FIDO NFC Protocol Specification v1.0

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Abstract

The FIDO U2F framework was designed to be able to support multiple authenticator form factors. This document describes the communication protocol with authenticators over Near Field Communication (NFC).

Status of This Document

This section describes the status of this document at the time of its publication. Other documents may supersede this document. A list of current FIDO Alliance publications and the latest revision of this technical report can be found in the FIDO Alliance specifications index at https://www.fidoalliance.org/specifications/.

This document was published by the FIDO Alliance as a Implementation Draft. This document is intended to become a FIDO Alliance Proposed Standard. If you wish to make comments regarding this document, please Contact Us. All comments are

welcome.

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1. Notation

Type names, attribute names and element names are written as `code`.

String literals are enclosed in “”, e.g. “UAF-TLV”.

In formulas we use “|” to denote byte wise concatenation operations.

DOM APIs are described using the ECMAScript [ECMA-262] bindings for WebIDL [WebIDL].

UAF specific terminology used in this document is defined in [FIDOGlossary].

1.1 Key Words

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119].

2. Protocol

The general protocol between a FIDO client and authenticator over NFC is as follows:

1. Client sends an applet selection command
2. Authenticator replies with success
3. Client sends a command for an operation (register / authenticate)
4. Authenticator replies with response data or error

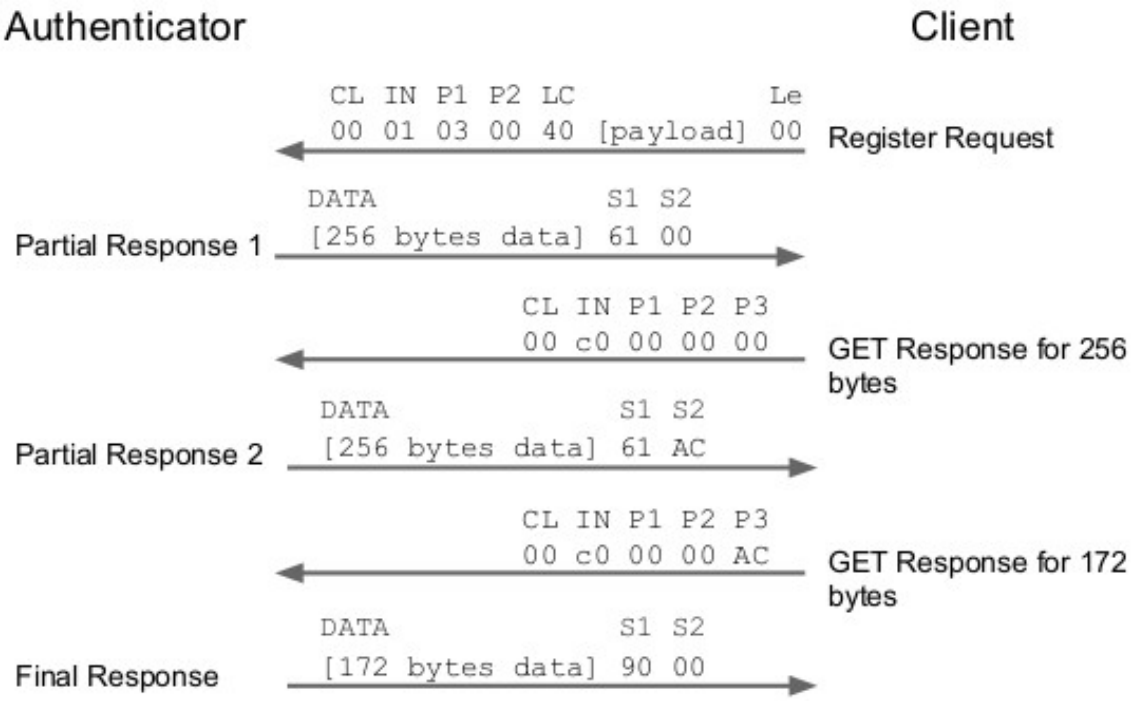
3. Framing

The NFC protocol SHALL NOT use any additional framing (unlike the USB HID protocol, for example). Instead, messages sent to an NFC authenticator SHALL follow the U2F raw message format as defined in [U2FRAWMESSAGES] in the bibliography.

4. APDU Length

Some responses may not fit into a short APDU, for this reason U2F authenticators MUST respond in the following way:

- If the request was of extended length (*i.e.,* had 3 length bytes), the authenticator MUST respond using the extended length APDU format.
- If the request was not of extended length (*i.e.,* had 1 length byte), the authenticator MUST respond using ISO 7816-4 APDU chaining (see Section A.4). See below for an example:



5. Applet selection

A FIDO client SHALL always send an applet selection command to begin interaction with a FIDO authenticator via NFC. The structure of the applection command SHALL follow the same APDU structure as in the raw message format mentioned above.

The FIDO U2F AID consists of the following fields:

Field	Value
RID	0xA000000647
AC	0x2F
AX	0x0001

As a result, the command for selecting the applet using the FIDO U2F AID is:

Field	Value
CLA	0x00
INS	0xA4
P1	0x04
P2	0x00
LEN	0x08
DATA	0xA0000006472F0001

In response to the applet selection command, the FIDO authenticator SHALL reply with its version string in the successful response. In this writing, the version string is "U2F_V2", hence a successful response to the applet selection command would consist of the following bytes:

```
0x5532465F56329000
```

6. Implementation Considerations

Some NFC authenticators may be passively powered -- drawing all of their power from the NFC field. If the authenticator does not power up quick enough or has insufficient power, a poor user experience is likely to occur.

7. Bibliography

[U2FRAWMESSAGES] Dirk Balfanz, Jakob Ehrensvard. FIDO U2F Raw Message Formats, Aug 2014

A. References

A.1 Normative references

[ECMA-262]
ECMAScript Language Specification, Edition 5.1. June 2011. URL: http://www.ecma-international.org/publications/standards/Ecma-262.htm

[FIDOGlossary]
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[RFC2119]
S. Bradner. *Key words for use in RFCs to Indicate Requirement Levels*. March 1997. Best Current Practice. URL: https://tools.ietf.org/html/rfc2119

[WebIDL]
Cameron McCormack. *Web IDL*. 19 April 2012. W3C Candidate Recommendation. URL: http://www.w3.org/TR/WebIDL/