

# Microphone Control Service

## **Bluetooth® Service Specification**

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### **Abstract:**

This specification describes the service that exposes a control interface and the status of a microphone mute control.



**Revision History**

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# 1 Introduction

This service enables a device to expose the mute control and state of one or more microphones.

## 1.1 Conformance

If conformance to this specification is claimed, all capabilities indicated as mandatory for this specification shall be supported in the specified manner (process-mandatory). This also applies for all optional and conditional capabilities for which support is indicated.

## 1.2 Service dependencies

This service depends on the Audio Input Control Service (AICS) [3], if AICS is included by this service.

## 1.3 Bluetooth Core Specification release compatibility

This specification is compatible with any version of the Bluetooth Core Specification [1] that includes the Generic Attribute Profile (GATT).

## 1.4 GATT sub-procedure requirements

Requirements in this section represent a minimum set of server requirements. Other GATT sub-procedures may be used if supported by both the client and server.

Requirements in this section are defined as “Mandatory” (M), “Optional” (O), “Excluded” (X), and “Conditional” (C.n). Conditional statements (C.n) are listed directly below the table in which they appear.

Table 1.1 summarizes additional GATT sub-procedure requirements beyond those required by all GATT servers over Unenhanced Attribute Protocol (ATT) bearers.

GATT Sub-Procedure	Requirements
Write Characteristic Values	M
Notifications	M
Read Characteristic Descriptors	M
Write Characteristic Descriptors	M

Table 1.1: GATT sub-procedure requirements over Unenhanced ATT bearers

## 1.5 Transport dependencies

This service uses GATT and therefore has no additional transport dependencies.

Notifications with GATT are considered unreliable when used with an Unenhanced ATT bearer.

An Enhanced ATT bearer can be used for reliability of Notifications and can be specified by a higher-layer profile.



## 1.6 Application error codes

This service defines the Application error codes shown in [Table 1.2](#).

Name	Error Code	Description
Mute Disabled	0x80	Mute/unmute commands are disabled.

Table 1.2: Application error codes

## 1.7 Byte transmission order

All characteristics used with this service shall be transmitted with the least significant octet (LSO) first (i.e., little endian). The LSO is identified in the characteristic definitions in the Bluetooth SIG Assigned Numbers [4].

## 1.8 Language

### 1.8.1 Language conventions

The Bluetooth SIG has established the following conventions for use of the words **shall**, **must**, **will**, **should**, **may**, **can**, **is**, and **note** in the development of specifications:

shall	<u>is required to</u> – used to define requirements.
must	is used to express: a natural consequence of a previously stated mandatory requirement. OR an indisputable statement of fact (one that is always true regardless of the circumstances).
will	<u>it is true that</u> – only used in statements of fact.
should	<u>is recommended that</u> – used to indicate that among several possibilities one is recommended as particularly suitable, but not required.
may	<u>is permitted to</u> – used to allow options.
can	<u>is able to</u> – used to relate statements in a causal manner.
is	<u>is defined as</u> – used to further explain elements that are previously required or allowed.
note	Used to indicate text that is included for informational purposes only and is not required in order to implement the specification. Each note is clearly designated as a “Note” and set off in a separate paragraph.

For clarity of the definition of those terms, see Core Specification Volume 1, Part E, Section 1.

### 1.8.2 Reserved for Future Use

Where a field in a packet, Protocol Data Unit (PDU), or other data structure is described as "Reserved for Future Use" (irrespective of whether in uppercase or lowercase), the device creating the structure shall set its value to zero unless otherwise specified. Any device receiving or interpreting the structure shall ignore that field; in particular, it shall not reject the structure because of the value of the field.

Where a field, parameter, or other variable object can take a range of values, and some values are described as "Reserved for Future Use," a device sending the object shall not set the object to those values. A device receiving an object with such a value should reject it, and any data structure containing

it, as being erroneous; however, this does not apply in a context where the object is described as being ignored or it is specified to ignore unrecognized values.

When a field value is a bit field, unassigned bits can be marked as Reserved for Future Use and shall be set to 0. Implementations that receive a message that contains a Reserved for Future Use bit that is set to 1 shall process the message as if that bit was set to 0, except where specified otherwise.

The acronym RFU is equivalent to Reserved for Future Use.

### 1.8.3 Prohibited

When a field value is an enumeration, unassigned values can be marked as “Prohibited.” These values shall never be used by an implementation, and any message received that includes a Prohibited value shall be ignored and shall not be processed and shall not be responded to.

Where a field, parameter, or other variable object can take a range of values, and some values are described as “Prohibited,” devices shall not set the object to any of those Prohibited values. A device receiving an object with such a value should reject it, and any data structure containing it, as being erroneous.

“Prohibited” is never abbreviated.

### 1.8.4 Terminology

Table 1.3 defines terms that are needed to understand features used in this service.

Term	Definition
gain	The amplification or attenuation of a signal.
microphone	A single or group of audio transducers that converts sound to an electrical signal.
Unenhanced ATT bearer	An ATT bearer not using the Enhanced Credit Based Flow Control Logical Link Control and Adaptation Protocol (L2CAP) channel mode introduced in Volume 3, Part A, Section 10.2 in the Bluetooth Core Specification [2].
Enhanced ATT bearer	An ATT bearer using the Enhanced Credit Based Flow Control L2CAP channel mode introduced in Volume 3, Part A, Section 10.2 in [2].

Table 1.3: Terminology

## 2 Service

### 2.1 Declaration

There shall be no more than one instance of the Microphone Control Service (MICS) on a device. MICS is declared on devices that can control the mute state of a microphone's audio.

The Attribute Type service declaration shall be set to the «Primary Service» or «Secondary Service» universally unique identifier (UUID), and the Attribute Value service declaration shall be set to the «Microphone Service» as defined in [4].

### 2.2 Included services

This service may include zero or more instances of AICS [3].

#### 2.2.1 Topology

This service provides global, device-wide, mute control. When included, AICS provides per-input mute and gain control.

##### 2.2.1.1 Microphone Control Service only

An instance of MICS with no included instances of AICS provides the simplest topology that allows control over the mute state. Devices that do not expose gain control should use the topology shown in Figure 2.1.

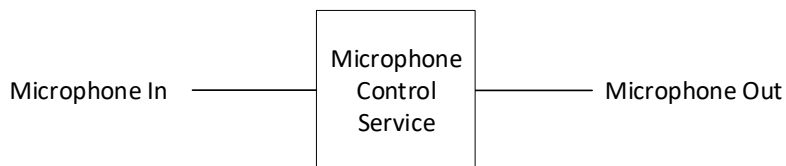


Figure 2.1: Example topology of MICS only

##### 2.2.1.2 Microphone Control Service with single Audio Input Control Service

An instance of MICS with one included instance of AICS allows control over device-wide mute and one single-input gain and mute. Devices that expose a single gain control should use the topology shown in Figure 2.2.

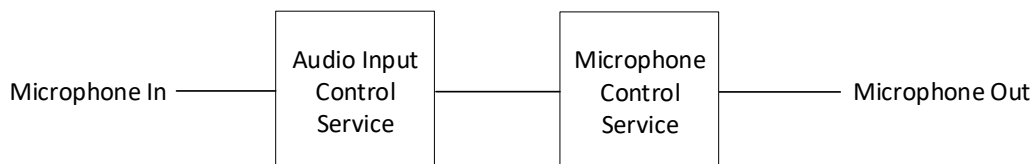


Figure 2.2: Example topology of MICS with a single instance of AICS



### 2.2.1.3 Microphone Control Service with multiple Audio Input Control Services

An instance of MICS with multiple included instances of AICS allows control over device-wide mute and the per-input gain and mute of multiple microphones. Devices with multiple individually controllable microphones should use the topology shown in [Figure 2.3](#).

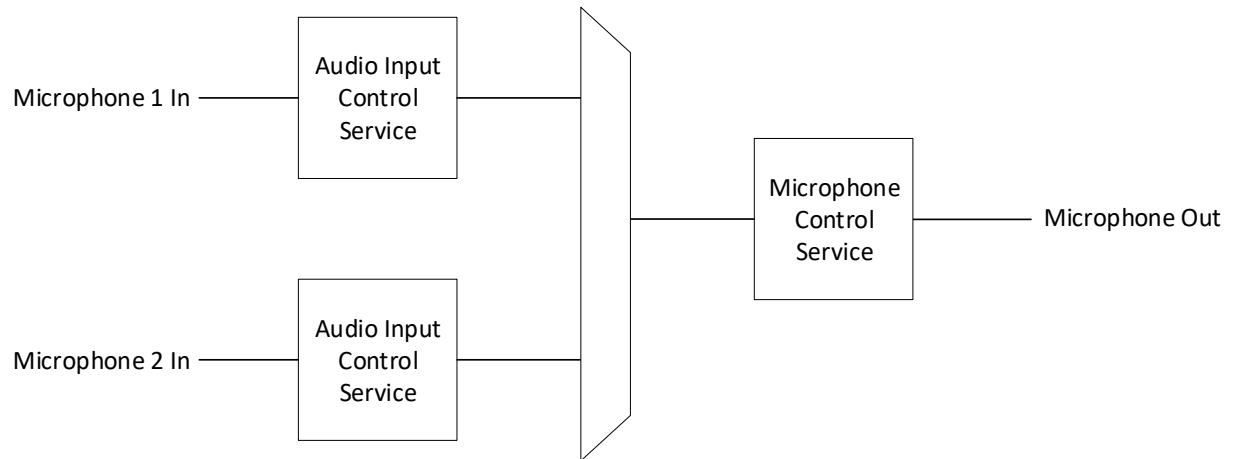


Figure 2.3: Example topology of MICS with multiple instances of AICS

## 3 Service characteristics

This section defines the characteristic and descriptor requirements.

Requirements in this section are defined as “Mandatory” (M), “Optional” (O), “Excluded” (X), and “Conditional” (C.n). Conditional statements (C.n) are listed directly below the table in which they appear.

Characteristic Name	Requirement	Mandatory Properties	Optional Properties	Security Permissions
Mute	M	Read, Write, Notify	–	Encryption Required

Table 3.1: MICS characteristics

### 3.1 Mute

The Mute characteristic shall be set to a value that reflects the current mute state of the audio to which this service applies. [Table 3.2](#) describes the Mute characteristic values.

Description	Value
Not Muted	0x00
Muted	0x01
Disabled	0x02
RFU	0x03–0xFF

Table 3.2: Mute characteristic values

The Mute characteristic value represents the server’s audio state, where a value of Not Muted represents unmuted audio, a value of Muted represents muted audio, and a value of Disabled represents that mute commands are disabled (for example, via a local privacy switch or other means) and the microphone is muted.

#### 3.1.1 Mute behavior

The Mute characteristic value may be read or written. When the Mute characteristic is configured for notification via the Client Characteristic Configuration descriptor, this value shall be notified when changed. When the Mute characteristic value is changed by the server or a client, then this value shall be notified to all clients that have enabled the Client Characteristic Configuration descriptor for notifications.

If the client writes a value of Disabled or RFU to the Mute characteristic, the server shall return an ATT Error Response with the ATT error code Value Not Allowed (0x13) as defined in [\[1\]](#).

If the client writes to the Mute characteristic when the Mute characteristic value is Disabled, the server shall return an ATT Error Response with the error code Mute Disabled (0x80) as defined in [Table 1.2](#). Only a local change on the server may transition the value from Disabled to another value.

## 4 SDP interoperability

If MICS is exposed over Basic Rate/Enhanced Data Rate (BR/EDR), then the server shall have the Service Discovery Protocol (SDP) record defined in [Table 4.1](#).

Requirements in this section are defined as “Mandatory” (M), “Optional” (O), “Excluded” (X), and “Conditional” (C.n). Conditional statements (C.n) are listed directly below the table in which they appear.

Item	Definition	Type	Value	Status
Service Class ID List	–	–	–	M
Service Class #0	–	UUID	«Microphone Control Service»	M
Protocol Descriptor List	–	Data Element Sequence	–	M
Protocol #0	–	UUID	«L2CAP»	M
Parameter #0 for Protocol #0	Protocol/Service Multiplexer (PSM)	Uint16	PSM = ATT	M
Protocol #1	–	UUID	«ATT»	M
Additional Protocol Descriptor List	–	Data Element Sequence	–	C.1
Protocol Descriptor List	–	Data Element Sequence	–	C.1
Protocol #0	–	UUID	«L2CAP»	C.1
Parameter #0 for Protocol #0	PSM	Uint16	PSM = EATT	C.1
Protocol #1	–	UUID	«ATT»	C.1
BrowseGroupList	–	–	PublicBrowseRoot Other browse UUIDs may also be included in the list.	M

Table 4.1: SDP record

C.1: Mandatory if Enhanced Attribute Protocol (EATT), introduced in Volume 3, Part F, Section 3.2.11 in [\[2\]](#), is supported, otherwise Excluded.

## 5 Acronyms and abbreviations

Acronym/Abbreviation	Meaning
AICS	Audio Input Control Service
ATT	Attribute Protocol
BR/EDR	Basic Rate/Enhanced Data Rate
EATT	Enhanced Attribute Protocol
GATT	Generic Attribute Profile
L2CAP	Logical Link Control and Adaptation Protocol
LSO	least significant octet
MICS	Microphone Control Service
PDU	Protocol Data Unit
PSM	Protocol/Service Multiplexer
RFU	Reserved for Future Use
SDP	Service Discovery Protocol
UUID	universally unique identifier

Table 5.1: Acronyms and abbreviations

## 6 References

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- [1] Bluetooth Core Specification, Version 4.0 or later
- [2] Bluetooth Core Specification, Version 5.2
- [3] Audio Input Control Service Specification, Version 1.0
- [4] Bluetooth SIG Assigned Numbers, <https://www.bluetooth.com/specifications/assigned-numbers>