

Wireless Networking with Nikon Cameras

As computers and cameras merge more and more the photographer now has to understand more about the computer side to simply do the job. In addition to understanding the basics of shooting pictures to- and editing digital photographs on- the computer the D2H supports a new wireless connection mode which adds an entire new technology which photographers must understand.

The D2H with the accessory WT-1 Wireless Transmitter allows images to be automatically moved from the camera, as they are shot, to a remote computer, potentially anywhere in the world, using the industry standard “802.11b” technology. 802.11b, also called “WiFi” or “Airport” is a medium range, easy to setup, wireless networking protocol widely used in laptop and handheld computers. This technology is now available in many coffee shops, airports, libraries and home networks around the world.

One of the benefits of a WiFi network is it’s ease of setup and use. While it is easy to use there are basics which must be understood before setting up any computer network. This short document will discuss the technology, configuration and security of WiFi in general as well as it’s usage with Nikon wireless products.

Networking Basics

A computer network is simply a group of computers connected together in some fashion to allow them to share data or interact. The “Internet” simply refers to every computer in the world that is connected to other computers. The ability for this global network of computers to talk with each other allows photographers to, at the speed of light, move images from the location back to the newsroom or studio for processing or distribution. WiFi technology takes this one step further; as soon as the photographer takes the photo the image can be automatically sent. There are essentially two types of networks, wired and wireless.

Wired Network

In a simple wired network each computer has a wire coming from the back to a central “hub.” Each hub is then wired to a larger box called a “router” that routes signals from hub-to-hub and computer-to-computer. The router may be connected to (or may also be) a “gateway” which, as it sounds, allows the local network to connect to different, outside networks.

The “1’s and 0’s” that make up the language that the computers speak travels up and down these wires from computer to computer. The router and gateway determine if the signal is destined to a computer on the local network (called a “LAN”) or if it should be routed out, through the gateway, to the larger network or “WAN” (Wide are Network).

Wireless Network

A wireless network is exactly the same as a wired network except that there is no wire from the computer to the hub. Instead, a “Wireless Access Point” is connected to the hub and a wireless “transceiver” (transmitter and receiver) is connected to the computer. The transceiver converts the network 1’s and 0’s into radio waves (in the 2.4GHz frequency range) which the Access Point receives, decodes and passes on to the hub and the rest of the wired network.

IP Addresses

Just like each house on a street has a unique address, each device (computer, camera, router, etc.) on a network must have a unique network number. This number is called an Internet Protocol Address or shorter “IP Address”. An IP Address is a group of numbers that looks like this: “192.168.1.234”, while the full description of IP Addressing is beyond the scope of this document the basics must be discussed.

As mentioned above each device on a network must have a unique (different) number. Not only does the number have to be unique it has to be part of the same network or subnetwork. Without getting into too much detail the first three parts of the address identify the network and the last part of the number is the individual network address. In the example above the “192.168.1” is the network and “234” is the device address. Much like a house is located at “1600 Main Street” where “1600” is the unique house number the “Main Street” can be thought of as the network the house is on. So a group of computers or cameras on one network all need to have address similar to:

```
192.168.1.150 - Computer
192.168.1.151 - Computer
192.168.1.152 - Camera
192.168.1.153 - Printer
```

Notice how the first three parts of the address are the same, only the last group of numbers changes. If set up properly like this each device above would be able to communicate with each other. The first part of the address may change depending on where the IP addresses are coming from (more on this later) but as long

as each device on the network has a similar front part and a unique ending number.

IP Number Distribution

There are several ways that each device on a network can be given a unique number. The first (and most complicated) is called “Manual” addressing. In a manual IP network the network administrator has a list of addresses and manually assigns one to each device. This is a complicated and time consuming method as a single IP number can be used by only one device and each device has to be manually configured.

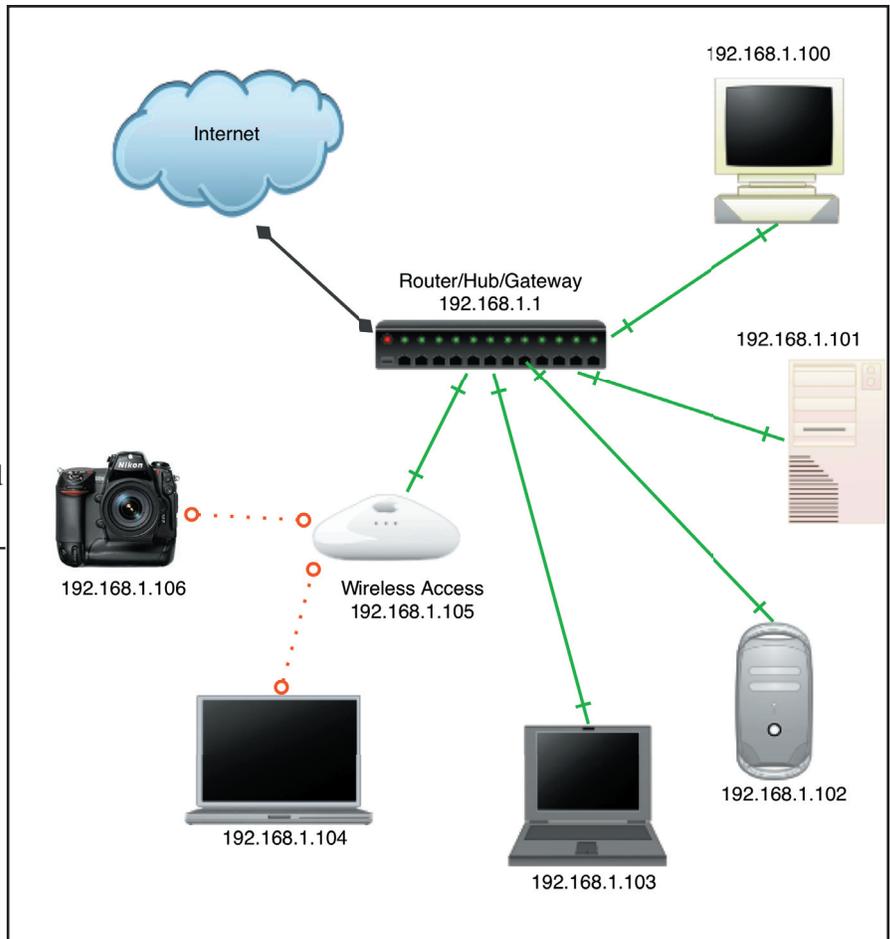
A much easier solution is to use a “DHCP Server.” DHCP stands for Dynamic Host Controller Protocol. A DHCP server is either software running on a computer or a function of the router or other hardware on the network.

The DHCP server automatically gives each device on a network a unique IP address as well as providing other important information about the network.

Simply set the computer or device to “Obtain an IP address automatically” and the DHCP server will issue and manage the numbers.

MAC Addresses

The Media Access Control or MAC address is a unique number that each and every device on the network has. Unlike IP addresses, which can be changed, a MAC address is hard coded into the network device and generally cannot be changed by the user. While not normally used, MAC addresses can be used to further protect a network. For instance the router can be setup to only allow certain MAC addresses to use the network. Other devices will not be able to connect.



A typical network showing wired computers connected to a hub (which is also a router/gateway in this case). Also shown is a wireless access point allowing a Nikon camera and a laptop computer to access the network. Each device has a unique IP address and can access the global “Internet” through the Router/Hub/Gateway

Network Protocols

A Network Protocol is like a language spoken between computers on a network. In order for devices to communicate they have to be on the same network (or have a way to get from one network to another) and speak the same language. Some examples of networking protocols are:

HTTP - This protocol is used to download and view World Wide Web pages from computer to computer.

AppleTalk - Used by older Macintosh computers for local networks

TCP/IP - Used by all computers on the worldwide Internet to communicate various information

FTP - File Transfer Protocol is used to easily move files (documents, pictures, programs, etc.) from computer to computer. The Nikon WT-1 transmitter uses the FTP protocol to transfer images from camera to a remote computer.

802.11b

A common form of wireless networking is the 802.11b or WiFi network. Adopted by many vendors this is a relatively fast, medium range wireless networking scheme that is easy to setup and reliable to use. A chip or card in the computer (or wireless device) converts the 1's and 0's of the data to be sent into radio waves (in the 2.4Ghz frequency) which are then received by a "base station" connected to a wired network. The base station converts the signal back to digital data and sends it along the network.

Other versions of this wireless standard are: 802.11g, which is a faster than the "b" version but just becoming available and 802.11a which is also faster but has very limited availability. In general 802.11g devices are interchangeable with 802.11b, but the network is slowed to the "b" speed of 11Mbps.

Wireless Access Points or "base stations" have gotten much less expensive and have added many feature in the last few years. Vendors like Apple Computer, Intel, Linksys and many others now make and sell devices which for a few hundred dollars are not only Wireless Access Points but also Routers, Firewalls and Print Servers. While an "Access Point" only network device may seem like a good idea they are generally a little harder to setup. An all-in-one access point/router adds functionality and are only marginally more expensive while being considerably easier to configure.

Range

The range of 802.11 networks depend on several factors, including: the construction of the building (steel and concrete block transmission more than wood framing), other devices in use (mobile phones, microwave ovens, etc. As the distance increases from the receiver the connection continues but at a slower speed. The chart below shows general connection speeds and how the range is affected by distance.

	Outdoor	Indoor (few obstacles)	Indoor (obstacles)
1	160m / 525ft	50m / 164ft	25m / 82ft
2Mbps	400m / 1312ft	90m / 295ft	40m / 131ft
1Mbps	550m / 1804ft	115m / 377ft	50m / 164ft

The Nikon WT-1 transmitter has two antennas available, the included WA-S1 has a range up to approximately 30m/90 feet and the optional WA-E1 which has a range up to 150m/450 feet at full speed. The WT-1 has been tested at a range of 250m/750 feet at the slower 1Mbps (megabit per second).

Wireless Security

Security is a big concern when it comes to moving files and images around wireless networks. Nikon has built several features into the WT-1 Wireless Transmitter to ensure that images are not compromised.

ESS-ID

The first security measure is the use of ESS ID's (Extended Service Set Identifier Identifications). An ESS ID is simply the name of the wireless network that the device will join, if the correct name of the network is not entered into the remote device (camera, computer, etc.) that device will not be able to connect to the wireless network.

WEP Encryption

Wired Equivalent Privacy provides wireless networks with the same level of security as that available with cabled networks. WEP works by encoding the data to be transmitted and then it is decoded by the Access Point. The WT-1 supports 64 or 128 bit encryption keys. The higher the encryption key the more secure the transmission, but also the slower the transfer speed. In general WEP encryption will slow the 802.11 transmission rate by approximately 20%.

MAC Address Filtering

As mentioned before, the MAC address is a unique number to each device. For ultimate security the MAC address of the WT-1 Transmitter could be added to the filter list of the Access Point and then only that WT-1 would be allowed on that wireless network.

Ad Hoc Mode

When using a Wireless Access Points and wireless cameras or computers the network is called an "Infrastructure" mode network. Many WiFi devices can also work in "Ad Hoc" mode which means that the 802.11 devices can communicate directly to each other without the need for a Wireless Access Points. In Ad Hoc mode a Nikon camera can directly send images to a laptop computer with a WiFi card. This is ideal for photographers who simply want to send images without the setup involved with a Wireless Access Points. Be aware that Ad Hoc mode does not support any of the advanced security features. For Ad Hoc network setup, see the section near the back of this guide.

Configuration

In order to use the Nikon WT-1 Wireless Transmitter there are basically four things that need to be set up: Wireless Network, Host Computer IP, FTP receiving software and WT-1 Transmitter. For Ad Hoc network setup, see the section near the back of this guide.

Wireless Network Setup

There are many different brands of Wireless receivers on the market today and setting up each one is beyond the scope of this document. However, some tips:

- 1) Choosing a Wireless device that also has a “Router” built-in can make setup and usage much easier.
- 2) If connecting to an existing network that is already setup and working do not turn on the “DHCP” options on the Wireless device
- 3) Record the “ESS-ID” or “Network Name” of the wireless network you create
- 4) Record the “WEP Key” if you choose to use WEP encryption
- 5) Connect wired computer so the “LAN” ports (if available) and a network connection to the “WAN” port
- 6) Most devices have a built-in web server which may be easier to use to configure than any “Wizard” which may be included. Find the default IP address of the device (usually in the manual) and try to connect to it with a web browser (from a computer connected to the device).

Host Computer Setup

The WT-1 transmits images via the standard FTP protocol. In order to do this we need to have a computer setup and running the FTP server software. The first part of this process is to setup a computer on the same network as the camera.

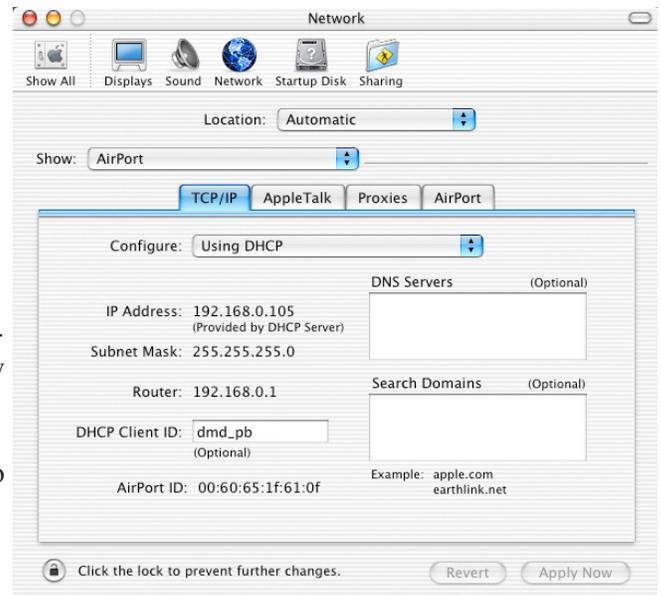
Since the router/access point set up in the previous section acts as “DHCP Servers” to automatically assign IP addresses to attached devices this step is fairly straight forward. Only follow these steps to setup a new network, if your computer is already connected to the internet or you already have a wireless network following these steps may interrupt your current connection.

Macintosh

- 1) Connect computer to pre-configured router/access point using a standard network cable or, if the computer has wireless capabilities, connect to the wireless network.

- 2) From the Mac OS X “Apple“ menu choose “System Preferences...” and then click on the “Network” icon
- 3) If you are connected wirelessly choose “Show” “Airport” near the top of the Network settings window. If you are using a wired connection choose “Show” “Built-in Ethernet”.
- 4) In the “TCP/IP“ tab choose “Configure” “Using DHCP” to have the computer automatically receive an IP address.
- 5) If you will be connecting to the access point wirelessly choose the “Airport” tab and then check the “Show Airport status in menu bar.

The computer is now connected to be on the same network as the router/access point and is ready to be setup to receive files using the FTP protocol.

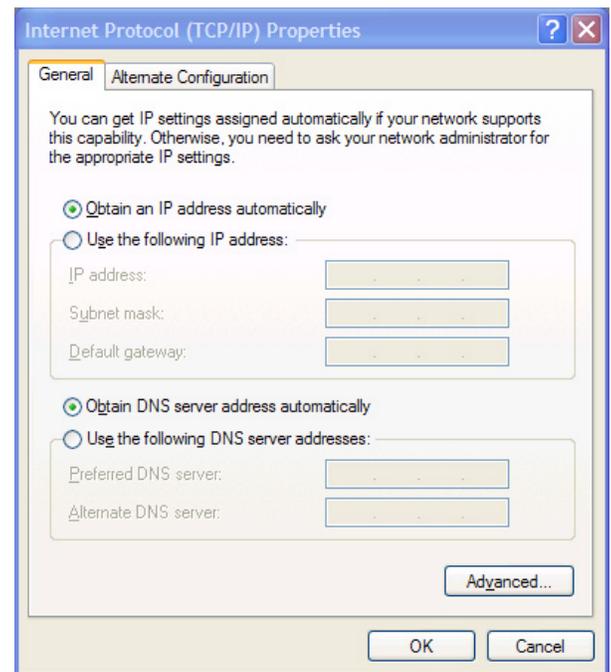


(above) The Mac OS X TCP/IP Setup for the Airport connection. The IP Address and other information is listed.
 (below) Windows XP TCP/IP Properties for the default network connection.

Windows XP

- 1) Connect computer to pre-configured router/access point you can use a standard network cable or if the computer has wireless capabilities connect to the wireless network.
- 2) From the “Start” menu choose “Control Panels” and click on the “Network Connections” icon
- 3) If you are connected wirelessly, right-click the “Wireless Network Connection” item and choose “Properties”. If you are using a wired connection to the router/access point right-click the “Local Area Connection” and choose “Properties”
- 4) In the “Properties“ window for the selected network connection click the “Internet Protocol” option in the “This connection uses the following items” list and then click “Properties”
- 5) In the “General” tab of the “TCP/IP Properties“ window click the radio buttons for the “Obtain an IP address automatically” and the “Obtain a DNS Server address automatically” options and click “OK” to close the Properties windows and “OK” to close the network connection window.

The computer is now connected to be on the same network as the router/access point and is ready to be setup to receive files using the FTP protocol.



FTP Software Setup

The “host computer” which we will send images to must be running an FTP (File Transfer Protocol) server to accept images. There are many different FTP server software programs available and both Mac OS X and Windows XP come with a built-in FTP server which can be used for simple FTP transfers. These built-in programs rely on the systems users accounts for access and are somewhat limited in their control. However, they are an excellent option for single-user systems where advanced handling of received images is not needed.

Macintosh OS X Built-in FTP Setup

Mac OS X has a functional FTP server built in to the system. To implement the feature follow these steps:

- 1) From the Mac OS X “Apple” menu choose “System Preferences...” and then click on the “Sharing” icon
- 3) In the “Services” tab check the box next to “FTP Access” and click the “Start” button on the right. Notice at the bottom of the window it will list the IP address that can be used to access your computer. Record this number for future reference.

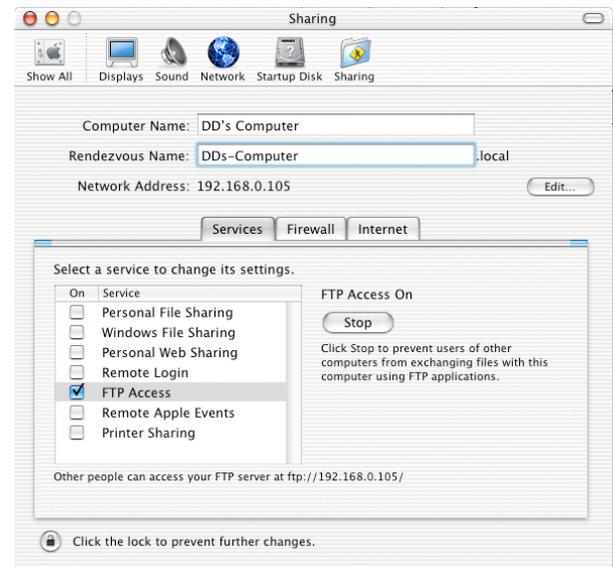
Your computer is now set up to accept incoming FTP connections. You will need to use the user name and password of a user on the computer to connect. You can use the default account that you use to log in with, or use the “Accounts” System Preference to create new accounts for access. However, you will only be able to access files that are FTP’d into the account that you are logged in to, so it is best to use the user name and password of the account that you use to log in.

Macintosh OS X Third-Party FTP Setup

While the built-in FTP server is useful a more powerful third-party program allows easier setup of users and control. The “Rumpus” FTP Server software from Maxum Development Corporation is an excellent third-party FTP server software available for the Mac OS. For a demo version please see: <http://www.maxum.com/rumpus>

To use Rumpus download, decompress and install it on the computer. After installing start Rumpus by double clicking. When running it with Mac OS X you must add it to the startup items by choosing that item from the “File” menu and then restart the computer. If Rumpus is quit the computer will need to be restarted before Rumpus will be able to accept incoming FTP connections.

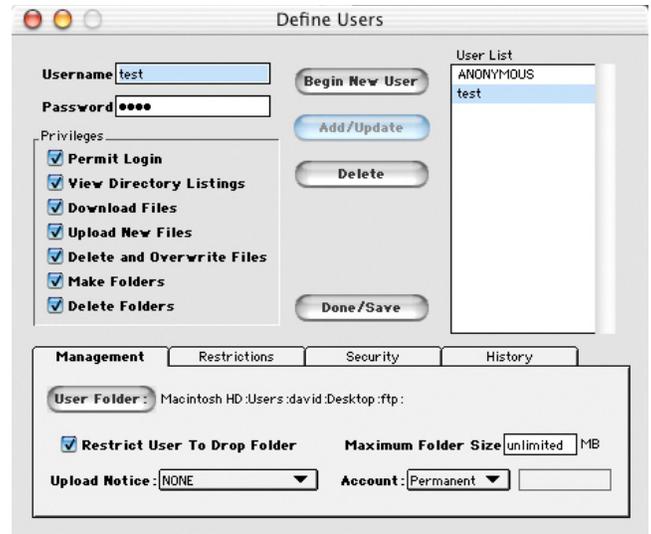
While Rumpus has many advanced features we are going to discuss the basics of adding users and starting the server.



The Mac OS X built-in FTP server setup. Note the text at the bottom of the window showing which IP address can be used to access the server.

To add users:

- 1) Choose “Define Users” from the “Setup” menu
- 2) Click the “Begin New User” button to create a blank user
- 3) Enter the “User name” and “Password” of the account. Be sure to remember these exactly as entered as they will be used later to setup the WT-1 Transmitter
- 4) The “Permit Login” “Upload New Files” and “Make Folders” Privileges must be selected
- 5) Uncheck the “Restrict User to Drop Folder” button.
- 6) To specify where received files will be stored click the “User Folder” button and designate a folder. This same folder will be chosen in Nikon View to display thumbnails.

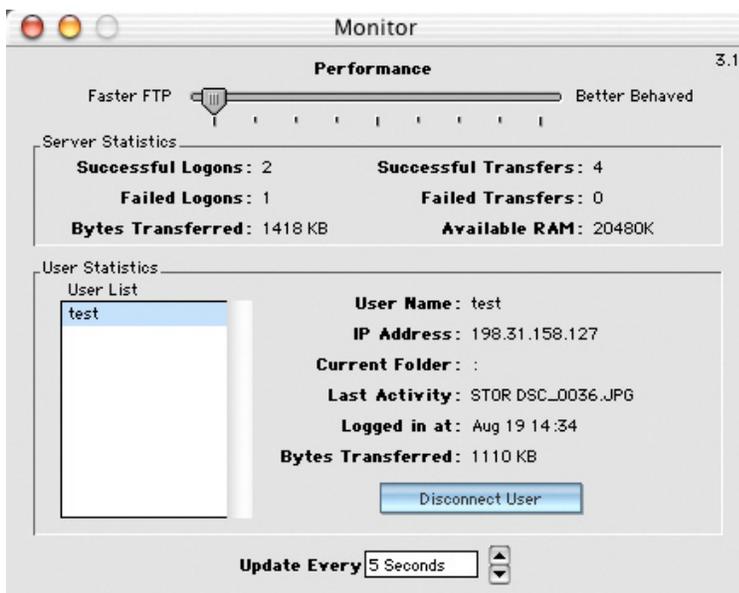


The Rumpus “Define Users” window with an account named “test” that has permissions to log in and the uploaded files will be sent to “MacintoshHD/Users/david/Desktop/ftp/”

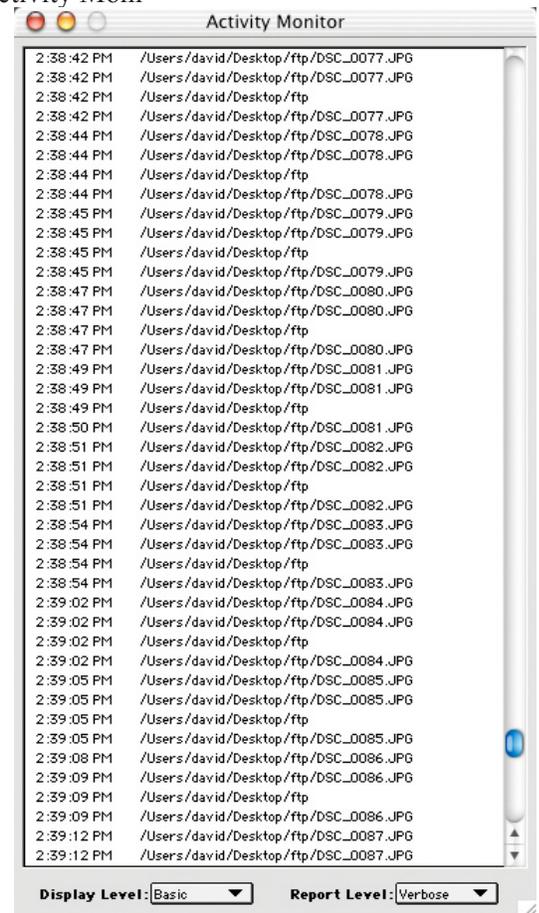
After making these changes click the “Done/Save” button to save the changes.

If you have several photographers shooting you can create accounts for each and then specify different (or the same) upload folders to easily sort images.

When running Rumpus you can leave the “Activity Monitor” and/or “Monitor” window open to view who is connected and what files are being transferred. The “Monitor” window will display currently connected users and the “Activity Monitor” will list all FTP commands (login, files being uploaded, etc.) between the server software and the remote device.



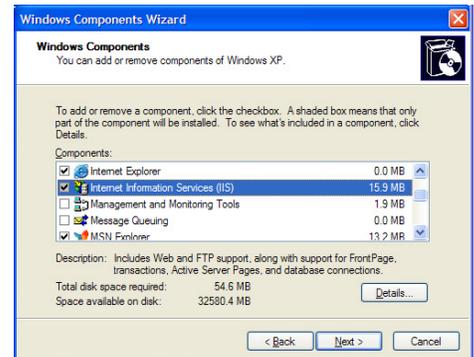
The Rumpus Monitor (above) showing one user (test) connected. The Activity Monitor (right) showing JPG files being uploaded to the “User/david/Desktop/ftp” directory



Windows XP Built-in FTP Setup

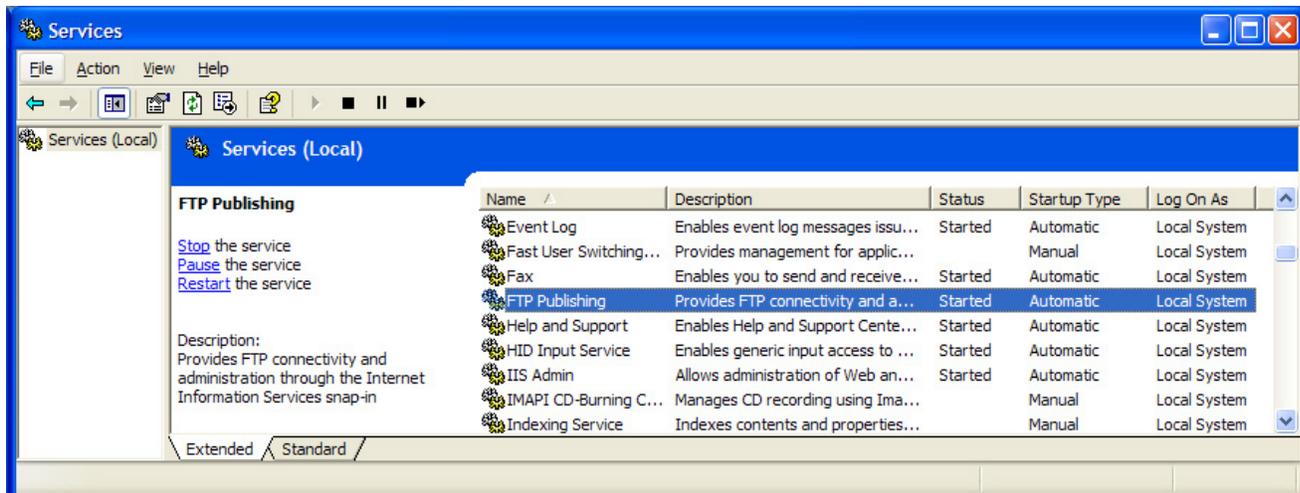
All versions of Windows have a built-in FTP server which can be configured to allow remote users (including Nikon wireless cameras) to connect and transfer images. This document will discuss the setup of the Windows XP version of the FTP server, however other versions are similar. First we need to install the Microsoft Internet Information Services:

- 1) From the “Start” menu choose “Control Panels” and then click “Add or Remove Programs”
- 2) Click the “Add or Remove Windows Components” button
- 3) Scroll through the list that is displayed and place a check next to Internet Information Services (IIS) and click “Next”
- 4) Follow the on-screen prompts and restart the computer when finished



Next we need to ensure that the FTP Service is running:

- 1) From the “Start” menu choose “Control Panels” and then click “Administrative Tools”
- 2) Double-click on the “Services” item



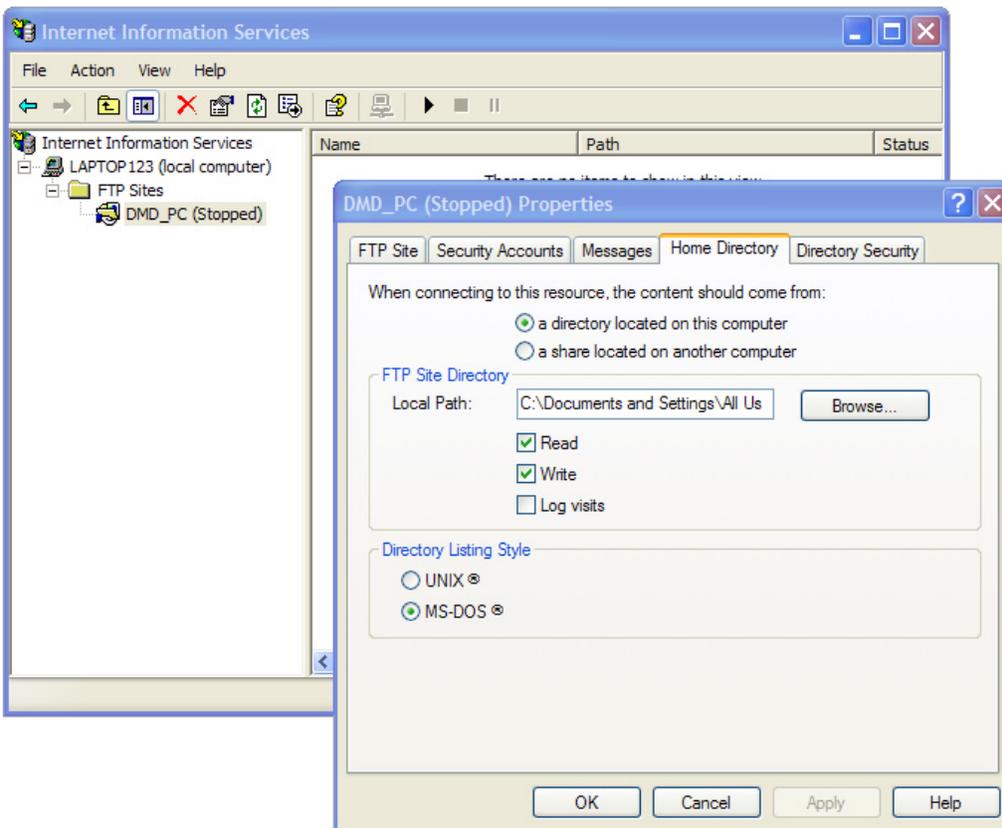
- 3) In the list that is displayed, find the “FTP Publishing” and be sure that it says “Started” in the “Status” column. If it does not right-click the item and choose “Start.”

Finally, we can setup the FTP server itself:

- 1) From the “Start” menu choose “Control Panels“ and then click “Administrative Tools”
- 2) Double-click on the “Internet Information Services (IIS)” item
- 3) In the list that is displayed, double-click the “<your computer name> (local computer)” item to expand the list
- 4) Double-click the “FTP Sites” item to expand the list
- 5) Right-click and choose “Properties” on the “Default FTP Site” item

- 6) Go to the “Home Directory” tab and click the “Browse...” button to locate the folder where the uploaded files will go to. Be sure that the “Write” box is checked.

Your computer is now set up to accept incoming FTP connections. You will need to use the “anonymous” user name and a “blank” password to connect. You can use the default account that you use to log in with or use the “Accounts” System Preference to create new accounts for access. However, you will only be able to access files that are FTP into the account that you are logged in to, so it is best to use the user name and password of the account that you use to log in.



Windows XP Third-Party FTP Setup

While the built-in FTP server is useful a more powerful third-party program allows easier setup of users and control. There are many different freeware, shareware and open-source FTP Servers available for Windows computer, the “ITP” FTP Server software from Thomas Sapiano is an excellent, third-party FTP server software available for Windows and Pocket PC devices. For a download, please see: <http://66.34.100.243/itp/>.

After downloading, decompressing and installing ITP launch the “Configure Server” application from the ITP menu in the “All Programs” menu. Click the “Users” button and follow the steps in the Wizard to add a new FTP user:

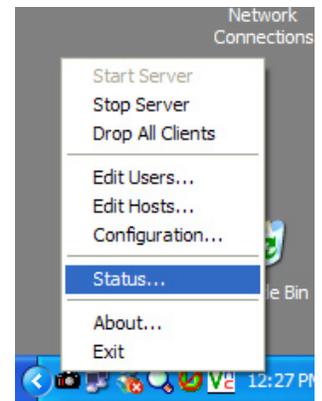
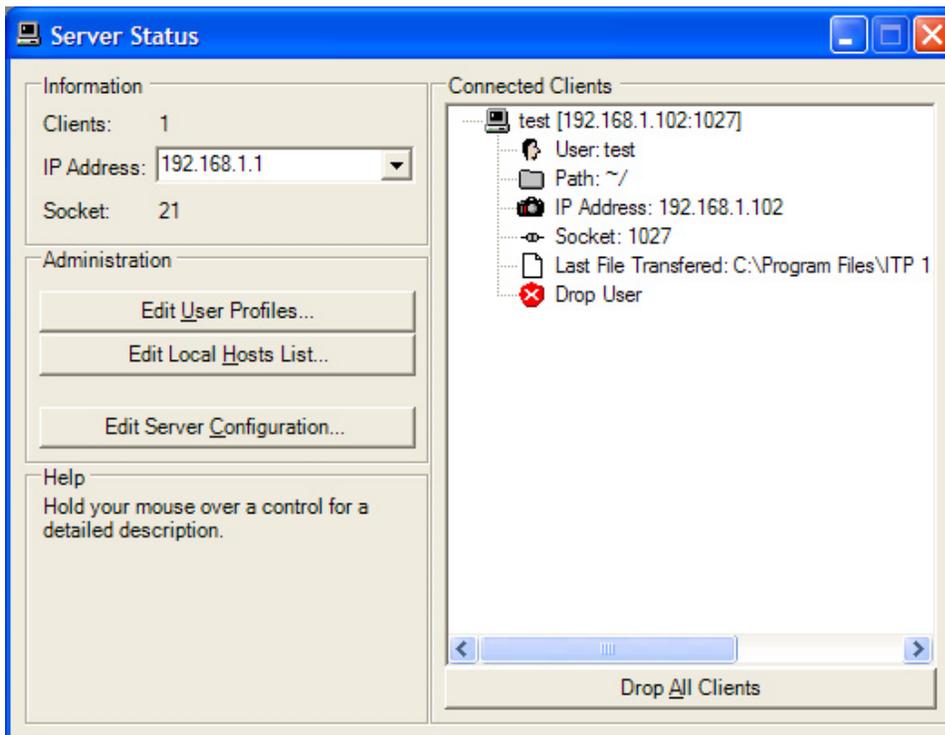
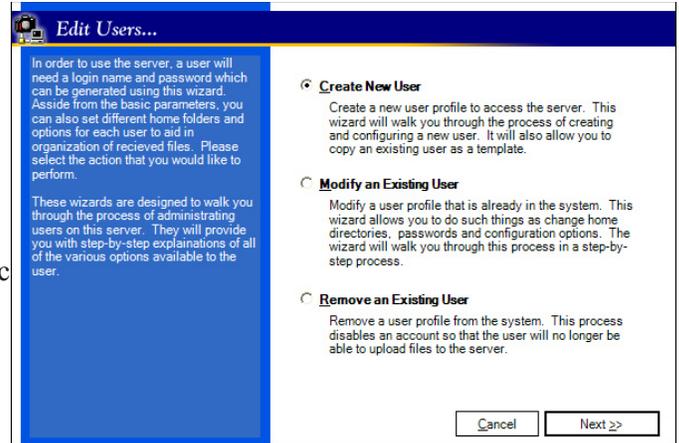
The “Users” setup wizard is straightforward and easy to follow; remember to record the “username” and “password” as these will be required when configuring the camera.

You can control options such as where the files will be saved as well as some powerful renaming options.

After creating a user click the “Server” option to set basic server options such as home directory.

The FTP server is now setup, to start the server choose “Start Server” from the new ITP Icon “System Tray”.

The computer and ITP Server software are now ready to accept incoming FTP connections. Again, from the System Tray icon choose “Status...” to see the current status of the server.



The Server Status window showing an FTP server running and a user called “test” logged in and sending an image via FTP.

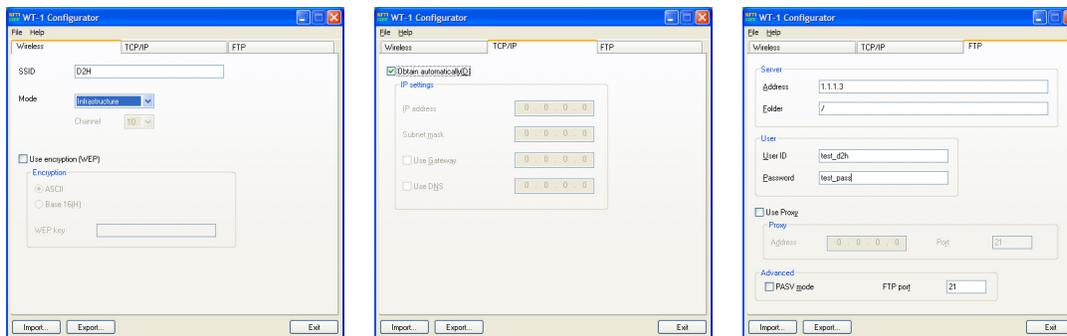
Configuring the D2H/WT-1 Transmitter

Now that the computer and FTP server are running, the Nikon equipment must be setup to connect. There are several different ways to configure the D2H/WT-1 Wireless Transmitter. The easiest method is the WT1 Configuration Setup Program which is used to easily configure all of the network settings. Before making any changes turn the “Transceiver” to the “Off” setting in the “Wireless LAN” sub-menu. For detailed information on setting up the WT-1 consult the *WT-1 Wireless Transmitter User’s Manual*.

WT1 Configurator Setup Program

To use the WT1 Configurator Setup Program simply launch the application and fill in the blanks with the appropriate information. After filling in all of the fields with the information specific to your network click the “Export...” button to save the settings as a “.wt1” file.

The “.wt1” file is then put onto a compact flash card and inserted into the camera. Use the “Load settings” command to choose the “.wt1” file on the card and store the settings on the camera.



Template File Upload

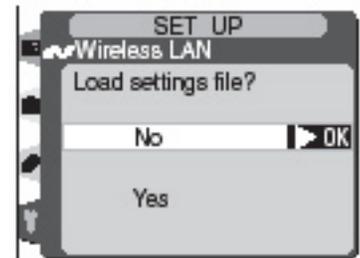
After following the steps in the “Wizard” (above) a text file will be written to the computer which can then be written to the camera. If you know and understand all of the variables which need to be configured you can manually create the “.txt” file by filling in the blanks.

LocalIpAddress=	<i>Leave blank for DHCP/enter manual IP</i>
SubnetMask=	<i>Leave blank for DHCP/enter manual subnet</i>
GatewayIpAddress=	<i>Leave blank for DHCP/enter manual gateway</i>
DnsIpAddress=	<i>Leave blank for DHCP/enter manual DNS Server</i>
IsDhcpOn=1	<i>Set “1” for DHCP “0” for manual IP</i>
WvLanMode=0	
WvLanChannel=1	<i>Leave blank for default, set wireless channel</i>

WvLanSpeed=0	<i>Leave blank for default, set wireless speed</i>
WvLanEssId=DMD	<i>Enter wireless ESS ID</i>
WvLanAuthType=	
WvLanIsWepOn=0	<i>Set "1" for WEP On "0" for WEP off</i>
WvLanWepKeyCodeAscii=	<i>Enter WEP Key (ASCII)</i>
WvLanWepKeyCodeHex=	<i>Enter WEP Key (Hex)</i>
FtpServerName=	<i>Enter FTP Server computer IP</i>
FtpServerPath=/	<i>Leave blank for default, or enter FTP path</i>
FtpPortNumber=21	<i>Leave at "21" for default, or enter special port</i>
FtpUserName=	<i>Enter FTP User ID</i>
FtpPassword=	<i>Enter FTP Password</i>
FtpIsPassiveModeOn=0	<i>Set "0" for PASV Off or "1" for On</i>
FtpProxyIpAddress=	<i>Enter proxy address (blank for none)</i>
FtpProxyPortNumber=	<i>Enter proxy port (blank for none)</i>

After opening the "WLANSSET1.txt" template file go through each item and enter your particular value (FTP Server Address, Gateway, etc.) and save the file (with the same name) to a CF Card. Follow these steps to upload the settings file to the camera:

- 1) Insert the CF Card into the D2H
- 2) Press "Menu" on the D2H
- 3) From the Setup Menu choose "Wireless LAN"
- 4) Scroll down to "Network Settings" and press the right multi-selector arrow
- 5) Select "Load Settings File"
- 6) Follow the on-screen steps to choose the settings file saved to the CF Card



Manual Setup

To manually setup all of the variables needed to connect the WT-1 to a network, change the settings in the "Network Settings" section in the "Wireless LAN" sub-menu on the D2H's "Set Up" menu. There are three settings areas to be changed: Wireless, TCP/IP and FTP. There are many settings which will need to be entered during the manual setup process so it is a good idea to either be familiar with your current network configuration or have someone who is assist.

"Wireless" Section

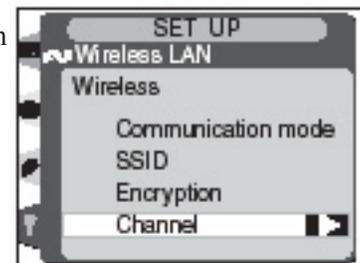
The Wireless section has all of the configuration for the actual wireless network the camera will be on. Use the camera's multi-selector and controls to adjust each setting option.

Communication Mode

Change the Communication mode between "Ad Hoc" (for direct camera to computer connections) or "Infrastructure" (to connect the camera to an existing wireless network router or base station).

SSID

The ESS-ID is the name of the wireless network that you wish to join. When the wireless access point/router was set up this name was established.



Encryption

If you chose to enable Encryption on the wireless network select “On” and then either “16” or “128” bit encryption. Scroll to the bottom and enter the hexadecimal (HEX) WEP Encryption key for the wireless network. HEX characters are 0-9 and A-F so a valid 16bit WEP key would be “1A3F45CE22” the same key must be entered in the wireless device and the router/access point.

Channel

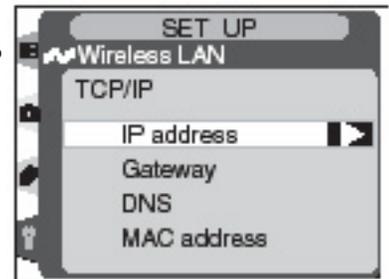
The channel of the current wireless network.

TCP/IP Section

The “TCP/IP” section is used to configure the WT1’s network address and settings.

IP Address

Use this setting to configure the WT-1’s unique IP address on the network. If the network you will be using has a DHCP server setup to automatically distribute IP addresses (most do) select the “Obtain automatically” option. If not using DHCP enter a unique IP address that works on your network.

**Gateway**

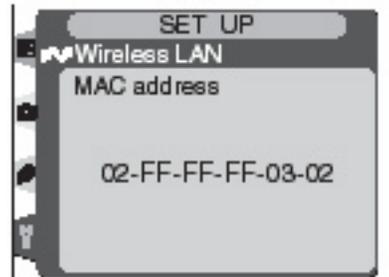
The “Gateway” settings specifies how to get out of the local network. If using DHCP this setting will be configured automatically. If using a manual TCP/IP configuration enter the IP address of the gateway here.

DNS

In a manual TCP/IP configuration enter the Domain Name Server IP address here. The DNS server allows you to enter the regular name of a remote server (ftp.nikon.net) rather than the IP address (123.45.678.91).

MAC Address

The MAC Address of the Nikon WT-1 will be displayed here when the device is on. Some networks require that the device MAC addresses be entered into the router/access point to allow access to the network, if you need to provide the MAC number you can get it from this menu. The number will look like: 00-02-2D-5C-DF-52.

**“FTP” Setting**

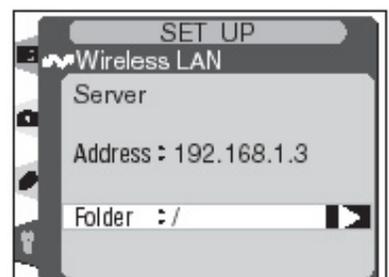
The last settings that need to be made are to indicate to the camera where to send the images after photographing. This is called the “FTP Server”

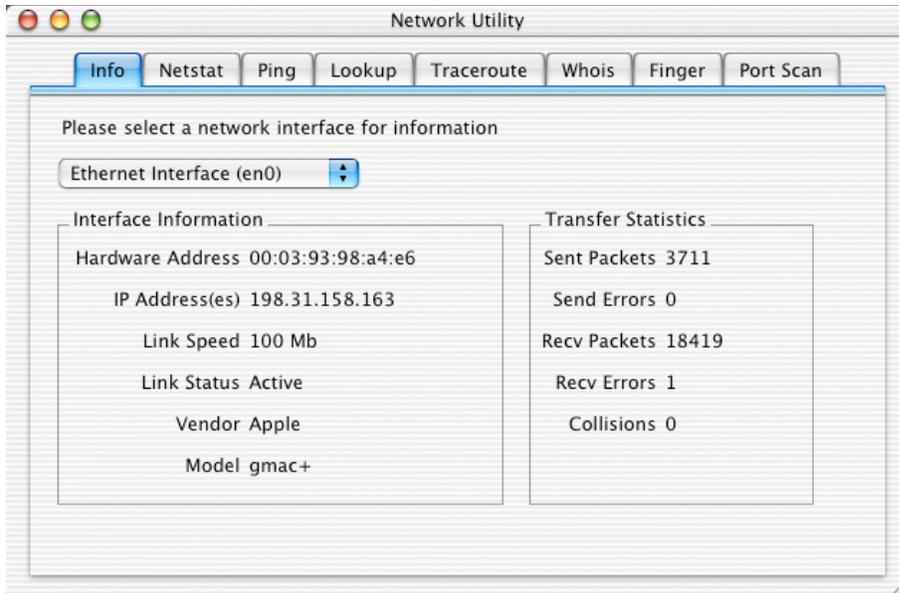
Server

The IP address or name of the computer that is hosting the FTP server software. Generally, this will be the address of the computer we installed the server software on earlier. To find the IP address of the computer:

Mac OS X:

- 1) Launch the “Network Utility” program (found in Hard Drive/Applications/Utilities”)





The Mac OS X “Network Utility” showing the IP Address for the wired Ethernet (en0) as 198.31.158.163.

- 2) in the “Info“ tab select the Ethernet connection to the network (“en1” for wireless or “en0” for a wired connection)
 - 3) Find the “IP Address” from the “Interface Information” section.
- Windows XP

- 1) Launch the “Command Prompt” (Start/All Programs/Accessories)
- 2) Type “ipconfig”
- 3) Find the “IP Address” listed for the Ethernet adapter that you are using to connect to the network

```

C:\> ipconfig

Windows IP Configuration

Ethernet adapter Wireless Network Connection 3:

    Connection-specific DNS Suffix  . : 
    IP Address. . . . .                : 192.168.0.132
    Subnet Mask . . . . .              : 255.255.255.0
    Default Gateway . . . . .          : 192.168.0.1

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . : nikon.net
    IP Address. . . . .                : 192.168.0.13
    Subnet Mask . . . . .              : 255.255.255.0
    Default Gateway . . . . .          : 192.168.0.1
  
```

The Windows XP “ipconfig” command showing the IP Address for the wireless Ethernet as 192.168.0.132 and the wired (Local Area Connection) as 192.168.0.13

User

Enter the user name and password for the account on the server. This will be either the login name and password for the computer or an account created in the FTP server software. Account names and passwords are case sensitive, so be sure to enter the text exactly as created on the computer.

Proxy

Some networks use a “Proxy” server to further control access and security. If your network uses one, enter it’s data here.

Advanced

The “Advanced” setting can be used to initiate a “PASV” or passive FTP transfer and to specify a port to be used. This is only use on certain networks with a NAT server. Check with your network administrator if having FTP problems and you think that this option may be needed.

Other WT-1 Settings

The main “Wireless LAN” settings menu has several other settings which may be useful.

Transceiver

This option can turn the WT-1 Transceiver On or Off. Turn the Transceiver “Off” when making configuration changes or not transmitting images to conserve battery.

Status

The Status menu will show the current connection status of the WT-1 to the wireless network, including signal strength and quality as well as number of frames and approximate time remaining to complete the transfer.

Auto Send

Use the Auto Send menu option to turn on or off the automatic sending of images to the FTP server. When “off” no images will be sent to the server until manually begun.

Send file as

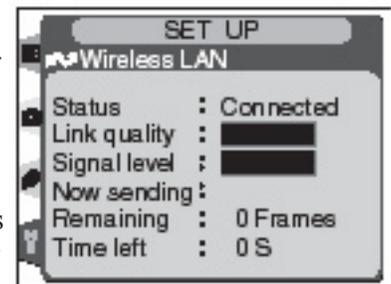
When shooting in the “RAW+JPEG” mode you can select to send via the wireless connection either “JPEG only” or both the “NEF(RAW)+ JPEG”.

Send folder

An entire folder can be manually sent to the remote FTP server by using this option.

Deselect All

To stop sending images and clear the queue use this option to clear all pending transfers.



Creating Ad Hoc Networks

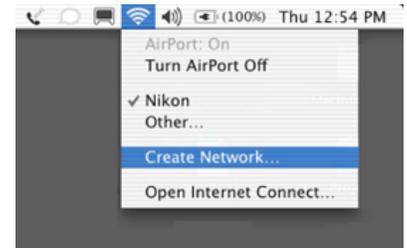
The ability to create an instant, “ad hoc” network between a camera and a computer with a wireless card is beneficial because no extra hardware is required. A photographer can simply shoot from the camera to a near by notebook computer and instantly review the images as they are shot.

Macintosh

To create an Ad Hoc network on a Macintosh is fairly straight forward and involves two steps, create the network and assign a manual IP address:

Create the Wireless Network

From the “Airport Status Menu” choose “Create Network” Give the new network a name (this will be the SSID used in the camera setup) and choose a channel to operate on. If the Airport status is not show on the top menu bar, turn this option on in the “Network” System Preference’s “Airport” tab. You now have created and joined a new Ad Hoc network.



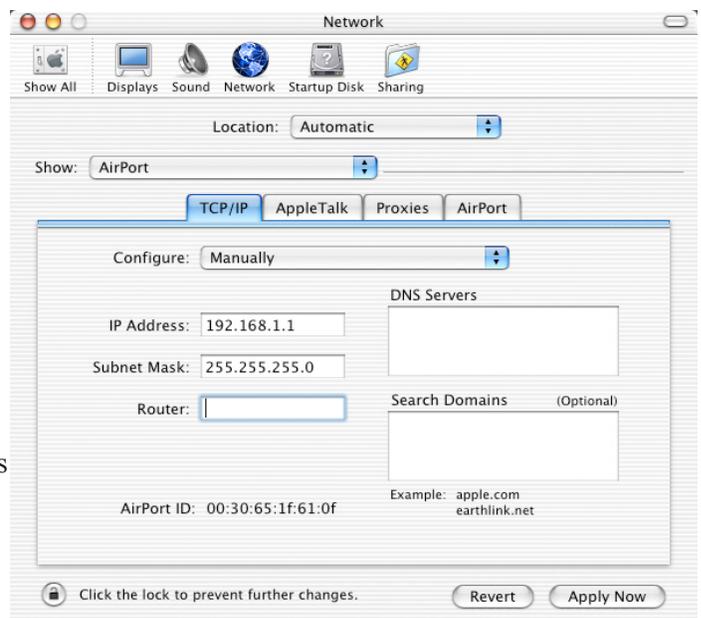
Configure the IP Address

When joining an Ad Hoc network to do FTP you will need to manually assign an IP address to each device on the network. From the Mac’s “Apple” menu choose “System Preferences”. Once the System Preferences Window is open click the “Network” icon.

Choose “Airport” from the “Show” pop-up and enter “Manually” in the “Configure” pop-up. You will then enter a unique number in the “IP Address” field.

Any unique IP number can be used, however, we recommend using a “normal” IP address such as “192.168.1.1” you could then use “192.168.1.2” for the camera’s IP address. The number you enter here will be the number that you choose in the camera as the “FTP Server Address”

You will need to “Manually” configure the IP Address of the camera as well. Use a number in the same range as the computer: “192.168.1.3” for example.

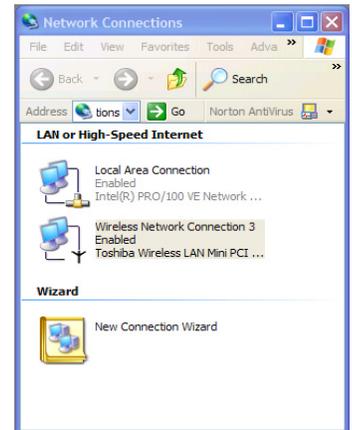


Windows

To create an Ad Hoc network on a Windows computer involves two steps, create the network and assign a manual IP address:

Create the Wireless Network

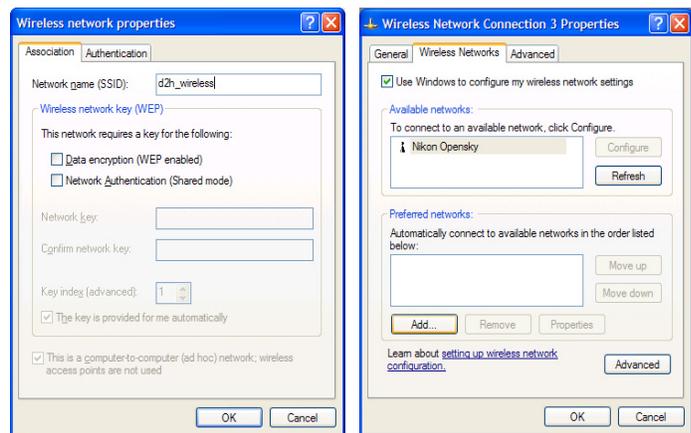
From the “Start” menu choose “Control Panels” then choose the “Network” control panel icon. Assuming that the wireless networking device is installed and working properly you will see a “Wireless Networking Connection” icon; you may also see a “Local Area Connection” if you have a wired network as well. If the wireless item is not present, consult the manufacturer of the wireless device for assistance.



Right-click on the “Wireless Networking Connection” icon and choose “Properties” choose the “Wireless Networks” tab and click the “Add” button. Enter the desired “Network name” (which will be the ESS ID entered into the camera) and turn off any WEP items. You now have created a wireless ad hoc network

Configure the IP Address

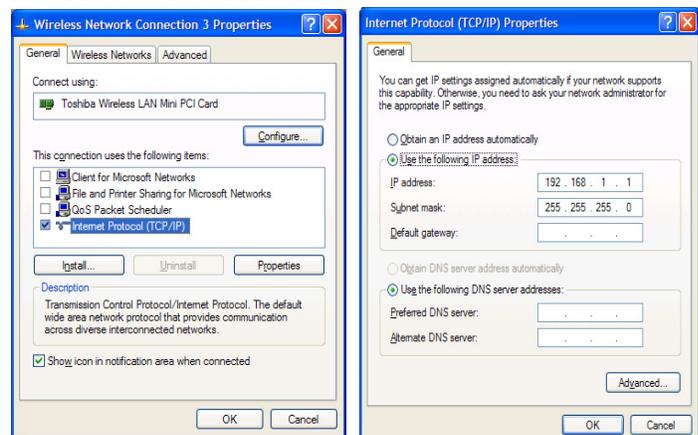
When joining an Ad Hoc network to do FTP you will need to manually assign an IP address to each device on the network. After creating the ad hoc network, click the “General” Tab for the wireless device.



Double-click the “Internet Protocol (TCP/IP)” item in the list and enter an IP address in the “Use the following IP address” field.

Any unique IP number can be used, however, we recommend using a “normal” IP address such as “192.168.1.1” you could then use “192.168.1.2” for the camera’s IP address. The number you enter here will be the number that you choose in the camera as the “FTP Server Address”

You will need to “Manually” configure the IP Address of the camera as well. Use a number in the same range as the computer: “192.168.1.3” for example.



Troubleshooting

Because there are so many variables (wireless connection, FTP server, WT-1, etc) it can be difficult to troubleshoot problems with wireless image transfers. The best method is to methodically check each component to be sure that each is working. First, check that the server computer is connected to the network.

Network Connection

There are several ways to check this, the easiest way is to connect to the router/access point's configuration page which usually has a "DHCP Clients" page (or something similar which will list the IP addresses of all machines connected to the network. If you find the IP address of the computer in question on the list you can be sure it is "on the network."

Wireless Network

If the connections to the FTP server is slow or drops off at random it could be related to having multiple wireless networks competing on the same (or close) channels. This can be a difficult problem to diagnose. There are several pieces of shareware software that can scan for local wireless networks and display relevant information. At right is a screen-shot from "MacStumbler" which shows that there are two wireless networks present: "d2h_wireless" on channel 5 and "Nikon Opensky" on channel 1. If you have a problem with a slow or unreliable connection check that there are not other networks present on the same channel, ideally the channels should be separated by at least one blank number, for example having one network on channel 2 and the next on channel 4 would be ideal.

The screenshot shows the MacStumbler 0.6b application window. It displays a table of detected wireless networks and a log of recent activity.

SSID	MAC	Chan	Signal	Noise	Type	Vendor	WEP
d2h_wireless	00:80:C8:23:EE:EF	5	37	3	Managed	unknown	No
Nikon Opensky	00:30:65:17:C6:F9	1	43	10	Managed	Apple	No

SSID	MAC	Chan	Max Sig	Type	Vendor	WEP	Last Seen	Comment
Nikon Opensky	00:30:65:17:C6:F9	1	46	Managed	Apple	No	03:09PM 10/07/03	
d2h_wireless	00:80:C8:23:EE:EF	5	62	Managed	unknown	No	03:09PM 10/07/03	

At the bottom of the window, there are buttons for "Save...", "Open...", and "Clear Log", and a status bar that reads "Status: Scanning..."

Macstumbler can be found at: "<http://www.macstumbler.com/>". A similar program for Windows PC's is "PCTEL Segue Roaming Client" from "<http://www.pctel.com/>".

FTP Server

A second thing to check when troubleshooting is the configuration of the FTP server software. An easy way to check this is to use an FTP Client program (such as "Fetch" on the Mac or wsFTP on Windows). An FTP client is used to connect to the server and either upload or download files. When using the WT-1 it acts as an FTP client, but for testing you can use a software to test the connection. To do this:

- 1) Install the FTP client software on the same computer as the FTP server software
- 2) In the client software create a new connection. Enter the IP address of the computer you are working on as well as the User ID and Password created in the server software.

If the connection works and you are able to move stuff from or to the server using the client software you have established that the FTP server and user account are properly setup.

WT-1 Connection

Most FTP server software have an “Activity Monitor” that shows all connection activity it is a good idea to keep this open when attempting to connect for the first time. After starting the WT-1 and taking some photos check the Router admin page again to be sure that the WT-1 is connected (again, look at the “DHCP Clients” page) and then look at the FTP server logs/activity to see if you can see any attempted connections or errors.

WT-1 Indicator LED's

The lights on the back of the WT-1 can also be useful in troubleshooting connection problems. When the transceiver is first turned on both the “Power” light and the “Link” light will glow solid. This indicates that the device is connected to a network and is looking for the FTP server. The “Link” light will then begin flashing steadily. This indicates that the WT-1 has successfully connected to the FTP server and is ready to send images. While sending, the “Busy” light will also light.

If the “Power” light blinks instead of the “Link” light beginning to flash this means that the device was unable to join the network and you should look at the network configuration. If both “Power” and “Link” remain solid the WT-1 connected to the network but could not connect to the FTP server, and you should check the server setup.