Preparing for the Big Transition to CCAP

With Cisco's help, Cox Communications is getting ready for the next-gen cable architecture

Initial Challenges

Like most major North American cable operators, Cox Communications has been trying to cope with a huge, sustained surge in broadband traffic that threatens to overwhelm its hybrid fiber/coax (HFC) access networks. Downstream data traffic has been growing at an astounding 50 percent compound annual growth rate for the last several years, while upstream data traffic has been climbing at a strong 18 percent to 25 percent rate. Yet, even after years of such heavy traffic increases, no end to the growth spiral appears to be in sight.

Moreover, video consumption is driving much of the broadband traffic growth, forcing the third-largest U.S. MSO to squeeze more and more high-bandwidth streams down its increasingly congested pipes. David Ririe, senior manager of Access/Docsis Engineering for Cox, estimates that video content now accounts for up to 25 percent to 35 percent of the MSO's network traffic during peak usage times.

With over-the-top (OTT) video consumption still on the rise, Cox pursuing ways to pump IP video over its networks and subscribers demanding higher resolution rates and expanded services to more video-capable devices, Ririe expects that percentage to remain high. "As we introduce our own OTT video, it will be interesting to see what happens," he says. The amount of video is "either going to stay the same or there will be a slight uptick. It's certainly not going to go down."

Due to the unprecedented surge in overall data traffic, and especially video-related traffic, Cox engineers know they will need far more than the 8 to 12 QAM channels per service group they now devote for broadband users on the downstream end. By the 2016/2017 time frame, they anticipate that they will need at least 24 QAM channels per service group, or at least double what they have available now, to support the increasingly heavy network load. In fact, as Ririe notes, even as many as 32 QAM channels per service group may not be "out of the question" just three to four years from now.

Given all these factors, Cox officials have been looking for ways to beef up their broadband capacity and boost their operational efficiency without using up even more space or power. So they have been developing a plan to upgrade their cable systems by carrying out the transition to the cable industry's next-generation Converged Cable Access Platform (CCAP) architecture, which will combine CMTS and edge QAM modulator features and functions in a single, super-dense headend device or system. The big challenge is making the transition to CCAP without ripping out all their current CMTS and edge QAM equipment, spending heavily on new equipment and disrupting service to their current broadband subscribers.

Solution

Cox technologists have decided to start the tricky transition to CCAP by to relying on Cisco equipment and solutions, just as they have for the last five years. For its rollout of Docsis 3.0, the MSO has already deployed the full Cisco modular CMTS (M-CMTS) solution throughout its entire

8+ million-home footprint. That solution includes the uBR10K CMTS and the RFGW-10 Gateway for edge QAM delivery.

"We did a lot of legwork and issued a lot of RFPs and RFIs," says Ririe, noting that Cox weighed products from all the major cable equipment vendors before going with Cisco. "Cisco came out with the solutions that made the most sense for us, from both a cost and upgrade perspective."

What Cox officials like about the Cisco M-CMTS solution is its flexible, modular approach, easy scalability and low incremental costs of expansion. They also like the ability to converge data and video services on the RGW-10 "universal edge QAM" Gateway.

Not surprisingly then, as it gears up for a fresh round of pre-CCAP equipment upgrades, Cox is not looking to switch out vendors. Instead, the MSO is getting ready to deploy Cisco's new PRE-5/3G-SPA module upgrade for the uBR10K CMTS, as well as Cisco's new DS-384 high-density QAM line cards for the RFGW-10 Gateway.

"We just finished our second round of upgrades on the Cisco platform," Ririe notes. "Our plan is to ride this platform right into CCAP."

Next Steps

With Cisco's backing, Cox officials feel well prepared for the company's upcoming transition to CCAP, which will be starting in earnest over the next few months. Using their current and new equipment from Cisco, they plan to begin converging video QAMs and data QAMs on the same platform in the second half of 2013 and 2014. In the first phase, Ririe says, Cox will likely converge narrowcast video QAMs on Cisco's RFGW-10 Gateway with DS-384 line cards, and then move on from there.

At the same time, Cox will start conducting extensive lab trials of both its current edge QAM equipment and new CCAP-enabled devices in the second half of the year. By spring 2014, Ririe says, MSO officials "hope to be well into multiple-vendor lab trials." He says Cox executives "expect to learn a lot" from these early trials over the next 12 to 18 months.

Once the lab trials are completed (or are at least well underway), Cox officials plan to shift their focus to extensive field tests of new CCAP equipment. "The first field soaks will be in 2014 and 2015," Ririe says. "We need to be in field trials by 2016."

Although Cox technologists have not yet decided which technical approach to take to reach full-fledged CCAP, they are leaning toward sticking with a modular architecture for the time being. "An integrated approach appeals to me," Ririe admits. "But we have a modular architecture today. I don't see us ripping that out any time soon."

New Challenges

Besides starting equipment trials, Cox strategists are aiming to engage in more fiber-node splits and realign their data and video service groups as they make the several-year transition to a full-fledged CCAP architecture. Currently, the MSO deploys physical fiber nodes primarily on a 1:1 or 2:1 per service group basis. But video services may require as many as 3:1 fiber nodes per service group as the video traffic load continues to grow.

To complicate matters even further, the proposed new Docsis 3.1 specs, which are now being drafted by CableLabs®, may well introduce more changes for the cable access architecture and data and video service groups. As a result, Cox engineers are studying how to carry out node splits and proactively reconfigure their video and data service groups over the next few years to ensure that their operations are aligned more efficiently and effectively.

"We're trying to be really smart about that," says Ririe, who calls future fiber-note splits "the most debated topic right now" in cable engineering circles. "It's a tough one. You can't stop doing it. But how do you do it in a really intelligent way that's not burning up a lot of capex?" Fortunately, he notes, "CCAP will help" with that effort.

Ririe also believes that the complex realignment of data and video service groups will get easier over time as CCAP is fully deployed. He cites such factors as "QAM replication and some other technologies we expect to come from CCAP."

Yet significant challenges still remain, particularly on the human end of things. Operationally, he notes, "it really becomes a question of ownership. Who is ultimately going to own and operate this converged platform, the video or data teams?"

End Game

If all goes according to plan and the necessary new equipment becomes available on time, Cox will begin full CCAP commercial deployments in a select few markets sometime in 2016. Ririe says the MSO will likely start the rollout by targeting "high-use areas that need both the Docsis capacity and converged video." The bulk of the CCAP deployments will then follow suit in 2017 and 2018.

Similar to Comcast and the other major MSOs that have discussed their plans, Cox intends to repurpose at least some of its current-generation equipment during the lengthy transition to CCAP. What this means is that CMTS and edge QAM devices now installed in cable systems with high-broadband traffic will be shifted to cable systems with lower traffic as the former are outfitted with new CCAP gear. This technology hand-me-down strategy will likely take several years to play out.

By the end of 2018, Cox aims to have CCAP "hopefully close to 100 percent" deployed across its service footprint. But it may take somewhat longer than that to achieve full footprint coverage, because some of the MSO's smaller systems may not need CCAP-like capacities for quite some time. As a result, Ririe says, Cox could be stuck at the "70 percent to 80 percent level for a while."

Nevertheless, Ririe says, sooner or later, Cox will have CCAP 100 percent deployed across its footprint.

This case study was commissioned by Cisco Systems Inc. and prepared by Alan Breznick, Senior Analyst, *Heavy Reading* (www.heavyreading.com)