

Open Transport: TCP/IP Configuration

This article provides information for configuring Open Transport TCP/IP.

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Open Transport/TCP works over, but is not limited to, Ethernet, Token Ring, and AppleTalk (as MacIP). It also works over serial lines when using backward compatible MDEV support (for example, MacPPP and InterSLIP).

Open Transport/TCP is configured using the TCP/IP Control Panel. Configuration may be done manually, or through a BOOTP, DHCP, RARP, or MacIP server. The steps to follow using each of these methods are detailed below.

By default, the TCP/IP Control Panel comes up in basic mode. Advanced or administration mode may be entered via the Edit menu. These modes allow expert users additional choices as well as the ability to augment information returned from a configuration server or to fill in gaps in the returned information.

The TCP/IP Control Panel may be used at any time to reconfigure the system. However TCP will not notice the new configuration until it has unloaded from the system. By default, this takes about 2 minutes after the last application using TCP or UDP has gone away.



Figure 1: Open Transport TCP/IP control panel in Advanced mode.

Description of the fields in the TCP/IP Control Panel

Figure 1, above, shows the Open Transport TCP/IP control panel in the Advanced mode.

Connect via

This is where you select the interface the system is going to use. This can include, but is not limited to, Ethernet, Token Ring, AppleTalk (MacIP), and MacPPP.

Configure

This is where you select how the system will obtain its IP address. The choices are Manually, BootP, DHCP, and RARP.

IP Address

This is where you enter the systems IP address if you have configured it to obtain its address manually. If BootP, DHCP, or RARP were selected for the "Configure:" field, the text "<supplied by server>" will be displayed.

Domain name

This is the default domain name used for domain name searches. For example, if a domain name of "apple.com" is configured, a search for "scott" would initially search for "scott.apple.com." It is not always necessary to fill in this field when configuring from a BootP or DHCP server since it may be returned along with the IP address. It is not necessary to have a domain name entered in this field.

Admin domain

In Advanced User mode only, you may enter an Admin Domain. This is used to allow implicit searches. For example, if my domain is tech.support.apple.com, and my admin domain is set to apple.com, a search for the name "scott" would first look for scott.tech.support.apple.com, then for scott.support.apple.com, then for scott.apple.com. Implicit searching will not be done unless an Admin Domain is explicitly setup and the default domain is a subdomain of the Admin Domain (per RFC 1535). If the name "scott" is not found here and Search domains are present, they are searched as well.

Search domain names

In Advanced User mode only, you may enter Search domains. See the "Domain Name Resolver Information" for complete details on how searching and the DNR work.

Domain Name Resolver Information

When a client of the DNR requests a name-to-address mapping, the DNR checks for a "." at the end of the name. If it exists, the name is assumed to be fully qualified (see RFCs 1034 and 1035 for an explanation of the Domain Name System). Otherwise, if the name contains at least one "." internally, it is considered to be provisionally fully qualified. Otherwise, the name is assumed to be partially qualified, and the DNR will begin a search for that name in the domain name in the "Domain name:" field. If it is not found there, and there is an Admin domain configured, implicit

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searches will take place as described in the "Admin domain" section. If the name is still not found, the Search domains are searched. For each search domain, the configured name servers are contacted in the order specified. If the name is resolved in the first search domain, that answer is returned. If an authoritative answer that the "name-does-not-exist" is returned, the DNR begins the search in the next configured search domain. The search continues through the domains, and if no match is found, the DNR will search the root domain if it makes sense to do so. The DNR has an overall timeout of 2 minutes after which it will abandon its search.

Subnet mask

This is for the subnet mask for the network the system is connected. For example, on a class C net which uses 4 bits of the host field for subnetting, the subnet mask should be entered as "255.255.255.240".

Router address

This is for the IP address of the default IP router located on the network the system is on.

Name server addr

This is for the IP address(es) of one or more Domain Name Servers.

Configuring Open Transport/TCP

Manual Configuration

To manually setup Open Transport/TCP, follow these steps:

1. Select the interface to use, or pick "AppleTalk (MacIP)" to run over AppleTalk on the interface selected in the AppleTalk control panel.
2. If an Ethernet interface is selected, a check box will appear offering the use of 802.3. By default, Open Transport/TCP uses Ethernet_II rather than 802.3.
3. Select "Manually" as the configuration method.
4. Fill in the IP address in dot notation (for example, 128.1.1.1).
5. Fill in the default domain extension to be used on name searches.
6. In Advanced User mode only, you may enter an Admin Domain. This is used to allow implicit searches.
7. Fill in the subnet mask in dot notation.
8. Fill in the IP address of the default IP router.
9. Fill in the IP address(es) of one or more Domain Name Servers.
10. In Advanced User mode only, additional search domains may be entered. See the preceding description of the Domain Name Resolver operation for details.
11. If a Hosts file is required, select it using the Hosts file button. For details about the Hosts file, see the description which follows.

DHCP Configuration

To use a DHCP server to setup Open Transport/TCP, follow these steps:

1. Select the interface to use in the AppleTalk control panel.
2. If an Ethernet interface is selected, a check box will appear offering the use of 802.3. By default, Open Transport/TCP uses Ethernet_II rather than 802.3.
3. Select "Using DHCP" as the configuration method.
4. In Advanced User mode only, you may enter an Admin Domain. This is used to allow implicit searches.
5. In Advanced User mode, a subnet mask may be entered but is not required. If a value is entered, it will be used if no subnet mask is returned from the DHCP server. Otherwise, any value entered is ignored.
6. In Advanced User mode, the manually entered IP addresses of routers are attached to the end of the (possibly empty) list of IP routers returned by the DHCP server.

7. In Advanced User mode, the manually entered IP addresses of Domain Name Servers are attached to the end of the (possibly empty) list of Name Servers returned by the DHCP server.
8. In Advanced User mode only, additional search domains may be entered. See the preceding description of the Domain Name Resolver operation for details.
9. If a Hosts file is required, select it using the Hosts file button. For details about the Hosts file, see the description which follows.

DHCP Address Leases

DHCP provides a network administrator with the ability to configure a host's IP address either for an unlimited or for a limited period of time. The limited lease period is under the network administrator's control and is non-negotiable. Leases may, however, be renewed at the option of the configuring server.

Open Transport/TCP fully supports DHCP address leases. Should an interface's IP address lease expire, the interface will be closed down. However, Open Transport/TCP will automatically attempt to renew any address lease that reaches its Renewal Interval, which defaults to half of the lease's lifetime, but may be configured to a different interval by the configuring server. Renewal will be attempted regardless of how many times the lease has already been renewed.

BootP Configuration

To use a BootP server to setup Open Transport/TCP, follow these steps:

1. Select the interface to use, or pick "AppleTalk (MacIP)" to run over AppleTalk on the interface selected in the AppleTalk control panel.
2. If an Ethernet interface is selected, a check box will appear offering the use of 802.3. By default, Open Transport/TCP uses Ethernet_II rather than 802.3.
3. Select "Using BootP " as the configuration method.
4. In Advanced User mode only, you may enter an Admin Domain. This is used to allow implicit searches.
5. In Advanced User mode, a subnet mask may be entered but is not required. If a value is entered, it will be used if no subnet mask is returned from the BOOTP server. Otherwise, any value entered is ignored.
6. In Advanced User mode, the manually entered IP address of the router is attached to the end of the (possibly empty) list of IP routers returned by the DHCP server.
7. In Advanced User mode, the manually entered IP addresses of Domain Name Servers are attached to the end of the (possibly empty) list of Name Servers returned by the DHCP server.
8. In Advanced User mode only, additional search domains may be entered. See the preceding description of the Domain Name Resolver operation for details.
9. If a Hosts file is required, select it using the Hosts file button. For details about the Hosts file, see the description which follows.

RARP Configuration

To use a RARP server to setup Open Transport/TCP, follow these steps:

1. Select the interface to use, or pick "AppleTalk (MacIP)" to run over AppleTalk on the interface selected in the AppleTalk control panel.
2. If an Ethernet interface is selected, a check box will appear offering the use of 802.3. By default, Open Transport/TCP uses Ethernet_II rather than 802.3.
3. Select "Using RARP" as the configuration method.
4. Fill in the default domain extension to be used on name searches.
5. In Advanced User mode only, you may enter an Admin Domain. This is used to allow implicit searches.
6. Fill in the subnet mask in dot notation.
7. Fill in the IP address of the IP router.
8. Fill in the IP address(es) of one or more Domain Name Servers.

9. In Advanced User mode only, additional search domains may be entered. See the preceding description of the Domain Name Resolver operation for details.

10. If a Hosts file is required, select it using the Hosts file button. For details about the Hosts file, see the description which follows.

MacIP Server Configuration

To use a MacIP Server to setup Open Transport/TCP, follow these steps:

1. Select "AppleTalk (MacIP)" as the interface to use. TCP will now run over AppleTalk on the interface selected in the AppleTalk control panel.
2. Select "Using MacIP Server" as the configuration method.
3. Select the zone the DDP/IP Gateway is in using the "Select Zone" button.
4. Fill in the default domain extension to be used on name searches.
5. In Advanced User mode only, you may enter an Admin Domain. This is used to allow implicit searches.
6. If a Hosts file is required, select it using the Hosts file button. For details about the Hosts file, see the description which follows.

Hosts File

Open Transport/TCP supports a Hosts file that may be used to supplement and/or customize the Domain Name Resolver's initial cache of information. The Hosts file is found in the System's Preferences folder. This file is parsed when Open Transport/TCP is initialized. As in MacTCP, the supported Hosts file features follow a subset of the Domain Name System Master File Format (see RFC 1035 page 33).

Supported features include blank lines, comments (indicated by a semicolon), and data entry. Comments may begin at any location in a line; they may follow data entry on the same line. A comment extends from the semicolon to the end of the line. Data entry must follow the format:

```
<domain><rr>[<comment>]
```

where is an absolute or Fully Qualified domain name (which, however, need not be terminated by a dot, but must contain at least one dot internally) and where

```
<rr>=[<t11>][<class>]<type><rdata> OR [<class>][<t11>]<type><rdata>
```

The only class currently supported is IN (Internet Domain); ttl (time to live; indicates the record's configured lifetime) is in seconds; and type can be A (host address), CNAME (canonical name of an alias), or NS (name server). If ttl is not present the entry is assumed to have an infinite lifetime; this may also be indicated by specifying a ttl of minus-one (-1).

\$INCLUDE and \$ORIGIN are not supported.

Examples of valid data entry lines including comments:

```
apple.com      A           130.43.2.2      ; address of host apple.com
foobar         CNAME      barfoo.apple.com ; canonical name for the host
               ; whose local alias is "foobar"
mit.edu        86400 NS    achilles.mit.edu ; name server for mit.edu domain,
               ; entry has a one-week lifetime
```

Open Transport/TCP's Hosts file support is somewhat more stringent than that of MacTCP. MacTCP permitted violation of the Fully Qualified requirement for <domain-name>, and this feature was often used to avoid the necessity for entering CNAME records by associating an address directly with a non-fully qualified name. For instance, this format:

```
charlie A 128.1.1.1
```

which was acceptable to the MacTCP DNR, is no longer permitted because of the use of domain search lists in Open Transport/TCP (charlie could potentially exist in any or all of the configured domains). If such a line exists in your hosts file, kOTBadNameError will be returned when the Hosts file is read. To accomplish the same effect, use this format instead:

```
charlie CNAME myhost.mydomain.edu
myhost.mydomain.edu A 128.1.1.1
```

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This associates the local alias "charlie" with the fully qualified domain name "myhost.mydomain.edu" and resolves it to the address 128.1.1.1. Use of local aliases is limited to CNAME entries; NS and A entries must use fully qualified domain names.

In general, use of the Hosts file is discouraged, as it often simply wastes memory by permanently configuring data that may only rarely be accessed. It is also highly susceptible to misuse by users who try to configure far too much information internally in order to avoid accessing DNS servers. Besides tying up memory, this practice is exactly the reason that the Domain Name System was developed in the first place - to eliminate the performance degradation caused by use of enormous hosts files.

Should a Hosts file be used, every effort should be made to keep it as small as possible and to only include entries that will be accessed frequently.

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