



Network Services Location Manager

Network administrator's guide

This document describes the Network Services Location (NSL) Manager and provides information on setting up a network to take advantage of its services. Read this document if you are a network administrator or are responsible for setting up or managing network services.

What Is the NSL Manager?

Part of the Mac OS, NSL Manager is software that helps network services advertise themselves and helps applications find advertised services on the network.

In the past, finding services on a TCP/IP network was difficult unless an administrator took steps to list available services.

With the NSL Manager, network services advertise themselves and applications can find those services. When an application asks it to locate a network service, the NSL Manager uses standard protocols to find available services. Located services are grouped into network “neighborhoods” based on such attributes as the network segment in which the services are found and the service location protocols operating in that segment.

Which Computers Use the NSL Manager?

The NSL Manager is available on all computers with a PowerPC™ microprocessor and Mac OS 8.5 or later installed. Details vary with the version of the Mac OS.

NSL Manager 1.0 in Mac OS 8.5

In version 1.0 of the NSL Manager in Mac OS 8.5, each service location protocol is implemented as a plug-in, an extension that makes itself available to the NSL Manager when the NSL Manager is initialized, but resides in memory only when it is responding to a request. You can use the Extensions Manager to enable and disable individual NSL plug-ins.

When the NSL Manager is initialized, each NSL plug-in tells it the types of services the plug-in can search for, such as HTTP and FTP, and the protocol the plug-in uses to conduct searches, such as DNS or LDAP.

When the NSL Manager receives a request to advertise or locate a network service, it passes the request to a plug-in that performs the actual registration or search.

NSL Manager 1.1 in Mac OS 9

In Mac OS 9, NSL Manager version 1.1 functions as described for OS 8.5 and includes four plug-ins: Domain Name Service (DNS), Service Location Protocol (SLP), Lightweight Directory Access Protocol (LDAP), and Name Binding Protocol (NBP).

NSL Manager 1.1.3 in Mac OS 9.1

NSL Manager version 1.1.3 in Mac OS 9.1 no longer includes a DNS plug-in, and the SLP plug-in uses a new algorithm to decide which network neighborhood to advertise a service in (see *SLP Registration in Mac OS 9.1 and Mac OS X*, below).

NSL Manager 1.2 in Mac OS X

NSL Manager version 1.2 in Mac OS X uses its own SLP and NBP plug-ins for service registration and discovery. LDAP and NetInfo searches are not supported in the first release of Mac OS X.

Setting Up Your Network to Work With the NSL Manager

How you set up your network affects which services the NSL Manager can locate. You may need to make adjustments to allow hosts to find specific network services. Read the following sections for protocol-specific information.

Setting Up for DNS Searches

The NSL Manager uses the DNS plug-in to find network services listed by Domain Name Service (DNS) servers.

DNS and Mac OS 9

Your DNS server must be configured to allow anyone to request and receive zone transfers.

To make network services available to the NSL Manager through the DNS plug-in, you need to manually add text records for network services to the DNS server. The format of the records is as follows:

<hostname> <TTL> TXT <URL>

The following table explains each element of the record.

Field	Contents
<hostname>	The name of the host
<TTL>	The time-to-live for this information
<URL>	The complete URL for this host (for example, http://www.apple.com/)

If you use more than one DNS server, make sure you add records for a particular host name to the server responsible for that host and add the names of these servers to the search domain lists in clients' TCP/IP configurations.

DNS in Mac OS 9.1 and Mac OS X

The NSL Manager does not use DNS for service location in Mac OS 9.1 or Mac OS X.

Setting Up for SLP Searches and Registrations

The NSL Manager uses the SLP plug-in to find and advertise network services using the Service Location Protocol.

Network services running on the Mac OS can use the NSL SLP plug-in to advertise their availability. (File sharing and Personal Web Sharing in Mac OS 9 and Mac OS 9.1, for example, use SLP registration.) The SLP plug-in creates an SLP service agent on the host computer. This service agent listens for and responds to requests. On networks that include an SLP Directory Agent (DA), the SLP service agent registers its services with the DA. NSL search requests are then made directly to the DA, reducing network traffic. (Most of this traffic is on the local subnet.)

Advertising and searching hosts must be running compatible versions of the SLP plug-in. Services advertised by version 1.0 of the plug-in cannot be found by hosts running version 1.1 or later. Similarly, services advertised by version 1.1 or later of the plug-in cannot be found by hosts running version 1.0.

To register or discover services outside the local subnet, IP Multicast Router capability must be enabled. Neither MacIP nor PPP support multicasting.

SLP Registration in Mac OS 9

When advertising a service, the SLP plug-in in Mac OS 9 follows these steps to decide which network neighborhood (SLP scope) to register the service in:

- If the registering application or service specifies a network neighborhood, the SLP plug-in registers the service in that neighborhood.
- If no neighborhood is provided by the registering application or service, the SLP plug-in registers the service in the first domain listed in the Search Domains list of the host's TCP/ IP settings.
- If no search domain is specified in the host's TCP/IP settings, the plug-in tries to derive a neighborhood from the domain of the service's URL. For example, a service with the URL <http://me.mydomain.com> is registered in the neighborhood mydomain.com and <http://me.sub.mydomain.com> is registered in sub.mydomain.com
- If none of these steps yields a neighborhood, the plug-in registers the service in the default SLP scope, which is listed as the Local Services neighborhood (or the localized equivalent).

SLP Registration in Mac OS 9.1 and OS X

The SLP plug-in in Mac OS 9.1 and Mac OS X uses a different algorithm from the plug-in in Mac OS 9 to decide which network neighborhood (SLP scope) to register the service in:

- If a mandated scope is specified by a Dynamic Host Configuration Protocol server (DHCP SLP service scope option, code 79), the SLP plug-in registers the service in a neighborhood named for that scope.
- If the DHCP server does not specify a mandatory scope, the plug-in registers the service in the neighborhood specified in any known configuration or preference file (like the one set using the AppleScript “Set my network neighborhood,” available in the OS 9.1 online help topic “Sharing a USB Printer”).
- If no neighborhood is found in a configuration or preference file, the plug-in registers the service in a neighborhood named for a voluntary scope specified by DHCP.
- If none of these steps yields a neighborhood, the plug-in registers the service in the default SLP scope, which is listed as the Local Services neighborhood.

Setting Up for LDAP Searches

The NSL Manager uses its LDAP plug-in to search LDAP directories for network services.

LDAP in Mac OS 9 and Mac OS 9.1

The NSL Manager’s LDAP plug-in always searches the server and associated searchbase specified in the LDAP Services fields in the Hosts settings on the Advanced tab of the Internet control panel. Services discovered in this default directory are listed in a neighborhood that has the same name as the LDAP server.

Applications and users can request the plug-in to search additional LDAP directories. Using the Network Browser, for example, you can browse an LDAP directory by adding a neighborhood with the name of the server and the searchbase in this form:

`<servername>%2f<searchbase>`

Example: `ldap.example.com%2fc=us`

Note: Choosing an item from the Favorites list in the Network Browser causes all active NSL plug-ins to perform a search. When you choose an LDAP server from the Favorites list, the DNS plug-in may also respond, generating a “nameserver not responding” message. If DNS browsing is not needed, you can disable the DNS plug-in using the Extensions Manager control panel. (The DNS plug-in is not included in Mac OS 9.1.)

If you add an LDAP neighborhood without including a searchbase in the name, the LDAP plug-in makes two attempts to get data from the server. First, it tries to access the directory without specifying a searchbase. (Version 3 LDAP servers can return data when no searchbase is provided.) If that fails, the plug-in tries again using a searchbase of `c=us`. For example, if you add a neighborhood named `ldap.example.com`, the plug-in tries these searches:

- `ldap://ldap.example.com`
- `ldap://ldap.example.com/c=us`

When you set up an LDAP directory to advertise services to NSL, keep these points in mind:

- The NSL plug-in searches for service URLs (for example, `afp://asip.example.com`, `ftp://www.example.com`, or `http://www.example.com`) in both the `labeleduri` and `url` attributes. For best results, use the `labeleduri` attribute. See RFC 2079 for more information.
- Directory entries are displayed using distinguished names. When possible, use attributes and names that are easy for a person to interpret, like `cn=Joe Smith`, rather than less revealing names like `userID=2159`.
- You can improve performance and readability by organizing the directory so that service lists contain fewer than 200 entries. For example, the searchbase
`ou=printers, o=school`
can be restructured as
`service=printers, ou=HumanitiesBldg, o=school`
`service=printers, ou=ScienceBldg, o=school`
`service=printers, ou=AdminBldg, o=school`
- You can create a separate branch in a directory specifically for NSL browsing.
Example: `ldap.example.com/ou=ns1,c=us`

LDAP in Mac OS X

The NSL Manager cannot perform LDAP searches in the first release of Mac OS X.

Setting Up for NBP Searches

If AppleTalk is active on a host, AppleTalk zones and AppleShare servers on the network are listed in the neighborhood named AppleTalk.

Setting Up for NetInfo Searches

NetInfo is the native directory service on Mac OS X. However NSL Manager does not support NetInfo searches in the first release of Mac OS X.

Security

The NSL Manager makes network services that were once difficult to find more readily available to network users. It does not make sites less secure; it just makes it easier for clients to find services that were already available.

If you use DNS to list your intranet's services, you control which services clients can discover through NSL searches. However, any network services that utilize SLP registration are discoverable by the NSL Manager.

For More Information

For more information, see the following sources:

Request for Comments (RFC) Documents

Service Location Protocol, RFC 2165

Service Location Protocol, Version 2, RFC 2608

DHCP Options for Service Location Protocol, RFC 2610

Lightweight Directory Access Protocol, RFC 1777

Definition of an X.500 Attribute Type and an Object Class to Hold Uniform Resource Identifiers (URIs), RFC 2079

You can find RFC documents at the following Web address:

- www.rfc-editor.org

Books and Articles

DNS and Bind, 3rd edition, by Paul Albitz and Cricket Liu, O'Reilly & Associates, Inc. 1998

Inside Macintosh: Networking, Chapter 3, "Name Binding Protocol," viewable at developer.apple.com/techpubs/mac/Networking/Networking-61.html

SLP White Paper, at playground.sun.com/srvloc/slp_white_paper.html