



TECHNICAL COLUMNS

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THE NEED FOR SPEED

By RON HRANAC

In the 1970s I teamed up with a friend to campaign a 1969 big block Chevy Camaro in what is known as ET bracket racing. This is old-fashioned quarter-mile drag racing, based on handicapped starts. Here's how it works: Each driver makes several practice runs down the strip to determine a consistent elapsed time (ET) that the car can do through the quarter mile - for instance, 14 seconds. Others do the same, and the chosen "dial-in" ET is painted on the car's windows using white shoe polish or similar. When it comes time for the actual competition runs, a 10-second car can race against the 14-second car.

How? The 14-second car gets a 4-second head start. In theory, if both cars are running optimally, the drivers have identical reaction times at the starting line, and a host of other factors come into play, the two cars will cross the finish line at the same time. This rarely happens, so most of the time the first car to cross the line wins the drag race. However, if one of the cars goes quicker than its chosen dial-in time (this is called breaking out), that car loses. If both cars break out, the car that breaks out the least is the winner. If a car leaves the starting line too early, it's an instant disqualification. Believe me, ET bracket racing is harder than it sounds. It's also a lot of fun and a big adrenalin rush. My friend and I won a class championship in the 1977 Can-Am Bracket Nationals at Spokane Raceway Park, with yours truly driving. This was our only claim to fame.

Still going fast

While I don't drag race anymore - my wife says I already have too many hobbies - I still like going fast. These days, speed for me usually has something to do with data transmission.

It doesn't seem like it was all that long ago that I was using an external 2,400 baud dial-up modem with my home computer. That was eventually replaced with a 56k internal dial-up modem, which was a whole lot faster and yielded around 45-48 kbps. I stayed with that technology until late 2004, when I finally got cable modem service installed (see my February 2005 column). At the time, Comcast's cable modem service in the Denver area offered 3 Mbps downstream and 256 kbps upstream. They later upgraded the high-speed data service to 6 Mbps downstream and more recently bumped that to as much as 8 Mbps. Comcast also has added a feature called PowerBoost. The latter temporarily increases the downstream speed to as much as 16 Mbps when downloading large files. Nice.

Think 6 to 8 Mbps is fast? Cablevision's Optimum Online high-speed data service provides its customers with data rates up to 15 Mbps downstream and 2 Mbps upstream. Leveraging existing DOCSIS 2.0 technology and some clever 1x2 MAC (media access control) domain configurations on their cable modem termination system (CMTS), Cablevision offers an even faster high-speed data service called Optimum Online Boost for another \$10 or so per month: 30 Mbps downstream and 5 Mbps upstream. Yikes!

Hopped-up DOCSIS

If that's not fast enough, DOCSIS 3.0, the next generation of DOCSIS, promises even faster downstream and upstream data rates, using something called channel bonding (www.cable360.net/ct/strategy/emergingtech/14944.html). CableLabs already has issued several parts of the



new DOCSIS 3.0 spec, including the Security Specification, Physical Layer Specification, MAC and Upper Layer Protocols Interface Specification, and Operations Support System Interface Specification. These can be found at www.cablemodem.com/specifications/specifications30.html.

CableLabs has tentatively scheduled DOCSIS 3.0 interoperability events July 9-20, Aug. 13-24, Sept. 10-28, and Oct. 22-26. In April it was announced that CableLabs has put together a three-tiered qualification program for DOCSIS 3.0 CMTSs, with first product submissions from the vendor community expected to occur in the fourth quarter of this year. Look for qualified CMTSs and certified modems shortly after that, perhaps late this year or early next year.

Demos

In the meantime, cable modem and CMTS manufacturers are already moving ahead with channel bonding technology. You may have heard about the high-speed hoopla at NCTA's Cable Show in Las Vegas. The wideband demo that Comcast Chairman/CEO Brian Roberts and Arris conducted in a general session at The Cable Show made the national news and was even referenced in one of Jay Leno's jokes a day or two later on "The Tonight Show." The demo featured four bonded downstream channels from Arris's C4 CMTS to a Touchstone Wideband Modem, yielding 150 Mbps. Roberts downloaded a 17 MB commercial from the NCTA in about a second, a 300 MB Comcast commercial in eight seconds, and a 4 GB file containing the 2007 Encyclopedia Britannica and a Merriam-Webster visual dictionary in about three-and-a-half minutes.

And that was the slow demo.

Slow?

Of course, slow is a relative term here. Cisco Systems had an eight-channel bonding demo in its NCTA booth, providing a whopping 293 Mbps downstream data rate. The company first showed downstream bonded speeds from its uBR10012 CMTS of 100 Mbps with a three-channel Scientific Atlanta modem and nearly three times that with an eight-channel Linksys modem.

The good news? While not yet qualified or certified under DOCSIS 3.0, some of this so-called wideband technology is shipping today and has already been deployed in Europe and Asia. Additional trials are underway in North America. The early overseas deployments have largely been in response to brutal competition from the telcos. In those highly competitive markets, cable operators are desperate for speedy products now, and early channel bonding products - some of which will be software or firmware upgradeable to DOCSIS 3.0 in the future - fit the bill.

Here in the United States, services such as Cablevision's Optimum Online Boost 30 Mbps/5 Mbps high-speed data offering has successfully met the competition head on. As the battle for data customers continues to heat up, DOCSIS 3.0 technology will be there with the ability to offer previously unheard of downstream and upstream data rates.

1 Gig?

You can bet the NCTA demos got the attention of our competition. Downstream cable modem speeds in the 150~300 Mbps range are nothing short of impressive. Try that with digital subscriber line (DSL).

Bond even more channels and the data rates go way up. For instance, if you have two dozen 6 MHz slots available to dedicate to downstream channel bonding, that would give you close to 1 Gbps of usable throughput (24 x 38 Mbps = 912 Mbps). The raw data rate tops the 1 Gbps threshold: 24 x 42.88 Mbps = 1.03 Gbps.

The NCTA demos focused on downstream channel bonding, but upstream channel bonding is just around the corner. Indeed, DOCSIS 3.0 supports channel bonding in both directions.

Oh, Leno's joke? I'm paraphrasing here, but it was something along the lines of, "Guys won't be downloading the encyclopedia with that new cable modem (wink, wink)."

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