_EVENT 0x00002000: ACI_GATT_INDICATION_EVENT 0x00004000: ACI_GATT_NOTIFICATION_EVENT 0x00008000: ACI_GATT_ERROR_RESP_EVENT 0x00010000: ACI_GATT_PROC_COMPLETE_EVENT 0x00020000: ACI_GATT_DISC_READ_CHAR_BY_UUID_RESP_EVENT 0x00040000: ACI_GATT_TX_POOL_AVAILABLE_EVENT 0x00100000: ACI_GATT_READ_EXT_EVENT 0x00200000: ACI_GATT_INDICATION_EXT_EVENT 0x00400000: ACI_GATT_NOTIFICATION_EXT_EVENT

Output parameters

Table 282. ACI_GATT_SET_EVENT_MASK output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.11

ACI_GATT_EXCHANGE_CONFIG

Description

Perform an ATT MTU exchange procedure. When the ATT MTU exchange procedure is completed, a ACI_ATT_EXCHANGE_MTU_RESP_EVENT event is generated. A ACI_GATT_PROC_COMPLETE_EVENT event is also generated to indicate the end of the procedure.

Input parameters

Table 283. ACI_GATT_EXCHANGE_CONFIG input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF

Output parameters

Table 284. ACI_GATT_EXCHANGE_CONFIG output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_ATT_EXCHANGE_MTU_RESP_EVENT

2.5.12
ACI_ATT_FIND_INFO_REQ
Description

Send a find information request. This command is used to obtain the mapping of attribute handles with their associated types. The responses of the procedure are given through the ACI_ATT_FIND_INFO_RESP_EVENT event. The end of the procedure is indicated by a ACI_GATT_PROC_COMPLETE_EVENT event.

Input parameters
Table 285. ACI_ATT_FIND_INFO_REQ input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Start_Handle	2	First requested handle number	-
End_Handle	2	Last requested handle number	-

Output parameters
Table 286. ACI_ATT_FIND_INFO_REQ output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_ATT_FIND_INFO_RESP_EVENT
- ACI_GATT_PROC_COMPLETE_EVENT

2.5.13
ACI_ATT_FIND_BY_TYPE_VALUE_REQ
Description

Send a find by type value request. The find by type value request is used to obtain the handles of attributes that have a given 16-bit UUID attribute type and a given attribute value. The responses of the procedure are given through the ACI_ATT_FIND_BY_TYPE_VALUE_RESP_EVENT event. The end of the procedure is indicated by a ACI_GATT_PROC_COMPLETE_EVENT event.

Input parameters

Table 287. ACI_ATT_FIND_BY_TYPE_VALUE_REQ input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Start_Handle	2	First requested handle number	-
End_Handle	2	Last requested handle number	-
UUID	2	2 octet UUID to find (little-endian)	-
Attribute_Val_Length	1	Length of attribute value (maximum value is ATT_MTU - 7).	-
Attribute_Val	Attribute_Val_Length	Attribute value to find	-

Output parameters

Table 288. ACI_ATT_FIND_BY_TYPE_VALUE_REQ output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [ACI_ATT_FIND_INFO_RESP_EVENT](#)
- [ACI_GATT_ERROR_RESP_EVENT](#)
- [ACI_GATT_PROC_COMPLETE_EVENT](#)

2.5.14

ACI_ATT_READ_BY_TYPE_REQ

Description

Send a read by type request. The read by type request is used to obtain the values of attributes where the attribute type is known but the handle is not known. The responses are given through the ACI_ATT_READ_BY_TYPE_RESP_EVENT event.

Input parameters

Table 289. ACI_ATT_READ_BY_TYPE_REQ input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Start_Handle	2	First requested handle number	-
End_Handle	2	Last requested handle number	-
UUID_Type	1	UUID type: 0x01 = 16 bits UUID while 0x02 = 128 bits UUID	-
UUID	2 or 16	16-bit UUID or 128-bit UUID	-

Output parameters

Table 290. ACI_ATT_READ_BY_TYPE_REQ output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)

- [ACI_ATT_READ_BY_TYPE_RESP_EVENT](#)
- [ACI_GATT_ERROR_RESP_EVENT](#)
- [ACI_GATT_PROC_COMPLETE_EVENT](#)

2.5.15 ACI_ATT_READ_BY_GROUP_TYPE_REQ

Description

Send a read by group type request. The read by group type request is used to obtain the values of grouping attributes where the attribute type is known but the handle is not known. Grouping attributes are defined at GATT layer. The grouping attribute types are: "Primary Service", "Secondary Service" and "Characteristic". The responses of the procedure are given through the [ACI_ATT_READ_BY_GROUP_TYPE_RESP_EVENT](#) event. The end of the procedure is indicated by a [ACI_GATT_PROC_COMPLETE_EVENT](#).

Input parameters

Table 291. ACI_ATT_READ_BY_GROUP_TYPE_REQ input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Start_Handle	2	First requested handle number	-
End_Handle	2	Last requested handle number	-
UUID_Type	1	UUID type: 0x01 = 16 bits UUID while 0x02 = 128 bits UUID	-
UUID	2 or 16	16-bit UUID or 128-bit UUID	-

Output parameters

Table 292. ACI_ATT_READ_BY_GROUP_TYPE_REQ output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [ACI_ATT_READ_BY_GROUP_TYPE_RESP_EVENT](#)
- [ACI_GATT_ERROR_RESP_EVENT](#)
- [ACI_GATT_PROC_COMPLETE_EVENT](#)

2.5.16 ACI_ATT_PREPARE_WRITE_REQ

Description

Send a prepare write request. The prepare write request is used to request the server to prepare to write the value of an attribute. The responses of the procedure are given through the [ACI_ATT_PREPARE_WRITE_RESP_EVENT](#) event. The end of the procedure is indicated by a [ACI_GATT_PROC_COMPLETE_EVENT](#).

Input parameters

Table 293. ACI_ATT_PREPARE_WRITE_REQ input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Attr_Handle	2	Handle of the attribute to be written	-
Val_Offset	2	The offset of the first octet to be written	-
Attribute_Val_Length	1	Length of attribute value (maximum value is ATT_MTU - 5).	-
Attribute_Val	Attribute_Val_Length	The value of the attribute to be written	-

Output parameters

Table 294. ACI_ATT_PREPARE_WRITE_REQ output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_ATT_PREPARE_WRITE_RESP_EVENT
- ACI_GATT_ERROR_RESP_EVENT
- ACI_GATT_PROC_COMPLETE_EVENT

2.5.17

ACI_ATT_EXECUTE_WRITE_REQ

Description

Send an execute write request. The execute write request is used to request the server to write or cancel the write of all the prepared values currently held in the prepare queue from this client. The result of the procedure is given through the ACI_ATT_EXEC_WRITE_RESP_EVENT event. The end of the procedure is indicated by a ACI_GATT_PROC_COMPLETE_EVENT event.

Input parameters

Table 295. ACI_ATT_EXECUTE_WRITE_REQ input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Execute	1	Execute or cancel writes.	• 0x00: Cancel all prepared writes • 0x01: Immediately write all pending prepared values

Output parameters

Table 296. ACI_ATT_EXECUTE_WRITE_REQ output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_ATT_EXEC_WRITE_RESP_EVENT
- ACI_GATT_PROC_COMPLETE_EVENT

2.5.18 ACI_GATT_DISC_ALL_PRIMARY_SERVICES

Description

Start the GATT client procedure to discover all primary services on the server. The responses of the procedure are given through the ACI_ATT_READ_BY_GROUP_TYPE_RESP_EVENT event.

Input parameters

Table 297. ACI_GATT_DISC_ALL_PRIMARY_SERVICES input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF

Output parameters

Table 298. ACI_GATT_DISC_ALL_PRIMARY_SERVICES output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_ATT_READ_BY_GROUP_TYPE_RESP_EVENT
- ACI_GATT_ERROR_RESP_EVENT
- ACI_GATT_PROC_COMPLETE_EVENT

2.5.19 ACI_GATT_DISC_PRIMARY_SERVICE_BY_UUID

Description

Start the procedure to discover the primary services of the specified UUID on the server. The responses of the procedure are given through the ACI_ATT_FIND_BY_TYPE_VALUE_RESP_EVENT event. The end of the procedure is indicated by a ACI_GATT_PROC_COMPLETE_EVENT event.

Input parameters

Table 299. ACI_GATT_DISC_PRIMARY_SERVICE_BY_UUID input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
UUID_Type	1	UUID type: 0x01 = 16 bits UUID while 0x02 = 128 bits UUID	-
UUID	2 or 16	16-bit UUID or 128-bit UUID	-

Output parameters

Table 300. ACI_GATT_DISC_PRIMARY_SERVICE_BY_UUID output parameters

Parameter	Size	Description	Possible values
Status	1	Error code	-

Events generated

- HCI_COMMAND_COMPLETE_EVENT
- ACI_ATT_FIND_BY_TYPE_VALUE_RESP_EVENT
- ACI_GATT_ERROR_RESP_EVENT

- [ACI_GATT_PROC_COMPLETE_EVENT](#)

2.5.20 ACI_GATT_FIND_INCLUDED_SERVICES

Description

Start the procedure to find all included services. The responses of the procedure are given through the [ACI_ATT_READ_BY_TYPE_RESP_EVENT](#) event. The end of the procedure is indicated by a [ACI_GATT_PROC_COMPLETE_EVENT](#) event.

Input parameters

Table 301. ACI_GATT_FIND_INCLUDED_SERVICES input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Start_Handle	2	Start attribute handle of the service	-
End_Handle	2	End attribute handle of the service	-

Output parameters

Table 302. ACI_GATT_FIND_INCLUDED_SERVICES output parameters

Parameter	Size	Description	Possible values
Status	1	Error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [ACI_ATT_READ_BY_GROUP_TYPE_RESP_EVENT](#)
- [ACI_GATT_ERROR_RESP_EVENT](#)
- [ACI_GATT_PROC_COMPLETE_EVENT](#)

2.5.21 ACI_GATT_DISC_ALL_CHAR_OF_SERVICE

Description

Start the procedure to discover all the characteristics of a given service. When the procedure is completed, a [ACI_GATT_PROC_COMPLETE_EVENT](#) event is generated. Before procedure completion the response packets are given through [ACI_ATT_READ_BY_TYPE_RESP_EVENT](#) event.

Input parameters

Table 303. ACI_GATT_DISC_ALL_CHAR_OF_SERVICE input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Start_Handle	2	Start attribute handle of the service	-
End_Handle	2	End attribute handle of the service	-

Output parameters

Table 304. ACI_GATT_DISC_ALL_CHAR_OF_SERVICE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_ATT_READ_BY_GROUP_TYPE_RESP_EVENT
- ACI_GATT_ERROR_RESP_EVENT
- ACI_GATT_PROC_COMPLETE_EVENT

2.5.22
ACI_GATT_DISC_CHAR_BY_UUID
Description

Start the procedure to discover all the characteristics specified by a UUID. When the procedure is completed, a ACI_GATT_PROC_COMPLETE_EVENT event is generated. Before procedure completion the response packets are given through ACI_GATT_DISC_READ_CHAR_BY_UUID_RESP_EVENT event.

Input parameters
Table 305. ACI_GATT_DISC_CHAR_BY_UUID input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Start_Handle	2	Start attribute handle of the service	-
End_Handle	2	End attribute handle of the service	-
UUID_Type	1	UUID type: 0x01 = 16 bits UUID while 0x02 = 128 bits UUID	-
UUID	2 or 16	16-bit UUID or 128-bit UUID	-

Output parameters
Table 306. ACI_GATT_DISC_CHAR_BY_UUID output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_GATT_DISC_READ_CHAR_BY_UUID_RESP_EVENT
- ACI_GATT_ERROR_RESP_EVENT
- ACI_GATT_PROC_COMPLETE_EVENT

2.5.23
ACI_GATT_DISC_ALL_CHAR_DESC
Description

Start the procedure to discover all characteristic descriptors on the server. When the procedure is completed, a ACI_GATT_PROC_COMPLETE_EVENT event is generated. Before procedure completion the response packets are given through ACI_ATT_FIND_INFO_RESP_EVENT event.

Input parameters
Table 307. ACI_GATT_DISC_ALL_CHAR_DESC input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Char_Handle	2	Handle of the characteristic value	-
End_Handle	2	End handle of the characteristic	-

Output parameters

Table 308. ACI_GATT_DISC_ALL_CHAR_DESC output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_ATT_FIND_INFO_RESP_EVENT
- ACI_GATT_ERROR_RESP_EVENT
- ACI_GATT_PROC_COMPLETE_EVENT

2.5.24
ACI_GATT_READ_CHAR_VALUE
Description

Start the procedure to read the attribute value. When the procedure is completed, a ACI_GATT_PROC_COMPLETE_EVENT event is generated. Before procedure completion the response packet is given through ACI_ATT_READ_RESP_EVENT event.

Input parameters
Table 309. ACI_GATT_READ_CHAR_VALUE input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Attr_Handle	2	Handle of the characteristic value to be read	-

Output parameters
Table 310. ACI_GATT_READ_CHAR_VALUE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_ATT_READ_RESP_EVENT
- ACI_GATT_PROC_COMPLETE_EVENT

2.5.25
ACI_GATT_READ_USING_CHAR_UUID
Description

This command sends a Read By Type Request packet to the server in order to read the value attribute of the characteristics specified by the UUID. When the procedure is completed, an ACI_GATT_PROC_COMPLETE_EVENT event is generated. Before procedure completion the response packets are given through ACI_GATT_DISC_READ_CHAR_BY_UUID_RESP_EVENT event.

Note: The number of bytes of a value reported by ACI_GATT_DISC_READ_CHAR_BY_UUID_RESP_EVENT event cannot exceed BLE_EVT_MAX_PARAM_LEN - 7 (i.e. 248 bytes for default value of BLE_EVT_MAX_PARAM_LEN).

Input parameters

Table 311. ACI_GATT_READ_USING_CHAR_UUID input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Start_Handle	2	Starting handle of the range to be searched	-
End_Handle	2	End handle of the range to be searched	-
UUID_Type	1	UUID type: 0x01 = 16 bits UUID while 0x02 = 128 bits UUID	-
UUID	2 or 16	16-bit UUID or 128-bit UUID	-

Output parameters

Table 312. ACI_GATT_READ_USING_CHAR_UUID output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_GATT_DISC_READ_CHAR_BY_UUID_RESP_EVENT
- ACI_GATT_ERROR_RESP_EVENT
- ACI_GATT_PROC_COMPLETE_EVENT

2.5.26

ACI_GATT_READ_LONG_CHAR_VALUE

Description

Start the procedure to read a long characteristic value. When the procedure is completed, a ACI_GATT_PROC_COMPLETE_EVENT event is generated. Before procedure completion the response packets are given through ACI_ATT_READ_BLOB_RESP_EVENT event.

Input parameters

Table 313. ACI_GATT_READ_LONG_CHAR_VALUE input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Attr_Handle	2	Handle of the characteristic value to be read	-
Val_Offset	2	Offset from which the value needs to be read	-

Output parameters

Table 314. ACI_GATT_READ_LONG_CHAR_VALUE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_ATT_READ_BLOB_RESP_EVENT
- ACI_GATT_ERROR_RESP_EVENT
- ACI_GATT_PROC_COMPLETE_EVENT

2.5.27 ACI_GATT_READ_MULTIPLE_CHAR_VALUE

Description

Start a procedure to read multiple characteristic values from a server. This sub-procedure is used to read multiple characteristic values from a server when the client knows the characteristic value handles. When the procedure is completed, a `ACI_GATT_PROC_COMPLETE_EVENT` event is generated. Before procedure completion the response packets are given through `ACI_ATT_READ_MULTIPLE_RESP_EVENT` event.

Input parameters

Table 315. ACI_GATT_READ_MULTIPLE_CHAR_VALUE input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Number_of_Handles	1	The number of handles for which the value has to be read	-
Handle[i]	2	The handles for which the attribute value has to be read	-

Output parameters

Table 316. ACI_GATT_READ_MULTIPLE_CHAR_VALUE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [ACI_GATT_ERROR_RESP_EVENT](#)
- [ACI_GATT_PROC_COMPLETE_EVENT](#)

2.5.28 ACI_GATT_WRITE_CHAR_VALUE

Description

Start the procedure to write a characteristic value. When the procedure is completed, a `ACI_GATT_PROC_COMPLETE_EVENT` event is generated.

Input parameters

Table 317. ACI_GATT_WRITE_CHAR_VALUE input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Attr_Handle	2	Handle of the characteristic value to be written	-
Attribute_Val_Length	1	Length of the value to be written	-
Attribute_Val	Attribute_Val_Length	Value to be written	-

Output parameters

Table 318. ACI_GATT_WRITE_CHAR_VALUE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)

- ACI_GATT_PROC_COMPLETE_EVENT
- ACI_GATT_ERROR_RESP_EVENT

2.5.29 ACI_GATT_WRITE_LONG_CHAR_VALUE

Description

Start the procedure to write a long characteristic value. When the procedure is completed, a ACI_GATT_PROC_COMPLETE_EVENT event is generated. During the procedure, ACI_ATT_PREPARE_WRITE_RESP_EVENT and ACI_ATT_EXEC_WRITE_RESP_EVENT events are raised.

Input parameters

Table 319. ACI_GATT_WRITE_LONG_CHAR_VALUE input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Attr_Handle	2	Handle of the characteristic value to be written	-
Val_Offset	2	Offset at which the attribute has to be written	-
Attribute_Val_Length	1	Length of the value to be written	-
Attribute_Val	Attribute_Val_Length	Value to be written	-

Output parameters

Table 320. ACI_GATT_WRITE_LONG_CHAR_VALUE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_GATT_PROC_COMPLETE_EVENT
- ACI_ATT_PREPARE_WRITE_RESP_EVENT
- ACI_ATT_EXEC_WRITE_RESP_EVENT
-

2.5.30 ACI_GATT_WRITE_CHAR_RELIABLE

Description

Start the procedure to write a characteristic reliably. When the procedure is completed, a ACI_GATT_PROC_COMPLETE_EVENT event is generated. During the procedure, ACI_ATT_PREPARE_WRITE_RESP_EVENT and ACI_ATT_EXEC_WRITE_RESP_EVENT events are raised.

Input parameters

Table 321. ACI_GATT_WRITE_CHAR_RELIABLE input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Attr_Handle	2	Handle of the attribute to be written	-
Val_Offset	2	Offset at which the attribute has to be written	-
Attribute_Val_Length	1	Length of the value to be written	-
Attribute_Val	Attribute_Val_Length	Value to be written	-

Output parameters

Table 322. ACI_GATT_WRITE_CHAR_RELIABLE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_GATT_PROC_COMPLETE_EVENT
- ACI_ATT_PREPARE_WRITE_RESP_EVENT
- ACI_ATT_EXEC_WRITE_RESP_EVENT

2.5.31
ACI_GATT_WRITE_LONG_CHAR_DESC
Description

Start the procedure to write a long characteristic descriptor. When the procedure is completed, a ACI_GATT_PROC_COMPLETE_EVENT event is generated. During the procedure, ACI_ATT_PREPARE_WRITE_RESP_EVENT and ACI_ATT_EXEC_WRITE_RESP_EVENT events are raised.

Input parameters
Table 323. ACI_GATT_WRITE_LONG_CHAR_DESC input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Attr_Handle	2	Handle of the attribute to be written	-
Val_Offset	2	Offset at which the attribute has to be written	-
Attribute_Val_Length	1	Length of the value to be written	-
Attribute_Val	Attribute_Val_Length	Value to be written	-

Output parameters
Table 324. ACI_GATT_WRITE_LONG_CHAR_DESC output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_GATT_PROC_COMPLETE_EVENT
- ACI_ATT_PREPARE_WRITE_RESP_EVENT
- ACI_ATT_EXEC_WRITE_RESP_EVENT

2.5.32
ACI_GATT_READ_LONG_CHAR_DESC
Description

Start the procedure to read a long characteristic value. When the procedure is completed, a ACI_GATT_PROC_COMPLETE_EVENT event is generated. Before procedure completion the response packets are given through ACI_ATT_READ_BLOB_RESP_EVENT event.

Input parameters

Table 325. ACI_GATT_READ_LONG_CHAR_DESC input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Attr_Handle	2	Handle of the characteristic descriptor	-
Val_Offset	2	Offset from which the value needs to be read	-

Output parameters

Table 326. ACI_GATT_READ_LONG_CHAR_DESC output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [ACI_ATT_READ_BLOB_RESP_EVENT](#)
- [ACI_GATT_PROC_COMPLETE_EVENT](#)

2.5.33

ACI_GATT_WRITE_CHAR_DESC

Description

Start the procedure to write a characteristic descriptor. When the procedure is completed, a [ACI_GATT_PROC_COMPLETE_EVENT](#) event is generated.

Input parameters

Table 327. ACI_GATT_WRITE_CHAR_DESC input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Attr_Handle	2	Handle of the attribute to be written	-
Attribute_Val_Length	1	Length of the value to be written	-
Attribute_Val	Attribute_Val_Length	Value to be written	-

Output parameters

Table 328. ACI_GATT_WRITE_CHAR_DESC output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [ACI_GATT_PROC_COMPLETE_EVENT](#)

2.5.34

ACI_GATT_READ_CHAR_DESC

Description

Start the procedure to read the descriptor specified. When the procedure is completed, a [ACI_GATT_PROC_COMPLETE_EVENT](#) event is generated. Before procedure completion the response packet is given through [ACI_ATT_READ_RESP_EVENT](#) event.

Input parameters

Table 329. ACI_GATT_READ_CHAR_DESC input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Attr_Handle	2	Handle of the descriptor to be read	-

Output parameters

Table 330. ACI_GATT_READ_CHAR_DESC output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_STATUS_EVENT](#)
- [ACI_ATT_READ_RESP_EVENT](#)
- [ACI_GATT_PROC_COMPLETE_EVENT](#)

2.5.35

ACI_GATT_WRITE_WITHOUT_RESP

Description

Start the procedure to write a characteristic value without waiting for any response from the server. No events are generated after this command is executed.

The length of the value to be written must not exceed (ATT_MTU - 3); it must also not exceed (BLE_EVT_MAX_PARAM_LEN - 5) i.e. 250 for BLE_EVT_MAX_PARAM_LEN default value.

Input parameters

Table 331. ACI_GATT_WRITE_WITHOUT_RESP input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Attr_Handle	2	Handle of the characteristic value to be written	-
Attribute_Val_Length	1	Length of the value to be written	-
Attribute_Val	Attribute_Val_Length	Value to be written	-

Output parameters

Table 332. ACI_GATT_WRITE_WITHOUT_RESP output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.36

ACI_GATT_SIGNED_WRITE_WITHOUT_RESP

Description

Start a signed write without response from the server. The procedure is used to write a characteristic value with an authentication signature without waiting for any response from the server. It cannot be used when the link is encrypted.

The length of the value to be written must not exceed (ATT_MTU - 15); it must also not exceed (BLE_EVT_MAX_PARAM_LEN - 5) i.e. 250 for BLE_EVT_MAX_PARAM_LEN default value.

Input parameters

Table 333. ACI_GATT_SIGNED_WRITE_WITHOUT_RESP input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Attr_Handle	2	Handle of the characteristic value to be written	-
Attribute_Val_Length	1	Length of the value to be written	-
Attribute_Val	Attribute_Val_Length	Value to be written	-

Output parameters

Table 334. ACI_GATT_SIGNED_WRITE_WITHOUT_RESP output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.37

ACI_GATT_CONFIRM_INDICATION

Description

Allow application to confirm indication. This command has to be sent when the application receives the event ACI_GATT_INDICATION_EVENT.

Input parameters

Table 335. ACI_GATT_CONFIRM_INDICATION input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF

Output parameters

Table 336. ACI_GATT_CONFIRM_INDICATION output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.38

ACI_GATT_WRITE_RESP

Description

Allow or reject a write request from a client. This command has to be sent by the application when it receives the ACI_GATT_WRITE_PERMIT_REQ_EVENT. If the write can be allowed, then the status and error code has to be set to 0. If the write cannot be allowed, then the status has to be set to 1 and the error code has to be set to the error code that has to be passed to the client.

Input parameters

Table 337. ACI_GATT_WRITE_RESP input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Attr_Handle	2	Handle of the attribute that was passed in the event EVT_BLUE_GATT_WRITE_PERMIT_REQ	-
Write_status	1	If the value can be written or not.	0x00: The value can be written to the attribute specified by attr_handle 0x01: The value cannot be written to the attribute specified by the attr_handle
Error_Code	1	The error code that has to be passed to the client in case the write has to be rejected	-
Attribute_Val_Length	1	Length of the value to be written as passed in the event EVT_BLUE_GATT_WRITE_PERMIT_REQ	-
Attribute_Val	Attribute_Val_Length	Value as passed in the event EVT_BLUE_GATT_WRITE_PERMIT_REQ	-

Output parameters

Table 338. ACI_GATT_WRITE_RESP output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.39

ACI_GATT_ALLOW_READ

Description

Allow the GATT server to send a response to a read request from a client. The application has to send this command when it receives the ACI_GATT_READ_PERMIT_REQ_EVENT or ACI_GATT_READ_MULTI_PERMIT_REQ_EVENT. This command indicates to the stack that the response can be sent to the client. So if the application wishes to update any of the attributes before they are read by the client, it has to update the characteristic values using the ACI_GATT_UPDATE_CHAR_VALUE and then give this command. The application must perform the required operations within 30 seconds. Otherwise the GATT procedure is timeout.

Input parameters

Table 339. ACI_GATT_ALLOW_READ input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF

Output parameters

Table 340. ACI_GATT_ALLOW_READ output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.40
ACI_GATT_SET_SECURITY_PERMISSION
Description

This command sets the security permission for the attribute handle specified. Currently the setting of security permission is allowed only for client configuration descriptor.

Input parameters
Table 341. ACI_GATT_SET_SECURITY_PERMISSION input parameters

Parameter	Size	Description	Possible values
Serv_Handle	2	Handle of the service which contains the attribute whose security permission has to be modified	-
Attr_Handle	2	Handle of the attribute whose security permission has to be modified	-
Security_Permissions	1	Security permission flags.	Bitmask of: • 0x00: None • 0x01: AUTHEN_READ (Need authentication to read) • 0x02: AUTHOR_READ (Need authorization to read) • 0x04: ENCRY_READ (Need encryption to read) • 0x08: AUTHEN_WRITE (need authentication to write) • 0x10: AUTHOR_WRITE (need authorization to write) • 0x20: ENCRY_WRITE (need encryption to write)

Output parameters
Table 342. ACI_GATT_SET_SECURITY_PERMISSION output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.41
ACI_GATT_SET_DESC_VALUE
Description

This command sets the value of the descriptor specified by charDescHandle.

Input parameters

Table 343. ACI_GATT_SET_DESC_VALUE input parameters

Parameter	Size	Description	Possible values
Serv_Handle	2	Handle of the service which contains the characteristic descriptor	-
Char_Handle	2	Handle of the characteristic which contains the descriptor	-
Char_Desc_Handle	2	Handle of the descriptor whose value has to be set	-
Val_Offset	2	Offset from which the descriptor value has to be updated	-
Char_Desc_Value_Length	1	Length of the descriptor value	-
Char_Desc_Value	Char_Desc_Value_Length	Descriptor value	-

Output parameters

Table 344. ACI_GATT_SET_DESC_VALUE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.42

ACI_GATT_READ_HANDLE_VALUE

Description

Reads the value of the attribute handle specified from the local GATT database.

Input parameters

Table 345. ACI_GATT_READ_HANDLE_VALUE input parameters

Parameter	Size	Description	Possible values
Attr_Handle	2	Handle of the attribute to read	-
Offset	2	Offset from which the value needs to be read	-
Value_Length_Requested	2	Maximum number of octets to be returned as attribute value	-

Output parameters

Table 346. ACI_GATT_READ_HANDLE_VALUE output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Length	2	Length of the attribute value	-
Value_Length	2	Length in octets of the Value parameter	-
Value	Value_Length	Attribute value	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.43 ACI_GATT_UPDATE_CHAR_VALUE_EXT

Description

This command is a more flexible version of ACI_GATT_UPDATE_CHAR_VALUE to support update of long attribute up to 512 bytes and indicate selectively the generation of indication/notification.

Input parameters

Table 347. ACI_GATT_UPDATE_CHAR_VALUE_EXT input parameters

Parameter	Size	Description	Possible values
Conn_Handle_To_Notify	2	Connection handle to notify. Notify all subscribed clients if equal to 0x0000.	-
Service_Handle	2	Handle of service to whom the characteristic belongs	-
Char_Handle	2	Handle of the characteristic declaration	-
Update_Type	1	Allow notification or Indication generation, If enabled in the client characteristic configuration descriptor.	Bitmask of: 0x00: Do not notify 0x01: Notification 0x02: Indication
Char_Length	2	Total length of the characteristic value. In case of a variable size characteristic, this field specifies the new length of the characteristic value after the update; in case of fixed length characteristic this field is ignored.	-
Value_Offset	2	The offset from which the attribute value has to be updated.	-
Value_Length	1	Length of the value parameter in octets	-
Value	Value_Length	Updated characteristic value	-

Output parameters

Table 348. ACI_GATT_UPDATE_CHAR_VALUE_EXT output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.44 ACI_GATT_DENY_READ

Description

Deny the GATT server to send a response to a read request from a client. The application may send this command when it receives the ACI_GATT_READ_PERMIT_REQ_EVENT or ACI_GATT_READ_MULTI_PERMIT_REQ_EVENT. This command indicates to the stack that the client is not allowed to read the requested characteristic due to e.g. application restrictions. The error code is either 0x08 (insufficient authorization) or a value in the range 0x80-0x9F (application error). The application must issue the ACI_GATT_DENY_READ or ACI_GATT_ALLOW_READ command within 30 seconds from the reception of the ACI_GATT_READ_PERMIT_REQ_EVENT or ACI_GATT_READ_MULTI_PERMIT_REQ_EVENT events otherwise the GATT procedure issues a timeout.

Input parameters

Table 349. ACI_GATT_DENY_READ input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Error_Code	1	Error code for the command	0x08: Insufficient authorization 0x80 ... 0x9F: Application error

Output parameters

Table 350. ACI_GATT_DENY_READ output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.45

ACI_GATT_SET_ACCESS_PERMISSION

Description

This command sets the access permission for the specified attribute handle.

Input parameters

Table 351. ACI_GATT_SET_ACCESS_PERMISSION input parameters

Parameter	Size	Description	Possible values
Serv_Handle	2	Handle of the service which contains the attribute whose access permission must be modified	-
Attr_Handle	2	Handle of the attribute whose security permission must be modified	-
Access_Permissions	1	Access permission	Bitmask of: 0x00: None 0x01: READ 0x02: WRITE 0x04: WRITE_WO_RESP 0x08: SIGNED_WRITE

Output parameters

Table 352. ACI_GATT_SET_ACCESS_PERMISSION output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.5.46

ACI_GATT_STORE_DB

Description

This command forces the saving of the GATT database for all active connections (by default the database is saved per active connection at the time of disconnection).

Input parameters

None

Output parameters

Table 353. ACI_GATT_STORE_DB output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.6 L2CAP commands

In Table 354 "Y" means that the corresponding command applies to the dedicated BLE stack variant, namely LO / BO / PO / BF / LB, respectively, for Link layer only / Beacon only / Peripheral only / Basic feature / Link layer only basic.

Table 354. L2CAP commands list

Command	OpCode	LO	PO	BO	BF	LB
ACI_L2CAP_CONNECTION_PARAMETER_UPDATE_REQ	0xFD81	-	Y	-	Y	-
ACI_L2CAP_CONNECTION_PARAMETER_UPDATE_RESP	0xFD82	-	-	-	Y	-
ACI_L2CAP_COC_CONNECT	0xFD88	-	-	-	-	-
ACI_L2CAP_COC_CONNECT_CONFIRM	0xFD89	-	-	-	-	-
ACI_L2CAP_COC_RECONF	0xFD8A	-	-	-	-	-
ACI_L2CAP_COC_RECONF_CONFIRM	0xFD8B	-	-	-	-	-
ACI_L2CAP_COC_DISCONNECT	0xFD8C	-	-	-	-	-
ACI_L2CAP_COC_FLOW_CONTROL	0xFD8D	-	-	-	-	-
ACI_L2CAP_COC_TX_DATA	0xFD8E	-	-	-	-	-

2.6.1 ACI_L2CAP_CONNECTION_PARAMETER_UPDATE_REQ

Description

Send an L2CAP connection parameter update request from the slave to the master. An ACI_L2CAP_CONNECTION_UPDATE_RESP_EVENT event is raised when the master responds to the request (accepts or rejects).

Input parameters

Table 355. ACI_L2CAP_CONNECTION_PARAMETER_UPDATE_REQ input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Conn_Interval_Min	2	Minimum value for the connection event interval. This is less than or equal to Conn_Interval_Max. Time = N * 1.25 ms	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)
Conn_Interval_Max	2	Maximum value for the connection event interval. This is greater than or equal to Conn_Interval_Min. Time = N * 1.25 ms	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)
Slave_latency	2	Slave latency for the connection in number of connection events.	0x0000 ... 0x01F3
Timeout_Multiplier	2	Defines connection timeout parameter in the following manner: Timeout Multiplier * 10ms.	-

Output parameters

Table 356. ACI_L2CAP_CONNECTION_PARAMETER_UPDATE_REQ output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- HCI_COMMAND_STATUS_EVENT
- ACI_L2CAP_CONNECTION_UPDATE_RESP_EVENT

2.6.2 ACI_L2CAP_CONNECTION_PARAMETER_UPDATE_RESP

Description

Accept or reject a connection update. This command must be sent in response to a `ACI_L2CAP_CONNECTION_UPDATE_REQ_EVENT` event from the controller. The accept parameter has to be set if the connection parameters given in the event are acceptable.

Input parameters

Table 357. ACI_L2CAP_CONNECTION_PARAMETER_UPDATE_RESP input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Conn_Interval_Min	2	Minimum value for the connection event interval. This is less than or equal to Conn_Interval_Max. Time = N * 1.25 ms	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)
Conn_Interval_Max	2	Maximum value for the connection event interval. This is greater than or equal to Conn_Interval_Min. Time = N * 1.25 ms	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)
Slave_latency	2	Slave latency for the connection in number of connection events.	0x0000 ... 0x01F3
Timeout_Multiplier	2	Defines connection timeout parameter in the following manner: Timeout Multiplier * 10ms.	-
Minimum_CE_Length	2	Information parameter about the minimum length of connection needed for this LE connection. Time = N * 0.625 ms	0x0000 (0.000 ms) ... 0xFFFF (40959.375 ms)
Maximum_CE_Length	2	Information parameter about the maximum length of connection needed for this LE connection. Time = N * 0.625 ms	0x0000 (0.000 ms) ... 0xFFFF (40959.375 ms)
Identifier	1	Identifier received in <code>ACI_L2CAP_Connection_Update_Req</code> event.	-
Accept	1	Specify if connection update parameters are acceptable or not.	0x00: Reject 0x01: Accept

Output parameters

Table 358. ACI_L2CAP_CONNECTION_PARAMETER_UPDATE_RESP output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- `HCI_COMMAND_COMPLETE_EVENT`

2.6.3 ACI_L2CAP_COC_CONNECT

Description

This command sends a credit based connection request packet on the specified connection. See Bluetooth core specification Vol.3 Part A.

Input parameters

Table 359. ACI_L2CAP_COC_CONNECT input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command applies.	0x0000 ... 0x0EFF

Parameter	Size	Description	Possible values
SPSM	2	Simplified Protocol/Service Multiplexer	0x0001 ... 0X00FF
MTU	2	Maximum transmission unit	23 ... 65535
MPS	2	Maximum payload size in octets	23 ... 65535
Initial_Credits	2	Number of K-frames that can be received on the created channel(s) by the L2CAP layer entity sending this packet	23 ... 65535
Channel_Number	1	Number of channels to be created. If this parameter is set to 0, it requests the creation of one LE credit based connection-oriented channel, otherwise it requests the creation of one or more enhanced credit based connection-oriented channels.	0 ... 5

Output parameters

Table 360. ACI_L2CAP_COC_CONNECT output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)
- [ACI_L2CAP_COC_CONNECT_CONFIRM_EVENT](#)
- [ACI_L2CAP_PROC_TIMEOUT_EVENT](#)
- [ACI_L2CAP_COMMAND_REJECT_EVENT](#)

2.6.4 ACI_L2CAP_COC_CONNECT_CONFIRM

Description

This command sends a credit based connection response packet. It must be used upon receipt of a connection request through an ACI_L2CAP_COC_CONNECT_EVENT event. See Bluetooth core specification Vol.3 Part A.

Input parameters

Table 361. ACI_L2CAP_COC_CONNECT_CONFIRM input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the command applies.	0x0000 ... 0x0EFF
MTU	2	Maximum transmission unit	23 ... 65535
MPS	2	Maximum payload size in octets	23 ... 65535
Initial_Credits	2	Number of K-frames that can be received on the created channel(s) by the L2CAP layer entity sending this packet	23 ... 65535
Results	2	This parameter indicates the outcome of the request. A value of 0x0000 indicates success while a non-zero value indicates that the request is refused.	0x0000 ... 0x000C

Output parameters

Table 362. ACI_L2CAP_COC_CONNECT_CONFIRM output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-
Channel_Number	1	Number of created channels. It is the length of Channel_Index_List.	0 ... 5
Channel_Index_List	Channel_Number	List of channel indexes to whom the primitive applies.	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.6.5 ACI_L2CAP_COC_RECONF
Description

This command sends a credit based reconfigure request packet on the specified connection. See Bluetooth core specification Vol.3 Part A.

Input parameters
Table 363. ACI_L2CAP_COC_RECONF input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle to whom the command applies.	0x0000 ... 0x0EFF
MTU	2	Maximum transmission unit	23 ... 65535
MPS	2	Maximum payload size in octets	23 ... 65535
Channel_Number	2	Number of channels to be created. It is the length of Channel_Index_List.	1 ... 5
Channel_Index_List	Channel_Number	List of channel indexes to whom the primitive applies.	-

Output parameters
Table 364. ACI_L2CAP_COC_RECONF output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)
- [ACI_L2CAP_COC_CONNECT_CONFIRM_EVENT](#)
- [ACI_L2CAP_PROC_TIMEOUT_EVENT](#)
- [ACI_L2CAP_COMMAND_REJECT_EVENT](#)

2.6.6 ACI_L2CAP_COC_RECONF_CONFIRM
Description

This command sends a credit based reconfigure response packet. It must be used upon receipt of a credit based reconfigure request through an ACI_L2CAP_COC_RECONF_EVENT event. See Bluetooth core specification Vol.3 Part A.

Input parameters
Table 365. ACI_L2CAP_COC_RECONF_CONFIRM input parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle to whom the command applies.	0x0000 ... 0x0EFF
Results	2	This parameter indicates the outcome of the request. A value of 0x0000 indicates success while a non-zero value indicates that the request is refused.	0x0000 ... 0x000C

Output parameters

Table 366. ACI_L2CAP_COC_RECONF_CONFIRM output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.6.7
ACI_L2CAP_COC_DISCONNECT
Description

This command sends a disconnection request signaling packet on the specified connection-oriented channel. See Bluetooth core specification Vol.3 Part A.

Input parameters
Table 367. ACI_L2CAP_COC_DISCONNECT input parameters

Parameter	Size	Description	Possible values
Channel_Index	1	Index of the connection-oriented channel to whom the command applies.	-

Output parameters
Table 368. ACI_L2CAP_COC_DISCONNECT output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)
- [ACI_L2CAP_COC_CONNECT_CONFIRM_EVENT](#)
- [ACI_L2CAP_PROC_TIMEOUT_EVENT](#)
- [ACI_L2CAP_COMMAND_REJECT_EVENT](#)

2.6.8
ACI_L2CAP_COC_FLOW_CONTROL
Description

This command sends a flow control credit signaling packet on the specified connection-oriented channel. See Bluetooth core specification Vol.3 Part A.

Input parameters
Table 369. ACI_L2CAP_COC_FLOW_CONTROL input parameters

Parameter	Size	Description	Possible values
Channel_Index	1	Index of the connection-oriented channel to whom the primitive applies.	-
Credits	2	Number of credits the receiving device can increment, corresponding to the number of K-frames that can be sent to the peer device sending the Flow Control Credit packet.	1 ... 65535

Output parameters

Table 370. ACI_L2CAP_COC_FLOW_CONTROL output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

2.6.9
ACI_L2CAP_COC_TX_DATA
Description

This command sends a K-frame packet on the specified connection-oriented channel. See Bluetooth core specification Vol.3 Part A.

Note:

For the first K-frame of the SDU, the information data shall contain the L2CAP SDU length coded on two octets followed by the K-frame information payload. For the next K-frames of the SDU, the information data shall only contain the K-frame information payload. The Length value must not exceed (BLE_CMD_MAX_PARAM_LEN - 3), i.e. 252 for BLE_CMD_MAX_PARAM_LEN default value.

Input parameters
Table 371. ACI_L2CAP_COC_TX_DATA input parameters

Parameter	Size	Description	Possible values
Channel_Index	1	Index of the connection-oriented channel to whom the primitive applies.	-
Length	2	Length of Data in octets	-
Data	Length	Information data	-

Output parameters
Table 372. ACI_L2CAP_COC_TX_DATA output parameters

Parameter	Size	Description	Possible values
Status	1	Status error code	-

Events generated

- [HCI_COMMAND_COMPLETE_EVENT](#)

3 ACI/HCI events

3.1 HCI events

In Table 373 "Y" means that the corresponding command applies to the dedicated BLE stack variant, namely LO / BO / PO / BF / LB, respectively, for Link layer only / Beacon only / Peripheral only / Basic feature / Link layer only basic.

Table 373. HCI events commands list

Command	OpCode	LO	PO	BO	BF	LB
HCI_DISCONNECTION_COMPLETE_EVENT	0x05	Y	Y	-	Y	Y
HCI_ENCRYPTION_CHANGE_EVENT	0x08	Y	Y	-	Y	Y
HCI_READ_REMOTE_VERSION_INFORMATION_COMPLETE_EVENT	0x0C	Y	Y	-	Y	Y
HCI_HARDWARE_ERROR_EVENT	0x10	Y	Y	Y	Y	Y
HCI_NUMBER_OF_COMPLETED_PACKETS_EVENT	0x13	Y	-	-	-	Y
HCI_ENCRYPTION_KEY_REFRESH_COMPLETE_EVENT	0x30	Y	Y	-	Y	Y
HCI_COMMAND_COMPLETE_EVENT	0x0E	Y	Y	Y	Y	Y
HCI_COMMAND_STATUS_EVENT	0x0F	Y	Y	Y	Y	Y

3.1.1 HCI_DISCONNECTION_COMPLETE_EVENT

Description

This event occurs when a connection is terminated. The status parameter indicates if the disconnection was successful or not. The Reason parameter indicates the reason for the disconnection, if the disconnection was successful. If the disconnection was not successful, its can be ignored by the host. For example, this can be the case if the host has issued the disconnect command and there was a parameter error, or the command was not presently allowed, or a Connection_Handle that did not correspond to a connection was given.

Event parameters

Table 374. HCI_DISCONNECTION_COMPLETE_EVENT parameters

Parameter	Size	Description	Possible values
Status	1	Error code	-
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Reason	1	Reason for disconnection (see Bluetooth core specification [Vol 2] Part D, Error codes)	-

3.1.2 HCI_ENCRYPTION_CHANGE_EVENT

Description

This event is used to indicate that the change of the encryption mode has been completed. The Connection_Handle is for an ACL connection. The Encryption_Enabled event parameter specifies the new Encryption_Enabled parameter for the Connection_Handle specified by the Connection_Handle event parameter. This event occurs on both devices to notify the hosts when encryption has changed for the specified Connection_Handle between two device. The Encryption change event is used to indicate that the change of the encryption mode has been completed. The Connection_Handle is a Connection_Handle for an ACL connection. The Encryption_Enabled event parameter specifies the new Encryption_Enabled parameter for the Connection_Handle specified by the Connection_Handle event parameter. This event occurs on both devices to notify the hosts when encryption has changed for the specified Connection_Handle between two devices.

Note: *This event is not generated if encryption is paused or resumed (for example, during a role switch).*

The meaning of the Encryption_Enabled parameter depends on whether the host has indicated support for secure connections in the Secure_Connections_Host_Support parameter. When Secure_Connections_Host_Support is 'disabled' or the Connection_Handle refers to an LE link, the controller only use Encryption_Enabled values 0x00 (OFF) and 0x01 (ON).

Event parameters

Table 375. HCI_ENCRYPTION_CHANGE_EVENT parameters

Parameter	Size	Description	Possible values
Status	1	Error code	-
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Encryption_Enabled	1	Link level encryption	0x00: Link level encryption OFF 0x01: Link level encryption is ON with AES-CCM

3.1.3 HCI_READ_REMOTE_VERSION_INFORMATION_COMPLETE_EVENT

Description

This event is used to indicate the completion of the process obtaining the version information of the remote controller specified by the Connection_Handle event parameter.

The Connection_Handle is for an ACL connection. The version event parameter defines the specification version of the LE controller. The Manufacturer_Name event parameter indicates the manufacturer of the remote controller. The subversion event parameter is controlled by the manufacturer and is implementation dependent. The subversion event parameter defines the various revisions that each version of the Bluetooth hardware goes through as design processes changes and errors are fixed. This allows the software to determine what Bluetooth hardware is being used and, if necessary, to work around various bugs in the hardware. When the Connection_Handle is associated with an LE-U logical link, the version event parameter is link layer VersNr parameter, the Manufacturer_Name event parameter is the compld parameter, and the subversion event parameter is the SubVersNr parameter.

Event parameters

Table 376. HCI_READ_REMOTE_VERSION_INFORMATION_COMPLETE_EVENT parameters

Parameter	Size	Description	Possible values
Status	1	Error code	-
Connection_Handle	2	Connection handle for which the command is given	0x0000 ... 0x0EFF
Version	1	Version of the current LMP in the remote controller	-
Manufacturer_Name	2	Manufacturer name of the remote Controller	-
Subversion	2	Subversion of the LMP in the remote Controller	-

3.1.4 HCI_HARDWARE_ERROR_EVENT

Description

This event is used to indicate the implementation specific type of hardware failure for the controller. This event is used to notify the host that a hardware failure has occurred in the controller.

Event parameters

Table 377. HCI_HARDWARE_ERROR_EVENT parameters

Parameter	Size	Description	Possible values
Hardware_Code	1	Hardware error event code. Error code 0 is not used. Error code 1 is bluecore act2 error detected. Error code 2 is bluecore time overrun error detected. Error code 3 is internal FIFO full.	0x00: Not used 0x01: event_act2 error 0x02: event_time_overrun error 0x03: event_fifo_full error

3.1.5 HCI_NUMBER_OF_COMPLETED_PACKETS_EVENT

Description

This event is used by the controller to indicate to the host how many HCI data packets have been completed (transmitted or flushed) for each Connection_Handle since the previous number of completed packets event was sent to the host. This means that the corresponding buffer space has been freed in the controller. Based on this information, and the HC_Total_Num_ACL_Data_Packets and HC_Total_Num_Synchronous_Data_Packets return parameter of the Read_Buffer_Size command, the host determines for which Connection_Handles the following HCI data packets must be sent to the controller. The number of completed packets event must not be sent before the corresponding connection complete event. While the controller has HCI data packets in its buffer, it must keep sending the number of completed packets event to the host at least periodically, until it finally reports that all the pending ACL data packets have been transmitted or flushed.

Event parameters

Table 378. HCI_NUMBER_OF_COMPLETED_PACKETS_EVENT parameters

Parameter	Size	Description	Possible values
Number_of_Handles	1	The number of Connection_Handles and Num_HCI_Data_Packets parameters pairs contained in this event	-
Connection_Handle[i]	2	Connection handle	-
HC_Num_Of_Completed_Packets[i]	2	The number of HCI data packets that have been completed (transmitted or flushed) for the associated Connection_Handle since the previous time the event was returned	-

3.1.6 HCI_ENCRYPTION_KEY_REFRESH_COMPLETE_EVENT

Description

This event is used to indicate to the host that the encryption key was refreshed on the given Connection_Handle any time encryption is paused and then resumed. If the encryption key refresh complete event was generated due to an encryption pause and resume operation embedded within a change connection link key procedure, the encryption key refresh complete event is sent prior to the change connection link key complete event. If the encryption key refresh complete event was generated due to an encryption pause and resume operation embedded within a role switch procedure, the encryption key refresh complete event is sent prior to the role change event.

Event parameters

Table 379. HCI_ENCRYPTION_KEY_REFRESH_COMPLETE_EVENT parameters

Parameter	Size	Description	Possible values
Status	1	Error code	-
Connection_Handle	2	Connection handle for which the command is given	0x0000 ... 0x0EFF

3.1.7

HCI_COMMAND_COMPLETE_EVENT

Description

This event is used by the controller for most commands to transmit return status of a command and the other event parameters that are specified for the issued HCI command. The Num_HCI_Command_Packets event parameter allows the controller to indicate the number of HCI command packets that the host can send to the controller. If the controller requires the host to stop sending commands, the Num_HCI_Command_Packets event parameter is set to 0. To indicate to the host that the controller is ready to receive HCI command packets, the controller generates a command complete event with the Command_Opcode 0x0000, and the Num_HCI_Command_Packets event parameter is set to 1 or more. See each command for the parameters that are returned by this event.

Event parameters

Table 380. HCI_COMMAND_COMPLETE_EVENT parameters

Parameter	Size	Description	Possible values
Num_HCI_Command_Packets	1	The Number of HCI command packets which are allowed to be sent to the controller from the host.	-
Command_Opcode	2	Opcode of the command which caused this event	-
Return_Parameters	Variable	This is the return parameter(s) for the command specified in the Command_Opcode event parameter. See each command's definition for the list of return parameters associated with that command.	-

3.1.8

HCI_COMMAND_STATUS_EVENT

Description

This event is used to indicate that the command described by the Command_Opcode parameter has been received, and that the controller is currently performing the task for this command. This event is needed to provide mechanisms for asynchronous operation, which makes it possible to prevent the host from waiting for a command to finish. If the command cannot begin to execute (a parameter error may have occurred, or the command may currently not be allowed), the status event parameter contains the corresponding error code, and no complete event follows since the command was not started.

The Num_HCI_Command_Packets event parameter allows the controller to indicate the number of HCI command packets the host can send to the controller. If the controller requires the host to stop sending commands, the Num_HCI_Command_Packets event parameter is set to 0. To indicate to the host that the controller is ready to receive HCI command packets, the controller generates a command status event with status 0x00 and Command_Opcode 0x0000, and the Num_HCI_Command_Packets event parameter is set to 1 or more.

Event parameters

Table 381. HCI_COMMAND_STATUS_EVENT parameters

Parameter	Size	Description	Possible values
Status	1	Error code	-
Num_HCI_Command_Packets	1	The Number of HCI command packets which are allowed to be sent to the controller from the Host	-
Command_Opcode	2	Opcode of the command which caused this event	-

3.2 HCI LE META events

In Table 382 "Y" means that the corresponding command applies to the dedicated BLE stack variant, namely LO / BO / PO / BF / LB, respectively, for Link layer only / Beacon only / Peripheral only / Basic feature / Link layer only basic.

Table 382. HCI LE META events command list

Command	OpCode	LO	PO	BO	BF	LB
HCI_LE_CONNECTION_COMPLETE_EVENT	0x01	Y	Y	-	Y	Y
HCI_LE_ADVERTISING_REPORT_EVENT	0x02	Y	-	Y	Y	Y
HCI_LE_CONNECTION_UPDATE_COMPLETE_EVENT	0x03	Y	Y	-	Y	Y
HCI_LE_READ_REMOTE_FEATURES_COMPLETE_EVENT	0x04	Y	Y	-	Y	Y
HCI_LE_LONG_TERM_KEY_REQUEST_EVENT	0x05	Y	Y	-	Y	Y
HCI_LE_DATA_LENGTH_CHANGE_EVENT	0x07	Y	Y	-	Y	Y
HCI_LE_READ_LOCAL_P256_PUBLIC_KEY_COMPLETE_EVENT	0x08	Y	Y	-	Y	Y
HCI_LE_GENERATE_DHKEY_COMPLETE_EVENT	0x09	Y	-	-	-	Y
HCI_LE_ENHANCED_CONNECTION_COMPLETE_EVENT	0x0A	Y	Y	-	Y	Y
HCI_LE_DIRECTED_ADVERTISING_REPORT_EVENT	0x0B	Y	-	-	Y	Y
HCI_LE_PHY_UPDATE_COMPLETE_EVENT	0x0C	Y	-	-	Y	Y
HCI_LE_EXTENDED_ADVERTISING_REPORT_EVENT	0x0D	Y	-	-	-	-
HCI_LE_SCAN_TIMEOUT_EVENT	0x11	Y	-	-	-	-
HCI_LE_ADVERTISING_SET_TERMINATED_EVENT	0x12	Y	-	-	-	-
HCI_LE_SCAN_REQUEST_RECEIVED_EVENT	0x13	Y	-	-	-	-
HCI_LE_CHANNEL_SELECTION_ALGORITHM_EVENT	0x14	Y	-	-	-	-

3.2.1 HCI_LE_CONNECTION_COMPLETE_EVENT

Description

The LE connection complete event indicates to both of the hosts forming the connection that a new connection has been created. Upon the creation of the connection a Connection_Handle is assigned by the controller, and passed to the host in this event. If the connection establishment fails this event is provided to the host that had issued the LE_Create_Connection command. This event indicates to the host which issued a LE_Create_Connection command and received a command status event if the connection establishment failed or was successful. The Master_Clock_Accuracy parameter is only valid for a slave. On a master, this parameter is set to 0x00.

Event parameters

Table 383. HCI_LE_CONNECTION_COMPLETE_EVENT event parameters

Parameter	Size	Description	Possible values
Status	1	Error code	-
Connection_Handle	2	Connection handle to be used to identify the connection with the peer device	0x0000 ... 0x0EFF
Role	1	Role of the local device in the connection	0x00: Master 0x01: Slave
Peer_Address_Type	1	The address type of the peer device	0x00: Public device address 0x01: Random device address

Parameter	Size	Description	Possible values
Peer_Address	6	Public device address or random device address of the peer device	-
Conn_Interval	2	Connection interval used on this connection. Time = $N * 1.25$ ms	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)
Conn_Latency	2	Slave latency for the connection in number of connection events.	0x0000 ... 0x01F3
Supervision_Timeout	2	Supervision timeout for the LE link. It is a multiple of 10 ms and larger than $(1 + \text{connSlaveLatency}) * \text{connInterval} * 2$. Time = $N * 10$ ms	0x000A (100 ms) ... 0x0C80 (32000)
Master_Clock_Accuracy	1	Master clock accuracy. Only valid for a slave	0x00: 500 ppm 0x01: 250 ppm 0x02: 150 ppm 0x03: 100 ppm 0x04: 75 ppm 0x05: 50 ppm 0x06: 30 ppm 0x07: 20 ppm

3.2.2 HCI_LE_ADVERTISING_REPORT_EVENT

Description

The LE advertising report event indicates that one or more Bluetooth devices have responded to an active scan or received some information during a passive scan. The controller may queue these advertising reports and send information from multiple devices in one LE advertising report event. In the current BLE vstack version, only one report is sent per event ($\text{num_Reports} = 1$).

Event parameters

Table 384. HCI_LE_ADVERTISING_REPORT_EVENT event parameters

Parameter	Size	Description	Possible values
Num_Reports	1	Number of responses in this event	0x01
Event_Type[i]	1	Type of advertising report event: 1. ADV_IND: Connectable undirected advertising 2. ADV_DIRECT_IND: Connectable directed advertising 3. ADV_SCAN_IND: Scannable undirected advertising 4. ADV_NONCONN_IND: Non connectable undirected advertising 5. SCAN_RSP: Scan response	0x00: ADV_IND 0x01: ADV_DIRECT_IND 0x02: ADV_SCAN_IND 0x03: ADV_NONCONN_IND 0x04: SCAN_RSP
Address_Type[i]	1	Address type	0x00: Public device address 0x01: Random device address 0x02: Public identity address 0x03: Random (static) identity address
Address[i]	6	Public or random device address of the device to be connected	-
Length_Data[i]	1	Length of the Data[i] field for each device who responded	0 ... 31

Parameter	Size	Description	Possible values
Data[i]	Length_Data[i]	Length_Data[i] octets of advertising or scan response data formatted	-
RSSI[i]	1	N Size: 1 octet (signed integer), in dBm	127: RSSI not available -127 ... 20

3.2.3 HCI_LE_CONNECTION_UPDATE_COMPLETE_EVENT

Description

The LE connection update complete event is used to indicate that the ontroller process to update the connection has completed. On a slave, if no connection parameters are updated, then this event is not issued. On a master, this event is issued if the Connection_Update command was sent.

Event parameters

Table 385. HCI_LE_CONNECTION_UPDATE_COMPLETE_EVENT event parameters

Parameter	Size	Description	Possible values
Status	1	Error code	-
Connection_Handle	2	Connection handle to be used to identify the connection with the peer device.	0x0000 ... 0x0EFF
Conn_Interval	2	Connection interval used on this connection. Time = $N * 1.25$ ms	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)
Conn_Latency	2	Slave latency for the connection in number of connection events.	0x0000 ... 0x01F3
Supervision_Timeout	2	Supervision timeout for the LE link. It is a multiple of 10 ms and larger than $(1 + \text{connSlaveLatency}) * \text{connInterval} * 2$. Time = $N * 10$ ms	0x000A (100 ms) ... 0x0C80 (32000 ms)

3.2.4 HCI_LE_READ_REMOTE_FEATURES_COMPLETE_EVENT

Description

The LE read remote features complete event is used to indicate the completion of the process of the controller obtaining the used features of the remote Bluetooth device specified by the Connection_Handle event parameter.

Event parameters

Table 386. HCI_LE_READ_REMOTE_FEATURES_COMPLETE_EVENT event parameters

Parameter	Size	Description	Possible values
Status	1	Error code.	-
Connection_Handle	2	Connection handle to be used to identify the connection with the peer device.	0x0000 ... 0x0EFF
LE_Features	8	Bit mask list of used LE features.	-

3.2.5 HCI_LE_LONG_TERM_KEY_REQUEST_EVENT

Description

The LE long term key request event indicates that the master device is attempting to encrypt or re-encrypt the link and is requesting the long term key from the host.

Event parameters

Table 387. HCI_LE_LONG_TERM_KEY_REQUEST_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle to be used to identify the connection with the peer device.	0x0000 ... 0x0EFF
Random_Number	8	64-bit random number	-
Encrypted_Diversifier	2	16-bit encrypted diversifier	-

3.2.6 HCI_LE_DATA_LENGTH_CHANGE_EVENT

Description

The LE data length change event notifies the host of a change to either the maximum payload length or the maximum transmission time of packets in both directions.

The values reported are the maximum actually used on the connection following the change, except that on the LE coded PHY a packet taking up to 2704 μ s to transmit may be sent even though the corresponding parameter has a lower value.

Event parameters

Table 388. HCI_LE_DATA_LENGTH_CHANGE_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle to be used to identify the connection with the peer device.	0x0000 ... 0x0EFF
MaxTxOctets	2	Maximum number of payload octets in a link layer packet that the local controller sends on this connection (connEffectiveMaxTxOctets)	0x001B ... 0x00FB
MaxTxTime	2	Maximum time that the local controller takes to send a link layer packet on this connection (connEffectiveMaxTxTime)	0x0148 ... 0x4290
MaxRxOctets	2	Maximum number of payload octets in a link layer packet that the local controller expects to receive on this connection (connEffectiveMaxRxOctets)	0x001B ... 0x00FB
MaxRxTime	2	Maximum time that the local controller expects to receive a link layer packet on this connection (connEffectiveMaxRxTime)	0x0148 ... 0x4290

3.2.7 HCI_LE_READ_LOCAL_P256_PUBLIC_KEY_COMPLETE_EVENT

Description

This event is generated when local P-256 key generation is complete.

Event parameters

Table 389. HCI_LE_READ_LOCAL_P256_PUBLIC_KEY_COMPLETE_EVENT event parameters

Parameter	Size	Description	Possible values
Status	1	Error code.	-
Local_P256_Public_Key	64	Local P-256 public key.	-

3.2.8 HCI_LE_GENERATE_DHKEY_COMPLETE_EVENT

Description

This event indicates that LE Diffie Hellman key generation has been completed by the controller.

Event parameters

Table 390. HCI_LE_GENERATE_DHKEY_COMPLETE_EVENT event parameters

Parameter	Size	Description	Possible values
Status	1	Error code	-
DHKey	32	Diffie Hellman key	-

3.2.9

HCI_LE_ENHANCED_CONNECTION_COMPLETE_EVENT

Description

The LE enhanced connection complete event indicates to both of the hosts forming the connection that a new connection has been created. Upon the creation of the connection a Connection_Handle is assigned by the controller, and passed to the host in this event. If the connection establishment fails, this event is provided to the host that had issued the LE_Create_Connection command. If this event is unmasked and LE connection complete event is unmasked, only the LE enhanced connection complete event is sent when a new connection has been completed. This event indicates to the host that issued a LE_Create_Connection command and received a command status event if the connection establishment failed or was successful. The Master_Clock_Accuracy parameter is only valid for a slave. On a master, this parameter is set to 0x00.

Event parameters

Table 391. HCI_LE_ENHANCED_CONNECTION_COMPLETE_EVENT event parameters

Parameter	Size	Description	Possible values
Status	1	Error code.	-
Connection_Handle	2	Connection handle to be used to identify the connection with the peer device.	0x0000 ... 0x0EFF
Role	1	Role of the local device in the connection.	0x00: Master 0x01: Slave
Peer_Address_Type	1	0x00 Public device address 0x01 Random device address 0x02 Public identity address (corresponds to resolved private address) 0x03 Random (static) identity address (corresponds to resolved private address)	0x00: Public device address 0x01: Random device address 0x02: Public identity address 0x03: Random (static) identity address
Peer_Address	6	Public device address, random device address, public identity address or random (static) identity address of the device to be connected.	-
Local_Resolvable_Private_Address	6	Resolvable private address being used by the local device for this connection. This is only valid when the Own_Address_Type is set to 0x02 or 0x03. For other Own_Address_Type values, the controller returns all zeros.	-
Peer_Resolvable_Private_Address	6	Resolvable private address being used by the peer device for this connection. This is only valid for Peer_Address_Type 0x02 and 0x03. For other Peer_Address_Type values, the controller returns all zeros.	-
Conn_Interval	2	Connection interval used on this connection. Time = N * 1.25 ms	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)
Conn_Latency	2	Slave latency for the connection in number of connection events.	0x0000 ... 0x01F3
Supervision_Timeout	2	Supervision timeout for the LE Link. It is a multiple of 10 ms and larger than (1 + connSlaveLatency) * connInterval * 2.	0x000A (100 ms) ... 0x0C80 (32000 ms)

Parameter	Size	Description	Possible values
		Time = N * 10 ms	
Master_Clock_Accuracy	1	Master clock accuracy. Only valid for a slave.	0x00: 500 ppm 0x01: 250 ppm 0x02: 150 ppm 0x03: 100 ppm 0x04: 75 ppm 0x05: 50 ppm 0x06: 30 ppm 0x07: 20 ppm

3.2.10 HCI_LE_DIRECTED_ADVERTISING_REPORT_EVENT

Description

The LE direct advertising report event indicates that directed advertisements have been received, where the advertiser is using a resolvable private address for the InitA field in the ADV_DIRECT_IND PDU and the Scanning_Filter_Policy is equal to 0x02 or 0x03, see HCI_LE_Set_Scan_Parameters. Direct_Address_Type and Direct_Address identify the address the directed advertisements are being directed to. Address_Type and Address are the address of the advertiser sending the directed advertisements.

Event parameters

Table 392. HCI_LE_DIRECTED_ADVERTISING_REPORT_EVENT event parameters

Parameter	Size	Description	Possible values
Num_Reports	1	Number of responses in this event	0x01
Event_Type[i]	1	Advertising type	0x01: connectable directed advertising (ADV_DIRECT_IND)
Address_Type[i]	1	Address type	0x00: public device address 0x01: random device address 0x02: public identity address 0x03: random (static) identity address
Address[i]	6	Public or random device address, public or random (static) identity address of the advertising device	-
Direct_Address_Type[i]	1	Address type	0x01: random device address
Direct_Address[i]	6	Random device address	-
RSSI[i]	1	N Size: 1 octet (signed integer), in dBm	127: RSSI not available -127 ... 20

3.2.11 HCI_LE_PHY_UPDATE_COMPLETE_EVENT

Description

The LE PHY update complete event is used to indicate that the controller has changed the transmitter PHY or receiver PHY in use. If the controller changes the transmitter PHY, the receiver PHY, or both PHYs, this event is issued. If an LE_Set_PHY command was sent and the controller determines that neither PHY changes as a result, it issues this event immediately.

Event parameters

Table 393. HCI_LE_PHY_UPDATE_COMPLETE_EVENT event parameters

Parameter	Size	Description	Possible values
Status	1	Error code.	-
Connection_Handle	2	Connection handle to be used to identify the connection with the peer device.	0x0000 ... 0x0EFF
TX_PHY	1	Transmitter PHY in use	0x01: The transmitter PHY for the connection is LE 1M 0x02: The transmitter PHY for the connection is LE 2M 0x03: The transmitter PHY for the connection is LE coded (not supported by STM32WB)
RX_PHY	1	Receiver PHY in use	0x01: The receiver PHY for the connection is LE 1M 0x02: The receiver PHY for the connection is LE 2M 0x03: The receiver PHY for the connection is LE coded (not supported by STM32WB)

3.2.12

HCI_LE_EXTENDED_ADVERTISING_REPORT_EVENT

Description

This event indicates that a Bluetooth device has responded to an active scan or has broadcast advertisements received during a passive scan. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.7.65.13].

Event parameters

Table 394. HCI_LE_EXTENDED_ADVERTISING_REPORT_EVENT event parameters

Parameter	Size	Description	Possible values
Num_Reports	1	Number of responses in this event	0x01
Event_Type	1	Event type	Bitmask of: 0x0001: connectable advertising 0x0002: scannable advertising 0x0004: directed advertising 0x0008: scan response 0x0010: legacy advertising PDUs used: 0x0020: incomplete, more data to come 0x0040: incomplete, data truncated, no more to come
Address_Type	1	Address type of the advertising device	0x00: public device address 0x01: random device address 0x02: public identity address (corresponds to resolved private address) 0x03: random (static) identity address (corresponds to resolved private address) 0xFF: no address provided (anonymous advertisement)
Address	6	Public, random, public or random (static) identity address of the advertising device	-
Primary_PHY	1	Primary advertising PHY	0x01: advertiser PHY is LE 1M
Secondary_PHY	1	Secondary advertising PHY	0x00: no packets on the secondary advertising physical channel 0x01: advertiser PHY is LE 1M

Parameter	Size	Description	Possible values
			0x02: advertiser PHY is LE 2M 0x01: advertiser PHY is LE coded
Advertising_SID	1	Value of the Advertising SID subfield in the ADI field of the PDU or, for scan responses, in the ADI field of the original scannable.	0xFF: no ADI field provided 0x00 ... 0x0F: advertising SID subfield
TX_Power	1	Tx Power (signed integer), in dBm	127: Tx power information not available -127 ... 20: Tx power
RSSI	1	RSSI (signed integer), in dBm	127: RSSI not available -127 ... 20: Tx power
Periodic_Adv_Interval	2	Interval of the periodic advertising	0x0000: no periodic advertising
Direct_Address_Type	1	Target device address type	0x00: public device address 0x01: random device address 0x02: public identity address (corresponds to resolved private address) 0x03: random (static) identity address (corresponds to resolved private address) 0xFE: random device address (controller unable to resolve)
Direct_Address	6	Public, random, public or random (static) identity address of the advertising device	-
Data_Length	1	Length of data	-
Data	Data_Length	Octets of advertising or scan response data formatted as defined in Bluetooth spec. v.5.2 [Vol 3, Part C, 11]	-

3.2.13 HCI_LE_SCAN_TIMEOUT_EVENT

Description

This event indicates that scanning has ended because the duration has expired. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.7.65.17].

Event parameters

None

3.2.14 HCI_LE_ADVERTISING_SET_TERMINATED_EVENT

Description

This event indicates that the controller has terminated advertising in the sets specified by the Advertising_Handle parameter. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.7.65.18].

Event parameters

Table 395. HCI_LE_ADVERTISING_SET_TERMINATED_EVENT event parameters

Parameter	Size	Description	Possible values
Status	1	Error code	-
Advertising_Handle	1	Used to identify an advertising set	0x00 ... 0xEF
Connection_Handle	2	Connection handle for which the event applies	0x0000 ... 0x0EFF
Num_Completed_Ext_Adv_Events	1	Number of completed extended advertising events transmitted by the controller	0x00 ... 0xFF

3.2.15 HCI_LE_SCAN_REQUEST_RECEIVED_EVENT

Description

The HCI_LE_Scan_Request_Received event indicates that a SCAN_REQ PDU or an AUX_SCAN_REQ PDU has been received by the advertiser. The request contains a device address from a scanner allowed by the advertising filter policy. The advertising set is identified by Advertising_Handle. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.7.65.19].

Event parameters

Table 396. HCI_LE_SCAN_REQUEST_RECEIVED_EVENT event parameters

Parameter	Size	Description	Possible values
Advertising_Handle	1	Used to identify an advertising set	0x00 ... 0xEF
Scanner_Address_Type	1	Scanner address type	• 0x00: public device address • 0x01: random device address • 0x02: public identity address (corresponds to resolved private address) • 0x03: random (static) identity address (corresponds to resolved private address) PDUs used: • 0x0020: incomplete, more data to come • 0x0040: incomplete, data truncated, no more to come
Scanner_Address	6	Public, random, public or random (static) identity address of the advertising device	-

3.2.16 HCI_LE_CHANNEL_SELECTION_ALGORITHM_EVENT

Description

This event indicates which channel selection algorithm is used on a data physical channel connection. See Bluetooth spec. v.5.2 [Vol 4, Part E, 7.7.65.20].

Event parameters

Table 397. HCI_LE_CHANNEL_SELECTION_ALGORITHM_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle to be used to identify the connection with the peer device.	0x0000 ... 0x0EFF
Channel_Selection_Algorithm	1	LE channel selection algorithm	• 0x00: algorithm #1 is used • 0x01: algorithm #2 is used

3.3 ACI GAP events

In Table 398 "Y" means that the corresponding command applies to the dedicated BLE stack variant, namely LO / BO / PO / BF / LB, respectively, for Link layer only / Beacon only / Peripheral only / Basic feature / Link layer only- basic.

Table 398. ACI GAP events commands list

Command	OpCode	LO	PO	BO	BF	LB
ACI_GAP_LIMITED_DISCOVERABLE_EVENT	0x0400	-	Y	-	Y	-
ACI_GAP_PAIRING_COMPLETE_EVENT	0x0401	-	Y	-	Y	-
ACI_GAP_PASS_KEY_REQ_EVENT	0x0402	-	Y	-	Y	-
ACI_GAP_AUTHORIZATION_REQ_EVENT	0x0403	-	Y	-	Y	-
ACI_GAP_SLAVE_SECURITY_INITIATED_EVENT	0x0404	-	Y	-	Y	-
ACI_GAP_BOND_LOST_EVENT	0x0405	-	Y	-	Y	-
ACI_GAP_PROC_COMPLETE_EVENT	0x0407	-	Y	-	Y	-
ACI_GAP_ADDR_NOT_RESOLVED_EVENT	0x0408	-	Y	-	Y	-
ACI_GAP_NUMERIC_COMPARISON_VALUE_EVENT	0x0409	-	Y	-	Y	-
ACI_GAP_KEYPRESS_NOTIFICATION_EVENT	0x040A	-	Y	-	Y	-

3.3.1 ACI_GAP_LIMITED_DISCOVERABLE_EVENT

Description

This event is generated by the controller when the limited discoverable mode ends due to timeout. The timeout is 180 seconds.

Event parameters

None

3.3.2 ACI_GAP_PAIRING_COMPLETE_EVENT

Description

This event is generated when the pairing process has completed successfully, or a pairing procedure timeout has occurred, or the pairing has failed. This is to notify the application that there has been a pairing with a remote device so that it can take further actions, or to notify that a timeout has occurred so that the upper layer can decide to disconnect the link.

Event parameters

Table 399. ACI_GAP_PAIRING_COMPLETE_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle on which the pairing procedure is completed	-
Status	1	Pairing status	0x00 Success 0x01 Timeout 0x02 Failed

Parameter	Size	Description	Possible values
Reason	1	Pairing reason error code (valid in case of pairing failed status)	0x00 0x01: PASSKEY_ENTRY_FAILED 0x02: OOB_NOT_AVAILABLE 0x03: AUTH_REQ_CANNOT_BE_MET 0x04: CONFIRM_VALUE_FAILED 0x05: PAIRING_NOT_SUPPORTED 0x06: INSUFF_ENCRYPTION_KEY_SIZE 0x07: CMD_NOT_SUPPORTED 0x08: UNSPECIFIED_REASON 0x09: VERY_EARLY_NEXT_ATTEMPT 0x0A: SM_INVALID_PARAMS 0x0B: SMP_SC_DHKEY_CHECK_FAILED 0x0C: SMP_SC_NUMCOMPARISON_FAILED

3.3.3 ACI_GAP_PASS_KEY_REQ_EVENT

Description

This event is generated by the security manager to the application when a passkey is required for pairing. When this event is received, the application has to respond with the ACI_GAP_PASS_KEY_RESP command.

Event parameters

Table 400. ACI_GAP_PASS_KEY_REQ_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the passkey has been requested.	-

3.3.4 ACI_GAP_AUTHORIZATION_REQ_EVENT

Description

This event is generated by the security manager to the application when the application has set that authorization is required for reading/writing of attributes. This event is generated as soon as the pairing is complete. When this event is received, ACI_GAP_AUTHORIZATION_RESP command must be used to respond by the application.

Event parameters

Table 401. ACI_GAP_AUTHORIZATION_REQ_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which authorization has been requested.	-

3.3.5 ACI_GAP_SLAVE_SECURITY_INITIATED_EVENT

Description

This event is generated when the slave security request is successfully sent to the master.

Event parameters

None

3.3.6 ACI_GAP_BOND_LOST_EVENT

Description

This event is generated when a pairing request is issued in response to a slave security request from a master previously bonded with the slave. When this event is received, the upper layer has to issue the command ACI_GAP_ALLOW_REBOND to allow the slave to continue the pairing process with the master.

Event parameters

None

3.3.7 ACI_GAP_PROC_COMPLETE_EVENT

Description

This event is sent by the GAP to the upper layers when a procedure previously started has been terminated by the upper layer or has completed for any other reason

Event parameters

Table 402. ACI_GAP_PROC_COMPLETE_EVENT event parameters

Parameter	Size	Description	Possible values
Procedure_Code	1	Terminated procedure.	0x01: GAP_LIMITED_DISCOVERY_PROC 0x02: GAP_GENERAL_DISCOVERY_PROC 0x04: GAP_NAME_DISCOVERY_PROC 0x08: GAP_AUTO_CONNECTION_ESTABLISHMENT_PROC 0x10: GAP_GENERAL_CONNECTION_ESTABLISHMENT_PROC 0x20: GAP_SELECTIVE_CONNECTION_ESTABLISHMENT_PROC 0x40: GAP_DIRECT_CONNECTION_ESTABLISHMENT_PROC 0x80: GAP_OBSERVATION_PROC
Status	1	Error code	-
Data_Length	1	Length of data in octets	-
Data	Data_Length	Procedure specific data. For name discovery Procedure: the name of the peer device if the procedure completed successfully.	-

3.3.8 ACI_GAP_ADDR_NOT_RESOLVED_EVENT

Description

This event is sent only by a privacy enabled Peripheral. The event is sent to the upper layers when the peripheral is unsuccessful in resolving the resolvable address of the peer device after connecting to it.

Event parameters

Table 403. ACI_GAP_ADDR_NOT_RESOLVED_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle for which the private address could not be resolved with any of the stored IRKs.	-

3.3.9 ACI_GAP_NUMERIC_COMPARISON_VALUE_EVENT

Description

This event is sent only during SC v4.2 Pairing, when numeric comparison association model is selected, in order to show the numeric value generated, and to ask for confirmation to the user. When this event is received the application must respond with the ACI_GAP_NUMERIC_COMPARISON_RESP command.

Event parameters

Table 404. ACI_GAP_NUMERIC_COMPARISON_VALUE_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the underlying pairing	-
Numeric_Value	4	-	-

3.3.10

ACI_GAP_KEYPRESS_NOTIFICATION_EVENT

Description

This event is sent only during SC v.4.2 Pairing, when keypress notifications are supported, in order to show the input type signalled by the peer device, having keyboard only I/O capabilities. When this event is received, no action is required to the user.

Event parameters

Table 405. ACI_GAP_KEYPRESS_NOTIFICATION_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the underlying pairing	-
Notification_Type	1	Type of keypress input notified/signaled by peer device (having keyboard only I/O capabilities)	-

3.4 ACI GATT/ATT events

In Table 406 "Y" means that the corresponding command applies to the dedicated BLE stack variant, namely LO / BO / PO / BF / LB, respectively, for Link layer only / Beacon only / Peripheral only / Basic feature / Link layer only basic.

Table 406. ACI GATT/ATT events commands list

Command	OpCode	LO	PO	BO	BF	LB
ACI_GATT_ATTRIBUTE_MODIFIED_EVENT	0x0C01	-	Y	-	Y	-
ACI_GATT_PROC_TIMEOUT_EVENT	0x0C02	-	Y	-	Y	-
ACI_ATT_EXCHANGE_MTU_RESP_EVENT	0x0C03	-	Y	-	Y	-
ACI_ATT_FIND_INFO_RESP_EVENT	0x0C04	-	-	-	Y	-
ACI_ATT_FIND_BY_TYPE_VALUE_RESP_EVENT	0x0C05	-	-	-	Y	-
ACI_ATT_READ_BY_TYPE_RESP_EVENT	0x0C06	-	-	-	Y	-
ACI_ATT_READ_RESP_EVENT	0x0C07	-	-	-	Y	-
ACI_ATT_READ_BLOB_RESP_EVENT	0x0C08	-	-	-	Y	-
ACI_ATT_READ_MULTIPLE_RESP_EVENT	0x0C09	-	-	-	Y	-
ACI_ATT_READ_BY_GROUP_TYPE_RESP_EVENT	0x0C0A	-	-	-	Y	-
ACI_ATT_PREPARE_WRITE_RESP_EVENT	0x0C0C	-	-	-	Y	-
ACI_ATT_EXEC_WRITE_RESP_EVENT	0x0C0D	-	-	-	Y	-
ACI_GATT_INDICATION_EVENT	0x0C0E	-	-	-	Y	-
ACI_GATT_NOTIFICATION_EVENT	0x0C0F	-	-	-	Y	-
ACI_GATT_PROC_COMPLETE_EVENT	0x0C10	-	Y	-	Y	-
ACI_GATT_ERROR_RESP_EVENT	0x0C11	-	-	-	Y	-
ACI_GATT_DISC_READ_CHAR_BY_UUID_RESP_EVENT	0x0C12	-	-	-	Y	-
ACI_GATT_WRITE_PERMIT_REQ_EVENT	0x0C13	-	Y	-	Y	-
ACI_GATT_READ_PERMIT_REQ_EVENT	0x0C14	-	Y	-	Y	-
ACI_GATT_READ_MULTI_PERMIT_REQ_EVENT	0x0C15	-	Y	-	Y	-
ACI_GATT_TX_POOL_AVAILABLE_EVENT	0x0C16	-	Y	-	Y	-
ACI_GATT_SERVER_CONFIRMATION_EVENT	0x0C17	-	Y	-	Y	-
ACI_GATT_PREPARE_WRITE_PERMIT_REQ_EVENT	0x0C18	-	Y	-	Y	-
ACI_GATT_READ_EXT_EVENT	0xC1D	-	-	-	Y	-
ACI_GATT_INDICATION_EXT_EVENT	0xC1E	-	-	-	Y	-
ACI_GATT_NOTIFICATION_EXT_EVENT	0xC1F	-	-	-	Y	-

3.4.1 ACI_GATT_ATTRIBUTE_MODIFIED_EVENT

Description

This event is generated to the application by the GATT server when a client modifies any attribute on the server, as consequence of one of the following GATT procedures:

- Write without response
- Signed write without response
- Write characteristic value
- Write long characteristic value - reliable write

Event parameters

Table 407. Event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	The connection handle which modified the attribute.	-
Attr_Handle	2	Handle of the attribute that was modified.	-
Offset	2	Bits 14-0: Offset from which the write has been performed by the peer device. Bit15 is used as flag: When set to 1 it indicates that more data are to come (fragmented event in case of long attribute data).	-
Attr_Data_Length	2	Length of Attr_Data in octets	-
Attr_Data	Attr_Data_Length	The modified value	-

3.4.2 ACI_GATT_PROC_TIMEOUT_EVENT

Description

This event is generated by the client/server to the application on a GATT timeout (30 seconds). This is a critical event that must not happen during normal operating conditions. It is an indication of either a major disruption in the communication link or a mistake in the application which does not provide a reply to GATT procedures. After this event, the GATT channel is closed and no more GATT communication can be performed. The applications is expected to issue an ACI_GAP_TERMINATE to disconnect from the peer device. It is important to leave an 100 ms blank window before sending the ACI_GAP_TERMINATE, since immediately after this event, system could save important information in non volatile memory.

Event parameters

Table 408. ACI_GATT_PROC_TIMEOUT_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle on which the GATT procedure has timed out	-

3.4.3 ACI_ATT_EXCHANGE_MTU_RESP_EVENT

Description

This event is generated in response to an Exchange MTU request. See ACI_GATT_EXCHANGE_CONFIG.

Event parameters

Table 409. ACI_ATT_EXCHANGE_MTU_RESP_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF
Server_RX_MTU	2	Attribute server receive MTU size	-

3.4.4 ACI_ATT_FIND_INFO_RESP_EVENT

Description

This event is generated in response to a find information request. This event is also generated in response to ACI_GATT_DISC_ALL_CHAR_DESC

Event parameters

Table 410. ACI_ATT_FIND_INFO_RESP_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF
Format	1	Format of the handle-uuid pairs	-
Event_Data_Length	1	Length of handle_UUID_Pair in octets	-
Handle_UUID_Pair	Event_Data_Length	A sequence of handle-uuid pairs. if format=1, each pair is: [2 octets for handle, 2 octets for UUIDs], if format=2, each pair is: [2 octets for handle, 16 octets for UUIDs]	-

3.4.5 ACI_ATT_FIND_BY_TYPE_VALUE_RESP_EVENT

Description

This event is generated in response to a ACI_ATT_FIND_BY_TYPE_VALUE_REQ.

Event parameters

Table 411. ACI_ATT_FIND_BY_TYPE_VALUE_RESP_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF
Num_of_Handle_Pair	1	Number of attribute, group handle pairs	-
Found_Attribute_Handle[i]	2	Found attribute handle	-
Group_End_Handle[i]	2	Group end handle	-

3.4.6 ACI_ATT_READ_BY_TYPE_RESP_EVENT

Description

This event is generated in response to a ACI_ATT_READ_BY_TYPE_REQ. See ACI_GATT_FIND_INCLUDED_SERVICES and ACI_GATT_DISC_ALL_CHAR_DESC.

Event parameters

Table 412. ACI_ATT_READ_BY_TYPE_RESP_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF
Handle_Value_Pair_Length	1	The size of each attribute handle-value pair	-
Data_Length	1	Length of Handle_Value_Pair_Data in octets	-
Handle_Value_Pair_Data	Data_Length	Attribute data. A sequence of handle-value pairs: [2 octets for Attribute Handle, (Handle_Value_Pair_Length - 2 octets) for Attribute Value]	-

3.4.7 ACI_ATT_READ_RESP_EVENT

Description

This event is generated in response to a read request. See ACI_GATT_READ_CHAR_VALUE.

Event parameters

Table 413. ACI_ATT_READ_RESP_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF
Event_Data_Length	1	Length of following data	-
Attribute_Value	Event_Data_Length	The value of the attribute.	-

3.4.8 ACI_ATT_READ_BLOB_RESP_EVENT

Description

This event can be generated during a read long characteristic value procedure. See ACI_GATT_READ_LONG_CHAR_VALUE.

Event parameters

Table 414. ACI_ATT_READ_BLOB_RESP_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response.	· 0x0000 ... 0x0EFF
Event_Data_Length	1	Length of following data	-
Attribute_Value	Event_Data_Length	Part of the attribute value.	-

3.4.9 ACI_ATT_READ_MULTIPLE_RESP_EVENT

Description

This event is generated in response to a read multiple request.

Event parameters

Table 415. ACI_ATT_READ_MULTIPLE_RESP_EVENT event parameters

Parameter	Size	Description	Possible values
Status	1	Error code	-
Connection_Handle	2	Connection handle for which the command is given.	0x0000 ... 0x0EFF
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF
Event_Data_Length	1	Length of following data	-
Set_Of_Values	Event_Data_Length	A set of two or more values. A concatenation of attribute values for each of the attribute handles in the request in the order that they were requested.	-

3.4.10 ACI_ATT_READ_BY_GROUP_TYPE_RESP_EVENT

Description

This event is generated in response to a read by group type request. See ACI_GATT_DISC_ALL_PRIMARY_SERVICES.

Event parameters

Table 416. ACI_ATT_READ_BY_GROUP_TYPE_RESP_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF
Attribute_Data_Length	1	The size of each attribute data	-
Data_Length	1	Length of Attribute_Data_List in octets	-
Attribute_Data_List	Data_Length	Attribute data list. A sequence of attribute handle, end group handle, attribute value tuples: [2 octets for Attribute Handle, 2 octets end group handle, (ttribute_Data_Length - 4 octets) for attribute value]	-

3.4.11 ACI_ATT_PREPARE_WRITE_RESP_EVENT

Description

This event is generated in response to a ACI_ATT_PREPARE_WRITE_REQ.

Event parameters

Table 417. ACI_ATT_PREPARE_WRITE_RESP_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF
Attribute_Handle	2	The handle of the attribute to be written	-
Offset	2	The offset of the first octet to be written.	-
Part_Attribute_Value_Length	1	Length of Part_Attribute_Value in octets	-
Part_Attribute_Value	Part_Attribute_Value_Length	The value of the attribute to be written	-

3.4.12 ACI_ATT_EXEC_WRITE_RESP_EVENT

Description

This event is generated in response to an Execute Write Request.

Event parameters

Table 418. ACI_ATT_EXEC_WRITE_RESP_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF

3.4.13 ACI_GATT_INDICATION_EVENT

Description

This event is generated when an indication is received from the server.

Event parameters

Table 419. ACI_GATT_INDICATION_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF
Attribute_Handle	2	The handle of the attribute	-
Attribute_Value_Length	1	Length of Attribute_Value in octets	-
Attribute_Value	Attribute_Value_Length	The current value of the attribute	-

3.4.14 ACI_GATT_NOTIFICATION_EVENT

Description

This event is generated when a notification is received from the server.

Event parameters

Table 420. ACI_GATT_NOTIFICATION_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF
Attribute_Handle	2	The handle of the attribute	-
Attribute_Value_Length	1	Length of Attribute_Value in octets	-
Attribute_Value	Attribute_Value_Length	The current value of the attribute	-

3.4.15 ACI_GATT_PROC_COMPLETE_EVENT

Description

This event is generated when a GATT client procedure completes either with error or successfully.

Event parameters

Table 421. ACI_GATT_PROC_COMPLETE_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF
Error_Code	1	Indicates whether the procedure completed with an error or was successful (see Section 4 Status error codes)	-

3.4.16 ACI_GATT_ERROR_RESP_EVENT

Description

This event is generated when an Error Response is received from the server. The error response can be given by the server at the end of one of the GATT discovery procedures. This does not mean that the procedure ended with an error, but this error event is part of the procedure itself.

Event parameters

Table 422. ACI_GATT_ERROR_RESP_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF
Req_Opcode	1	The request that generated this error response	-
Attribute_Handle	2	The attribute handle that generated this error response	-
Error_Code	1	The reason why the request has generated an error response (ATT error codes)	• 0x01: Invalid handle • 0x02: Read not permitted • 0x03: Write not permitted • 0x04: Invalid PDU • 0x05: Insufficient authentication • 0x06: Request not supported • 0x07: Invalid offset • 0x08: Insufficient authorization • 0x09: Prepare queue full • 0x0A: Attribute not found • 0x0B: Attribute not long • 0x0C: Insufficient encryption key size • 0x0D: Invalid attribute value length • 0x0E: Unlikely error • 0x0F: Insufficient encryption • 0x10: Unsupported group type • 0x11: Insufficient resources

3.4.17

ACI_GATT_DISC_READ_CHAR_BY_UUID_RESP_EVENT

Description

This event can be generated during a "Discover Characteristics By UUID" procedure or a "Read using Characteristic UUID" procedure. The attribute value is a service declaration, when a "Discover characteristics by UUID" has been started. It is the value of the characteristic if a "Read using characteristic UUID" has been performed.

Event parameters

Table 423. ACI_GATT_DISC_READ_CHAR_BY_UUID_RESP_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF
Attribute_Handle	2	The handle of the attribute	-
Attribute_Value_Length	1	Length of Attribute_Value in octets	-
Attribute_Value	Attribute_Value_Length	The attribute value is a service, when a "Discover characteristics by UUID" has been started. It is the value of the characteristic if a "Read using characteristic UUID" has been performed.	-

3.4.18 ACI_GATT_WRITE_PERMIT_REQ_EVENT

Description

This event is given to the application when a write request, write command or signed write command is received by the server from the client. This event is given to the application only if the event bit for this event generation is set when the characteristic was added. When this event is received, the application has to check whether the value being requested for write can be allowed to be written and respond with the command ACI_GATT_WRITE_RESP. The details of the parameters of the command can be found. Based on the response from the application, the attribute value is modified by the stack. If the write is rejected by the application, then the value of the attribute is not modified. In case of a write REQ, an error response is sent to the client, with the error code as specified by the application. In case of write/signed write commands, no response is sent to the client but the attribute is not modified.

Event parameters

Table 424. ACI_GATT_WRITE_PERMIT_REQ_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Handle of the connection on which there was the request to write the attribute	-
Attribute_Handle	2	The handle of the attribute	-
Data_Length	1	Length of data field	-
Data	Data_Length	The data that the client has requested to write	-

3.4.19 ACI_GATT_READ_PERMIT_REQ_EVENT

Description

This event is given to the application when a read request or read blob request is received by the server from the client. This event is given to the application only if the event bit for this event generation is set when the characteristic was added. On receiving this event, the application can update the value of the handle if it desires and when done, it has to send the ACI_GATT_ALLOW_READ command to indicate to the stack that it can send the response to the client.

Event parameters

Table 425. ACI_GATT_READ_PERMIT_REQ_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response.	0x0000 ... 0x0EFF
Attribute_Handle	2	The handle of the attribute	-
Offset	2	Contains the offset from which the read has been requested	-

3.4.20 ACI_GATT_READ_MULTI_PERMIT_REQ_EVENT

Description

This event is given to the application when a read multiple request or read by type request is received by the server from the client. This event is given to the application only if the event bit for this event generation is set when the characteristic was added. On receiving this event, the application can update the values of the handles if it desires and when done, it has to send the ACI_GATT_ALLOW_READ command to indicate to the stack that it can send the response to the client.

Event parameters

Table 426. ACI_GATT_READ_MULTI_PERMIT_REQ_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Handle of the connection which requested to read the attribute	-
Number_of_Handles	1	-	-
Handle[i]	2	-	-

3.4.21 ACI_GATT_TX_POOL_AVAILABLE_EVENT

Description

Each time BLE FW stack raises the error code BLE_STATUS_INSUFFICIENT_RESOURCES (0x64), the ACI_GATT_TX_POOL_AVAILABLE_EVENT event is generated as soon as there are at least two buffers available for notifications or write commands.

Event parameters

Table 427. ACI_GATT_TX_POOL_AVAILABLE_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the request	-
Available_Buffers	2	Number of buffers available	-

3.4.22 ACI_GATT_SERVER_CONFIRMATION_EVENT

Description

This event is generated when the client has sent the confirmation to a previously sent indication.

Event parameters

Table 428. ACI_GATT_SERVER_CONFIRMATION_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the event	-

3.4.23 ACI_GATT_PREPARE_WRITE_PERMIT_REQ_EVENT

Description

This event is given to the application when a prepare write request is received by the server from the client. This event is given to the application only if the event bit for this event generation is set when the characteristic was added. When this event is received, the application has to check whether the value being requested for write can be allowed to be written and respond with the command ACI_GATT_WRITE_RESP. Based on the response from the application, the attribute value is modified by the stack. If the write is rejected by the application, then the value of the attribute is not modified and an error response is sent to the client, with the error code as specified by the application.

Event parameters

Table 429. ACI_GATT_PREPARE_WRITE_PERMIT_REQ_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Handle of the connection on which there was the request to write the attribute	-
Attribute_Handle	2	The handle of the attribute	-
Offset	2	The offset from which the prepare write has been requested	-
Data_Length	1	Length of Data field	-
Data	Data_Length	The data that the client has requested to write	-

3.4.24 ACI_GATT_READ_EXT_EVENT

Description

When it is enabled with ACI_GATT_SET_EVENT_MASK, this event is generated instead of ACI_ATT_READ_RESP_EVENT / ACI_ATT_READ_BLOB_RESP_EVENT / ACI_ATT_READ_MULTIPLE_RESP_EVENT. This event should be used instead of those events when ATT_MTU > (BLE_EVT_MAX_PARAM_LEN - 4), i.e. ATT_MTU > 251 for BLE_EVT_MAX_PARAM_LEN default value.

Event parameters

Table 430. ACI_GATT_READ_EXT_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to response	0x0000 ... 0x0EFF
Offset	2	Bits 14-0: offset in octets from which Attribute_Value data starts. Bit 15 is used as flag: when set to 1 it indicates that more data are to come (fragmented event in case of long attribute data)	-
Event_Data_Length	2	Length of following Data	-
Attribute_Value	Event_Data_Length	The value of the attribute(s)	-

3.4.25 ACI_GATT_INDICATION_EXT_EVENT

Description

When it is enabled with ACI_GATT_SET_EVENT_MASK and when an indication is received from the server, this event is generated instead of ACI_GATT_INDICATION_EVENT. This event is used instead of ACI_GATT_INDICATION_EVENT when ATT_MTU > (BLE_EVT_MAX_PARAM_LEN - 4) i.e. ATT_MTU > 251 for BLE_EVT_MAX_PARAM_LEN default value.

Event parameters

Table 431. ACI_GATT_PREPARE_WRITE_PERMIT_REQ_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response	0x0000 ... 0x0EFF
Attribute_Handle	2	The handle of the attribute	-
Offset	2	Bits 14-0: offset in octets from which Attribute_Value data starts. Bit 15 is used as flag: when set to 1 it indicates that more data are to come (fragmented event in case of long attribute data).	-
Data_Length	2	Length of Attribute_Value in octets	-
Data	Attribute_Value_Length	The current value of the attribute	-

3.4.26

ACI_GATT_NOTIFICATION_EXT_EVENT

Description

When it is enabled with ACI_GATT_SET_EVENT_MASK and when a notification is received from the server, this event is generated instead of ACI_GATT_NOTIFICATION_EVENT. This event is used instead of ACI_GATT_NOTIFICATION_EVENT when ATT_MTU > (BLE_EVT_MAX_PARAM_LEN - 4) i.e. ATT_MTU > 251 for BLE_EVT_MAX_PARAM_LEN default value.

Event parameters

Table 432. ACI_GATT_PREPARE_WRITE_PERMIT_REQ_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle related to the response	0x0000 ... 0x0EFF
Attribute_Handle	2	The handle of the attribute	-
Offset	2	Bits 14-0: offset in octets from which Attribute_Value data starts. Bit 15 is used as flag: when set to 1 it indicates that more data are to come (fragmented event in case of long attribute data).	-
Data_Length		Length of Attribute_Value in octets	-
Data	Attribute_Value_Length	The current value of the attribute	-

3.5 ACI L2CAP events

In Table 433 "Y" means that the corresponding command applies to the dedicated BLE stack variant, namely LO / BO / PO / BF / LB, respectively, for Link layer only / Beacon only / Peripheral only / Basic feature / Link layer only basic.

Table 433. ACI L2CAP events commands list

Command	OpCode	LO	PO	BO	BF	LB
ACI_L2CAP_CONNECTION_UPDATE_RESP_EVENT	0x0800	-	Y	-	Y	-
ACI_L2CAP_PROC_TIMEOUT_EVENT	0x0801	-	Y	-	Y	-
ACI_L2CAP_CONNECTION_UPDATE_REQ_EVENT	0x0802	-	-	-	Y	-
ACI_L2CAP_COMMAND_REJECT_EVENT	0x080A	-	Y	-	Y	-
ACI_L2CAP_COC_CONNECT_EVENT	0x0810	-	-	-	-	-
ACI_L2CAP_COC_CONNECT_CONFIRM_EVENT	0x0811	-	-	-	-	-
ACI_L2CAP_COC_RECONF_EVENT	0x0812	-	-	-	-	-
ACI_L2CAP_COC_RECONF_CONFIRM_EVENT	0x0813	-	-	-	-	-
ACI_L2CAP_COC_DISCONNECT_EVENT	0x0814	-	-	-	-	-
ACI_L2CAP_COC_FLOW_CONTROL_EVENT	0x0815	-	-	-	-	-
ACI_L2CAP_COC_RX_DATA_EVENT	0x0816	-	-	-	-	-
ACI_L2CAP_COC_TX_POOL_AVAILABLE_EVENT	0x0817	-	-	-	-	-

3.5.1 ACI_L2CAP_CONNECTION_UPDATE_RESP_EVENT

Description

This event is generated when the master responds to the connection update request packet with a connection update response packet.

Event parameters

Table 434. ACI_L2CAP_CONNECTION_UPDATE_RESP_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle referring to the COS channel where the disconnection has been received	-
Result	3	-	-

3.5.2 ACI_L2CAP_PROC_TIMEOUT_EVENT

Description

This event is generated when the master does not respond to the connection update request packet with a connection update response packet or a command reject packet within 30 seconds.

Event parameters

Table 435. ACI_L2CAP_PROC_TIMEOUT_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Handle of the connection related to this L2CAP procedure.	-
Data_Length	1	Length of following data	-
Data	Data_Length	-	-

3.5.3 ACI_L2CAP_CONNECTION_UPDATE_REQ_EVENT

Description

The event is given by the L2CAP layer when a connection update request is received from the slave. The upper layer which receives this event has to respond by sending a ACI_L2CAP_CONNECTION_PARAMETER_UPDATE_RESP command.

Event parameters

Table 436. ACI_L2CAP_CONNECTION_UPDATE_REQ_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Handle of the connection related to this L2CAP procedure.	-
Identifier	1	This is the identifier which associate the request to the response.	-
L2CAP_Length	2	Length of the L2CAP connection update request.	-
Interval_Min	2	Minimum value for the connection event interval. This is less than or equal to Conn_Interval_Max. Time = N * 1.25 ms	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)
Interval_Max	2	Maximum value for the connection event interval. This is greater than or equal to Conn_Interval_Min. Time = N * 1.25 ms	0x0006 (7.50 ms) ... 0x0C80 (4000.00 ms)
Slave_Latency	2	Slave latency for the connection in number of connection events.	0x0000 ... 0x01F3
Timeout_Multiplier	2	Defines connection timeout parameter in the following manner: Timeout Multiplier * 10 ms.	-

3.5.4 ACI_L2CAP_COMMAND_REJECT_EVENT

Description

This event is generated when the master responds to the connection update request packet with a command reject packet.

Event parameters

Table 437. ACI_L2CAP_COMMAND_REJECT_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Connection handle referring to the COS channel where the disconnection has been received.	-
Identifier	1	This is the identifier which associate the request to the response.	-
Reason	2	Reason	-
Data_Length	1	Length of following data	-
Data	Data_Length	Data field associated with reason	-

3.5.5 ACI_L2CAP_COC_CONNECT_EVENT

Description

This event is generated when receiving a valid credit based connection request packet.

Event parameters

Table 438. ACI_L2CAP_COC_CONNECT_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Handle of the connection where this event occurred.	0x0000 ... 0x0EFF

Parameter	Size	Description	Possible values
SMPS	2	Simplified Protocol/Service Multiplexer	0x0000 ... 0x00FF
MTU	2	Maximum transmission unit	23 ... 65535
MPS	2	Maximum payload size in octets	23 ... 65535
Initial_Credits	2	Number of K-frames that can be received on the created channel(s) by the L2CAP layer entity sending this packet.	0 ... 65535
Channel_Number	1	Number of channels to be created. If set to 0 this parameter requests the creation of one LE credit based connection-oriented channel, otherwise it requests the creation of one or more enhanced credit based connection-oriented channels.	0 ... 5

3.5.6 ACI_L2CAP_COC_CONNECT_CONFIRM_EVENT

Description

This event is generated when receiving a valid credit based connection response packet. See Bluetooth spec. v.5.2 [Vol 3, Part A].

Input parameters

Table 439. ACI_L2CAP_COC_CONNECT_CONFIRM_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Handle of the connection where this event occurred.	0x0000 ... 0x0EFF
MTU	2	Maximum transmission unit	23 ... 65535
MPS	2	Maximum payload size in octets	23 ... 65535
Initial_Credits	2	Number of K-frames that can be received on the created channel(s) by the L2CAP layer entity sending this packet.	0 ... 65535
Results	2	This parameter indicates the outcome of the request. A value of 0x0000 indicates success, a non-zero value indicates the request is refused.	0x0000 ... 0x000C
Channel_Number	1	Number of created channels. It is the length of Channel_Index_List.	0 ... 5
Channel_Index_List	Channel_Number	List of channel indexes for which the primitive applies.	-

3.5.7 ACI_L2CAP_COC_RECONF_EVENT

Description

This event is generated when receiving a valid credit based reconfigure request packet. See Bluetooth spec. v.5.2 [Vol 3, Part A].

Event parameters

Table 440. ACI_L2CAP_COC_RECONF_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Handle of the connection where this event occurred.	0x0000 ... 0x0EFF
MTU	2	Maximum transmission unit	23 ... 65535
MPS	2	Maximum payload size in octets	23 ... 65535
Channel_Number	1	Number of created channels. It is the length of Channel_Index_List.	1 ... 5
Channel_Index_List	Channel_Number	List of channel indexes to whom the primitive applies.	-

3.5.8 ACI_L2CAP_COC_RECONF_CONFIRM_EVENT

Description

This event is generated when receiving a valid credit based reconfigure response packet. See Bluetooth spec. v.5.2 [Vol 3, Part A].

Input parameters

Table 441. ACI_L2CAP_COC_RECONF_CONFIRM_EVENT event parameters

Parameter	Size	Description	Possible values
Connection_Handle	2	Handle of the connection where this event occurred.	0x0000 ... 0x0EFF
Result	2	This parameter indicates the outcome of the request. A value of 0x0000 indicates success, a non-zero value indicates that the request is refused.	0x0000 ... 0x000C

3.5.9 ACI_L2CAP_COC_DISCONNECT_EVENT

Description

This event is generated when a connection-oriented channel is disconnected following an L2CAP channel termination procedure. See Bluetooth spec. v.5.2 [Vol 3, Part A].

Event parameters

Table 442. ACI_L2CAP_COC_DISCONNECT_EVENT event parameters

Parameter	Size	Description	Possible values
Channel_Index	1	Index of the connection-oriented channel to whom the primitive applies.	-

3.5.10 ACI_L2CAP_COC_FLOW_CONTROL_EVENT

Description

This event is generated when receiving a valid flow control credit signaling packet. See Bluetooth spec. v.5.2 [Vol 3, Part A].

Event parameters

Table 443. ACI_L2CAP_COC_DISCONNECT_EVENT event parameters

Parameter	Size	Description	Possible values
Channel_Index	1	Index of the connection-oriented channel to whom the primitive applies.	-
Credits	2	Number of credits the receiving device can increment, corresponding to the number of K-frames that can be sent to the peer device sending the Flow Control Credit packet.	1 ... 65535

3.5.11 ACI_L2CAP_COC_RX_DATA_EVENT

Description

This event is generated when receiving a valid K-frame packet on a connection-oriented channel. See Bluetooth spec. v.5.2 [Vol 3, Part A].

Note: *For the first K-frame of the SDU, the Information data contains the L2CAP SDU length coded on two octets followed by the K-frame information payload. For the next K-frames of the SDU the information data only contains the K-frame information payload.*

Event parameters

Table 444. ACI_L2CAP_COC_RX_DATA_EVENT event parameters

Parameter	Size	Description	Possible values
Channel_Index	1	Index of the connection-oriented channel to whom the primitive applies.	-
Length	2	Length of data in octets	-
Data	Length	Information data	-

3.5.12

ACI_L2CAP_COC_TX_POOL_AVAILABLE_EVENT

Description

Each time ACI_L2CAP_COC_TX_DATA raises the error code BLE_STATUS_INSUFFICIENT_RESOURCES (0x64), the ACI_L2CAP_COC_TX_POOL_AVAILABLE_EVENT event is generated as soon as there is a free buffer available for sending K-frames.

Event parameters

None

3.6 ACI HAL events

In Table 445 "Y" means that the corresponding command applies to the dedicated BLE stack variant, namely LO / BO / PO / BF / LB, respectively, for Link layer only / Beacon only / Peripheral only / Basic feature / Link layer only basic.

Table 445. ACI HAL events commands list

Command	OpCode	LO	PO	BO	BF	LB
ACI_HAL_END_OF_RADIO_ACTIVITY_EVENT	0x0004	Y	Y	Y	Y	Y
ACI_HAL_SCAN_REQ_REPORT_EVENT	0x0005	-	-	-	-	-
ACI_HAL_FW_ERROR_EVENT	0x0006	-	Y	-	Y	-

3.6.1 ACI_HAL_END_OF_RADIO_ACTIVITY_EVENT

Description

This event is generated when the device completes a radio activity, and provides information when a new radio activity is performed. The provided information includes the type of radio activity and the absolute time in system ticks when a new radio activity is scheduled, if any. The application uses this information to schedule user activities synchronous to selected radio activities. A command ACI_HAL_SET_RADIO_ACTIVITY_MASK is provided to enable radio activity events of user interests (by default no events are enabled). The enabling radio events in applications with intense radio activity can lead to a fairly high rate of generated events. The application use cases includes synchronizing notification with connection interval, switching antenna at the end of advertising, or performing flash erase operation while radio is idle.

Event parameters

Table 446. ACI_HAL_END_OF_RADIO_ACTIVITY_EVENT parameters

Parameter	Size	Description	Possible values
Last_State	1	Completed radio events	0x00: Idle 0x01: Advertising 0x02: Connection event slave 0x03: Scanning 0x04: Connection request 0x05: Connection event slave 0x06: TX test mode 0x07: RX test mode
Next_State	1	Incoming radio events	0x00: Idle 0x01: Advertising 0x02: Connection event slave 0x03: Scanning 0x04: Connection request 0x05: Connection event slave 0x06: TX test mode 0x07: RX test mode
Next_State_SysTime	4	32-bit absolute current time expressed in internal time units	-
Last_state_Slot	1	Slot number of completed radio event	0xFF: Idle 0x00 ... 0x07
Next_State_Slot	1	Slot number of incoming radio event	0xFF: Idle 0x00 ... 0x07

3.6.2 ACI_HAL_SCAN_REQ_REPORT_EVENT

Description

This event is reported to the application after a scan request is received and a scan response is scheduled for transmission.

Event parameters

Table 447. ACI_HAL_SCAN_REQ_REPORT_EVENT parameters

Parameter	Size	Description	Possible values
RSSI	1	N Size: 1 octet (signed integer), in dBm	127: RSSI not available -127 ... 20
Peer_Address_Type	1	Peer address type	0x00: public device address 0x01: random device address 0x02: public identity address 0x03: random (static) identity address
Peer_Address	6	Public or random device address of the peer device	-

3.6.3

ACI_HAL_FW_ERROR_EVENT

Description

This event is generated to report firmware error information.

Event parameters

Table 448. ACI_HAL_FW_ERROR_EVENT parameters

Parameter	Size	Description	Possible values
FW_Error_Type	1	FW error type	0x01: L2CAP recombination failure 0x02: GATT unexpected peer message 0x03: NVM level warning 0x04: COC RX data length too large
Data_Length	1	Length of data in octets	-
Data	Data_Length	The error event info	-

4 Status error codes

Status error codes are used for the return status of all commands. Only the codes from 0 to 0x3E are used for HCI commands (see Core Specification v5.2, Vol. 2, part D), while more codes are defined for ACI commands (see table below).

Table 449. Status error codes description

Status error code	Description
0x00	Success
0x01	Unknown HCI command
0x02	Unknown connection identifier
0x03	Hardware failure
0x05	Authentication failure
0x06	PIN or key missing
0x07	Memory capacity exceeded
0x08	Connection timeout
0x09	Connection limit exceeded
0x0B	ACL connection already exists
0x0C	Command disallowed
0x11	Unsupported feature or parameter value
0x12	Invalid HCI command parameters
0x13	Remote user terminated connection
0x16	Connection terminated by local host
0x17	Repeated attempts
0x18	Pairing not allowed
0x1A	Unsupported remote feature / unsupported LMP feature
0x1E	Invalid LMP parameters
0x1F	Unspecified error
0x21	Role change not allowed
0x22	LMP response timeout / LL response timeout
0x23	LMP error transaction collision
0x24	LMP PDU not allowed
0x25	Encryption mode not acceptable
0x26	Link key cannot be changed
0x28	Instant passed
0x29	Pairing with unit key not supported
0x2A	Different transaction collision
0x2E	Channel assessment not supported
0x2F	Insufficient security
0x30	Parameter out of mandatory range
0x37	Secure simple pairing not supported by host
0x38	Host busy - pairing

Status error code	Description
0x39	Connection rejected due to no suitable channel fFound
0x3A	Controller busy
0x3B	Unacceptable connection interval
0x3C	Directed advertising timeout
0x3D	Connection terminated due to MIC failure
0x3E	Connection failed to be established
0x42	Invalid parameters
0x45	Pending
0x59	Device in blacklist
0x5A	CSRK not found
0x5B	IRK not found
0x5C	Device not found in DB
0x5D	Security DB full
0x5E	Device not bonded
0x5F	Insufficient encryption key size
0x60	Invalid handle
0x61	Out of handles
0x62	Invalid operation
0x63	Characteristic already exist
0x64	Insufficient resources
0x65	Security permission error
0x70	Address not resolved
0x82	No valid slot
0x83	Short window
0x84	New interval failed
0x85	Too large interval
0x86	Slot length failed
0x91	Failed
0x92	Invalid parameters
0x93	Busy
0x95	Pending
0x97	Host error
0x98	Out of memory

Revision history

Table 450. Document revision history

Date	Version	Changes
20-Feb-2019	1	Initial release.
04-Jun-2019	2	Updated Table 6. HCI_SET_EVENT_MASK input parameters, Table 377. HCI_HARDWARE_ERROR_EVENT parameters, Table 448. ACI_HAL_FW_ERROR_EVENT parameters
17-Jun-2019	3	Updated: - Table 273. ACI_GATT_UPDATE_CHAR_VALUE input parameters, - Table 281. ACI_GATT_SET_EVENT_MASK input parameters, - Table 309. ACI_GATT_READ_CHAR_VALUE input parameters, - Table 313. ACI_GATT_READ_LONG_CHAR_VALUE input parameters, - Table 317. ACI_GATT_WRITE_CHAR_VALUE input parameters, - Table 319. ACI_GATT_WRITE_LONG_CHAR_VALUE input parameters, - Table 331. ACI_GATT_WRITE_WITHOUT_RESP input parameters, - Table 333. ACI_GATT_SIGNED_WRITE_WITHOUT_RESP input parameters, - Table 347. ACI_GATT_UPDATE_CHAR_VALUE_EXT input parameters, Table 406. ACI GATT/ATT events commands list Added: - Section 3.4.25 ACI_GATT_INDICATION_EXT_EVENT and Section 3.4.26 ACI_GATT_NOTIFICATION_EXT_EVENT
25-Sep-2019	4	Updated: - Section 2.4.18 ACI_GAP_CONFIGURE_WHITELIST, - Section 2.5.14 ACI_ATT_READ_BY_TYPE_REQ, - Section 2.5.25 ACI_GATT_READ_USING_CHAR_UUID, - Section 3.4.25 ACI_GATT_INDICATION_EXT_EVENT, Section 4 Status error codes - Table 216. ACI_GAP_TERMINATE_GAP_PROC input parameters, - Table 281. ACI_GATT_SET_EVENT_MASK input parameters, - Table 374. HCI_DISCONNECTION_COMPLETE_EVENT parameters, - Table 402. ACI_GAP_PROC_COMPLETE_EVENT event parameters, Table 406. ACI GATT/ATT events commands list, Table 407. Event parameters, - Table 431. ACI_GATT_PREPARE_WRITE_PERMIT_REQ_EVENT event parameters, - Table 432. ACI_GATT_PREPARE_WRITE_PERMIT_REQ_EVENT event parameters, - Table 449. Status error codes description Added Section 3.4.24 ACI_GATT_READ_EXT_EVENT Removed former Section 4.2 ATT error codes
07-Jan-2020	5	Updated: - Table 136. ACI_HAL_WRITE_CONFIG_DATA input parameters, - Table 138. ACI_HAL_READ_CONFIG_DATA input parameters, - Table 399. ACI_GAP_PAIRING_COMPLETE_EVENT event parameters - Section 2.5.35 ACI_GATT_WRITE_WITHOUT_RESP, - Section 2.5.36 ACI_GATT_SIGNED_WRITE_WITHOUT_RESP
26-May-2020	6	Updated Table 6. HCI_SET_EVENT_MASK input parameters, Table 136. ACI_HAL_WRITE_CONFIG_DATA input parameters, Table 138. ACI_HAL_READ_CONFIG_DATA input parameters, Table 374. HCI_DISCONNECTION_COMPLETE_EVENT parameters, Table 399. ACI_GAP_PAIRING_COMPLETE_EVENT event parameters, Table 421. ACI_GATT_PROC_COMPLETE_EVENT event parameters, Table 448. ACI_HAL_FW_ERROR_EVENT parameters and Table 449. Status error codes description. Updated title of Section 2.1.34 HCI_LE_READ_REMOTE_FEATURES and Section 3.2.4 HCI_LE_READ_REMOTE_FEATURES_COMPLETE_EVENT. Updated Section 2.4.22 ACI_GAP_START_LIMITED_DISCOVERY_PROC and Section 2.4.23 ACI_GAP_START_GENERAL_DISCOVERY_PROC. Added note in Section 2.4.10 ACI_GAP_INIT. Removed former section HCI_DATA_BUFFER_OVERFLOW_EVENT.

Date	Version	Changes
16-Jul-2020	7	Added three columns in Table 1. HCI commands list, Table 124. HCI testing commands list, Table 134. HAL commands list, Table 164. GAP commands list, Table 263. GATT/ATT commands list, Table 354. L2CAP commands list, Table 373. HCI events commands list, Table 382. HCI LE META events command list, Table 398. ACI GAP events commands list, Table 406. ACI GATT/ATT events commands list, Table 433. ACI L2CAP events commands list, and Table 445. ACI HAL events commands list. Updated Section 3.2.2 HCI_LE_ADVERTISING_REPORT_EVENT. Removed section 3.6.4 ACI_HAL_DATAPUMP_SENT_EVENT.
03-Nov-2020	8	Updated document title, Introduction, Section 1 General information, Section 2.1 HCI commands, Section 2.2 HCI testing commands, Section 2.3 HAL commands, Section 2.4 GAP commands, Section 2.5 GATT/ATT commands, Section 2.6 L2CAP commands, and Section 3.1 HCI events. Updated Table 1. HCI commands list, Table 134. HAL commands list and Table 399. ACI_GAP_PAIRING_COMPLETE_EVENT event parameters. Removed former Section 2.3.12 ACI_HAL_SET_SMP_ENG_CONFIG. Minor text edits across the whole document.
21-Jan-2021	9	Updated Introduction, Section 3.2 HCI LE META events, Section 3.3 ACI GAP events, and Section 4 Status error codes. Updated Table 146. ACI_HAL_GET_LINK_STATUS output parameters. Minor text edits across the whole document.
18-Jun-2021	10	Updated Section 2.1 HCI commands, Section 2.1.6 HCI_SET_CONTROLLER_TO_HOST_FLOW_CONTROL, Section 2.1.7 HCI_HOST_BUFFER_SIZE, Section 2.2 HCI testing commands, Section 2.3 HAL commands, Section 2.4 GAP commands, Section 2.5 GATT/ATT commands, Section 2.6 L2CAP commands, and Section 3.5 ACI L2CAP events. Updated Table 1. HCI commands list, Table 124. HCI testing commands list, Table 134. HAL commands list, Table 164. GAP commands list, Table 263. GATT/ATT commands list, Table 354. L2CAP commands list, and Table 433. ACI L2CAP events commands list. Added Section 2.1.70 HCI_LE_READ_TRANSMIT_POWER, Section 2.1.73 HCI_LE_SET_PRIVACY_MODE, Section 2.4.43 ACI_GAP_ADDITIONAL_BEACON_START, Section 2.4.44 ACI_GAP_ADDITIONAL_BEACON_STOP, Section 2.4.45 ACI_GAP_ADDITIONAL_BEACON_SET_DATA, Section 3.5.5 to Section 3.5.9 , and Section 3.5.5 to Section 3.5.12 . Minor text edits across the whole document.
17-Dec-2021	11	Updated Table 1. HCI commands list, Table 124. HCI testing commands list, Table 134. HAL commands list, Table 136. ACI_HAL_WRITE_CONFIG_DATA input parameters, Table 164. GAP commands list, Table 166. ACI_GAP_SET_LIMITED_DISCOVERABLE input parameters, Table 168. ACI_GAP_SET_DISCOVERABLE input parameters, Table 170. ACI_GAP_SET_DIRECT_CONNECTABLE input parameters, Table 182. ACI_GAP_INIT input parameters, Table 210. ACI_GAP_START_GENERAL_CONNECTION_ESTABLISH_PROC input parameters, Table 212. ACI_GAP_START_SELECTIVE_CONNECTION_ESTABLISH_PROC input parameters, Table 214. ACI_GAP_CREATE_CONNECTION input parameters, Table 224. ACI_GAP_SET_BROADCAST_MODE input parameters, Table 226. ACI_GAP_START_OBSERVATION_PROC input parameters, Table 236. ACI_GAP_GET_OOB_DATA output parameters, Table 237. ACI_GAP_SET_OOB_DATA input parameters, Table 239. ACI_GAP_ADD_DEVICES_TO_RESOLVING_LIST input parameters, Table 382. HCI LE META events command list, Table 406. ACI GATT/ATT events commands list, Table 448. ACI_HAL_FW_ERROR_EVENT parameters, and Table 449. Status error codes description.

Date	Version	Changes
17-Dec-2021	11(cont'd)	Added Section 2.1.58 HCI_LE_SET_ADVERTISING_SET_RANDOM_ADDRESS, Section 2.1.59 HCI_LE_SET_EXTENDED_ADVERTISING_PARAMETERS, Section 2.1.60 HCI_LE_SET_EXTENDED_ADVERTISING_DATA, Section 2.1.61 HCI_LE_SET_EXTENDED_SCAN_RESPONSE_DATA, Section 2.1.62 HCI_LE_SET_EXTENDED_ADVERTISING_ENABLE, Section 2.1.63 HCI_LE_READ_MAXIMUM_ADVERTISING_DATA_LENGTH, Section 2.1.64 HCI_LE_READ_NUMBER_OF_SUPPORTED_ADVERTISING_SETS, Section 2.1.65 HCI_LE_REMOVE_ADVERTISING_SET, Section 2.1.66 HCI_LE_CLEAR_ADVERTISING_SETS, Section 2.1.67 HCI_LE_SET_EXTENDED_SCAN_PARAMETERS, Section 2.1.68 HCI_LE_SET_EXTENDED_SCAN_ENABLE, Section 2.1.69 HCI_LE_EXTENDED_CREATE_CONNECTION, Section 2.3.13 ACI_HAL_SET_SLAVE_LATENCY, Section 2.4.42 ACI_GAP_ADD_DEVICES_TO_LIST, Section 2.4.46 ACI_GAP_ADV_SET_CONFIGURATION, Section 2.4.47 ACI_GAP_ADV_SET_ENABLE, Section 2.4.48 ACI_GAP_ADV_SET_ADV_DATA, Section 2.4.49 ACI_GAP_ADV_SET_SCAN_RESP_DATA, Section 2.4.50 ACI_GAP_ADV_REMOVE_SET, Section 2.4.51 ACI_GAP_ADV_CLEAR_SETS, Section 2.4.52 ACI_GAP_ADV_SET_RANDOM_ADDRESS, Section 3.2.12 HCI_LE_EXTENDED_ADVERTISING_REPORT_EVENT, Section 3.2.13 HCI_LE_SCAN_TIMEOUT_EVENT, Section 3.2.14 HCI_LE_ADVERTISING_SET_TERMINATED_EVENT, Section 3.2.15 HCI_LE_SCAN_REQUEST_RECEIVED_EVENT, and Section 3.2.16 HCI_LE_CHANNEL_SELECTION_ALGORITHM_EVENT. Updated Section 2.1.19 HCI_LE_READ_ADVERTISING_PHYSICAL_CHANNEL_TX_POWER, Section 2.1.37 HCI_LE_ENABLE_ENCRYPTION, Section 2.1.39 HCI_LE_LONG_TERM_KEY_REQUEST_NEGATIVE_REPLY, Section 2.2.4 HCI_LE_RECEIVER_TEST_V2, Section 2.2.5 HCI_LE_TRANSMITTER_TEST_V2, Section 2.3.2 ACI_HAL_WRITE_CONFIG_DATA, and Section 2.4.4 ACI_GAP_SET_DIRECT_CONNECTABLE. Removed former Section 2.4.24 ACI_GAP_START_NAME_DISCOVERY_PROC. Minor text edits across the whole document.
29-Apr-2022	12	Updated Table 1. HCI commands list, Table 22. HCI_LE_SET_EVENT_MASK input parameters, Table 127. HCI_LE_TRANSMITTER_TEST input parameters, Table 134. HAL commands list, Table 164. GAP commands list, and Table 382. HCI LE META events command list. Added Section 2.1.71 HCI_LE_READ_RF_PATH_COMPENSATION and Section 2.1.72 HCI_LE_WRITE_RF_PATH_COMPENSATION.
17-Jun-2022	13	Updated Introduction, Section 2.1 HCI commands, Section 2.2 HCI testing commands, Section 2.3 HAL commands, Section 2.4 GAP commands, Section 2.4.10 ACI_GAP_INIT, Section 2.5 GATT/ATT commands, Section 2.6 L2CAP commands, Section 3.1 HCI events, Section 3.2 HCI LE META events, Section 3.3 ACI GAP events, Section 3.4 ACI GATT/ATT events, Section 3.5 ACI L2CAP events, and Section 3.6 ACI HAL events. Updated Table 1. HCI commands list, Table 116. HCI_LE_EXTENDED_CREATE_CONNECTION input parameters, Table 124. HCI testing commands list, Table 134. HAL commands list, Table 164. GAP commands list, Table 263. GATT/ATT commands list, Table 354. L2CAP commands list, Table 373. HCI events commands list, Table 382. HCI LE META events command list, Table 398. ACI GAP events commands list, Table 406. ACI GATT/ATT events commands list, Table 433. ACI L2CAP events commands list, and Table 445. ACI HAL events commands list. Minor text edits across the whole document.
06-Jul-2022	14	Updated Section 2.5.6 ACI_GATT_UPDATE_CHAR_VALUE, and Section 3.2.10 HCI_LE_DIRECTED_ADVERTISING_REPORT_EVENT. Added Section 2.5.46 ACI_GATT_STORE_DB. Minor text edits across the whole document.

Date	Version	Changes
06-Jul-2022	14 (cont'd)	Updated Table 116. HCI_LE_EXTENDED_CREATE_CONNECTION input parameters, Table 134. HAL commands list, Table 136. ACI_HAL_WRITE_CONFIG_DATA input parameters, Table 146. ACI_HAL_GET_LINK_STATUS output parameters, Table 245. ACI_GAP_ADDITIONAL_BEACON_START input parameters, Table 256. ACI_GAP_ADV_SET_SCAN_RESP_DATA input parameters, Table 257. ACI_GAP_ADV_SET_SCAN_RESP_DATA output parameters, Table 260. ACI_GAP_ADV_CLEAR_SETS output parameters, Table 263. GATT/ATT commands list, Table 392. HCI_LE_DIRECTED_ADVERTISING_REPORT_EVENT event parameters, and Table 446. ACI_HAL_END_OF_RADIO_ACTIVITY_EVENT parameters.
21-Jul-2022	15	Updated Table 159. ACI_HAL_READ_RAW_RSSI output parameters.

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