Latency

In the IP world, the amount of time a packet sits in a bridger or a router represents latency.

The delay, or late-ness, in getting signals or information from origination to destination. Examples are plentiful: In early digital TV systems, "latency" showed as seconds of blank time between channel changes. In telephony, latency's symptom is blank spots in conversation, such that one feels the need to say "over" after completing a sentence or thought. On the Internet, latency is how to describe a slow-loading Web page. In short, anything that moves from one place to another as part of its usual routine is subject to latency.

Leakage

"After ascending the utility pole to examine the cable line, the veteran installer realized immediately what had caused the signal leakage: a squirrel."

What happens when RF signals spill out of a transmission media. In coaxial cable, leakage can occur for a variety of reasons: Cracked or chewed cable lines, bad shielding of TV tuners, or improperly crimped connectors.

No matter how you look at it, leakage is bad. Not only does it weaken the strength of the transmitted signal as it tries to get from one place to another (i.e., from the home to the headend, or *vice versa*), but in cable's case, signal leakage also can create problems for the Federal Aviation Administration, which uses some of the same frequencies as cable, for air traffic control.

Because cable is inherently a closed system, it theoretically doesn't interfere with FAA signals. But in the 1980s, the FCC found enough evidence of RF seepage into the air that it mandated a series of regularly occurring "cumulative leakage index" tests, to force cable operators into fixing signal leaks. Not surprisingly, when CLI tests were conducted, and leaks repaired, cable system reliability rose.

Line conditioning

Line conditioning aims to reduce noise and distortion, thus readying phone lines for clean delivery of data.

The process of making an analog telephone wire, extending from the telco central office to the home or office, suitable for handling digital information, such as digital subscriber line services.

The enemy within

One of the obstacles to pervasive digital subscriber line (DSL) availability over telephone networks is a load coil — a small inductor once routinely placed on the local telephone loop every 6,000 feet. The purpose: to suppress high-frequency signal noise that could interfere with phone calls. The problem: those same high frequencies are used to convey DSL data traffic. Thus, a load coil between your home and the telephone central office facility has the effect of limiting DSL availability or hurting performance. Telephone providers have systematically been removing load coils from lines as they further DSL availability across the U.S. and elsewhere.

Qwest for ubiquity

Denver-based Qwest Communications lags other Bell companies in its DSL rollout, but the company's continuing expansion of its DSL footprint reflects a broader industry movement toward widespread availability.

	2004	2003
DSL subscribers (mil.)	1.04	0.64
DSL-qualified HHs (mil.)	6.6	5.1

SOURCE: QWEST COMMUNICATIONS

Local exchange carrier (LEC)

In the U.S. today, the largest LECs are BellSouth, Qwest Communications, SBC Communications and Verizon.

A company that provides local telephone service to businesses and residences. Also called independent local exchange carriers (ILECs), regional Bell operating companies (RBOCs), "Baby Bells," and "telcos."

Local loop

Local loops were designed originally to do one thing: carry analog, electrical signals across a pair of wires, to make a voice conversation happen at both ends.

The pair of copper wires that extend from a telco central office, to a home or business, thus forming a loop between homes/businesses and telco switching equipment.

When homes require additional lines, as in for Internet access, home faxes, or teenagers, telephone providers install additional loops.

Luminance

Because the human eye notices brightness and contrast more so than color, many digital video compression techniques allocate more pixel coding muscle to the luminance than the chrominance information.

The brightness and contrast level of a television picture, as opposed to its color, which is designated by "chrominance." In color television, signals are generally described by their luminance and chrominance. In general, the human eye is more sensitive to luminance/brightness detail than it is to color detail.

Management information base (MIB)

Devices within a MIB respond to queries issued by the network about general health and operations.

A set of information used by an electronics device to identify itself and respond to network management queries or actions. Pronounced as a word, "mib," as in, rhymes with "rib." MIBs exist, in large part, so that a device can report to a network manager that it isn't feeling well, or that it's broken, or that something is going on that needs attention.

In cable television, MIBs are historically associated with network monitoring, which is the science of checking on the health of various devices in the network. Nowadays, MIBs figure heavily into many network-controlled in-home devices, from cable modems and VoIP adapters to set-top boxes. MIBs are an outgrowth of simple network management protocol (SNMP), which is a network management language.

PHOTO: SCIENTIFIC ATLANTA INC.

LISTENING: Telecommunications industry network operations centers rely on management information bases to keep watch over network performance.

Media access control (MAC)

The MAC layer of a network plays the role of traffic cop, determining how to parcel out resources that are under constant demand by multiple users.

A protocol that arbitrates how and when information is sent on a broadband network, and particularly the portions of that network that are shared among many users.

In cable modem parlance, the term "MAC" seems always to move in sync with the term "PHY." Both are spoken acronyms — MAC as in the first part of the famous hamburger provider; PHY like the "fi" in "hi-fi."

PHY is a shortcut for "physical layer," which is a set of functions that defines how data get from one place to another along a specified transmission medium — say, hybrid fiber/coax (HFC). PHY includes things such as modulation format and synchronization, so that sent data are timed correctly for receipt on the other end.

MAC comes into play in cable networks because the network itself is shared. For this reason, there needs to be a bandwidth arbitrator that decides who gets access to the upstream leg of the HFC network at any given time. Thus, MAC is an upstream thing, and not a downstream thing, for cable modem transmissions.

MAC, in the modem sense, handles:

1) the physical address of the cable modem
2) bandwidth allocation — which modems get how much bandwidth
3) room, described as "mini-slots," for upstream transmissions
4) quality of service parameters
5) extensions to security and privacy mechanisms

The MAC is important because, in cable networks, the device transmitting data upstream (home to headend) can't hear what other upstream transmissions are taking place in the same node. (This is different than Ethernet, where each transmitter can hear the others.)

That's why upstream time slots in cable modem systems are allocated using time division multiple access (TDMA), a protocol that essentially generates a reservation for each cable modem that has indicated a need to transmit. When the reserved time slot occurs, that modem transmits; any others on the network fall silent until it is their turn.