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Architectural Requirements for Base Network Mobility Using Bidirectional
Tunneling
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Abstract

While traditional mobility support deals with providing continuous Internet connectivity to mobile hosts (host mobility support), network mobility support means dealing with situations where an entire network changes its point of attachment to the Internet. Such a network is called a mobile network. This document identifies architectural entities of network mobility and nested network mobility.

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1. Introduction

This document assumes that the reader is familiar with the terminology defined in [1] and problem description in [2] and Mobile IPv4 based description in [Section 4.5](#) of [3].

The purpose of traditional mobility support is to provide continuous Internet connectivity to mobile hosts (host mobility support). In contrast, network mobility support is concerned with situations where an entire network changes its point of attachment to the Internet and thus its reachability in the topology. We shall refer to such a network as a mobile network. Cases of mobile networks include networks attached to people (Personal Area Networks or PAN), and networks of sensors deployed in aircrafts, boats, busses, cars, train, etc that need a permanent Internet connection. Those mobile networks may also provide Internet access to devices carried by people (laptop, camera, mobile phone, etc, and PAN).

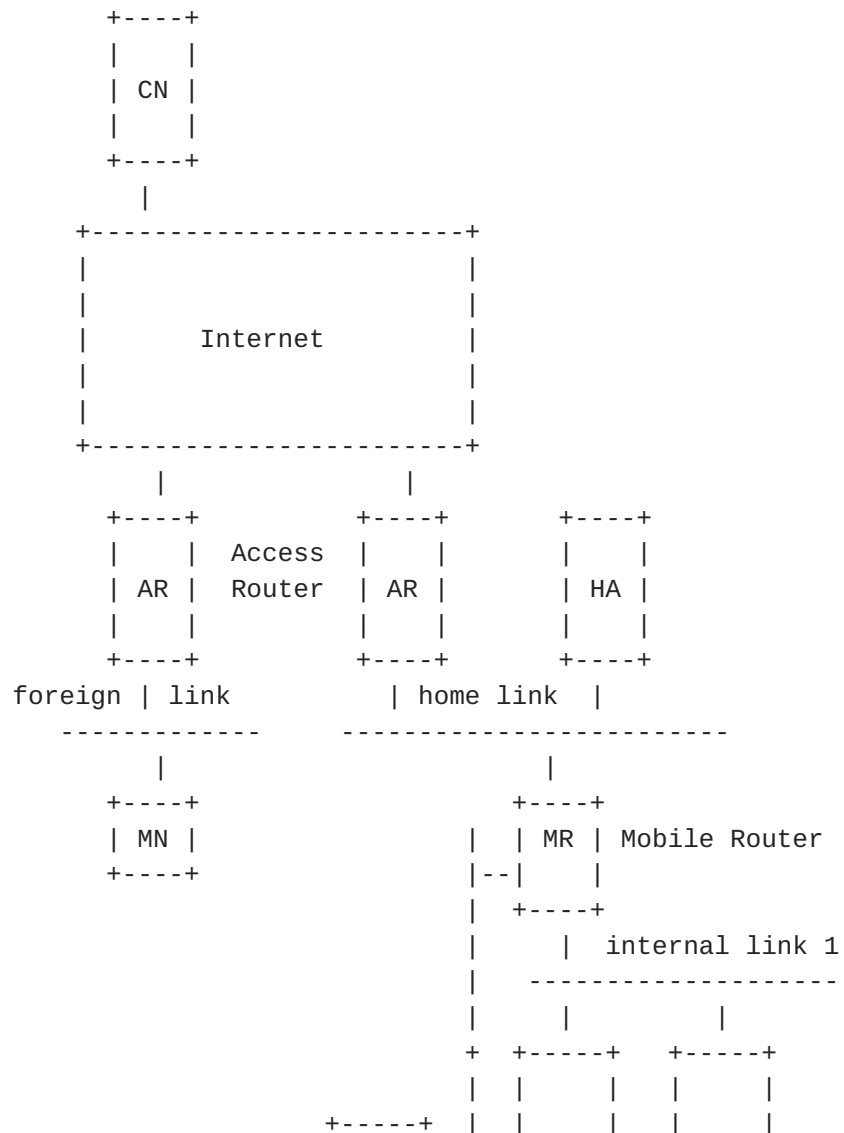
There is a desire to achieve two levels of mobility: node mobility and network mobility. A passenger is a mobile node which visits a mobile network (VMN in a NEMO), and passengers may themselves be mobile IP-subnets (NEMO in a NEMO), for example when carrying a PAN. Since people move from a NEMO to another, and since instances of NEMOs like trains, car, aircrafts cross country boundaries, both VMNs and NEMOs are also most likely to cross ISP boundaries and therefore to move between topologically distant parts of the Internet. This means we must allow VMNs belonging to potentially different administrative domains to visit the NEMO. These instances also justify the need to consider potentially large NEMOs containing hundreds of hosts and several routers. The train example highlights that the number of correspondent nodes could also be very large, and that these may be sparsely distributed in the Internet. It also justifies the need for true worldwide mobility in the Internet. A NEMO may attach to very distant parts of the Internet topology, provided it is granted access to it, therefore requiring both Local-Area Mobility support and Wide-Area Mobility support.

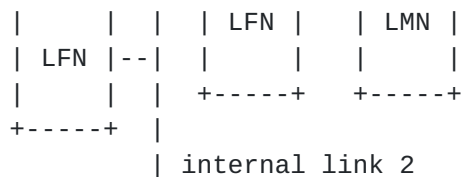
The document continues in [Section 2](#) with general requirements on architecture.

2. Architecture

2.1 Generic architecture

A new architectural entity called mobile router (MR) is needed to support network mobility. The mobile router (MR) connects the mobile network to the home link. In order to provide session continuity to the nodes in its network, MR needs a Mobile IP Home Agent (HA) [4]. MR may have several internal links to which local fixed (LFN) and mobile (LMN) nodes are connected (Figure 1). MR and HA together provide support for network mobility. HA MUST know that MR is not a basic mobile node but a router.

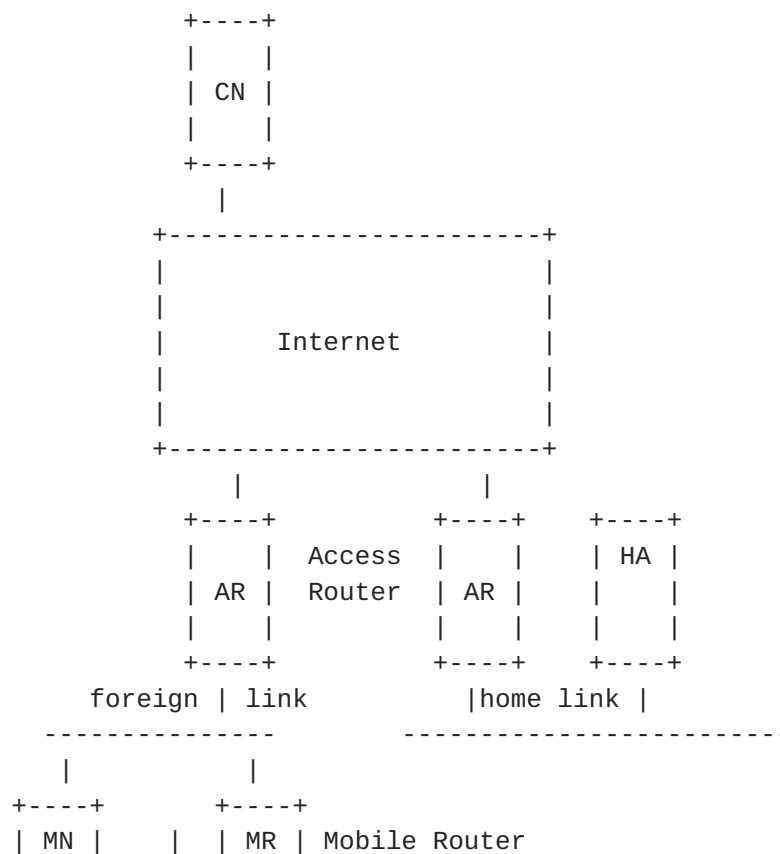




MR has an egress interface to its home link. MR MAY have several ingress interfaces to its internal links.

The mobile network MAY move in its entirety and MAY attach itself to another link, e.g. foreign link. This situation is shown in Figure 2. MR MUST provide session continuity to all the nodes in its network.

The correspondent node (CN) MAY be communicating with a mobile node (LMN) or with a fixed node (LFN). Base network mobility support MUST not require any changes to the correspondent nodes.



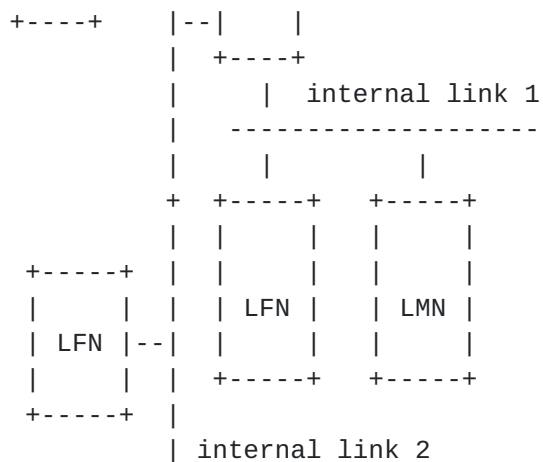
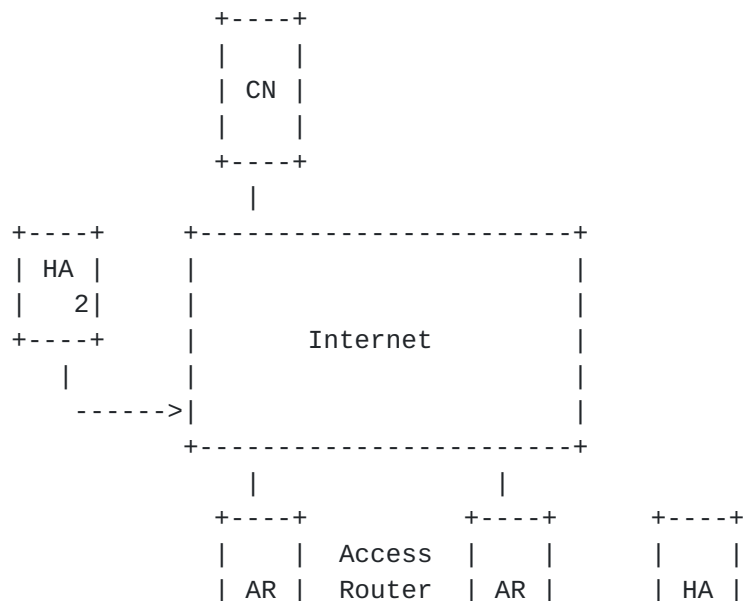


Figure 2. Mobile Network at a Foreign Link

A mobile router becomes the visiting mobile router (VMR) if it connects to another network in mobility. This is called nested mobility. An architecture for nested mobility is shown in Figure 3. A visiting mobile router (VMR) connects itself to the network in mobility by attaching to one of the links, e.g. local link 2. The visiting network in mobility may have its own links to which several fixed and mobile nodes are connected. HA1 is the home agent for MR and HA2 is for VMR.



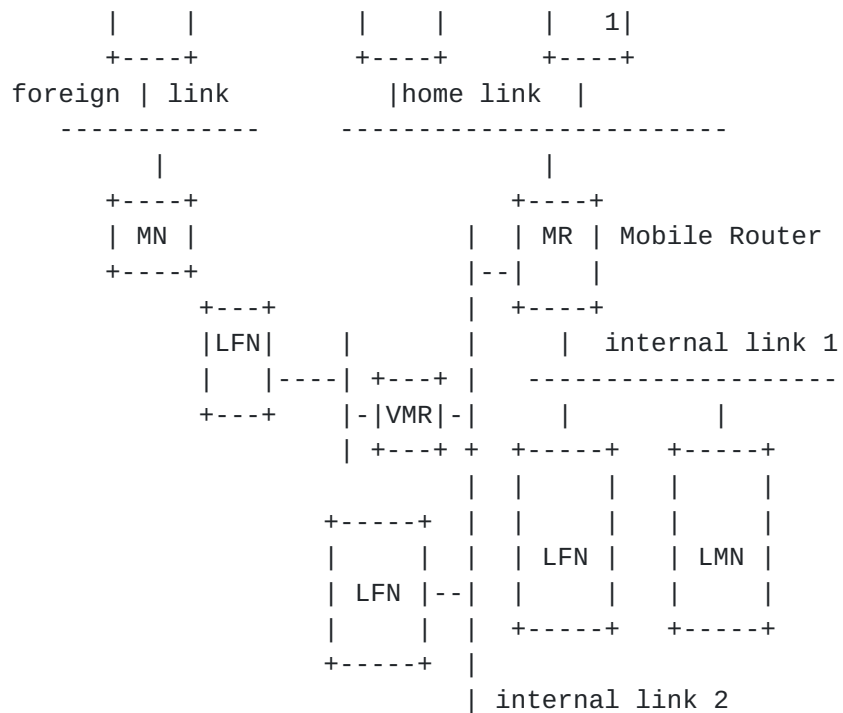
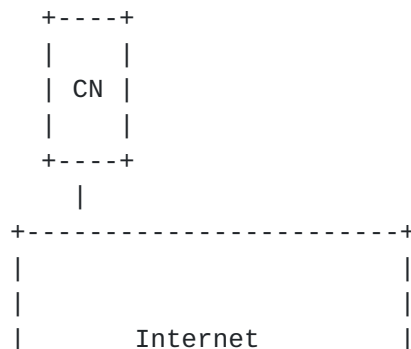


Figure 3. Nested Mobility

2.2 Mobile IPv4 Considerations

In Mobile IPv4, LMNs as well as MR MAY have a Foreign Agent (FA). The FA for LMNs MUST be on the internal link(s). MR MAY act as a FA to LMNs only if one of MR's interfaces directly connect to the internal links in the mobile network. Figure 4 shows the use of Mobile IPv4 when the network in mobility is on a foreign link. MR uses a local FA as its foreign agent while serving as FA to LMNs on the links attached to its interfaces.



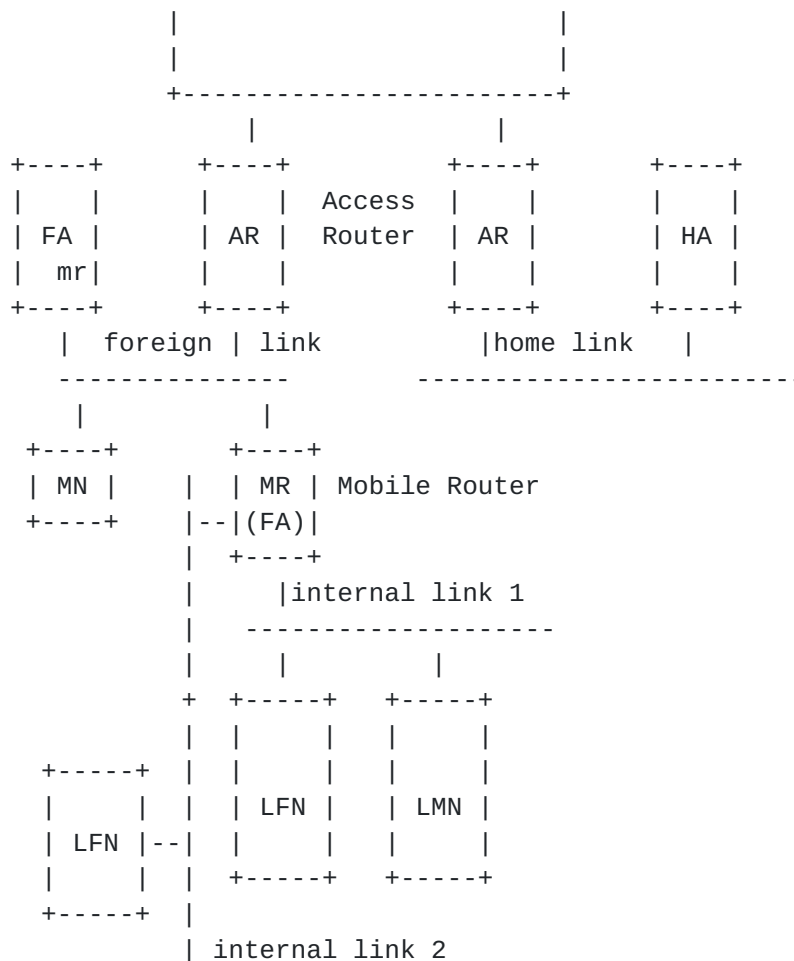


Figure 4. Network mobility and Mobile IPv4

3. Security Considerations

To be addressed in a separate draft.

4. References

- 1 Thierry Ernst, Hong-Yon Lach, "Network Mobility Support Terminology ", [draft-ernst-nemo-terminology-00.txt](#), October 2002, Work in progress.
- 2 Hesham Soliman "Problem Scope" IETF internet-draft [draft-soliman-nemo-scope-00.txt](#), October 2002, Work in progress.
- 3 Charlie Perkins, "IP Mobility Support for IPv4", IETF [RFC 3344](#), August 2002.

- 4 David Johnson, Charlie E. Perkins, Jari Arkko, "Mobility Support in IPv6", [draft-ietf-mobileip-ipv6-19.txt](#), work in progress, October

2002.

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