Deployment Models for Distributed Mobility Management
draft-sijeon-dmm-deployment-models-00.txt

Abstract

   This document briefly presents available deployment models for
   distributed mobility management networks, being 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.

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1. Introduction

This draft briefly 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 distributed mobility management requirement [RFC7333]. In this draft, with the functions, we sketch and describe the deployment models for distributed mobility management 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. It can be deployed in a decoupled way, i.e.
separated control plane and data plane. In that case, following two
terms - AF-CP and 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. 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

```
             +--------------------------+
             |            (LM)          |
             +--------------------------+
                 ^                    ^
                 |                    |
                 |                    |
                 v                    v
          +-------------+      +-------------+
          |AF + LM + FM | (<---->) |AF + LM + FM |
          +-------------+      +-------------+


             +------+
             |  MN  |
             +------+
```
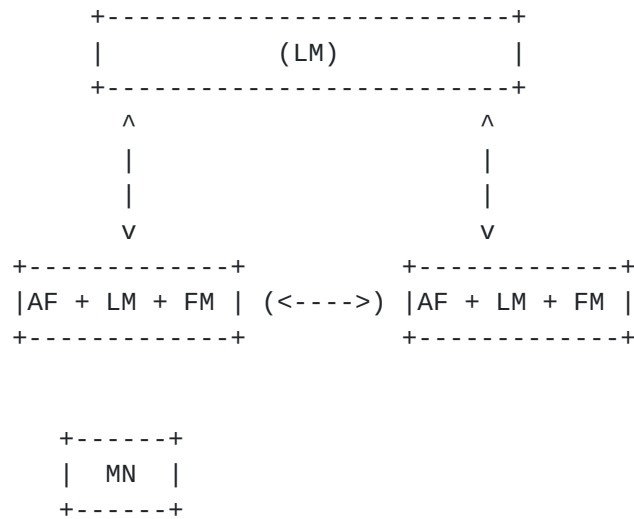
Figure 1.   Distributed AM, LM, and FM functions (with centralized LM)

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. Solutions following the given model are presented in
[I-D.seite-dmm-dma][I-D.bernardos-dmm-pmip].

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

```
             +---------------------------+
             |        AF-CP (+ LM)       |
             +---------------------------+
                 ^                    ^
                 |                    |
                 |                    |
                 v                    v
          +-----------+        +-----------+
          |   AF-DP   |        |   AF-DP   |
          | LM  +  FM | (<----->) | LM  +  FM |
          +-----------+        +-----------+


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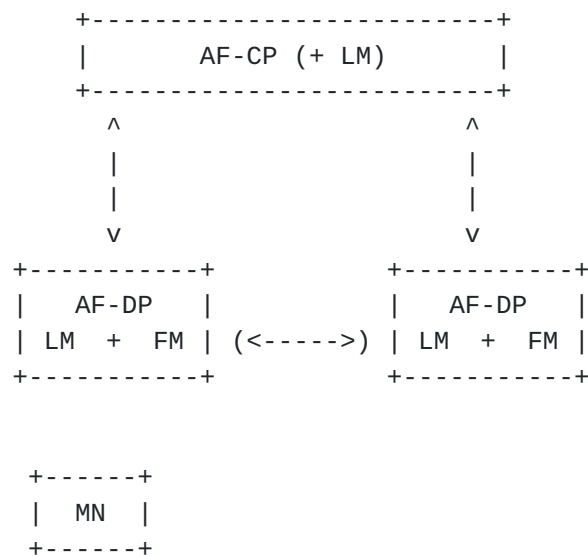
Figure 2.   Distributed AF-DP, LM and FM functions with centralized
AF-CP (+ LM)

AF-DP is distributed with LM and FM into deployed mobility routers
while AF-CP is centralized in a single entity. 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].

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

```
                +--------------------------+
                |    AF-CP + LM + FM-CP     |
                +--------------------------+
                     ^                     ^
                     |                     |
                     |                     |
                     v                     v
          +---------------+       +---------------+
          | AF-DP + FM-DP | (<--->) | AF-DP + FM-DP |
          +---------------+       +---------------+


               +------+
               |  MN  |
               +------+
```
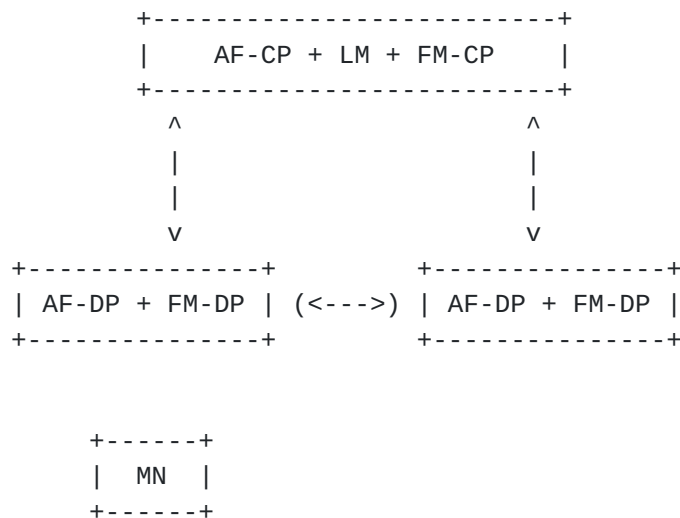
Figure 3. Distributed AF-DP and FM-DP with centralized AF-CP, LM,
and FM-CP

In the model, separation of FM-CP and FM-DP is implemented with the
separation of AF-CP and AF-DP. The LM is located at the central
entity. Comparing D3 with D2, D3 can provide flexibility to make
forwarding path between the AF-DP of an allocated IP address and the
current serving router where the terminal is attached.
[I-D.matsushima-stateless-uplane-vepc] may be subject to D3 model,
control functions in vEPC delivers Route Update to EPC Edge Routers,
to configure data-plane routing path. [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.

4. IANA Considerations

This document makes no request of IANA.

5. Security Considerations

   T.B.D.

6. Acknowledgements

7. Normative References

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