Transmission of IPv6 Packets over Near Field Communication

draft-ietf-6lo-nfc-10

Younghwan Choi (ETRI),
Y-G. Hong (ETRI), J-S. Youn (DONG-EUI Univ.),
D-K. Kim (KNU), J-H. Choi (Samsung)

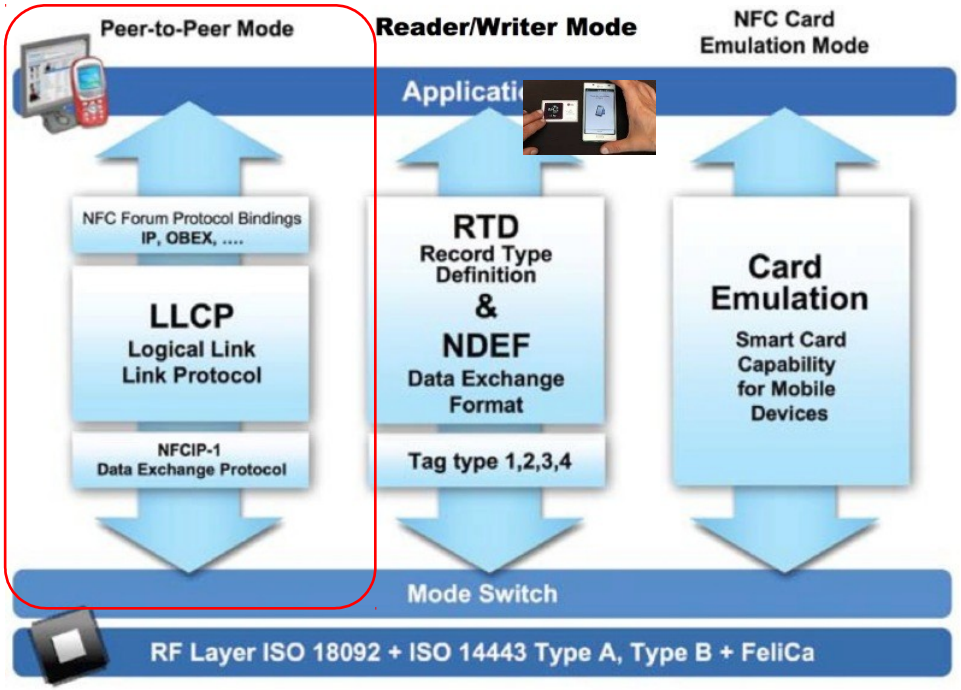
6lo WG Meeting@IETF102 – Montreal

2018. 7. 17.

What is Near Field Communication (NFC) ?

- NFC technology enables (Source: NFC Forum)
  - simple and safe two-way interactions between electronic devices, allowing consumers to perform contactless transactions, access digital content, and connect electronic devices with a single touch.
- NFC Functions

  (Source: NFC forum)



History and status of IPv6-over-NFC

- **WG Adoption: draft-ietf-6lo-nfc-00** (Mar 03, 2015)
  - Update Stateless address autoconfiguration

- **1st ~ 5th Revision**
  - **ver-01** (July, 2015)
    - MAC PDU size and MTU
    - SLAAC and IPv6 link local address
    - Fragmentation and Reassembly
  - **ver-02** (Oct, 2015) @Buenos Aires
    - Dispatch Header (added)
    - Header Compression (modified for GHC)
  - **ver-03** (Apr. 2016) @Berlin, DE
    - Some typos fixed
    - Section 7. Security Considerations
  - **Ver-04** (Jul. 2016)
    - NFC FAR-related sentence updated
    - Related to "multi-hop topologies"
  - **ver-05** (Oct. 2016) @Seoul, KR
    - Feedback from NFC forum
    - IID generation (feedback from Dave)

- **6th~9th Revision for WGLC**
  - **ver-06** (by Dave Thaler, Sep. 2016)
    - IID generation (2nd rev.)
  - **ver-07** (by James Woodyett Jun. 2017)
    - IID generation (4th rev.) ->RFC7217
    - Neighbor Discovery -> Reworded
  - **Ver-08,-09** (by Pascal Thubert, Nov. 2017
    - Neighbor Discovery -> Reworded
- **In WG Last Call** (Mar. 6, 2018~)
- **No more feedback from NFC forum** (since Jan. 2017)
- **New Shepherd**: Samita Chakrabarti
- **Shepherd Comments** (July 2018)
- **Rev. ver-10** (to be published asap)
  - Editorial comments (RFC2119)
  - Revised texts for clarification about NFC MTU & FAR, ND, Security

Shepherd's Comment #1

- In § 3.4 (MTU of NFC)

announce a larger MIU for a data link connection by transmitting an MIUX extension parameter within the information field. If no MIUX parameter is transmitted, the default MIU value of 128 MUST be used. Otherwise, the MTU size in NFC LLCP SHOULD be calculated from the MIU value as follows:

MIU = 128 + MIUX.

Added

According to [LLCP-1.3], Figure 2 shows an example of the MIUX parameter TLV. Each of TLV Type and TLV Length field is 1 byte, and TLV Value field is 2 bytes.

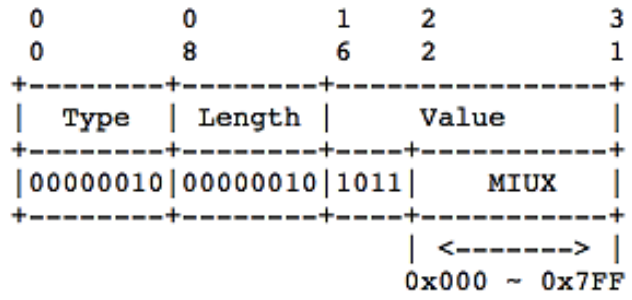


Figure 2: Example of MIUX Parameter TLV

When the MIUX parameter is encoded as a TLV option, the TLV Type field MUST be 0x02 and the TLV Length field MUST be 0x02. The MIUX parameter MUST be encoded into the least significant 11 bits of the TLV Value field. The unused bits in the TLV Value field MUST be set to zero by the sender and ignored by the receiver. A maximum value of the TLV Value field can be 0x7FF, and a maximum size of the MTU in NFC LLCP is 2176 bytes including the 128 byte default of MIU.

Shepherd's Comment #2

- In § 4.2 (Link Model)

In the case of BT-LE, the Logical Link Control and Adaptation Protocol (L2CAP) supports fragmentation and reassembly (FAR) functionality; therefore, the adaptation layer for IPv6 over BT-LE does not have to conduct the FAR procedure. The NFC LLCP, in contrast, does not support the FAR functionality, so IPv6 over NFC needs to consider the FAR functionality, defined in [RFC4944]. However, the MTU on an NFC link can be configured in a connection procedure and extended enough to fit the MTU of IPv6 packet (see Section 4.8).

Added

This document does NOT RECOMMEND using FAR over NFC link due to simplicity of the protocol and implementation. In addition, the implementation for this specification SHOULD use MIUX extension to communicate the MTU of the link to the peer as defined in Section 3.4.

The NFC link between two communicating devices is considered to be a point-to-point link only. Unlike in BT-LE, an NFC link does not support a star topology or mesh network topology but only direct connections between two devices. Furthermore, the NFC link layer does not support packet forwarding in link layer. Due to this characteristics, 6LoWPAN functionalities, such as addressing and auto-configuration, and header compression, need to be specialized into IPv6 over NFC.

Shepherd's Comment #3

- In § 4.8 (FAR)

NFC provides fragmentation and reassembly (FAR) for payloads from 128 bytes up to 2176 bytes as mentioned in Section 3.4. The MTU of a general IPv6 packet can fit into a single NFC link frame. Therefore, the FAR functionality as defined in RFC 4944, which specifies the fragmentation methods for IPv6 datagrams on top of IEEE 802.15.4, MAY NOT be required as the basis for IPv6 datagram FAR on top of NFC. The NFC link connection for IPv6 over NFC MUST be configured with an equivalent MIU size to fit the MTU of IPv6 Packet. If NFC devices support extension of the MTU, the MIUX value is 0x480 in order to fit the MTU (1280 bytes) of a IPv6 packet.

Simplified

IPv6-over-NFC fragmentation and reassembly (FAR) for the payloads is NOT RECOMMENDED in this document as discussed in Section 3.4. The NFC link connection for IPv6 over NFC MUST be configured with an equivalent MIU size to fit the MTU of IPv6 Packet. If NFC devices support extension of the MTU, the MIUX value is 0x480 in order to fit the MTU (1280 bytes) of a IPv6 packet.

Shepherd's Comment #4

- In § 7 (Security Considerations)

When interface identifiers (IIDs) are generated, devices and users are required to consider mitigating various threats, such as correlation of activities over time, location tracking, device-specific vulnerability exploitation, and address scanning.

IPv6-over-NFC is, in practice, not used for long-lived links for big size data transfer or multimedia streaming, but used for extremely short-lived links (i.e., single touch-based approaches) for ID verification and mobile payment. This will mitigate the threat of correlation of activities over time.

IPv6-over-NFC uses an IPv6 interface identifier formed from a "Short Address" and a set of well-known constant bits (such as padding with '0's) for the modified EUI-64 format. However, the short address of NFC link layer (LLC) is not generated as a physically permanent value but logically generated for each connection. Thus, every single touch connection can use a different short address of NFC link with an extremely short-lived link. This can mitigate address scanning as well as location tracking and device-specific vulnerability exploitation.

Thus this document does not RECOMMEND sending NFC packets over the Internet or any unsecured network.

If there is a compelling reason to send/receive the IPv6-over-NFC packets over the unsecured network, the deployment SHOULD make sure that the packets are sent over secured channels. The particular Security mechanisms are out of scope of this document.

Added

Any Questions & Comments?