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Managing Router Identifiers during IPv4 Sunset
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Abstract

This document describes problems of managing protocol identifiers when turning off IPv4 and migrating to IPv6 only network, with some potential solutions discussed.

Status of This Memo

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1. Introduction

There are many places in IETF protocols where a unique identifier is needed. An identifier is typically referred to as a router ID or system ID identifying a router/system running the protocol, and is traditionally designed to be a 32-bit number. Usually the IDs are required to be unique across some domain, but the actual value is not relevant. The value of IDs is often conventionally chosen to be an IPv4 address on the router, and in many implementations the IDs are even expressed in dotted decimal notation. There is some operational convenience of the common practice of tying the IDs to IP addresses:

1. A human-readable set of information is easy for network operators to deal with.

2. IDs can be auto-configured, saving the work of planning and assignment.

3. It is helpful to quickly perform diagnosis and troubleshooting, and easy to identify the availability and location of the identified router.

2. Problem Statement

In an IPv6 only network, there are no IP addresses that can be directly used to number an ID. IDs have to be planned individually to meet the uniqueness requirement, and the advantages of tying to IP addresses indicated in section 1 are lost.

3. Solution Ideas

If the ID is required to correspond to some information on the router or system, e.g. an IP address, the ID should be extended to meet the

requirement; if the value is irrelevant and only needs to be unique, there has been suggestion about avoiding protocol change.

One can use some record keeping mechanisms, e.g. DNS or even text file, to associate IDs and IPv6 addresses to retain some of the

operational convenience, though extra record keeping does introduce additional work. Record keeping should be reliable enough so as to be reachable when a network problem occurs. Another option is to use some external provisioning system, e.g. network management system, to manage and allocate the IDs.

Another possible solution is to embed the ID into an IPv6 address, e.g. use a /96 IPv6 prefix and append it with a 32-bit long ID, then an ID is naturally tied to an IP address.

The above ideas require IDs be planned and generated in advance and meet the uniqueness requirement. IDs can be manually planned, possibly with some hierarchy or design rule, or can be created automatically. A simple way of automatic ID creation is to generate pseudo-random numbers, and one can use another source of data such as the clock time at boot or configuration time to provide additional entropy during the generation of unique IDs.

One can also hash an IPv6 address down to a value as ID. It is necessary to be able to override the hashed value, and desirable if hash is provided by the router implementation. The hash algorithm is supposed to be known and the same across the domain. Since typically the number of routers in a domain is far smaller than the value range of IDs, the hashed IDs are hardly likely to conflict with each other, as long as the hash algorithm is not designed too badly.

4. Security Considerations

TBD.

5. IANA Considerations

None.

6. Acknowledgements

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