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Deployment Models for Distributed Mobility Management
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Abstract

This document presents available deployment models for distributed mobility management networks, consisted of mobility management functions: anchoring function, location management, and forwarding management functions defined in RFC7429. Some of the functions are modified on a need to allow potential deployment scenarios support.

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 September 22, 2016.

Table of Contents

1. Introduction

This draft presents available deployment models consisted of mobility management functions defined in [RFC7429], for distributed mobility management (DMM) networks. With the mobility management functions in [RFC7429], i.e. anchor function (AF), location management function (LM), and forwarding management function (FM), centralized mobility management solutions such as Mobile IP (MIP), Hierarchical Mobile IPv6 (HMIPv6), and Proxy Mobile IPv6 (PMIPv6) have been described and decomposed by functional aspects, trying to analyze gaps from the requirements for DMM [RFC7333]. In this draft, with the functions, we sketch and describe the deployment models for DMM networks, accommodating the possible DMM solutions as well as providing an insight to understand the potentials of DMM. We also describe where the presented deployment models are substantiated with solution proposals submitted in DMM WG.

2. Conventions and Terminology

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].

Following terms come from [RFC7429] with modified definition in the AF.

Anchoring Function (AF) is defined as a combined control-plane and data-plane functions. For the control-plane function, it allocates an IP address, i.e., Home Address (HoA), or prefix, i.e., Home Network Prefix (HNP) a mobile node, topologically anchored by the advertising node. That is, the anchor node is able to advertise a connected route into the routing infrastructure for the allocated IP prefixes. It also takes a data-plane anchor point where packets destined to the IP address or IP prefix allocated by the anchor should pass through.

The AF can be deployed in a decoupled way, i.e. separated control plane and data plane. In that case, following two terms - AF Control Plane (AF-CP) and AF Data Plane (AF-DP) - are used. AF-CP is responsible of allocating the IP address and advertising a connected route for an associated terminal while AF-DP is responsible of anchoring received data packets destined to the IP address allocated by the anchor.

Internetwork Location Management (LM) is a control-plane function, which manages and keeps track of the internetwork location of an MN. The location information may be a binding of the advertised IP address/prefix, e.g., HoA or HNP, to the IP routing address of the MN, or it may be a binding of a node that can forward packets destined to the MN. Note that the LM could belong to the AF-CP, as it is done in several solutions, i.e. Mobile IP (MIP) and Proxy Mobile IPv6 (PMIPv6). However, in this draft, each function is indicated distinctively, as those functions could be deployed in different locations to allow advanced control and smooth evolution for DMM.

Forwarding Management (FM) function performs packet interception and forwarding to/from the IP address/prefix assigned to the MN, based on the internetwork location information, either to the destination or to some other network element that knows how to forward the packets to their destination. Following the FM definition in [RFC7429], it may be split into the control plane (FM-CP) and data plane (FM-DP).

3. Deployment Models

We specify and analyze expected use cases where the MN tries to initiate an application.

3.1. D1: Distributed AM, LM, and FM (with centralized LM) - All-in-One

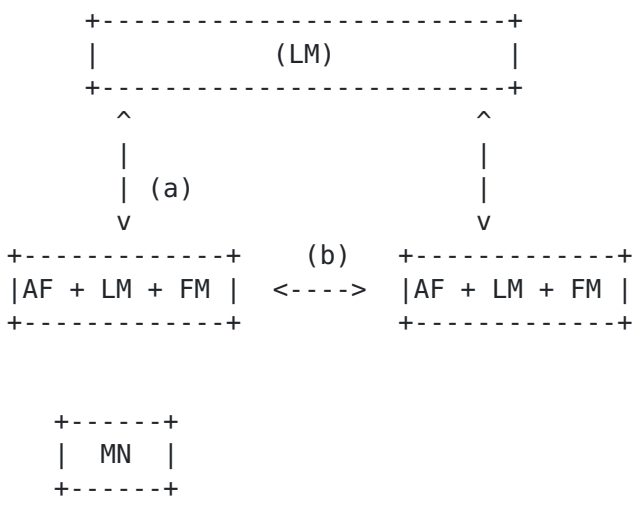

Figure 1. Distributed AM, LM, and FM functions (with centralized LM)

In this deployment model, AF, LM, and FM functions are co-located in every mobility router deployed at edge. This model can be called All-in-One for DMM. Depending on the use of the central LM, the model can be distinguished into fully distributed or partially distributed. In the partially distributed case, interface (a), between the centralized LM and the mobility routers shown in Fig. 1, is could be used for querying necessary mapping information by the edge mobility routers. Interface (b), between the mobility routers shown in Fig. 1, is used for conveying control signaling messages to control a forwarding path between them. Solutions following the given model could be [I-D.seite-dmm-dma][I-D.bernardos-dmm-pmip].

3.2. D2: Distributed AF-DP, LM and FM with centralized AF-CP (+ LM)

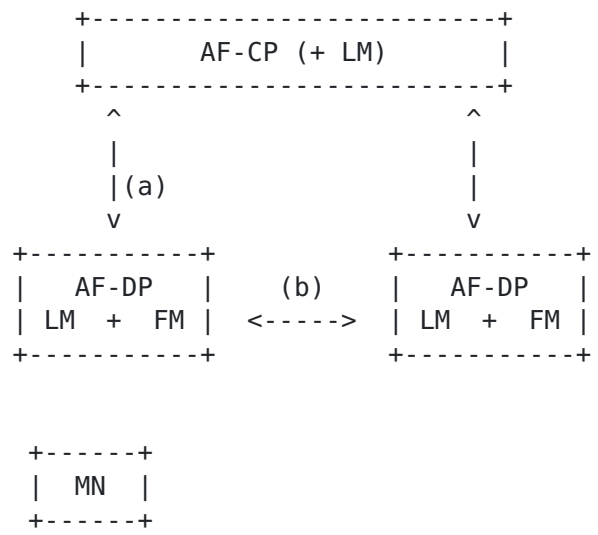

Figure 2. Distributed AF-DP, LM and FM functions with centralized AF-CP (+ LM)

In this model, we distinguish AF with AF Control Plane (AF-CP) and AF Data Plane (AF-DP). AF-DP is distributed with LM and FM into deployed mobility routers while AF-CP is centralized in a single entity, following a trend of separation of control and user plane for mobility management. For an extensive scenario support, LM may be co-located with the AF-CP. AF-DP is determined by the AF-CP. One possible solution could be to use such as User-Plane Address option to deliver AF-DP IP address serving router or terminal should contact, as proposed in [RFC7389]. Interface (a) shown in Fig. 2 is used to control AF-DP function, with signaling messages or configuration information. Interface (b) shown in Fig. 2 is used for establish and control the forwarding path between the mobility routers.

3.3. D3: Distributed AF-DP and FM-DP with centralized AF-CP, LM, and FM-CP

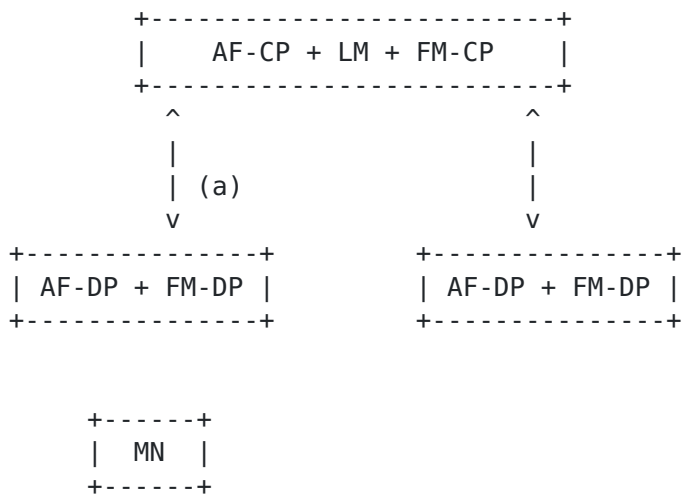

Figure 3. Distributed AF-DP and FM-DP with centralized AF-CP, LM, and FM-CP

In the model, separation of FM Control Plane (FM-CP) and FM Data Plane (FM-DP) is applied with the separation of AF-CP and AF-DP. The LM is located at the central entity. Comparing D3 with D2, D3 can provide smooth and flexible forwarding path management between the AF-DP of an allocated IP address and the current serving router where the terminal is attached. Interface (a) shown in Fig. 3 is used to control AF-DP and FM-DP function by the respective control functions, AF-CP and FM-CP, with signaling messages or configuration information. [I-D.ietf-dmm-fpc-cpdp] presents a framework that can facilitate forwarding policy configuration, based on D3 model, imparting a role and characteristics of a mobility router as well as configuring a forwarding path.
[I-D.matsushima-stateless-uplane-vepc] may be subject to D3 model, the control functions in vEPC delivers Route Update to EPC Edge Routers, to configure a data-plane routing path.

4. IANA Considerations

This document makes no request of IANA.

5. Security Considerations

T.B.D.

6. Acknowledgements

7. References

7.1. Normative References

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7.2. Informative References

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