DHCP Options for Internet Storage Name Service

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Comments

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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.
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 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.
DHCP Option Number for iSNS        February 2002

<table>
<thead>
<tr>
<th>Value</th>
<th>iSNS Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>DISCOVERY Only</td>
</tr>
<tr>
<td>1</td>
<td>DISCOVERY and AUTHORIZATION</td>
</tr>
<tr>
<td>3</td>
<td>DISCOVERY, AUTHORIZATION and SECURITY</td>
</tr>
</tbody>
</table>

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 the a1-a4 is the primary iSNS server IP address, and any following IP addresses are the iSNS backup servers, listed in order of precedence.

If the Heartbeat byte is 1, then the a1-a4 is the iSNS heartbeat multicast address, and 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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