



# TECHNICAL COLUMNS

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## WHAT'S A QAM?

By RON HRANAC

Every industry has its own jargon, some of which is often incomprehensible to outsiders. This is certainly true of the cable industry. Much of cable's terminology is technical in nature, making some of our favorite words, phrases, abbreviations and acronyms even more difficult to sort out. Further complicating things is misuse of some of our lingo, which is the subject of this month's column. With apologies to 60 Minutes' Andy Rooney, here goes.

### Decibel

One of the most commonly misused among cable's lexicon is the lowly decibel, more specifically its abbreviation, dB. By itself, the decibel expresses a ratio between two power levels - it cannot represent an absolute value. For example, we can correctly say that a 100 watt stereo has 3 dB more power than a 50 watt stereo; the RF output of a two-way splitter is about 4 dB less than the input; an attenuator has 10 dB of loss; or an amplifier has 20 dB of gain. It's incorrect to say the signal level at the input to a set-top box or TV set is -3 dB. One must append dB with a reference in order to use it to express an absolute value, as in, "The input to a set-top is -3 dBmV." Even here, we're still technically expressing a ratio of one value to a reference value (1 millivolt in the case of dBmV), but the point is that signal level must be stated in dBmV, dBμV, dBV, etc., not dB.

### CLI

Do you remember when the Federal Communications Commission introduced the following in Part 76? "(1) prior to carriage of signals in the aeronautical radio bands and at least once each calendar year, with no more than 12 months between successive tests thereafter, based on a sampling of at least 75% of the cable strand, and including any portion of the cable system which are known to have or can reasonably be expected to have less leakage integrity than the average of the system, the cable operator demonstrates compliance with a cumulative signal leakage index by showing either that (i)  $10 \log I_{3000}$  is equal to or less than -7 or (ii)  $10 \log I_{\infty}$  is equal to or less than 64, using one of the following formula..."

What the FCC calls cumulative signal leakage index - more commonly referred to cumulative leakage index or simply CLI - is a mathematical calculation that represents a "snapshot" of a cable network's signal leakage performance at a given point in time. Like dB, CLI is frequently misused, sometimes even by leakage detector manufacturers. One cannot measure CLI, nor is there such a thing as a cumulative leakage index test. We measure signal leakage, and then calculate a CLI.

### MSO

Next on my list is MSO, an abbreviation (sorry, MSO is not an acronym) for multiple system operator. What is an MSO? It's a corporate entity that owns or manages more than one cable system. MSO is not a generic abbreviation that can be used to describe a cable company or the cable industry in the same way that, say, PSTN (public switched telephone network) describes a telco. Not all cable operators are MSOs, but all MSOs are cable operators. Local cable systems aren't MSOs, either. For example, the cable system that



serves the Denver area is not an MSO. It's a cable system that is owned by an MSO - Comcast in this case. What about "cable MSO"? This clearly fits into the department of redundancy department. It's just "MSO."

#### Headend

And then there is headend. Most readers of this column know what a headend is, so I won't define it here. But it's headend, not head-end or head end.

#### Bandwidth

Not only is some terminology misused, sometimes it gets hijacked - and then misused. Case in point: bandwidth. Those of us who work in the RF world know that bandwidth describes how much of the electromagnetic spectrum, expressed in units of Hertz (Hz), is used for some purpose. An 860 MHz cable network's bandwidth is 810 MHz - that is, the downstream spectrum occupies 50 to 860 MHz (860 MHz is the upper frequency limit, not the bandwidth). Likewise, a single analog NTSC TV channel's bandwidth is 6 MHz. Several years ago, the data world decided that bandwidth ought to be synonymous with data rate, throughput or capacity, as in "1.544 megabits per second of bandwidth." 1.544 Mbps is not bandwidth; it's the number of bits per second.

#### Quad play

Service providers have been quite successful with something known as the triple play: video, data and voice. Note that these three things are types of services being provided to customers, not ways to deliver them. The cable industry uses its fiber and coaxial cable networks to deliver video, data and voice. Somewhere along the way, someone coined the term quadruple or quad play, adding wireless (or mobility) to the mix. The types of services being provided are still the triple play: video, data and voice. Wireless is just one more way to deliver them.

#### Reliability

Reliability is often used when availability is what was meant. These two words cannot be used interchangeably. Availability is the percentage of time out of a defined total amount of time that a service, device or system is available or operational. Reliability is the probability that a system or device will not fail during some specified period. So it's OK to say that a cable network has four nines (99.99 percent) availability, but one cannot say it has four nines reliability. I remember a major telecommunications equipment manufacturer's ad that appeared in this magazine a few years ago, in which a product was stated to have "five nines reliability." Five nines availability, perhaps, but not five nines reliability.

#### QAM

The latest addition to the list of abused and misused cable jargon is QAM. I've seen QAM used to describe the digitally modulated signals carried on a cable network (they are QAM signals or digitally modulated signals, not QAMs), but by far the most common misuse is calling a QAM modulator a QAM, edge-QAM, EQAM, universal QAM or UQAM. There is no such thing as a QAM. QAM is a type of modulation: quadrature amplitude modulation. Calling an edge-QAM modulator a QAM is no different than calling your favorite FM radio station's broadcast transmitter an "FM." Hmmm, how would that be pronounced? Foom?

#### Now fly right

I could go on, but I think you get the point. Andy Rooney stick-on eyebrows back in the desk drawer.

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