



GATT GSV-6BT LE Service

Abstract:

This GATT- service enables the control of certain communication parameters of a GSV-6 Bluetooth Low Energy device.



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Introduction

Bluetooth Low Energy

(**Bluetooth LE, BLE**, formerly marketed as Bluetooth Smart) is a wireless personal area network technology designed and marketed by the Bluetooth Special Interest Group (SIG) aimed at novel applications in the healthcare, fitness, beacons, security, and home entertainment industries. Compared to Classic Bluetooth, Bluetooth Low Energy is intended to provide considerably reduced power consumption and cost while maintaining a similar communication range.

Mobile operating systems including iOS, Android, Windows Phone and BlackBerry, as well as macOS, Linux, Windows 8 and Windows 10, natively support Bluetooth Low Energy^[1].

GATT Overview

The Generic Attributes (GATT) define a hierarchical data structure that is exposed to connected Bluetooth Low Energy (LE) devices^[2].

Generic Attribute Profile (GATT)

Dealing with data exchange in BLE device, GATT defines a basic data model and procedures to allow devices to discover, read, write, notify .

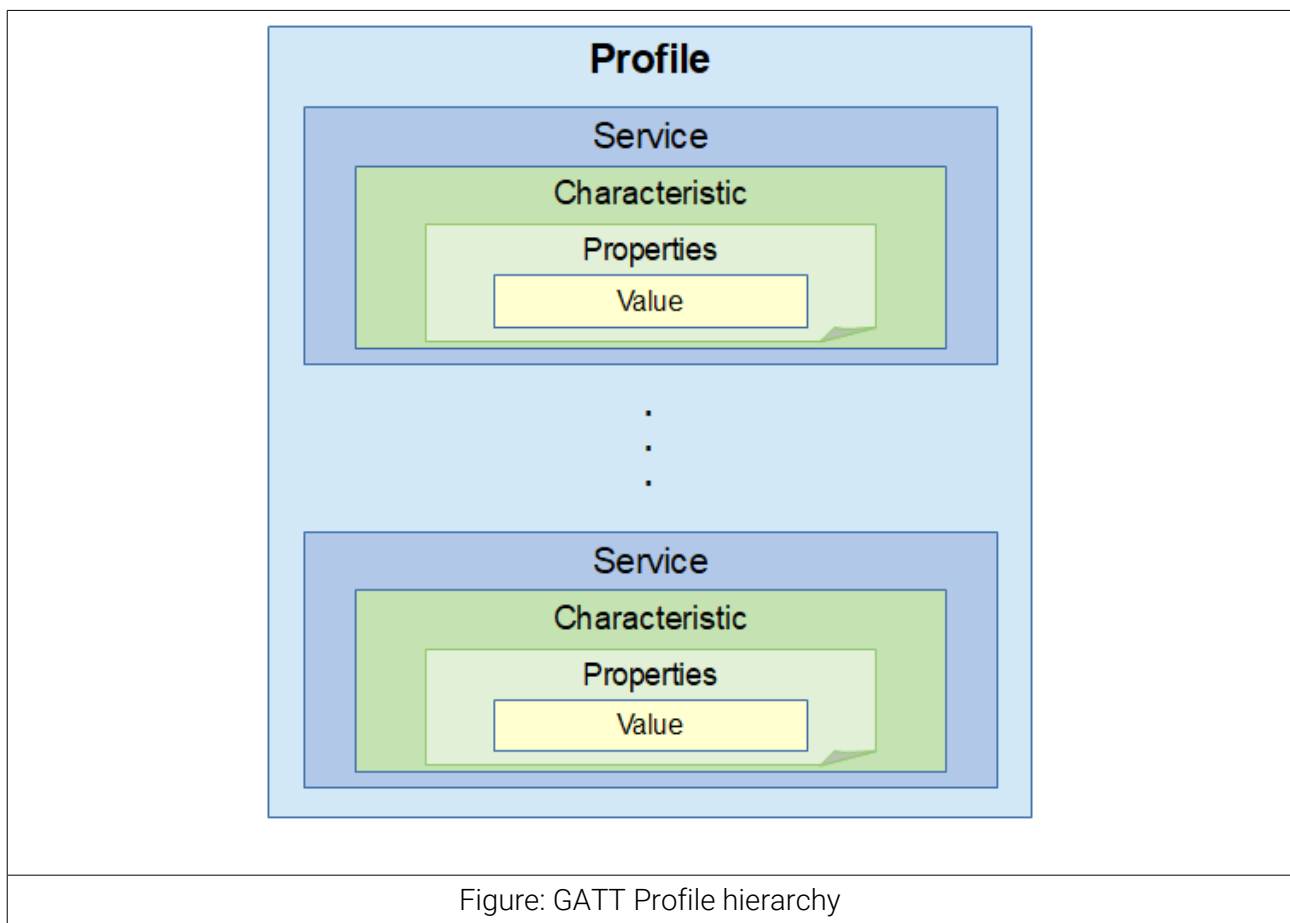


Figure: GATT Profile hierarchy



The Generic ATTRIBUTE profile (GATT) has similar client server structure as Attribute Protocol. However the GATT encapsulates data (attributes) into services and the data is exposed as characteristics.

GATT Services

Services are collections of characteristics and relationships to other services that encapsulate the behavior of part of a device^[2].

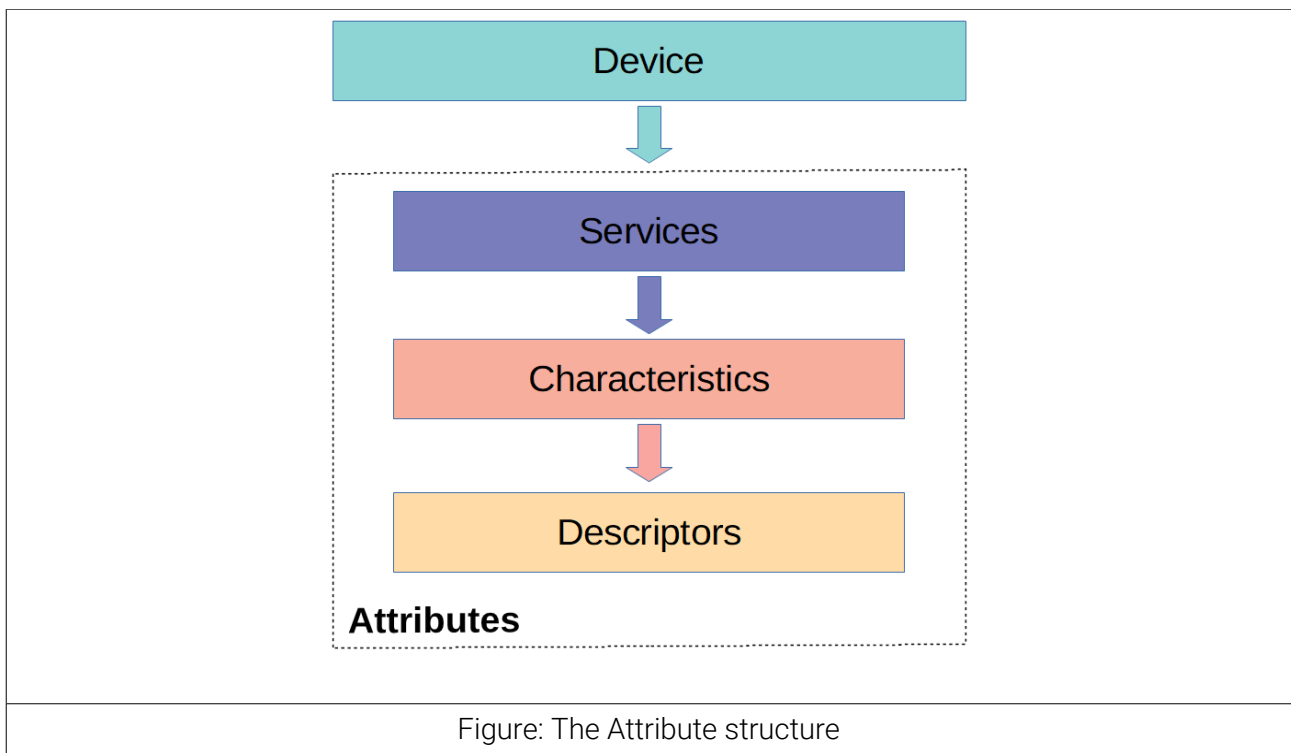
GATT Characteristics

Characteristics are defined attribute types that contain a single logical value. A characteristic also contains properties that define what operations are allowed or can be configured for the value.

Read: If enabled, it will allow a Client to read the value.

Write: If enabled, it will allow a Client to change the value.

Notify: If enabled, the Client will be notified if the value changes, a confirmation is NOT expected^[2].



GSV-6BT LE Services

When a BLE client device requests the list of supported services and their characteristics from our GSV-6BT LE running on board, it will receive the following:

Generic Access Service

Contains generic information about the device. All available Characteristics are readonly.

- **Device Name Characteristic** - The name of our device.
- **Appearance Characteristic** - The external appearance of this device. The values are composed of a category (10-bits) and sub-categories (6-bits).

Service		Universally Unique Identifier (UUID)			
Generic Access		0x1800			
Service Characteristics	UUID	Type	Format	Property	Requirement
Device Name	0x2A00	String	utf8s	Read	Mandatory
Appearance	0x2A01		16-bit (unsigned 16-bit integer)	Read	Mandatory

Device Information Service

The Device Information Service exposes manufacturer and/or vendor information about a device.

- **Manufacturer Name String Characteristic** - This characteristic represents the name of the manufacturer of the device.
- **Model Number String Characteristic** - This characteristic represents the model number that is assigned by the device vendor.
- **Serial Number String Characteristic** - This characteristic represents the serial number for a particular instance of the device.
- **Hardware Revision String Characteristic** - This characteristic represents the hardware revision for the hardware within the device.

Service		Universally Unique Identifier (UUID)			
Device Information		0x180A			
Service Characteristics	UUID	Type	Format	Property	Requirement
Manufacturer Name String	0x2A29	String	utf8s	Read	Mandatory
Model Number String	0x2A24	String	utf8s	Read	Mandatory
Serial Number String	0x2A25	String	utf8s	Read	Mandatory
Hardware Revision String	0x2A27	String	utf8s	Read	Mandatory



Battery Service

The Battery Service exposes the state of a battery within a device.

- **Battery Level Characteristic** - this mandatory characteristic is used to read the battery level as a percentage from 0% to 100%.

Service		Universally Unique Identifier (UUID)			
Battery service		0x2A19			
Service Characteristics	UUID	Type	Format	Property	Requirement
Battery Level	0x2A19		Uin8 (unsigned 8-bit integer)	Read Notify	Mandatory Optional

Automation IO Service

The Automation IO service is used to expose the analog inputs/outputs and digital input/outputs of a generic IO module (IOM).

- **Digital Characteristic** - The Digital characteristic is used to expose and change the state of an IOM's digital signals.

Service		Universally Unique Identifier (UUID)			
Automation IO		0x1815			
Service Characteristics	UUID	Type	Format	Property	Requirement
Digital	0x2A56		2bit (unsigned 2-bit integer)	Read Write Notify	Optional Optional Optional

Configuration Service

- ***xgatt_modus Characteristic*** - This characteristic is used to switch to classic mode.
Parameter: 0 for Bluetooth LE, 1 for Bluetooth Classic mode.
- ***Active channels Characteristic*** - This characteristic is used to definition which channels is active.

Service		Universally Unique Identifier (UUID)			
ME-Configuration		e26b9463-92b3-464b-85c6-a3ae2c75bd92			
Service Characteristics	UUID	Type	Format	Property	Requirement
xgatt_modus	d5061a8a-6425-4d57-b04b-4af961797076		sint16	Write	Optional
active_channels	efab15fe-3e02-494b-a316-391adc0ecc7e		sint16	Read	Optional

Measure Channels Service

- ***ch1..ch7 Characteristic*** - This characteristic is used to present a measuring values to the client.

Service		Universally Unique Identifier (UUID)			
ME-MeasureChannels		7843eaa3-8daf-4d3d-af2b-06763cd1f2f2			
Service Characteristics	UUID	Type	Format	Property	Requirement
ch1	564a86fb-7282-498e-9dbe-b4ba64c65ddb		float32	Read Notify	Optional Optional
ch2	3fd04fa5-bb14-4ca3-a5ec-2f3ff9ec322d		float32	Read Notify	Optional Optional
ch3	d9ce9f45-9849-4a38-ad45-a982a2177a28		float32	Read Notify	Optional Optional
ch4	bebbe3f1-6f85-4437-a749-0b4712aa77a3		float32	Read Notify	Optional Optional
ch5	37004164-3c41-4f88-a352-8fe02790946d		float32	Read Notify	Optional Optional
ch6	aa9d0ff9-e061-4ea6-9306-93ca8c257682		float32	Read Notify	Optional Optional
ch7	a081a909-31ea-41a8-ac9f-7ae824264e77		float32	Read Notify	Optional Optional

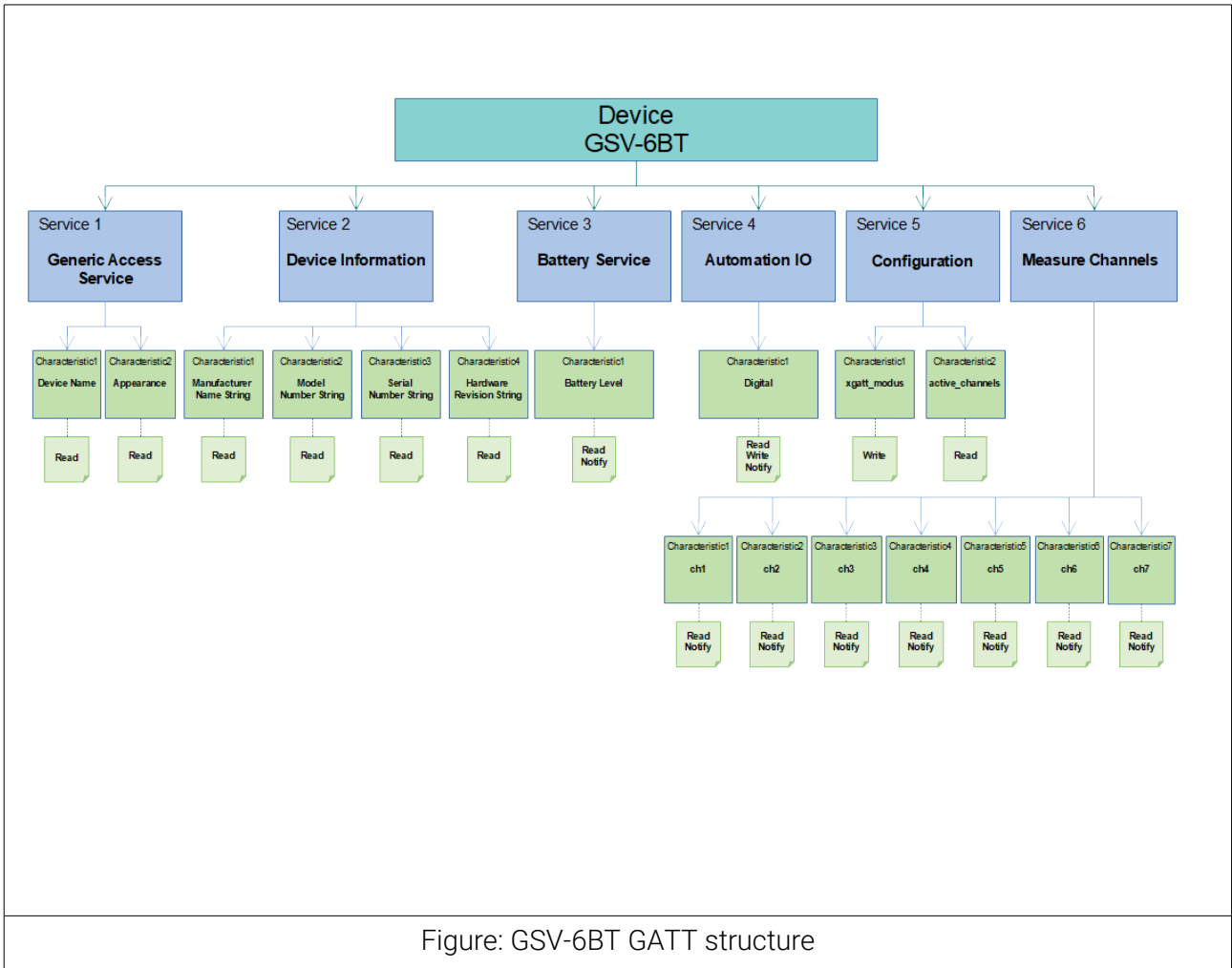


Figure: GSV-6BT GATT structure

References

1. https://en.wikipedia.org/wiki/Bluetooth_Low_Energy
2. <https://www.bluetooth.com/specifications/gatt/services>

Change log

Version	Comments
ba-gsv6bt-gattservices-en.pdf	Initial Version
ba-gsv6bt-gattservices-v1.1_en.pdf	Formatted for publication
ba-gsv6bt-gattservices-v1.2_en.odt	Correction