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Dynamic Prefix Allocation for
Network Mobility for Mobile IPv4 (NEMOv4)

Abstract

The base Network Mobility for Mobile IPv4 (NEMOv4) specification defines extensions to Mobile IPv4 for mobile networks. This specification defines a dynamic prefix allocation mechanism for NEMOv4.

Status of This Memo

This is an Internet Standards Track document.

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1. Introduction

The base NEMOv4 specification [RFC5177] defines extensions to Mobile IPv4 [RFC5944] for mobile networks. This specification adds support for dynamic allocation of mobile prefixes by the home agent.

2. Requirements Notation

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].

3. Dynamic Mobile Prefix Allocation

The following extension is defined according to this specification.

3.1. Mobile Client Considerations

According to this specification, the Prefix field of the Mobile Network Request extension MUST be set to zero to indicate that the Mobile Router requests mobile network prefix(es) be assigned to it by the home agent. In this case, the Mobile Router MAY set the prefix length field of such extensions to zero or to a length of its choice as a hint to the home agent. According to this specification, Mobile Network Request extensions with the Prefix field set to zero MAY be included in a registration request message either during initial registration or during a subsequent registration.

When a Mobile Router receives a registration reply, it MUST process it as defined in Mobile IPv4 [RFC5944] and [RFC5177]. If one or more network acknowledgement extensions are included with the Code field set to "Success", the Mobile Router SHOULD treat the prefixes in the corresponding Prefix fields as allocated prefixes and create the appropriate bindings as defined in [RFC5177].

In response to a registration request with a Mobile Network Request extension with the Prefix field set to zero, if a Mobile Router receives a registration reply with a network acknowledgement extension including Code field set to 1 "invalid prefix", it may use it as a hint that the home agent does not support dynamic prefix allocation.

3.2. Home Agent Considerations

A home agent receiving a Mobile Network Request extension with the Prefix field set to zero MAY return a Mobile Network Acknowledgement extension [RFC5177] with the Prefix field set to the prefix allocated to the Mobile Router. The length of that prefix is at the discretion of the home agent. The home agent MAY take into account the prefix length hint if one is included in the Mobile Network Request extension. Once the home agent allocates a prefix, it MUST maintain the prefix registration table as defined in [RFC5177]. Alternatively, the home agent MAY return a Mobile Network Acknowledgement extension with the Code field set to one of the negative codes defined in [RFC5177].

Dynamic mobile prefix allocation, as defined in this specification, MAY be combined with dynamic home address allocation, as defined in [RFC5177]. In other words, the home address field of the registration request message MAY be set to zero while the message also includes one or more Mobile Network Request extensions with the Prefix field also set to zero.

Once the home agent allocates a prefix, it MUST maintain the prefix registration table as defined in [RFC5177]. The lifetime of the allocated prefix will be equal to the lifetime of the binding cache entry. The Mobile Router may request for multiple mobile network prefixes to be assigned by the home agent. For a Mobile Network Prefix for which the assignment was unsuccessful, the Code field in the corresponding Mobile Network Acknowledgement extension should be set to 4 (MOBNET_UNASSIGNED).

For dynamic prefix allocation, the Mobile Router's home address MAY be used to identify the client if it is not set to zero. Otherwise, as defined in the Network Access Identifier (NAI) extension [RFC2794] of Mobile IPv4 [RFC2794], the NAI extension needs to be included in the registration request, in which case the same extension SHOULD be used to identify the Mobile Router for prefix allocation purposes.

4. Security Considerations

This specification operates in the security constraints and requirements of Mobile IPv4 [RFC5944], NAI [RFC2794], and [RFC5177].

Home agent implementations SHOULD take steps to prevent address exhaustion attacks. One way to limit the effectiveness of such an attack is to limit the number and size of prefixes any one Mobile Router can be allocated.

5. IANA Considerations

A new value has been assigned in the Mobile Network Acknowledgement Extension registry: 4 - Home Agent cannot assign a mobile network prefix (MOBNET_UNASSIGNED).

6. Acknowledgements

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7. Normative References

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