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A Distributed NHRP Service Using SCSP

Status of this Memo

Abstract

This document describes a method for distributing an NHRP service within a LIS[1]. This method uses the Server Cache Synchronization Protocol (SCSP)[2] to synchronize the client information databases held by NHRP Servers (NHSs) within a LIS.

1. Introduction

NHRP Clients (NHCs) register their existence and reachability information with NHRP Servers (NHSs). There may be multiple NHSs in a given Logical IP Subnet (LIS). NHCs do not necessarily register with all NHSs in a LIS; however, all NHCs need to be able to query at least one NHS about any NHC within the LIS. Thus, the contents of

the NHS databases in a LIS need to be synchronized across the LIS. The Server Cache Synchronization Protocol (SCSP) solves the generalized server synchronization/cache-replication problem for distributed databases and thus SCSP may be applied to the NHS database synchronization problem within the LIS.

SCSP is defined in two parts: the protocol independent part and the client/server protocol specific part. The protocol independent part is defined in [2] whereas this document will specify the client/server protocol specific part where NHRP is the client/server protocol.

This document is separate from [2] because it was felt that it was desirable to allow the client/server protocol specific part specification for NHRP to progress independently from the protocol independent specification.

2. Overview

All NHSs belonging to a Logical IP Subnet (LIS)[1] are said to belong to a Server Group (SG). An SG is identified by, not surprisingly, its SGID which is contained in a field in all SCSP packets. All SCSP packets contain a Protocol ID (PID) field as well. This PID field is set to 0x0002 to signify that SCSP synchronizing NHS databases as opposed to synchronizing some other protocol's databases (see Section B.2.0.1 of [2] for more details). In general, PIDs for SCSP will be assigned by IANA as described in Section C of [2]. In the case of NHRP, the client/server protocol specific specification was initially written at the same time as SCSP, and thus a PID=0x0002 was assigned by the author.

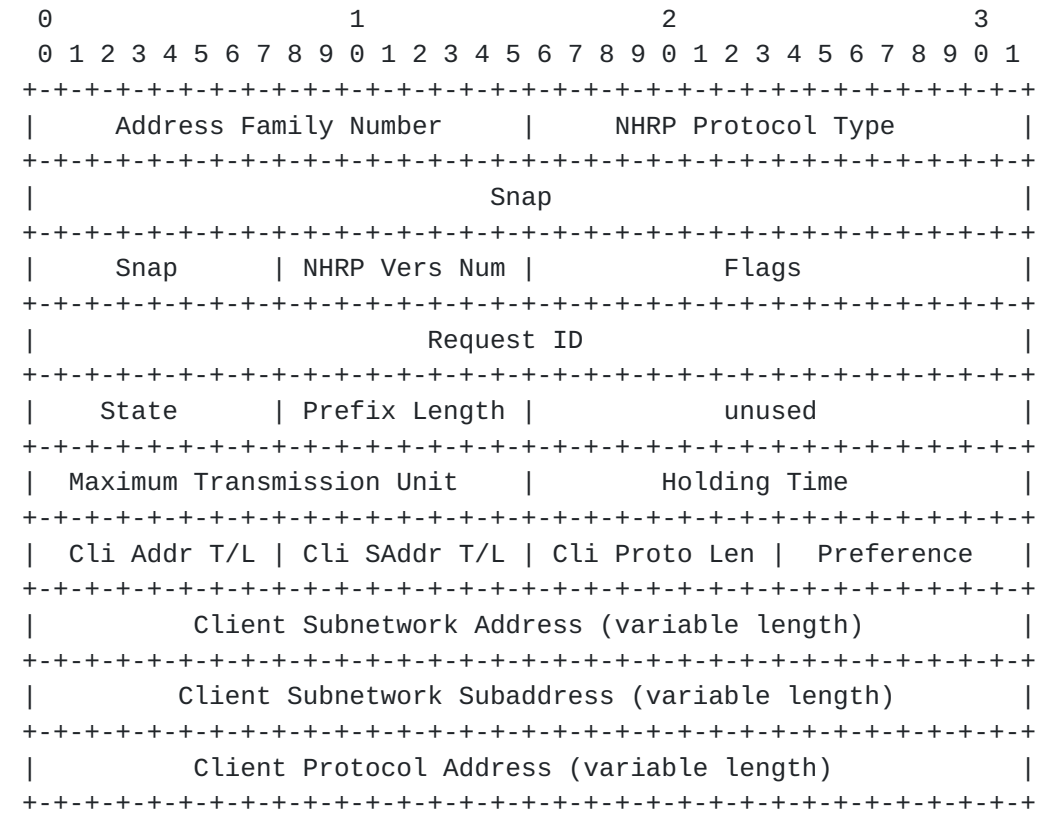
SCSP places no topological requirements upon an NHRP SG. Obviously, however, the resultant graph of NHSs must span the set of NHSs to be synchronized. For more information about the client/server protocol independent part of SCSP, the reader is encouraged to see [2].

When a SG is using SCSP for synchronization, an NHC will register with only one NHS, but the NHC MAY use any NHS in the SG. When an NHC wishes to leave a SG, the NHC MUST do one of the following: 1) the NHC MUST send an NHRP Purge Request for itself requesting a reply, and it MUST wait for an NHRP Purge Reply, 2) the NHC MUST keep the Request ID it used when registering itself in non-volatile RAM and use a Request ID larger than the one saved when re-registering, or 3) the NHC MUST not re-register for a time equal to the Holding Time specified in the previous registration. It is necessary to do one of the previous in order to prevent the unlikely case of race conditions from occurring during updated. In the case where method 2

is used, the NHS with which the NHC registered uses its ID as the OID and the Request ID from the NHC as the CSA Sequence Number in the CSA(S) Record.

3. Format of the CSA Record NHRP Specific Part

CSA Records in SCSP contain a "Client/Server Protocol Specific Part" which contains the non-protocol independent information for a given server's cache entry.



The following six fields contain values specified in the common header of the mandatory part of an NHRP Registration Request or NHRP Purge Request packet which caused the creation/deletion/modification/update/etc. of an NHS's cache entry.

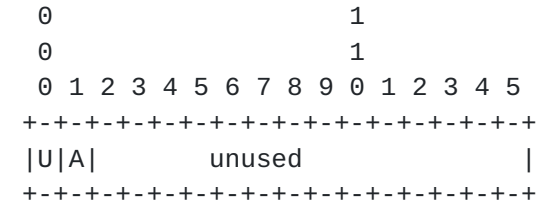
Address Family Number
Defines the type of "link layer" addresses being carried. This number is taken from the 'address family number' list specified in [3]. This field is the same field which would be supplied in an NHRP packet in the ar$afn field.

NHRP Protocol Type
This field is the same field which would be supplied in an NHRP packet in the ar$pro.type field.

Snap
This field is the same field which would be supplied in an NHRP packet in the ar$pro.snap field.

NHRP Vers Num
This field indicates what version of generic address mapping and management protocol that is represented by this message. This field contains 0x01 for the NHRP protocol version 1. This field is the same field which would be supplied in an NHRP packet in the ar$op.version field.

Flags
Defined flags are as follows:



U
This is the Uniqueness bit.

A
When set, this bit specifies that the cache entry was created as a result of ATMARP client interaction with the NHS.

Request ID
This field contains the Request ID value placed in the cache entry of the NHS as a result of an NHRP Registration Request. This NHS is the NHS causing a synchronization event.

State
This field contains a value which represents the new state of the client.

0 - Client is registered and available.
1 - Client reregistered.
2 - Client has been purged.
3 - No such client data in server cache

Note that a time-out of a cache entry does not cause a CSA Record to be sent because, if everything is working properly then all NHSs have the cache entry timing out at the same time. Thus, the individual NHSs would take the appropriate actions necessary.

The following ten fields contain values specified in or derived from

the CIE of an NHRP Registration Request or NHRP Purge Request packet which caused the creation/deletion/modification/update/etc. of an NHS's cache entry.

Prefix Length
This field contains the internetwork layer address prefix length value covered by the cache entry being synchronized.

Maximum Transmission Unit
This field contains a value supplied by or derived from information in the CIE of the NHRP Registration Request packet.

Holding Time
The Holding Time field specifies the number of seconds remaining for which the Next Hop NBMA information specified in the CIE of the NHRP Registration Request is considered to be valid by the NHS initiating the synchronization event.

Cli Addr T/L
Type & length of next hop NBMA address (see [1]).

Cli SAddr T/L
Type & length of next hop NBMA subaddress (see [1]).

Cli Proto Len
This field holds the length in octets of the Client Protocol Address.

Preference
This field specifies the preference value for use of the next hop NBMA information specified.

Client NBMA Address
This is the client's NBMA address.

Client NBMA SubAddress
This is the client's NBMA subaddress.

Client Protocol Address
This is the client's internetworking layer address.

4. Values for SCSP Protocol Independent Part

The following sections give values for fields of the SCSP Protocol Independent Part of the various SCSP messages.

4.1 Values for the SCSP "Mandatory Common Part"

Protocol ID = 0x0002
Sender ID Len = 0x04
Recvr ID Len = 0x04

See Section B.2.0.1 of [2] for a detailed description of these fields.

4.2 Values for the SCSP "CSAS Record"

Cache Key Len = 0x04
Orig ID Len = 0x04

See Section B.2.0.2 of [2] for a detailed description of these fields.

5. Security Considerations

Relevant security considerations are documented in [1] and [2].

References

[1] "NBMA Next Hop Resolution Protocol (NHRP)", Luciani, Katz, Piscitello, Cole, draft-ietf-rolc-nhrp-12.txt.

[2] "Server Cache Synchronization Protocol", Luciani, Armitage, Halpern, draft-ietf-ion-scsp-02.txt.

[3] Assigned Numbers, J. Reynolds and J. Postel, RFC 1700.

[4] "Key words for use in RFCs to Indicate Requirement Levels", S. Bradner, RFC 2119.

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