

CRUNCH TIME ON THE CABLE ACCESS NETWORK

PRESENTED BY



IN PARTNERSHIP WITH

MultichannelSMEN

PUBLISHERS PAGE

CRUNCH TIME ON THE CABLE ACCESS NETWORK



FOR CABLE TV PROVIDERS, connecting their subscribers with great content is a good thing. But you can have too much of a good thing: Today MSOs' networks are being overloaded by bandwidth-devouring over-the-top (OTT) programming.

"50-60 percent of U.S. MSOs are running out of RF spectrum, thanks to the demands of unmanaged OTT video traffic," said Todd McCrum, Director of Product Development for Cisco's Cable Access Business Unit. "Coping by splitting nodes and reducing homes passed isn't a long-term solution, because of the additional demands this puts on the MSOs' headends."

To deal with rising bandwidth demands, CableLabs, MSOs, and vendors such as Cisco are moving to virtualized network solutions to take the strain off cable TV headends, while allowing lots of room for traffic growth at minimum CAPEX and OPEX. They are doing this by moving the functions of the Converged Cable Access Platform (CCAP), which traditionally resides physically in the headend, deeper into the network and the cloud as well.

Such changes are vital to cable TV economic survival, because the old ways of doing things just won't work. Even if MSOs could technically keep up with growing demands by expanding their old-style centralized plants, their cost-conscious customers would rebel against the rate hikes needed to support this kind of expansion. Yes, subscribers want all the OTT they can watch and more—but they don't want to pay for it!

As a result, it truly is Crunch Time on the Cable Access Network. This eBook has been created to help MSOs cope with this crunch; both through relevant and timely articles taken from the pages of *Multichannel News*, and brand new content featuring ideas and analysis from cable industry/vendor engineers and managers. The payoff: There are ideas in here that really can help cable

companies large and small move past the crunch to much more capable, scalable, and futureproof access networks.

This eBook is cosponsored by Cisco, which has done tremendous work on the causes, challenges and solutions associated with moving CCAPs from the physical headend into distributed and virtualized applications. These Cisco engineers have devised a powerful technological remedy that is now being adopted by Altice, Comcast and Quickline; among many others.

At the same time, these engineers realize that moving to a distributed/virtualized CCAP environment is a paradigm shift for cable companies. This is why they raise the questions MSOs need to ask their trusted vendors before investing substantially in this new equipment. Some of the questions that need to be asked:

- Can your cable TV equipment vendor outline the end-to-end installation and functioning of their equipment in your plant and network?
- How easily will their equipment integrate with your existing facilities, and how much will it affect day-to-day operations during the buildout?
- Who is using their equipment today, and can they provide MSO customer references that you can contact for honest assessments of the vendor's equipment?

We hope this eBook proves truly useful in helping your company tackle and master the challenges associated with exploding OTT traffic growth on your cable access network. Please contact me at lhillelson@nbmedia.com with feedback or ideas for additional coverage in this area.

Louis Hillelson

Vice President/Group Publisher
Broadcasting & Cable
Multichannel News
 Next TV
 Ratings Intelligence

By Jeff **BAUMGARTNER**

CABLELABS, CISCO GET REAL ABOUT VIRTUALIZATION



CABLELABS AND CISCO SYSTEMS have announced the creation of a new software project aimed at enabling virtualization on cable networks.

That new software project, labeled “OpenRPD” and originally developed by

Cisco, is targeted at what’s called the Remote PHY Device (RPD). The RPD, they explained, is a physical layer converter commonly located in an optical node of the cable network. The open source software will reside in the Remote PHY Device and will be available to cable operators and RPD vendors around the world, they said.

CableLabs president and CEO Phil McKinney detailed the initiative at his keynote at this week’s CableLabs Winter Conference in Orlando, Fla.

The effort will build on the original work around the Converged Cable Access Platform (CCAP), a high-density architecture that combines the functions of the cable modem termination system and the edge QAM. The open source software will help to virtualize those functions as they are distributed toward the edge of the network.

“More and more of the telecommunications infrastructure is running on open source platforms,” said Ralph Brown, CTO, CableLabs, in a statement. “CableLabs has a history of contributing to and hosting open source projects. The OpenRPD project helps launch CableLabs increased focus on open source projects for the cable industry.”

“This is open source for cable access. Not only does it help move the industry toward the future architecture but it also enables a new developer community,” added Dave Ward, CTO of engineering and chief architect, at Cisco. “Open standards, open source and an open ecosystem community for developers is a key trajectory for networking. We see the Remote PHY architecture and RPD evolving to a more generalized and virtualized architecture that can be applied to all types of access networks.”

“Our collaborative industry effort is about helping cable networks scale,” said John Chapman, Cisco Fellow and CTO of the company’s Cable Access business. “Remote PHY, OpenRPD and DOCSIS 3.1 are playing a pivotal role in expanding the capacity of the HFC plant in a reliable, cost-effective and scalable way.”

THAT NEW SOFTWARE PROJECT, LABELED “OPENRPD” AND ORIGINALLY DEVELOPED BY CISCO, IS TARGETED AT WHAT’S CALLED THE REMOTE PHY DEVICE (RPD). THE RPD, THEY EXPLAINED, IS A PHYSICAL LAYER CONVERTER COMMONLY LOCATED IN AN OPTICAL NODE OF THE CABLE NETWORK.

By James CARELESS

EASING BROADBAND'S TRAFFIC JAM VIA DISTRIBUTION



THE EXPLOSIVE GROWTH of broadband traffic over cable is overwhelming the industry's centralized processing architecture. "50-60 percent of U.S. MSOs are running out of RF spectrum, thanks to the demands of unmanaged OTT video traffic," said Todd McCrum, Director of Product Development

for Cisco's Cable Access Business Unit. "Coping by splitting nodes and reducing homes passed isn't a long-term solution, because of the additional demands this puts on the MSOs' headends."

In response to OTT traffic growth, CableLabs, MSOs and vendors are pushing aspects of broadband control into the network and closer to the home. Since this approach essentially distributes some of the headend's CCAP (Converged Cable Access Platform) function to hardware located at the network node level (the neighborhood), this approach is known as Distributed CCAP Architecture, or DCA.

The upside of DCA is that it offers a real alternative to getting even more out of the strained centralized network model. The downside is that DCA will require substantial investment to implement and a need for MSO executives to think differently.

A DCA PRIMER

A DCA physically divides the equipment/functions found in a traditional headend CCAP. 'Breaking' the CCAP into subcomponents allows some of the CCAP's signal workload to be processed at the node level, before those signals arrive at the headend.

There are three 'models' possible for a DCA, in terms of what the node-located CCAP equipment does before the signal is passed onto the headend. These are the Remote PHY, Remote MACPHY, and Remote CCAP models.

In the Remote PHY model, a Remote PHY (Physical Layer) Device is installed at each node. Known as an RPD, this device contains PHY electronics such as downstream QAM/OFDM modulators and upstream QAM/OFDM demodulators; rather than having them located at the headend. The Remote MACPHY model adds the DOCSIS MAC (Media Access Control) functionality to the node as well. Finally, the Remote CCAP variant of the Remote MACPHY puts all CCAP functionality in the node, rather than the headend.

A further wrinkle: Beyond distributing the MAC and PHY functions to the node level, Gainspeed's Virtual CCAP (vCCAP) uses cloud computing and software defined network (SDN) technology to eliminate equipment in the network. "This approach completely eliminates the physical CMTS/CCAP and the associated headend space, power and cooling demands and expenses," said Jeff White, Gainspeed's Chief Strategy Officer and Co-founder. "The architecture transforms the HFC network from RF to digital, making the link from the headend all the way to the Ethernet node a 10 Gigabit Ethernet connection."

Virtualization is not exclusive to Remote MACPHY, observed Asaf Matatyaou, Senior Director of Solutions and Strategy for Harmonic's Cable Edge Business. "You can have a Remote PHY distributed solution that supports a virtual implementation or a traditional hardware-based implementation," he said.

DCA PROS AND CONS

The case for deploying distributed versions of CCAPs come with pros and cons -- and there isn't a 'one size fits all' answer for all MSOs.

As well, not everyone needs to move to DCA quite yet: "MSOs that already have 1GHz plants will not need to move to DAA/DCA for many years," said Cisco's Todd McCrum. "As a result, they don't need to move to the distributed CCAP model, because their networks already have enough capacity to handle OTT demand growth.

They can add over 2 Gigabits of downstream capacity to each service group with no changes to their outside plant or segmentation of service group sizes.”

(For the record, Gainspeed’s White and Harmonic’s Matatyaou disagree that moving to 1 GHz infrastructure can handle OTT demand growth by itself, “as this does not resolve the issues associated with further segmentation to increase capacity by reducing service group size, nor does it allow for improving SNR to enable DOCSIS 3.1 performance potential,” said Matatyaou.)

Here are the Pros and Cons of Distributed CCAP Architecture (DCA), starting with the Pros.

The big plus? DCAs can provide exponentially higher capacity and capability to existing cable networks. “You can double or even triple your network’s effective carrying capacity by using these kinds of CCAPs,” said Todd Kessler, Arris’ SVP of Product Management. “This is a significant advance.”

Even without implementing DCA, just moving from DOCSIS 3.0 to DOCSIS 3.1 “can increase the network’s spectral efficiency up to 50 percent; theoretically up to 10Gbps per DS RF port,” said Harmonic’s Asaf Matatyaou. Nevertheless, “any distributed architecture which moves the RF components out of the head end and shifts from analog to digital optics reduces the capex (capital expenditure) and opex (operational expenditure),” he said.

A DCA can also be more affordable in terms of power consumption, compared to constantly

adding and cooling/heating complete CCAPs at the headend. In particular, the vCCAP approach can negate the need to add equipment to a cable company’s head ends. In fact, “We are actually adding technology to the node, to eliminate equipment at the head end,” said White.

On the Con side: Advances continue to be made in conventional CCAP equipment, which means that an MSO may not need to move to a DCA model quite yet. For instance, Casa Systems has just released the DS8x192 DOCSIS 3.1 compliant module for its carrier-class C100G and C40G CCAP platforms. “It can deliver downstream data speeds up to 10 Gbps, and is the most energy efficient CCAP on the market,” said Casa Systems’ CTO Weidong Chen.

As well, moving to a DCA model will require design adjustments and procedural changes to an MSO’s operations. Thus, cable operators might first want to roll out DOCSIS 3.1 with its superior capacity and see how this improves the headroom on their networks, before making such a fundamental shift as a migration to partial or even full distributed CCAPs.

This said, it is clear that cable operators must do something radical to keep up with the growing OTT demands on their broadband networks. “After all, the time will come when our industry will have to move to all-IP networks, in order to keep up with consumer demand,” said Belal Hamzeh, CableLabs’ Director of Network Technologies. “So whatever MSOs choose to do in the short-term, they must make their plans with this fact firmly in their sights, because it will happen someday.”

THE FULL SOLUTION WILL SATISFY
BANDWIDTH NEEDS IN A COST-EFFECTIVE
AND EFFICIENT MANNER, DELIVERING
BETTER AGILITY.

SPONSORED CONTENT

WHERE CABLE COMPANIES STAND NOW, AS THEY LOOK THREE TO FIVE YEARS AHEAD

CABLE TV MSOS TODAY ARE FACING A PERFECT STORM. Customers are replacing traditional TV viewing with online OTT (over-the-top) programming; there's competition from new broadband services; and their subscriber base wants to pay less, not more. In this context, cable TV companies are struggling to face the future while—at the very least—maintaining their market positions.

“One cable company tells me their subscribers expect cable to offer more services and faster download speeds without raising monthly fees, all while cable companies are coping with flat CAPEX and OPEX,” says Gordon Fincham, Cisco Systems' regional manager. “So subscribers are demanding that this company do more, without giving them the extra money needed to do so.”

Another company, which serves two and a half million customers in a major metropolitan area, is feeling the same pressure. “In order to stay competitive, they have to offer ever-increasing High Speed Internet services to their residential and commercial customers,” says Glenn McGilvray, Cisco's marketing-business development manager. “Typically the Internet data rates are increasing 40 percent every year.”

This is too true. According to ACG Research, average household bandwidth requirements will rise from 2.9 Mbps in 2014 to 7.3 Mbps in 2018. By 2019, ABI Research predicts that new viewing formats, OTT services, and consumer devices will create a nine-fold bandwidth increase per movie and an 81 percent increase in video views; compared to today.

Speaking of competitive pressures, “cable TV companies are seeing their subscribers defect to OTT services such as Netflix, which has grown to 69 million subscribers globally,” says Venkatram

“IN ORDER TO STAY COMPETITIVE, THEY HAVE TO OFFER EVER-INCREASING HIGH SPEED INTERNET SERVICES TO THEIR RESIDENTIAL AND COMMERCIAL CUSTOMERS.”

GLENN MCGILVRAY
CISCO

SPONSORED CONTENT

**“A TYPICAL
LARGE
OPERATOR
CAN EXPECT
ITS NUMBER
OF SERVICE
GROUPS
PER HUB TO
TRIPLE OVER
THE NEXT
FIVE YEARS.”**

MARC E. ALDRICH
CISCO

Krishnamoorthy, Cisco’s cBR-8 product manager. “Meanwhile, Google Fiber’s 1GB broadband service is poised to cut into cable’s Internet base, by offering faster broadband at competitive prices.”

Things are even tougher for Tier 2 and 3 regional MSOs. “Compared to the biggest MSOs, these companies have smaller subscriber bases and limited CAPEX, and yet they too have to move quickly to compete,” says Todd Greene, Cisco’s business development manager for cable access, RMSO.

“MSOs big and small are doing what they can to reduce costs by streamlining their operations and converging their once-separate video, voice, and data operations onto a single platform,” concludes Fincham. “But with the current technology they’ve got, there is a limit to what the MSOs can do.”

TRAFFIC JAM ON THE CABLE ACCESS NETWORK

FOR AN INDUSTRY THAT STARTED by capturing TV signals off-air and then simply amplifying and re-transmitting them one-way across coaxial cable, the cable TV industry has come a long, long way. In the past few decades, the industry has stepped up time and again to meet technological challenges such as two-way broadband Internet, digital television, VOD (video on demand), and other requirements codified in successive DOCSIS (Data Over Cable Service Interface Specification) transmission standards. The latest one in common use is DOCSIS 3.0.

Things are going to become even more demanding in the near future. To keep up with customer demands, “a typical large operator can expect its number of service groups per hub to triple over the next five years,” observes Marc E. Aldrich, Cisco’s vice president for the US cable & media segment. “And as cable providers expand video services and move to offer gigabit (and eventually multigigabit) service tiers, large MSOs can expect

SPONSORED CONTENT

“TO MEET THAT DEMAND BY SCALING CAPACITY LINEARLY USING TODAY’S INTEGRATED CMTS AND CCAP PLATFORMS, MSOS WOULD NEED TO DOUBLE THEIR CAPEX SPEND.”

MARC E. ALDRICH
CISCO

bandwidth per service group to increase six-fold over the same period.”

To meet these growing bandwidth and traffic demands, cable companies are preparing to roll out DOCSIS 3.1. This new standard will enable them to support much higher data rates and more online video services, boosting data delivery speeds to 10 Gbps downstream and one Gbps upstream, using 4096 QAM and moving to a flexible structure that will allow operators to pack in more channels. But a software upgrade will not be enough to keep up with the expected growth. Under the current hardware-centric model, many more elements of the access infrastructure will be needed to support DOCSIS 3.1’s enhanced capabilities.

Unfortunately, with their fundamental approach to infrastructure, cable TV is having a hard time keeping up. Space is running out in centralized headends (hubs) that are already packed full of power-hungry dedicated equipment running separate video and data (Cable Modem Termination Systems, or CMTS) networks. And even if a company manages to achieve space and operational savings by integrating video and data onto a single Converged Cable Access Platform (CCAP), using this technological approach will not enable a company to sustain future economic growth.

“To meet that demand by scaling capacity linearly using today’s integrated CMTS and CCAP platforms, MSOs would need to double their CAPEX spend,” says Aldrich. “Space would also be at a premium as MSOs added more and more platforms, and they would quickly run out of room in existing hubs.”

“But it’s the OPEX growth that would prove most challenging under this scenario. According to SCTE, as much as 83 percent of the overall energy consumption of a cable network is from hub and head-end equipment,” Aldrich adds. “Under the growth projected previously, MSOs would see the power consumed by the access network—and the overall OPEX for power—grow by a factor of six.”

Clearly, cable’s current approach is not economically sustainable. It is time to look seriously at something new and different.

SPONSORED CONTENT

DISTRIBUTION/ VIRTUALIZATION CAN RETURN CABLE TV TO SUSTAINABILITY

THE BEST PART IS THAT THE TECHNOLOGY DRIVING THIS CCAP DISTRIBUTION REVOLUTION IS SOFTWARE DEFINED, IP BASED AND CONNECTED, AND BUILT UPON COTS IT PLATFORMS.

SO WHAT IS CABLE TV'S NEW AND DIFFERENT OPTION? The answer is infrastructure distribution and virtualization—in other words, moving functions out of the headend and into the MSO's network, and even into the cloud. Doing this will radically reduce head-end power, space, and cooling requirements. Choosing network-distributed hardware (closer to subscribers) that is software-defined is far easier to upgrade and expand.

“The move to distribution and virtualization makes perfect sense to MSOs,” says Gordon Fincham. “They’ve told me that they want to invest in their networks, not at the customer end. Ideally, they can do this by distributing and pushing equipment closer to the subscriber while ensuring that actual customer equipment is inexpensive and simple—as opposed to today’s costly set-top boxes with their hard disks.”

Whether executed in the network or the cloud, the goal of this next-generation approach is the same: to break up the functions of supporting converged video/data CCAPs by prying some of their elements out of the hub. Not only does this reduce cost and space in the headend, but it also moves specific functions closer to the subscriber. The result is better, more scalable service provision at a more controllable cost.

The best part is that the technology driving this CCAP distribution revolution is software defined, IP based and connected, and built upon COTS (commercial off-the-shelf) IT platforms. So it is easily expandable and can be upgraded to new delivery standards as needed. For simplicity's sake, we will refer to this as an ‘evolved CCAP’ approach.

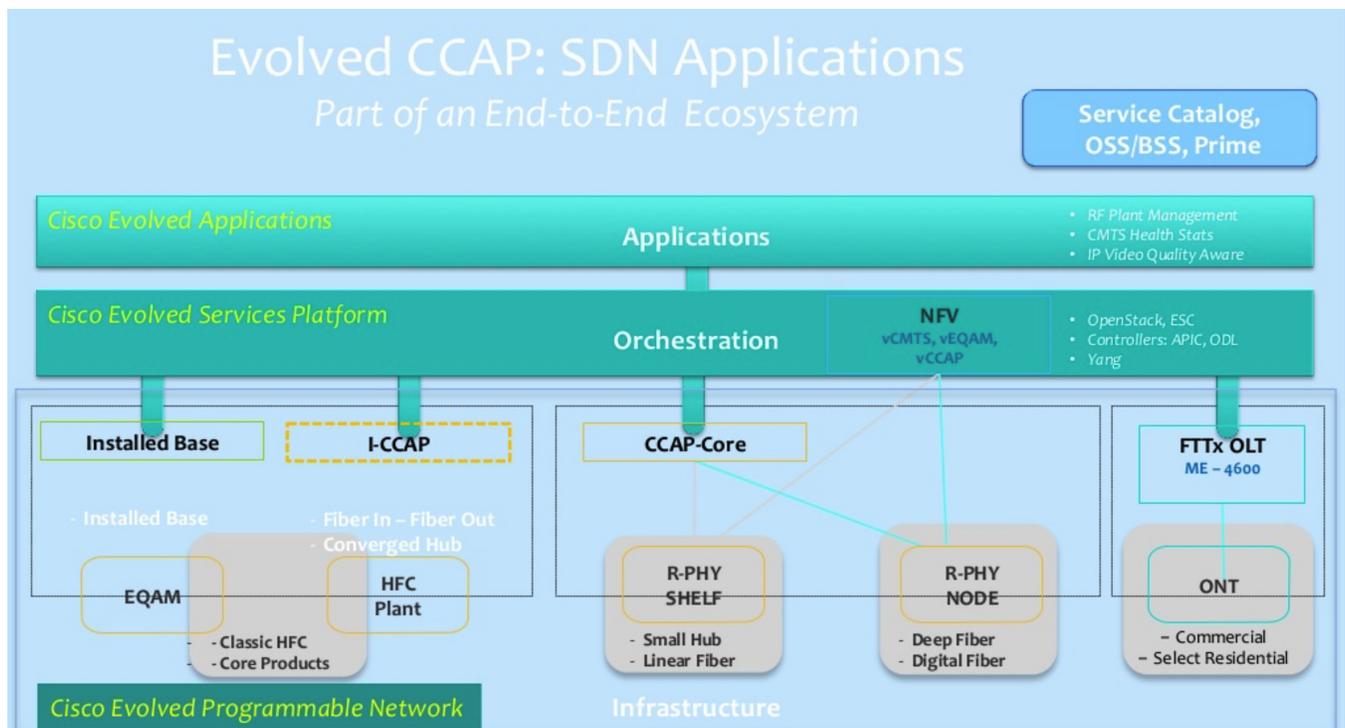
“An evolved CCAP enables 100 percent convergence of all video types—narrowcast/VOD, linear/MPEG, managed IP video tiers

SPONSORED CONTENT

that might be entering the service mix, and enough room for both DOCSIS 3.0 and 3.1-based traffic,” says Todd McCrum, director of product management for Cisco’s Cable Access Business Unit. “Evolved CCAP can be distributed and linked through the network in multiples locations, including putting RPDs—Remote PHY (physical layer) Devices—in nodes rather than at the hub. RPDs contain downstream QAM/OFDM modulators and upstream QAM/OFDM demodulators,” he says. “This immediately expands IP capacity and can double the number of serving groups that can be reached.”

Once the RPDs are out of the hub, all that is left are the CCAP core data plane and the control plane, both of which can be housed in data centers elsewhere. (See Figure: The Evolved CCAP’s Many Capabilities) The result? The MSO’s CMTS is now “virtualized,” because the control systems are in the cloud rather than in the headend. “This saves the MSOs a lot of money in space and power,” Fincham says. “This is of major importance to cable TV customers.”

THE EVOLVED CCAP’S MANY CAPABILITIES



The evolved CCAP serves as a data center. It is focused on agile applications services that ride on top of a new virtualized network layer enabled by technology such as Cisco’s cBR-8. Such a system can support many software defined (SDN) functions encompassing all aspects of an MSO’s operations.

SPONSORED CONTENT



Cisco's **Todd McCrum** talks about future CCAP solutions in plain language. He starts with moving Remote PHY into the network, followed by other elements traditionally located in the headend.

SPONSORED CONTENT

“SPEED MATTERS TO OUR CUSTOMERS, AND WE HAVE MADE IT A PRIORITY TO RESHAPE OUR NETWORK TO DELIVER THE FASTEST, MOST RELIABLE INTERNET SERVICE POSSIBLE.”

JON PEDERSON
MIDCO

“From one cable company’s perspective, they want something that saves space, power, and cooling, that converges video, voice, and data onto one platform and only has to be wired once, and that uses technology that is easily software upgradeable and expandable,” says Bob Tynan, business development manager at Cisco’s Cable Access Business Unit. “Moving to an evolved CCAP model can make this happen.”

The benefits cited above explain why MSOs such as Altice, Comcast, KBRO, Midco, Quickline, and SK Broadband are moving to evolved CCAPs. In all cases, these companies are using Cisco’s cBR-8 Evolved CCAP equipment. The cBR-8 is DOCSIS 3.1 capable and can scale from today’s one Gbps speeds to 10 Gbps, eliminating the need for multiple system rewiring.

“Platforms like Cisco’s cBR-8 will provide next-generation speed and capacity, enabling converged cable access architecture for multigigabit services, increased scalability, and improved operational efficiency to keep up with the unprecedented growth of broadband and IP video traffic,” says Kevin McElearney, Comcast Cable’s senior vice president.

“Speed matters to our customers, and we have made it a priority to reshape our network to deliver the fastest, most reliable Internet service possible,” says Jon Pederson, Midco’s chief technology officer (CTO). “Cisco shares our vision for a fully scalable, efficient network that will take us into the future and manage the bandwidth demands of our increasingly connected lives.”

“We are building the next generation of fixed mobile converged networks,” says Max Blumberg, Altice Group’s CTO. “With a combination of Cisco’s Evolved CCAP, DOCSIS 3.1, and migration to NFV/SDN, Altice will continue providing the best customer experience, based on the highest bandwidth and cutting edge technology.”

The payoff is that, by moving to a software-defined, distributed/virtual evolved CCAP model, a cable TV company can keep up with market demand and technological change—affordably and effectively.

It’s worth noting that “Scaling up services with the cBR-8 is a

SPONSORED CONTENT



Cisco's **John Chapman**, Cisco Fellow and CTO, Cable Access BU, clearly explains the benefits of evolved CCAP as a virtual application, and what it can deliver to cable.

SPONSORED CONTENT

“WE ARE BUILDING THE NEXT GENERATION OF FIXED MOBILE CONVERGED NETWORKS.”

MAX BLUMBERG
ALTICE GROUP

matter of buying more licenses and expanding the system’s capacity under our Smart Licensing program,” according to Suzanne Ewert, Cisco’s strategic account manager. “One cable company considers Smart Licensing a huge operational advantage,” observes George Goncalves, Cisco’s business development manager. “It is one of the major reasons they chose the cBR-8.”

In addition, the cBR-8 can also output RF and Ethernet signals. Should—or rather when—the day come when MSOs replace current video signals with OTT TV carriage, this kind of evolved CCAP system will be able to migrate easily.

BEST PRACTICES FOR PREPARING FOR CHANGE

ACROSS THE WORLD, forward-looking MSOs are testing evolved CCAP equipment in their labs and getting experience in how best to deploy and use this problem-solving tech in the near future.

Cisco is not the only evolved CCAP equipment maker in the market, and cable TV executives are advised to research and contact all manufacturers to learn about their product options. They should also press these vendors for clear answers to important questions.

“For instance, you should ask them to outline the end-to-end functioning and installation of their equipment in your network,” says Venkatram Krishnamoorthy. “You need to know if their products/solutions will integrate easily into your existing plant, if they allow your company to make a gradual transition from your current model to a fully evolved CCAP, and what degree of scalability and virtualization their products provide. You will also need to quiz them about during and after-installation support, and check out what their track record with other MSOs is to date.”

“Ask every vendor about the amount of money they are investing in distributed/virtual CCAP SDN (software defined network)

SPONSORED CONTENT



Cisco's **John Mattson** introduces the first evolved CCAP: Cisco's cBR-8

SPONSORED CONTENT

CISCO'S CBR-8

The Cisco cBR-8 is the heart of the company's evolved CCAP solution. Offering 20 times the capacity of current access platforms, the cBR-8 can deliver more than 96 channels per service group. This includes more than 6,000 downstream channels of DOCSIS 3.0, with the ability to scale to full DOCSIS 3.1 and video, and 200-Gbps forwarding capacity with a backplane scalable to 1.6 Tbps.

In fact, the cBR-8 was designed from the ground up for DOCSIS 3.1. It can deliver full-scale DOCSIS 3.1 capacity for every service group and household, supporting gigabit and ultimately multigigabit service tiers. The cBR-8 also supports full CCAP convergence, delivering all video and data services with a single platform and radically lower cost per bit.

Functionally, the cBR-8 supports 4.9 service groups per rack unit—40 percent higher than competitive ATCA platforms—to substantially reduce power consumption. The cBR-8 supports Remote PHY technology, allowing MSOs to place this level of control deep within their networks. With this done, MSOs can move their data-plane and control-plane functions into the cloud (data centers), allowing them to virtualize these processes away from the headend.

Find details at <http://www.cisco.com/c/en/us/solutions/collateral/service-provider/converged-cable-access-platform-ccap-solution/white-paper-c11-734417.html>

technology, and how well their systems actually work with the virtualized CCAP data center model," Gordon Fincham adds. "Also ask which MSOs are adopting their technology today, as is the case with multiple MSOs choosing our cBR-8."

Properly executed, an MSO's move to an evolved CCAP model will position them to meet the many competitive challenges on the horizon. In contrast, an MSO that sticks with current ways of doing things will be as doomed as someone selling analog NTSC TVs in the coming 4K age.

Choose wisely!

