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Use Cases and API Extension for Source IP address selection
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Abstract

This draft specifies and analyzes the expected cases regarding the selection of a proper source IP address and address type based on the application features over a distributed mobility management (DMM) network. It also provides available selection methods in the specified scenarios.

Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on August 26, 2015.

Table of Contents

1. Introduction

In [draft-yegin-dmm-ondemand-mobility], it makes an attempt to classify the source IP address type for a mobile host, depending on the need of IP session continuity and/or IP address reachability. Therefore, three types of IP addresses were defined with regard to the mobility management; fixed IP address, sustained IP address, and nomadic IP address.

After introducing the three types of IP addresses, it proposed a solution for the applications running on the mobile host to indicate whether they need IP session continuity or IP address reachability.

When an application tries to get an IP address, it may require or prefer specific type of IP address or non-specific (any) type of it to the IP stack. The proposed approach aims to obtain a proper IP

address corresponding to a specific address requirement, whereas the former approaches [RFC5014][RFC6724] operate on the available set of IP addresses, based on a preference.

But even in the specific type of IP address request, there may be a need to indicate further requirements such as which IP address is more preferred among already configured multiple IP addresses based on the same type requested. Such a situation is easily met over a DMM network environment for some reasons such as QoS or Policy, as a mobile host is supposed to obtain a new prefix at each new mobility access router.

Aligned with the needs, this draft specifies and describes expected use cases and proposes required extensions to support the given use cases. This draft is based on the [draft-yegin-dmm-ondemand-mobility] that proposed the three types of IP addresses with regard to the mobility management.

2. Use Cases

We specify and analyse expected use cases when an application session is initiated. Furthermore, we organize the use cases according to the requested IP address type and additional requirement.

2.1. When an application does not need to request a specific IP address type and requirement

Applications such as a text-based web browsing or information-centric service, e.g. weather and stock information may belong to this category. The suggested flag, IPV6_REQ_NOMADIC_IP, defined in [draft-yegin-dmm-ondemand-mobility] is used for expressing its preference to the IP stack. But it does not require a further signaling between the mobile host and the network, as a nomadic IP address is obtained by default whenever the mobile host is attached at an (mobility) access router. That is, obtaining this type of IP address could be orthogonal with the IP request by the application. However, it is only valid while the mobile host stays at the attached mobility access router.

2.2. When an application needs to request specific IP address type and requirement

This category is for an application requiring IP session continuity with different granularity of IP address reachability. This case is again divided by three sub-cases with regard to IP address type availability and/or address selection, if needed. But the request of

nomadic IP address is excluded in following cases, since it is given by default as described in Section 3.1.

2.2.1. Case 1: there is no available IP address based on a requested type in the IP stack.

For resource-efficiency mobility support, the dynamic configuration of a sustained IP or fixed IP address can be preferred. Since there is a nomadic IP address configured in the IP stack, when a new type of IP address is needed, additional support mechanism is needed to express the preference of the application.

In this case, the IP stack triggers one of the IP address configuration mechanisms (e.g. DHCPv6, SLAAC, or IP mobility protocols).

2.2.2. Case 2: there are one or more IP addresses based on a requested type in the IP stack, and no selection preference by the application.

The mobile host already has the IP addresses following a requested IP address type by the application. In this case, the default address selection rules will apply [RFC6724], i.e. scope preference and longest prefix matching. The best-matched IP address among them will be selected.

2.2.3. Case 3: there are one or more IP addresses based on a requested type in the IP stack, but there is a selection preference by the application.

In case of fixed IP address, the default address selection rule can simply be applied so that one IP address can be selected.

In case of sustained IP address, taking into account the benefits of on-demand mobility from several DMM solution proposals, it is highly preferred for a mobile host to use a sustained IP address based on the prefix from a currently attached router.

By following the default address selection algorithm, only the best-matched IP address will be selected, which may not be "the best" in terms of optimal routing and network resource spent. Indicating the host's preference will be required (See Section 4 for the proposed flag).

For instance, suppose that an MN has already a sustained IP address (PrefA::) obtained in the IP stack when it stayed at network A and now it moved to network B. We also suppose that another application

wants to configure a sustained IP address, but based on a new prefix from currently attached network for optimal routing. Without any indication by the application, the existing sustained IP address (PrefA::) will be selected and the session will be anchored at network A, which may lead to inefficiency to application performance and network resource due to sub-optimal routing.

3. Indications for expressing requirements

When an application prefers a new IP address of the requested IP address type, additional indication flags should be delivered through the socket API interface.

3.1. Suggested indication flag

IPV6_PREFER_SRC_NEW

/* Prefer a new IP address based on a requested IP address type as source */

This flag is proposed to be added in RFC5014, and aims to express the preference for enabling differentiated per-flow anchoring. The use of the flag can be combined together with the three types of IP address defined in [draft-yegin-dmm-ondemand-mobility]. It is in equal degree and orthogonal with the defined flag-set in IPv6 socket API for source address selection [RFC5014].

4. Security Considerations

T.B.D.

5. IANA Considerations

T.B.D.

6. References

6.1. Normative References

[RFC5014] E. Nordmark, S. Chakrabarti, and J. Laganier, "IPv6 Socket API for Source Address Selection," IETF RFC 5014, Sep. 2007.

[RFC6724] D. Thaler, R. Draves, A. matsumoto, and T. Chown, "Default Address Selection for Internet Protocol Version 6 (IPv6)," IETF RFC 6724, Sep. 2012.

[draft-yegin-dmm-ondemand-mobility] A. Yegin, K. Kweon, J. Lee, and J. Park, "On Demand Mobility Management," draft-yegin-dmm-ondemand-mobility-02, Jul. 2014.

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