Transmission of IPv6 Packets over Near Field Communication

draft-ietf-6lo-nfc-11 & 12

(Since the reviews of INTdir & IoTdir)

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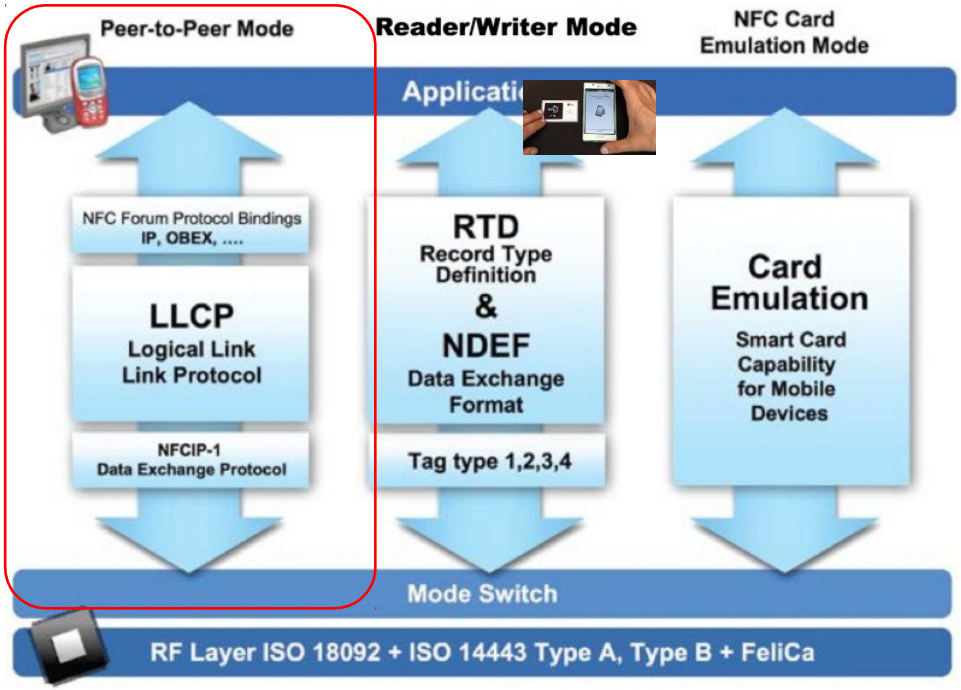
What is Near Field Communication (NFC) ?

- 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)

- **Revisions 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
- **No more feedback from NFC forum** (since Jan. 2017)
- **WGLC** (Mar. 2018~Jul. 2018)
  - **New Shepherd**: Samita Chakrabarti
  - **Shepherd Comments** (July 2018)
- **Rev. ver-10 from the Shepherd reviews**
  - Editorial comments (RFC2119)
  - Revised texts for clarification about NFC MTU & FAR, ND, Security
- **Rev. ver-11 & -12 (Oct. ~ Nov. 2018)**

(Resolved Reviews from IoTdir & INTdir)

INTdir's Review (Sheng Jiang)

- Review result: Ready with Nits ␣ -11 version is OK for me
  - 'ECMA-340' is defined in reference section, but not quoted in the document.

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1.  Introduction

   NFC is a set of short-range wireless technologies, typically
   requiring a distance of 10 cm or less.  NFC operates at 13.56 MHz on
   ISO/IEC 18000-3 air interface and at rates ranging from 106 kbit/s to
   424 kbit/s [ECMA-340].  NFC always involves an initiator and a
   target; the initiator actively generates an RF field that can power a
   passive target.  This enables NFC targets to take very simple form
   factors such as tags, stickers, key fobs, or cards that do not
   require batteries.  NFC peer-to-peer communication is possible,
   provided both devices are powered.  NFC builds upon RFID systems by
   allowing two-way communication between endpoints, where earlier
   systems such as contactless smart cards were one-way only.  It has
   been used in devices such as mobile phones, running Android operating
   system, named with a feature called "Android Beam".  In addition, it
   is expected for the other mobile phones, running the other operating
   systems (e.g., iOS, etc.) to be equipped with NFC technology in the
   near future.
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IoTdir's Review (Brian Haberman)

- Review result: On the Right Track
  - Every changes of -11 & -12 is OK

- § 3.4
  - Use of MIUX : SHOULD
    - MUST

- § 4.8
  - Required a scenario ab out the lack of the MIU X

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3.4.  MTU of NFC Link Layer

   As mentioned in Section 3.2, an IPv6 packet MUST be passed down to
   LLCP of NFC and transported to an Unnumbered Information Protocol
   Data Unit (UI PDU) and an Information Field in Protocol Data Unit (I
   PDU) of LLCP of the NFC-enabled peer device.

   The information field of an I PDU contains a single service data
   unit.  The maximum number of octets in the information field is
   determined by the Maximum Information Unit (MIU) for the data link
   connection.  The default value of the MIU for I PDUs is 128 octets.
   The local and remote LLCs each establish and maintain distinct MIU
   values for each data link connection endpoint.  Also, an LLC MAY
   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 MUST be calculated from the MIU
   value as follows:
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4.8.  Fragmentation and Reassembly

   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.  The MIUX value is
   0x480 in order to fit the MTU (1280 bytes) of a IPv6 packet if NFC
   devices support extension of the MTU.  However, if the NFC device
   does not support extension, IPv6-over-NFC uses FAR with default MIU
   (128 bytes), as defined in [RFC4944].
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IoTdir's Review (Brian Haberman)

- § 4.3
  - Required some guidance on how the **Network_ID** parameter of f() can be used to increase the randomness of the generated IID

4.3. Stateless Address Autoconfiguration

An NFC-enabled device (i.e., 6LN) performs stateless address autoconfiguration as per [RFC4862]. A 64-bit Interface identifier (IID) for an NFC interface is formed by utilizing the 6-bit NFC LLCP address (see Section 3.3). In the viewpoint of address configuration, such an IID SHOULD guarantee a stable IPv6 address because each data link connection is uniquely identified by the pair of DSAP and SSAP included in the header of each LLC PDU in NFC.

Following the guidance of [RFC7136], interface identifiers of all unicast addresses for NFC-enabled devices are 64 bits long and constructed by using the generation algorithm of random (but stable) identifier (RID) [RFC7217] (see Figure 4).

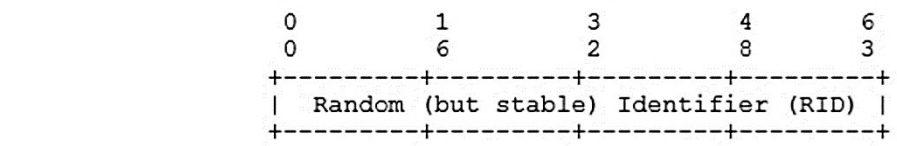

Figure 4: IID from NFC-enabled device

The RID is an output which MAY be created by the algorithm, F() with input parameters. One of the parameters is Net_IFace, and NFC Link Layer address (i.e., SSAP) MAY be a source of the NetIFace parameter. The 6-bit address of SSAP of NFC is easy and short to be targeted by attacks of third party (e.g., address scanning). The F() can provide secured and stable IIDs for NFC-enabled devices. In addition, an optional parameter, Network_ID MAY be used to increase the randomness of the generated IID.

IoTdir's Review (Brian Haberman)

- § 4.5
  - Required some explanations for **6LR & 6LBR behaviors** of a NFC device

4.5. Neighbor Discovery

Neighbor Discovery Optimization for 6LoWPANs ([RFC6775]) describes the neighbor discovery approach in several 6LoWPAN topologies, such as mesh topology. NFC does not support a complicated mesh topology but only a simple multi-hop network topology or directly connected peer-to-peer network. Therefore, the following aspects of RFC 6775 are applicable to NFC:

- o When an NFC-enabled device (6LN) is directly connected to a 6LBR, an NFC 6LN MUST register its address with the 6LBR by sending a Neighbor Solicitation (NS) message with the Address Registration Option (ARO) and process the Neighbor Advertisement (NA) accordingly. In addition, if DHCPv6 is used to assign an address, Duplicate Address Detection (DAD) MAY not be required.

⋮

- o For sending Router Solicitations and processing Router Advertisements, the NFC 6LNs MUST follow Sections 5.3 and 5.4 of [RFC6775].

- o When a NFC device becomes a 6LR or a 6LBR, the NFC device MUST follow Section 6 and 7 of [RFC6775].

IoTdir's Review (Brian Haberman)

- § 5.
  - Required explanations for technical details

5. Internet Connectivity Scenarios

As two typical scenarios, the NFC network can be isolated and connected to the Internet.

5.1. NFC-enabled Device Connected to the Internet

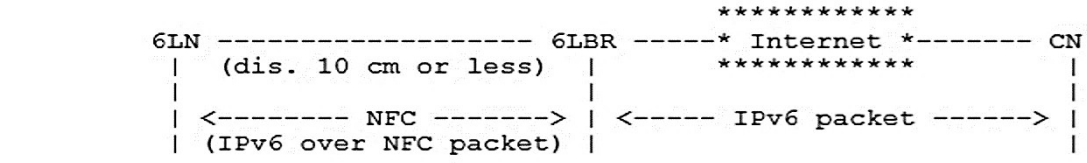

Figure 10: NFC-enabled device network connected to the Internet

Two or more LNs MAY be connected with a 6LBR, but each connection uses a different subnet. The 6LBR is acting as a router and forwarding packets between 6LNs and the Internet. Also, the 6LBR MUST ensure address collisions do not occur and forwards packets sent by one 6LN to another.

5.2. Isolated NFC-enabled Device Network

In some scenarios, the NFC-enabled device network may transiently be a simple isolated network as shown in the Figure 11.

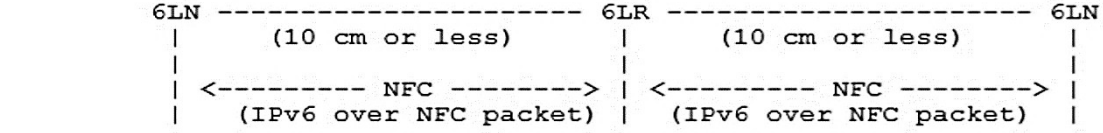

Figure 11: Isolated NFC-enabled device network

In mobile phone markets, applications are designed and made by user developers. They may image interesting applications, where three or more mobile phones touch or attach each other to accomplish outstanding performance. In an isolated NFC-enabled device network, when two or more LRs MAY be connected with each other, and then they are acting like routers, the 6LR MUST ensure address collisions do not occur.

Any Questions & Comments?