

NETWORKING TIPS ©

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BASICS of NETWORKING: (Tutorials) (High speed DSL or Broadband Cable) See these helpful sites:

- Tutorials: <http://www.homenethelp.com/home-network.asp> <http://practicallynetworked.com/networking/>
- Diagrams: <http://compnetworking.about.com/od/homenetworking/ig/Home-Network-Diagrams/>
- Networking info: <http://www.networkclue.com/>
- Wireless Tutorial: <http://compnetworking.about.com/cs/wirelessproducts/a/howtobuildwlan.htm>
- Wireless Tutorial: <http://www.wireless-network-tutorial.com/>
- Home Networking Basics (Videos) <http://www.linksysbycisco.com/US/en/learningcenter>
- Router Set-up Theory <http://support.knology.net/content/setup.new.connection.cfm>
- Network Tips & Help: <http://www.smallnetbuilder.com/>

POWER-UP SEQUENCE FOR PC/NETWORK DEVICES. (To restart an internet connection)

1. Power everything off. (All PC's connected to the network, plus the Router & Modem)
2. Power on the Modem & wait 30 seconds or until the DSL or ONLINE light is on solid.
3. Power on the Router (if you have one) and wait another 30 seconds or so.
4. Power on the PC or PC's. (Note: This sequence properly loads the DNS Tables into the Router and all PC's)

ROUTER INSTALLATION, SETUP & CONFIGURATION

(See my separate document called ROUTER SETUP - TIPS at www.jimopi.net)

DNS LOOKUP:

For increased security and reliability, I suggest using the "OPENDNS" DNS Servers instead of the DNS servers used by your internet provider (For details, see <http://www.opendns.com>). Most routers can be set up to use the opendns servers, so you do not have to customize each PC on the network individually. To set up an individual PC: (Control Panel > Network Connections > right-click LAN > Properties > TCP/IP > Properties) . Use the following DNS server addresses: 208.67.222.222 and 208.67.220.220.

Google now offers DNS service as well: To use it, enter the following DNS addresses: 8.8.8.8 and 8.8.4.4. Instructions can be found at: <http://code.google.com/speed/public-dns/docs/using.html>

FIREWALLS (Software Firewalls like Zonealarm)

For PC's to communicate with each other on a local network, each PC must have it's software Firewall set up to include the other PC's IP Addresses in a "Trusted Zone". I usually set each PC for a trusted range: IE: 192.168.1.100 thru 192.168.1.120. If the router assigns IP addresses starting at 100, that should cover most DHCP assigned IP addresses. Remember, even though only 4 PC's can plug into a Router, using a switch or wireless PC's will cause it to use more IP addresses.

HOME NETWORKING SETUP TIPS

FOR XP

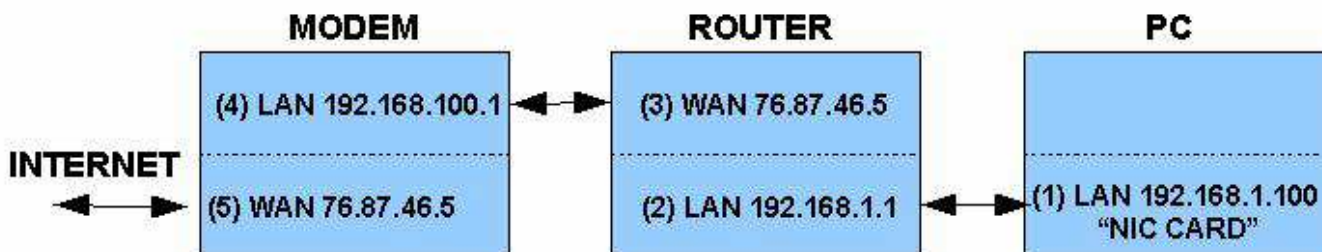
- This guide is from the Mike Tech Show (#222) Website http://miketechshow.com/files/Win_XP_Home_Network_Setup.pdf
- Home network troubleshooting guide from Carey Holzman: <http://fixnetworkproblems.com/>
- HOME NETWORKING VIDEOS: <http://www.dlinktv.com/>

FOR WINDOWS 7

- **UNDER CONSTRUCTION.....**

IP ADDRESSES (Finding IP Addresses)

- PC's "IP ADDRESS" (1) as seen from the Network. Open a DOS prompt and enter: ipconfig/all The IP Address shown is the PC's. *Note: This IP Address is usually assigned by the Router (or Modem if there is no Router) and typically starts at 192.168.1.100 and goes up one for each added PC (.101, .102, .103, etc).*
- ROUTER (LAN) IP ADDRESS (2) as seen from the PC. Open a DOS prompt and enter: ipconfig/all The Default Gateway address is the Router IP Address. *It is typically 192.168.1.1 or 192.168.0.1*
- ROUTER (WAN) IP ADDRESS (3) as seen from the Modem & ISP. This IP Address is usually the same as the Modem WAN IP Address. It can be viewed by logging-in to the Router as ADMIN. *For Linksys, Log-in > Status tab > WAN section, IP Address. For D-Link, Log-in > Status tab > WAN section, IP Address. For Netgear, Log-in > under Maintenance in LH column, click Router Status > LAN Port IP Address.*
- MODEM (LAN) IP ADDRESS (4) as seen from the PC. With the Modem connected directly to the PC, open a DOS Prompt and enter: ipconfig/all The Default Gateway address is the Modem IP Address. A Cable Modem is typically 192.168.100.1. A DSL Modem is typically 10.0.0.1, 10.0.0.2, or 10.0.0.138, but can be anything. *Note: If you know the Modem IP Address, you can connect to the Modem from the PC's Browser without disconnecting the Router.*
- MODEM (WAN) IP ADDRESS (5) as seen by the ISP, go to <http://www.ipchicken.com> (This is usually a dynamic address (DHCP) and is assigned by the ISP). It can change periodically as the ISP does maintenance).
- DNS SERVER IP ADDRESSES: Use the command: ipconfig/all
- HELP: To find more IP Addresses of various devices, see these sites:
<http://www.homepage.nflworld.com/robin.d.h.walker/cmtips/ipaddr.html> or
<http://compnetworking.about.com/od/findingipaddresses/>
- TYPICAL HOOK-UP DIAGRAM (of a CableModem-to-Router-to-PC hook-up)



- SCAN LOCAL NETWORK FOR DEVICES: The latest version of Belarc Advisor (8.1b or higher) now scans your full home network and lists all devices discovered. First by IP address, then Device Type, Device Name, & Device Description.

MAC ADDRESSES (Finding MAC Addresses)

Windows XP:

Open a DOS prompt and enter: ipconfig /all
The "Physical Address" is the MAC address.

Windows 98SE:

1. Click on the Start menu, then click on the Run option.
2. When the "Run" window opens, type winipcfg into the "Open" field, then click the OK button.
3. The "IP Configuration" window should appear, select the Ethernet Adapter that the PC is using from the drop down list.
4. Make note of the "Adapter Address" which is the MAC Address.
5. ALTERNATE METHOD = From the Run window or a DOS prompt: ipconfig /all

NAS HARD-DRIVES (Network Attached Storage)

- FreeNAS: Make any old PC into a NAS Storage device: See www.freenas.org
- CONNECTION:
 - NAS drives connect to your PC's via the home ethernet network (either cabled or wireless).
 - Each NAS device has its own IP address and can include one or many hard drives inside.
- FILE FORMATS:
 - Currently all NAS device controllers are Linux based and cannot use the Windows NTFS formatting system. (As of 5-2009).
 - If you plan to use a NAS Drive for image backups, do not get one that only formats its disk/s as FAT32. Newer NAS Drives use file formats such as: EXT2, EXT3, EXT4, XFS, or ReiserFS (3.6). Choose a drive that uses one of these formats, since image backup files are gigantic (easily 5 to 50 GB) and these file systems do allow file sizes that are large enough to use for large backup images. I prefer ReiserFS (3.6) or XFS if you can find it.
 - If you have a MAC on the network, it will only use the HFS format. I am not sure what other formats that MAC's can read and write to.
 - Also see: http://en.wikipedia.org/wiki/Comparison_of_file_systems
- FAT32 Issues:
 - The FAT32 format limits the maximum file size to 4 GB.
 - A FAT32 NAS Drive is fine if you only want to use an NAS Drive to store common data files to share among several PC's.
 - I do not recommend using a FAT32 formatted drive for Image Backups because the image files are very, very large.

NIC "Network Interface Cards" (PCI CARDS for wired networks)

- Rosewill RC 400 (10/100/1000 Supports all Operating systems):
<http://www.newegg.com/Product/Product.aspx?Item=N82E16833166002>

PORT FORWARDING:

- To make port forwarding work in a router, you need to first set unique static IP addresses in each of your PC's and disable DHCP in the Router. This makes sure the forwarding goes to the correct PC.
- See portforward.com

ROADRUNNER "DIAL-UP" ACCESS SETUP:

- Time Warner offers free dial-up access available to Roadrunner customers who travel. To my knowledge, they have never formally announced this.
- Here is a link to the Time Warner Dial-access sign-up: <http://dialaccess.rr.com/index.html>
- When you register, you must use the PRIMARY E-mail address of your T.W. Roadrunner Account. You also must use the password for that Account as your dial-in password. Once you register, it may take a day or two to propagate your info to the local dial-servers before it works.
- You must download, install, and configure the Roadrunner Dialer program.
- You can also download a list of available dial-in phone numbers from the above website, so it conveniently resides on your PC for reference while traveling.
- CONNECTION BUG: Once signed up, I was still unable to log in via Dial-Up. I kept getting an error message saying "invalid username or password". TW support finally told me to un-install Microsoft Security Update KB911280 dated June 13, 2006 and re-install it with the updated KB911280 dated June 27, 2006 (*This has to do with running dial-up scripts*). *NOTE: If your computer is newer than about October 2006, you will probably already have the newer version of this update installed.* See the Microsoft Support Knowledge Base for details: <http://support.microsoft.com/kb/911280>

SPEED OF A NETWORK

- If your PC speed is slow or intermittently hangs, try setting up your router up for MAC address cloning. Many ISP's are set up to (officially) only allow one PC to be used. Multiple MAC addresses can confuse the server. MAC address cloning always sends the same MAC address to the ISP server, no matter which PC is running.
- If ping delay is >40ms, you need a bigger receive window. Default is 16ms. Chg to 32ms. This is done using the regedit command and should only be done by an expert. Another option is a free utility called TCP Optimizer from <http://www.speedguide.net/downloads.php>
- Try: <http://www.dslreports.com/tweaks> for ideas for improving speed.

TROUBLESHOOTING NETWORK CONNECTIVITY TO THE INTERNET. *Note: For Wireless issues, see the section below called "Wireless Tips and Problems".*

- **FIRST:** Before doing any network troubleshooting.....
 1. Turn off the Windows Firewall and all 3rd party software Firewalls. Turn off all Antivirus & Anti-Spyware suites & programs, especially Trend Micro, Norton Internet Security, McAfee, CA, & Panda.
 2. Check in Device Manager to make sure the Network adapter is enabled. (If not, try deleting the Adapter and rebooting, so Windows can reinstall the Adapter Driver).
- **MODEM (DSL or Cable Modems only)**
 1. Make sure you have powered down then back up all devices in the correct sequence. See above under POWER-UP SEQUENCE.
 2. Make sure the ONLINE or DSL light is on solid. If it is on, then the Modem is connected to the internet. *Note: Nothing should be blinking but a "DATA" or "PC ACTIVITY" light. If not, call your ISP.*
 3. Bypass the router if necessary by plugging the PC directly into the MODEM.
 4. Try to log into the MODEM from your browser or ping it from a command prompt (see "PING Command"). If you cannot connect to the Modem, try a MODEM power on reset. *To find a MODEM's IP Address, see the section on "Finding IP Addresses". Warning: Never do a "Pushbutton reset" on a Modem. If you do, you may have to call your ISP for help getting it configured and operational again. It depends on the ISP.*
- **ROUTER:** If you can connect OK to the internet without the router in the circuit, then try these steps to help fix router issues:
 1. Make sure you have powered up all devices in the correct sequence. See above.
 2. Try to PING the router. The address is usually 192.168.1.1 or 192.168.0.1. (see "PING Command").
 3. Verify all the Router Settings. For details, see my "Router Setup - Tips" help sheet.
 4. Make sure the MAC Address of correct PC is being used for MAC address cloning.
 5. Try a "PushButton" reset on the router and start over. (Hold button in for 15-30 seconds until lights flash). *Note: Netgear Routers may need you power off, then hold the button in during the entire power on self test sequence to fully reset it to factory defaults.*
 6. Try to log in to the router as "admin" from your browser. If you cannot get to the Router log-in screen, verify the router IP address, see the section "Finding IP Addresses". Pushbutton Reset the router and try again.
 7. Wireless Router: See "Wireless Tips" section of this document.
- **NORTON INTERNET SECURITY & NORTON ANTIVIRUS** are known to be a likely causes of internet connectivity problems. Sometimes you have to remove all NORTON PRODUCTS using the "Norton Removal Tool" to clear things up. TREND MICRO and MCAFEE PRODUCTS have similar issues. There is also a TREND Removal tool and a MCAFEE Removal tool available. See my "ANTI-MALWARE TOOLS & TIPS" sheet. *Note: Even if Norton was not on the system, running the Norton Removal Tool can restore many Network settings back to normal and can resolve communication problems.*
- **PING Command**
 1. Ping is a DOS Command that sends a data packet to a device on the network or internet and tells you if the device replies and how long it took.
 2. To ping, open a DOS Command window and enter: ping xx.xx.xx.xx (where xx.xx.xx.xx is an IP Address) or ping an Internet URL, like www.google.com (*for command options, enter ping/?*).
 - a. A good Address to ping is 127.0.0.1. (That is your own PC loopback test).
 - b. A good IP address to ping is your ISP's DNS Server. To find it enter: ipconfig/all
 3. If ping fails, either the IP Address Address you entered is wrong or the connection is bad. Again, make sure your software firewall is off.

NETWORKING TIPS

- **TRACERT Command:** This command is similar to PING, but tells you every router and every node used to reach the device you pinged.
- **SET NETWORK SECURITY TO DEFAULTS.** (*Control Panel > Internet Options > Advanced Tab*). Click the Reset button. *Note: This resets all IE Options to default, including the default Home Page.*
- **NETWORK CONNECTS BUT CANNOT REACH WEBSITES.** Try changing your Network settings to use the OPENDNS.COM DNS servers instead of your ISP's default servers. (*Control Panel > Network connections > TCP/IP > Properties*). Change from "Obtain DNS Addresses automatically" to "Use the following DNS Server addresses": 208.67.222.222 and 208.67.220.220.
- **SAFE-MODE:** Try booting into Safe-Mode (with Networking), to see if you can connect to Internet. If so, then some service is running in normal mode that is preventing access to the internet. Probably some anti-malware program.
- **COMMANDS:** Try these commands from a Command Prompt Window (run one at a time).
netsh winsock reset
netsh firewall reset
netsh interface ip reset
ipconfig /flushdns
restart
- **HINTS:** Troubleshooting Internet Connection Problems.
<http://antivirus.about.com/od/windowsbasics/a/interneterrors.htm?nl=1>
- **WINSOCK XP FIX:** Try this utility as a last resort.

TROUBLESHOOTING PC to PC NETWORK CONNECTIVITY

- Turn off all Firewalls before troubleshooting PC to PC connectivity.
- Make sure all steps in the previous section have been completed and connectivity to the internet works OK.
- **WINDOWS 7 or VISTA:** If you cannot access files on a networked XP PC, you need to "Leave the Homegroup", then set up sharing manually for each PC (Win7, Vista, or XP) on your network. (*Control Panel > Network and sharing Center > click Homegroup (on the left) > click "Leave the homegroup"*).
- **NetBIOS:** If you have problems communicating with other PC's on your home network, try activating NetBIOS on each PC. (*for XP = Control Panel > Network Connections > right-click the LAN Icon > Properties > General tab > click "Internet Protocol TCP/IP" > Properties button > "Advanced" button > WINS tab*). Then select "☑ Enable NetBIOS over TCP/IP". To exit, click OK, OK, Close.
- To keep Multiple Network Adapters on a PC from conflicting with each other: See this troubleshooting tip:
<http://www.windowsreference.com/windows-2000/change-the-interface-metric-on-a-network-adapter/>

UTILITY PROGRAMS FOR NETWORK TROUBLESHOOTING

- **FREEMETER - Portable** (Monitors live network throughput + some great networking utilities) - Free: <http://miechu.pl/freemeter/>
- **NETMETER** - Free: http://download.cnet.com/NetMeter/3000-2085_4-10171922.html?tag=mncol
- **3DTRACEROUTE** (Traces & identifies network slowdowns) - Free: <http://www.snapfiles.com/get/3dtraceroute.html>
- **ETHERREAL** (Network Protocol Analyzer) - Free:
http://www.download.com/Ethereal-Network-Protocol-Analyzer/3000-2085_4-10492160.html.
- **WINSOCK XP FIX** utility from <http://www.snapfiles.com/get/winsockxpfix.html> as a last resort.
- **"ROUTE" COMMAND** (Run from a Command Prompt). "route print" displays a table with lots of info. See this link for help: <http://www.microsoft.com/resources/documentation/windows/xp/all/proddocs/en-us/route.mspx?mfr=true>
- **SYDI** (scans and documents the network. Requires Microsoft WORD.) - Free: <http://sydiproject.com/download/>
✓ Listen to the Mike Tech Show podcast #251 for a Tutorial.

WIRELESS TIPS & PROBLEMS:

- **START TROUBLESHOOTING WITH NO SECURITY:** First, be sure to get your wireless running with the Router in basic mode. This means no WEP, no WPA, no passwords, no firewalls. Once you get it running, then you can set up stealth and security. See my "Router - Setup & Tips" sheet.
- **INTERFERENCE:** Interference problems are usually caused by too many close networks, but can also be caused by many appliances, wireless security cameras, cordless phones, motion detectors, etc:
 1. First, try a different wireless channel (Select a new channel in the Router).
 2. Second, change the "Wireless Zero Config" Windows Service from "Automatic" to "Manual" (XP = *Right-click My Computer > Manage > Services & Apps > Services*). *Warning: some Wireless adapter programs need "Wireless Zero Config" to be running.*
 3. Try a wireless analyzer Utility to see what 802.11b/g/n signals are in the area competing with your signal. These are listed in the next section. NOTE: They will not detect signals from anything other than 802.11 compatible wireless devices.
 4. If you have a serious problem, you can buy the Wi-Spy Spectrum Analyzer (for the 2.4 GHz band only). (\$176.00 from Amazon) <http://www.metageek.net/products/wi-spy-24x> . (The dual band version is \$599.00)
- **WI-FI SIGNAL MONITORS / ANALYZERS** (Channels, signal Strength, signal levels, graphs)
 - ✓ Netstumbler (Free) (but does not work with all devices): http://www.snapfiles.com/reviews/Network_Stumbler/netstumbler.html
 - ✓ Xirrus Wi-Fi Inspector (Free) : <http://www.xirrus.com/library/wifitools.php>
 - ✓ Homedale: <http://www.softpedia.com/get/Network-Tools/Network-Monitoring/Homedale.shtml>
- **MISC INFO**
 - ✓ WI-FI COAX: The best kind of coax wire to use for antennas is type: RG213
 - ✓ WI-FI HARDWARE: Leo Laporte prefers the AIRGO Chipset and it used by many Manufacturers. Look on the box to see.
 - ✓ WI-FI ANTENNA INFO: <http://www.radiolabs.com/>
 - ✓ ANTENNA SIGNAL IMPROVEMENT: If you have a wireless router that does not quite give a strong enough signal, try the trick at these links:
http://www.metacafe.com/watch/1009569/how_to_double_your_wifi_signal_easy_and_free/ and at:
<http://www.freeantennas.com/projects/template2/index.html>
- **PUBLIC WIRELESS**
 - ✓ SECURITY OF PUBLIC WI-FI:
 1. Anyone can see anything you do on a Public Wireless access point. I do not recommend doing any banking or purchasing on a public wireless connection. This includes connections in Hotels, libraries, etc. (wired or wireless).
 2. There are ways to set up an encrypted virtual private network but you have to buy a monthly subscription.
 - ✓ ENCRYPT YOUR PUBLIC WIRELESS ACCESS CONNECTION:
 1. iPIG: <http://www.iopus.com/ipig/>
 2. HOTSPOT SHIELD <http://downloads.zdnet.com/abstract.aspx?docid=873563&tag=nl.e530>

NETWORKING TIPS ©

NETWORK TERMINOLOGY (Brief Definitions)

1. **AD-HOC MODE** - This term is used to describe a wireless mode where a PC communicates directly with one or more other wireless networked PC's, without using any kind of Host computer. Connecting to a Host is called **INFRASTRUCTURE MODE**.
2. **DHCP (Dynamic Host Configuration Protocol)** - DHCP refers to the process of automatically assigning IP Addresses to devices on a Network. DHCP is how an ISP assigns IP Addresses to the DSL or Cable Modems as well as how the Router or Modem assigns IP Addresses to the PC's on your local network. The most common setup is all DHCP (ISP, Modem, Router, & PC), but a network can be all Static IP addresses or a combination of DHCP and Static IP Addresses in different segments of the network. This can get confusing.
3. **INFRASTRUCTURE MODE** - This term is used to describe where a wireless networked PC communicates to a host Server/Router that is connected to a wired ethernet network. That connection then goes to the Internet. *Caution, if you are using a public server to wirelessly access the internet, others on that server can see into your PC. Very insecure.*
4. **IP ADDRESS** - This is usually a temporary, but sometimes permanent address assigned to a device to identify it on a Network. Each device has its own IP Address. Note: If a PC is set for DHCP, its IP address is assigned by the Router. If it is set as static, you must physically type a permanent IP Address into the PC and then configure that address into the Router so that it knows how to reach the PC.
5. **ISP - (Internet Service Provider)** This can be a DSL, Cable, or Dialup provider and is the company that connects your home to the internet.
6. **LAN - (Local Area Network)**. The term given to the network on the house side of the Modem/Router including all wireless devices.
7. **MAC ADDRESS** - This is a hardwired address unique to each and every networking device or adapter in the world.
8. **MAC ADDRESS CLONING** - The process of copying the MAC Address of your PC's ethernet card (NIC) into the Router. This way your ISP thinks that your Modem is always talking to your main PC and not to a Router or other PC's.
9. **MODEM** - A device that connects a user to the internet usually via DSL or Cable. Some Modems have a router integrated inside and can include wireless. A Modem can also refer to a Dial-up Modem that connects you to the internet via a regular phone line.
10. **NAS (Network Attached Storage)** - This refers to Hard-drives that are connected directly to the local network and have their own IP Addresses.
11. **NAT (Network Address Translation)** - The process that routers use to keep track of multiple PC's and data packets.
12. **NIC (Network Interface Card)** - The Ethernet adapter in your PC. It can be a separate card, but is usually integrated into the motherboard these days.
13. **PPPOE - Protocol** used by some providers that force you to log-in to activate the connection. (simulates a dial=up connection).
14. **ROUTER** - A device that allows more than one PC to attach to a Modem and also acts as a hardware firewall defending your whole network from intruders.
15. **STATIC IP ADDRESSES** - These are permanently assigned addresses on your PC, Modem, Router or any device. This mode is generally not used. See DHCP.
16. **STEALTH** - A good Router setup makes you invisible to the outside world.
17. **UPnP - (Universal Plug & Play)**. Should be disabled in all network devices for Security.
18. **WAN - (Wide Area Network)**. The term given to the network coming into your House from outside. It also can refer to the ethernet between the Modem and the Router.
19. **WAP - (Wireless Access Point)** Any device on a Network that connects wireless devices to a wired network. (This includes Wireless Routers, Switches, Modems, etc.)
20. **WI-FI** - The technology and standards used to wirelessly connect your PC to the Internet. Usually referred to as 802.11a, b, g, or n.

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