

Internet Service, Grounded Outlets, Corporate Specifications, and Lost Customers

So I cancelled my order (which required 3 phone calls to place, after wrestling with a non-responsive website) with a new Internet Service Provider for TV/Phone, etc., because the technician, and a supervisor I later spoke with on the phone didn't seem to understand that a 3-wire surge protection plug-in strip fed from a 3-prong outlet, was in fact, a grounded outlet.

And as if that weren't enough, none of my explanations that the 3rd wire in the plug-in strip was the ground and that I've been engineering electrical systems for quite a while now, and thus have some knowledge of what's necessary and why, made any difference, either.

Explaining to both the technician and the supervisor that I wasn't about to move bookcases containing hundreds of books with aggregate weights of many hundreds if not a few thousand pounds, just to get at a wall outlet hardwired to the electrical panel cut no ice with them, with the supervisor solemnly telling me their specifications required a "grounded outlet".

The breathtaking ignorance of any employee of a tech company, even a janitor, no less a technician or supervisor that, forget the Electrical Code, there have been no ungrounded electrical systems and no ungrounded outlets installed in Manhattan for at least 60 years just blew me away.

Where do they think we are? [West Nyack](#)? Hello!? We're dealing here with a building in the Financial District that was converted from office to residential space. How long ago could that have been? How could there be anything **except** grounded outlets in the place?

Arrgh!! All of which led me to write this missive

Do You Really Need In-Home Fiber Optic Network Connections for HD or Even UHD Streaming Video?

And the second part of the above sad story was that I discovered they wanted to run fiber right up to their modem. Now, while I expected they'd be able to do so with a minimum of disruption by running along The existing Cable TV Co-Ax at the ceiling (The technician, of course was looking at the ceiling along the *opposite* wall, where she'd have had to work leaning over the existing bookshelves.), I wondered why they couldn't run Co-Ax or twisted pairs from their fiber optic spine in the building.

So, I thought about it.

I mean, streaming 1080p (1920x1080 pixels) [HDTV](#) video works at 3-5 Mbps, depending upon the service you're using and with providers telling us they provide 100 Mbps, there isn't an issue, is there? Well, actually, there starts to become one when 4K [UHDTV](#) becomes commonplace, especially if different folks in your home are doing (or watching)

different things at the same time.

The key word there was *starts* because Co-ax can sustain data transfer rates between 20-38 Mbps, and 4K UHDTV can get by on 15 Mbps, though you'd want 25 Mbps or so to have a nearly bulletproof transfer connection.

So what the blazes was I talking about?

Well, we've been living with **1080p** HDTV long enough that we should know it means drawing a High Definition Television image via **1080 progressively** delivered (as opposed to interlaced [i.e., 1080i, gone, like dinosaurs] where only half the image is delivered at a time) horizontal lines with each one of those lines comprised by 1920 dots across the screen where the shorthand for a 1920 by 1080 image is 2K because 1920 is (almost; 2048 is the actual) the binary "equivalent" of 2000 in decimal and 1920x1080 = 2,073,600 picture elements (pixels) or dots filling the screen.

OK, but binary and decimal? Oh, *binary* means only two choices, on, or off (or "yes" or no", or "up" or "down", no "maybe", and no "sideways"), and **Mbps** is **Megabits per second**, and you of course remember that K, "kilo" is the prefix for thousands and M, "mega" is the prefix for millions, but what's a "bit" (eight of which comprise a **byte**) and what does any of this have to do with "binary"?

Well, a bit is shorthand for a **binary digit**, of which there are only the two "1" and "0", corresponding to "on" and "off" respectively, whereas in the **decimal** system we all use every day there are also the digits "2" through "9" to complete the **ten** digits we use to describe any number, so 25 megabits per second is an information transmission rate of 25 million binary digits per second, and to get back to what you need on your premises, it depends on how the different folks I spoke of at the top of this column are interconnected, and strange as it may seem, if it's via "old" [Cat5](#) or [Cat5e](#) unshielded twisted pairs, we're talking about hundreds of Mbps, approaching a thousand Mbps via something called "[Gigabit Ethernet](#)" where all 4 twisted pairs in the cable are in use.

Even on-premises Wi-Fi from your newer technology router can deliver enough bandwidth for 3 to 8 UHDTV streaming video connections at once, but if you've been attentive so far (I know, damn near impossible given how fascinating the subject is) you've realized that on-off isn't enough to deal with shades of gray or colors. I mean "on-off" lights a lamp or pixel, but it doesn't change its intensity.

In the old days lamps were dimmed by reducing the voltage to them via a *rheostat* or variable resistance inserted between the power source and the lamp (DC) or via a variable transformer (AC). When the solid-state dimmer came along we were chopping a piece out of the AC waveform to dim the lamp, with the chopped out piece getting larger and larger to make the average delivered voltage lower and lower so as to dim the lamp more and more.

If, however, each pixel on a screen can have multiple values assigned to it, you can vary intensity (or color) by varying the numerical value of a given pixel, and now we get into bytes, where a byte (8 bits, remember?) can have up to **256** values, allowing for that many shades of grey. Huh?

If, in decimal, each place is 10 times the previous place, i.e.; ones, tens, hundreds, thousands, ten thousands, etc. the number **37,543** has **3** ten thousands, **7** one thousands, **5** hundreds, **4** tens, and **3** ones, represented by the 5 decimal digits, and therefore if we have the 8-bit binary number **11111111**, where each place is twice the previous place, we're looking at **1** one, **1** two, **1** four, **1** eight, **1** sixteen, **1** thirty-two, **1** sixty-four, and **1** one hundred twenty-eight, and adding them up, $1+2+4+8+16+32+64+128 = 256$, so one byte can code for 256 shades of gray on a black and white pixel.

In color, so called true color has a byte for each of the three [additive](#) primaries, red, green, and blue, and is thus called [24-bit color](#), able to deliver 256x256x256 or 16,777,216 different colors.

Multiply the pixels on a screen by the gray or color values it can have and you end up with absurdly large numbers, way in excess of the bit rates quoted for the transmission various video resolutions where raw 1080p video would require a transfer rate of about 911 Mbps.

So how does streaming HDTV get by on only 3-5 Mbps? Something called a [codec](#) (coder-decoder) and if even UHDTV requires only 25Mbps and on-premises [Ethernet](#) (Cat5/e or Co-Ax) can transmit data at up to 1000 Mbps or 200 Mbps for Wi-Fi, why fiber?

Why indeed? Well, while you may not have five or ten 25Mbps users online in your place simultaneously, your apartment building, office building, or suburban neighborhood may have hundreds if not thousands or such users online simultaneously and a single standard fiber optic cable can have up to 12 fibers in it, with *all* those users able to be supplied by a single such cable.

Actually, the question should have been "Why *on-premises* fiber?", to which the answer is, cost (more to you, less to the [ISP](#)) and hardware. An Optical Network Terminal ([ONT](#)) takes the place of a cable modem because your computer(s) and router(s) can't decode light signals, nor do they have the capability to connect to fiber optic cables. Some places, like a large office, might need Fiber to the Premises, or [FTTP](#), as it's called, but the individual user certainly doesn't need all that bandwidth.

Bless the Clerks for They Shall Keep us Humble

So in my continuing [Struggles](#) with the NYC Department of Buildings (NYCDOB), one of the forms which must be filed is a [TR-1](#) Technical Report which says at the top it must be *typewritten*. All the forms I execute must have my seal and original signature (hey, it's really me!), but every now and then a DOB clerk also insists the dated initials on the form must also be *original rather than typed*. Not typewritten? Hello! Ain't bureaucracy grand?

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