DHCP Options for Internet Storage Name Service

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Abstract

   This document proposes a new DHCP option number to allow iSCSI and
   iFCP devices using DHCP to discover the location of the iSNS server.
   iSNS provides discovery and management capabilities for iSCSI and
   Fibre Channel (FCP) storage devices in an enterprise-scale IP
   storage network. iSNS provides intelligent storage management
   services comparable to those found in Fibre Channel networks,
   allowing a commodity IP network to function in a similar capacity as
   a storage area network.

Conventions used in this document

   iSNS refers to the framework consisting of the storage network model
   and associated services.

   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].

   All frame formats are in big endian network byte order.

   This document uses the following terms:

   "iSNS Client" - iSNS clients are processes resident in iSCSI and
   iFCP devices that initiate transactions with the iSNS server using
   the iSNS Protocol.

   "iSNS Server" - The iSNS server responds to iSNS protocol query and
   registration messages, and initiates asynchronous notification
   messages. The iSNS server stores information registered by iSNS
   clients.

   "iSCSI (Internet SCSI)" - iSCSI is an encapsulation of SCSI for a
   new generation of storage devices interconnected with TCP/IP.

   "iFCP (Internet Fibre Channel Protocol)" - iFCP is a gateway-to-
   gateway protocol designed to interconnect existing Fibre Channel and
   SCSI devices using TCP/IP. iFCP maps the existing FCP standard and
   associated Fibre Channel services to TCP/IP.

1.   Introduction

   The Dynamic Host Configuration Protocol provides a framework for
   passing configuration information to hosts. Its usefulness extends
   to hosts and devices using the iSCSI and iFCP protocols to connect
   to block level storage assets over a TCP/IP network.

   The iSNS Protocol provides a framework for automated discovery,

management, and configuration of iSCSI and iFCP devices on a TCP/IP
   network. It provides functionality similar to that found on Fibre
   Channel networks, except that iSNS works within the context of an IP

network. iSNS thereby provides the requisite storage intelligence
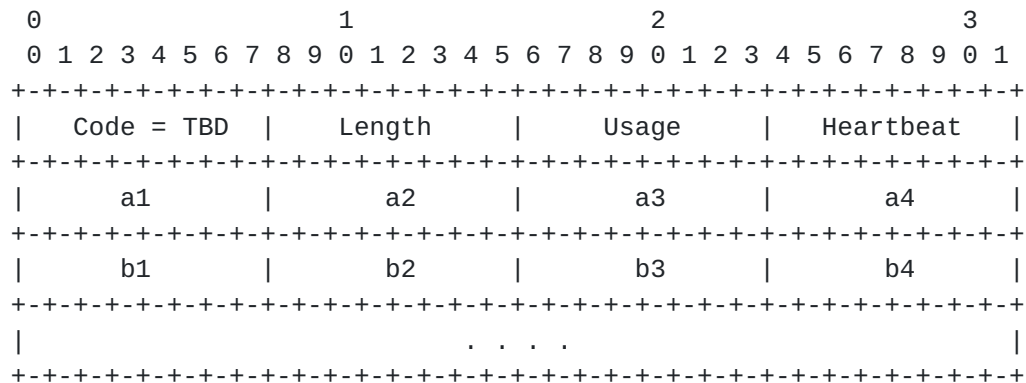to IP networks that are standard on existing Fibre Channel networks.

Existing DHCP option numbers are not plausible due to the following
reasons:

1) iSNS functionality is distinctly different from other protocols
using existing DHCP option numbers. Specifically, iSNS provides a
significant superset of capabilities compared to typical name
resolution protocols such as DNS. It is designed to support client
devices that allow themselves to be configured and managed from a
central iSNS server.

2) iSNS requires a DHCP option format that provides more than the
location of the iSNS server. The DHCP option number needs to
specify the subset of iSNS services that will be actively used by
the iSNS client.

The proposed DHCP option for iSNS is used by iSCSI and iFCP devices
to discover the location of the iSNS server. Although a standard
one-byte DHCP option number is strongly desired, the assignment of a
two-byte option number implemented by options 126 and 127 is
acceptable.

2.   iSNS Option for DHCP

This option specifies the location of the primary and backup iSNS
servers and the subset of iSNS services that will be used by the
iSNS client.

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   Code = TBD  |     Length    |     Usage     |   Heartbeat   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|      a1       |      a2       |      a3       |      a4       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|      b1       |      b2       |      b3       |      b4       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                            . . . .                           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

The iSNS Option specifies a list of IP addresses used by iSNS
servers.

Length indicates the number of bytes that follow the Length field.
The minimum value for the Length field is 2 in order to account for
the Usage and Heartbeat bytes.

The Usage byte indicates whether the DHCP option overrides the

static configuration of the iSCSI or iFCP device, as well as the
subset of iSNS features that are to be used by the iSNS client
device. The following table indicates how iSNS is to be used by the
DHCP client.

         Value   iSNS Usage
         -----   ----------
          0   DISCOVERY Only
          1   DISCOVERY and AUTHORIZATION
          3   DISCOVERY, AUTHORIZATION and SECURITY
        All other values are reserved and should not be used

   A Usage byte value of 0 indicates that iSNS is to be used for
   discovery only, and that static or manual configuration of the iSCSI
   or iFCP device overrides any discovery or configuration information
   found in the iSNS server through iSNS protocol messages. Although
   the Discovery Domain/Zoning features of the iSNS may be used to
   manage the discovery process, Discovery Domain membership does not
   indicate authorization to establish a session with any storage
   device.

   A Usage byte value of 1 indicates that iSNS is used for both
   discovery and authorization. Information discovered from the iSNS
   server overrides any static or manual configuration of the iSCSI or
   iFCP device. The Discovery Domain/Zoning membership configuration
   stored in the iSNS provide authorizations that determine whether
   storage sessions may be established between peer devices.

   A Usage byte value of 3 indicates that in addition to discovery and
   authorization, the iSNS is used to distribute IKE/IPSec security
   policy configuration to iSCSI and/or iFCP devices.

   The Heartbeat byte determines if the IP address indicated in a1-a4
   is the iSNS heartbeat multicast address.

   If the Heartbeat byte is 0, then then a1-a4 is the IP address of the
   primary iSNS server. Any additional IP addresses are the iSNS
   backup servers, listed in order of precedence.

   If the Heartbeat byte is 1, then a1-a4 is the iSNS heartbeat
   multicast address, b1-b4 is the primary iSNS server IP address, and
   any following IP addresses are the iSNS backup servers listed in
   order of precedence.

3.   Security Considerations

   DHCP currently provides no authentication or security mechanisms.
   Potential exposures to attack are discussed in section 7 of the DHCP
   protocol specification [DHCP].

   iSNS security considerations are discussed in [iSNS] and [SEC-IPS].

4.   References

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