



DIGITAL PHONE & MODEMS

A White Paper

DIGITAL PHONE SERVICE AND HOW IT AFFECTS MODEM COMMUNICATION

DKSE - VoIP / MoIP Modem Issue Discussion

There has been an increasing incidence of communication issues relating to the use of *VoIP* phone service at locations with DKS PC programmable controllers. The rise in the number of those sites equipped with non conventional telephone lines has resulted in a growing number of data transfer issues. Beyond our experience there are ongoing issues with fax machines, credit card machines, alarm systems, and point of sale devices that rely on technology developed for use with what has always been the typical telephone environment. DKS instituted the DK Server connection to lessen the impact of *VoIP* lines in the management office where the programming computer is located. However, the number of sites using *VoIP* lines at the controller is rising.

Let's start with a review of some terms that are used in reference to the telephone service itself. We have often heard that we need a *POTS* line to connect to the telephone entry unit or controller. *POTS* stands for Plain Old Telephone Service and is a commonly used slang term in the industry. The correct term is *PSTN* which stands for Public Switched Telephone Network. This type of service is becoming less and less common as homes and businesses opt for the economic advantages of telephone service that is derived from a more modern means. The FCC has recently conducted hearings and determined the end of this type of service is inevitable.

DKS has always used a voice modem or a Hayes compatible modem to send and receive data to our PC programmable systems. In the day of copper wires and Ma-Bell this was no problem as long as the amount of noise on the line was kept to a minimum. With the advent and rise of today's telephone provider alternatives, the use of a modem is facing new obstacles. The most common type of phone service that people are choosing to replace their *POTS* line is through *VoIP* or Voice over Internet Protocol.

VoIP is a general term used to describe various transmission technologies, communication protocols and methodologies that are used to provide voice communication over an internet connection rather than a *POTS* line. It is also sometimes referred to as *VoBB* for Voice over Broad Band. The main difference in the way a signal travels from point a to point b is that with *POTS* a call is initiated, conducted and terminated in a direct sequential manner over a fixed route. There was a network of phone lines connecting the initiator through a telephone company switch system to the destination. With *VoIP* a call travels over various paths in packets that are reassembled when they arrive at the destination. There may be omissions or errors that are insignificant to producing an audibly acceptable rendition of the original conversation. Those same errors in content or timing are often fatal to the data transfer process conducted by a modem because it is constantly conducting checksum tests to insure accuracy. There are also handshake and confirmation signals between the two modems that can be corrupted as packets of information are reassembled during an attempted download. The quality of the connection and of the network deriving the *VoIP* signal has an effect on the ability to transfer data.

There are settings and adjustments as well as developments in the technology of *VoIP* systems that may make it possible to transfer data with a voice modem over a *VoIP* service. Be aware that best case scenarios are still referred to with terms such as "might", "sensitive", "problem", "challenging", "unreliable", "quirky", "susceptible to quality disruption of various types due to delay jitter or packet loss". In spite of the chance that the *VoIP* service may cause continued data transfer failures there are some suggestions that may help. The industry is working on a permanent fix that may already be available through the client's *VoIP* provider. The *ITU* or International Telecommunications Union is an agency of the United Nations that is involved in establishing standards of uniformity for the telephone industry. *ITU V.150.1*, or *V.MOIP*, is a standard that defines how to relay modem data across IP networks. If you are having a problem with analog voice modems working over a *VoIP* service, **start by asking if the provider can support ITU V.150.1**. Unfortunately this standard is not implemented in most *VoIP* equipment. If the *V.150.1* standard cannot apply, inquire about *ITU G.711* which is a high bit rate codec that uses no compression and has the lowest latency or lag. *G.711* is supported by most *VoIP* providers. There are cases where *G.711* codec equipment can solve the issue.

There are many reasons why an analog modem may not work over VoIP. There are a few adjustments that may help if you are using a modem at the PC rather than the DKS Server:

- adding S11=80 to the modem initiation string to give an 80 millisecond delay between each DTMF tone when dialing
- disable your modems error correction feature
- disable your VoIP call-waiting service
- adjust your modem baud rate to 1200 baud
- adding *99, before the area code and number to be dialed can upgrade the quality of the connection with some service providers

If there is no fix available from the provider and they are not able to supply a service that meets the *MoIP* (Modem over Internet Protocol) standard of *ITU V.150.1* and the suggested settings or the *G.711* codec hasn't helped or isn't available, we have another option. Many of our PC Programmable systems can be retrofitted with p/n 1830-175 RS-232 to TCP/IP adapter. With this adapter the *VoIP* line can continue to provide the telephone service for outgoing calls from the telephone entry system. Programming is transferred to a network connection at the adapter. The site must have availability of a LAN, WAN or internet connection to use this means of transferring data to the controller. It could be a wired, fiber optic or wireless connection with the appropriate network hardware provided by others to connect to the adapter's 8P8C / RJ45 port. A direct connection between the controller and the programming PC is also an option, through the use of the controller's onboard RS-232 terminals.

The evolution of telephone service has introduced a number of challenges for systems integrators trying to stay on top of this changing technology. Some providers are able to provide service compatible with existing needs better than others. Knowing some of the terminology and standards that apply to *VoIP* systems can be a big help.

Please be aware of these Telephone Service factors.