Domain Name Resolver (DNR) Configuration

This chapter provides an overview of the information required to customize Cisco IOS for S/390. It includes these sections:

- Introducing the Domain Name Resolver (DNR)

  Describes the basic concepts of domain name resolution.

- Services Provided by DNR

  Describes the services provided by the domain name resolver.

- Major Components of the Domain Name System (DNS)

  Describes the domain name space, name servers and resolvers.

- Initial DNR Customization

  Provides a quick startup customization for DNR.

- Configuring DNR in LOCAL or GLOBAL Mode

  Describes how to set up DNR for local or global resolution.

- Primary DNR Configuration Member (DNRCFGxx)

  Describes DNRCFGxx.

- Secondary DNR Members

  Describes the secondary DNR members such as DNRHSTxx, DNRALCxx, etc.

- Mapping Host Names (DNRHSTxx)

  Describes DNRHSTxx, which is used to resolve fully qualified domain names to Internet addresses.

- Host Name Aliases (DNRALCxx)

  Describes the DNRALCxx, which creates fully qualified domain names from partially qualified domain names.

- Search Lists (DNRSLCxx)

  Describes DNRSLCxx, which is used to specify the search list for the DNR component of Cisco IOS for S/390.

- Coordinating DNRALCxx and DNRSLCxx Configuration

  Describes how to coordinate the configuration of DNRALCxx and DNRSLCxx to enable Cisco IOS for S/390 users to specify partially qualified domain names as arguments to DNR requests that require a fully qualified domain name as a search argument.

- Name Servers (DNRNSCxx)

  Describes DNRNSCxx, which is used to specify the name servers assigned various domains for the DNR component of Cisco IOS for S/390.

- Setting Network Preferences (DNRNPCxx)

  Describes DNRNPCxx, which is used is used to order the preferred routes of networks.

- Setting Network Name to Network Number Mapping (DNRNETxx)

  Describes DNRNETxx, which is used to specify network name to network number mappings and vice versa.

- Setting Protocol Name to Address Mappings (DNRPRTxx)

  Describes DNRPRTxx, which is used to specify protocol name to address mappings and vice versa.

- Setting Protocol Name/Service Pair to Port Numbers (DNRSVCxx)

  Describes DNRSVCxx, which is used to specify the mappings from protocol name/service name pairs to port numbers and vice versa.

- Setting RPC Name-to-Program Mappings (DNRRPCxx)

  Describes DNRRPCxx, which is used to specify RPC name to RPC program number mappings and vice versa.

- Examples of DNR Customization

  Provides several examples of DNR configurations for different environments.

Introducing the Domain Name Resolver (DNR)

The DNR information base provides information about network objects by answering queries.To obtain information from the DNR, provide the name of some object known to the DNR. The DNR searches for the information associated with that name or attribute and returns the information.

The DNR task group provides services for both Cisco IOS for S/390 and its API application programs. DNR configuration members must be configured with site specific information. Without site specific configuration, Cisco IOS for S/390 itself and Cisco IOS for S/390 users must specify Internet addresses in attempts to communicate with remote hosts. Any site that wants to communicate with hosts by specifying a name must configure the DNR members.

Services Provided by DNR

DNR currently provides these services, with either the dirsrv() API call or the DNRGET TSO command:

- Given a host name, returns network address(es)
- Given a host name, returns the CPU and operating system information
- Given a host name, returns a list of well known services supported by host
- Given a host name, returns a list of host names designated as mail routers for the given host
- Given an alias name, returns the official host name and network address
- Given a network name, returns the network number
- Given a network number, returns the network name

- Given a protocol name and service name, returns the associated transport protocol address (in other words, TCP or UDP port number)
- Given a TCP or UDP port number, returns the associated protocol and service names
- Given a protocol name, returns the official protocol number
- Given an official protocol number, returns the protocol name
- Given an RPC service name, returns an RPC service number
- Given an RPC service number, returns an RPC service name

Major Components of the Domain Name System (DNS)

The DNS has these major components:

- Domain name space

  A tree structured name space that corresponds to the naming hierarchy of nodes (or hosts) in the name space.

- Name servers

  Hold information about the domain name space and provide answers to resolver's requests.

- Resolvers

  Extract information from name servers in response to client requests. DNR implements the resolver portion of the DNS and queries name servers for responses.

Locally Managed Names

Local names consist of those names defined in locally maintained configuration data sets, and can be any one of these types:

- Alias name (for hosts only)
- Network name
- Service name
- Protocol name

Such names are case insensitive and consist of alphanumeric characters from the EBCDIC character set (a-z, A-Z, 0-9). The dash (-) and underscore (_) characters may also be used as long as they are embedded within the name (in other words, does not appear at the beginning or end of the name). Locally managed names must be less than or equal to 40 characters in length.

Domain Name Specification

The DNS identifies hosts by the hierarchical domain name space. Using domain names, each DNS node is represented by a label which is the simple name of the node. A fully qualified domain name describes a path through the DNS to a particular node, beginning with the top level (root) node. The name is formed by concatenating the simple names (or labels) of each node in right-to-left sequence by periods (.) beginning with the top level domain. A 4-level domain name appears as:

```
level-4.level-3.level-2.level-1.
```

The period at the end of a domain name represents the root of the DNS and indicates the name is fully qualified. A domain name not terminated with a period is assumed to be partially qualified. The DNR constructs fully qualified names by appending qualifiers from a search list in a predetermined order.

Simple domain names (in other words, domain name labels) are case insensitive and consist of alphanumeric characters from the EBCDIC character set (a-z, A-Z, 0-9). The dash (-) and underscore (_) characters may also be used as long as they are embedded within the name (in other words, do not appear at the beginning or end of the name). Simple domain names must be less than or equal to 63 characters in length, and fully qualified domain names must be less than or equal to 255 characters in length, including the terminating period.

How DNR Resolves Host Names

In order for Cisco IOS for S/390 to make a connection to a host on the network, it must know the IP address of that host before it sends out the first packet. You can either supply the address (for example, Telnet 138.47.118.32), or you can give the name (for example, Telnet hobbes) and do a search to map that name to an IP address. This search is the primary function of DNR.

From FTP2, give the command **OPEN HOBBES** to connect to the remote host named HOBBES.

To resolve this name into an IP address that can be placed in a network packet, DNR makes these checks:

- Checks the DNRALCxx member to see if HOBBES is an alias. If there is a match, DNR uses the fully qualified name in the alias file and proceeds to the next step.

  Since HOBBES is not a fully qualified name (it does not end in a period), DNR appends the entries found in the DNRSLCxx member in an attempt to create one and checks the DNRALCxx table again (this example uses ND.EDU. and a period (.) as the search list entries). If there is a match at this point, it will be for an entry with an associated IP address and the check is completed.

- Checks to see if DNR is in GLOBAL or LOCAL mode for this request.

  If DNR is in LOCAL mode it searches the DNRHSTxx table with the fully qualified names HOBBES.ND.EDU. and HOBBES. If there is no match, DNR returns indicating no match was made.

  If DNR is in GLOBAL mode, it sends out queries to all the name servers listed in the DNRNSCxx member for HOBBES.ND.EDU. and HOBBES. If it does not receive a positive response in the allotted time (set by the DNR parameter of the GLOBAL statement in APPCFGxx), it returns indicating a timeout condition. If it receives a negative response from all servers, it returns indicating no match was made.

DNR Suffix Conventions

Like other Cisco IOS for S/390 configuration members, the DNR software ships with all task group members specified with the default 00. In other words, the primary configuration member is DNRCFG00. However, these members can be specified to something other than the default. Therefore, the members described in this document use xx (in other words, DNRCFGxx), to indicate that the last two digits can be specified to your choice.

Caution It is recommended that you make a copy of the DNRCFG00 that is shipped with Cisco IOS for S/390. If you apply SMP/E maintenance, the original DNRCFG00 may be overwritten.

Initial DNR Customization

Minimal DNR customization must occur before using Cisco IOS for S/390 for the first time. DNR, as distributed, is set to run in LOCAL mode. This means that all host addresses are resolved from either DNRALCxx or DNRHSTxx. Run the initial test in this mode to verify that name resolution is done correctly. If you have network name servers, you can configure DNR to point to them for name resolution. DNR configuration changes are implemented by either stopping (STOP) and starting (START) the DNR task group or by recycling the Cisco IOS for S/390 address space.

Be aware that many Cisco IOS for S/390 services, including SNMP, NFS, and SMTP, do not work properly if DNR is not configured properly.

The initial changes for each of the primary DNR configuration members are shown below.

DNR Member Name	Description
DNRCFGxx	This is the primary configuration member and contains pointers to the other members. The minimum change required for this member is to make a copy of the default DNRCFG00 in the PARM library and change the last two digits.
DNRHSTxx	This DNR host table is used by DNR in LOCAL mode to resolve host names. You must define LOCAL DNR usage in the GLOBAL statement in member APPCFGxx. In LOCAL mode, any syntactically correct host name is valid. In GLOBAL mode, the host names must match the server definitions. It is recommended that the LOCAL host be defined first in this member. The minimum change required for this member is to make a copy of the default DNRHST00 and change the last two digits. Enter this new name in the HOSTTABLE parameter of your DNRCFGxx member. Modify or add an entry to map the fully qualified name for this usage of Cisco IOS for S/390 to its IP address.
DNRALCxx	This DNR alias table identifies the Cisco IOS for S/390 host name, any alias names for hosts, and if you are running in global mode, you can place any host name entries here that are not defined on the name servers you are using. The alias table is searched in both modes and before either the host table or the network name servers. The minimum change required for this member is to make a copy of the default DNRALC00 and change the last two digits. Enter this new name in the ALIAS parameter of your DNRCFGxx member. Modify or add an entry to map the Cisco IOS for S/390 subsystem ID to the fully qualified host name for the system. The subsystem name must be defined as an alias. It is recommended that the LOCAL host be defined first in this member.
DNRNSCxx	This DNR name server table lists the names and IP addresses of the name servers DNR is to use to resolve host names or addresses. There are no changes required for this member. DNR is initially set up to run in LOCAL mode and the NAMESERVER parameter in DNRCFGxx is set to NONE. (And the DNR parameter in the APPCFGxx GLOBAL statement is set to LOCAL.)
DNRSLCxx	This table makes fully qualified names out of partially qualified ones. It appends the entries in this table to the name provided and then attempts to resolve it. The minimum change required for this member is to make a copy of the default DNRSLC00 and change the last two characters. Enter this new name in the SEARCHLIST parameter of your DNRCFGxx member. Modify the OUR.COM entry, inserting your own domain name.

With these minimum configuration changes in place, Cisco IOS for S/390 is able to resolve its own name and IP address. However, you are not able to address hosts in your network by name with the client commands. To do this, you must add entries for them to either the DNRHSTxx or DNRALCxx members.

You can use the DNRGET command (read the *Cisco IOS for S/390 System Management Guide* for information about this command) to query DNR and verify it is working correctly.

Configuring DNR in LOCAL or GLOBAL Mode

The DNR task group is an information base that keeps track of hosts in the network. It consists of locally configured information and optional global information. Corresponding to this data, Cisco IOS for S/390 DNR may be configured in LOCAL mode, defined in the GLOBAL statement in member APPCFGxx. Likewise, Cisco IOS for S/390 users may write applications that issue the DIRSRV macro (used to invoke the DNR facilities), specifying LOCAL resolution.

- LOCAL requests instruct DNR to search locally configured configuration members to satisfy DNR queries.
- GLOBAL requests are resolved using the DNR implementation of the Domain Name System (DNS).

The configuration data read by the DNR at initialization is contained in these members of the PARM data set. Table 7-1 lists the required member configuration:

Table 7-1 DNR Configuration Members

	Cisco IOS for S/390		API	
Member Name	**Local Mode**	**Global Mode**	**Local Requests**	**Global Requests**
DNRCFGxx	Required	Required	Required	Required
DNRHSTxx	Required	Required	Required	Required
DNRALCxx	Required	Required	Required	Required
DNRSLCxx	Required	Required	Required	Required
DNRNSCxx	n/a	Required	n/a	Required
DNRNPCxx	Optional	Required	Optional	Required
DNRPRTxx	n/a	n/a	Optional	Optional
DNRNETxx	n/a	n/a	Optional	Optional
DNRSVCxx	n/a	n/a	Optional	Optional
DNRRPCxx	n/a	n/a	Optional	Optional

Secondary DNR Members describes each of the DNR configuration members.

Caution When customizing the DNR task group, *do not* change the PARM members that were shipped with Cisco IOS for S/390. These members are under SMP/E control and may be replaced when maintenance is applied. Instead, make a copy of the member you want to customize, changing the default suffix 00 to your own unique suffix (for example, 01).

Primary DNR Configuration Member (DNRCFGxx)

The primary DNR configuration member in the PARM data set is DNRCFGxx. It specifies the main configuration parameters for the DNR task group. It also specifies DNR initialization parameters and the names of the secondary DNR configuration members.

You should make a copy of the default DNRCFG00 in the PARM library and change the last two digits. In this new copy, you should set the APISUBSYS (if different than the default ACSS) and specify the names of the secondary DNR configuration members.

To the default DNRCFG00 member, specify CNFG(xx) in the START DNR command in the STARTxx member of the PARM data set.

POOLDEF Statement Syntax

The first statement in the DNRCFGxx member is the POOLDEF statement.

Caution The POOLDEF statement specifies the parameters related to a required storage pool named DSRB. This pool must be defined in this member; do not delete this POOLDEF statement as there are no defaults for the associated storage pool.

Note IFS storage pool utilization can be monitored using the **POOL** operator command. You might need to adjust the parameters associated with these pools. Do not change the POOLDEF parameter unless monitoring indicates that a change is needed. For tuning purposes, issue the POOL operator command and adjust accordingly based on "low water mark" and buffer amounts allocated. In all cases where the POOLDEF statements are altered, exercise care in implementing these changes.

Refer to Defining Control Block Pools (POOLDEF Statement) for information on POOLDEF statement syntax.

DNR Statement Syntax

Use this syntax with the DNR statement:

DNR [ALIAS (DNRALCxx)]

[APISUBSYS (*subsystem_name***)]**

[CYCLEMAX (*number***)]**

[HOSTTABLE (DNRHSTxx)]

[INTERNALTRACE | NOINTERNALTRACE]

[MAXSENDS (*number***)]**

[MAXTIME (*number***)]**

[NAMESERVER (DNRNSCxx)]

[NETWORK (DNRNETxx)]

[NETWORKPREF (DNRNPCxx)]

[PROTOCOL (DNRPRTxx)]

[QUERYWAIT (*number***)]**

[RECURSIVE | NONRECURSIVE]

[RPCNAMES (DNRRPCxx)]

[SEARCHLIST (DNRSLCxx)]

[SERVICES (DNRSVCxx)]

[TRACE | NOTRACE]

Syntax Description

ALIAS (DNRALCxx)	Specifies the member name of the alias configuration member. This member specifies alias names to the hosts. Default: DNRALC00
APISUBSYS (*subsystem_name*)	Specifies the MVS subsystem name of the API subsystem. The special name of **** indicates that the API subsystem resides in the same address space with the DNR task group. Default: ****
CYCLEMAX (*number*)	Specifies the maximum number of times to try the name server list. Default: 3
HOSTTABLE (DNRHSTxx)	Specifies the member name of the local host name configuration member. This member specifies the names and Internet addresses of hosts whose names are resolved locally (in other words, without access to name servers). Default: DNRHST00
INTERNALTRACE | NOINTERNALTRACE	Specifies whether the Domain Name Resolver writes internal trace records to the DNRLOG and DNRERR DD data sets. Default: NOINTERNALTRACE
MAXSENDS (*number*)	Specifies the maximum number of times that a single query to a name server is transmitted. Default: 10
MAXTIME (*number*)	Specifies the maximum number of seconds allowed to resolve any request. Default: 90
NAMESERVER (DNRNSCxx)	Specifies the member name of the name server configuration member. This member is used to specify the name server(s) associated with various domains. Default: DNRNSC00
NETWORK (DNRNETxx)	Specifies the member name of the local network name configuration member. This member specifies the names and network addresses of networks. Default: DNRNET00

NETWORKPREF (DNRNPCxx)

Specifies the member name of the network preference configuration member. This member specifies the preference of networks for remote hosts that are multihomed (in other words, hosts that have multiple network attachments).

Default: DNRNPC00

PROTOCOL (DNRPRTxx)

Specifies the member name of the local protocol name configuration member. This member specifies the names and protocol numbers of protocols.

Default: DNRPRT00

QUERYWAIT (*number*)

Specifies the number of seconds to wait before retrying a query to a name server.

Default: 2

RECURSIVE | NONRECURSIVE

Specifies whether the domain name resolver requests recursive or non-recursive requests. DNR is directed to only use the name servers in file DNRNSCxx when RECURSIVE is set in GLOBAL mode. You must specify the RECURSIVE parameter on a local network utilizing firewalls in GLOBAL mode.

RECURSIVE DNR GLOBAL mode implies that the servers in the name server file DNRNSCxx are responsible for providing definitive answers back to DNR queries.

The NONRECURSIVE parameter tells DNR to use other name servers (as it learns about them) to resolve DNR queries. Running DNR in GLOBAL mode with NONRECURSIVE parameter set generates increasing amounts of superfluous network activity as DNR learns about other name servers beyond the local firewall.

Default: NONRECURSIVE

RPCNAMES (DNRRPCx)

Specifies the member name of the local RPC name configuration member. This member specifies the RPC names and RPC numbers associated with that service.

Default: DNRRPC00

SEARCHLIST (DNRSLCxx)

Specifies the member name of the search list configuration member. This member specifies the search strings that are appended to incomplete domain name search strings.

Default: DNRSLC00

SERVICES (DNRSVCxx)

Specifies the member name of the local services name configuration member. This member specifies the service name and protocol name and port number associated with that service.

Default: DNRSVC00

TRACE | NOTRACE

Specifies whether the domain name resolver writes trace records to the DNRLOG and DNRERR DD data sets for each Domain Name System message DNR sends or receives.

Default: NOTRACE

Controlling DNR Member Processing

If a secondary configuration member is not to be processed during DNR task group initialization, specify the member name NONE in the appropriate parameter.

If the local host configuration member is not to be processed at startup, specify this command:

```
HOSTTABLE(NONE)
```

Note Specifying the member name NONE in the NAMESERVER parameter causes all DIRSRV macro requests issued with OPTCD=GLOBAL to be processed as if OPTCD=LOCAL was coded. Read *Cisco IOS for S/390 Assembler API Macro Reference* for more information about the DIRSRV macro.

DNRCFGxx Examples

This example shows the usage of the DNRCFGxx member:

```
*-------------------------------------------------------------*
*       SPECIFY POOL CONFIGURATION PARAMETERS
*-------------------------------------------------------------*
POOLDEF NAME ( DSRB )
        INITIAL ( 16 )
        MINIMUM ( 24 )
        EXPAND ( 8 )
*-------------------------------------------------------------*
*       SPECIFY DNR START UP PARAMETERS
*-------------------------------------------------------------*
DNR APISUBSYS(****)
    NAMESERVER ( NONE )
    ALIAS ( DNRALC00 )
    SEARCHLIST ( DNRSLC00 )
    NETWORKPREF ( DNRNPC00 )
    HOSTTABLE ( DNRHST00 )
    NETWORK ( DNRNET00 )
    PROTOCOL ( DNRPRT00 )
    SERVICES ( DNRSVC00 )
    RPCNAMES ( DNRRPC00 )
    CYCLEMAX ( 04 )
    QUERYWAIT ( 06 )
    MAXSENDS ( 05 )
```

```
    NONRECURSIVE
    NOTRACE
    NOINTERNALTRACE
```

This example shows DNRCFGxx in GLOBAL mode. Note that the suffix GL is used to indicate use of GLOBAL mode.

```
*================================================*
*SPECIFY POOL    CONFIGURATION PARAMETERS
*================================================*
POOLDEF NAME ( DSRB )
        INITIAL ( 16 )
        MINIMUM ( 24 )
        EXPAND ( 8 )
*================================================*
*SPECIFY DNR START UP PARAMETERS
*RPCNAMES ( DNRRPC00 )
*================================================*
DNR     APISUBSYS ( **** )
        NAMESERVER ( DNRNSCGL )
        ALIAS ( DNRALCGL )
        SEARCHLIST ( DNRSLCGL )
        NETWORKPREF ( DNRNPCGL )
        HOSTTABLE ( DNRHSTGL )
        NETWORK ( DNRNETGL )
        PROTOCOL ( DNRPRT00 )
        SERVICES ( DNRSVC00 )
        CYCLEMAX ( 04 )
        QUERYWAIT ( 03 )
        MAXSENDS ( 03 )
        MAXTIME ( 90 )
        RECURSIVE
        TRACE
        INTERNALTRACE
```

Recommendations

It is recommended that you always set APISUBSYS (****) so that the subsystem is always associated with the Cisco IOS for S/390 job.

It is recommended that you set the parameter INTERNALTRACE on the DNR statement.

You *must* specify the RECURSIVE parameter on a local network utilizing firewalls in GLOBAL mode. The RECURSIVE parameter directs DNR to only use the name servers in its name server list (in file DNRNSCxx). The NONRECURSIVE parameter directs DNR to use other name servers as it learns about them. In a firewall environment, DNR sends out queries to other servers that cannot be answered. Running DNR in GLOBAL mode with the NONRECURSIVE parameter set generates increasing amounts of superfluous network activity as DNS learns about other name servers beyond the local firewall.

If you are having problems resolving host names, turn on the TRACE parameter on the DNR statement.

All entries in member DNRCFGxx must have sequence numbers or all the sequence numbers must be blank. Mixed sequence numbers and blanks lead to configuration parsing errors.

This example shows DNRCFGxx in LOCAL mode. The suffix LC is used to indicate the use of LOCAL mode.

```
*================================================*
*SPECIFY POOL    CONFIGURATION PARAMETERS
*================================================*
POOLDEF NAME ( DSRB )
        INITIAL ( 16 )
        MINIMUM ( 24 )
        EXPAND ( 8 )
*================================================*
*SPECIFY DNR START UP PARAMETERS
*================================================*
DNR     APISUBSYS ( **** )
        ALIAS ( DNRALCLC )
        SEARCHLIST ( DNRSLCLC )
        NAMESERVER ( NONE )
        NETWORKPREF ( DNRNPCLC )
        HOSTTABLE ( DNRHSTLC )
        NETWORK ( DNRNETLC )
        CYCLEMAX ( 03 )
        QUERYWAIT ( 2 )
        MAXSENDS ( 10 )
        MAXTIME ( 90 )
        RECURSIVE
        TRACE
        INTERNALTRACE
```

In local mode, all hosts will be resolved from the files DNRALCxx and DNRHSTxx.

NAMESERVER(NONE) on the DNR statement indicates that there is no domain name server in the network to resolve host names.

It is recommended that you turn on INTERNALTRACE on the DNR statement.

If you are having problems resolving host names, turn on the TRACE parameter on the DNR statement.

All entries in file DNRCFGxx must have sequence numbers or all the sequence numbers must be blank. Mixed sequence numbers and blanks lead to configuration parsing errors.

Secondary DNR Members

DNR uses nine secondary configuration members that are referenced from within the DNRCFGxx member. These members provide directory information that enables DNR to satisfy or aid in processing application program requests. At system startup, these members are read and customization data is stored for processing by the DNR. If any of these members are changed, the DNR task group must be stopped and restarted for the new changes to take effect.

The DNR configuration members are 80-character members consisting of fields separated by spaces. Entries that require more than one line can be extended by entering a special character sequence. A dash (-) placed at the end of a line indicates the next field continues on the next line. A plus sign (+) placed at the end of a line indicates the field continues on the next line.

The address:

```
OUR.COM. A.OUR.COM. 26.26.26.26 may be entered as:

OUR.COM
A.OUR.COM. 26.26.26.26
OUR.COM. A.OUR. +
COM. 26.26.26.26
```

Mapping Host Names (DNRHSTxx)

The DNRHSTxx member in the PARM data set implements a static host table. It is referenced by the HOSTTABLE parameter of the DNR statement in DNRCFGxx. This member satisfies Cisco IOS for S/390 and its API requests to resolve fully qualified domain names to Internet addresses. Use DNRHSTxx for LOCAL requests and as a backup for GLOBAL requests. Configure DNRHSTxx with the fully qualified names and Internet addresses of hosts at your site.

Note It is recommended that the LOCAL host be defined first in this member.

The format of the DNRHSTxx member shows the host domain name followed by the host address in dotted decimal format:

```
CETI.OUR.COM.      129.192.192.235
IBM.OUR.COM.       129.192.192.111
IBM.OUR.COM.       129.192.192.112
```

Host names must end with a period (.) for proper name resolution. Host names are used in local mode.

Host Name Syntax

hostname hostaddress comment

Syntax Description

hostname Specifies the fully qualified host name.

Default: None (required field).

hostaddress Specifies the Internet address in dotted decimal notation assigned to the host name referenced as hostname.

Default: None (required field).

comment Specifies an optional comment.

Default: None.

DNRHSTxx Example

This example shows the usage of the host name:

```
LOOPBACK.OUR.COM.   127.0.0.1      TCP/IP LOOPBACK ADDRESS
A.OUR.COM.          192.16.73.1
A.OUR.COM.          192.16.73.2

LOCALHOST.          127.0.0.1
NIC.DDN.MIL.        192.67.67.20
A.OUR.COM.          192.16.73.1
B.OUR.COM.          192.16.73.2
```

Configuring the DNRHSTxx member enables the DNR to satisfy all LOCAL host name to Internet address requests given the fully qualified domain name listed in the host domain name field of the DNRHSTxx member.

This file must contain, at a minimum:

- The local host name and address
- The local loopback name and address (for example, LOOPBACK 127.0.0.1)

If you have DNR configured in GLOBAL mode, this member must also contain the fully qualified names of the Domain Name Servers in the network.

If a site's DNRHSTxx configuration member includes the items listed in the previous distributed DNRHST00 member list, and a Cisco IOS for S/390 user attempts to establish an FTP session with B.OUR.COM and Cisco IOS for S/390 is configured in LOCAL mode, DNR returns 192.16.73.2 as the address to Cisco IOS for S/390, enabling the connection to be established.

Alternatively, you can specify partially qualified names instead of fully qualified names.

You can establish an FTP session to B.OUR.COM. by specifying a partially qualified host name such as B.

In order to specify a host name other than the fully qualified name given in the host domain name field of the DNRHSTxx member, the DNRALCxx member and/or the DNRSLCxx member must be configured. DNRALCxx and/or DNRSLCxx members must be configured regardless of GLOBAL or LOCAL requests.

GLOBAL Example

This example shows DNRHSTxx in GLOBAL mode:

```
MVS.SITE1.COM.       138.22.140.117
MVS.                 138.22.140.117
ACSS.                138.22.140.117
SUN2.SITE1.COM.      138.22.140.44
SUN2.                138.22.140.44
LOOPBACK.SITE1.COM.  127.0.0.1
LOOPBACK.            127.0.0.1
```

For each host, place two mappings into the file:

- the fully qualified host name ending with a period that maps to an IP address.
- the host name ending with a period that maps to an IP address.

Map the subsystem name ending with a period map to an IP address.

The only hosts needed in global are the MVS Cisco IOS for S/390 host, loopback, and the domain name server host.

All entries in file DNRHSTxx must have sequence numbers or all the sequence numbers must be blank. Mixed sequence numbers and blanks lead to configuration parsing errors.

LOCAL Example

This example shows DNRHSTxx in LOCAL mode:

```
MVS.SITE1.COM.       138.22.140.117
MVS.                 138.22.140.117
ACSS.                138.22.140.117
MVS1.SITE1.COM.      138.22.140.13
MVS1.                138.22.140.13
MVS3.SITE1.COM.      138.22.140.136
MVS3.                138.22.140.136
SUN2.SITE1.COM.      138.22.140.165
SUN2.                138.22.140.165
SUN1.SITE1.COM.      138.22.140.165
SUN1.                138.22.140.165
OLDSUN.SITE1.COM.    138.22.140.160
OLDSUN.              138.22.140.160
SUNHQ.SITE1.COM.     138.22.140.128
SUNHQ.               138.22.140.128
LOOPBACK.SITE1.COM.  127.0.0.1
LOOPBACK.            127.0.0.1
```

For each host, place two mappings into the file.

- the fully qualified host name ending with a period that maps to an IP address
- the host name ending with a period that maps to an IP address

Map the subsystem name ending with a period to an IP address.

Note All hosts to be resolved by a name must be in files DNRALCxx and DNRHSTxx. You can still get to a host by using an IP address that is not in files DNRALCxx and DNRHSTxx.

All entries in file DNRHSTxx must have sequence numbers or all the sequence numbers must be blank. Mixed sequence numbers and blanks lead to configuration parsing errors.

Host Name Aliases (DNRALCxx)

The DNRALCxx member in the PARM data set creates fully qualified domain names from partially qualified domain names. It is referenced by the ALIAS parameter of the DNR statement in DNRCFGxx. This member must be configured with the fully qualified domain name of the Cisco IOS for S/390 subsystem name. This member must also be configured in conjunction with the DNRSLCxx member to enable Cisco IOS for S/390 users to specify partially qualified domain names (not ending in a period) as arguments to DNR requests that require a fully qualified domain name as a search argument. Configure DNRALCxx with site specific information.

DNRALCxx Format

The member format of the DNRALCxx member is

Search String	Replacement String	Comments
ACSS	MVS.OUR.COM.	PUT IN OUR TCP/IP SUBSYSTEM NAME.
MVS	MVS.OUR.COM.	PUT IN OUR TCP/IP ALIAS.
NEPTUNE	NEPTUNE.OUR.COM.	ALIASES TO AVOID SEARCH LISTS.
CETI	CETI.OUR.COM.	ALIASES TO AVOID SEARCH LISTS.
ALPHA	A.OUR.COM.	3.0 ALPHA SITE.
B.ASU.EDU.	26.1.2.3	DOES NOT PARTICIPATE IN DNS.

The format of the DNRALC00 member distributed with Cisco IOS for S/390 is shown below:

ACSS	A.OUR.COM.	OUR TCP/IP SUBSYSTEM NAME.
MVS	A.OUR.COM.	AN ALIAS FOR OUR LOCAL HOST.
LOOPBACK	127.0.0.1	TCP/IP LOCAL HOST NAME.
LOCALHOST127.0.0.1	TCP/IP LOCAL HOST NAME.	
A	A.OUR.COM.	ALIAS TO AVOID SEARCH LISTS.
B	1.1.1.1	DOES NOT PARTICIPATE IN DNS.

Specify at least one alias entry for each copy of Cisco IOS for S/390 running at your site. The entry must have the Cisco IOS for S/390 Subsystem Name mapped to the fully qualified host name (in other words, ACSS A.OUR.COM).

The alias configuration member, DNRALCxx, works very closely with the search list configuration member (DNRSLCxx).

Note It is recommended that the LOCAL host be defined first in this member.

You must specify an alias entry that maps the Cisco IOS for S/390 subsystem ID to the host name; the replacement string must end in a period. Failure to do this will cause certain tasks to terminate (in other words, USMTP) and also causes the SNM task group to fail.

Search String Syntax

search_string replacement_string comment

Syntax Description

search_string Specifies an alias.

Default: None

replacement_string Specifies a string used as a substitute string for the alias referenced as search_string.

Default: None

comment Specifies an optional comment.

Default: None

Host Aliases Examples

In these examples:

- All hosts will be resolved from files DNRALCxx and DNRHSTxx.
- Subsystem ACSS maps out to fully qualified hostname ending with a period.
- MVS hostname maps out to fully qualified MVS hostname ending with a period.
- Our domain name server host hobbes maps out to its full hostname ending with a period.
- The only alias that maps out to an ip address (in DNRALCxx file) should be loopback (127.0.0.1).
- Notice the shorthand alias on the left does not end with a period, while all the fully qualified names on the right end with a period.
- All entries in file DNRALCxx must have sequence numbers or all the sequence numbers must be blank. Mixed sequence numbers and blanks lead to configuration parsing errors.

This example shows the usage of the host aliases:

```
ACSS A.OUR.COM.              TCP/IP SUBSYSTEM NAME
MVS A.OUR.COM.               AN ALIAS FOR OUR LOCAL HOST
LOOPBACK  LOOPBACK.OUR.COM.  TCP/IP LOOPBACK
A A.OUR.COM.                 ALIAS TO AVOID SEARCHLIST
```

This entry in the DNRALCxx configuration member lets users connect to A.OUR.COM by ACSS:

```
ACSS A.OUR.COM.
```

GLOBAL Mode Example

This example shows DNRALCxx configured in GLOBAL mode:

```
ACSS MVS.       SITE1.COM.
MVS             MVS.SITE1.COM.
HOBBES          HOBBES.SITE1.COM.
LOOPBACK        127.0.0.1
LOCALHOST       127.0.0.1
```

LOCAL Mode Example

This example shows DNRALCxx in LOCAL mode:

```
ACSS        MVS.SITE1.COM.
MVS         MVS.SITE1.COM.
MVSHQ       MVSHQ.SITE1.COM.
SUN1        SUN1.SITE1.COM.
SUN2        SUN2.SITE1.COM.
LOOPBACK   127.0.0.1        TCP/IP LOCAL HOST NAME
LOCALHOST  127.0.0.1        TCP/IP LOCAL HOST NAME
```

Search Lists (DNRSLCxx)

Use the DNRSLCxx member to specify the search list for the DNR component of Cisco IOS for S/390. This member name is referenced as the argument in the SEARCHLIST operand of the DNR statement in the DNRCFGxx member.

The DNRSLCxx member in the PARM data set creates fully qualified domain names from partially qualified domain names. Configure this member in conjunction with the DNRALCxx member to enable Cisco IOS for S/390 users to specify partially qualified domain names (not ending in a period) as arguments to DNR requests that require a fully qualified domain name as a search argument. Configure DNRSLCxx with site-specific information.

The domain field must end in a period (.).

Search List Syntax

domain_name comment

Syntax Description

domain_name	Specifies a fully qualified domain name. This parameter specifies search strings that are appended to incomplete domain name search strings to create fully qualified names. Default: None
comment	Specifies an optional comment. Default: None

DNRSLCxx Usage

This table shows the format of the DNRSLCxx member:

Fully Qualified Domain String	Comments
.	Try root first,
OUR.COM.	...then OUR.COM,
ISI.EDU.	...then try this.

The format of the default DNRSLC00 member distributed with Cisco IOS for S/390 is shown here:

```
OUR.COM.          <=== Place your domain here.
.                 Put root level next.
```

On receipt of a partially qualified name, the DNR must be able to search the directory and create a fully qualified domain name whether the request is LOCAL or GLOBAL. The DNRSLCxx member information is used with the Cisco IOS for S/390 subsystem name configured in the DNRALCxx member to build a search list.

If the DNRSLCxx at your site contains this entry:

```
THEIR.COM.
MY.EDU.
```

And your DNRALCxx contains this entry:

```
ACSS      A.OUR.COM
```

DNR creates this search list:

```
THEIR.COM.
MY.EDU.
OUR.COM.
.
```

On receipt of a partial domain name, DNR concatenates the partial name with each item in the search list and searches the directory for the qualified names. It performs a check for string uniqueness, making it possible to reorder the local host domain search by adding a level to the search list.

If the site DNRSLCxx contains this entry:

```
OUR.COM.
.
THEIR.COM.
MY.EDU.
```

And your DNRALCxx contains this entry:

```
ACSSA.OUR.COM
```

DNR creates this search list:

```
OUR.COM.
.
THEIR.COM.
MY.EDU.
COM.
```

List the local domain followed by the root domain (.) first in the site DNRSLCxx.

All entries in file DNRSLCxx must have sequence numbers or all the sequence numbers must be blank. Mixed sequence numbers and blanks lead to configuration parsing errors.

Search List Examples

Here is an example of DNRSLCxx. The configuration for both GLOBAL and LOCAL is the same:

```
SITE1.COM.
COM.
. ROOT
```

The first line contains your local domain name SITE1.COM. ending with a period.

The second line contains the last qualifier of your domain name COM. ending with a period.

The third line contains the last qualifier, which is a period (.)

Coordinating DNRALCxx and DNRSLCxx Configuration

As stated, the purpose of DNRALCxx and DNRSLCxx configuration files is to enable Cisco IOS for S/390 users to specify partially qualified domain names as arguments to DNR requests that require a fully qualified domain name as a search argument. Without the DNRALCxx and DNRSLCxx configuration files, Cisco IOS for S/390 itself and its users would be required to specify fully qualified domain names as arguments to DNR requests that require fully qualified domain names. Configuration of these files, however, enables DNR users to request information giving partially qualified names.

When the DNR receives a partially qualified name, it must be able to search the directory and create a fully qualified domain name whether the request is LOCAL or GLOBAL. A minimum configuration maps your Cisco IOS for S/390 subsystem name to the Cisco IOS for S/390 legal fully qualified host name in the DNRALCxx member. This enables your site to resolve all names within your domain by giving the host name as a partially qualified name.

If your DNRALCxx configuration member contains the entry:

```
ACSS      A.OUR.COM.
```

and your DNRSLCxx configuration contains this entry

```
OUR.COM.
COM.
.
```

Cisco IOS for S/390 users are able to connect to A.OUR.COM. by specifying either A, A.OUR, or A.OUR.COM partially qualified names.

The DNR is able to resolve all names within the local domain (OUR.COM. in the previous example) if the DNRALCxx member includes the proper subsystem name configuration.

To connect to domains other than the local domain without having to specify a fully qualified name, configure DNRSLCxx with the remote domain.

To enable Telnet users to connect to C.THEIR.COM. by specifying C, configure DNRSLCxx with this entry:

```
THEIR.COM.
```

Alternatively, a site may list the specific alias in the DNRALCxx member this way:

```
C C.THEIR.COM.
```

However, the entry in DNRALCxx in this example lets DNR resolve C to C.THEIR.COM. only. Entering THEIR.COM in the search list lets Cisco IOS for S/390 users resolve all names within the THEIR.COM. domain specifying the host label only.

DNR Alias and Search List Recommendations

Here are some recommendations for configuring the DNRALCxx and DNRSLCxx members:

- The DNRALCxx member is consulted before the DNRSLCxx member. If the search string is found, the replacement string is used for further processing. Therefore, if the replacement string is not a fully qualified name, the replacement string is concatenated with the search list strings configured in DNRSLCxx to form fully qualified names.
- The DNRALCxx member search is not recursive.

  If DNRALCxx is configured with these entries:

  ```
  A         MVS
  MVS       A.OUR.COM.
  ```

  A request for A resolves to MVS only. If an application program wants a recursive search, it must be included in the application program. Likewise, the search returns only one replacement string; therefore, the search string must be unique. However, several search strings can have the same replacement string.
- For performance reasons, configure frequently accessed host names in the DNRALCxx member giving their fully qualified name as the replacement string. This decreases the number of table lookups (LOCAL) or DNS requests (GLOBAL) sent per DNR request.
- If the dotted decimal representation of an Internet address is given as the replacement string in DNRALCxx, DNR returns the binary representation of this string in a name to address resolution request. This feature enables joint communication with hosts participating in the domain name system and hosts not participating in the domain system.

Name Servers (DNRNSCxx)

Use the DNRNSCxx member to specify the name servers assigned various domains for the DNR component of Cisco IOS for S/390. This member name is referenced as the argument in the NAMESERVER operand of the DNR statement in the DNRCFGxx member.

This member must contain site specific information if Cisco IOS for S/390 is configured in GLOBAL mode or if any API application programs issue GLOBAL requests. If running in LOCAL mode, specify NAMESERVER(NONE) in DNRCFGxx to ensure usage of LOCAL tables.

The domain and nameserver fields must end in a period (.).

Name Server Syntax

domain nameserver nsiaddr comment

Syntax Description

domain Specifies a fully qualified domain.

Default: None (required field).

nameserver Specifies a fully qualified name of the name server authoritative for the domain referenced by domain.

Default: None (required field).

nsiaddr Specifies the Internet address in decimal dot notation of the name server referenced by nameserver.

Default: None (required field).

comment Specifies an optional comment.

Default: None.

DNRNSCxx Operation

Table 7-2 shows the format of the DNRNSCxx member:

Table 7-2 DNRNSXxx member

Zone Name	Server Name	Server Address	Comments
INC.COM.	A.INC.COM	192.16.73.1	Our authoritative first.
INC.COM.	B.INC.COM	192.16.73.2	Our authoritative first.
.	NIC.DDN.MIL	126.0.0.73	1st root name server.
.	A.ISI.EDU	26.3.0.13	2nd root name server.

Here is the format of the DNRNSC00 member distributed with Cisco IOS for S/390:

OUR.COM.	SERVERA.OUR.COM	192.16.43.4	<== Set server for your domain
OUR.COM.	SERVERB.OUR.COM	192.16.73.3	<== Set server for your domain
.	NS.NIC.DDN.MIL	192.67.67.53	Root name server
.	A.ISI.EDU	26.3.0.103	Root name server
.	NS.NASA.GOV	28.102.16.10	Root name server

Here is an example of DNRNSCxx configured for GLOBAL mode:

```
IN-ADDR.ARPA.       SUNSERVER.SITE1.COM.    138.22.140.44
SITE1.COM.          SUNSERVER.SITE1.COM.    138.22.140.44
.                   NS.NIC.DDN.MIL.         192.67.67.53
```

138.22.140.44 is the local network domain resolver host.

The first line must contain IN-ADDR.ARPA. going to your local domain network server host (ending with a period) followed by its IP address.

The second line must contain an installation's domain name (colmbia.com.) (ending with a period) going to your local domain network server host (ending with a period) followed by its IP address.

192.67.67.53 is the DDN network domain resolver host.

The third line goes out to the NIC to resolve remote hosts.

If an installation has no Internet connection, or if there is a firewall that prevents DNR query responses from returning, then the third line would look like (except the period would start in column 1):

```
. SUNSERVER.SITE1.COM.     138.22.140.44
```

All entries in file DNRNSCxx must have sequence numbers or all the sequence numbers must be blank. Mixed sequence numbers and blanks lead to configuration parsing errors.

On receipt of an application program request, the DNR builds a list of name servers to query for each outgoing request. This list is built by choosing the “closest” name servers for a particular domain name. The “closest” name server is determined by matching the domain of the search string provided in the application program request and the domains indicated in this member. This list is then sorted according to the networks specified in the DNRNPCxx configuration member described here. If running in LOCAL mode, specify NAMESERVER(NONE) in DNRCFGxx to ensure the use of local tables; this is the default as shipped in DNRCFGxx.

When queries are sent to name servers, a name server may return an address of a name server that is closer to the requested domain. These name server “delegation” records are added to the cache maintained by the DNR and are used for subsequent queries. Therefore, the DNRNSCxx member contains a list of name servers to be used on initial queries so long as delegations are not received.

If this member is empty, all GLOBAL requests are processed as if they were requested with the LOCAL option.

For reliability reasons, include the name servers for the local host's domain and two root name servers in this member. Also, the local host's domain name server should be attached to the local subnetwork.

To use a local name server (instead of a networked name server) to resolve addresses, specify the local name server in the DNRNSCxx member. (This may be particularly important for networks protected by a “fire wall”, in which case name server queries may not be able to be returned to your local DNR server). It is also recommended that reverse address lookup (IN-ADDR.ARPA) is used.

DNRNSCxx member format:

```
IN-ADDR.ARPA.   SERVERA.OUR.COM.   192.16.43.4
OUR.COM.        SERVERA.OUR.COM.   192.16.43.4
IN-ADDR.ARPA.   SERVERB.OUR.COM.   192.16.73.3
OUR.COM.        SERVERB.OUR.COM.   192.16.73.3
```

Name Servers Example

This example shows the usage of the name servers:

```
. NIC.DDN.MIL.    26.0.0.73   ROOT NAME SERVER
. NIC.DDN.MIL.    10.0.0.51   ROOT NAME SERVER
. A.ISI.EDU.      26.3.0.13   ROOT NAME SERVER
```

Setting Network Preferences (DNRNPCxx)

The DNRNPCxx member in the PARM data set is used to order the preferred routes of networks. It is referenced by the NETWORKPREF parameter of the DNR statement in DNRCFGxx. This member, used by the DNR, affects the order of name servers that are queried. The list is also used to order returned address lists when a remote host is multi-homed. This member must contain site specific information if Cisco IOS for S/390 is configured in GLOBAL mode or if any Cisco IOS for S/390 application programs issue GLOBAL requests.

Network Preferences Syntax

network comment

Syntax Description

network Specifies a network address in dotted decimal notation.

Default: None

comment Specifies an optional comment.

Default: None

DNRNPCxx Configuration

Table 7-3 shows the member format of the DNRNPCxx member:

Table 7-3 DNRNPCxx member

Network Number	Comments
129.192.192	lan
129.192.128	pdn
26	last

The DNRNPC00 member distributed with Cisco IOS for S/390 is shown below. The configuration is the same for both GLOBAL or LOCAL mode:

```
192.16.73        PUT THE LOCAL NETWORK FIRST,
192.67.67        ... THEN NIC.DDN.MIL NETWORK,
26               ... THEN MILNET,
10               ... THEN ARPANET.
```

The NICDDN, ARPANET, and MILNET entries (lines 2-4) can be placed in file DNRNETxx to resolve other hosts on the Internet.

Note If your installation cannot connect to the Internet, do not place these lines (2-4) in this file. If your installation has a firewall that will not allow DNR query responses back into the installation, do not place these lines (2-4) in this file.

All entries in file DNRNETxx must have sequence numbers or all the sequence numbers must be blank. Mixed sequence numbers and blanks lead to configuration parsing errors.

Network Preference Example

This example shows the usage of the network preference:

```
192.16.73       PUT OUR LOCAL NETWORK FIRST
26              THEN MILNET
```

Setting Network Name to Network Number Mapping (DNRNETxx)

The DNRNETxx member in the PARM data set specifies network name to network number mappings and vice versa. It is referenced by the NETWORK parameter of the DNR statement in DNRCFGxx. Configuration of this member is required only for sites that run Cisco IOS for S/390 application programs that issue DIRSRV GET NETWORK requests.

Network Syntax

networkname networkaddress comment

Syntax Description

networkname Specifies a network name.

Default: None (required field).

networkaddress Specifies the network address in dotted decimal notation assigned to the network name referenced as networkname.

Default: None (required field).

comment Specifies an optional comment.

Default: None

Table Table 7-4 shows the member format of the DNRNETxx member:

Table 7-4 DNRNETxx member

Network Name	Network Number In Dotted Decimal Format
MILNET	26
ISI-NET	128.9

The DNRNET00 member distributed with Cisco IOS for S/390 is shown below:

```
ARPANET    10
MILNET     26
LOCALNET   192.16.73     LOCAL HOST NETWORK.
```

Here is an example of DNRNETxx configured for either LOCAL or GLOBAL mode:

```
ETHERNET2     138.22.140     LOCAL HOST NETWORK
NICDDN        192.67         OPTIONAL LINE WHEN CONNECTED TO THE INTERNET
ARPANET       10             OPTIONAL LINE WHEN CONNECTED TO THE INTERNET
MILNET        26             OPTIONAL LINE WHEN CONNECTED TO THE INTERNET
```

138.22.140 is our local network.

The NICDDN, ARPANET, and MILNET entries (lines 2-4) can be placed in file DNRNETxx to resolve other hosts on the Internet.

Note If your installation cannot connect to the Internet, do not place these lines (2-4) in this file. If your installation has a firewall that will not allow DNR query responses back into the installation, do not place these lines (2-4) in this file.

All entries in file DNRNETxx must have sequence numbers or all the sequence numbers must be blank. Mixed sequence numbers and blanks lead to configuration parsing errors.

Network Names Examples

This example shows the usage of the network names:

```
ARPANET     10
MILNET      26
LOCALNET    192.16.73 LOCAL HOST'S NETWORK
```

Setting Protocol Name to Address Mappings (DNRPRTxx)

The DNRPRTxx member of the PARM data set specifies protocol name to address mappings and vice versa. It is referenced by the PROTOCOL parameter of the DNR statement in DNRCFGxx. Configuration of this member is required only for sites that run Cisco IOS for S/390 application programs that issue DIRSRV GET PROTOCOL requests.

Protocol Name Syntax

protocolname protocolnumber comment

Syntax Description

protocolname Specifies a protocol name.

Default: None (required field).

protocolnumber Specifies the protocol number assigned to the protocol name referenced as protocolname.

Default: None (required field).

comment Specifies an optional comment.

Default: None.

Table 7-5 shows the member format of the DNRPRTxx member:

Table 7-5 DNRPRTxx member

Protocol Name	Protocol Number	Comments
TCP	6	TRANSMISSION CONTROL.
UDP	17	USER DATAGRAM.

This table shows the DNRPRT00 member distributed with Cisco IOS for S/390:

```
ICMP     1    # INTERNET CONTROL MESSAGE PROTOCOL.
GGP      3    # GATEWAY-GATEWAY PROTOCOL.
TCP      6    # TRANSMISSION CONTROL PROTOCOL.
EGP      8    # EXTERIOR GATEWAY PROTOCOL.
PUP      12   # PARC UNIVERSAL PACKET PROTOCOL.
UDP      17   # USER DATAGRAM PROTOCOL.
HMP      20   # HOST MONITORING PROTOCOL.
XNS-IDP  22   # XEROX NS IDP.
RDP      27   # "RELIABLE DATAGRAM" PROTOCOL.
```

Protocol Names Example

This example shows the usage of the protocol names:

```
TCP   6     TRANSMISSION CONTROL PROTOCOL
UDP   17     USER DATAGRAM PROTOCOL
```

Setting Protocol Name/Service Pair to Port Numbers (DNRSVCxx)

The DNRSVCxx member in the PARM data set is used to specify the mappings from protocol name/service name pairs to port numbers and vice versa. It is referenced by the SERVICES parameter of the DNR statement in DNRCFGxx. Configuration of this member is required only for sites that run Cisco IOS for S/390 application programs that issue DIRSRV GET SERVICE requests. This is a static table.

Protocol Name/Service Pair Syntax

protocol service portnumber comment

Syntax Description

protocol Specifies a protocol name.

Default: None (required field).

service Specifies the service name.

Default: None (required field).

portnumber Specifies the port number associated with the PROTOCOL and SERVICE parameters referenced in protocol and service.

Default: None (required field).

comment Specifies an optional comment.

Default: None.

DNRSVCxx Configuration

Table 7-6 shows the format of the DNRSVCxx member:

Table 7-6 DNRSVCxx member

Protocol Name	Service Name	Port Number	Comment
TCP	FTP	21	FILE TRANSFER PROTOCOL
TCP	SMTP	25	SIMPLE MAIL TRANSFER
UDP	SMTP	25	SIMPLE MAIL TRANSFER

The DNRSVC00 member distributed with Cisco IOS for S/390 is shown below:

```
TCP     ECHO        7
TCP     DISCARD     9       SINK NULL
TCP     SYSTAT      11      USERS
TCP     DAYTIME     13
TCP     NETSTAT     15
TCP     QOTD        17      QUOTE
TCP     CHARGEN     19      TTYTST SOURCE
TCP     FTP         21
TCP     TELNET      23
TCP     SMTP        25      MAIL
TCP     TIME        37      TIMSERVER
TCP     NAMESERVER  42      NAME # len 116
TCP     WHOIS        43       NICNAME
TCP     DOMAIN      53       NAMESERVER # Domain Name Server
TCP     MTP         57       # Deprecated
TCP     RJE         77       NETRJS
TCP     FINGER      79
TCP     LINK        87       TTYLINK
TCP     SUPDUP      95
TCP     HOSTNAMES   101      HOSTNAME # Usually from
TCP     POP         109      POSTOFFICE
TCP     SUNRPC      111
TCP     AUTH        113      AUTHENTICATION
TCP     SFTP        115
TCP     UUCP-PATH   117
TCP     NNTP        119      READNEWS UNTP # Usenet news transfer
TCP     EXEC        512
TCP     LOGIN       513
TCP     SHELL       514      CMD # No passwords
TCP     PRINTER     515      SPOOLER # Line printer
TCP     EFS         520      # For LucasFilm
TCP     TEMPO       526      NEWDATE
TCP     COURIER     530      RPC
TCP     CONFERENCE  531      CHAT
TCP     NETNEWS     532      READNEWS
TCP     UUCP        540      UUCPD # UUCP Daemon
TCP     REMOTEFS    556      RFS_SERVER RFS # Brunhoff remote filesy
TCP     UUCP        540      UUCPD # UUCP Daemon
TCP     REMOTEFS    556      RFS_SERVER RFS # Brunhoff remote filesy
TCP     VMTELNET    1023
UDP     ECHO        7
UDP     DISCARD     9        SINK NULL
UDP     DAYTIME     13
UDP     CHARGEN     19       TTYTST SOURCE
UDP     TIME        37       TIMSERVER
UDP     RLP         39       RESOURCE # Resource locator
UDP     DOMAIN      53       NAMESERVER
```

```
UDP     TFTP        69
UDP     SUNRPC      111
UDP     SNMP        161      # SNMPD
UDP     BIFF        512      COMSAT
UDP     WHO         513      WHOD
UDP     SYSLOG      514
UDP     TALK        517
UDP     NTALK       518
UDP     ROUTE       520       ROUTER ROUTED   # RIP
UDP     TIMED       525       TIMESERVER
UDP     NETWALL     533       # Emergency Broadcast
```

Service Names Example

This example shows the usage of the service names:

```
TCP   FTP   21      FILE TRANSFER PROTOCOL
TCP   SMTP  25
UDP   RPC   111
```

Setting RPC Name-to-Program Mappings (DNRRPCxx)

The DNRRPCxx member in the PARM data set is used to specify RPC name to RPC program number mappings and vice versa. It is referenced by the RPCNAMES parameter of the DNR statement in DNRCFGxx. The file also includes RPC alias to RPC official name mappings. Configuration of this member is required only for sites that run Cisco IOS for S/390 application programs that issue DIRSRV GET RPC requests such as NFS. This is a static table.

RPC Name-to-Program Mappings Syntax

RPC_name RPC_number RPC_alias comment

Syntax Description

RPC_name Specifies an RPC name.

Default: None (required field).

RPC_number Specifies the RPC number.

Default: None (required field).

RPC_alias Specifies a maximum of five aliases for the RPC name.

Default: None

comment Specifies an optional comment.

Default: None

Table 7-7 shows the member format of the DNRRPCxx member. An RPC name may have a maximum of 5 aliases:

Table 7-7 DNRRPCxx member

RPC Name	RPC Number	RPC Aliases	Comments
PORTMAPPER	100000	PORTMAP SUNRPC	
RSTATD	100001	RSTAT RSTAT_SVC RUP	PERFMETER
RUSERSD	100002	RUSERS	
NFS	100003	NFSPROG	

The DNRRPC00 member distributed with Cisco IOS for S/390 is shown below.

Note Multiple aliases can be specified; the last value is always interpreted as a comment.

```
PORTMAPPER     100000 PORTMAP SUNRPC
RSTATD         100001 RSTAT RSTAT_SVC RUP PERFMETER
RUSERSD        100002 RUSERS
NFS            100003 NFSPROG
YPSERV         100004 YPPROG
MOUNTD         100005 MOUNT SHOWMOUNT
YPBIND         100007
WALLD          100008 RWALL SHUTDOWN
YPPASSWDD      100009 YPPASSWD
ETHERSTATD     100010 ETHERSTAT
RQUOTAD        100011 RQUOTAPROG QUOTA RQUOTA
SPRAYD         100012 SPRAY
3270_MAPPER    100013
RJE_MAPPER     100014
SELECTION_SVC  100015 SELNSVC
DATABASE_SVC   100016
REXD           100017 REX
ALIS           100018
SCHED          100019
LLOCKMGR       100020
NLOCKMGR       100021
X25.INR        100022
STATMON        100023
STATUS         100024
BOOTPARAM      100026
YPUPDATED      100028 YPUPDATE
KEYSERV        100029 KEYSERVER
TFSD           100037
NSED           100038
NSEMNTD        100039
MVSMOUNT       100044
SHOWATTR       100059
PCNFSD         150001
```

RPC Name Example

This example shows the usage of the RPC name:

```
PORTMAPPER   100000 PORTMAP SUNRPC
RSTATD       100001 RSTAT RSTAT_SVC RUP PERFMETER
RUSERSD      100002 RUSERS
NFS          100003 NFSPROG
YPSERV       100004 YPPROG
MOUNTD       100005 MOUNT SHOWMOUNT
YPBIND       100007
WALLD        100008 RWALL SHUTDOWN
YPPASSWDD    100009 YPPASSWD
```

Examples of DNR Customization

This section provides examples of DNR configurations. These examples demonstrate how the DNR task group can be customized to meet the specific needs of your installation.

DNR with Only Configuration Data

This section uses an example company named XYZ, Inc., that has a single Ethernet. Connected to the Ethernet is an MVS system running Cisco IOS for S/390 and several workstations. The Ethernet is not connected to another network. Therefore, the network administrator randomly chose an internet network number of 1.0.0.0. The GLOBAL statement DNR operand in APPCFGxx must specify LOCAL for this configuration.

New PARM member DNRHST01

The network administrator assigns the MVS system the internet address of 1.0.0.1. Each workstation is assigned the next available host number (in other words 1.0.0.2, 1.0.0.3,...). Lastly, the MVS system is given the host name MVS and the workstations are assigned the names of their users.

A new host configuration member, DNRHST01, is created listing the host names and internet addresses of the MVS system and workstations. Note that each host name ends with a period:

```
LOOPBACK.    127.0.0.1   Required Entry
MVS.         1.0.0.1     TCP/IP HOST
BILL.        1.0.0.2
JOE.         1.0.0.3
ROBERT.      1.0.0.5
KIRK.        1.0.0.6
MARY.        1.0.0.7
SAM.         1.0.0.8
FRANK.       1.0.0.9
DEBBIE.      1.0.0.10
NAT.         1.0.0.11
BARB.        1.0.0.12
ALICE.       1.0.0.13
CHARLIE.     1.0.0.14
```

New PARM member DNRALC01

One of the workstation users, Robert, is known by both his formal name and by the nickname Bob. A new alias configuration member, DNRALC01, is created to assign an alias for Robert. In addition to the alias for Bob, there is a required alias entry to map the Cisco IOS for S/390 subsystem name to the Cisco IOS for S/390 host name. An entry to map ACSS to MVS is included in DNRALC01.

```
ACSS   MVS.        TCP/IP SUBSYSTEM NAME
BOB    ROBERT.     ALIAS BOB FOR HOST NAME ROBERT
```

New TCPPARM member DNRSLC01

A new search list member, DNRSLC01, is created. Without this member, users must enter the fully qualified host names are listed in the DNRHST01 member. A single entry, a period (.), is included to enable users to specify host names as partially qualified names (not including the trailing period). Therefore, if the host name MARY is entered, the period is appended to the end forming the host name MARY. which is in the DNRHST01 member.

```
.ADD PERIOD IF OMITTED
```

New PARM member DNRCFG01

To ensure that all requests are processed in LOCAL mode the NAMESERVER parameter of the DNR statement is updated to specify NONE.

The primary configuration member must be modified to include the new secondary configuration members. A new DNRCFG01 member is created using DNRCFG00 as a model. DNRCFG01 includes the new secondary members. Note that only the NAMESERVER, ALIAS, SEARCHLIST and HOSTTABLE keywords are modified.

```
*================================================*
*SPECIFY POOL CONFIGURATION PARAMETERS
*================================================*
POOLDEF   NAME ( DSRB )
          INITIAL ( 16 )
          MINIMUM ( 24 )
          EXPAND ( 8 )
*================================================*
*SPECIFY DNR START UP PARAMETERS
*================================================*
DNR       APISUBSYS ( **** )
          NAMESERVER ( NONE )
          ALIAS ( DNRALC01 )
          SEARCHLIST ( DNRSLC01 )
          NETWORKPREF ( DNRNPC00 )
          HOSTTABLE ( DNRHST01 )
          NETWORK ( DNRNET00 )
          PROTOCOL ( DNRPRT00 )
          SERVICES ( DNRSVC00 )
          CYCLEMAX ( 04 )
          QUERYWAIT ( 3 )
          MAXSENDS ( 05 )
          RECURSIVE
          NOTRACE
          NOINTERNALTRACE
```

New PARM member START01

The start command for the DNR task group includes the new DNRCFG01 member. A new PARM data set member, START01, is created using the START00 member as the model. The START DNR statement is modified to specify DNRCFG01 as the new primary configuration member.

```
START API
START ACP
START DNR CNFG(01)
START MAP
START SNM
```

Finally, the JCL procedure to run Cisco IOS for S/390 replaces the CMND=START00 keyword of the PROC statement with CMND=START01. This invokes the new PARM member START01 when Cisco IOS for S/390 begins.

Migration of DNR to DNS

UVW, Inc. has a single Ethernet. Connected to the Ethernet is an MVS system running Cisco IOS for S/390 and several workstations. This Ethernet is attached to the Internet via a single IP router. The Ethernet was assigned the class C internet address 192.3.17.0. Also, an official domain name of UVW.COM. has been assigned UVW.

The network administrator assigned the MVS system the internet address of 192.3.17.1. Each workstation was assigned the next available host number (in other words, 192.3.17.2, 192.3.17.3,...). Lastly, the MVS system was given the host name MVS.UVW.COM. and the workstations were assigned the names of their user's concatenated with UVW's domain name.

The domain name server workstation and the IP router have not been purchased. However, the network administrator customized the DNR configuration members to facilitate the conversion from LOCAL to GLOBAL configuration. The GLOBAL statement DNR operand in APPCFGxx also needs to be updated from LOCAL to GLOBAL mode.

New PARM member DNRHST01

A new host configuration member, DNRHST01, is created listing the host names and internet addresses of the MVS system and workstations. Note that each host name ends with a period (.).

```
LOOPBACK.UVW.COM.  127.0.0.1     Required Entry
MVS.UVW.COM.       192.3.17.1    TCP/IP HOST
BILL.UVW.COM.      192.3.17.2    WORKSTATIONS
JOE.UVW.COM.       192.3.17.3
HARRY.UVW.COM.     192.3.17.4
ROBERT.UVW.COM.    192.3.17.5
JOHN.UVW.COM.      192.3.17.6
LINDA.UVW.COM.     192.3.17.7
DON.UVW.COM.       192.3.17.8
TOM.UVW.COM.       192.3.17.9
ANN.UVW.COM.       192.3.17.11
MARY.UVW.COM.      192.3.17.12
JACKIE.UVW.COM.    192.3.17.13
CHARLIE.UVW.COM.   192.3.17.14
```

New PARM member DNRALC01

One of the workstation users, Robert, is known by both his formal name and by the nickname Bob. A new alias configuration member, DNRALC01, is created to assign an alias for ROBERT. In addition to the alias for Robert, there is a required alias entry to map the Cisco IOS for S/390 subsystem name to the host name. An entry to map ACSS to MVS.UVW.COM. is included in DNRALC01.

```
ACSS   MVS.UVW.COM.     TCP/IP SUBSYSTEM NAME
BOB    ROBERT.UVW.COM.  ALIAS BOB FOR HOST NAME ROBERT
```

New PARM member DNRSLC01

A new search list member, DNRSLC01, is created. Two entries are included to enable users to specify host names as partially qualified names (not including the trailing period). Without this member, users must enter the fully qualified host names that are listed in the DNRHST01 member. A UVW.COM. entry is included to enable users to specify host name labels. Therefore, if the host name MARY is entered, UVW.COM is appended to the end forming the host name MARY.UVW.COM., which is in the DNRHST01 member. The second entry, a period (.), is included

to enable users to specify host names without the trailing period. For example, if the host name MARY.UVW.COM is entered, the period is appended to the end forming the host name MARY.UVW.COM. which is in the DNRHST01 member.

```
UVW.COM.
.
```

New PARM member DNRCFG01

To ensure that all requests are processed in LOCAL mode (not communicating with a name server), the NAMESERVER operand is updated to specify NONE.

The primary configuration member must be modified to include the new secondary configuration members. A new DNRCFG01 member is created using DNRCFG00 as a model. DNRCFG01 includes the new secondary members. Note that only the NAMESERVER, ALIAS, SEARCHLIST, and HOSTTABLE keywords are modified.

```
*================================================*
*SPECIFY POOL CONFIGURATION PARAMETERS
*================================================*
POOLDEF    NAME ( DSRB )
           INITIAL ( 16 )
           MINIMUM ( 24 )
           EXPAND ( 8 )
*================================================*
*SPECIFY DNR START UP PARAMETERS
================================================*
DNR        APISUBSYS ( **** )
           NAMESERVER ( NONE )
           ALIAS ( DNRALC01 )
           SEARCHLIST ( DNRSLC01 )
           NETWORKPREF ( DNRNPC00 )
           HOSTTABLE ( DNRHST01 )
           NETWORK ( DNRNET00 )
           PROTOCOL ( DNRPRT00 )
           SERVICES ( DNRSVC00 )
```

```
CYCLEMAX ( 04 )
QUERYWAIT ( 3 )
MAXSENDS ( 05 )
RECURSIVE
NOTRACE
NOINTERNALTRACE
```

New PARM member START01

The start command for the DNR task group must be modified to include the new DNRCFG01 member. A new PARM data set member, START01, is created using the START00 member as the model. The START DNR statement is modified to specify DNRCFG01 as the new primary configuration member.

```
START API
START ACP
START DNR CNFG ( 01 )
START MAP
START SNM
```

Finally, the JCL procedure to run Cisco IOS for S/390 is modified to replace the CMND=START00 keyword of the PROC statement to CMND=START01. This invokes the new PARM member START01 when Cisco IOS for S/390 begins.

After several weeks of running the DNR in LOCAL mode, the domain name server workstation and IP router are purchased, installed, and configured. The domain name server is assigned the internet address of 192.3.17.100 and host name of NS.UVW.COM. The internet router is assigned the internet address of 192.3.17.101.

APPPCFG01, which is the customized copy of APPCFG00, is edited and the DNR parameter on the GLOBAL statement changed from LOCAL to GLOBAL mode. GLOBAL mode is configured by specifying a decimal value that specifies the maximum time the DNR spends processing a Cisco IOS for S/390 request.

```
.
.
.
HOST    DNR ( * 30 )   /* Global requests, 30 sec maxwait */
        TIMEZ ( EASTERN )
        LUPARM ( ACPLUPOS )
        SSN ( ACSS )
        ACBNAME ( ACCES )
        XSEC ( GLBLACT )
        JES ( 2 JES2 JES2 $ )
        VSREPORT
.
.
.
```

New PARM member DNRNSC01

The name server configuration member, DNRNSC01, is created indicating NS.UVW.COM. as a name server for the UVW.COM. domain. A root level domain name server is also included as a backup to the UVW.COM. name server. The NAMESERVER operand of the DNRCFG01 member must be modified from NONE to DNRNSC01.

```
UVW.COM.NS.UVW.COM.192.3.17.100 UVW's domain name server
.A.ISI.EDU.26.3.0.13EDU domain name server
```

New PARM member DNRNPC01

Multiple name servers are included in the DNRNSC01 configuration member. Therefore, a new DNRNPC01 is configured to instruct the DNR the name server order to use. A new network preference member, DNRNPC01, is created with one entry defined. This entry, 192.3.17.00, instructs the DNR to query NS.UVW.COM. first. NS.UVW.COM. is a recursive name server. A recursive name server guarantees an answer, therefore, DNRNPC01 contains only one entry.

In addition, the DNRCFG01 primary configuration member must be modified to include the new DNRNPC01 configuration member. Only the NETWORKPREF keyword is modified.

```
192.3.17 Our local subnet has highest preference
```

DNR With Only The Domain Name System

The University of Somewhere, USW, has several Ethernets that have been in place for many years. They have participated in the Domain Name System for a long time. They have a primary and a backup domain name server to resolve requests for the USW.EDU. domain.

Recently, they upgraded their host computing system to include an IBM mainframe running MVS/ESA. Attached to this IBM host are 3270 series terminals for the students to use. Cisco IOS for S/390 is installed to enable students and faculty using the IBM system to connect to non-IBM hosts both on and off the USW campus.

The MVS system running Cisco IOS for S/390 is assigned the internet address 137.35.15.139. The primary domain name server, WISDOM.USW.EDU. is assigned the internet address 137.35.3.1. The backup domain name server, KNOWLEDGE.USW.EDU. is assigned the internet address 137.35.15.1.

New PARM member DNRALCSW:

The MVS system running Cisco IOS for S/390 is assigned the host name BIGBLUE.USW.EDU. An alias of MVSESA is also defined. A new alias member, DNRALCSW, is created. This member includes the required entry mapping the Cisco IOS for S/390 subsystem to its host name. The Cisco IOS for S/390 subsystem name is changed to USW1. DNRALCSW and includes entries for MVSESA alias and TEST.

```
USW1      BIGBLUE.USW.EDU.   Required alias for Subsystem
MVSESA    BIGBLUE.USW.EDU.   Alias known to students
TEST      127.0.0.1          Alias for testing in loopback mode
```

New PARM member DNRSLCSW

A new search list member, DNRSLCSW, is created. Two entries are included to enable users to specify host names as a partially qualified name (not including the trailing period). Without this member, users are required to enter the fully qualified host names of all remote hosts. A UVW.EDU. entry is included to enable users to specify host name labels. The second entry, period (.), is included to enable users to specify host names without the trailing period.

```
USW.EDU.      First try appending USW.EDU. to the name
.             Then try appending. to the name
```

New PARM member DNRNSCSW

A new name server configuration member, DNRNSCSW, is created. The USW.EDU. name servers are included as well as two EDU. name servers.

```
USW.EDU.  WISDOM.USW.EDU.     137.35.3.1     Primary server
USW.EDU.  KNOWLEDGE.USW.EDU.  137.35.15.1    Backup server
EDU.      A.ISI.EDU.          26.3.0.103     EDU server
EDU.      A.ISI.EDU.          128.9.0.107    EDU server
```

New PARM member DNRNPCSW

Multiple name servers are included in the DNRNSCSW configuration member. Therefore, a new DNRNPCSW tells the DNR what name server order to use. A new network preference member, DNRNPCSW, defines three entries. The first entry, 137.35.15, instructs the DNR to query KNOWLEDGE.USW.EDU. first. The second entry, 137.35.3, instructs the DNR to query WISDOM.USW.EDU. second if KNOWLEDGE.USW.EDU. does not have an answer.

The DNRNPCSW is also used by the DNR to order returned address lists when a remote host is multihomed. The third entry, 137.35, is included to instruct the DNR to order any internet address with a network number of 137.35.0.0 after addresses with networks 137.35.15 or 137.35.3. Internet address with network numbers not included in DNRNPCSW are ordered last.

```
137.35.15   Our local subnet has highest preference
137.35.3    This subnet is preferred also
137.35      Our network takes preference above other networks
```

New PARM member DNRCFGSW

The primary configuration member includes the new secondary configuration members. A new DNRCFGSW member is created using DNRCFG00 as a model. DNRCFGSW includes the new secondary members. Note that only the NAMESERVER, ALIAS, SEARCHLIST, and NETWORKPREF keywords are modified.

```
*================================================*
*    SPECIFY POOL CONFIGURATION PARAMETERS
*================================================*
POOLDEF   NAME ( DSRB )
          INITIAL ( 16 )
          MINIMUM ( 24 )
          EXPAND ( 8 )
*================================================*
*    SPECIFY DNR START UP PARAMETERS
*================================================*
DNR       APISUBSYS ( **** )
          NAMESERVER ( DNRNSCSN )
          ALIAS ( DNRALCSW )
          SEARCHLIST ( DNRSLCSW )
          NETWORKPREF ( DNRNPCSW )
          HOSTTABLE ( DNRHST00 )
          NETWORK ( DNRNET00 )
          PROTOCOL ( DNRPRT00 )
          SERVICES ( DNRSVC00 )
          CYCLEMAX ( 04 )
          QUERYWAIT ( 3 )
          MAXSENDS ( 05 )
          RECURSIVE
          NOTRACE
          NOINTERNALTRACE
```

New PARM member STARTUSW

The start command for the DNR task group must be modified to include the new DNRCFGSW member. A new PARM data set member, STARTUSW, is created using the START00 member as the model. The START DNR statement is modified to specify DNRCFGSW as the new primary configuration member.

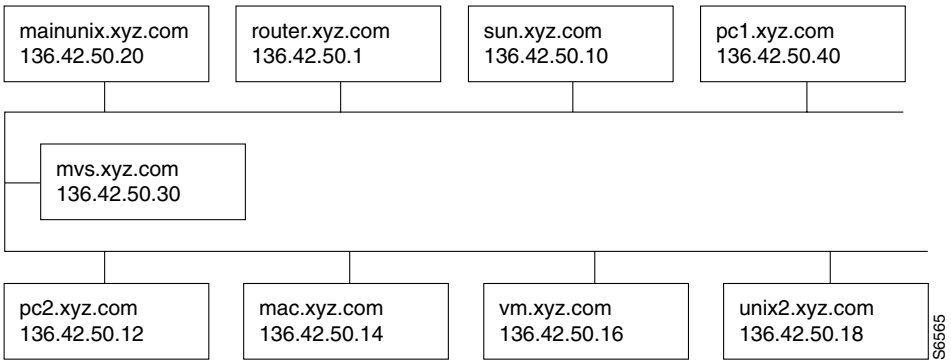
```
START API
START ACP
START DNR CNFG(SW)
START MAP
START SNM
```

Finally, the JCL procedure to run Cisco IOS for S/390 is modified to replace the CMND=START00 keyword of the PROC statement to CMND=STARTUSW. This invokes the new PARM member STARTUSW when Cisco IOS for S/390 begins.

DNR Configuration Set for a Network with a Domain Name Server

This example shows a network with a router to be configured for DNR in GLOBAL mode. A complete set of sample DNR files for this configuration is included in this section. The filenames all end in WG to indicate GLOBAL.

Figure 7-1 Configuration for DNR in GLOBAL Mode



Using DNR with domain name servers (GLOBAL mode) requires that the DNR parameter be set to DNR (* timevalue) on the GLOBAL statement in file APPCFGxx.

MVS host mvs.xyz.com (IP address 136.42.50.30) exists on network xyz.com.

Host mainunix.xyz.com (IP address 136.42.50.20) acts as the primary domain name server on network xyz.com. The NONRECURSIVE parameter in file DNRCFGWG tells the MVS host to use other domain name servers as it learns about them.

Access to the internet will be via the router named router.xyz.com at IP address 136.42.50.1. While router.xyz.com is not needed in the DNR configuration files, it will be placed on a ROUTE statement in file TCPCFGxx.

Files ending with suffix 00 (for example, DNRPRT00, DNRPCC00, and DNRSVC00) are not shown because they are the same as the default distributed versions and rarely need to be updated at a site.

Sample Cisco IOS for S/390 DNR configuration files for running MVS host mvs.xyz.com with a name server on its local network are given in the following sections.

DNRALCWG

```
ACSS MVS.XYZ.COM.
MVS MVS.XYZ.COM.
MAINUNIX MAINUNIX.XYZ.COM.
LOOPBACK 127.0.0.1
LOCALHOST 127.0.0.1
```

DNRCFGWG

```
*=========================================*
* SPECIFY POOL    CONFIGURATION PARAMETERS
*=========================================*
POOLDEF NAME ( DSRB )
        INITIAL ( 16 )
        MINIMUM ( 24 )
        EXPAND ( 8 )
*=========================================*
* SPECIFY DNR START UP PARAMETERS
*=========================================*
DNR     APISUBSYS ( **** )
        NAMESERVER ( DNRNSCWG )
        ALIAS ( DNRALCWG )
        SEARCHLIST ( DNRSLCWG )
        NETWORKPREF ( DNRNPCWG )
        HOSTTABLE ( DNRHSTWG )
        NETWORK ( DNRNETWG )
        PROTOCOL ( DNRPRT00 )
        RPCNAMES ( DNRRPC00 )
        SERVICES ( DNRSVC00 )
        CYCLEMAX ( 04 )
        QUERYWAIT ( 03 )
        MAXSENDS ( 03 )
        MAXTIME ( 90 )
        NONRECURSIVE
        TRACE
        INTERNALTRACE
```

DNRHSTWG

```
MVS.XYZ.COM.         136.42.50.30
MVS.                 136.42.50.30
ACSS.                136.42.50.30
MAINUNIX.XYZ.COM.    136.42.50.20
MAINUNIX.            136.42.50.20
LOCALHOST.           127.0.0.1
LOOPBACK.            127.0.0.1
```

DNRNETWG

```
ETHERNET2    136.42.50    LOCAL HOST NETWORK
NICDDN       192.67       OPTIONAL LINE WHEN CONNECTED TO INTERNET
ARPANET      10           OPTIONAL LINE WHEN CONNECTED TO INTERNET
MILNET       26           OPTIONAL LINE WHEN CONNECTED TO INTERNET
```

DNRNPCWG

```
136.42.50      PUT OUR LOCAL NETWORK FIRST
192.67         NIC.DDN OPTIONAL INTERNET NETWORK
10             THEN OPTIONAL ARPANET NETWORK
26             THEN OPTIONAL MILNET NETWORK
```

DNRNSCWG

```
IN-ADDR.ARPA.   MAINUNIX.XYZ.COM.   136.42.50.20
XYZ.COM.        MAINUNIX.XYZ.COM.   136.42.50.20
.               MAINUNIX.XYZ.COM.   136.42.50.20
.               NS.NIC.DDN.MIL.     192.67.67.53
```

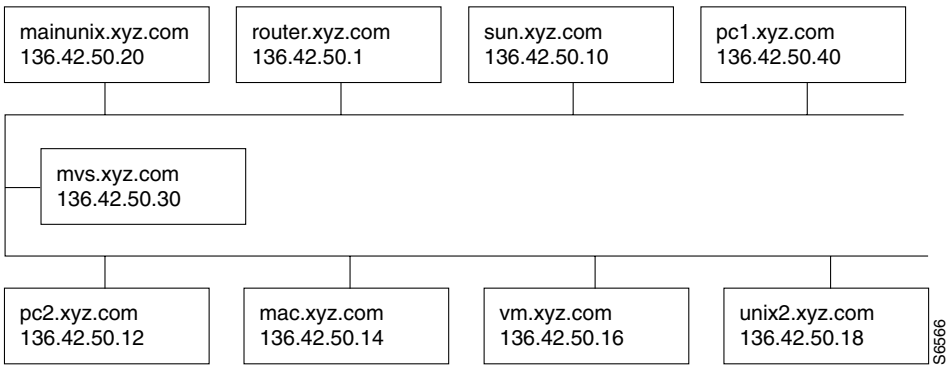
DNRSLCWG

```
XYZ.COM.
COM.
.           ROOT
```

DNR Configuration Set without a Domain Name Server

This example shows a network to be configured for DNR with no domain name servers. A complete set of sample DNR files for this configuration is included in this section. The filenames all end in WL to indicate LOCAL.

Figure 7-2 Configuration for DNR with No Domain Name Servers



Using DNR without domain name servers (LOCAL mode) requires that the DNR parameter be set to LOCAL on the GLOBAL statement in file APPCFGxx.

MVS host mvs.xyz.com (IP address 136.42.50.30) exists on network xyz.com.

Since there are no name servers on the local network xyz.com, all hosts on the network should be placed in files DNRALCxx and DNRHSTxx. When running DNR in LOCAL mode there is no need to configure files DNRNETxx and DNRNSCxx. File DNRCFGWL accomplishes this by placing NETWORK(NONE) and NAMESERVER(NONE) on the DNR statement.

Access to the internet will be via the router named router.xyz.com at IP address 136.42.50.1. While router.xyz.com is not needed in the DNR configuration files, it will be placed on a ROUTE statement in file TCPCFGxx.

Files ending with suffix 00 (for example, DNRPRT00, DNRPCC00, and DNRSVC00) are not shown because they are the same as the default distributed versions and rarely need to be updated at a site.

Sample Cisco IOS for S/390 DNR configuration files for running MVS host mvs.xyz.com with a name server on its local network are given in the sections that follow.

DNRALCWL

```
ACSS      MVS.XYZ.COM.
MVS       MVS.XYZ.COM.
SUN       SUN.XYZ.COM.
PC2       PC2.XYZ.COM.
MAC       MAC.XYZ.COM.
VM        VM.XYZ.COM.
UNIX2     UNIX2.XYZ.COM.
MAINUNIX  MAINUNIX.XYZ.COM.
PC1       PC1.XYZ.COM.
LOOPBACK  127.0.0.1
LOCALHOST 127.0.0.1
```

DNRCFGWL

```
*=======================================*
* SPECIFY POOL CONFIGURATION PARAMETERS
*=======================================*
POOLDEF NAME ( DSRB )
        INITIAL ( 16 )
        MINIMUM ( 24 )
        EXPAND ( 8 )
*=======================================*
* SPECIFY DNR START UP PARAMETERS
*=======================================*
DNR     APISUBSYS ( **** )
       ALIAS ( DNRALCWL )
       SEARCHLIST ( DNRSLCWL )
       NAMESERVER ( NONE )
       NETWORKPREF ( DNRNPCWL )
       HOSTTABLE ( DNRHSTWL )
       NETWORK ( NONE )
       PROTOCOL ( DNRPRT00 )
       RPCNAMES ( DNRRPC00 )
       SERVICES ( DNRSVC00 )
       CYCLEMAX ( 03 )
       QUERYWAIT ( 2 )
       MAXSENDS ( 10 )
       MAXTIME ( 90 )
       RECURSIVE
       TRACE
       INTERNALTRACE
```

DNRHSTWL

```
MVS.XYZ.COM.        136.42.50.30
MVS.                136.42.50.30
ACSS.               136.42.50.30
SUN.XYZ.COM.        136.42.50.10
SUN.                136.42.50.10
PC2.XYZ.COM.        136.42.50.12
PC2.                136.42.50.12
MAC.XYZ.COM.        136.42.50.14
MAC.                136.42.50.14
VM.XYZ.COM.         136.42.50.16
VM.                 136.42.50.16
UNIX2.XYZ.COM.      136.42.50.18
UNIX2.              136.42.50.18
MAINUNIX.XYZ.COM.   136.42.50.20
MAINUNIX.           136.42.50.20
PC1.XYZ.COM.        136.42.50.40
PC1.                136.42.50.40
LOCALHOST.          127.0.0.1
LOOPBACK.           127.0.0.1
```

DNRNPCWL

```
136.42.50       PUT OUR LOCAL NETWORK FIRST
192.67          NIC.DDN OPTIONAL INTERNET NETWORK
10              THEN OPTIONAL ARPANET NETWORK
26              THEN OPTIONAL MILNET  NETWORK
```

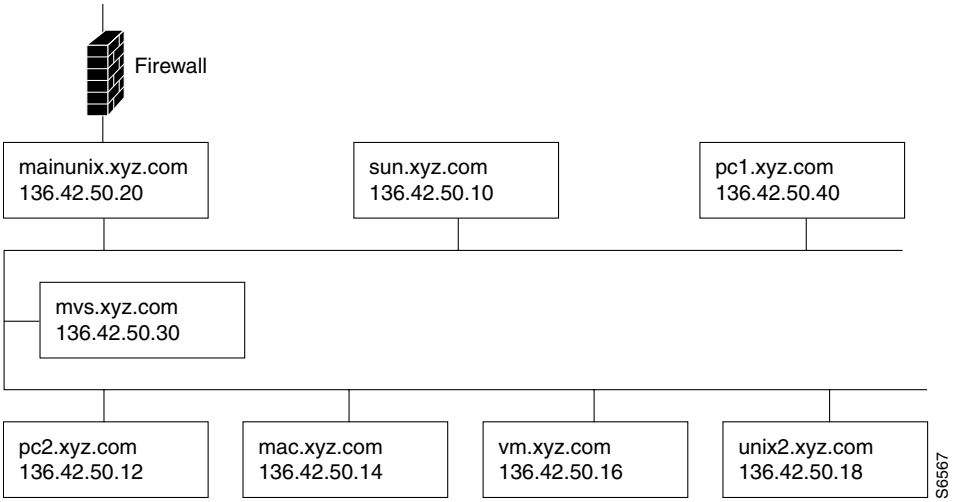
DNRSLCWL

```
XYZ.COM.
COM.
.            ROOT
```

DNR Configuration Set With a Domain Name Server and a Firewall

Figure 7-3 shows a network to be configured for DNR with a domain name server and a firewall. A complete set of sample DNR files for this configuration is included in this section. The filenames all end in WF to indicate Firewall

Figure 7-3 Configuration for DNR with a Firewall



Using DNR with domain name servers (GLOBAL mode) requires that the DNR parameter be set to DNR(* timevalue) on the GLOBAL statement in file APPCFGxx.

MVS host mvs.xyz.com (IP address 136.42.50.30) exists on network xyz.com.

Host mainunix.xyz.com (IP address 136.42.50.20) acts as the only domain name server on network xyz.com. The RECURSIVE parameter in file DNRCFGWF tells the MVS host to use only domain name servers in its nameserver list (DNRNSCWF).

The RECURSIVE parameter *must be set* for DNR to function correctly behind a firewall.

Access to the internet will only be allowed from host mainunix.xyz.com at IP address 136.42.50.20.

Files ending with suffix 00 (for example, DNRPRT00, DNRPCC00, and DNRSVC00) are not shown because they are the same as the default distributed versions and rarely need to be updated at a site.

Sample DNR configuration files for running MVS host mvs.xyz.com with a name server on its local network behind a firewall are given below.

DNRALCWF

```
ACSS        MVS.XYZ.COM.
MVS         MVS.XYZ.COM.
MAINUNIX    MAINUNIX.XYZ.COM.
LOOPBACK    127.0.0.1
LOCALHOST   127.0.0.1
```

DNRCFGWF

```
*=======================================*
* SPECIFY POOL CONFIGURATION PARAMETERS
*=======================================*
POOLDEF NAME ( DSRB )
        INITIAL ( 16 )
        MINIMUM ( 24 )
        EXPAND ( 8 )
*=======================================*
* SPECIFY DNR START UP PARAMETERS
*=======================================*
DNR     APISUBSYS ( **** )
        NAMESERVER ( DNRNSCWF )
        ALIAS ( DNRALCWF )
        SEARCHLIST ( DNRSLCWF )
        NETWORKPREF ( DNRNPCWF )
        HOSTTABLE ( DNRHSTWF )
        NETWORK ( DNRNETWF )
        PROTOCOL ( DNRPRT00 )
        RPCNAMES ( DNRRPC00 )
        SERVICES ( DNRSVC00 )
        CYCLEMAX ( 04 )
        QUERYWAIT ( 03 )
        MAXSENDS ( 03 )
        MAXTIME ( 90 )
        RECURSIVE
        TRACE
        INTERNALTRACE
```

DNRHSTWF

```
MVS.XYZ.COM.        136.42.50.30
MVS.                136.42.50.30
ACSS.               136.42.50.30
MAINUNIX.XYZ.COM.   136.42.50.20
MAINUNIX.           136.42.50.20
LOCALHOST.          127.0.0.1
LOOPBACK.           127.0.0.1
```

DNRNETWF

```
ETHERNET2     136.42.50     LOCAL HOST NETWORK
```

DNRNPCWF

```
136.42.50     PUT OUR LOCAL NETWORK FIRST
```

DNRNSCWF

```
IN-ADDR.ARPA.      MAINUNIX.XYZ.COM.      136.42.50.20
XYZ.COM.           MAINUNIX.XYZ.COM.      136.42.50.20
.                  MAINUNIX.XYZ.COM.      136.42.50.20
```

DNRSLCWF

```
XYZ.COM.
COM.
.                 ROOT
```