MOTOROLA

BRIDGING THE GAP TO CCAP AND BEYOND

STRATEGIES FOR CABLE'S NETWORK TRANSITION

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THE STATE OF THE NETWORK

Not long ago, a typical cable system hosted dozens if not hundreds of analog video channels, with a single DOCSIS® channel in each system given over for broadband data delivery. Then in the early part of the new millennium, the landscape began to shift dramatically. Operators started to consider seriously a conversion from analog to digital signaling, consumer demand for high-definition content took off, digital video recorders entered the scene, and MSOs began a major effort to scale up video-on-demand (VOD) services. As if that wasn't enough, Internet video exploded in 2005 with the launch of YouTube, and surged again in 2007 with the debut of Netflix streaming.

The popularity of new cable TV and Internet services – particularly Internet video – has changed the requirements for cable infrastructure and the cable network as we once knew it. Today, a single DOCSIS channel isn't enough to support data demand, and that host of analog video channels is rapidly losing ground to narrowcast video QAMs. Bandwidth is at a premium, and the fine balance between subscriber demand and capacity constraints is growing more difficult to sustain.

Parallel pressure from data and video is driving an entirely new vision for the next generation of cable infrastructure. Issues of overall bandwidth availability are being managed near term with strategies like switched digital video and analog-to-digital conversion. However, there are also new challenges springing up thanks to limited rack space in the headend, and increasing expenses driven by power and cooling needs. Given finite resources, cable providers are struggling to add on DOCSIS and QAM channels without straining budgets or available space. It's not a matter of just building on top of old equipment, but of finding innovative new ways to increase channel density and reduce costs.

Beyond driving greater density through the network, the industry as a whole is also exploring the potential of a future Converged Cable Access Platform (CCAP). The goal of CCAP is to bring data and video delivery together in one integrated system. This should result in greater resource efficiency and create a useful transition to all-IP delivery. The only problem is that cable providers have to manage the day-to-day growth of existing systems while planning for the possibility of a CCAP migration. For both data and video delivery, there are conflicting imperatives between the demand for immediate upgrades, and the demand for convergence. To be successful, the cable industry needs new strategies for extending the life and value of today's systems, while preparing for the converged platform of the future.

DATA DELIVERY GROWS UP

Cable's data capacity crunch stems largely from the rapid growth of Internet video streaming. Netflix alone accounts for a third of traffic during peak streaming times, according to Sandvine, and total web traffic has skyrocketed since the early days of consumer broadband. Intel claims that in 2010, more data traveled across the Internet than during all preceding years combined.

There are several strategies at work in the industry for increasing DOCSIS capacity. Many of the old 550 MHz cable systems have been significantly upgraded, and more operators are now considering extending the cable plant to 1 GHz and beyond. Analog channel reclamation and switched digital video are also popular for maximizing bandwidth utilization, as are node splits and spectrum management tools designed to reduce channel noise and interference. In that last category of RF optimization, Motorola has a rich history of innovation with broadband access network technologies including amp-to-node conversion solutions, and the highest performance Gallium Nitride-based amps and nodes available.

Total bandwidth, or spectrum, however, is only part of the cable data challenge. The cable modem termination system (CMTS) has undergone a massive transformation in recent years to address higher density requirements in the headend. The more DOCSIS channels operators can squeeze into a single CMTS chassis, the more subscribers operators can serve. In addition, by grouping more DOCSIS channels together, operators can increase data throughput and market higher speed tiers on the order of 100 Mbps and above. Channel bonding is a critical strategy for maintaining a competitive broadband offering, and it wouldn't be possible without the availability of multiple DOCSIS channels in the headend.

CMTS providers have steadily increased channel density since the explosion of video on the web, and Motorola is a leader in that field. The Motorola BSR 64000 CMTS has had a long life in the industry largely because of continued upgrades to improve channel capacity. In 2008, Motorola introduced the TX32 decoupled downstream module, which was designed to slot into an existing BSR 64000 chassis for a capacity increase of more than 500 percent. The TX32 has since replaced many legacy two-by-eight cards in cable systems around the world, and has allowed operators to target new data channels where they're needed most. Even more importantly, the TX32 module has enabled operators to add capacity without sacrificing the original CMTS hardware investment.

Motorola further upgraded capacity in the BSR 64000 in 2009 with the launch of the RX48 decoupled upstream module. True to its name, the RX48 offers 48 upstream channels in a single card, and can be used to add upstream capacity with a simple software upgrade. More recently, Motorola also introduced the TXPlus, which will come to market in 2012 with 64 DOCSIS channels. The TXPlus doubles downstream DOCSIS capacity, and can increase capacity by 50 percent for EuroDOCSIS environments.

The CMTS transformation is critical for meeting growing data demand today, but continued upgrades can and should be weighed against any future CCAP migration plans. Current operator thinking suggests that CCAP migrations will take place on a phased deployment model. In other words, many operators are planning to make hybrid networks the norm over the next several years. Given that approach, Motorola has invested heavily in both legacy CMTS technology and the evolving CCAP platform. While the company has significant new technologies in development, Motorola is also working closely with providers to determine when and where a transition to CCAP makes the most sense. There is a key inflection point where the economics of CCAP overtake those of the CMTS. By analyzing those economics carefully, operators can balance the advantages of existing hardware with the potential benefits to be gained in merging data and video delivery.

THE EVOLUTION OF VIDEO

On the video front, the cable industry is confronting a major shift from television broadcasting to television narrowcasting. This is by no means a comprehensive shift, as many channels are still broadcast to large audiences. However, increasingly, a greater number of video streams are delivered on the narrowcast model. This is due to substantial VOD growth, and experimentation with network-based digital video recording (nDVR).

To meet increasing demand for narrowcast video, Motorola has introduced the new APEX3000 high-density, chassis-based edge QAM. The hardware includes 32 ports, and, with 48 channels per port, supports a total of 1,536 QAM channels. It also includes 12 10GigE ports – eight primary ports, and four back-up ports – allowing operators to ingest enough content to fill every QAM channel with unique, narrowcast content.

The purpose of the new APEX3000 is to help operators save on space, as well as power and cooling costs. However, it also offers MSOs a chance to increase capacity on an incremental basis. As VOD libraries grow, and as operators begin nDVR trials, use of the APEX3000 can be expanded accordingly. Operators can start with as few as 16 QAM channels per port, and scale up to the full 48 as needed. There's also flexibility to configure the hardware for redundancy purposes, helping providers avoid large-scale outages.

In addition to capacity, operators need to add intelligence to the cable network for greater efficiency in video storage and streaming. This is because consumers don't just want more content; they want access to content from any screen, anywhere, and at any time. The trend toward nDVR is not because it's cheaper today to store content in the network, but because operators need to move in a direction that makes the delivery infrastructure more capable of supporting multi-screen services. Hosting content in the network – or in the cloud – makes it easier to encode video in different formats, define policy rules around subscriber access, and capture aggregate data on consumer viewing habits.

This shift in network requirements is driving the cable industry toward a content delivery model that is not dissimilar to Internet-based CDNs. The big difference is that cable providers are dealing with huge video files, and primarily supporting QAM-based video delivery today. For this purpose, Motorola offers the M3 Media Server family, part of the larger Motorola Media Delivery System. The M3 Media Server uses sophisticated software to optimize the performance of commodity off-the-shelf (COTS) hardware in cable networks. It supports intelligent edge caching, and allows operators to increase streaming and ingest capacity as needed.

The M3 Media Server family facilitates more efficient content delivery across today's cable networks, but it also supports IP distribution on the same platform. This dual support for MPEG transport and IP is an increasingly important criterion for hardware systems throughout the cable pipeline. From the satellite receiver, to the headend, to the home, cable is now looking to hybrid approaches for managing both MPEG and IP video delivery.

Motorola offers a range of hybrid solutions, starting with satellite receivers/decoders, and moving through the company's video grooming and encoding product lines. Motorola's latest satellite receivers all convert video from satellite networks to IP. The Motorola CAP-1000 CherryPicker Application Platform processes MPEG2 and MPEG4 over IP for rate shaping and ad insertion. And the newest Motorola encoder, the ST-6000, transcodes IP traffic from MPEG2 to MPEG4, and is targeting IP video services in the home.

As operators begin to enable more IP-based content for delivery to multiple devices, Motorola has a broad portfolio of products designed to support the IP transition. Whether video merges with data delivery in the near term, or further down the road, Motorola can help cable companies create a viable path from QAM to IP.

CCAP AND THE SHIFT TO IP

With cable networks in flux, it's difficult to balance investments in legacy technology and future-serving IP-based systems. Demand for greater data and video capacity means that operators have to continue scaling up on both fronts, while planning to merge the two functions in the future in one integrated architecture. With that in mind, every potential hardware upgrade requires careful evaluation. For every investment made, there needs to be a logical strategy in place for migrating to a next-generation, converged platform, and, where necessary, supporting hybrid delivery modes.

For DOCSIS data delivery, Motorola continues to upgrade the BSR 64000 platform to increase channel density and decrease costs. This is an investment protection strategy for cable providers who have the CMTS in place and need to support more subscribers at higher speeds. However, as operators choose to begin migration to a CCAP architecture, Motorola can also support the transition by modeling the economics for moving a headend away from a standard CMTS and toward a converged delivery platform. The Motorola product roadmap is designed with CCAP in mind, and, as operators start looking to bond more than eight downstream channels at a time, Motorola will help customers target appropriate headends in high-demand regions for a CCAP migration.

Because most cable video is delivered over QAM channels today, Motorola is committed to increasing QAM capacity to meet growing narrowcast video demand. However, adding higher-density edge QAMs like the APEX3000 to a cable network today does not mean those channels can't be put to good use in a future CCAP deployment. Typically, operators won't initially need the full capacity available in an APEX3000, and with an extra eight to 16 QAM channels per port left unused, there is room to reallocate a portion of those QAMs to DOCSIS traffic as needed. This reallocation can be done in a distributed CCAP deployment where operators phase in a converged platform while still taking advantage of greater narrowcast QAM capacity in the near term.

As cable providers launch new advanced services – including nDVR and multiscreen applications – there is increasing need for more powerful and flexible video encoding, grooming, and streaming technologies. Motorola addresses that need with a wide range of hybrid solutions that support QAM and IP delivery. From satellite receivers to statistical multiplexers and video servers, Motorola offers proven technology that is built to scale and adapt as cable networks evolve.

WRAPPING IT ALL UP

In the shift to IP, the proposed Cable Converged Access Platform is the next evolutionary way station. However, there's no direct path for moving from today's systems to a CCAP architecture and beyond. Instead, cable providers need several strategies to preserve existing investments, meet new subscriber demands, and converge data and video delivery for greater resource efficiency. Motorola's long history of experience in the cable industry, combined with expertise in rapidly evolving IP technologies, means the company is in a unique position to help define those strategies for cable in the coming months and years – strategies that will support cable with today's data and video needs, tomorrow's CCAP migrations, and the future industry shift to all-IP delivery.

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