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Toshiba TC35661

GATT
Command Interface Document

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PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

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PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

Revision History

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Date	Modification	Note
24th-June-2013	1st Release Based on TC35661APL_ROM500_GATT_E_12thJune2013	
24th-June-2013	<p>Added "MAX_BUFFER_SIZE" and "ATT_MTU_SIZE" to the acronyms list of section 1.</p> <p>Changed Parameter Name "Server Rx MTU Size" to "MTU Size"</p> <p>Changed Command Formats and Parameters of "TCU_LE_GATT_CLI_DISCOVER_CHAR_DECL_BY_UUID_EVENT"</p> <p>Changed Command Formats and parameters of "TCU_LE_GATT_CLI_READ_CHAR_VAL_EVENT"</p> <p>Changed Command Formats and Parameter Length of "TCU_LE_GATT_CLI_WRITE_CHAR_VAL_REQ"</p> <p>Changed Parameter's Value of "TCU_LE_GATT_CLI_READ_CHAR_DESP_EVENT"</p> <p>Changed Parameter Length of "TCU_LE_GATT_CLI_WRITE_CHAR_DESP_REQ"</p> <p>Changed Command Format and parameter Length of "TCU_LE_GATT_SER_WRITE_CHAR_DESP_EVENT"</p> <p>Changed Command Format and parameter Length of "TCU_LE_GATT_SER_CHAR_VAL_NOTIFICATION_REQ"</p> <p>Changed Parameter Length of "TCU_LE_GATT_SER_CHAR_VAL_INDICATION_REQ"</p> <p>Changed Command Format and parameter Length of "TCU_LE_GATT_SER_READ_MULTIPLE_EVENT"</p> <p>Changed Command Formats and parameter Length of "TCU_LE_GATT_CLI_RELIABLE_WRITES_REQ"</p> <p>Changed Command Format of "TCU_LE_GATT_CLI_READ_LONG_CHAR_VAL_EVENT"</p> <p>Changed Command Format of "TCU_LE_GATT_CLI_READ_LONG_CHAR_DESC_EVENT"</p> <p>Changed Command Format of "TCU_LE_GATT_CLI_WRITE_LONG_CHAR_VAL_REQ"</p> <p>Changed Command Format of "TCU_LE_GATT_CLI_READ_LONG_CHAR_DESC_REQ"</p> <p>Added error codes to List of error codes of section 4.</p>	
26th-July-2013	<p>ErrorHandle, StatusX, HandleX are added in parameter</p> <p>Initialization Already Done (0xF1) is added in status.</p> <p>"3 List of error codes" is modified.</p> <p>The following commands are added.</p> <p style="padding-left: 40px;">TCU_LE_GATT_CLI_SIGNED_WRITE_WITHOUT_RESPONSE_REQ</p> <p style="padding-left: 40px;">TCU_LE_GATT_CLI_SIGNED_WRITE_WITHOUT_RESPONSE_EVENT</p> <p style="padding-left: 40px;">TCU_LE_GATT_SER_WRITE_LONG_REL_CHAR_VAL_EVENT</p> <p style="padding-left: 40px;">TCU_LE_GATT_SER_WRITE_LONG_REL_CHAR_VAL_ACCEPT_REQ</p> <p style="padding-left: 40px;">TCU_LE_GATT_SER_WRITE_LONG_CHAR_VAL_ACCEPT_RESP</p>	

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Date	Modification	Note
	<p>TCU_LE_GATT_SER_WRITE_LONG_CHAR_DESP_EVENT TCU_LE_GATT_SER_WRITE_LONG_CHAR_DESP_ACCEPT_REQ TCU_LE_GATT_SER_WRITE_LONG_CHAR_DESP_ACCEPT_RESP</p> <p>The following each command description is modified.</p> <p>TCU_LE_GATT_SER_READ_CHAR_VAL_EVENT TCU_LE_GATT_SER_READ_CHAR_VAL_ACCEPT_REQ TCU_LE_GATT_SER_WRITE_CHAR_VAL_EVENT TCU_LE_GATT_SER_WRITE_CHAR_VAL_ACCEPT_REQ TCU_LE_GATT_CLI_READ_CHAR_DESP_REQ TCU_LE_GATT_SER_READ_CHAR_DESP_EVENT TCU_LE_GATT_SER_READ_CHAR_DESP_ACCEPT_REQ TCU_LE_GATT_SER_READ_CHAR_DESP_ACCEPT_RESP TCU_LE_GATT_SER_WRITE_CHAR_DESP_EVENT TCU_LE_GATT_CLI_RELIABLE_WRITES_REQ TCU_LE_GATT_CLI_RELIABLE_WRITES_EVENT TCU_LE_GATT_CLI_WRITE_LONG_CHAR_VAL_REQ TCU_LE_GATT_CLI_WRITE_LONG_CHAR_DESC_REQ</p> <p>The followings comand name is changed.</p> <p>TCU_LE_GATT_CLI_WRITE_WITHOUT_RESPONSE_CMD → TCU_LE_GATT_CLI_WRITE_WITHOUT_RESPONSE_REQ TCU_LE_GATT_CLI_WRITE_WITHOUT_RESPONSE_CMD_EVENT → TCU_LE_GATT_CLI_WRITE_WITHOUT_RESPONSE_EVENT TCU_LE_GATT_SER_WRITE_WITHOUT_RESPONSE_CMD_EVENT → TCU_LE_GATT_SER_WRITE_WITHOUT_RESPONSE_EVENT</p>	
<p>20th-November- 2013</p>	<p>Added 1.8 TCU_LE_GATT_SER_EXG_MTU_ACCEPT_REQ Maximum valu for MTU Size is 64Bytes (0x40).</p>	

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1 GATT Command Format

For All GATT TCU Commands Data input (Parameter Length, Start Handle etc) must be in Little Endian Format. Also the data output through Response and Event will be in Little Endian Format.

For each Request, Response and Event that is sent to remote device “**Connection Handle**” is added as the parameter. “**Connection Handle**” is used as the index for accessing the remote device. This is needed to support Multiple Instances of GATT Client and GATT Server module.

1.1 TCU_LE_GATT_CLI_INIT_REQ

This command is used by the host application to initialize the GATT client.
The GATT client must be initialized before any GATT command is issued to the client device.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes

ServiceID 0xD2
OpCode 0x00
Parameter Length 0x0000

Parameters:

Parameters	Parameter Description	Value
NA	-	-

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1.2 TCU_LE_GATT_CLI_INIT_RESP

This response is generated by GATT client when initialization is complete.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Status	1Byte

ServiceID 0xD2
OpCode 0x80
Parameter Length 0x0001

Parameters:

Parameters	Parameter Description	Value
Status	Result Code: - Success - Initialization Already Done	0x00 0xF1

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1.3 TCU_LE_GATT_SER_INIT_REQ

This command is used by the host application to initialize the GATT server.
The GATT server must be initialized before any GATT command is issued to the server device.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes

ServiceID 0xD3
OpCode 0x00
Parameter Length 0x0000

Parameters:

Parameters	Parameter Description	Value
NA	-	-

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1.4 TCU_LE_GATT_SER_INIT_RESP

This response is generated by GATT server when initialization is complete.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Status	1Byte

ServiceID 0xD3
OpCode 0x80
Parameter Length 0x0001

Parameters:

Parameters	Parameter Description	Value
Status	Result Code: - Success - Initialization Already Done	0x00 0xF1

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1.5 TCU_LE_GATT_CLI_EXG_MTU_REQ

This command is used by the client to inform the server about the client's maximum receive MTU size and request the server to respond with its maximum receive MTU size. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed exchange MTU event "**TCU_LE_GATT_CLI_EXG_MTU_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Client Rx MTU Size	2Bytes

ServiceID 0xD2
OpCode 0x01
Parameter Length 0x0004

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Client Rx MTU Size	Client's maximum receive MTU size	-

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1.6 TCU_LE_GATT_CLI_EXG_MTU_EVENT

This event is generated when server responds with its receive MTU size. The server and client shall set ATT_MTU to the minimum of the Client Rx MTU and the Server Rx MTU.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
MTU Size	2Bytes

ServiceID 0xD2
OpCode 0x41
Parameter Length 0x0003 – 0x0005

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---
MTU Size	Negotiated MTU size	---

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1.7 TCU_LE_GATT_SER_EXG_MTU_EVENT

This event is generated by GATT Server to inform the Server Application that an exchange MTU request has been received from the client device. In response to this event, server application will generate the server exchange MTU Accept Request “TCU_LE_GATT_SER_EXG_MTU_ACCEPT_REQ”.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Client Rx MTU Size	2Bytes

ServiceID 0xD3
OpCode 0xC1
Parameter Length 0x0004

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Client Rx MTU Size	Client's maximum receive MTU size	-

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1.8 TCU_LE_GATT_SER_EXG_MTU_ACCEPT_REQ

This event is generated by server application in response to server MTU event. The server application will respond with its Maximum receive MTU size in Accept Request. The GATT server will indicate this server maximum receive MTU size to the client device through response.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Server Rx MTU Size	2Bytes

ServiceID 0xD3
OpCode 0x01
Parameter Length 0x0003 – 0x0005

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---
Server Rx MTU Size	Servers maximum receive MTU size.	Max 64Bytes (0x40).

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1.9 TCU_LE_GATT_SER_EXG_MTU_ACCEPT_RESP

This response is sent to server application by GATT Server on receiving the Accept Request from server application.

Once the GATT server responds with the server MTU size to client this response is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
MTU Size	2Bytes

ServiceID 0xD3
OpCode 0x81
Parameter Length 0x0003 – 0x0005

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---
MTU Size	Negotiated MTU size	-

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1.10 TCU_LE_GATT_CLI_DISCOVER_PRIM_SVC_REQ

This command is used by a GATT client to discover the primary services on a server. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed primary services event "**TCU_LE_GATT_CLI_DISCOVER_PRIM_SVC_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Start Handle	2Bytes
End Handle	2Bytes

ServiceID 0xD2
OpCode 0x02
Parameter Length 0x0002 or 0x0006

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Start Handle	The start handle is the handle at which the primary service discovery will begin.	0x0001 to 0xFFFF
End Handle	The end handle is the handle at which the service discovery will end.	0x0001 to 0xFFFF

(Note)

For Primary services request if Start Handle and End Handle are not specified (i.e. Parameter Length is only 2 bytes) then default values of 0x0001 and 0xFFFF will be considered for Start Handle and End Handles respectively.

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1.11 TCU_LE_GATT_CLI_DISCOVER_PRIM_SVC_EVENT

This event is generated when primary services response is sent from server. It is possible that multiple events may be generated for a single discovery request. When the primary services discovered on server is greater than MAX_BUFFER_SIZE(128 or 512) multiple response events will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the primary services listed in current response event are partly and service discovery is not yet complete. When continue flag is 0 it indicates end of service discovery.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Continue Flag	1Byte
Number of Groups (N1)	1Byte
Length of each group (L1)	1Byte
Attribute Handle	2Bytes
End Group Handle	2Bytes
Attribute Value	2Bytes or 16Bytes
Number of Groups (N2)	1Byte
Length of each group (L2)	1Byte
Attribute Handle	2Bytes
End Group Handle	2Bytes
Attribute Value	2Bytes or 16Bytes

ServiceID 0xD2
OpCode 0x42
Parameter Length 0x0003 – MAX_BUFFER_SIZE

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Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00
Continue Flag	When the number of primary services is greater than MAX_BUFFER_SIZE multiple responses will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the primary services listed in current response are partly and service discovery is not yet complete. When continue flag is 0 it indicates end of service discovery.	0x00 or 0x01
Number of Groups (N1, N2 Nn)	Each Group comprises of attribute handle, end group handle and attribute value. Each response may contain any number of such groups N1, N2 ... Nn. The numbers of groups each of length L is indicated using this field.	0x00 – 0xFF
Length of each group (L)	This field indicated the size of each group. This size is the sum of the sizes of the attribute handle, end group handle and attribute value. Attribute value can be either 2 bytes or 16 bytes. So, the length of group can be either 6 bytes or 20 bytes.	0x06 or 0x14
Attribute Handle	This field indicates the attribute handle of the primary service.	0x0001-0xFFFF
End Group Handle	This field indicates the end group handle of the primary service.	0x0001-0xFFFF
Attribute Value	This field indicates the attribute value of the primary service which is service UUID of 2 or 16 bytes.	Primary Service UUID Ex: 1. GATT Service (0x1801) 2. Thermometer (0x1809) etc

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1.12 TCU_LE_GATT_CLI_DISCOVER_PRIM_SVC_BY_UUID_REQ

This command is used by a GATT client to discover the specific primary service on a server only when Service UUID is known. The specific primary service may exist multiple times on the server. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed primary service event **TCU_LE_GATT_CLI_DISCOVER_PRIM_SVC_BY_UUID_EVENT** is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Start Handle	2Bytes
End Handle	2Bytes
Attribute Value Service UUID	2bytes or 16bytes

ServiceID 0xD2
OpCode 0x03
Parameter Length 0x0004, 0x0008, 0x0012 or 0x0016

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Start Handle	The start handle is the handle at which the primary service discovery will begin.	0x0001 to 0xFFFF
End Handle	The end handle is the handle at which the service discovery will end.	0x0001 to 0xFFFF
Attribute Value Service UUID	Attribute Value set to the 16-bit Bluetooth UUID or 128-bit UUID for the specific primary service.	UUID for specific primary service Ex: 1. GATT Service (0x1801) 2. Thermometer (0x1809) etc

(Note)

If Start Handle and End Handle are not specified then default values of 0x0001 and 0xFFFF will be considered for Start Handle and End Handles respectively. UUID value to be discovered should be given by the user

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1.13 TCU_LE_GATT_CLI_DISCOVER_PRIM_SVC_BY_UUID_EVENT

This event is generated when specific primary services specified by UUID are discovered. The specific primary service may exist multiple times on the server.

It is possible that multiple response events may be generated for a single discovery request. When the number of specific primary services is greater MAX_BUFFER_SIZE (128 or 512 bytes) multiple events will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the primary service listed in current event are partly and service discovery is not yet complete. When continue flag is 0 it indicates end of service discovery.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Continue Flag	1Byte
Number of Groups (N)	1Byte
Length of Each Group (L)	1Byte
Attribute Handle	2Bytes
End Group Handle	2Bytes

ServiceID 0xD2
OpCode 0x43
Parameter Length 0x0003 - MAX_BUFFER_SIZE

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00
Continue Flag	When the number of primary services is greater than 512 bytes multiple responses will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the primary services listed in current response are partly and service discovery is not yet complete. When continue flag is 0 it indicates end of service discovery.	0x00 or 0x01
Number of Groups (N)	Each Group comprises of attribute handle, end group handle. The numbers of groups each of length L is indicated using this field.	0x00 – 0xFF
Length of each group (L)	This field indicates the size of each group. This size is the sum of the sizes of the attribute handle, end group handle. The length of each group is fixed and is 4 bytes.	0x04
Attribute Handle	This field indicates the attribute handle of the specific primary service.	0x0001-0xFFFF
End Group Handle	This field indicates the end group handle of the primary service.	0x0001-0xFFFF

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.14 TCU_LE_GATT_CLI_FIND_INCL_SVC_REQ

This command is used by a client to find include service declarations within a service definition on a server. The service specified is identified by the service handle range.

When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed include services event "**TCU_LE_GATT_CLI_INCL_SVC_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Start Handle	2Bytes
End Handle	2Bytes

ServiceID 0xD2
OpCode 0x04
Parameter Length 0x0002 or 0x0006

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Start Handle	The start handle is the handle at which the included service discovery will begin.	0x0001 to 0xFFFF
End Handle	The end handle is the handle at which the included discovery will end.	0x0001 to 0xFFFF

(Note)

If Start Handle and End Handle are not specified then default values of 0x0001 and 0xFFFF will be considered for Start Handle and End Handles respectively.

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1.15 TCU_LE_GATT_CLI_FIND_INCL_SVC_EVENT

This event is generated when included services are found. It is possible that multiple events may be generated for a single request. When the number of included services is greater than MAX_BUFFER_SIZE (128 or 512 bytes) multiple events will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the primary services listed in current event are partly and service discovery is not yet complete. When continue flag is 0 it indicates end of service discovery.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Continue Flag	1Byte
Number of Groups (N)	1Byte
Length of Each Group (L)	1Byte
Attribute Handle	2Bytes
Attribute Handle Included Service	2Bytes
End Group Handle Included Service	2Bytes
Included Service UUID	0 or 2Bytes

ServiceID: 0xD2

OpCode: 0x44

Parameter Length: 0x0003 – MAX_BUFFER_SIZE

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00
Continue Flag	When the number of included services is greater than 512 bytes multiple responses events will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the primary services listed in current response event are partly and service discovery is not yet complete. When continue flag is 0 it indicates end of service discovery.	0x00 or 0x01
Number of Groups (N1, N2 Nn)	Each response may contain any number of such groups N1, N2 ... Nn. The numbers of groups each of length L is indicated using this field.	0x00 – 0xFF
Length of each group (L)	This field indicated the size of each group. This is the sum of the size of the attribute handle and attribute value (which is composed of attribute handle of included service, end group handle and service UUID). Service UUID is contained if it is of 2 bytes otherwise it is not contained. So, the length of group can be either 6 bytes or 8 bytes.	0x06 or 0x08
Attribute Handle	This field indicates the attribute handle for the included service.	0x0001-0xFFFF
Attribute Handle Included Service	This is attribute handle of included service.	0x0001-0xFFFF
End Group Handle Included Service	This is end group handle of the included service.	0x0001-0xFFFF
Included Service UUID	This field is the service UUID of included service. It is contained if it is of 2 bytes otherwise it is not contained and must be got using the Read Request Separately using the Attribute Handle Included Service.	Service UUID Ex: 1. GATT Service (0x1801) 2. Thermometer (0x1809) etc

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.16 TCU_LE_GATT_CLI_DISCOVER_CHAR_DECL_REQ

This command is used by a client to find all the characteristic declarations within a service definition on a server when only the service handle range is known. The service specified is identified by the service handle range. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed characteristic declaration event "**TCU_LE_GATT_CLI_DISCOVER_CHAR_DECL_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Start Handle	2Bytes
End Handle	2Bytes

ServiceID 0xD2
OpCode 0x05
Parameter Length 0x0006

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Start Handle	The start handle of the service for which characteristic declaration must be found.	-
End Handle	The ends handle of the service for which characteristic declaration must be found.	-

(Note)

The start handle and end handle range must be mandatorily specified to find the characteristic declarations of the service.

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.17 TCU_LE_GATT_CLI_DISCOVER_CHAR_DECL_EVENT

This event is generated when all characteristic declarations for the service are discovered. It is possible that multiple events may be generated for a single discovery request. When the number of characteristic declarations is greater than MAX_BUFFER_SIZE (128 or 512 bytes) multiple response events will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the declarations listed in current event are partly and discovery is not yet complete. When continue flag is 0 it indicates end of characteristic declaration discovery.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Continue Flag	1Byte
Number of Groups (N1)	1Byte
Length of each group (L1)	1Bytes
Attribute Handle	2Bytes
Characteristic Properties	1Bytes
Characteristic Value Handle	2Bytes
Characteristic UUID	2Bytes or 16Bytes
Number of Groups (N2)	1Byte
Length of each group (L2)	1Byte
Attribute Handle	2Bytes
Characteristic Properties	1Bytes
Characteristic Value Handle	2Bytes
Characteristic UUID	2Bytes or 16Bytes

ServiceID 0xD2
OpCode 0x45
Parameter Length 0x0003 – MAX_BUFFER_SIZE

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00
Continue Flag	When the length of response is greater than 512 bytes multiple events will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the characteristic declarations listed in current response are partly and service discovery is not yet complete. When continue flag is 0 it indicates end of service discovery.	0x00 or 0x01
Number of Groups (N1 , N2 Nn)	Each Group comprises of attribute handle, and attribute value (which consists of Char properties, characteristic value handle, characteristic UUID). Each response may contain any number of such groups N1, N2 ... Nn. The numbers of groups each of length L is indicated using this field.	0x00 – 0xFF
Length of each group (L)	This field indicates the size of each group. This size is the sum of the size of the attribute handle, and attribute value pair. Characteristic UUID can be either 2 bytes or 16 bytes. So, the length of group can be either 7 bytes or 21 bytes.	0x07 or 0x15
Attribute Handle	This field indicates the attribute handle of the characteristic definition handle.	-
Characteristic Properties	Bit field of characteristic properties.	-
Characteristic Value Handle	The Characteristic Value Attribute Handle field is the Attribute Handle of the Attribute that contains the Characteristic Value.	-
Characteristic UUID	The Characteristic UUID field is a 16-bit Bluetooth UUID or 128-bit UUID that describes the type of Characteristic Value.	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.18 TCU_LE_GATT_CLI_DISCOVER_CHAR_DECL_BY_UUID_REQ

This command is used by a client to find the characteristic declarations within a service definition on a server when only the service handle range is known and characteristic UUID is known. The service specified is identified by the service handle range. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed characteristic declaration event "**TCU_LE_GATT_CLI_DISCOVER_CHAR_DECL_BY_UUID_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Start Handle	2Bytes
End Handle	2Bytes
Characteristic UUID	2bytes or 16bytes

ServiceID 0xD2
OpCode 0x06
Parameter Length 0x0008 or 0x0016

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Start Handle	The start handle of the service for which characteristic declaration must be found.	-
End Handle	The ends handle of the service for which characteristic declaration must be found.	-
Characteristic UUID	Characteristic UUUID to search the characteristic declaration	Characteristic UUID Ex: 1. Temperature Type (0x2A1D)

(Note)

The start handle and end handle range must be mandatorily specified to find the characteristic declarations of the service.

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.19 TCU_LE_GATT_CLI_DISCOVER_CHAR_DECL_BY_UUID_EVENT

This event is generated when characteristic declarations specified by UUID are discovered. It is possible that multiple events may be generated for a single discovery request. When the number of characteristic declarations is greater than MAX_BUFFER_SIZE multiple events will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the declarations listed in current event are partly and discovery is not yet complete. When continue flag is 0 it indicates end of characteristic declaration discovery.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Continue Flag	1Byte
Number of Groups (N1)	1Byte
Length of each group (L1)	1Bytes
Attribute Handle	2Bytes
Attribute Value	(AT_MTU_SIZE-2)
Number of Groups (N2)	1Byte
Length of each group (L2)	1Byte
Attribute Handle	2Bytes
Attribute Value	(AT_MTU_SIZE-2)

ServiceID 0xD2
OpCode 0x46
Parameter Length 0x0003 – MAX_BUFFER_SIZE

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Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00
Continue Flag	When the length of response is greater than MAX_BUFFER_SIZE bytes multiple responses will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the characteristic declarations listed in current response are partly and service discovery is not yet complete. When continue flag is 0 it indicates end of discovery.	0x00 or 0x01
Number of Groups (N1 , N2 Nn)	Each Group comprises of attribute handle, and attribute value (which consists of Char properties, characteristic value handle, characteristic UUID). Each response may contain any number of such groups N1, N2 ... Nn. The numbers of groups each of length L is indicated using this field.	0x00 – 0xFF
Length of each group (L)	This field indicates the size of each group. This size is the sum of the size of the attribute handle, and attribute value pair.	-
Attribute Handle	This field indicates the attribute handle of the characteristic definition handle.	-
Attribute Handle	List of Attribute Data.	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.20 TCU_LE_GATT_CLI_DISCOVER_CHAR_DESP_REQ

This request is used by a client to find all the characteristic descriptor's within a characteristic definition when only the characteristic handle range is known. The characteristic specified is identified by the characteristic handle range. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed characteristic descriptor event "**TCU_LE_GATT_CLI_DISCOVER_CHAR_DESP_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Start Handle	2Bytes
End Handle	2Bytes

ServiceID 0xD2
OpCode 0x07
Parameter Length 0x0006

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Start Handle	The start handle of the characteristics for which characteristic descriptors must be found.	-
End Handle	The ends handle of the characteristics for which characteristic descriptors must be found.	-

(Note)

The start handle and end handle range must be mandatorily specified to find the characteristic descriptor of the service.

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.21 TCU_LE_GATT_CLI_DISCOVER_CHAR_DESP_EVENT

This response event is generated when characteristic descriptors are discovered. It is possible that multiple events may be generated for a single discovery request. When the characteristic descriptors data is greater than MAX_BUFFER_SIZE (128 or 512 bytes) multiple events will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the descriptors listed in current event are partly and discovery is not yet complete. When continue flag is 0 it indicates end of characteristic descriptors discovery.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Continue Flag	1Byte
Number of Groups (N1)	1Byte
Length of each group (L1)	1Bytes
Attribute Handle	2Bytes
Characteristic Descriptor UUID	2Bytes or 16Bytes
Number of Groups (N2)	1Byte
Length of each group (L2)	1Byte
Attribute Handle	2Bytes
Characteristic Descriptor UUID	2Bytes or 16Bytes

ServiceID 0xD2
OpCode 0x47
Parameter Length 0x0003 – MAX_BUFFER_SIZE

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00
Continue Flag	When the length of event is greater than MAX_BUFFER_SIZE bytes multiple responses will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the characteristic descriptors listed in current event are partly and service discovery is not yet complete. When continue flag is 0 it indicates end of discovery.	0x00 or 0x01
Number of Groups (N1, N2 Nn)	Each Group comprises of attribute handle, and attribute value (which consists of Characteristic Descriptor UUID). Each response may contain any number of such groups N1, N2 ... Nn. The numbers of groups each of length L is indicated using this field.	0x00 – 0xFF
Length of each group (L)	This field indicates the size of each group. This size is the sum of the size of the attribute handle, and attribute value pair. Characteristic Descriptor UUID can be either 2 bytes or 16 bytes. So, the length of group can be either 4 bytes or 18 bytes.	0x04 or 0x12
Attribute Handle	This field is the attribute handle of the characteristic descriptor.	-
Characteristic Descriptor UUID	The Characteristic Descriptor UUID field is a 16-bit Bluetooth UUID or 128-bit UUID.	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.22 TCU_LE_GATT_CLI_READ_CHAR_VAL_REQ

This request is used to read a Characteristic Value from a server when the client knows the Characteristic Value Handle. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed characteristic value event "**TCU_LE_GATT_CLI_READ_CHAR_VAL_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Value Handle	2Bytes

ServiceID 0xD2
OpCode 0x08
Parameter Length 0x0004

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Value Handle	The Characteristic Value Handle to be read.	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.23 TCU_LE_GATT_CLI_READ_CHAR_VAL_EVENT

This event is generated when server responds with characteristic value for the handle specified.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Continue Flag	1Byte
Characteristic Value	1-ATT_MTU_SIZE

ServiceID: 0xD2

OpCode: 0x48

Parameter Length: 0x0003 – (4+ATT_MTU_SIZE)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---
Continue Flag	When continue flag is 0 it indicates value is completely read.	0x00
Characteristic Value	Characteristic Value	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.24 TCU_LE_GATT_SER_READ_CHAR_VAL_EVENT

This event is generated by GATT Server to inform the Server Application that the read characteristic value request has been received from the client device.

If the sufficient permission (like read , authorization etc) to read the characteristic value is not available for the specified characteristic value handle, then request event will not be sent to server application and directly GATT server will send the response with appropriate error code to the client device.

On receiving this event the server application must update the value for the specified characteristic value handle (From Corresponding Sensor) in server database using the API “**UpdateCharElements**” and must indicate the same to GATT server using the “**TCU_LE_GATT_SER_READ_CHAR_VAL _ACCEPT_REQ**” with status as **0x00 (Success)**. **If authorization is required by the remote device to read this char value from server and host application do not want to authorize the corresponding remote device to read this data ,then the host need not update this value and must send the accept request with status as 0x08 (Insufficient Authorization) to GATT Server. The same will be indicated to remote client in error response.**

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Value Handle	2Bytes

ServiceID 0xD3
OpCode 0xC2
Parameter Length 0x0004

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Value Handle	The Characteristic Value Handle to update the value of the characteristic descriptors in server database.	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.25 TCU_LE_GATT_SER_READ_CHAR_VAL_ACCEPT_REQ

The server application will send the accept request to GATT server,. The status flag will indicate whether updating was successful or resulted in error. If status field is success the GATT server will read the updated value using the characteristic value handle and will send the response to client device.

If status field is error then the same will be communicated to remote device using error response.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Error Handle	2Bytes

ServiceID 0xD3
OpCode 0x02
Parameter Length 0x0005

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 -
Error Handle	This field is valid and applicable only when the status is not success. This field will contain the handle that has the error.	0x0001-0xFFFF

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.26 TCU_LE_GATT_SER_READ_CHAR_VAL_ACCEPT_RESP

On receiving the Accept Request, the GATT server will read the updated value using the characteristic value handle and will send the response to client device.

Once the GATT Server sends the response to client device, it will send the Accept response to Server application.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte

ServiceID 0xD3
OpCode 0x82
Parameter Length 0x0003

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 -

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.27 TCU_LE_GATT_CLI_READ_CHAR_VAL_UUID_REQ

This request is used to read a Characteristic Value from a server when the client does not know the Characteristic Value Handle and knows only the characteristic UUID. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed characteristic value event "**TCU_LE_GATT_CLI_READ_CHAR_VAL_UUID_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Start Handle	2Bytes
End Handle	2Bytes
Attribute Value Service UUID	2bytes or 16bytes

ServiceID 0xD2
OpCode 0x0D
Parameter Length 0x0008 or 0x0016

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Start Handle	The start handle is the handle at which the search of characteristic value by UUID will begin.	0x0001 to 0xFFFF
End Handle	The start handle is the handle at which the search of characteristic value by UUID will end.	0x0001 to 0xFFFF
Attribute Value Service UUID	Attribute Value set to the 16-bit Bluetooth UUID or 128-bit UUID for the specific primary service.	

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.28 TCU_LE_GATT_CLI_READ_CHAR_VAL_UUID_EVENT

This event is generated when server responds with characteristic value for the UUID specified. When the value read is greater than MAX_BUFFER_SIZE (128 or 512 bytes) (**in case of Long Characteristic Value Read**) multiple events will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the value read is partly (i.e. incomplete and more data to follow). When continue flag is 0 it indicates value is completely read.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Continue Flag	1Byte
Number of Groups (N)	1Byte
Length of Each Group (L)	1Bytes
Handle	2Bytes
Attribute Value	0x2Bytes – 0x1FE Bytes

ServiceID 0xD2
OpCode 0x4D
Parameter Length 0x0003 – MAX_BUFFER_SIZE

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00
Continue Flag	When the size of characteristic handle value pairs is greater than MAX_BUFFER_SIZE bytes multiple response events will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the handle value pairs listed in current response event are partly and read is not yet complete. When continue flag is 0 it indicates end of read.	0x00 or 0x01
Number of Groups (N)	Each Group comprises of handle value pair. The numbers of groups each of length L is indicated using this field.	0x00 – 0xFF
Length of each group (L)	This field indicates the size of each group. This size is the sum of the size of the handle and attribute value.	0x00 – 0xFF
Handle	This field indicates the handle of the specific characteristic value.	0x0001-0xFFFF
Attribute Value	This field indicates the characteristic value.	

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.29 TCU_LE_GATT_CLI_WRITE_CHAR_VAL_REQ

This request is used to write a Characteristic Value to a server when the client knows the Characteristic Value Handle. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed characteristic write value event "**TCU_LE_GATT_CLI_WRITE_CHAR_VAL_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Value Handle	2Bytes
Characteristic Value	1-(ATT_MTU_SIZE-3)

ServiceID 0xD2
OpCode 0x09
Parameter Length 0x0005 – (ATT_MTU_SIZE + 1)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Value Handle	The Characteristic Value Handle to read the value of the characteristic descriptors.	
Characteristic Value	Characteristic Attribute value to be written onto server	

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.30 TCU_LE_GATT_CLI_WRITE_CHAR_VAL_EVENT

This event is generated when client receives response from the server indicating whether the writing of characteristic value was success or resulted in error.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte

ServiceID 0xD2
OpCode 0x49
Parameter Length 0x0003

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.31 TCU_LE_GATT_SER_WRITE_CHAR_VAL_EVENT

This event is generated by GATT Server to inform the Server Application that the write characteristic value (also for Long Characteristic Value) request has been received from the client device.

If the sufficient permission (like write , authorization etc) to write the characteristic value is not available for the specified characteristic value handle, then request event will not be sent to server application and directly GATT server will send the response with appropriate error code to the client device.

On receiving this request event the server application must update the value for the specified characteristic value handle with the characteristic value sent by GATT server in server database using the API “UpdateCharElements” and must indicate the same to GATT server using the “TCU_LE_GATT_SER_WRITE_CHAR_VAL_ACCEPT_REQUEST” with status as 0x00 (Success). If authorization is required by the remote device to write this char value to server and host application do not want to authorize the corresponding remote device ,then the host need not update this value and must send the accept request with status as 0x08 (Insufficient Authorization) to GATT Server. The same will be indicated to remote client in error response.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Value Handle	2Bytes
Characteristic Value	(ATT_MTU_SIZE-3)

ServiceID 0xD3
OpCode 0xC3
Parameter Length 0x0005 – (ATT_MTU_SIZE+1)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Value Handle	The Characteristic Value Handle to read the value of the characteristic descriptors.	-
Characteristic Value	Characteristic Attribute value to be written onto server	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.32 TCU_LE_GATT_SER_WRITE_CHAR_VAL_ACCEPT_REQ

The server application will send the accept request to GATT server. The status flag will indicate whether updating was successful or not. The GATT server will send the response to client device indicating the status of write request.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Error Handle	2Bytes

ServiceID 0xD3
OpCode 0x03
Parameter Length 0x0005

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---
Error Handle	This field is valid and applicable only when the status is not success. This field will contain the handle corresponding to the error.	0x0001-0xFFFF

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1.33 TCU_LE_GATT_SER_WRITE_CHAR_VAL_ACCEPT_RESP

On receiving Accept Request, the GATT server will send the response to client device indicating the status of write request.

Also the GATT server will send the Accept Response to Server Application.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte

ServiceID 0xD3
OpCode 0x83
Parameter Length 0x0003

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---

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1.34 TCU_LE_GATT_CLI_READ_CHAR_DESP_REQ

This request is used to read a characteristic descriptor (ex: characteristic format, characteristic user descriptor) from a server when the client knows the characteristic descriptor declaration's Attribute handle. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed read characteristic descriptor event "**TCU_LE_GATT_CLI_READ_CHAR_DESP_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Descriptor Handle	2Bytes

ServiceID 0xD2
OpCode 0x0A
Parameter Length 0x0004

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Descriptor Handle	The Characteristic Descriptor Handle to read the value of the characteristic descriptors.	-

(Note)

Note: Characteristic Descriptors (ex: Characteristic User Descriptor, Characteristic User Format etc) which hold constant values and have Read Only permission set need not be updated by server application.

Server application can just send Accept Request for such read descriptor events received from GAT Server. The server application can update such value on need basis in database using UpdateCharElements and can send accept request.

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But for descriptors which have write permission and for Client Characteristic Configuration Descriptor the value needs to be stored and updated by Server Application, every time the read request is made for corresponding remote device. When Multiple GATT Clients are supported by a GATT Server (i.e. GATT Server supporting Multiple Client instances, which is true when Central/Master Device is acting as GATT Server and Peripheral/Slave Device is acting as GATT client) the server application must have multiple instances of Client Characteristic Configuration Descriptor for number of GATT Client devices supported(Refer Section 3.3.3.3 Volume 3 Page 541 of Core_V4.0.pdf specification) . These instances need to be maintained by Server Application and stored each time write request is made. On GATT Server in Firmware there will be single instance, which will be sent to remote device , once server application updates and send the accept request The Client Characteristic Configuration descriptor value shall be set to default value at each connection for non-bonded devices. The descriptor value shall be persistent across connections for bonded devices.

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.35 TCU_LE_GATT_CLI_READ_CHAR_DESP_EVENT

This event is generated by GATT Client, when server device responds with characteristic descriptor value.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Continue Flag	1Byte
Characteristic Descriptor Value	1-ATT_MTU_SIZE

ServiceID 0xD2
OpCode 0x4A
Parameter Length 0x0003 – (4+ATT_MTU_SIZE)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---
Continue Flag	If continue flag is 0 it indicates value is completely read.	0x00
Characteristic Descriptor Value	Characteristic Descriptor Value	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.36 TCU_LE_GATT_SER_READ_CHAR_DESP_EVENT

This event is generated by GATT Server to inform the Server Application that the read characteristic descriptor request has been received from the client device.

If the sufficient permission (like write , read, authentication etc) to read the characteristic descriptor is not available for the specified characteristic descriptor handle, then request event will not be sent to server application and directly GATT server will send the response with appropriate error code to the client device.

On receiving this request event the server application must update the value for the specified characteristic descriptor handle with the updated characteristic descriptor value using the API “**UpdateCharElements**” and must indicate the same to GATT server using the “**TCU_LE_GATT_SER_READ_CHAR_DESP_ACCEPT_REQ**” with status as 0x00 (Success). If authorization is required by the remote device to read this char descriptor value from server and host application do not want to authorize the corresponding remote device to read this data ,then the host need not update this value and must send the accept request with status as 0x08 (Insufficient Authorization) to GATT Server. The same will be indicated to remote client in error response.

Characteristic Descriptors (ex: Characteristic User Descriptor, Characteristic User Format etc) which hold constant values and have Read Only permission set need not be updated by server application.

Server application can just send Accept Request for such read descriptor events received from GAT Server. The server application can update such value on need basis in database using UpdateCharElements and can send accept request.

But for descriptors which have write permission and for Client Characteristic Configuration Descriptor the value needs to be stored and updated by Server Application, every time the read request is made for corresponding remote device. When Multiple GATT Clients are supported by a GATT Server (i.e. GATT Server supporting Multiple Client instances, which is true when Central/Master Device is acting as GATT Server and Peripheral/Slave Device is acting as GATT client) the server application must have multiple instances of Client Characteristic Configuration Descriptor for number of GATT Client devices supported (Refer Section 3.3.3.3 Volume 3 Page 541 of Core_V4.0.pdf specification). These instances need to be maintained by Server Application and stored each time write request is made. On GATT Server in Firmware there will be single instance, which will be sent to remote device , once server application updates and send the accept request The Client Characteristic Configuration descriptor value shall be set to default value at each connection for non-bonded devices. The descriptor value shall be persistent across connections for bonded devices.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Descriptor Handle	2Bytes

ServiceID 0xD3
OpCode 0xC8
Parameter Length 0x0004

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Parameters:

Parameters	Parameter Description	Value
Connection Handle	The Characteristic Descriptor Handle to read the value of the characteristic descriptors.	-

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1.37 TCU_LE_GATT_SER_READ_CHAR_DESP_ACCEPT_REQ

The server application will send the accept request to GATT server. The status flag will indicate whether updating was successful or not. The GATT server will send the response to client device indicating the status of read descriptor request together with descriptor value.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Error Handle	2Bytes

ServiceID 0xD3
OpCode 0x08
Parameter Length 0x0005

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---
Error Handle	This field is valid only when the status is not success. This field will contain the handle that is having the error	

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.38 TCU_LE_GATT_SER_READ_CHAR_DESP_ACCEPT_RESP

On receiving the Accept Request from application, the GATT server will send the response to client device. Also the GATT server will send the Accept Response to Server Application.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte

ServiceID 0xD3
OpCode 0x88
Parameter Length 0x0003

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---

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1.39 TCU_LE_GATT_CLI_WRITE_CHAR_DESP_REQ

This request is used to write a Characteristic Descriptor Value to a server when the client knows the Characteristic Descriptor Handle. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed characteristic descriptor event "**TCU_LE_GATT_CLI_WRITE_CHAR_DESP_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Descriptor Handle	2Bytes
Characteristic Descriptor Value	1-(ATT_MTU_SIZE-3)

ServiceID 0xD2
OpCode 0x0B
Parameter Length 0x0005 – (ATT_MTU_SIZE+1)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Descriptor Handle	The Characteristic Descriptor Handle to read the value of the characteristic descriptors.	-
Characteristic Descriptor Value	Characteristic Descriptor Attribute value to be written on to server.	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.40 TCU_LE_GATT_CLI_WRITE_CHAR_DESP_EVENT

This event is generated by GATT client when it receives response from the server indicating whether the writing of characteristic descriptor was success or resulted in error.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte

ServiceID: 0xD2

OpCode: 0x4B

Parameter Length: 0x0003

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.41 TCU_LE_GATT_SER_WRITE_CHAR_DESP_EVENT

This event is generated by GATT Server to inform the Server Application that the write characteristic descriptor request has been received from the client device.

If the sufficient permission (like write , read, authentication etc) to write the characteristic descriptor is not available for the specified characteristic descriptor handle, then request event will not be sent to server application and directly GATT server will send the response with appropriate error code to the client device.

On receiving this request event the server application must update the value for the specified characteristic descriptor handle sent by client with the characteristic descriptor value in server database using the API “UpdateCharElements” and must indicate the same to GATT server using the “TCU_LE_GATT_SER_WRITE_CHAR_DESP_ACCEPT_REQ” with status as 0x00 (Success). If authorization is required by the remote device to write this char descriptor value from server and host application do not want to authorize the corresponding remote device to read this data ,then the host need not update this value and must send the accept request with status as 0x08 (Insufficient Authorization) to GATT Server. The same will be indicated to remote client in error response.

For descriptors which have write permission and for Client Characteristic Configuration Descriptor the value needs to be stored and updated by Server Application, every time the write request is made for corresponding remote device. When Multiple GATT Clients are supported by a GATT Server (i.e. GATT Server supporting Multiple Client instances, which is true when Central/Master Device is acting as GATT Server and Peripheral/Slave Device is acting as GATT client) the server application must have multiple instances of Client Characteristic Configuration Descriptor for number of GATT Client devices supported(Refer Section 3.3.3.3 Volume 3 Page 541 of Core_V4.0.pdf specification) . These instances need to be maintained by Server Application and stored each time write request is made. On GATT Server in Firmware there will be single instance, which will be sent to remote device , once server application updates and send the accept request. The Client Characteristic Configuration descriptor value shall be set to default value at each connection for non-bonded devices. The descriptor value shall be persistent across connections for bonded devices.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Descriptor Handle	2Bytes
Characteristic Descriptor Value	(ATT_MTU_SIZE-3)

ServiceID: 0xD3

OpCode: 0xC4

Parameter Length: 0x0005 – (ATT_MTU_SIZE+1)

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Parameters:

Parameters	Parameter Description	Value
Connection Handle	The Characteristic Descriptor Handle to read the value of the characteristic descriptors.	-
Characteristic Descriptor Handle	Characteristic Descriptor Attribute value to be written onto server	-
Characteristic Descriptor Value		

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.42 TCU_LE_GATT_SER_WRITE_CHAR_DESP_ACCEPT_REQ

The Accept Request is generated by server application when it writes the characteristic descriptor to server database.

On receiving this request the GATT server will send the response to client device indicating the status of write request.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Error Handle	2Bytes

ServiceID: 0xD3

OpCode: 0x04

Parameter Length: 0x0005

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---
Error Handle	This field is valid only when the status is not success. This field will contain the handle corresponding to the error	0x0001-0xFFFF

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1.43 TCU_LE_GATT_SER_WRITE_CHAR_DESP_ACCEPT_RESP

On receiving the Accept Request from application, the GATT server will send the response to client device indicating the status of write request.

Also the GATT server will send the Accept Response to Server Application.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte

ServiceID 0xD3
OpCode 0x84
Parameter Length 0x0003

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.44 TCU_LE_GATT_SER_CHAR_VAL_NOTIFICATION_REQ

The Characteristic Value Notification requests are sent by Server Application to GATT server. Notifications are configured by client device using Client Characteristic Configuration Descriptor. The client must configure the notification using the request “TCU_LE_GATT_CLI_WRITE_CHAR_DESP_REQ” with Characteristic Value Handle set to “Client Characteristic Configuration Descriptor Handle” and Value set to 0x0001 (Characteristic Value shall be Notified). When this request is received by GATT Server, the GATT server will send the Request Event “TCU_LE_GATT_SER_WRITE_CHAR_DESP_EVENT” to Server Application. On receiving this Request Event the Sever Application must enable the notifications for requested “Characteristic Value” and must send the Notification Request to GATT server at equal intervals as defined by Service Profile. After sending this indication request, the server application will receive “TCU_LE_GATT_ACCEPT” as an acknowledgement.

When Server Application is configured to enable Notifications, it must accomplish below said tasks:

1. It must update the “Characteristic Value” for which notification is requested in Server Database using the API “**UpdateCharElements**”.
2. It must send the Notification Request to GATT Server, indicating the “**Characteristic Value Handle**” and current “**Characteristic Value**” at equal intervals as specified by Service Profile.
3. Since no confirmations are sent for notifications, the Server must send Notifications at equal intervals, until it is disabled using “Client Characteristic Configuration Descriptor” request.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Value Handle	2Byte
Characteristic Value	1-(ATT_MTU_SIZE-1)

ServiceID 0xD3
OpCode 0x05
Parameter Length 0x0005 –(ATT_MTU_SIZE+3)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Value Handle	Handle of the characteristic value to be Notified.	
Characteristic Value	Characteristic value to be notified.	

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1.45 TCU_LE_GATT_SER_CHAR_VAL_NOTIFICATION_EVENT

This event is generated by GATT Server to inform the Server Application that the Characteristic Value Notification has been sent to the GATT Client.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes

ServiceID 0xD3
OpCode 0x45
Parameter Length 0x0002

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)

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1.46 TCU_LE_GATT_CLI_CHAR_VAL_NOTIFICATION_IND_EVENT

This event is generated by GATT client to the Client Application when it receives Notification from the GATT Server indicating the current Characteristic Value.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Value Handle	2Byte
Characteristic Value	<= (ATT_MTU-3) Bytes

ServiceID: 0xD2

OpCode: 0xC0

Parameter Length: <= (ATT_MTU - 1) Bytes

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Value Handle	Handle of the Characteristic Value Notified.	
Characteristic Value	Characteristic Value Notified.	

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1.47 TCU_LE_GATT_SER_CHAR_VAL_INDICATION_REQ

The Characteristic Value Indication is sent by Server Application to GATT Server.

Indications are configured by client device using Client Characteristic Configuration Descriptor. The client must configure the indication using the request “TCU_LE_GATT_CLI_WRITE_CHAR_DESP_REQ” with Characteristic Value Handle set to “Client Characteristic Configuration Descriptor Handle” and Value set to 0x0002 (Characteristic Value shall be Indicated). When this request is received by GATT Server, the GATT server will send the Request Event “TCU_LE_GATT_SER_WRITE_CHAR_DESP_EVENT” to Server Application. On receiving this Request Event the Server Application must enable the Indications for requested “Characteristic Value” and must send the Indications Request to GATT server at equal intervals as defined by Service Profile. After sending this indication request, the server application will receive “TCU_LE_ACCEPT” as an acknowledgement.

When Server Application is configured to enable Indications, it must accomplish below said tasks:

1. It must update the “Characteristic Value” for which Indication is requested in Server Database using the API “**UpdateCharElements**”.
2. It must send the Indication Request, indicating the “**Characteristic Value Handle**” and current “**Characteristic Value**” at equal intervals as specified by Service Profile.
3. The server must get the Characteristic Value Confirmation from the client for every Indication sent. Until server gets the Confirmation for the Corresponding Indication sent, it must not send the next Indication.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Value Handle	2Bytes
Characteristic Value	1-(ATT_MTU_SIZE-3)

ServiceID 0xD3
OpCode 0x06
Parameter Length 0x0005 –(ATT_MTU_SIZE+1)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Value Handle	Handle of the characteristic value to be Notified.	
Characteristic Value	Characteristic value to be notified.	

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1.48 TCU_LE_GATT_SER_CHAR_VAL_INDICATION_EVENT

This event is generated by GATT Server to inform the Server Application that the Confirmation has been received from the GATT Client for Characteristic Value Indication Request “TCU_LE_GATT_SER_CHAR_VAL_INDICATION_REQ” sent.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte

ServiceID: 0xD3

OpCode: 0x46

Parameter Length: 0x0003

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.49 TCU_LE_GATT_CLI_CHAR_VAL_INDICATION_IND_EVENT

This event is generated by GATT client to the Client Application when it receives Indication from the GATT Server indicating the current Characteristic Value.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Value Handle	2Byte
Characteristic Value	<= (ATT_MTU-3) Bytes

ServiceID: 0xD2

OpCode: 0xD0

Parameter Length: <= (ATT_MTU - 1) Bytes

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Value Handle	Handle of the Characteristic Value Notified.	
Characteristic Value	Characteristic Value Notified.	

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.50 TCU_LE_GATT_CLI_CHAR_VAL_CONFIRMATION_ACCEPT_REQ

The Characteristic Value Confirmation Accept request is sent by client application to GATT client .This response is Confirmation to Indication received from server.

The client must send this response for every indication received from server.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes

ServiceID 0xD2
OpCode 0x10
Parameter Length 0x0002

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)

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1.51 TCU_LE_GATT_CLI_CHAR_VAL_CONFIRMATION_ACCEPT_RESP

On receiving the Accept Request, the GATT Client sends the confirmation to client device.
Also it will send the Accept Response Confirmation to Client Application.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes

ServiceID 0xD2
OpCode 0x90
Parameter Length 0x0003

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.52 TCU_LE_GATT_CLI_WRITE_WITHOUT_RESPONSE_REQ

This command is used to write a Characteristic Value to a server when the client knows the Characteristic Value Handle and the client does not need an acknowledgement that the write was successfully performed. This sub-procedure only writes the first (ATT_MTU – 3) octets of a Characteristic Value. This sub-procedure cannot be used to write a long characteristic.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Value Handle	2Bytes
Characteristic Value	(ATT_MTU - 3) Bytes

ServiceID 0xD2
OpCode 0x0F
Parameter Length 0x0005 – (ATT_MTU + 1)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Value Handle	The Characteristic Value Handle to which data must be written.	
Characteristic Value	Characteristic Attribute value to be written onto server.	

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1.53 TCU_LE_GATT_CLI_WRITE_WITHOUT_RESPONSE_EVENT

This event is sent to the Application when the processing of the Write Command is started and the command is sent to Server Device.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte

ServiceID 0xD2
OpCode 0x4F
Parameter Length 0x0003

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.54 TCU_LE_GATT_SER_WRITE_WITHOUT_RESPONSE_EVENT

This event is generated by GATT Server to inform the Server Application that the Write Without Response Command has been received from the Client Device.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Value Handle	2Bytes
Characteristic Value	(ATT_MTU - 3) Bytes

ServiceID 0xD3
OpCode 0xC9
Parameter Length 0x0005 – (ATT_MTU + 1)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Value Handle	The Characteristic Value Handle to which data must be written.	-
Characteristic Value	Characteristic Attribute value to be written onto server	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.55 TCU_LE_GATT_CLI_SIGNED_WRITE_WITHOUT_RESPONSE_REQ

This command is used to write a Characteristic Value to a server when the client knows the Characteristic Value Handle and the client does not need an acknowledgement that the write was successfully performed. This sub-procedure only writes the first (ATT_MTU – 15) octets of a Characteristic Value. This sub-procedure cannot be used to write a long characteristic.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Value Handle	2Bytes
Characteristic Value	(ATT_MTU - 15) Bytes

ServiceID: 0xD2

OpCode: 0x11

Parameter Length: 0x0005 – (ATT_MTU - 11)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Value Handle	The Characteristic Value Handle to which data must be written.	-
Characteristic Value	Characteristic Attribute value to be written onto server.	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.56 TCU_LE_GATT_CLI_SIGNED_WRITE_WITHOUT_RESPONSE_EVENT

This event is sent to the Application when the processing of the Signed Write Command is started and the command is sent to Server Device.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte

ServiceID: 0xD2

OpCode: 0x51

Parameter Length: 0x0003

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.57 TCU_LE_GATT_CLI_READ_MULTIPLE_CHAR_VALUES_REQ

This request is used to read multiple Characteristic Values from a server when the client knows the Characteristic Value Handles. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed characteristic value event "**TCU_LE_GATT_CLI_READ_MULTIPLE_CHAR_VALUES_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Value Handle List	(4 – (ATT_MTU_SIZE -1)) Bytes

ServiceID 0xD2
OpCode 0x0C
Parameter Length 0x0006 – (ATT_MTU_SIZE + 1)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Value Handle List	The List of Characteristic Value Handles to be read.	

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.58 TCU_LE_GATT_CLI_READ_MULTIPLE_CHAR_VALUES_EVENT

This event is generated when server responds with characteristic values for the handles specified. This event will give all characteristic values read with in the limit of ATT_MTU_SIZE to the client application.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Continue Flag	1Byte
Characteristic Values	(ATT_MTU_SIZE-1)

ServiceID 0xD2
OpCode 0x4C
Parameter Length 0x0003 – (ATT_MTU_SIZE+3)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---
Continue Flag	When continue flag is 0 it indicates value is completely read.	0x00
Characteristic Values	Characteristic Values read from different handles	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.59 TCU_LE_GATT_SER_READ_MULTIPLE_EVENT

This event is generated by GATT Server to inform the Server Application when the Server needs to update multiple handle values into the server database.

If the sufficient permission (like read , authorization etc) to read a handle is not available, then request event will not be sent to server application and directly GATT server will send the response with appropriate error code to the client device.

On receiving this event the server application must update all the necessary handles in server database using the API “**UpdateCharElements**” and must indicate the same to GATT server using the “**TCU_LE_GATT_SER_READ_MULTIPLE_ACCEPT_REQ**”.

On receiving this response the GATT server will read the value from server database and will send response to Central Device.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
List of Characteristic Value Handles each of 2 bytes	2-(ATT_MTU_SIZE-1)

ServiceID 0xD3
OpCode 0xCA
Parameter Length 0x0004 – (ATT_MTU_SIZE+1)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
List of Characteristic Value Handles each of 2 bytes	List of Characteristic Value Handles.	Variable

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.60 TCU_LE_GATT_SER_READ_MULTIPLE_ACCEPT_REQ

The server application will send this response to GATT server, once it updates all the handles requested in read multiple events. The status flag must indicate whether updation was successful or resulted in error. On receiving this response the GATT server will read the updated values using the handles and will send the response to client device.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Error Handle	2Bytes

ServiceID 0xD3
OpCode 0x0A
Parameter Length 0x0005

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 -
Error Handle	This field is valid and applicable only when the status is not success. This field will have the handle corresponding to the error.	

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.61 TCU_LE_GATT_SER_READ_MULTIPLE_ACCEPT_RESP

On receiving the Read Multiple Accept Request, the GATT server will read the updated values using the handles and will send the response to client device.

Once the GATT Server sends the response to client device, it will send the Accept response to Server application.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte

ServiceID 0xD3
OpCode 0x8A
Parameter Length 0x0003

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 -

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.62 TCU_LE_GATT_CLI_RELIABLE_WRITES_REQ

This request is used to write Characteristic Values to a server when the client knows the Characteristic Value Handles. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed characteristic descriptor event "**TCU_LE_GATT_CLI_RELIABLE_WRITES_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Value Handle1	2Bytes
Characteristic Value Offset1	2Bytes
Characteristic Value Length1	2Bytes
Characteristic Value1	0- (ATT_MTU_SIZE-5)
Characteristic Value Handle2	2Bytes
Characteristic Value Offset2	2Bytes
Characteristic Value Length2	2Bytes
Characteristic Value2	0- (ATT_MTU_SIZE-5)

ServiceID: 0xD2

OpCode: 0x0E

Parameter Length: 0x0009 – (MAX_BUFFER_SIZE+2)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Value Handle	The Characteristic Value Handle to write the value.	-
Characteristic Value Offset	Offset for writing the characteristic value.	-
Characteristic Value Length	Length of the characteristic value to be written.	-
Characteristic Value	Characteristic Attribute value to be written.	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.63 TCU_LE_GATT_CLI_RELIABLE_WRITES_EVENT

This event is generated by GATT client when it receives response from the server indicating whether the writing of characteristic values were success or resulted in error.

The event will contain status handle pairs. The numbers of pairs will be the same as the number of handles issued in the request. The parameter length will indicate the number of handle value pairs contained in the event.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status1	1Byte
Handle1	2Bytes
Status2	1Byte
Handle2	2Bytes

ServiceID 0xD2
OpCode 0x4E
Parameter Length 0x0005-0x003E

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
StatusX	Result Code: - Success - Refer Error Code Table	0x00 ---
HandleX	This field will contain the handle corresponding to StatusX	0x0001-0xFFFF

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.64 TCU_LE_GATT_CLI_READ_LONG_CHAR_VAL_REQ

This request is used to read a Long Characteristic Value from a server when the client knows the Characteristic Value Handle. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed characteristic value event "**TCU_LE_GATT_CLI_READ_LONG_CHAR_VAL_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Value Handle	2Bytes
Characteristic Value Offset	2Bytes

ServiceID 0xD2
OpCode 0x12
Parameter Length 0x0006

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Value Handle	The Characteristic Value Handle to be read.	
Characteristic Value Offset	The Characteristic Value Offset to be read.	

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.65 TCU_LE_GATT_CLI_READ_LONG_CHAR_VAL_EVENT

This event is generated when server responds with characteristic value for the handle specified. When the value read is greater than MAX_BUFFER_SIZE multiple events will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the value read is partly (i.e. incomplete and more data to follow). When continue flag is 0 it indicates value is completely read. The Characteristic value read should have a minimum length of (ATT_MTU_SIZE-1) and can be up to MAX_BUFFER_SIZE. MAX_BUFFER_SIZE is the maximum data length that can be sent at a time from firmware to application. Currently it is 128 Bytes.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Continue Flag	1Byte
Characteristic Value	(ATT_MTU_SIZE - 1) – MAX_BUFFER_SIZE

ServiceID 0xD2
OpCode 0x52
Parameter Length 0x0003 – (MAX_BUFFER_SIZE+4)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---
Continue Flag	If continue flag is 1 it indicates that the Characteristic value read is partly (i.e. incomplete and more data to follow). When continue flag is 0 it indicates value is completely read.	0x00 or 0x01
Characteristic Value	Characteristic Value	

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.66 TCU_LE_GATT_CLI_READ_LONG_CHAR_DESC_REQ

This request is used to read a Long Characteristic Descriptor from a server when the client knows the Characteristic Descriptor Handle. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed characteristic descriptor event "**TCU_LE_GATT_CLI_READ_LONG_CHAR_DESC_EVENT**" is generated.

Command Format:

ServiceID	1 Byte
OpCode	1 Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Descriptor Handle	2Bytes
Characteristic Descriptor Offset	2Bytes

ServiceID 0xD2
OpCode 0x13
Parameter Length 0x0006

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Descriptor Handle	The Characteristic Descriptor Handle to be read.	-
Characteristic Descriptor Offset	The Characteristic Descriptor Offset to be read.	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.67 TCU_LE_GATT_CLI_READ_LONG_CHAR_DESC_EVENT

This event is generated when server responds with characteristic descriptor for the handle specified. When the descriptor read is greater than MAX_BUFFER_SIZE multiple events will be generated which is indicated by continue flag. If continue flag is 1 it indicates that the descriptor read is partly (i.e. incomplete and more data to follow). When continue flag is 0 it indicates descriptor is completely read. The Characteristic descriptor read should have a minimum length of (ATT_MTU_SIZE-1) and can be up to MAX_BUFFER_SIZE. MAX_BUFFER_SIZE is the maximum data length that can be sent from firmware to application. Currently it is 128 Bytes.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Continue Flag	1Byte
Characteristic Descriptor	(ATT_MTU_SIZE-1) - MAX_BUFFER_SIZE

ServiceID 0xD2
OpCode 0x53
Parameter Length 0x0003 – (MAX_BUFFER_SIZE+4)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---
Continue Flag	If continue flag is 1 it indicates that the Characteristic descriptor read is partly (i.e. incomplete and more data to follow). When continue flag is 0 it indicates descriptor is completely read.	0x00 or 0x01
Characteristic Descriptor	Characteristic descriptor	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.68 TCU_LE_GATT_CLI_WRITE_LONG_CHAR_VAL_REQ

This request is used to write a Long Characteristic Value to a server when the client knows the Characteristic Value Handle. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed characteristic write value event "**TCU_LE_GATT_CLI_WRITE_LONG_CHAR_VAL_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Value Handle	2Bytes
Characteristic Value Offset	2Bytes
Characteristic Value	(ATT_MTU_SIZE-4) MAX_BUFFER_SIZE

ServiceID 0xD2
OpCode 0x14
Parameter Length (ATT_MTU_SIZE +2) – (MAX_BUFFER_SIZE +6)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Value Handle	The Characteristic Value Handle to read the value of the characteristic descriptors.	
Characteristic Value Offset	The Characteristic Value Offset to read the value of the characteristic descriptors.	
Characteristic Value	Characteristic Attribute value to be written onto server.	

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.69 TCU_LE_GATT_CLI_WRITE_LONG_CHAR_VAL_EVENT

This event is generated when client receives response from the server indicating whether the writing of characteristic long value was success or resulted in error.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte

ServiceID 0xD2
OpCode 0x54
Parameter Length 0x0003

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.70 TCU_LE_GATT_SER_WRITE_LONG_REL_CHAR_VAL_EVENT

This event is generated when the server receives Prepare Write for a characteristic value during write long request and reliable write request. The server need to convey whether it allows the handle to be prepared for write or not, indicating using the status field of ACCEPT Request 'TCU_LE_GATT_SER_WRITE_LONG_REL_CHAR_VAL_ACCEPT_REQ'.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Attribute Handle	2Bytes
Offset	2Bytes

ServiceID: 0xD3

OpCode: 0xCB

Parameter Length: 0x0006

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Attribute Handle	The attribute handle whose value has to be written	0x0001-0xFFFF
Offset	The offset from which the remote device wants to Prepare the write for the characteristic value	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.71 TCU_LE_GATT_SER_WRITE_LONG_REL_CHAR_VAL_ACCEPT_REQ

The server application will send this response to GATT server, indicating that the firmware can send the response for Prepare Write Request. The status flag will indicate whether the prepare write is permitted for the corresponding handle requested or not (i.e. authorization and write permissions are allowed or not) by server application. On receiving this response the GATT server will send the appropriate response to the remote device.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Error Handle	2Bytes

ServiceID: 0xD3

OpCode: 0x0B

Parameter Length: 0x0005

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 -
Error Handle	This field is valid and applicable only when the status is not success. This field will have the handle corresponding to the error.	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.72 TCU_LE_GATT_SER_WRIHE_LONG_CHAR_VAL_ACCEPT_RESP

On receiving the Write Long Characteristic Value Accept Request, the GATT server will send the response to client device. Once the GATT Server sends the response to client device, it will send the Accept response to Server application.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte

ServiceID: 0xD3

OpCode: 0x8B

Parameter Length: 0x0003

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 -

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.73 TCU_LE_GATT_CLI_WRITE_LONG_CHAR_DESC_REQ

This request is used to write a Long Characteristic Descriptor to a server when the client knows the Characteristic Descriptor Handle. When this command processing is started **TCU_LE_ACCEPT** is generated. When this command processing is completed characteristic write Descriptor event "**TCU_LE_GATT_CLI_WRITE_LONG_CHAR_DESC_EVENT**" is generated.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Characteristic Descriptor Handle	2Bytes
Characteristic Descriptor Offset	2Bytes
Characteristic Descriptor	(ATT_MTU_SIZE-4) MAX_BUFFER_SIZE -

ServiceID 0xD2
OpCode 0x15
Parameter Length (ATT_MTU_SIZE +2) – (MAX_BUFFER_SIZE +6)

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Characteristic Descriptor Handle	The Characteristic Descriptor Handle to read the value of the characteristic descriptors.	-
Characteristic Descriptor Offset	The Characteristic Descriptor Offset to read.	-
Characteristic Descriptor	Characteristic Descriptor to be written onto server.	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.74 TCU_LE_GATT_CLI_WRITE_LONG_CHAR_DESC_EVENT

This event is generated when client receives response from the server indicating whether the writing of characteristic long descriptor was success or resulted in error.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte

ServiceID 0xD2
OpCode 0x55
Parameter Length 0x0003

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 ---

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.75 TCU_LE_GATT_SER_WRITE_LONG_CHAR_DESP_EVENT

This event is generated when the server receives Prepare Write for a characteristic descriptor during write long char descriptor request. The server need to convey whether it allows the handle to be prepared for write or not, indicating using the status field of ACCEPT Request 'TCU_LE_GATT_SER_WRITE_LONG_CHAR_DESP_ACCEPT_REQ.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Attribute Handle	2Bytes
Offset	2Bytes

ServiceID: 0xD3

OpCode: 0xCC

Parameter Length: 0x0006

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Attribute Handle	The attribute handle whose value has to be written	0x0001-0xFFFF
Offset	The offset from which the remote device wants to write the characteristic descriptor	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.76 TCU_LE_GATT_SER_WRITE_LONG_CHAR_DESP_ACCEPT_REQ

The server application will send this response to GATT server, indicating that the firmware can send the response for Prepare Write Request. The status flag will indicate whether the prepare write is permitted for the corresponding handle requested or not ((i.e. authorization and write permissions are allowed or not) by server application. On receiving this response the GATT server will send the appropriate response to the remote device.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte
Error Handle	2Bytes

ServiceID: 0xD3

OpCode: 0x0C

Parameter Length: 0x0005

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 -
Error Handle	This field is valid and applicable only when the status is not success. This field will have the handle corresponding to the error.	-

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

1.77 TCU_LE_GATT_SER_WRITE_LONG_CHAR_DESP_ACCEPT_RESP

On receiving the Write Long Characteristic Descriptor Accept Request, the GATT server will send the response to client device. Once the GATT Server sends the response to client device, it will send the Accept response to Server application.

Command Format:

ServiceID	1Byte
OpCode	1Byte
Parameter Length	2Bytes
Connection Handle	2Bytes
Status	1Byte

ServiceID: 0xD3

OpCode: 0x8C

Parameter Length: 0x0003

Parameters:

Parameters	Parameter Description	Value
Connection Handle	Connection handle is the index for accessing the remote device.	0x0000 to 0x0EFF (0x0F00 to 0x0FFF Reserved for future use)
Status	Result Code: - Success - Refer Error Code Table	0x00 -

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

2 GATT Command Interface Message Sequence Chart (MSC)

2.1 Response time from command to response

Command(TCU_LE_GATT_***)	msec
TCU_LE_GATT_CLI_INIT_REQ	100
TCU_LE_GATT_CLI_EXG_MTU_REQ	100
TCU_LE_GATT_CLI_CHAR_VAL_CONFIRMATION_ACCEPT_REQ	100
TCU_LE_GATT_CLI_WRITE_WITHOUT_RESP_REQ	100
TCU_LE_GATT_SER_INIT_REQ	100
TCU_LE_GATT_SER_EXG_MTU_ACCEPT_REQ	100
TCU_LE_GATT_SER_READ_CHAR_VAL_ACCEPT_REQ	100
TCU_LE_GATT_SER_WRITE_CHAR_VAL_ACCEPT_REQ	100
TCU_LE_GATT_SER_WRITE_CHAR_DESP_ACCEPT_REQ	100
TCU_LE_GATT_SER_READ_CHAR_DESP_ACCEPT_REQ	100
TCU_LE_GATT_SER_READ_MULTIPLE_ACCEPT_REQ	100

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

2.2 Response time from command to Event

Command (TCU_LE_GATT***)	Description	Maximum respond time(s)
TCU_LE_GATT_CLI_EXG_MTU_REQ		10
TCU_LE_GATT_CLI_EXG_MTU_EVENT	SUM	10
TCU_LE_GATT_CLI_DISCOVER_PRIM_SVC_REQ		5
TCU_LE_GATT_CLI_DISCOVER_PRIM_SVC_EVENT	Continue Flag = 1	5
TCU_LE_GATT_CLI_DISCOVER_PRIM_SVC_EVENT	Continue Flag = 0	5
TCU_LE_GATT_CLI_READ_CHAR_VAL_REQ		10
TCU_LE_GATT_CLI_READ_CHAR_VAL_EVENT	SUM	10
TCU_LE_GATT_CLI_READ_CHAR_VAL_UUID_REQ		10
TCU_LE_GATT_CLI_READ_CHAR_VAL_UUID_EVENT	SUM	10
TCU_LE_GATT_CLI_WRITE_CHAR_VAL_REQ		10
TCU_LE_GATT_CLI_WRITE_CHAR_VAL_EVENT	SUM	10
TCU_LE_GATT_CLI_READ_CHAR_VAL_REQ		10
TCU_LE_GATT_CLI_READ_CHAR_VAL_EVENT	SUM	10
TCU_LE_GATT_CLI_READ_CHAR_DESP_REQ		10
TCU_LE_GATT_CLI_READ_CHAR_DESP_EVENT	SUM	10
TCU_LE_GATT_CLI_WRITE_CHAR_DESP_REQ		10
TCU_LE_GATT_CLI_WRITE_CHAR_DESP_EVENT	SUM	10
TCU_LE_GATT_CLI_CHAR_VAL_NOTIFICATION_IND_EVENT		5
TCU_LE_GATT_CLI_CHAR_VAL_IND_EVENT		5
TCU_LE_GATT_CLI_READ_MULTIPLE_CHAR_VAL_REQ		10
TCU_LE_GATT_CLI_READ_MULTIPLE_CHAR_VAL_EVENT	SUM	10

2.3 Recommendation for HOST CPU

When TC35661 does not notify event within above time, TC35661 is under unusual operation.

Then HOST CPU should reset TC35661 with HW-RESET. It is recommended for HOST to consider extra time from above time.

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

3 List of error codes

ERROR	VALUE
Invalid Handle	0x01
Read Not permitted	0x02
Write Not permitted	0x03
Invalid Packet Data Unit	0x04
Insufficient Authentication	0x05
Request Not supported	0x06
Invalid Offset	0x07
Insufficient Authorization	0x08
Prepare Queue Full	0x09
Look Up attribute Not Found	0x0A
Attribute Not Long	0x0B
Insufficient Encryption Key Size	0x0C
Invalid Attribute Value Length	0x0D
Unlikely Error	0x0E
Insufficient Encryption	0x0F
Unsupported Group Type	0x10
Insufficient Resources	0x11
Application Error	0x80
Not Initialized	0xE1
Request In Progress	0xE2
Invalid Connection Handle	0xE3
Disconnect Error	0xE4
Remote Data Length Error (Data from remote greater then MTU Size)	0xE5
Invalid Parameter Length	0xE6
Accept Request Status Error (Accept Request contains error in status field)	0xE7
Invalid Request (Error in Opcode)	0xEE
Initialization Already Done	0xF1

PANASONIC Bluetooth Module PAN1026 TC35661-ROM501 CMD(GATT)

4 Appendix

Listed below are the acronyms used in this document:

SL. No	ACRONYM	DEFINITION
1	CHAR	Characteristic
2	CLI	Client
3	DECL	Declaration
4	DESP	Descriptor
5	DISC	Discover
6	EVT	Event
7	EXG	Exchange
8	GATT	Generic Attribute Profile
9	LE	Low Energy
10	PRIM	Primary
11	REQ	Request
12	RES	Response
13	SDB	Server Database
14	SER	Server
15	SVC	Service
16	UUID	Universally Unique Identifier
17	VAL	Value
18	WR	Write
19	NA	Not Applicable
20	MAX_BUFFER_SIZE	Maximum Size that can be send at a time from Firmware to Application Currently it is fixed as 128 Bytes
21	ATT_MTU_SIZE	The ATT MTU Size negotiated between Client and Server.

End of document.