Fax machines and point-of-sale (POS) devices have internal modems that allow them to transmit data over telephone lines. Traditional fax machines, POS devices, and modems can behave differently even though they all use modems for transmission. While these types of equipment were created to be used on the traditional telephony network, they typically can be made to work with Voice over Internet Protocol (VoIP).

Recommendations for overcoming certain equipment limitations:

- Fax machines – set to G3 mode and a max transmission speed of 14.4kbps (i.e. turn off Super G3) Point-of-sale (POS) devices – turn off V.90 and V.92 protocols
- Modems – set transmission speed to 33.6kbps or below, and turn off V.90 and V.92 protocols
- Fax machines, POS devices, and modems will only work when G.711 is used as the codec.

**FAX MACHINES**

**FUNCTIONALITY**

A fax machine is basically an image scanner, a modem, and a computer printer combined into one device for the purpose of converting optical images into electrical signals for transmission over communication systems (phone line, Internet, etc.). When the electrical signal is received, it is converted back to an optical format for display or printing of the original image. This process is called facsimile transmission or faxing.

Today, the overwhelming majority of fax machines are Group 3 (G3) fax machines.

Group 1 (G1) and Group 2 (G2) fax machines are the previous generation of fax machines. They have been made obsolete by G3 machines. G1 and G2 machines are no longer manufactured, and most have been discarded.

G2 machines can interoperate with G3 machines. Group 4 fax machines were specifically designed to run over 64Kbps ISDN circuits and are not interoperable with the VoIP service.

Many of the newer G3 fax machines include Super G3 capabilities that use V.34bis modulation to transfer data at rates up to 33.6Kbps. However, Super G3 does not generally function well over VoIP. Consequently, we recommend disabling Super G3 capabilities in favor of G3 for use with VoIP.

In general, modems within G3 fax machines should run at 14.4Kbps, and most will negotiate to lower speeds as needed. If your fax machine settings allow for communication higher than 14.4Kbps (as they are with Super G3), you need to change the settings so the fax machine connects at 14.4Kbps.
In many cases, fax machine manuals do not indicate how to disable Super G3 capabilities. You may need to contact the manufacturer directly to determine if your fax machine uses SuperG3 and to ask for instructions on how to disable Super G3 capabilities. The CenturyLink help desk cannot assist you in determining how to disable Super G3 on your fax machine.

Note: Many fax machines are Super G3 enabled, and many people do not know this. Brother 8220 and 8500 fax machines have been tested with CenturyLink VoIP service and can be used. All other Brother fax machines have not been tested on CenturyLink VoIP.

TECHNIQUES FOR HANDLING FAX USING VOIP

There are two techniques for supporting fax calls using VoIP: fax pass-through and fax relay. CenturyLink® Hosted VoIP, CenturyLink® Integrated Access, and CenturyLink® Core Connect® Enterprise only support fax pass-through. We do not offer fax relay support.

Fax pass-through is the term used to describe the support of a fax call over VoIP where the two fax machines are communicating directly. The sending machine calls the receiving machine, and the call is converted to VoIP during the transmission.

Fax relay is the term used to describe the support of a fax call over VoIP where the VoIP device, generally called an analog termination adapter (ATA), actually spoofs a fax machine on each end of the relay. The ATA terminates the fax call by acting like a fax machine, recreates the original image, packetizes that image, and sends it across the IP network to the IAD on the other end of the call. That terminating ATA does the reverse to deliver the fax call to the terminating fax machine. T.38 is the most common protocol for fax relay.
POINT OF SALE (POS) MACHINES

FUNCTIONALITY

POS is often used in connection with hardware and software for checkout machines at stores that electronically process credit card, debit card, and check transactions. These devices can be wireline or wireless.

Today, most of the major retailers use POS software/devices. During the 1990s, standalone credit card devices were developed so credit card processing could be more easily and securely supported.

VeriFone Tranz 330, Hypercom T7, and Lipman Nurit 2085 are popular models. These relatively simple devices have evolved to allow multiple applications (credit card, gift card, age verification, employee time clock) to reside on one device.

Connection rates vary, but these devices traditionally connect at very low baud rates, typically 300 baud. However, because encoding techniques allow transmissions at high speeds, the modems in some POS devices may try to connect at 33.6Kbps or even higher using V.90 or V.92 (KFlex and X2 were merged into the V.90 standard).

COMMON POS COMMUNICATION COMMAND PROTOCOLS

- EPSON Esc/POS Ultimate
- UTC Standard CD 5220
- UTC Enhanced DSP-800
- AEDEX IBM dumb terminal
- ICD 2002 ADM 787/788

LIMITATIONS OF THE PROTOCOL

Old POS devices work somewhat with PSTN service, but less so with VoIP. New POS technology helps decrease problems related to VoIP. POS machines set at high baud rates, such as V.90 or V.92, tend to have more problems over VoIP than those using lower rates. We recommend you disable higher speeds by turning off V.90 or V.92 protocols and speeds over 33.6kbps.

TROUBLESHOOTING POS WITH VOIP

While troubleshooting POS devices on VoIP, we have learned:

- The underlying carrier (and their underlying carriers) can have an impact on the ability of a POS transaction to complete, based upon the quality of the service their networks are providing on any given day
- The devices are pre-programmed by the servicing vendor to dial (much like a dial-up service) any one of several pre-programmed numbers and then re-dial using the next number in the pool and so on, until a successful call completion (transaction) occurs
  - Some of the numbers may be 7-digit numbers; those may fail and need 10-digit numbers, or a "#" after the dialing string
  - Some of the numbers may no longer be active, but have not been removed from the POS unit’s dialing pool, likely because the vendor knows that the failure will prompt a re-dial with the next number
- Most of the POS devices dial 8XX numbers to avoid long-distances charges for the service the customer is already paying for through the vendor (these toll-free numbers are susceptible to the same potential issues that other 8XX numbers may encounter when dialed)
MODEMS

FUNCTIONALITY

A modem converts the serial digital (binary) data from a transmitting terminal into a form suitable for retransmission over an analog telephone channel. A second modem reconverts this signal to binary data for acceptance by the receiving terminal. Modems using VoIP can run at rates above 14.4Kbps, but should be configured not to exceed 33.6Kbps. This means that V.90 and V.92 should be disabled.

TECHNIQUES FOR HANDLING MODEM CALLS USING VOIP

There are two techniques for supporting modem calls using VoIP—modem pass-through and modem relay. These techniques are analogous to the fax pass-through and fax relay described above. In this case, CenturyLink supports only modem pass-through.

TELEPHONE RELAY SERVICE/TELETYPETRIVER (TTY) MACHINES

FUNCTIONALITY

VoIP customers have access to the Telecommunications Relay Service (TRS), a free service that connects customers who are deaf, hard of hearing, or have speech disabilities with others using either standard telephone equipment or telephone equipment that has been specifically designed for individuals with disabilities.

TRS can be accessed by dialing 711, or the toll-free TRS number listed in the telephone directory. A trained communications assistant answers calls and relays the telephone conversation between the caller and the called party. All call information and conversations are confidential. Relay service is available 24/7/365. Long-distance calls can be billed collect or to a pre-paid calling card, carrier calling card, or third-party.

Teletypewriter (TTY) machines are typewriter-style devices used by the hearing impaired community to communicate over the telephone. VoIP customers can use TTY equipment with the VoIP product.

TECHNIQUES FOR HANDLING TTY DEVICES USING VOIP

TTY devices must use the G.711 codec.

TECHNIQUES FOR HANDLING EMERGENCY CALLS USING TRS/TTY WITH VOIP

TTY callers should directly dial 911 or other existing emergency numbers in emergency situations. All 911 centers are now equipped to handle TTY calls. After the 911 dispatcher answers the call, pressing the space bar may help inform the dispatcher this is a TTY call. Dialing 911 directly, when using relay service for 911 may result in a delay to getting the urgent message through.