A Technical Introduction to Choosing a Telephone Modem

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A Technical Introduction to Choosing a Telephone Modem

This part two of a series designed to help demystify the decision of what modem to purchase. Future installments will appear in /Update. This installment covers error connection and data compression protocols.

Error correction and data compression are vital aspects of high-speed data transfer over telephone lines. Error correction provides data integrity over noisy phone lines, while compression of (primarily text) files increases effective modem speed, saving time and money.

Error Correction

All phone lines suffer from at least some intermittent background noise, and this noise can interfere with the receiving modem's ability to decipher incoming data bits, resulting in garbled characters appearing on the screen, and other, more serious corruption of data. The noisier a line is (and the faster the speed of transmission), the more likely it is that some incoming data bits will be misinterpreted. Error-correction circuits on modems can detect when errors have occurred during the transmission of data and, if errors are detected, cause the affected data packets to be retransmitted. The various methods used to accomplish this process have been formalized as protocols to allow error-correction compatibility among different brands of modems.

The most commonly used error-correction protocols are:

- **MNP (Microcom Networking Protocol) classes 1 through 4.** These are error-correction protocols developed by Microcom Systems, Inc. MNP-1 is now effectively obsolete and is often not included on modems that support newer MNP error-correction protocols.

- **V.42.** This protocol incorporates a standard called LAP-M (Link Access Procedure for Modems), which offers better performance than MNP-1 through MNP-4. For compatibility with modems that have only the MNP error-correction protocols, the V.42 standard has MNP-2 through MNP-4 built into it as fallback alternatives to LAP-M.

Not all modems have error-correction protocols built into them, although almost all high-speed modems (V.32 and higher) do. Some error-correction protocols, such as MNP-4 and V.42, can sometimes have the side benefit of increasing the effective data-transfer rate, since these protocols can reduce the amount of data sent by grouping the data in packets and stripping out start and stop bits.

Data compression

Data-compression protocols can reduce the amount of data that needs to be sent over the phone lines. These compression techniques work by encoding the data in a way that minimizes redundancies in the data. The two data-compression protocols most commonly built into modems are the following:
• **MNP class 5.** This data-compression protocol is often included in modems that have MNP error-correction protocols. (MNP-5 requires MNP-4.) This protocol can reduce by half the amount of data that needs to be transmitted.

• **V.42bis.** This NERDC-supported protocol (which always includes the V.42 error-correction protocol as a subset) can reduce the amount of data that needs to be transmitted to as little as one quarter of its original size.

With either of these protocols, the amount of compression depends on the type of data being transmitted. For example, plain text files benefit most from compression, but interactive applications such as logging onto a remote computer and running a text editor may not benefit significantly. In addition, previously compressed files, such as those compressed by StuffIt on the Macintosh, PKZIP on an IBM PC or compatible computer, or the `compress` command in UNIX, probably will not benefit from compression at all. (Most files available on Internet bulletin boards and commercial information services are already compressed.) If a modem with MNP-5 attempts to compress already compressed data, the resulting data are likely to be increased in size rather than decreased. V.42bis will attempt to compress only data that will benefit from compression. Although data compression built into modems can be very useful for some applications, using software compression utilities before transferring files via modem can sometimes be more efficient.

These data-compression protocols are independent of the modulation standard used. For example, the effective data-transfer rate of a V.22bis (2400 bps) modem can theoretically reach a maximum speed of 9600 bps using V.42bis, and a V.32bis modem can theoretically reach a maximum speed of 57600 bps using V.42bis. In practice these maximum speeds are rarely attained.

Virtually all high-speed modems currently available support both of these data-compression protocols.

*Next Month: Which protocols should you choose?*

Your Comments are Welcome

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