Router TroubleShooting Guide

Note: The concepts in this document may apply to any router. *This is a guideline*; not exact directions. If you have the TP-Link TL-R401M or TL-R402M router, the examples are actual. The terms should be similar in your own router's manual.

 We are not responsible for any failure to reconnect your PC to the internet. We will not fix settings on your modem, router or PC. **If you do not have the administrative rights or the skill to adjust router or switch settings, then please contact a technician for help.**

Definitions

Address Range – the specific IP addresses set aside in the router for DHCP assignment.

Address Reservation – new routers can assign an IP based on the gateway's MAC address as an alternative to static ip.

Default – the setting pre-configured by the vendor based on most common usage expectations.

DHCP Reservation – see Address Reservation.

Dynamic Host Configuration Protocol (DHCP) – the ability to assign an IP address "on the fly".

Electronic Device – examples include a PC, router, switch, gateway or any component that contains electronic circuitry and (for this discussion) is capable of performing network or internet communication.

Internet Protocol (IP) Address – a specific numeric label required on an electronic device before it can communicate over the internet. The format of an IP address is 4 blocks of numbers 1-3 digits in length separated by periods (e.g. ###.##.###.###).   We support IPV4.

LAN – Local Area Network (for our purposes the computers connected inside your building).

Media Access Control (MAC) Address: a unique identifier assigned to every electronic device that will access a network or the internet. The format of a MAC Address is XX-XX-XX-XX-XX-XX for which XX can be a letter or number.

Modem – a device that translates specific types of communication (e.g. cable or DSL internet service).

Network – any two or more electronic devices connected for shared communication.

Router – a device that connects two or more devices via its DHCP ability to assign IP addresses. Technically, a router can be hardware or software, but our examples use the hardware type as that is most common at home or in a small business.

Static IP – an IP registered in the electronic device that is manually set so it will not change.

Subnet Mask – an address code that determines the size of the network.

Switch – it looks like a router and connects devices, but it cannot assign DHCP. When DHCP is turned off in a router, it functions as a switch.

TCP/IP – the communication language of most networks and the internet.

WAN – Wide Area Network (for our purposes the computers outside your house).

Router Rules

1. Only one device can serve as your router and use DHCP to assign IP addresses.
2. Any additional network devices must be configured as switches to prevent DHCP conflict.

Tip: The sudden inability to communicate on the network or internet is a potential symptom of DHCP conflict.

Router Basic Issues

Router Needs a Reboot
Any electronic component that is "always on" can experience content errors (e.g. after a power interruption, static electricity, etc.). If you have service problems, reboot the router before pursuing any changes in router configuration or seeking support. There is usually a reboot command in the router menu, but a simple power cycle (e.g. turn unit off, wait 10 seconds, turn on again) will usually clear any memory errors.

If you have knowledge of an interruption in service, it can be best to reboot everything: cable/dsl modem, router, and PC. Then retest your internet access.

Router is Cabled Wrong

The single most common error we see is cabling in the router incorrectly. This section assumes DHCP is enabled, which defines a router. To trouble-shoot cabling, you trace wires from the wall to the computer.

The most common configuration is:

1. Your cable or dsl service comes into the house and the first cable goes to the cable/dsl modem provided by your ISP (pictures are illustrative only).
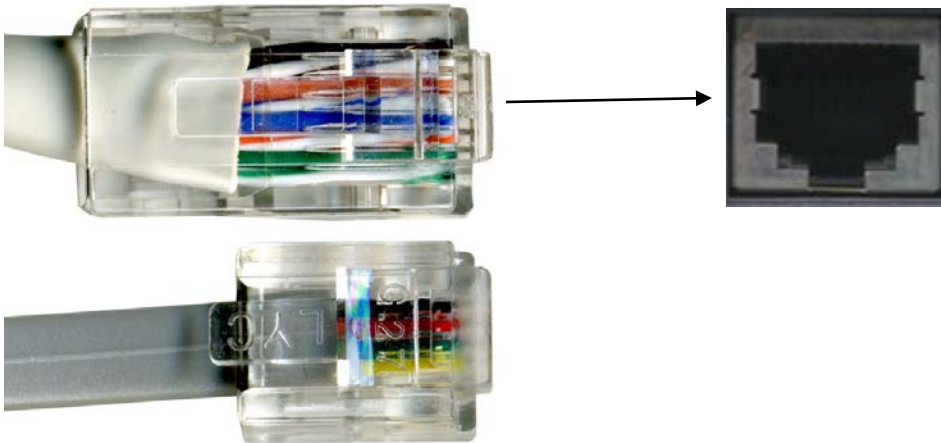

    o   In cable service, the first cable is a standard coax cable connection:
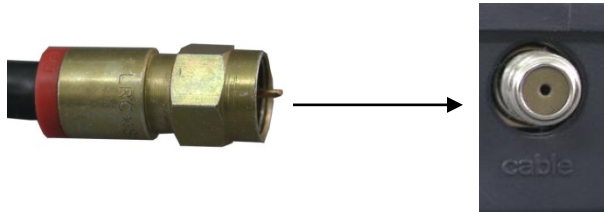

    o   In dsl service, the first cable is standard RJ-11 telephone line.


2. Then a cat5e RJ-45 network cable (white cable below) is attached to the Ethernet port on the cable/dsl modem. (**Note**: A network cable looks like phone line but is larger.)

3. Next, the other RJ-45 end of the cat5e network cable plugs into the WAN port of the router. **Note:** The WAN port usually has some differentiation from the bank of (approximately) 4 standard LAN ports on the back.
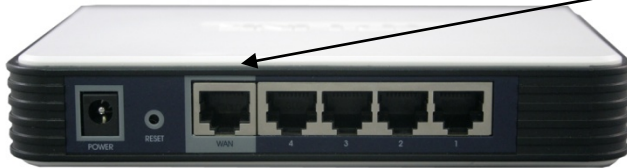
4. Lastly <u>another</u> RJ-45 cat5e network cable plugs into a LAN port on the router at one end, and the other end may plug into your Ethernet port on the computer for PCs not using wifi (one must go to the standard gateway).
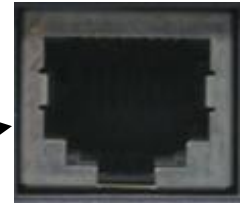
5. After the PC is connected through the router to the cable/dsl modem, any other devices are connected to the remaining LAN ports on the router (with more cat5e RJ-45 network cables).

Reminder: If the router has DHCP on, each device connected must also have DHCP turned on in tcp/ip **Properties** so it requests an IP address. If the device is a standard gateway, the configuration information can be read in the Gateway Advanced Setup software (requires Windows PC).

Router Configuration Issues

Router Limits IPs Available

From time to time we see IP limits set in a router. There are several varieties of this scenario:

1. ***The limit is set in the DHCP assignment range***. When DHCP is enabled, you specify a range that is available to assign to requesting electronic devices. In this TP-Link example (see right), 100 possible IPs are available.

Where the household owns a desktop and a laptop, we've seen the range limited to two IPs: e.g. 192.168.1.100 to 192.168.1.101. When an additional device enables DHCP requests (e.g. standard gateway), there is no IP for it. **Note**: A static IP may still connect.

2. *The subnet mask limits IPs*. The default Subnet Mask is 255.255.255.0, which means it will allow a maximum of 256 devices (hosts) to connect. Specifying a subnet mask is common in corporate networks to separate portions of the network.
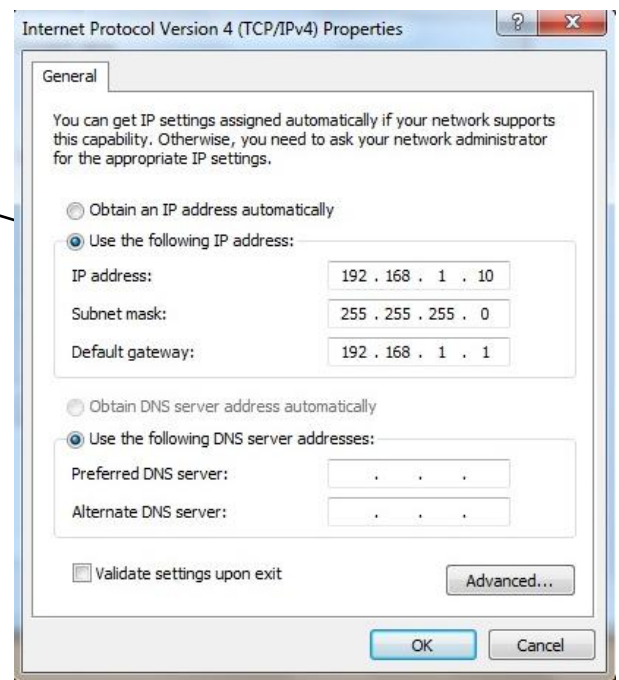
LAN

MAC Address:	
IP Address:	192.168.1.1
Subnet Mask:	255.255.255.0 ▼

Save

As a simple example to watch for where the router may limit to a small number of connections (or search for subnet mask cheat sheet):

Subnet Mask	Number of Connections
255.255.255.252	4
255.255.255.248	8
255.255.255.240	16

Warning: The subnet mask in the router must match the subnet mask in each device.

Subnet mask: Home users usually keep the default 255.255.255.0. This value must match the entry in your router.

Default gateway: node that forwards packets; usually the router.

Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically
● Use the following IP address:

IP address:	192 . 168 . 1 . 10
Subnet mask:	255 . 255 . 255 . 0
Default gateway:	192 . 168 . 1 . 1

○ Obtain DNS server address automatically
● Use the following DNS server addresses:

Preferred DNS server:	. . .
Alternate DNS server:	. . .

☐ Validate settings upon exit   Advanced...

OK   Cancel

3. ***The router limits IP usage time (address lease)***. The router can be set to limit the length of time any IP can stay connected to it (see Address Lease Time below). The default setting on the TP-Link router is 120 minutes. If this number is set very small, it becomes almost impossible for a connected device (e.g. the standard gateway) to finish a data download.

DHCP Settings

DHCP Server:	◉ Disable ◉ Enable
Start IP Address:	192.168.1.100
End IP Address:	192.168.1.199
Address Lease Time:	120 minutes (1~2880 minutes, the default value is 120)

MAC Filter is On

When you use the TP-Link router as a firewall, the default usually is **MAC Filter Off**. If you enabled the MAC Filter or if the default on your router is MAC Filter <u>On</u>, then you need to specifically add each device's MAC address to the filter (e.g. on TP-Link you do so from the configuration screen's **Add New** button).

Repeat: If the MAC Filter is ON, every device (e.g. PC, the standard Gateway, etc.) must be registered in the router for specific permission by exact MAC Address to connect.

Your MAC address (see definitions) is private information. The only need-to-know basis of this number is your network administrator or a qualified support person working on your router issues.

TP-LINK Cable/DSL Router

Cable/DSL Router
Model No.:TL-R402M

MAC Address Filtering

Firewall Settings (You can change it on Firewall page)

Enable Firewall:	Disabled
Enable MAC Address Filtering:	Disabled
Default Filtering Rules:	Deny these PCs with enabled rules to access the Internet

ID	MAC Address	Description	Status	Modify

Add New.. Enable All Disable All Delete All

Previous   Next

- Status
— Basic Settings —
- Quick Setup
+ Network
— Advanced Settings —
+ DHCP
+ Forwarding
- Security
 • Firewall
 • IP Address Filtering
 • Domain Filtering
 • MAC Filtering
 • Remote
   Management

Examples of how to locate an electronic device's MAC address:

- For a PC, go to a command prompt or PowerShell window. Type **ipconfig /all** and press **Enter**. The ***Physical Address*** is your network card's MAC Address (e.g. the format is 6 sets of two characters each separated by hyphens XX-XX-XX-XX-XX-XX).
- For the standard gateway, the MAC Address will display in the Gateway Advanced Setup software (Windows PC required):
    - Weather Direct: http://www.weatherdirect.com/help/software.aspx
    - La Crosse Alerts Mobile: http://support.lacrossealertsmobile.com/static-ip.html


Gateway Static IP

To register, a gateway must achieve 4 blinks. If it is stuck on 2 or 3, a static ip may help. Use the instructions online to set one:

- Weather Direct: http://www.weatherdirect.com/help/gatewayhelp3.aspx
- La Crosse Alerts Mobile: http://support.lacrossealertsmobile.com/static-ip.html

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Router DHCP Reservation or Address Reservation

Users with a Windows PC can download our Gateway Advanced Software utility and set a static ip directly in the gateway (e.g. http://support.lacrossealertsmobile.com/static-ip.html). This static ip is lost when the gateway is factory reset.
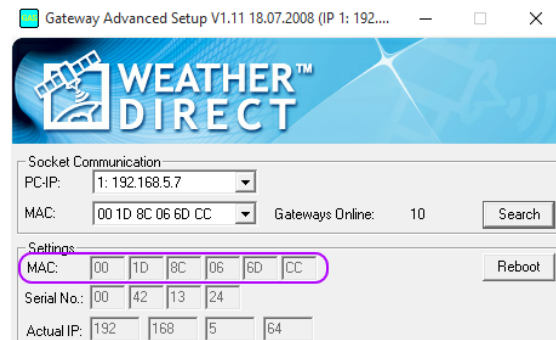
If you have the skills, ***newer routers can accomplish a similar result by setting a DHCP Reservation (aka Address Reservation).*** This IP is not lost when the gateway is factory reset. Consult your router documentation for details. In general:

- Use our Gateway Advanced Software per the static ip instructions, but you only need to read the MAC address on the gateway (see illustration above).

- Locate the DHCP Reservation section in the router to select an IP for this gateway. The MAC address will ensure the correct device gets the number.
- To select an IP to reserve, find the DHCP Settings range of IPs to dynamically allocate. There are various schools on selection; generally choose from near the end of the range. If the subnet (see page 5) supports more addresses than the range specified, you can alternatively select just above it.
- A reserved address is not exactly the same as a static IP. The gateway with a reserved address retains DHCP on. If the gateway goes elsewhere, it gets an IP assigned via DHCP from the new router's pool. When it comes back to this router, it gets the reserved IP back via MAC address.
- Most router directions will state the router needs a reboot to implement a reservation. Wait a minute, then the gateway will need to be power-cycled (remove a/c 10 seconds and re-attach). If an IP is received, it will go to 4 blinks (unregistered) or solid red (registered).

Other Common Issues

Device Menu Lacks DHCP Settings

When a user cannot find the DHCP menu, we sometimes discover they have a switch rather than a router. If you have the login information for the device, a router will usually make the DHCP access menu reasonably available.

The best way to verify any device is to locate the actual description label on the device - find the specific information after the phrase "Model No." For example, the TP-Link says "TL-R402M" on a label on the bottom of the device.

With the model number, you can use any search engine (e.g. www.google.com, www.yahoo.com, www.bing.com, etc.) and type it as the search criteria (without quotes). You should then be able to find more information on the device.

Note: The model # tag on the device may also contain other useful information, like the IP to log into the unit or confirming words like "Cable/DSL Router".

Unit is old or incompatible

Sometimes, no matter what configuration is set in the router, it simply does not work. This is likely when the router is too old to be compatible with current internet or network communication protocols. Strictly speaking, routers have been available for over 30 years, but a modern or router must be able to support internet communication.

The current version for internet communication is tcp/ip V4, with tcp/ip V6 in concurrent use. **Our standard gateway is tcp/ip V4**. We cannot guarantee the compatibility of any router.

Unit is defective or partially so

Any electronic component has a certain failure rate. If you buy a new router or a switch, know your return time limit and warranty or repair options. We have assisted customers with our internet-enabled products on various brands of routers, and on occasion a new router is simply defective (e.g. LAN port 1 fails but 2-4 are ok). For this reason, keep all documentation and packaging so that you can locate both the vendor and the manufacturer should the unit fail since if it is new, you will want a replacement if entitled to it.

Additionally, as units age some aspect of them naturally begin to break down. Those of us who work in the computer industry may own routers in which say port #3 is defective, but we mark the unit so that the broken port is never used again by mistake.

If you are shopping:

- If you need DHCP to obtain an IP address, then keep saying "router, router, router" and check the package. A router may state "broadband router" or "cable/dsl router". A wireless router is fine provided that it has 4 or 5 standard LAN ports on the back.
- If you already have DHCP but don't have enough network ports, then keep saying "switch, switch, switch". A switch is generally less expensive than a router but you need the router first. This package should say "switch".
- If you don't know or the prices are close, then find the best router price.
- A router becomes a switch when DHCP is disabled; a switch is a cheaper way to add network ports to a router. If you upgrade to a new router, an old router or access point can disable DHCP to be a switch (if it has LAN ports available). Consult your product documentation for details.