Fax Basics
&
Troubleshooting

3-11-15

Introduction

The Fax in our Multi-Function products are designed to work with traditional analog phone services. They are not designed to work with digital phone services such as DSL, PBX, VoIP, or ISDN.

See page 3 for more information on configuring the Fax product
for DSL, PBX, VoIP, and ISDN lines.

This information is provided as a courtesy to help set up and troubleshoot issues related to connecting an Fax product to a digital phone line.

Line setup options should be discussed with the telephone service provider. For further information or support, contact the service provider or system administrator.

 NOTE: If there is voice mail, call waiting or billing tone installed on the telephone system, disable these features as they can interrupt fax communication. The Fax product shown in the diagrams might
differ from your actual product. These diagrams are to be used only as guidelines in that Fax products *are not supported* on these types
of lines and should be used for reference purposes only.

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What is DSL (Digital Subscriber Line)

DSL (Digital Subscriber Line) is a special service that allows digital data to be delivered to a computer using a normal telephone line. DSL (also referred to as XDSL, ADSL, HDSL, or RADSL) *uses a much higher bandwidth for transmitting information than the fax product is capable of understanding*.

To use a fax machine (or any regular phone services) with a DSL line, a filter must be used to reserve some of the bandwidth for standard analog use. This allows for the use of the telephone or fax, and computer on the same line and at the same time.

When setting up DSL with a service provider, request filters for the wall jacks where regular faxing and telephone service will also be used.

DSL uses digital technology to bring high-bandwidth information over ordinary copper telephone wires. Digital data is transmitted to the computer directly as digital data (instead of analog) and this allows the telephone company to use a much wider bandwidth for transmitting the data to its destination.

Unlike regular dialup phone service, DSL provides a continuously available, "always on" connection. DSL simultaneously accommodates analog (voice) information on the same line. DSL is generally offered at downstream data rates from 512 Kbps to about 6 Mbps. However, if specified during the set-up of the DSL line, the signal can be separated so that some of the bandwidth is used to transmit an analog signal (for voice and fax) or ISDN signal while the remaining bandwidth is used to transmit digital data (for the internet). This allows for the use of the **telephone** and **fax** and **computers** on the same line and at the same time.
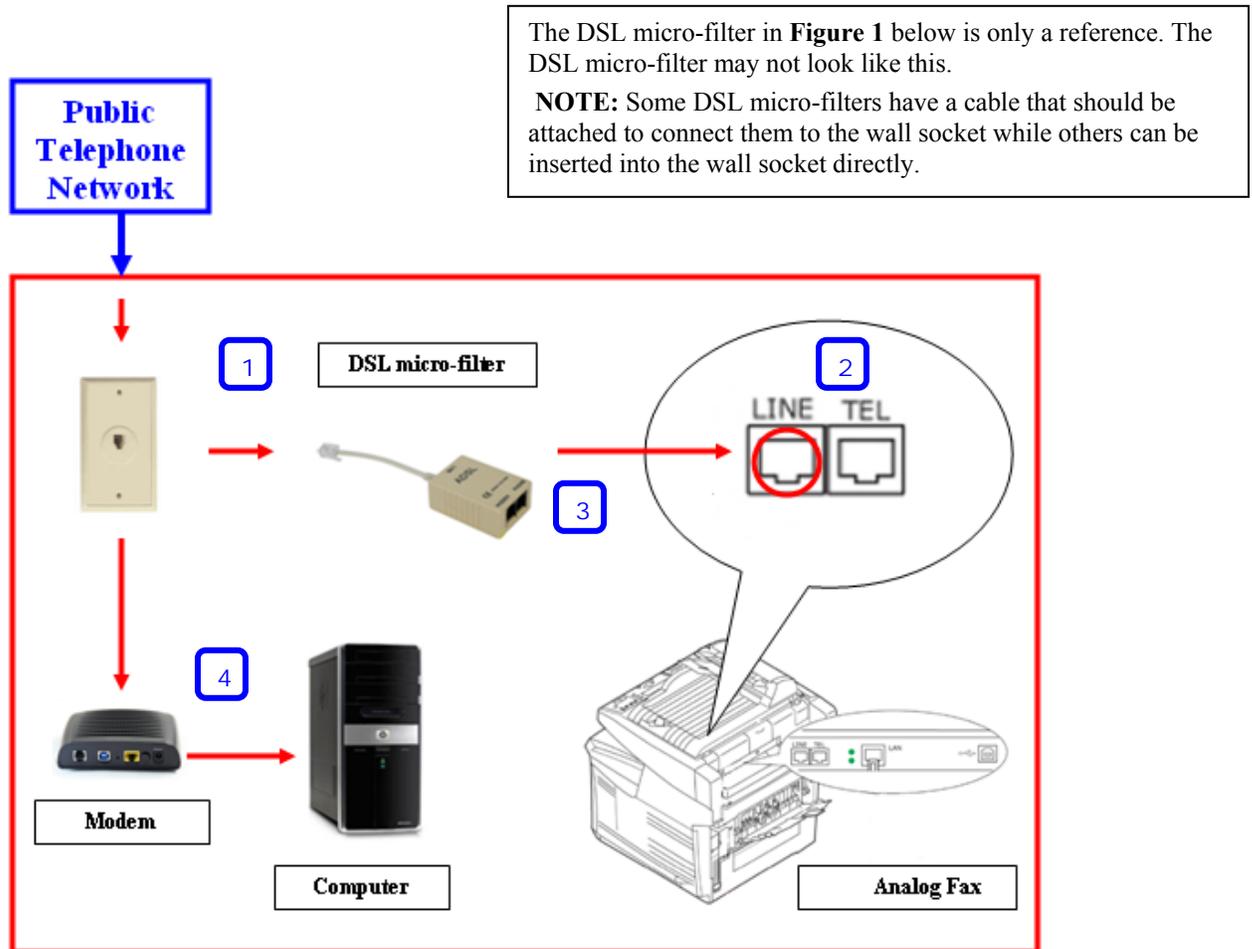
In order for analog equipment to use analog channels on a DSL line, a **DSL micro-filter** is needed to be installed so that digital and analog channels can be separated.

Figure 1: DSL Fax Setup

Figure 1 on the next page shows the typical configuration to connect the fax product to a DSL line.

Connecting a Fax product to DSL

Figure 1: DSL Fax Setup

The DSL micro-filter in **Figure 1** below is only a reference. The DSL micro-filter may not look like this.

 NOTE: Some DSL micro-filters have a cable that should be attached to connect them to the wall socket while others can be inserted into the wall socket directly.

1 Connect the DSL Micro-filter to the wall socket.

2 The product will have an RJ-11 Fax cable supplied with it, connect this to the product outlet at the back of the machine as shown in the diagram above.

3 Insert the other end of the supplied RJ-11 Fax cable into the analog outlet on the DSL micro-filter.

4 Connect the PC to the DSL modem according to their respective manuals. The DSL modem can be external or internal to the computer; if in doubt check the specifications of your computer.

WARNING: Not all printers and faxes are compatible with DSL services. The manufacture does not guarantee that all fax products will be compatible with all DSL service lines or providers.

What is a PBX (Public Branch Exchange)

A **PBX** allows more then one user to be on a telephone network, based on the idea that not everybody uses their local phone extension at the same time. A PBX is typically installed in offices and homes. The user will have more then one-telephone number which benefits the user because the user will not have to pay for another separate line from the telephone companies. Calls can be routed internally to the PBX. A PBX baud rate speed is usually about 9.6Kpbs. This is not as fast as ISDN, as ISDN can be a guaranteed 64Kbps.

In a PBX environment you need to dial a prefix number to connect to the external **public phone network** (this prefix number is programmed by the PBX). Once realizing that a prefix number is dialed (it is the first integer in the phone number) the PBX knows that the caller wants to communicate to an external number outside the PBX. A prefix number usually comprises of a 0 or 9.

Note:
- PBX systems operate differently than a standard dedicated line. The PBX system might not have a standard dial tone that the fax will recognize until an access code (usually 0 or 9) has been dialed.

- On a PBX system, the fax might attempt to dial too quickly. Insert a pause into the dialing sequence just before and after the first number.

Figure 2: PBX Fax Setup

Figure 2 on the next page shows the typical configuration to connect the fax product to a PBX line.

Connecting an HD-MF14dn product to PBX

Figure 2: PBX Fax Setup
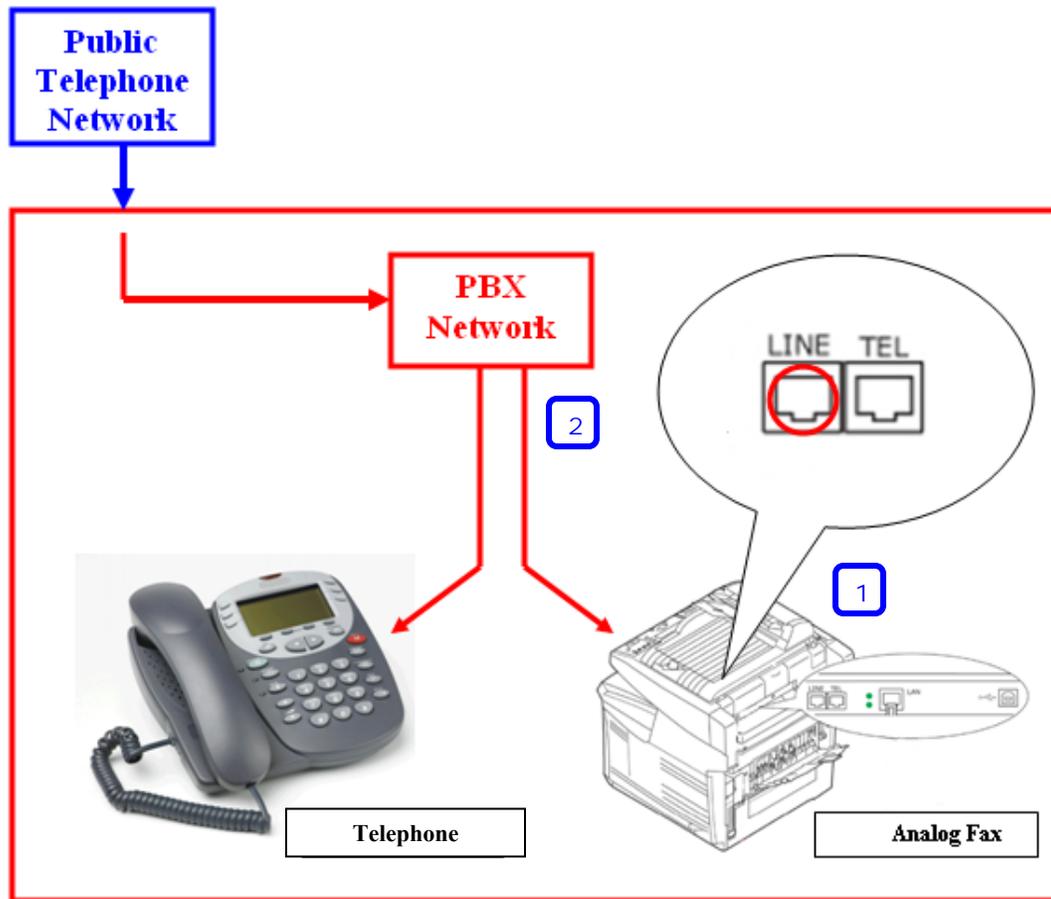
1 The product will have an RJ-11 Fax cable supplied with it, connect this to the product outlet at the back of the machine as shown in the diagram above.

2 Connect the Product into one of the PBX wall sockets according to the guidelines of the PBX manufacturer.

NOTE: In the set-up above, each unit will have its own telephone line and hence its own telephone number. See your PBX manual for instructions on setting up telephone lines, including sharing telephone lines between multiple ports. You may use any port on the PBX to connect your product. The port on the PBX can usually be programmed to get an external dial tone directly. In most cases a fax-number can be assigned to the specific PBX port you have connected the product to. For further information please consult your PBX documentation.

What is ISDN (Integrated Service Digital Network)

ISDN provides two *B channels* and one *D Channel* on a single telephone company twisted pair copper wire. Each **B** channel carries 64 kbps allowing each channel to carry a telephone call either as voice, fax or internet. The **D** channel carries 16 Kbps and manages both **B** channels. Simultaneously two channels can be used on one line. A **B** channel must be free for any data to be used.

An **NTBA** (Network Termination for Basic Access) is installed at the end users house or office and connects to the main switch board. The NTBA usually acts like a PBX system as you may need to dial a prefix number to gain access to the external dial tone, also you can call internally.

Typically the ISDN provider will allow the ISDN users a certain range of numbers they can use. For example the ISDN provider will assign a user the phone number range between 100 - 110 (allowing 10 phone numbers) and then it is up to the user on how they want to assign these numbers to the telephone equipment.

An **A/D converter** (analog/digital converter) allows analog devices to be installed on an ISDN network. The A/D converter routes the calls to the assigned analog ports, converts ISDN signals to analog and allows analog equipment to communicate over ISDN.

Note:
- ISDN is a telephone company technology that provides digital service typically in increments of 64 Kb/s channels. The phone company installs services within their phone switches to support this digitally switched connection service.
- Connecting to an analog telephone port (also called an R-interface port) on an ISDN terminal adapter may enable the fax product to function on an ISDN service. Contact the ISDN provider for more information and to request an R-interface adapter.

Figure 3: ISDN Fax Setup

Figure 3 on the next page shows the typical configuration to connect the Product to an ISDN line. Equipment installed on an ISDN network must be assigned a correct tag, meaning what type of device is it. For example: Is the device a telephone, modem or a fax. The A/D converter must program each analog port a tag.

Connecting an Fax product to ISDN

Figure 3: ISDN Fax Setup
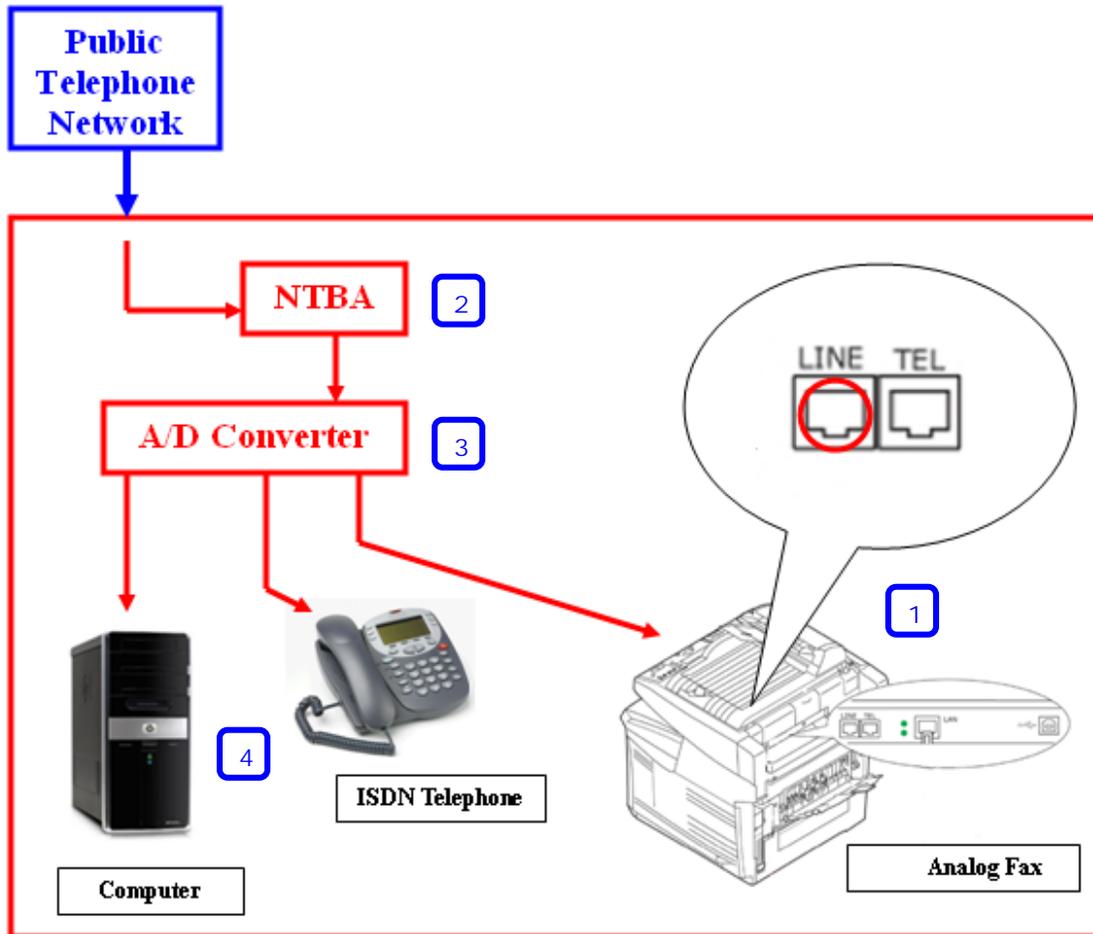
1. **The product will have an RJ-11 Fax cable supplied with it, connect this to the product outlet at the back of the machine as shown in the diagram above.**

2. **Connect the NTBA (Network Termination for Basic Access).**

3. **Connect the A/D converter (Analog to Digital converter) and if applicable other ISDN equipment to the NTBA.**

4. **Connect the product into one of the A/D converter's ports (analog outlets) according to the guidelines of the A/D converter manufacturer.**

WARNING: It is usually advisable to program the port on 'Multicombi' mode, 'Equal' mode or equivalent. Please follow the instructions in the manufacturer's manual for the A/D converter to program the ports.

NOTE: The NTBA and A/D converter may be in 1 box. In most cases these names are labeled on the equipment. The port on the A/D converter can usually be programmed to get an external dial tone directly. You may use any A/D converter port to connect to the product. Some A/D converters can assign a different fax number to the ports available. If the A/D converter has this functionality, its users' manual should cover details of how this can be done.

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What is VoIP (Voice over Internet Protocol)

Voice over IP (VoIP) services provide normal telephone service (usually long distance) through a broadband Internet connection rather than the standard telephone network. These services use packets to break up the voice signal on a phone line and transmit it digitally to the receiver where the packets are reassembled.

With VoIP, analog faxing is a challenge. There are a number of problems that range from packet-loss to interworking issues to signal corruption due to voice compression. VoIP companies do not manage the Internet and have no way to guarantee that fax calls will work. *Because qwt 'fax products are designed to work with ordinary analog phone service, we **don't support** and **cannot guarantee** that the fax product will work with a VoIP service.*

The general public should be made aware of the fact that, not only do fax calls not work reliably over IP networks, but neither do point-of-sale terminals, security alarm systems, modems, or any other device that emits an analog signal. It is not because VoIP is bad, but simply because legacy analog technologies were not designed for the Internet.

Faxing with VoIP services
These services are often ***not compatible with fax machines*** unless the provider ***explicitly states*** they support fax over IP services. Although a fax may sometimes work on a VoIP network, it may fail for the following reasons:

- Fax transmissions are sensitive to the timing of signals. There is a slight delay in the signal because of the time it takes to create the Internet packets. Internet traffic becomes heavy and packets are lost which then have to be recreated.
- Heavy Internet traffic also increases latency (the time it takes for a packet to travel from its point of origin to its point of destination) which then exceeds timing requirements.

What can be done to help the fax transmission?
The communication speed is a major factor in fax transmission over VoIP. Currently there are three speed standards:

- Fast - v.34 which communicates at 33.6 Kbps.
- Medium - v.17 which communicates at 14.4 Kbps
- Slow - v.29 which communicates at 9.6 Kbps

Changing the fax speed setting to medium or slow may improve your ability to send a fax over a VoIP network. On all fax products the connection speed can be set to a lower speed. Consult your product user's manual for information specific to the model. Try the fax again. If you continue to have problems faxing, contact your VoIP provider as they may have options to improve the ability to send and receive faxes over VoIP telephone service.

Basic Troubleshooting of Fax Issues

Contents

A. Troubleshooting Preparation (Step 1)

Make sure that the following items are available to complete the troubleshooting steps included in this document:

- Fax configuration and settings (Print Configuration Page(s)
- Another analog fax device for testing (send to – receive from).
- The phone number of another fax machine that can be used to verify whether the fax is sending and receiving correctly.
- A single-line telephone : This phone will be used for testing the phone line.
- The original fax RJ-11 cable supplied with the unit .

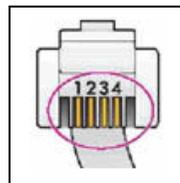## B. Testing the phone line and phone cable (Step 2)

Part # 1

This step is aimed at testing both the phone line and the phone cable. To do so, follow the instructions listed below:

1. Unplug the phone cable from the Fax product.
2. Verify the phone cable configuration.
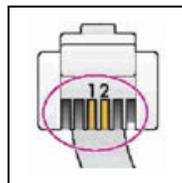
Correct **2-wire**	**Incorrect** **4-wire**

3. Plug the phone cable into a single-line phone.
4. Pick up the handset and listen for a dial tone.

a. If no dial tone is present, then replace the phone cable with another one, and listen again for a dial tone.

- If a dial tone is present, unplug the phone cable from the test phone, and plug it into the fax line port on the Fax and test the sending and receiving functions of the fax product. If the fax works properly, stop here.
- If the fax continues to have issues, go to Part # 2.

b. If no dial tone is present, then stop here, and contact your telephone service provider for assistance.

Part # 2

If a dial tone is present, follow the steps below:

- Dial a local phone number and verify that the call can be completed.

If the outgoing call cannot be completed, stop here, and contact the telephone service provider for assistance. If the outgoing call is completed correctly, continue troubleshooting.

- Have someone dial your number from another phone line to verify that the phone rings and the incoming call can be answered (allow three rings before answering). If the line rings briefly and then stops, another device may be answering the line. This device could be a credit card machine or a computer modem connected to the phone line and set to answer incoming calls. Try to identify which device is answering the call, disconnect it from the line, and test again.

- If the incoming call cannot be received, stop here, and contact the telephone service provider for assistance.

D. Verifying the fax configuration and settings (Step 3)

Follow the steps listed below to set up the fax with a basic configuration in order to test the Fax functionalities:

- Remove any additional device sharing the phone line. These devices may be plugged directly into the fax product or into another wall jack on the same line (including answering machines in another room or on the same phone line, and any line splitters and extension cables).

- Connect the fax to a regular analog phone line.

- Print the Fax configuration page

- Enable the Auto Receive Mode (See the product users' manual). Ensure that the fax product is connected to a telephone line reserved only for fax communications. The fax roduct will assume all incoming calls are fax messages and automatically receive all incoming fax messages.

Configure the fax settings as indicated below:

Auto Receive Mode	On
Ring Response	1 ring

Send a fax to the test fax machine, and have someone send a fax to the fax device. If faxes still cannot be sent or received, check the following sections and determine which one best describes your issue, and follow the troubleshooting steps provided.

E. Faxes can be sent but not received

Review the information below to determine the reason why faxes are not being received:

- Verify the fax configuration and settings (print configuration page(s).

- Phone company services : Check whether any of the following telephone line services is enabled: Voice Mail, Call Waiting, Billing Tone Privacy Block, Security Screen, Anonymous Call Rejection, Privacy Manager. These phone services are intended to prevent undesired calls, so they may also block incoming faxes. Contact the telephone company to disable these features as they can interrupt fax communication.

- If automatic fax reception is your desired option, verify that the Automatic Answering feature is enabled (see configuration sheet) and also, ensure that the Rings to Answer value is set to a number of rings equal or larger than one.
(see configuration sheet)

- If an answering machine is connected to the same line, fax reception problems may occur. These may be corrected by changing fax settings, or phone line connections. For more information on using a TAM (Telephone Answering Machine) see the product users' manual.

- If your line is not analog, refer to How to setup the Fax product on an ISDN, PBX and DSL line to learn how to resolve a problem when the Fax is set up over one of this kind of lines.

- If faxes still cannot be received, skip to the section "Faxes cannot be sent or received or the issue cannot be determined" .

F. Faxes can be received but not sent

Follow the steps below to resolve this issue:

- Verify the fax configuration and settings (Print Configuration page(s).

- Verify that the number is dialed correctly. All the digits required to make a phone call from the same line must be dialed. This includes digits that must be dialed to access an outside line or long distance services.

- If the Speed Dial has been used for dialing or the fax has been sent from your computer, print the page to be faxed and dial the number manually on the Fax products front panel.

- Make sure that the appropriate option between Tone Dialing and Pulse Dialing is set on the Fax product depending on your phone service provider or PBX.

G. Faxes fail intermittently or with only one fax number

Check the following items to find out the cause of the failure:

- If static is present on the phone line, fax communication may fail. It is advisable to have the phone line checked and serviced by the telephone company (or have the other party check their line).

NOTE: Phone line quality is the most common reason for intermittent fax failures. Some old locations and buildings have inadequate phone system wiring.

- Check the phone cable from the wall socket to the Fax product. It should not be coiled or longer than necessary.

NOTE: A coiled cable can cause cross-talk or echo on the line. Signal strength and quality can be lost with long cables. Make sure that the original fax cable (supplied with the Fax product) is being used. Otherwise the Fax product may not work correctly.

- Make sure that the phone cable routing (and any cables not plugged into the same socket but sharing the same line) is not close to any electrical appliances (electric motors, fans, kitchen appliances, or televisions) and/or near coaxial cables.

NOTE: Many of these devices do not have sufficient electrical shielding and can induce electromagnetic force (EMF) onto the phone line.

- Some Fax models are capable of blocking faxes sent from certain phone numbers. Verify that the telephone number of the sending fax has not been blocked from the faxing software.

- Turn the Error Correction Mode (ECM) off, or turn it back on, depending on its current state. Follow the instructions included in the Changing the Error Correction Mode (ECM) Setting of the users' manual to learn how to modify the ECM configuration. If faxes still cannot be sent or received, skip to the next section, "Faxes cannot be sent or received or the issue cannot be determined" .

H. Faxes cannot be sent or received or the issue cannot be determined

Follow these steps if none of the previous sections has helped to resolve your issue:

- Reinitialize the fax machine
- (contact Technical Support for assistance)

I. Troubleshooting and Help

For information on how to set up and configure your Fax product, please consult the products *User Guide* for that product.

If necessary, **Contact Technical Support** for assistance.

Troubleshooting and Help

If you seem to be experiencing intermittent fax send and receive problems, it is recommended that you reduce the baud rate speed. Lowering the speed of fax communication may solve this issue. (See page 10 for further explanation on baud rate speed).

DSL

In order for analog equipment to use analog channels on a DSL line, a DSL micro-filter is needed to be installed so that digital and analog channels can be separated. Change the micro-filter if it is suspect. Verify that all other analog products that are connected to the line are using DSL micro-filters.

Other DSL Setup Configurations to Consider

**1.** If the DSL router is **not** in the same wall jack as the fax. The fax product can be connected to a wall jack with an inline filter installed between (refer to the image below). If the fax is connected without the filter, there will be interference with the faxing capability.
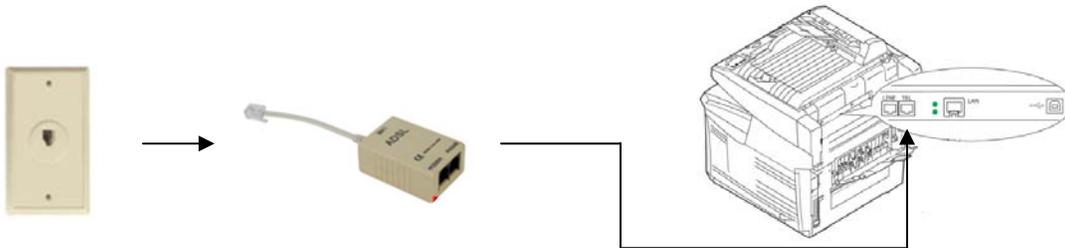

2. If the fax is connected to the same wall jack as the computer, and the router has a built-in DSL filter. The fax and computer connections need to be split with a router (refer to the image below). To use this setup, the router must have a built-in DSL filter (such as Cisco 675 router) to ensure that the DSL signal is filtered from the fax connection.

3. If the fax is connected to the same wall jack as the computer, and the router *does not* have a built-in DSL filter, the fax and computer connections will need to be split with a router. If the router does not have a built-in DSL filter (such as a Cisco 678 router), an inline filter needs to be installed between the fax and the router to ensure that the DSL signal is filtered from the printer connection (refer to the image below).
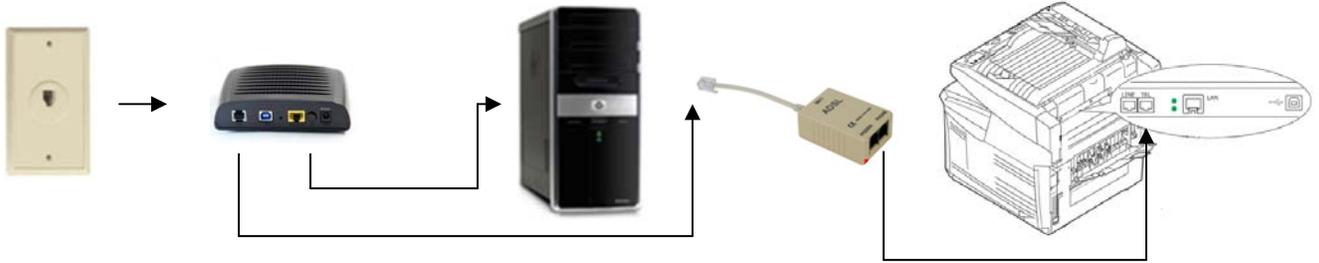
4. If the fax is connected to the same wall jack as a computer without a built-in filter, the fax can also be connected to the same telephone wall jack as a computer via a splitter (refer to the image below).
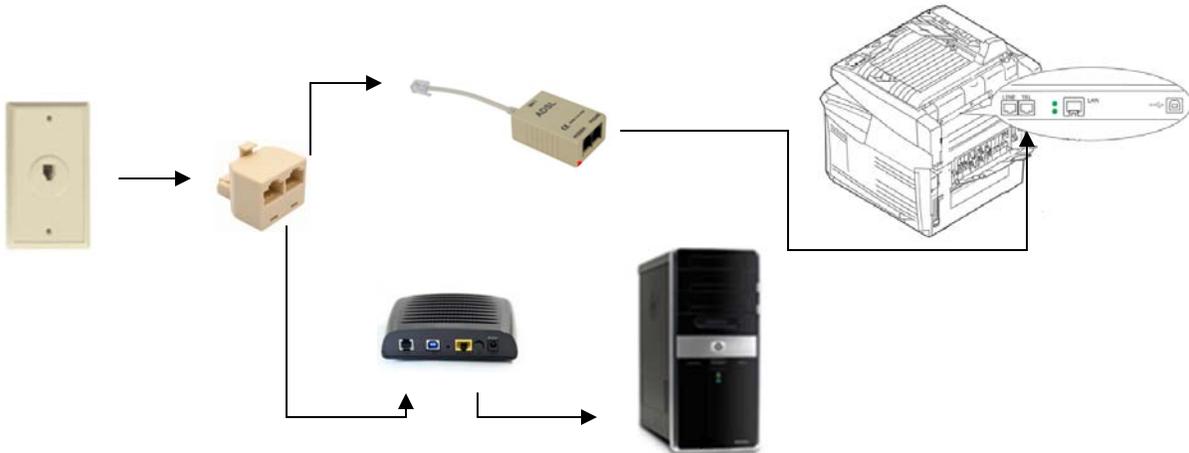
PBX

PBX systems operate differently than a standard dedicated line. The PBX system might not have a standard dial tone that the fax will recognize until an access code (usually 9) has been dialed. Because there is no standard busy signal in PBX phone systems, if the product does not connect to another fax or detect a busy signal, it will cancel the fax.
On a PBX system, the fax might attempt to dial too quickly. Insert a pause into the dialing sequence just before and after the first number. Contact the phone system administrator for additional assistance.

ISDN

ISDN is a telephone company technology that provides digital service typically in increments of 64 Kb/s channels. The phone company installs services within their phone switches to support this digitally switched connection service. Connecting to an analog telephone port (also called an R-interface port) on an ISDN terminal adapter may enable the fax product to function on an ISDN service. Contact the ISDN provider for more information and to request an R-interface adapter.