



Microchip Transparent Profile v1.1

Abstract:

This profile defines fundamental requirements to connect and interact with Transparent-Channels intended for consumer to exchange control and data between Transparent Client and Transparent Server.

Revision History

Revision	Date (yyyy-mm-dd)	Comments
V1.0	2016-08-26	Initiate this document
V1.1	2020-07-14	Revised spec for Chimera and later BLE platforms.

Table of Contents

1	Introduction	4
1.1	Profile Dependencies	4
1.2	Conformance.....	Error! Bookmark not defined.
1.3	Bluetooth Specification Release Compatibility	4
2	Configuration	4
2.1	Roles	4
2.2	Role/Service Relationships	4
2.3	Concurrency Limitations and Restrictions	Error! Bookmark not defined.
2.4	Topology Limitations and Restrictions	Error! Bookmark not defined.
2.5	Transport Dependencies	5
3	Transparent Server Role Requirements	5
3.1	Additional Requirements for Low Energy Transport	5
3.1.1	Manufacturer Specific Data AD Type	5
4	Transparent Client Role Requirements	5
4.1	GATT Sub-Procedure Requirements	6
4.2	Service Discovery	6
4.3	Characteristic Discovery	6
4.3.1	Transparent Service Characteristic Discovery	6
4.4	Transparent Service Characteristics	6
4.4.1	Transparent Transmitter Characteristic	7
4.4.2	Transparent Receiver Characteristic	7
4.4.3	Transparent Control Point (TCP) Characteristic	7
4.4.3.1	TCP Enable CBFC-S-C	Error! Bookmark not defined.
4.4.3.2	TCP Enable CBFC-C-S	Error! Bookmark not defined.
4.5	Transparent Procedures	7
4.5.1	Enable Credit Based Flow Control, Server to Client (CBFC-S-C)	Error! Bookmark not defined.
4.5.2	TCP Enable Credit Based Flow Control, Client to Server (CBFC-C-S)	Error! Bookmark not defined.
5	Connection Establishment Procedures	7
6	Security Considerations	8
7	Acronyms and Abbreviations	8
8	References	8

1 Introduction

The Transparent Profile (TRP) defines fundamental requirements to enable higher layer application data exchange between TRP Client and Server devices that exposes the Transparent Service (TRS) [1].

1.1 PROFILE DEPENDENCIES

This profile requires the Generic Attribute Profile (GATT).

1.2 BLUETOOTH SPECIFICATION RELEASE COMPATIBILITY

This specification is compatible with Bluetooth Core Specification v4.1 [3].

2 Configuration

2.1 ROLES

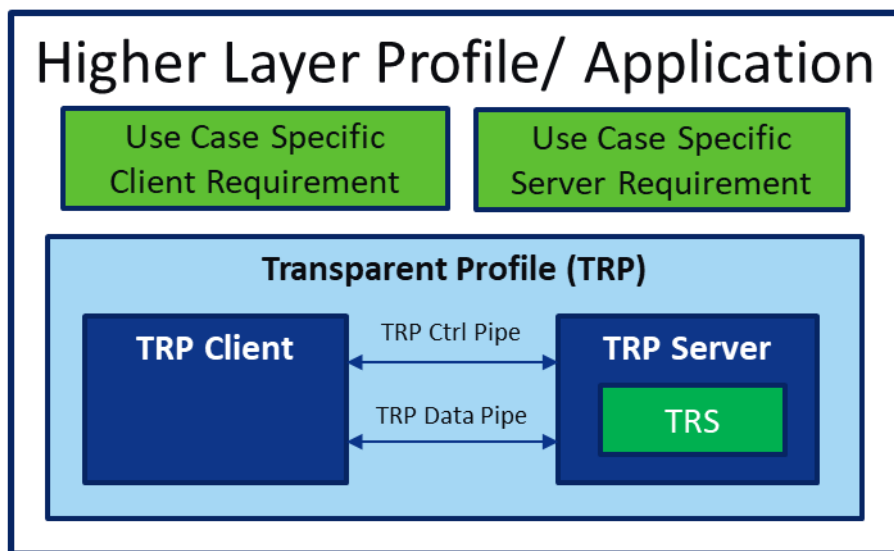
The profile defines two roles: Transparent Server and Transparent Client. Transparent Server and Transparent Client can transfer data to each other.

The Transparent Server shall be a GATT Server

The Transparent Client shall be a GATT Client

2.2 ROLE/SERVICE RELATIONSHIPS

The following diagram illustrates the relationships between service and profile roles.



A Transparent Server shall instantiate the Transparent Service [1]. As shown above, a higher layer specification is required to provide additional requirements on top of TRS/TRP that are specific to the need of the use case.

There are 2 Transparent Channels, Control Pipe and Data Pipe, can be established for higher application layer are defined in this profile. Control Pipe is based on TCP characteristic attribute and Data Pipe is on TUD and TDD characteristic attributes.

2.3 TRANSPORT DEPENDENCIES

There are no transport restrictions imposed by this profile specification. However, a higher layer specification may impose additional requirements.

3 Transparent Server Role Requirements

The Transparent Server shall instantiate one Transparent Services [1]. A higher layer specification may impose additional requirements on the service declaration of the Transparent Service (e.g., «Primary Service») as well as other additional requirements. There shall not be more than one instance of the Transparent Service that is declared as a «Primary Service».

Service	Transparent Server
Transparent Service	M

Table 3.1: Service Requirements for Transparent Server

3.1 ADDITIONAL REQUIREMENTS FOR LOW ENERGY TRANSPORT

This section describes additional Transparent Server requirements beyond those defined in the Transparent Service when using this profile over Low Energy transport.

3.1.1 MANUFACTURER SPECIFIC DATA OR SERVICE DATA AD TYPES

While in a GAP Discoverable Mode for initial connection to a Transparent Client, the Transparent Server may include the Manufacturer Specific Data or Service Data defined in [3] AD type field of the advertising data. This enhances the user experience since a Transparent Server may be identified by the Transparent Client before initiating a connection.

4 Transparent Client Role Requirements

Table4.1 describes the discovery requirements for a Transparent Client

Discovery Requirement	Section	Support in Transparent Client
Transparent Service Discovery	4.2	O
Transparent Service Characteristic Discovery	4.3.1	M

Table4.1 Discovery Requirements for Transparent Client

Table 4.2 describes the characteristic support requirements for a Transparent Client.

Characteristic Support Requirements	Support in Transparent Client
Transparent Uplink Data	M
Transparent Downlink Data	M
Transparent Control Point	M

Table 4.2Characteristic Support Requirements for Transparent Client.

4.1 GATT SUB-PROCEDURE REQUIREMENTS

Requirements in this section represent a minimum set of requirements for a Transparent Client. Other GATT sub-procedures may be used if supported by both Transparent Client and Transparent Server. The table below summarizes additional GATT sub-procedure requirements beyond those required by all GATT clients.

GATT Sub-Procedure	Transparent Client Requirements
Discover All Characteristics of a Service	M
Discover All Characteristics Descriptors	M
Write Characteristic Value	M
Write Without Response	M
Write Characteristic Descriptors	M

Table 4.3: Additional GATT Sub-Procedure Requirements

4.2 SERVICE DISCOVERY

The Transparent Client shall discover the Transparent Service on Transparent Server. When using the Low Energy transport and performing primary service discovery, the Transparent Client shall use either the GATT Discover All Primary Services sub-procedure or the GATT Discover Primary Services by Service UUID sub-procedure.

When using the Low Energy transport and performing secondary service discovery, the Transparent Client shall use the GATT Find Included Services sub-procedure to discover the Transparent Service.

4.3 CHARACTERISTIC DISCOVERY

As required by GATT, the Transparent Client shall be tolerant of additional optional characteristics in the service records of services used with this profile. Where a characteristic is discovered that can be indicated or notified, the Transparent Client shall also discover the associated Client Characteristic Configuration descriptor.

4.3.1 TRANSPARENT SERVICE CHARACTERISTIC DISCOVERY

The Transparent Client shall use either the GATT Discover All Characteristics of a Service sub-procedure or the GATT Discover Characteristics by UUID sub-procedure to discover the characteristics of the service. The Transparent Client shall use the GATT Discover All Characteristic Descriptors sub-procedure to discover the characteristic descriptors.

4.4 TRANSPARENT SERVICE CHARACTERISTICS

This section contains characteristics and behavior that is otherwise not defined in the transparent procedures in Section 4.5.

4.4.1 TRANSPARENT UPLINK DATA (TUD) CHARACTERISTIC

Before Transparent Server sends data to Transparent Client through this attribute handle, the Transparent Client shall configure the Transparent Uplink Characteristic on Transparent Server for notifications (i.e., via the *Client Characteristic Configuration* descriptor).

Transparent Client shall Write a Characteristic Value to the *Client Characteristic Configuration* descriptor of Transparent Uplink Characteristic on Transparent Server.

4.4.2 TRANSPARENT DOWNLINK DATA (TDD) CHARACTERISTIC

The Transparent Client shall perform a Write Command or Write Request with a Characteristic Value to Transparent Downlink Characteristic on Transparent Server through this channel.

4.4.3 TRANSPARENT CONTROL POINT (TCP) CHARACTERISTIC

Before performing a Transparent Control Point procedure, the Transparent Client shall configure the Transparent Control Point (TCP) characteristic for notifications (i.e., via the *Client Characteristic Configuration* descriptor).

When Transparent Client wants to send data to Transparent Server, the Transparent Client shall Write a Characteristic Value to the Transparent Control Point Characteristic. The Transparent Server may respond it with a notification by Response Code that may include the Request Op Code and may also include a Response Parameter as defined in [1].

When Transparent Server wants to send data to Transparent Client, the Transparent Server shall perform a Notification with a Characteristic Value to the Transparent Control Point Characteristic.

Table 4.4 shows the requirements for the TCP Op Codes in the context of this profile:

TCP Op Code	Requirement
Response Code (0x00 ~ 0x03)	Mandatory
Downlink Credit Based Flow Control Enable	Mandatory if the Downlink Credit Based Flow Control is supported.
Uplink Credit Based Flow Control Enable	Mandatory if the Uplink Credit Based Flow Control is supported.

Table 4.4: TCP Op Code Requirements

4.5 TRANSPARENT PROCEDURES

The generic procedures defined in this section provide standardized methods of using the features of the Transparent Service [1] in specified sequences to satisfy common use cases. However, wherever a procedure listed in Table 4.5 is supported, the implementation of the procedure shall conform to the requirements of this profile specification.

5 Connection Establishment Procedures

Connection establishment requirements may be defined by the higher layer specification.

6 Security Considerations

Security requirements may be defined by the higher layer specification.

7 Acronyms and Abbreviations

Acronyms and Abbreviations	Meaning
AD	Advertising Data
GATT	Generic Attribute Profile
LE	Low Energy
MTU	Maximum Transmission Unit
TP	Transparent Profile
TS	Transparent Service
RFU	Reserved for Future Use
CBFC-S-C	Credit Based Flow Control, Server to Client
CBFC-C-S	Credit Based Flow Control, Client to Server

Table 7.1: Abbreviations and Acronyms

8 References

[1] Transparent Service v1.0.

[2] Bluetooth Core Specification v4.0 or later version of the Core Specification.

[3] Characteristic and Descriptor descriptions are accessible via the Bluetooth SIG Assigned Numbers.