# How To | Use Dynamic DNS To Allow You To Host Servers Behind A Dynamically-Assigned Public IP Address

Allied Telesis routers feature a dynamic DNS client, which allows you to host web domains, FTP servers, and mail servers behind a dynamically-assigned public IP address that periodically changes. The dynamic DNS client works with the service provided by DynDNS.com (www.dyndns.com). When the public IP address changes, the client notifies DynDNS.com of the change.

## What information will you find in this document?

This How To Note begins with essential background information, in the following sections:



Then it describes the example configuration, in the following sections:



## Which products and software version does it apply to?

This configuration applies to the following Allied Telesis routers, running Software Version 2.9.1 or later:

- AR415S
- AR440S, AR441S, AR442S
- AR750S, AR750S-DP, AR770S

# DynDNS.com hostnames

In order to use the dynamic DNS client on the router, you first need to register at least one hostname (actually a fully qualified domain name—FQDN) with DynDNS.com.

The dynamic DNS client can work with the following three hostname types from DynDNS.com:

- Dynamic Hosts

  This is the option to use if you don't own a domain name, but you want to host a server on your network and have people reach it by entering a domain name.

  Dynamic hosts are free to register with DynDNS.com, and allow you to associate a dynamic IP address with up to five of the static domain names that DynDNS.com provide. Dynamic host IP associations require at least one update every 35 days to prevent them from expiring.

- Static Hosts

  This is the option to use if you have a fixed IP address, you want to host a server on your network and have people reach it by entering a domain name, but you do not want to buy your own domain name.

  Like dynamic hosts, static hosts are free to register with DynDNS.com, and allow you to associate your public IP address with up to five of the static domain names that DynDNS.com provides. However, static hosts are designed for use with IP addresses that rarely or never change. This means that static host IP associations do not expire, and that dynamic DNS updates take longer to propagate through the DNS system with static hosts.

- Custom Hosts

  This is the option to use if you already own your own domain name.

  Custom hosts support both static and dynamic IP addresses. For custom hosts, in addition to automatic updates via the dynamic DNS client, DynDNS.com also provides a web-based interface where you can make updates directly. Such direct changes propagate through the DNS system very quickly.

## DNS server assignment

For the dynamic DNS process on the router to work, the router itself must be able to resolve the domain name dyndns.com. Therefore, the router needs to know the address of at least one DNS server. The router can learn the addresses of DNS servers dynamically from your ISP, or you can configure them statically.

**Dynamically**

When ISPs supply IP address settings dynamically, they mostly supply DNS server settings as well. They do this by setting one of the following:

- DHCP option 6 on Eth and VLAN interfaces
- IPCP options 129 (Primary server) and 131 (secondary server) on PPP interfaces

You can check if your router has dynamically-assigned name servers, and if so, what the server addresses are, by using the command:

```
show ip dns
```

Dynamically-assigned servers are identified by an * in the **Domain** column of the output of this command.

If necessary, you can force the router to learn DNS servers over a particular Eth, PPP or VLAN interface. Use the command:

```
add ip dns interface=interface
```

**Statically**

If your ISP does not assign DNS servers dynamically, you need to enter their addresses statically. Use the command:

```
add ip dns primary=ipadd secondary=ipadd
```

If you manually configure the DNS servers and you have a backup connection to a different ISP, you may need to set up triggers so that when the primary WAN connection fails, the router is re-configured with the correct DNS servers for the backup connection.

## Configuring dynamic DNS

In this example, an AR440S connects to the Internet through a primary ADSL connection to ISP 1, with a backup ISDN connection to ISP 2. The AR440S router also acts as a firewall.

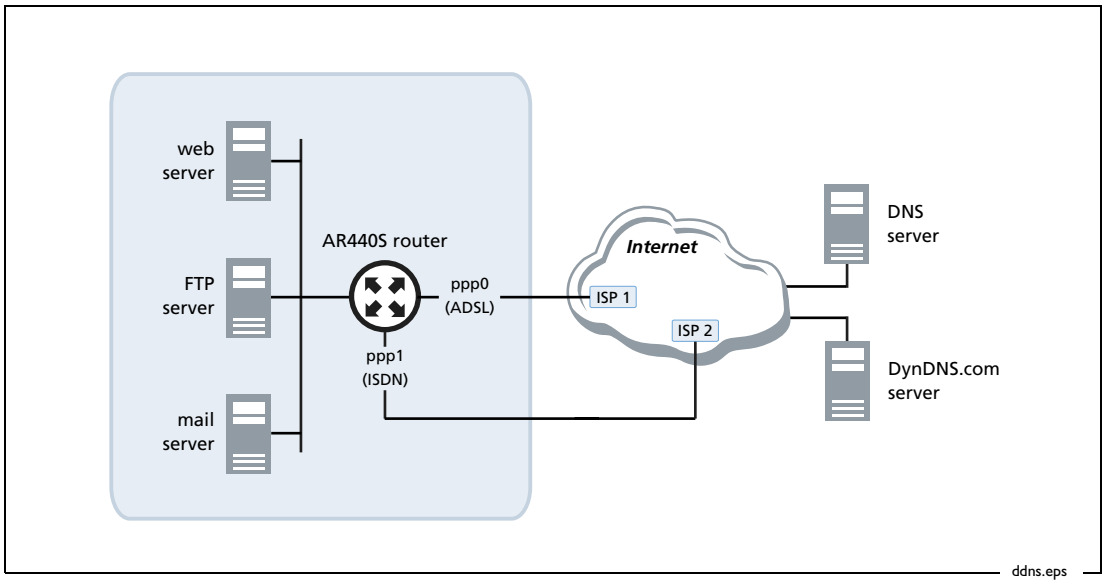
Steps that relate to the backup link are labelled, so you can avoid them if you have a single connection.

To configure this example, follow the steps in the following sections:


- "Configure the network and firewall" on page 4
- "Configure dynamic DNS" on page 7
- "Check dynamic DNS configuration" on page 9

## Network diagram

The following figure shows the network configuration.




## Configure the network and firewall

This section describes how to configure the WAN links, IP, and the firewall.

### 1. Specify the country

Setting the country sets the ADSL defaults. Use the command:

```
set system country=your-country
```

### 2. Configure the WAN links

For the **primary** ADSL link, use the commands:

```
create atm=0 over=adsl0
add atm=0 channel=1
enable adsl=0
```

For the **backup** ISDN link, use the command:

```
add isdn call=backup num=isdn-number-of-isp prec=out
```

## 3. Configure PPP

Configure the PPP link to each ISP. Use the username and password settings that your ISP provides.

For the **primary** ADSL link, use the commands:

```
create ppp=0 over=atm0.1 lqr=off echo=10
set ppp=0 bap=off iprequest=on username=username
  password=password
```

For the **backup** ISDN link, use the commands:

```
create ppp=1 over=isdn-backup idle=300 iprequest=on
  username=username password=password lqr=off echo=10 bap=off
```

## 4. Configure IP

Enable IP, allow the router to obtain its addresses remotely, and assign an IP address to the WAN interface. Use the commands:

```
enable ip
enable ip remote
add ip int=vlan1 ip=your-private-side-ip-address
```

If your ISP does not provide DNS server addresses as part of the dynamic IP configuration, specify DNS servers for the router to use. See "DNS server assignment" on page 3 for more information.

```
add ip dns primary=ip-of-primary-dns-server
  secondary=ip-of-secondary-dns-server
```

For the **primary** ADSL link, assign an unnumbered address to the link and create a default route. Use the commands:

```
add ip int=ppp0 ip=0.0.0.0 mask=0.0.0.0
add ip rou=0.0.0.0 mask=0.0.0.0 int=ppp0 next=0.0.0.0
```

For the **backup** ISDN link, assign an unnumbered address to the link and create a default route with a higher preference value than the route over the primary link. This ensures that the backup link is only used if the primary link goes down. Use the command:

```
add ip int=ppp1 ip=0.0.0.0 mask=0.0.0.0
add ip rou=0.0.0.0 mask=0.0.0.0 int=ppp1 next=0.0.0.0 pref=500
```

## 5. Configure the firewall

Create a firewall policy and enable it. Use the commands:

```
create firewall policy=internet
enable firewall
enable firewall policy=internet icmp_f=all
```

Add the private interface to it. Use the command:

```
add firewall policy=internet int=vlan1 type=private
```

Add the public interface to it and set up Network Address Translation (NAT) between the private and public interfaces. For the **primary** ADSL link, use the commands:

```
add firewall policy=internet int=ppp0 type=public
add firewall policy=internet nat=enhanced int=vlan1 gblint=ppp0
```

For the **backup** ISDN link, use the commands:

```
add firewall policy=internet int=ppp1 type=public
add firewall policy=internet nat=enhanced int=vlan1 gblin=ppp1
```

## 6. Add firewall rules

Add firewall rules to allow traffic from the WAN to access the servers. In this example, there are web, FTP and mail servers.

For the **primary** ADSL link, use the commands:

```
add firewall policy=internet rule=1 action=allow interface=ppp0
  protocol=tcp port=80 ip=ip-address-of-web-server gblip=0.0.0.0
  gblport=80
add firewall policy=internet rule=2 action=allow interface=ppp0
  protocol=tcp port=21 ip=ip-address-of-ftp-server gblip=0.0.0.0
  gblport=21
add firewall policy=internet rule=3 action=allow interface=ppp0
  protocol=tcp port=25 ip=ip-address-of-smtp-server gblip=0.0.0.0
  gblport=25
```

For the **backup** ISDN link, use the commands:

```
add firewall policy=internet rule=4 action=allow interface=ppp1
  protocol=tcp port=80 ip=ip-address-of-web-server gblip=0.0.0.0
  gblport=80
add firewall policy=internet rule=5 action=allow interface=ppp1
  protocol=tcp port=21 ip=ip-address-of-ftp-server gblip=0.0.0.0
  gblport=21
add firewall policy=internet rule=6 action=allow interface=ppp1
  protocol=tcp port=25 ip=ip-address-of-smtp-server gblip=0.0.0.0
  gblport=25
```

# Configure dynamic DNS

This section describes how to configure dynamic DNS.

## 1. Enable dynamic DNS

Use the command:

```
enable ddns
```

## 2. Specify the DynDNS.com host or hosts

Depending on the kind of DynDNS.com host you have (see "DynDNS.com hostnames" on page 2), use one of the commands:

```
set ddns dynamichost=your-hostname.dyndns-domain
```

or

```
set ddns statichost=your-hostname.dyndns-domain
```

or

```
set ddns customhost=your-hostname.your-domain
```

Note that the dynamic DNS client only supports one **type** of hostname at a time, but supports multiple hostnames of that type. If you have multiple hostnames, specify them as a comma-separated list. For example:

```
set ddns dynamichost=myhost1.dyndns.org,myhost2.dnsalias.org
```

## 3. Specify the dynamic DNS interface

Specify the interface that the WAN link uses.

For the **primary** ADSL link, use the command:

```
set ddns primaryinterface=ppp0
```

If you also have the **backup** ISDN link, also use the command:

```
set ddns secondaryinterface=ppp1
```

Note that the dynamic DNS client only supports one active WAN interface at a time.

## 4. Specify the TCP port, if necessary

The router sends dynamic DNS updates to DynDNS.com. If necessary, you can specify the port number that it uses for these. The DynDNS.com server listens to the following TCP ports:

- 80 (for HTTP)—the default
- 8245 (an alternative for HTTP)
- 443 (for HTTPS)

To use TCP port 8245, use the command:

```
set ddns port=8245
```

To use TCP port 443, use the command:

```
set ddns port=443
```

## 5. Enable wildcard host look-ups

Wildcard hosts allow DNS look-ups for any hosts on your registered domain, even if DynDNS.com and the DNS server do not know about those specific hosts.

For example, if the domain name you registered with DynDNS.com is:

```
mysite.dyn-o-saur.com
```

and wildcard hosts are enabled, the DNS look-ups to *any-hostname*.mysite.dyn-o-saur.com resolve to the current IP address of mysite.dyn-o-saur.com.

You must also enable wildcard hosts on DynDNS.com.

To enable wildcard hosts, use the command:

```
set ddns wildcard=on
```

## 6. Specify the username and password

Specify the username and password that you have registered with DynDNS.com.

```
set ddns user=username-for-DynDNS password=password-for-DynDNS
```

## Check dynamic DNS configuration

**show ddns**

After you have entered the DDNS configuration, you can check it by using the command:

```
show ddns
```

The following figure shows an example output from the command **show ddns** once the public IP address has been assigned, but before a dynamic DNS update has occurred.

```
DDNS Config Information:
  Client State ..................... ENABLED
  Debug ............................ ENABLED
  Server ........................... members.dyndns.org
  Port ............................. 80
  User ............................. test
  Password ......................... ****
  system name ...................... dyndns
    hosts .......................... test.dyndns.org
  Wildcard ......................... off
  Offline .......................... no
  Primary WAN Interface ............ ppp0
  Secondary WAN Interface .......... ppp1

DDNS Operation Information:
  Server IP ........................ 0.0.0.0
  IP in DynDns ..................... 0.0.0.0
  Current IP ....................... 222.152.186.174
```

In the above output of **show ddns**, the fields show the settings you have configured, except the **system name** field and probably the **Server** field—you can configure the server setting but do not need to. The following table has more information about these two fields.

| Field | Meaning | Configurable? |
|---|---|---|
| Server | The server that the dynamic DNS client connects to at DynDNS.com, which is members.dyndns.org. | Yes, by using the command **set ddns**, but you do not need to configure it because the only valid value is the default value of members.dyndns.org. |
| System name | The DynDNS.com system that update messages use: one of dyndns, statdns, or custom, depending on the type of hostname you chose. | No. The router automatically sets the system name to an appropriate value for your hostname type. |

When your ISP assigns a public IP address to your WAN interface, dynamic DNS waits for 30 seconds, then initiates a dynamic DNS update. The wait allows time for the PPP interface to become fully open and means that the ISP's DNS server is reachable. The dynamic DNS client can then resolve the IP address for members.dyndns.org and send the dynamic DNS update.

The following figure shows an example output from the command **show ddns** once a dynamic DNS update has occurred.

```
DDNS Config Information:
  Client State ..................... ENABLED
  Debug ............................ ENABLED
  Server ........................... members.dyndns.org
  Port ............................. 80
  User ............................. test
  Password ......................... ****
  system name ...................... dyndns
    hosts .......................... test.dyndns.org
  Wildcard ......................... off
  Offline .......................... no
  Primary WAN Interface ............ ppp0
  Secondary WAN Interface .......... ppp1

DDNS Operation Information:
  Server IP ........................ 63.208.196.95
  IP in DynDns ..................... 222.152.186.174
  Current IP ....................... 222.152.186.174
```

**log entry** You can also check the router log to see information about the dynamic DNS update. Use the command:

```
show log
```

The following figure shows the log entry for a successful dynamic DNS update.

```
07 10:36:18 5 DDNS MSG   INFO  Dynamic DNS update succeed. Host test.dyndns.org
                               is 222.152.186.174.
--------------------------------------------------------------------------------
```

# Troubleshooting

To diagnose issues with dynamic DNS updates, try:

- checking the output of the **show ddns** command
- looking for log entries
- using the **enable ddns debug** command

You can manually activate a dynamic DNS client update. You should only do this when your public IP address has changed but the dynamic DNS client has not been able to automatically update. DynDNS.com treats repeated updates with no changes as abuse, and may blacklist and disable your account. Therefore, the router requires confirmation whenever you activate a dynamic DNS client update manually. To activate an update manually, use the command:

```
activate ddns update
```

## The “show ddns” command

If the dynamic DNS update fails for any reason, the output from the **show ddns** command includes a statement that the update failed, and suggested actions to resolve the issue. This information appears at the bottom of the command, like in the following figure.

```
.
.
.
DDNS Operation Information:
  Server IP ......................... 0.0.0.0
  IP in DynDns ...................... 0.0.0.0
  Current IP ........................ 222.152.186.174
Update failed - Suggested actions:
  Config IP DNS or Set DDNS Server
```

## Log entries

After every dynamic DNS update, a log entry indicates whether or not the update succeeded. To see log entries, use the command:

```
show log
```

The following figure shows the log entry you might see if an update fails. In this case, the user configured a domain name that DynDNS.com did not recognise, instead of using a domain name from the list of domains that DynDNS.com owns (see Step 2 on page 7 and www.dyndns.com).

```
Date/Time   S Mod  Type  SType Message
------------------------------------------------------------------------
07 10:31:37 5 DDNS MSG   WARN  Dynamic DNS update failed. Host
                               fail_dyn_host_test is malformed.
```

## Debugging

The dynamic DNS client debug facility gives more information about rejected updates. When DynDNS.com rejects an update it returns an error code, which is displayed in the debug output. To enable debugging, use the command:

```
enable ddns debug
```

The figure on the next page shows debugging output for an update that failed because of an incorrect username or password. The "return code" section of the output shows the error code ("badauth" in this example, as shown in **bold**), and further down in the output is more information about the cause of the return code ("Incorrect userid or path" in this example).

```
Manager >
ddnsIpgSetDynamicIpAddrNotify int=ppp0, ip=222.152.180.63
Manager >
ddnsReadDdnsRecord:
DynDns record file read IP=219.89.51.70, unicode=0x44444353
ddnsIpDNSServerName
ddnsIpDNSCallback server ip 63.208.196.95
idleflag=0x00000030, result=0x01000000
ddnsStartRequest
Manager >
ddnsHttpCreateRequestHeader
Manager >
ddnsHttpClientCallback sessionid=0x01581adc statusCode=401
ddnsHttpClientCallback sessionid=0x01581adc statusCode=1
HTTP Done
ddnsProcessReturnCodeTop
return code:
7
badauth
0


search for numhost
search for dnserr
search for 911
search for badsys
search for badagent
search for badauth
Incorrect userid or password.
result=0x00004000
action=0x00000400
ddnsProcessUpdateResult
```

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