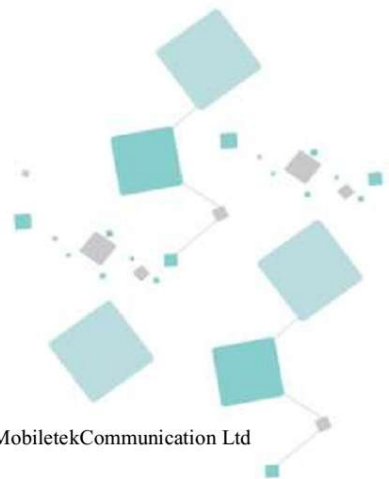# LYNQ L218E GATT Server Application Note

Version V1.0

Date: 2018-04-11

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Version History

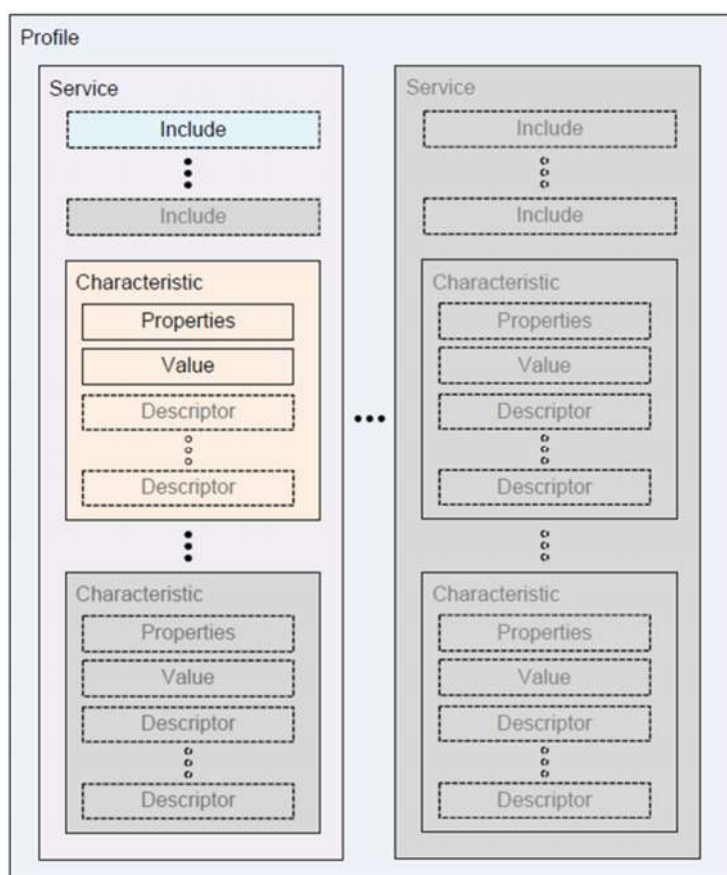| Date	Version	Description of change	Author
2018-04-30	V1.0	Initial Document	Prithvi Rai

Contents

1   Summary

This document demonstrates a Simple BLE GATT Server application AT Command Sequence in L218E BLE module. It provides information on how to use the BLE GATT Server to enable Services and Characteristics.

2   GATT Overview

The Generic Attributes (GATT) define a hierarchical data structure that is exposed to connected Bluetooth Low Energy (LE) devices.

GATT profiles enable extensive innovation while still maintaining full interoperability with other Bluetooth® devices. The profile describes a use case, roles and general behaviors based on the GATT functionality. Services are collections of characteristics and relationships to other services that encapsulate the behavior of part of a device. This also includes hierarchy of services, characteristics and attributes used in the attribute server.

GATT is built on top of the Attribute Protocol (ATT) (see Bluetooth Core System Architecture for block diagram and explanations), which uses GATT data to define the way that two Bluetooth Low Energy devices send and receive standard messages. Note that GATT is not used in Bluetooth BR/EDR implementations, which use only adopted profiles.

The top level of the hierarchy is a profile, which is composed of one or more services necessary to fulfill a use case. A service is composed of characteristics or references to other services. A characteristic consists of a type (represented by a UUID), a value, a set of properties indicating the operations the characteristic supports and a set of permissions relating to security. It may also include one or more descriptors—metadata or configuration flags relating to the owning characteristic.

3 Related Documents

L218 BLUETOOTH AT DOCUMENT V1.1

4 BLE Initialization

Initialization commands list:

Module Commands	Response	Description
AT+IPR=115200	OK	Set UART baud rate
AT+EBTPWR=1	+EBTPRFAC:1 OK	Power On the BLE on L218E
AT+EBTNAME=L218E	OK	Name the L218E Module BLE Device local name as 54 Char , e.g.: L218E
AT+EBTVISB=1,0	OK	n=1 (Visible to other device),0(Invisible to other device) , time =0 (Keep visible forever), 1~255 (Visibility Timeout in Seconds)
AT+EBTINQ	OK +EBTINQ:19D66D08608E,Galaxy Note8 +EBTIND:1,0	List out visible devices in proximity with Device address and Names
AT+EBTPAIRCNF=1	OK	Confirm Pairing request
	+EBTCONN:1,19D66D086088E,4382	Pair connection response with HFP (0x4382)

5   BLE GATT Server Initialization Operation

Module Commands	Response	Description
AT+GATSREG=1,"1234ABCD"	+GATSREG:1,1234ABCD,0 OK	Register GATT Server with <user id> : 1234ABCD
AT+GATSS=1,"1234ABCD","365615169",8,1,5	+GATSS:1,1234ABCD,3656151690,1,0,5,256 OK	ADD Services < num_handles > parameter set to 8.< num_handles > parameter setting should be greater than the number of Charecteristics multiplied by 2. For example, you need to add three Charecteristic, < num_handles > parameters need to be greater than 6. If you still need to add the description of the service (AT + GATSD) also need to increase the value of this parameter Response : Service Handle 256
AT+GATSC=1,"1234ABCD",256,"365612469",1,2,17	+GATSC:1,1234ABCD,256,3656124690,1,0,258 OK	Create Read Characteristics with Service Handle 256
AT+GATSC=1,"1234ABCD",256,"365612449",2,8,17	+GATSC:1,1234ABCD,256,3656124490,2,0,260 OK	Create Write Characteristics with Service handle 256

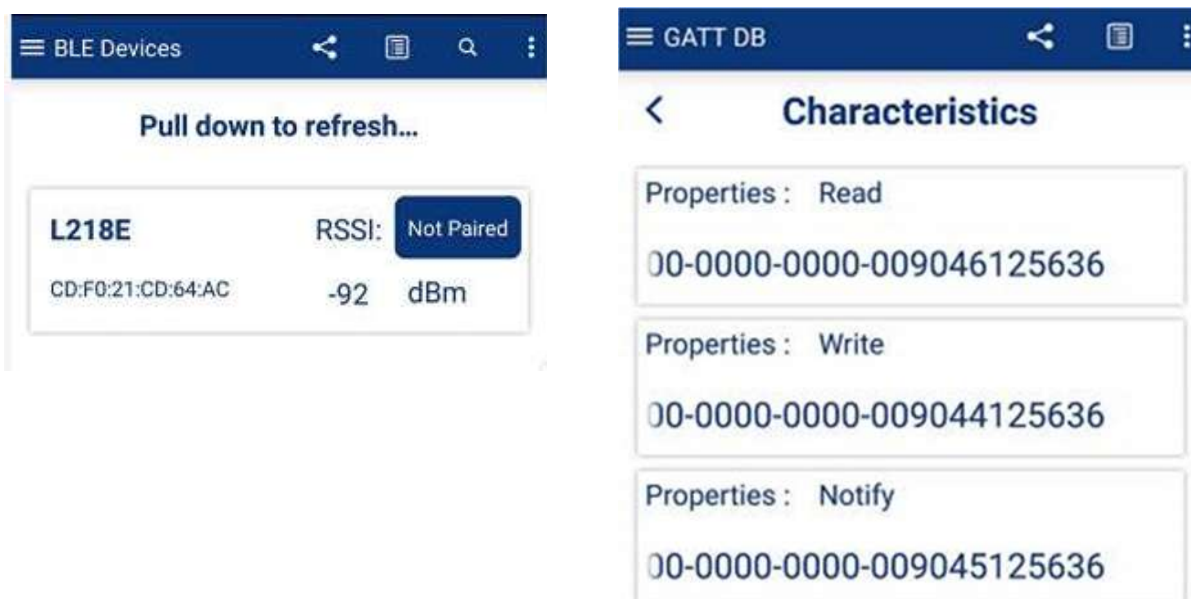|		
AT+GATSC=1,"1234ABCD",256,"365612459",3,16,17	+GATSC:1,1234ABCD,256,3656124590,3,0,262 OK	Create Notify Characteristics with service Handle 256
AT+GATSST=1,"1234ABCD",256,0	+GATSST:1,1234ABCD,0,256 OK	Start GATT Service Advertising

6 BLE GATT Server Communication Operation

Install the GATT Client Application, For example Cypress CySmart Application.

Play Store: https://play.google.com/store/apps/details?id=com.cypress.cysmart

Download Link: http://www.cypress.com/documentation/software-and-drivers/cysmart-bluetooth-le-test-and-debug-tool

Following are a Few snapshots of the Application interface.

Module Commands	Response	Description
	+GATSCON:1,1234ABCD,0,2D3C7D691E66,1	URC Response to the Connection request sent from the GATT Client application
	+GATRREQ:1234ABCD,1,122,0C097F247A5B,258,0,0	Read Characteristics request from Client Application with Conn ID 122
AT+GATSRSP="1234ABCD",0,1,121,260,"41424344"	+GATSRSP:0,1234ABCD,1,260 OK	Responding to Read Characteristics Request with sending data "41424344" signifying 0x41,0x42,0x43,0x44
	+GATWREQ:1234ABCD,1,123,0C097F247A5B,260,41424344,1,0,0	Write Characteristics Request to Server . Conn ID 123
AT+GATSRSP="1234ABCD",0,1,123,260,"00"	+GATSRSP:0,1234ABCD,1,260 OK	Response to Write characteristics Request with Data Value 0x00
AT+GATSIND="1234ABCD",1,262,1,"41424344"	+GATSIND:0,1234ABCD,1,4 OK	Notify Characteristics Broadcast , 262 Char Handle and 0x41,0x42,0x43,0x44 data value