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Address Autoconfiguration for MANET: Terminology and Problem Statement
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Abstract

   This document states the problems pertaining to automatic IPv6
   address configuration and prefix allocation in MANETs.

   This draft currently contains terminology, target scenarios and goals
   for MANET autoconfiguration. Future versions of this document will
   also review the applicability of existing IPv6 address
   autoconfiguration and prefix allocation mechanisms, and security
   considerations.

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1. Introduction

   As defined in [1], a MANET is a network composed of MANET routers,
   each of which has at least one MANET interface. This document states
   the goals of autoconfiguration mechanism(s) for MANETs, with respect
   to the necessary parameters for basic IP identification.
   Specifically, this document thus states the requirements for:

   - autoconfiguring MANET interfaces with IPv6 addresses;

   - automatic allocation of IPv6 prefixes to MANET routers.

   This draft currently contains terminology, target scenarios and goals
   for MANET autoconfiguration. Future versions of this document will
   also review the applicability of existing IPv6 address
   autoconfiguration and prefix allocation mechanisms, and security
   considerations.

2. **Terminology**

   This document uses the terminology defined in [1], as well as the
   following terms :

   External Network - a network connected to the MANET, through an
      interface that is not part of this MANET.

   Subordinate MANET - a MANET, which is connected to one or more
      external network(s), and where such external network(s) are
      imposing an addressing hierarchy scheme on the MANET.

   Autonomous MANET - a MANET upon which no external network imposes an
      addressing hierarchy.

   Address autoconfiguration - the process of configuring an interface
      with a given address, using an automatic mechanism (contrary to
      manual configuration).

   Prefix allocation - the process of providing a router with authority
      over an aggregatable pool of addresses (i.e. a prefix), for the
      purpose of configuring interfaces or other routers.

   Disjoint prefixes - two prefixes are said to be disjoint if and only
      if their respective address ranges do not overlap.

   Network merging - the process by which two or more previously
      disjoint MANETs get connected.

   Network partitioning - the process by which a MANET splits into two
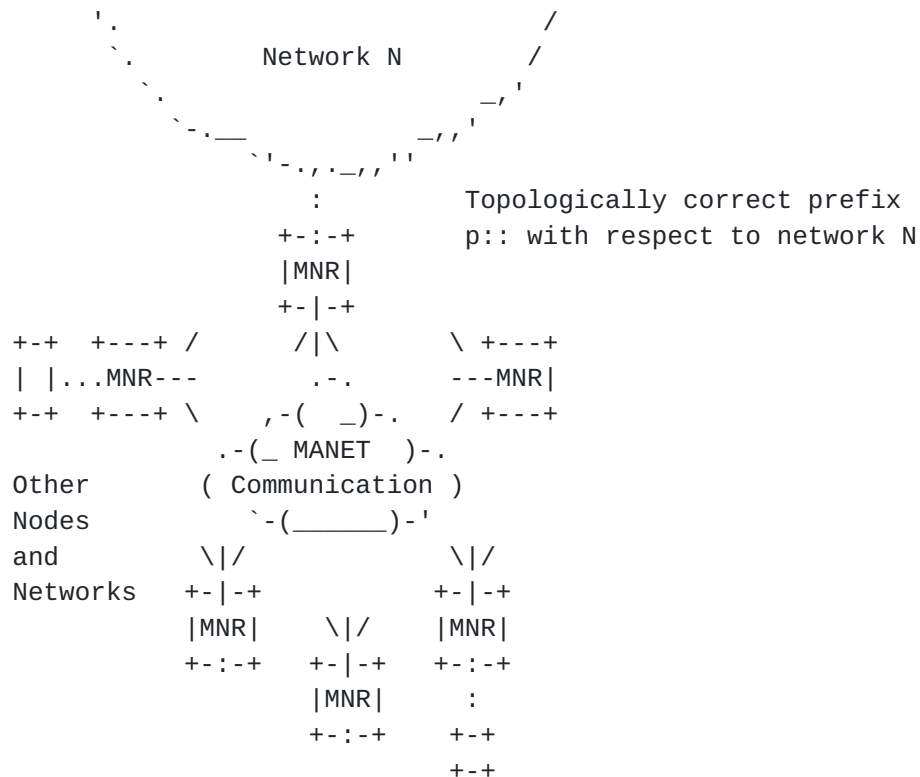   or more disconnected MANETs.

3. MANET Categories

   IP address autoconfiguration on MANET interfaces and prefix
   allocation for MANET routers may be used in a number of deployment
   scenarios. This section outlines the different types of scenarios
   that are to be addressed by solutions for MANET autoconfiguration.

   Note that solutions should also aim at coping with special cases such
   as a MANET transiting from one type of scenario to an other, or such
   as routers pre-configured with IP addresses (or prefixes) joining the
   MANET.

3.1. Subordinate MANET

   A subordinate MANET, as shown in Fig. 1, is a MANET which is
   connected to at least one external network N that imposes a specific
   addressing hierarchy on the MANET. In a subordinate MANET, this
   addressing hierarchy yields the use of specific prefixes for
   communications between nodes in the MANET and nodes in or across
   network N. For instance, in Fig. 1, these prefixes need to be
   topologically correct, i.e. allocated from within a prefix p::, over
   which the point of attachment to network N has authority.

```
              '.                        /
               `.           Network N        /
                 `.                       _,'
                  `-.__         _,,'
                     `'-.,.-,,''
                        :           Topologically correct prefix
                      +-:-+         p:: with respect to network N
                      |MNR|
                      +-|-+
        +-+   +---+ /     /|\       \ +---+
        | |...MNR---       .-.       ---MNR|
        +-+   +---+ \    ,-(  _)-.   / +---+
                    .-(_ MANET  )-.
        Other      ( Communication )
        Nodes         `-(_____)-'
        and          \|/            \|/
        Networks    +-|-+          +-|-+
                    |MNR|    \|/    |MNR|
                    +-:-+   +-|-+   +-:-+
                            |MNR|     :
                            +-:-+    +-+
                                     +-+
```

Figure 1: Subordinate MANET. Imposed address
hierarchy by external network N.

3.1.1. Scenarios of Subordinate MANETs

This section contains a non-exhaustive list of examples of MANETs
falling in the subordinate category.

A typical example of subordinate MANET is a MANET that is part of the
Internet, which yields the use of topologically correct IP addresses
in order to communicate over the Internet. For instance public
wireless mesh networks, i.e. scattered fixed WLAN access routers
participating in a MANET of mobile users, and acting as border
routers.

Another typical example is the coverage extension of a fixed wide-
area wireless network, where one or more MANET router(s) are
connected to the Internet through technologies such as UMTS or WiMAX.

Car-to-car communication networks connected to an external
infrastructure may also be understood as an instance of subordinate
MANET.

3.2. Autonomous MANET

Autonomous MANETs are MANETs upon which no external network imposes
an addressing hierarchy. This is shown in Fig. 2, as opposed to the
subordinate MANET category described in Section 3.1.

```
                            +---+
                            |MNR|
                            +-|-+
         +-+   +---+ /        /|\         \ +---+
         | |...MNR---        .-.       ---MNR|
         +-+   +---+ \     ,-(  _)-.   / +---+
                     .-(_ MANET  )-.
         Other      ( Communication )
         Nodes           `-(_____)-'
         and          \|/              \|/
         Networks    +-|-+            +-|-+
                     |MNR|    \|/      |MNR|
                     +-:-+   +-|-+    +-:-+
                             |MNR|      :
                             +-:-+    +-+
                                      +-+
```

Figure 2: Autonomous MANET. No subordination to an
 addressing scheme imposed by an external network.

3.2.1. Scenarios of Autonomous MANETs

This section contains a non-exhaustive list of instances of MANETs
falling in the autonomous category.

Typical examples of autonomous MANETs are networks set-up in areas
where infrastructure is unavailable or inapproriate. For instance,
car-to-car communication for sharing traffic and safety-related
information, on-site emergency communication among rescue team
members for disaster recovery, file sharing in conference or class
rooms.

4. **MANET Autoconfiguration Goals**

   The goals of AUTOCONF is to provide autoconfiguration mechanisms
   which allow each MANET router to:

   1. configure IPv6 addresses that are unique within the MANET, on
   their MANET interface(s).

   2. be allocated IPv6 prefixes that are disjoint from prefixes
   allocated to other routers within the MANET.

   3. maintain, within the MANET, the uniqueness of configured addresses
   and the disjoint character of allocated prefixes (even in face of
   network merging).

   4. be allocated topologically correct prefixes, in the subordinate
   MANET scenario.

5. Security Considerations

   This document does not currently introduce security considerations
   beyond those captured by [1].

6. IANA Considerations

   This document does not specify IANA considerations.

7. References

7.1. Normative References

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