Apple Notification Center Service (ANCS) Specification

v1.0

Developer

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Introduction

The purpose of the Apple Notification Center Service (ANCS) is to give Bluetooth accessories (that connect to iOS devices through a Bluetooth low-energy link) a simple and convenient way to access many kinds of notifications that are generated on iOS devices.

The ANCS is designed around three principles: simplicity, efficiency and scalability. As a result, accessories ranging from simple LEDs to powerful "companion" devices with large displays can find the service useful.

Dependencies

The ANCS has no dependencies, apart from the standard set of Generic Attribute Profile (GATT) sub-procedures. An accessory acting as a GATT client is free to access and use other services provided by the iOS device while using the ANCS.

Endianness and String Encoding

Unless specified otherwise, all numerical values transmitted through the ANCS shall be little endian.

Unless specified otherwise, all string values transmitted through the ANCS shall be composed of unicode characters encoded with UTF-8.

Terminology

The Apple Notification Center Service shall be referred to as the *ANCS* .

The publisher of the ANCS service (the iOS device) shall be referred to as the *Notification Provider (NP)* .

Any client of the ANCS service (an accessory) shall be referred to as a *Notification Consumer (NC)* .

A notification displayed on an iOS device in the iOS Notification Center shall be referred to as an *iOS notification* .

A notification sent by a GATT characteristic as an asynchronous message shall be referred to as a *GATT notification* .

The Apple Notification Center Service

The Apple Notification Center Service is a primary service whose service UUID is `7905F431-B5CE-4E99-A40F-4B1E122D00D0`.

Only one instance of the ANCS may be present on an NP. Due to the nature of iOS, the ANCS is not guaranteed to always be present. As a result, the NC should look for and subscribe to the Service Changed characteristic of the GATT service in order to monitor for the potential publishing and unpublishing of the ANCS at any time.

Service Characteristics

In its basic form, the ANCS exposes three characteristics:

- **Notification Source:** UUID `9FBF120D-6301-42D9-8C58-25E699A21DBD` (notifiable)
- **Control Point:** UUID `69D1D8F3-45E1-49A8-9821-9BBDFDAAD9D9` (writeable with response)
- **Data Source:** UUID `22EAC6E9-24D6-4BB5-BE44-B36ACE7C7BFB` (notifiable)

Support for the Notification Source characteristic is mandatory, whereas support for the Control Point characteristic and Data Source characteristic is optional.

Note: There may be more characteristics present in the ANCS than the three listed above. That said, an NC may ignore any characteristic it does not recognize.

Notification Source

The Notification Source characteristic is the characteristic upon which an NC is informed of:

- the arrival of a new iOS notification on the NP
- the modification of an iOS notification on the NP
- the removal of an iOS notification on the NP

GATT notifications may be delivered as soon as the NC subscribes to the Notification Source characteristic. As a result, the NC should be in a state where it can properly accept and process these messages before subscribing to this characteristic.

The format of GATT notifications delivered through the Notification Source characteristic is shown in Figure 2-1.

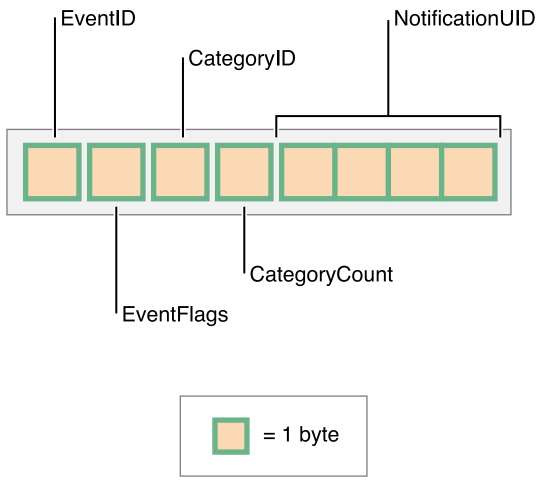


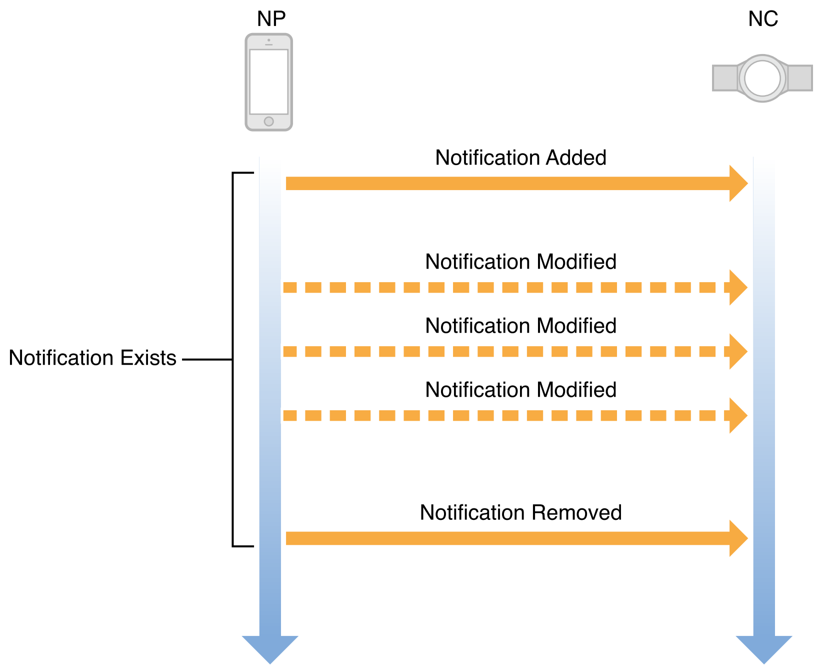
Figure 2-1 The format of a GATT notification delivered through a Notification Source characteristic

A GATT notification delivered through the Notification Source characteristic contains the following information:

- **EventID:** This field informs the accessory whether the given iOS notification was added, modified, or removed. The enumerated values for this field are defined in "EventID Values" (page 15).
- **EventFlags:** A bitmask whose set bits inform an NC of specificities with the iOS notification. For example, if an iOS notification is considered "important", the NC may want to display a more aggressive user interface (UI) to make sure the user is properly alerted. The enumerated bits for this field are defined in "EventFlags" (page 15).
- **CategoryID:** A numerical value providing a category in which the iOS notification can be classified. The NP will make a best effort to provide an accurate category for each iOS notification. The enumerated values for this field are defined in "CategoryID Values" (page 14).
- **CategoryCount:** The current number of active iOS notifications in the given category. For example, if two unread emails are sitting in a user's email inbox, and a new email is pushed to the user's iOS device, the value of CategoryCount is 3.
- **NotificationUID:** A 32-bit numerical value that is the unique identifier (UID) for the iOS notification. This value can be used as a handle in commands sent to the Control Point characteristic to retrieve more information about the iOS notification.

The lifetime of an iOS notification can be implicitly deduced through the sequence of Notification Source GATT notifications generated by the NP, as shown in Figure 2-2.

Figure 2-2 The lifetime of an iOS notification



Control Point and Data Source

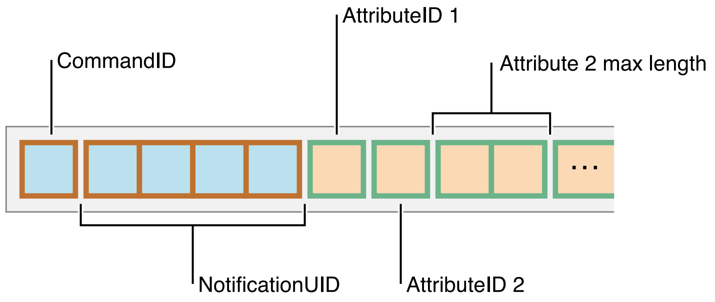
An NC may want to retrieve more information about an iOS notification, including its contents. The retrieval of these attributes is performed through the Control Point and Data Source characteristics.

An NC can issue a request to retrieve more information about an iOS notification by writing specific commands to the Control Point characteristic. If the write to the Control Point characteristic is successful, the NP will promptly respond to the request through a stream of GATT notifications on the Data Source characteristic.

Get Notification Attributes

The Get Notification Attributes command allows an NC to retrieve the attributes of a specific iOS notification. The format of a Get Notification Attribute command is shown in Figure 2-3.

Figure 2-3 The format of a Get Notification Attribute command

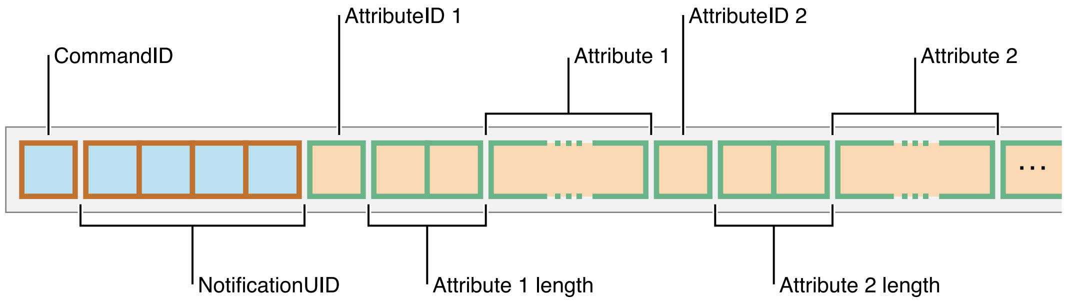


A Get Notification Attributes command contains the following information:

- **CommandID:** Should be set to `0` (`CommandIDGetNotificationAttributes`).
- **NotificationUID:** The 32-bit numerical value representing the UID of the iOS notification for which the client wants information.
- **AttributeIDs:** A list of attributes that the NC wants to retrieve. Some attributes may need to be followed by a 16-bit length parameter that specifies the maximum number of bytes of the attribute the NC wants to retrieve.

The format of a response to a Get Notification Attributes command is shown in Figure 2-4.

Figure 2-4 The format of a response to a Get Notification Attributes command



A response to a Get Notification Attributes command contains the following information:

- **CommandID:** Set to `0` (`CommandIDGetNotificationAttributes`).
- **NotificationUID:** The 32-bit numerical value that is the UID of the iOS notification the following attributes correspond to.

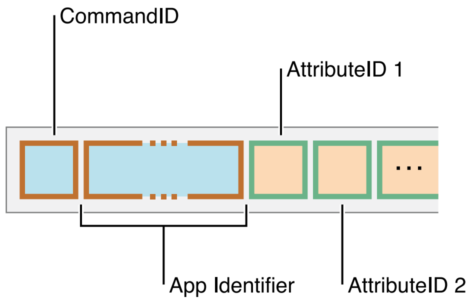
- **AttributeList:** A list of AttributeIDs/16-bit Length/Attribute tuples. An attribute is always a string whose length in bytes is provided in the tuple, but which is not NULL-terminated. If a requested attribute is empty or missing for the iOS notification, its length is set to `0`.

If the response is larger than the negotiated GATT Maximum Transmission Unit (MTU), it is split into multiple fragments by the NP. The NC must recompose the response by splicing each fragment. The response is complete when the complete tuples for each requested attribute has been received.

Get App Attributes

The Get App Attributes command allows an NC to retrieve attributes of a specific app installed on the NP. The format of the Get App Attributes command is shown in Figure 2-5.

Figure 2-5 The format of a Get App Attributes command

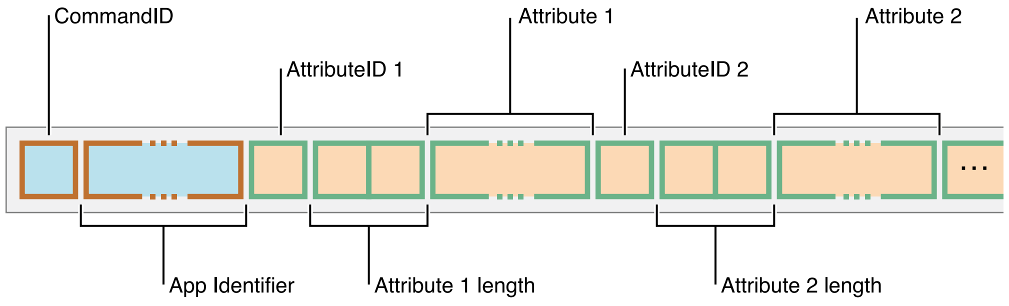


A Get App Attributes command contains the following information:

- **CommandID:** Should be set to 1 (`CommandIDGetAppAttributes`).
- **AppIdentifier:** The string identifier of the app the client wants information about. This string must be NULL-terminated.
- **AttributeIDs:** A list of attributes the NC wants to retrieve.

The format of a response to a Get App Attributes command is shown in Figure 2-6.

Figure 2-6 The format of a response to a Get App Attributes command



A response to a Get App Attributes command contains the following information:

- **CommandID:** Set to `1` (`CommandIDGetAppAttributes`).
- **AppIdentifier:** The string identifier of the app the following attributes correspond to. This string is NULL-terminated.
- **AttributeList:** A list of AttributeIDs/16-bit Length/Attribute tuples. An attribute is always a string whose length in bytes is provided in the tuple, but which is not NULL-terminated. If a requested attribute is empty or missing for the app, its length is set to `0`.

As with a response to a Get Notification Attributes command, if the response to a Get App Attributes command is larger than the negotiated GATT Maximum Transmission Unit (MTU), it is split into multiple fragments by the NP. The NC must recompose the response by splicing each fragment. The response is complete when the complete tuples for each requested attribute has been received.

Sessions

An ANCS session begins when an NC subscribes to the Notification Source characteristic on an NP and ends when the NC either unsubscribes from the same characteristic or disconnects from the NP. Because the ANCS is not designed to be a complete synchronization service, it does not keep track of state across sessions. As a result, all identifiers (such as NotificationUID and AppIdentifier) and all data exchanged between an NC and an NP are valid only within a particular session.

When a particular session ends, the NC should remove any identifiers and data it gathered and stored during the session. When a new session begins, the NP does its best to inform the NC of any existing iOS notifications on the system. The NC can use this information to build a model to use for the remainder of the session.

Attribute Fetching and Caching

It is strongly recommended for an NC to fetch attributes only as needed and possibly in response to user actions. For example, if an NC chooses to display active iOS notifications in a simple list, and to show only details about a specific iOS notification when selected by the user, then the retrieval of this iOS notification's attributes can be triggered lazily.

During a session, it is strongly recommended that an NC build a cache of App Attributes for each app identifier it encounters. Building this cache allows the NC to avoid retrieving the same immutable App Attributes multiple times—saving time and preserving battery.

Error Codes

When writing to the Control Point characteristic, an NC may receive the following ANCS-specific error codes:

- **Unknown command** (`0xA0`): The commandID was not recognized by the NP.
- **Invalid command** (`0xA1`): The command was improperly formatted.
- **Invalid parameter** (`0xA2`): One of the parameters (for example, the NotificationUID) does not refer to an existing object on the NP.

If the NP replies with an error, it will not generate any GATT notification on the Data Source characteristic for the corresponding command.

Example Diagrams

The following two figures show examples of two common interactions between an NP and an NC. Figure 2-7 shows the typical sequence of commands and responses needed to set up the ANCS on an NC. Figure 2-8 (page 13) shows the typical sequence of commands and responses needed to get more information about an iOS notification in order to display it on an NC.

Figure 2-7 Service setup example

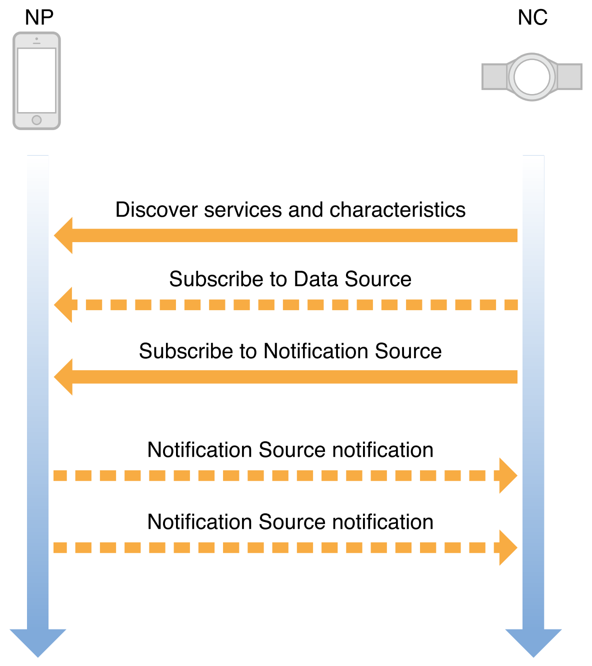
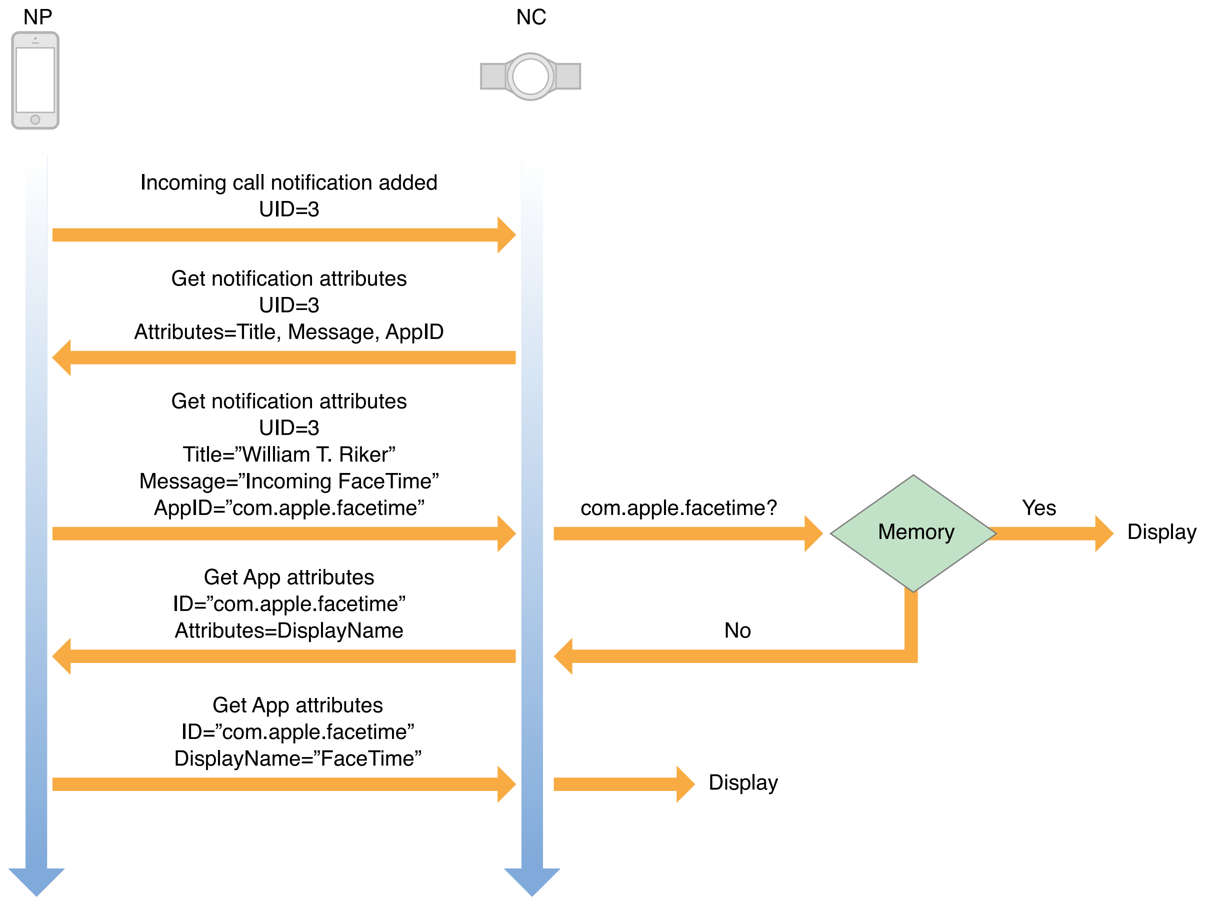

NP
NC
Discover services and characteristics
Subscribe to Data Source
Subscribe to Notification Source
Notification Source notification
Notification Source notification

Figure 2-8 Notification attribute retrieval example



Appendix

The following tables list important values used in the ANCS.

CategoryID Values

Table 3-1 CategoryID values

`CategoryIDOther`	= 0,
`CategoryIDIncomingCall`	= 1,
`CategoryIDMissedCall`	= 2,
`CategoryIDVoicemail`	= 3,
`CategoryIDSocial`	= 4,
`CategoryIDSchedule`	= 5,
`CategoryIDEmail`	= 6,
`CategoryIDNews`	= 7,
`CategoryIDHealthAndFitness`	= 8,
`CategoryIDBusinessAndFinance`	= 9,
`CategoryIDLocation`	= 10,
`CategoryIDEntertainment`	= 11,
Reserved `CategoryID` values	= 12–255

EventID Values

Table 3-2 EventID values

`EventIDNotificationAdded`	= 0,
`EventIDNotificationModified`	= 1,
`EventIDNotificationRemoved`	= 2,
Reserved `EventID` values	= 3–255

EventFlags

Table 3-3 EventFlags

`EventFlagSilent`	= (1 << 0),
`EventFlagImportant`	= (1 << 1),
Reserved `EventFlags`	= (1 << 2)–(1 << 7)

CommandID Values

Table 3-4 CommandID values

`CommandIDGetNotificationAttributes`	= 0,
`CommandIDGetAppAttributes`	= 1,
Reserved `CommandID` values	= 2–255

NotificationAttributeID Values

Table 3-5 NotificationAttributeID values

`NotificationAttributeIDAppIdentifier`	= 0,

`NotificationAttributeIDTitle`	= 1, (Needs to be followed by a 2-bytes max length parameter)
`NotificationAttributeIDSubtitle`	= 2, (Needs to be followed by a 2-bytes max length parameter)
`NotificationAttributeIDMessage`	= 3, (Needs to be followed by a 2-bytes max length parameter)
`NotificationAttributeIDMessageSize`	= 4,
`NotificationAttributeIDDate`	= 5,
Reserved `NotificationAttributeID` values	= 6–255

Note: The format of the `NotificationAttributeIDMessageSize` constant is a string that represents the integral value of the message size. The format of the `NotificationAttributeIDDate` constant is a string that uses the Unicode Technical Standard (UTS) #35 date format pattern `yyyyMMdd'T'HHmmSS`. The format of all the other constants in Table 3-5 are UTF-8 strings.

AppAttributeID Values

Table 3-6 AppAttributeID values

`AppAttributeIDDisplayName`	= 0,
Reserved `AppAttributeID` values	= 1–255

Document Revision History

This table describes the changes to *Apple Notification Center Service (ANCS) Specification* .

Date	Notes
2013-10-22	Added information about an ANCS session. Added the "Sessions" (page 10) section, which describes an ANCS session.
2013-09-18	Changes made for version v1.0: Added format information for the `NotificationAttributeID` constants in Table 3-5 (page 15).
2013-11-21	Made format and value changes for Version v0.2. Changed the format of GATT notifications delivered through the Notification Source characteristic, as shown in Figure 2-1 (page 6) and the bulleted-list that follows. Updated the `CategoryID` values in Table 3-1 (page 14). Added reserved values for the `CategoryID`, `EventID`, `EventFlags`, `CommandID`, `NotificationAttributeID`, and `AppAttributeID` attributes in "Appendix" (page 14). New document that describes the specification for building Bluetooth accessories that communicate with Apple Notification Center Service (ANCS).