WeGet letters

by Michael W Lucas

> Oh, Transcendent All-Knowing Letters Person,
> We're all working from home now, and the network is terrible. It doesn't matter if I'm using my cable modem or my cellular hotspot, working on the office network is slow and painful and super annoying. Even the Internet seems clunky. What can I do?
>
> —Sudden Telecommuter

ST,

You can accept that you have been consigned to an inner ring of the Inferno and get on with shambling through your wretched existence.

No, no, fine. I know how this goes. I give you a shot glass brimming—brimming, I say!—with undiluted truth, and you write me back beseeching me to break it up into sugar-coated capsules that'll go down without you having to taste them. It's as if you want to guzzle bridge mix without tasting any of the delicious licorice, when the licorice is the ingredient that builds character and integrity. No, not "black licorice." That's like saying "wet water." There is only one licorice. We do not speak of the loathsome, extruded-sugar rainbows that have reprehensibly stolen licorice's wholesome banner for their own unspeakable enterprises.

So. Let's see if I can break this down into drams sufficiently minuscule for your tender palate.

The Internet isn't a single network. It's a collection of interconnected networks. The miracle of this isn't that the networks can interoperate. No, once you consider that the overwhelming majority of these networks are run by for-profit companies intent on providing service at the lowest possible price point, the miracle is that these networks function even internally. Kludges and workarounds suffuse them all. A network that isn't running at full capacity wastes resources, namely the network operator's money. They're designed to have corporate users during the day and residential users on evenings and weekends—but with the unexpected immediacy of an asteroid impact in Lake Michigan, people's homes have started gobbling bandwidth during the day. It's no different than the shortage of home toilet paper triggered by millions of employees unexpectedly being denied the fringe benefit of their sumptuous corporate facilities.

And you want to know what you can do about it?

My suggestions might appear intended to help you maintain that brittle façade of empowerment. Don't let them fool you. They're all about methodically and inexorably demolishing each board in that front, so that you can fully embrace the existential horror of the modern Internet.

First, understand that your ISP has sold you the sort of lie that would make the most gloriously demonic used car salesperson blush from shame. Perhaps the link into your house is full-on gigabit. Perhaps it's not the sort of gigabit that's a technicality because it speaks the gigabit protocol, but it can actually push almost a thousand megabits a second even when your appli-

cation carves up the traffic into puny little 64-byte chunks and spews millions of them. Sure, you can get those to the ISP's router. But the ISP sold every house on your block one of those gigabit lines, and their connection to their upstream is, what, 10 gigabit? How many houses are in your neighborhood? The ISP's network is optimized for seamless delivery of The Wiggles, because the list of Customers You Don't Want to Hear From starts with "overwhelmed single parent desperately seeking socially-acceptable spawn sedation."

To see exactly how doomed you are, break out MTR. The acronym might have originally stood for "Matt's Trace Route," but it's been repeatedly retronymed and "Multiple Trace Route" seems to be the interpretation of the day. MTR gives you a real-time view of how traffic flows between network nodes. A node that appears as a series of asterisks, or with very high times, isn't necessarily bad; it simply means that the node prioritizes supporting actual traffic over your petty, irrelevant, and unwanted diagnostics. MTR runs constantly, so you can keep it going in another window. When a network connection hangs up on you, you can flip over to your MTR session to see who's dropping packets.

If you're so desperate as to think reporting a problem will give you relief, MTR output is essential. Your ISP's helpdesk will be happy to educate you why you're wrong.

Mind you, that output's largely useless without a corresponding MTR going the other way. Running MTR on your remote node reveals how traffic goes from that node back to you. It might follow the same path. It might traverse a completely different set of routers. If an ISP reboots a router, it might all flicker and fade and founder, or it might seamlessly switch. Who knows? Look both ways before crossing the Internet.

If MTR doesn't expose any ghastly secrets, you aren't looking hard enough. But let's try another tool.

Many network problems occur at your home. The neighbor's need for a microwaved burrito might make your wireless cut out. Squirrels nesting in the cable box on the phone pole find data frames highly tasty. Fortunately, you have the tools to see where such problems occur. Most computing professionals have a bunch of technology in their homes. You're probably streaming music from the Internet or your own server, or have a movie on in the background, or something. Use these to narrow the problem scope.

If you have traffic, you can scrutinize it. All computing professionals must have a passing familiarity with packet sniffers. Even a base familiarity with tcpdump(8) will serve you well. If you want a glossier tool, try Wireshark. A book like Sanders' *Practical Packet Analysis* will help you achieve base competence.

Speaking of packet sniffers, consider what your computer is putting on the network. Even Unix desktops can unpleasantly surprise you with the garbage they spew, and if you're running a commercial operating system you're almost certain to see it spewing useless traffic. (Useless to you, that is. The software developer finds it highly monetizable.) Also consider what traffic arrives at your host. Do you have an IoT device constantly vomiting multicast that nobody asked for? Is your buggy switch sending megabits of bootp requests a second? I've seen these and worse. Individually these are small, but they all demand that every device on your network expend precious computing resources rejecting and ignoring it all. Clean up your own sewer before you criticize the wastewater treatment plant.

If you don't see an identifiable problem, you might fall back on blind luck. If your IPv4 connection is painfully slow, try using IPv6. If you or your organization don't have IPv6, I invite you to join the 21st century at your earliest convenience. If the IPSec VPN is slow, try SSH or openvpn. Perhaps one of those can leap across the chasms in the lackadaisical collection of kludges we call the Internet.

Ultimately, the less traffic you can send across the network, the happier you will be. That means SSH.

The command line is everything. Bind yourself to it. Our predecessors thrived on 300 baud. Cease complaining that the network no longer supports you in the manner to which you have grown accustomed and acclimate yourself to your sadly fallen circumstances.

Once you swallow that, you'll be fine.

Have a question for Michael?
Send it to letters@freebsdjournal.org

MICHAEL W LUCAS (https://mwl.io)'s newest books are *Sudo Mastery, 2nd Edition* and *Terrapin Sky Tango*.