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How to Manage Broadband Use For Satisfaction & Profits

p.12

WHITE PAPER: Kentucky's FPB: 60 Years Of Well-Managed Growth

p.22

Wading Into Streaming Video

p.18

NCTC: Three Decades On And Just Hitting Their Stride

p.10



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CONTENTS

Features

- 6 Out Of Limbo: 2012 Farm Bill**
What's next in Congress' efforts to provide equitable broadband access for rural Americans.
Written by **Liz Zucco**
- 10 Thirty Is The New Twenty**
Three decades of serving America's independent cable systems only means NCTC is just getting started.
Written by **Grayson Hill**
- 12 How To Manage Broadband Use For Customer Satisfaction And Profits**
The key to effective broadband management isn't about speed.
Written by **Rick Yuzzi**
- 18 Wading Into Streaming Video**
Subscribers are dropping cable TV and moving to Internet Protocol and Over-the-Top video. Here's why.
Written by **Levy Jones**

Editorial

- 4 A Note From The Publisher**
Who we are, what we're doing and how we plan to cover the rapidly growing field of broadband technology.
- 6 The NCTA And SCTE, From Then To Today**
A story of industry organization and capture
Written by **Rex Porter**

White Paper

- 22 Frankfort Plant Board**
How an independent system managed competition, debt and the challenges of staying relevant
Written by **Grayson Hill**



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Broadband in the Heartland: The *Rural Communications* Message

From design, construction and maintenance to financial, programming, advertising, marketing, customer-service and IT issues, *Rural Communications* looks at all the places in which key purchasing, financial and operational decisions are made daily in the front office, in middle management and in the field.

This edition of *Rural Communications* documents how a rural water and electrical co-op sagely managed its cable TV affairs for 60 years, transitioning to a cutting-edge broadband provider capable of making complex and costly upgrades without relying on state or federal funding.

Elsewhere in this issue:

- Rex Porter gives us an overview of how the cable industry once found a place for every one in the industry, and how its independence and innovation may be a thing of the past.
- Liz Zucco offers her expert view of what the belated 2012 Farm Bill has on offer... so far.
- How the NCTC's relevance is even greater today than it was when it started three decades ago.
- Levy Jones wades into the important trends in streaming video.

As *Rural Communications* takes its unique look at the core and tangential issues surrounding broadband's rollout in America's heartland, there's no doubt that its development is continuing at a rapid clip.

All of that said, let us know if there's a cable or broadband system, a subject or a theme that you think should be the focus of *Rural Communications*' coverage. Send a note directly to the publisher, Paul Levine, at PLevine@RuralComMag.com.

Today's technological change and innovation continues to rocket. That's why you need *Rural Communications*. It's the business of broadband... independent, innovative and fun.

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The NCTA & SCTE, From Then To Today

A Story Of Industry Organization And Capture



Rex Porter

CABLE TV BEGAN IN THE 1940s. System operators soon met in Pottstown, PA to form their first trade association, the National Cable Television Association (NCTA). Serving a group of small cable owners as consolidation gave birth to the term MSO (multiple system operator), the NCTA remained dedicated to the good business health of all its members. As the NCTA grew, new state and regional associations flourished. The Western Cable Show began to rival the national trade show. Other regional events, such as the Texas Show and the Mid America Show, became popular meetings that drew huge crowds.

In the early years, system owners often did not understand the engineering side of the business. Since qualified engineers were still in short supply they often were closely guarded for fear of poaching. These gilded cages made it hard to train up or innovate, which is poison to any serious engineer. So, in 1969, at a NCTA convention, a small group of engineers formed their own Society of Cable Telecommunications Engineers (SCTE), to share training and know-how around the country. Special events, such as Emerging Technologies and Vendor Appreciation Days drew techs and engineers to see new equipment and train personnel. The society grew rapidly.

CONSOLIDATION & ISOLATION

Beginning in the 1990s, MSOs merged until the number of major players had shrunk to less than ten, which pressured the NCTA to change the focus of the annual convention, which was rechristened The Cable Show, reflecting its more oligopolistic attitude. The NCTA accepted continuing FCC rules and regulations, but ceased to fight broadcasters that demanded exorbitant retransmission fees. Since the NCTA was now in the hands of the top three or four MSOs, pressure was applied to dissolve the state and regional meetings, making the NCTA's Cable Show more dominant than even before.

Small and independent operators saw the writing on the wall. As the industry was facing runaway consolidation, many left the NCTA to join organizations like the American Cable Association (ACA) that they felt were more dedicated to the good of smaller and independent owners.

The SCTE began to change as well. At the start of the new century, correspondence was sent out from the SCTE headquarters asking for a change to the national bylaws. Citing complaints that the democratic process kept even spelling and punctuation revisions from being changed in a timely manner, the SCTE members were asked to vote to remove the requirement that members approve bylaw changes.

Up to that time, members had a high level of trust for the SCTE's officers and management, and so allowed the bylaws to be changed without direct approval of the members.

By then, the SCTE also was captured. The owners of the major MSOs pressured its own engineers and technicians to change the make-up of the board in favor of the major MSOs. One of our most successful gathering – Emerging Technologies – was scrubbed from the SCTE annual calendar and given over to the NCTA to incorporate into their Cable Show schedule. Following the NCTA's lead, there was an effort to minimize the number of vendor days and other local meetings. The SCTE caved.

What changes might we see over the next few years? Will rural systems continue to compete with the big players, buoyed by technology advances like over-the-top content and new organizations rededicated to the well-being of smaller systems? Or will retransmission fees and hardball tactics drive smaller systems to extinction? Time will tell. ■■■

Rex Porter began his career in the early days of telecom as a microwave engineer. Rex built up several small cable MSOs, and later became Editor-in-Chief for *Communications Technology*, the official journal of the SCTE and is a member and past Vice Chairman of the NCTA Cable Pioneers. Rex is Rural Communications' Technical Editor.

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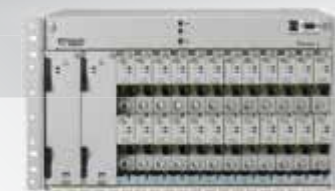
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ALMOST OUT OF LIMBO:

2012 Farm Bill

What's Next In Congress' Efforts To Provide Equitable Broadband Access For Rural Americans

Liz Zucco

TWENTY-TWELVE MARKED THE POINT in the five-year process when Congress reviews and updates the Farm Bill. Because the 2012 bill did not pass the U.S. House of Representatives at the end of the year, nine-month extensions to the 2008 Farm Bill were placed in the American Taxpayer Relief Act of 2012, which dealt mainly with last year's fiscal cliff.

At the time of this article, the 2012 Farm Bill – which now goes by several different names – has cleared the U.S. Senate, but has not passed the House.

So far, the House has offered very few revisions to the Senate version of what we know as the Rural Utilities Service Broadband and Telecom Loan Program (RUS), which is covered in farm bills. We can only comment of what *did* pass in the Senate and the types of changes we feel may be upcoming to the two programs.

The Senate appropriated \$50 million for RUS, but left it unclear what portion of those funds may be used for the Community Connect Grant program. As a result, it's uncertain how much loan leverage will be available to back lending.

Usually, available loan leverage brings program levels to approximately \$1 billion dollars, but the Senate version also gives the RUS authority to do loan grant combinations, which may lower the funding levels further. More on that momentarily.

Below are five important results that we can glean from the Senate Farm Bill. Hopefully, the House will make only minor revisions.

1) Projects will be reviewed for funding two-to-four times per year. This is important because it will push the RUS to not greenlight or stop funding more quickly, thus keeping good projects from going into limbo once submitted.

2) Priority will be given to projects that are in “rural communities”. This is nothing new, but there is language that puts an emphasis on projects that are isolated from other urbanized communities, have declining populations, and/or have above-average poverty levels.

3) There appears to be language that prevents overbuilding by limiting projects to areas that have more than two other service providers. This is down from three other service providers in the 2012 Farm Bill rules. This will make it harder to use federal money to duplicate existing broadband footprints — something for which federally funded networks have been seriously criticized for in recent years, especially in the National Telecommunications and Information Administration's Broadband Technology Opportunities Program.

4) There is language in the 2012 Farm Bill that allows the RUS to make grants of up to 50% for qualified Proposed Funded Service Areas. This is critical as it could greatly reduce the amount of money available to leverage much-needed low interest loans. RUS often seems to attract badly-managed and poorly-planned projects because grant monies do not have to be paid back. A result of this policy is that less sophisticated operators are attracted to the money as there is less to lose on their part.

5) Lastly, the RUS must now depend on the infamous and poorly-developed state broadband mapping tool to determine where it makes loans so long as the tool gives street address level data. Because these maps are not standardized from state to state and depend on carrier inputs for accuracy, the data may be questionable. It is an open question how this will play out in the application process.

So far, the bill also promises more transparency, both for projects in consideration and for projects that are already funded. This policy means carriers may come in during the review process, build out to a proposed network area and effectively disqualify the area with little effort. We saw a lot of this “spite-lining” – a carryover term from the old rural electric days – during the Stimulus.

The new broadband speeds needed to qualify for lending now matches the Connect America Fund specifications of 4 Mbps down and 1 Mbps up, a departure from the last Farm Bill that only defined a 5 Mbps download speed with no mention of upload speed.

The Bill also contains promises of better program management with the ability to claw back or rescind funding if an operator is not meeting performance goals. This is truly a good thing. Many projects sit on the RUS and Stimulus books for years without any authority to pull funding away from a poorly-conceived or badly-run network to reissue funding to a better operator or to another area that needs the money.

While much of the 2012 Farm Bill so far is a step in the right direction, it's questionable whether there is enough money in its budget to go around. Like everything else about it, we'll have to wait and see. ■■■■



Liz Zucco is President and Chief Strategist of MarketSYS USA, Inc.

MarketSYS privatized the management of *The List* with the help of numerous industry organizations. The latest *List of Acceptable Materials* can be found at MarketSys.net, and reflects the list of manufacturers who have satisfied technical and “Buy American” compliance for 2012.

30 IS THE NEW 20

As It Nears Three Decades Of Serving America's Independent Cable Systems, NCTC's Mission Is As Important As Ever

Grayson Hill

THE STORY GOES THAT IN 1984, members of the Mid America Cable Association were sitting around a table playing cards during the annual conference when the conversation turned to the competitive advantages new video providers – like the larger MSOs entering the market – had over smaller systems around the country.

Was it fair a small cable operator in Lawrence, KS was paying more for its programming than a large operator in Los Angeles? With capital-heavy, satellite-delivered cable networks beginning to proliferate, their concern was growing with each new network launch. Could the Mid America Association play a role in leveling the playing field between small town and big city operators?

The group took on the challenge; Mid-America's Rob Marshall started the process by forming a not-for-profit co-op buying group to serve the members they knew. With the hiring of HBO veteran Michael Pandzik as the new buying group's President and CEO, the National Cable Television Cooperative (NCTC) was up and running, serving twelve Midwest cable companies. NCTC grew quickly, adding, on average, a new member every eight business days for three decades. Thirty years on, NCTC continues to help its more than 950 member companies – many of them serving fewer than 5,000 subscribers – save operating costs on programming, hardware and services.

NOW MORE THAN EVER

Some things don't change. Programming costs continue to challenge small and large operators alike. And technology? — the Internet's promises of new technology and new models for delivering content and value are growing so fast that capital burdens are only growing.

NUMBER OF VIDEO SUBSCRIBERS:
NCTC: 25 million
Comcast: 22 million
DirectTV: 20 million
Dish: 14 million
Time Warner: 12 million

Source: NCTA, 2012

NCTC continues to negotiate with programmers on behalf of all members not only to keep costs as low as possible, but also to secure the advanced rights (e.g., HD, TV Everywhere, VOD and in-home streaming) important to today's cable operators and demanded by their customers.

WHAT'S IS NCTC'S VALUE?

Over the years, NCTC has built relationships and garnered agreements with most networks, and leading hardware makers and distributors.

On the retail side, operators capitalize on NCTC's aggregated buying power and hard-won relationships to save on programming fees and hardware purchases. Those savings can be passed on to customers, or re-invested to help pay for more programming, or to cover the capital costs that come with upgrading technology.

NCTC also helps members get access to discounted operations, such as billing, training and marketing.

Those functions are made easier by the NCTC which relieves its members of the efforts and expenses associated with establishing and managing contracts... or paying them. NCTC members get a single, aggregated invoice.

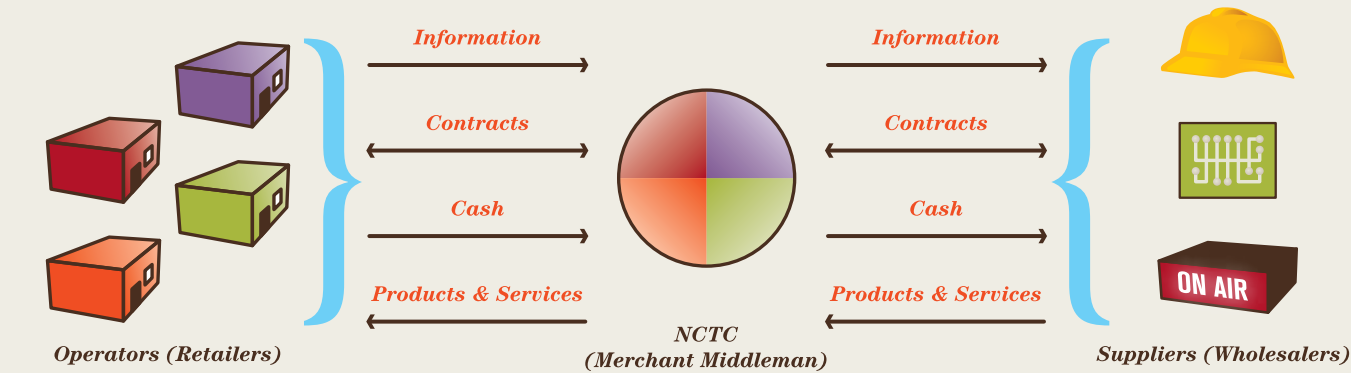
NCTC helps to serve the other side of the table, as well. Programmers gain the efficiency of negotiating one contract with NCTC rather than individual contracts with over 950 member companies. NCTC pays the programmers each month with one check and provides full billing details for each member company and their cable systems.

In the same vein, hardware companies also can secure uniform terms and conditions with NCTC rather than securing direct deals with members. NCTC collects and pays the hardware invoices on behalf of member companies, reducing the billing and collection issues for technology solutions partners. Members benefit from the broad array of technology available for purchase through NCTC, providing members easy access to the many advanced – and possibly otherwise unreachable – components necessary to build and maintain video, data and phone distribution plant.

RECENT WINS

JULY 2013: TV Everywhere (TVE) is the buzzword for the technology and services that make on-demand video available via IP, or on mobile devices and tablets. NCTC developed a TVE product – WatchTVEverywhere (WTVE) – in conjunction with member system MCTV of Ohio and released it to NCTC members. As of July 2013, more than 100 member systems signed up, making WTVE the most widely-deployed solution by volume of distributors in the country — ahead of all other solutions combined.

THE COOPERATIVE AS MERCHANT MIDDLEMAN



Generally we think of the NCTC as a buying cooperative, but it's also helpful to think of it as a merchant middleman.

When we think of a cooperative, we tend to think of buying co-ops — entities that can make purchases at lower prices because of opportunities of scale. But a merchant middleman serves the needs of wholesalers and retailers. By acting as the go-between, the merchant middleman is able to provide information about retailers' needs to wholesalers, and is able to reduce transaction costs for the wholesaler. For example, when NCTC bundles its members' needs into a single purchasing contract, it takes the

burden of contract-making off the wholesaler – in our case, programmers, service and hardware providers – thereby reducing their costs. Instead of trying to come to agreements with 950 operators (our retailers), a content provider or hardware maker needs only to make the agreement with the NCTC. For a huge number of systems, this is a life-saver, as the cost to the wholesaler of coming to agreements with small systems might lead to an ROI too small (or negative) to make the deal worthwhile at a reasonable price. Small systems would become obsolete in a hurry.

But it also makes the wholesaler smarter. Manufacturers and content and service

providers have few reliable ways to know what nearly 1,000 systems need. That's a lot of picking up the phone and poor statistical inferences. Instead of doing the massive amount of legwork needed to figure out directly what demands smaller systems are trending toward, the wholesalers can simply work through the NCTC. By having better information about what the retailers want, wholesalers are able to run their businesses more efficiently.

In essence, NCTC's merchant middleman role makes wholesalers' businesses providing goods and services to small operators more profitable and more desirable.

Says Paul Venturella of RMA Broadband and Cable TV, "WTVE is the only way we, as a small system, could afford to offer this innovative service to our cable customers. NCTC and WTVE have made offering TVE service easy... very easy." (MCTVOhio.com, RanchoMurietaWeb.org)

FEBRUARY 2013: NCTC signed TelVue as a preferred vendor. TelVue provides advanced IP and digital video broadcast solutions to many of America's largest MSOs. Telvue's IP broadcast servers and cloud video services automate their clients' channels, expand their audiences across multiple screens, and broaden their clients' ability to monetize content. (TelVue.com)

FEBRUARY 2013: NCTC reached a multi-year agreement with Entertainment Studios to carry six of their eight national cable networks. "This is a milestone moment. Through our partnership with NCTC, we now have the opportunity to bring the Entertainment Studios HD Networks and our content to NCTC members," said Janice Arouh, President of Distribution and Marketing for Entertainment Studios Networks. (ES.tv)

DECEMBER 2012: NCTC secured a multi-year, comprehensive agreement with NBCUniversal that allows NCTC's nearly 1,000 member operators to carry

"WatchTVEverywhere is the only way we, as a small system, could afford to offer this innovative service to our cable customers."

~ Paul Venturella, RMA Broadband and Cable TV

NCTC's understanding of the value that NBCUniversal delivers to their members." (NBCUni.com)

BEING A MEMBER

Members, which include telephone companies, municipalities, utilities and traditional cable operators, pay a one-time fee to join and currently pay no annual dues. To qualify for NCTC membership, a company must provide television reception or service for the public primarily by means of a "cable system" as defined in 47 U.S.C. Section 522(7). An applicant also must currently provide multichannel video service to residential subscribers. Operators with plans to provide services in the 90-180 days following the application also may apply. (NCTCOnline.org) ||||

Grayson Hill is the editor and creative director for *Rural Communications*.



Surprise!

Tracking Data (Not Speed) Is The Key
To Effective Broadband Usage Management

Rick Yuzzi

MOST AMERICANS TODAY probably could not imagine living without broadband Internet. Worldwide, 2 billion Internet users are being joined every day by new devotees. The steady increase in broadband users has been a boon for the service provider industry, but growth has also presented infrastructure and operations challenges as the average amount of bandwidth use per subscriber continues to grow as well.

When providers initially launched their broadband services, they offered flat-rate plans with no limits to the amount of data a subscriber could use. Early on, it worked out fine. Operators had plenty of bandwidth on their local networks and along the larger backbones. Broadband speeds offered to the average subscriber were not as high as today, which was fine because most Web content was static. There were some outliers such as those engaged in person-to-person (P2P) file sharing, but most subscribers were not using very much bandwidth.

Over time, these factors changed, making effective broadband usage policies increasingly important. Cable providers began upgrading their plants to DOCSIS 3.0 to offer higher speeds and differentiate their service. To compete with cable companies, telcos started rolling out fiber to increase their networks' bandwidth. To stay competitive, Internet providers regularly offered ever higher speeds to their subscribers with little or no price increase. But about the same time, Web content started to shift to more video and interactivity: customers started gobbling up every bit of bandwidth available to them.

Now that streaming video and over-the-top content (OTT) are becoming both normal and ubiquitous, unlimited bandwidth plans are simply no longer practical. This is especially significant for providers offering pay TV service, as it means not only higher average data use, but less revenue from customers who decide to cut the cable TV cord in favor of Internet services.

Static Web content gave way to video and interactivity. More users are using more bandwidth, gobbling up everything providers have to offer.

NOTE: For the purposes of this article, the term "bandwidth" is meant in the computing sense rather than the signal processing or spectral line-width definitions. Here, we mean the amount of data being supplied or consumed in a given period.

THE NEED FOR SPEED

For broadband providers and their subscribers, the increasing burden on available bandwidth can cause Internet performance to suffer – especially during peak use times – in the same way that legacy and inadequate electricity grids brown out under the burden of an increasingly gadget-ized society. The result? Unhappy customers and rising customer service costs.

Whatever the situation, operators need to be profitable in order to upgrade their networks and keep up with bandwidth demands... in order to have happy customers that keep the operator profitable. It's easy to see the vicious circle.

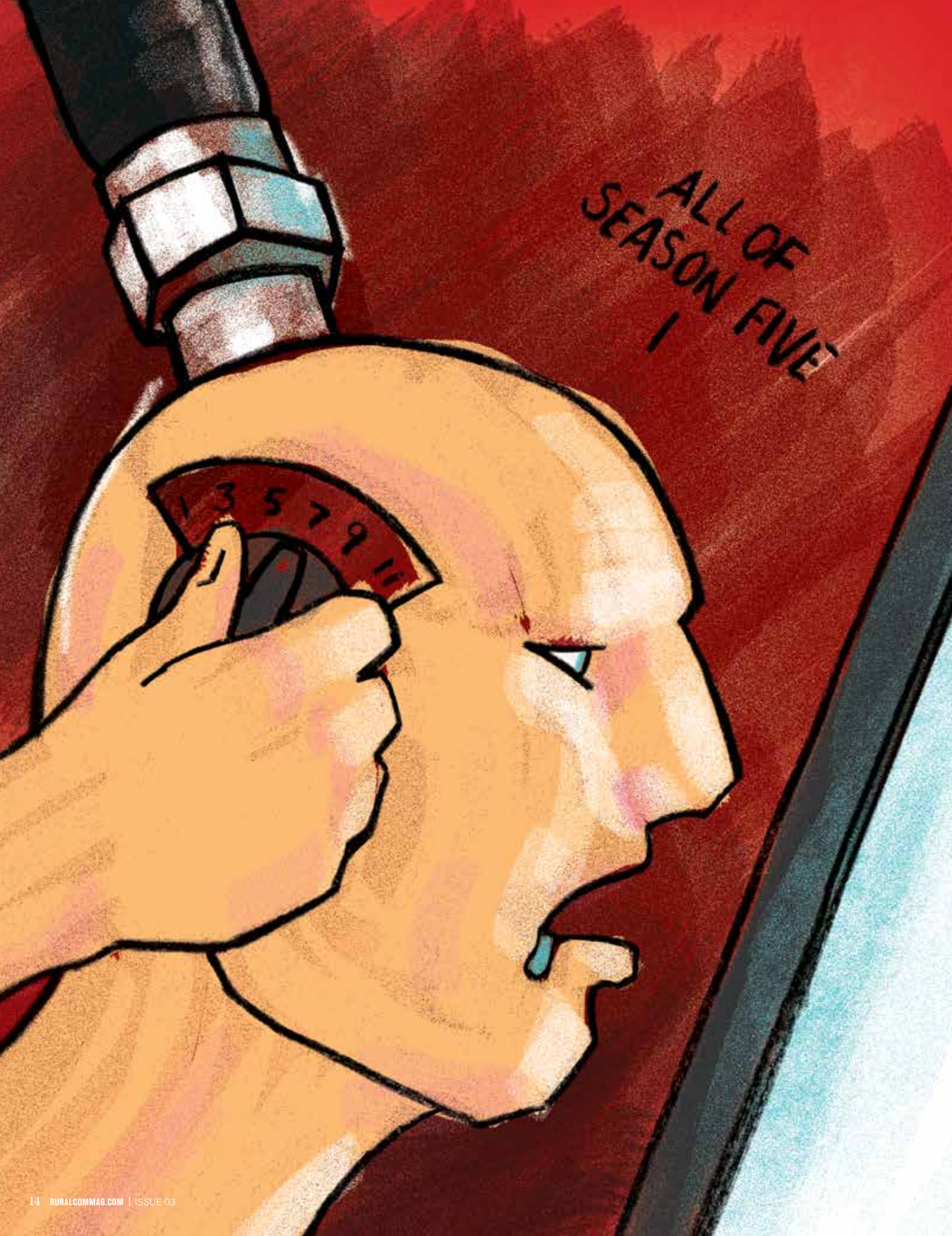
So how do we get into the middle of that circle and disrupt it? First, we need to remember the difference between consumption and demand. Consumption is the total amount of a service used, while demand is the peak volume at a given time. Any utility has to plan for the total amount of service needed throughout a day (so that the right amount of water is supplied, or energy is produced), but also must have capacity on hand for when the maximum number of users require the maximum amount of the service.

On the front end, we manage consumption by upgrading infrastructure, and by helping subscribers manage their own expectations. Usually, that management is built into subscription levels that vary mostly by speed. Think fast, faster, fastest. Since subscribers don't want to pay for what they aren't using, they help us identify what their – and our – future consumption requirements will be.

USAGE IS KEY

But speed is only one of the variables that make up bandwidth, and it can't be used practically by consumers to choose when to consume bandwidth, so it doesn't help us solve our demand problems. Typically, a strained system will dial-down access across the

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board – either voluntarily or not – in order to cope. In the electric utility world, an involuntary dialing down of access is called a brownout. In broadband, an involuntary dialing down of access speed is called a broken promise.

So we have to attack the other part of the bandwidth equation, which is data, or what we call usage. In addition to speed-based pricing, our other options include hard usage caps and usage-based pricing. Since one of our goals is to provide for demand – to make sure the maximum number of subscribers are able to enjoy your Internet service when they want it – implementing usage limits or charging for higher usage are ultimately the only reasonable solutions.

Any good solution, it should be noted, will accurately track bandwidth demand and put processes in place to eventually enforce data usage limits. That requires good reporting tools.

THE TIME IS RIGHT

While speed tiers are commonplace, smaller providers have been hesitant to implement usage tiers for several reasons, including backlash from angry customers. In 2009, Time Warner took a PR beating when they tried to impose usage-based pricing, and that memory is still fresh in the minds of some providers. But over the years, subscribers have become more accustomed to usage tiers.

First of all, the half of Americans who own smartphones are quite familiar with usage tiers. Plus, several national and regional broadband providers have successfully implemented usage tiers, making it easier for smaller providers to now put them in place.

Another concern providers have had is how to actively monitor usage and enforce limits. While early adopters had to develop their own tools, there are now powerful tools on the market available from third parties that are designed specifically to monitor and enforce usage-based packages. Whether you build your own, or purchase a third-party product, make sure your solution has features that will support the best practices we'll outline below.

PLAN CAREFULLY

When you are ready to implement usage-based pricing it is important to plan carefully. As a first step, you should look at the data used by your customers over a couple of months. You may be surprised. Consumers will tend to gravitate to the lowest-priced package with a speed that meets their needs. But, customers on lower-priced tiers also can be consuming a great deal of data. That is, they're using their low-speed plan *a lot*. Like most others users, they will demand bandwidth during peak hours.

The point is to have a way to address your highest-use customers without making the majority of your subscribers feel like they are being punished or

getting less for their money. This also will make it easier when it is time sell the new usage policies.

Next, think about the tiers you want to establish. As you study the data, you will see that there are a percentage of customers who use very little data. Consider establishing an economy package that includes a relatively small amount of data transfer. In addition to promoting loyalty from your low-use (and low-cost) customers, this will give you a lower price point to promote in the market. As those customers begin to use more bandwidth, you can upgrade them to a plan that includes more bandwidth.

Don't forget your heavy users. Come up with a few packages for those subscribers who will be using their connection the most during peak hours. As mentioned, some broadband customers are cutting the video cord and are now watching all their TV and movie content over-the-top, and this trend will likely continue. While someone may cut their cable TV or satellite service, they still will need a broadband connection to consume all of that content. Even if you are the one who is losing the video subscription, you want to keep the broadband account if it can be profitable.

The planning stage also is the time to determine how you will be tracking bandwidth usage and enforcing limits. There are products that will track subscriber usage and automatically notify customers when they are approaching or have exceeded their usage limits, as well as dynamically change the service when limits are reached based on the package or even based on the time of day or the network resources being used at that time.

Before you ever charge for usage, you need to make sure you have a way for customers to see how much data they have transferred at any time during the month. Be sure you make available a usage meter that customers

You want to address your highest-use customers without making the rest feel like they are being punished or getting less for their money.

can check. All mobile providers do this, so it's not like you're introducing a new habit. Having a method to accurately track and report usage is critical, since your subscriber's service level and/or billing can be based on their bandwidth consumption.

If you are a cable provider, the best way to collect usage is using a protocol called Internet Protocol Detail Record (IPDR). IPDR is more efficient and more accurate for collecting data usage than

Simple Network Management Protocol (SNMP). IPDR is part of CableLabs' DOCSIS standard, which means no additional equipment is necessary to collect usage data so long as a DOCSIS 2.0 or 3.0 compatible CMTS in providing the service. If possible, use a bandwidth management tool that leverages IPDR for data collection.

COMMUNICATE EARLY AND OFTEN

Make sure you communicate well in advance of implementing any usage tiers. Start with a letter sent postal mail, as well as an email, a bill insert and perhaps a notice on your website letting customers know about the upcoming usage policy change. Don't hide it. Be sure to highlight the reason for implementing usage plans, which is so a small percentage of users do not negatively impact all subscribers. Implementing thresholds is a good thing because it will allow you to continue to provide a quality experience for all customers. Again, include examples of the kinds of things your customers will be able to do with the bandwidth provided in each tier, such as how many HD movies and songs they'll be able to stream or download.

Finally, make sure you change your terms of service to reflect the fact that usage tiers are in place and that subscribers may see service limitations






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or additional charges based on their bandwidth use.

CAREFULLY CONSIDER THE CONSEQUENCES

As they say, just because an idea is possible does not mean it is good. There are several options for how and when to enforce bandwidth usage limits, but some are better than others. For example, putting an account on hold or noticeably restricting speeds for an extended period of time will certainly get the customer's attention and will prompt a call to your office. But, that call may be to cancel your service, rather than to upgrade or pay for additional bandwidth.

A method that gives you more granular control over your bandwidth thresholds will help you more consistently manage the bandwidth on your network over time. It's okay to have a monthly quota, but waiting to enforce limits based on a monthly cap will likely mean that your network is far more congested in the earlier part of the month when your heavy bandwidth users have the same clean slate as everyone else, and so haven't yet hit their monthly limit. A system that looks at usage limits on an hourly or daily basis will help prevent congestion throughout the month, while giving customers a fresh start with full bandwidth use the next day.

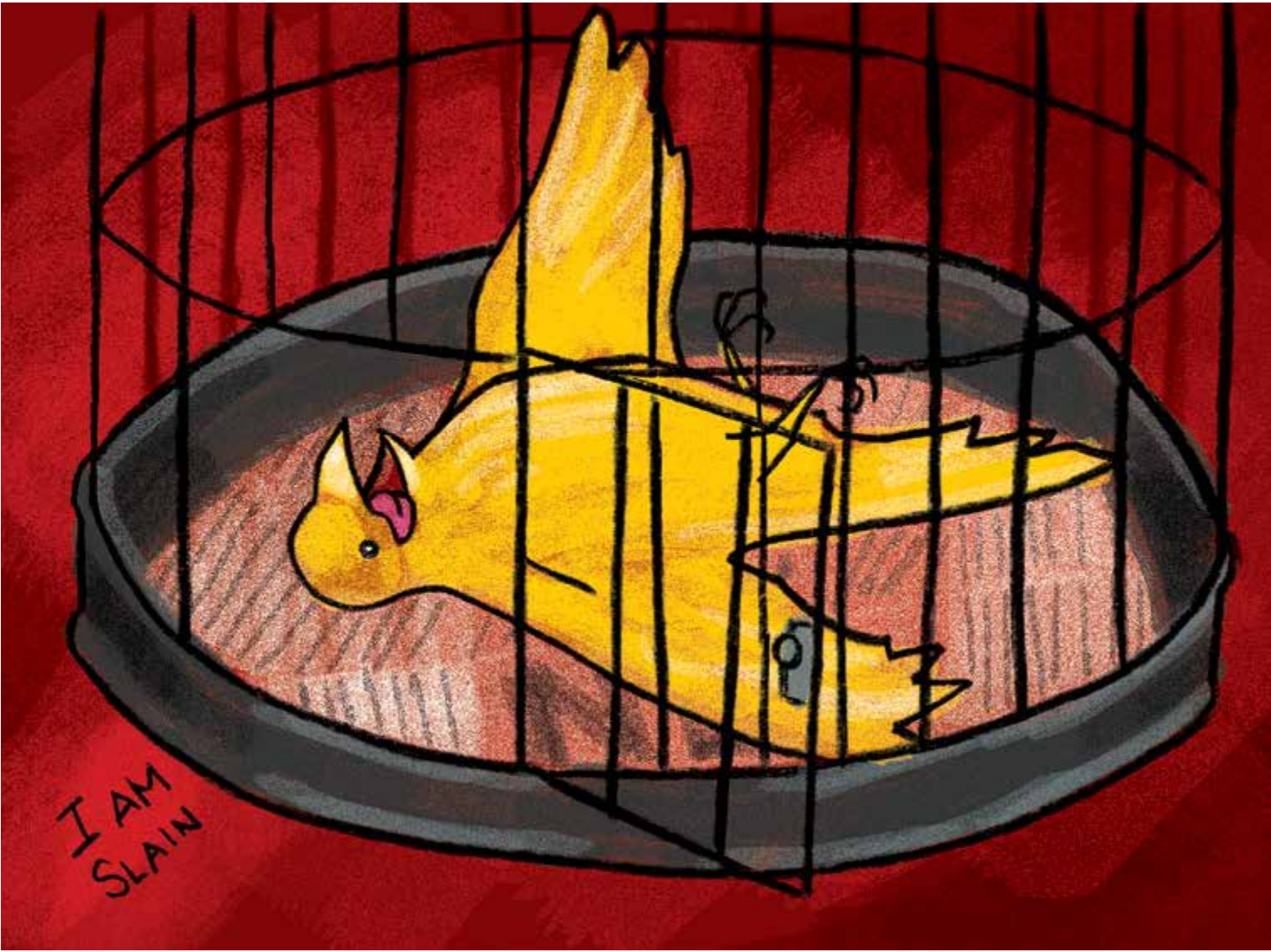
Consider giving subscribers an incentive to use bandwidth during off-peak hours. A staple of the old long-distance telephone giants and early mobile phone plans, this strategy also is used to even out demand by industries from airlines to restaurants. A system that can take into account your peak hours and even the current resources being used on the network will provide the most effective method of network management and cost control. For example, you could create a policy where bandwidth use in the middle of the night or other times when there is little congestion on the network is not counted towards daily or monthly quotas.

As customers reach their monthly limit you can take additional action, including charging for additional bandwidth. If you choose to bill for excess usage, you can do this manually by going through a report at the end of the month of all users who exceeded their limit. With a little programming work, you also should be able to tie your bandwidth management system into your billing system and add charges automatically.

Whatever policy and enforcement method you choose, be sure to clearly communicate the policy and consequences beforehand in both your general communication efforts, as well as specific notifications as customers approach or reach limits. People don't like to be surprised by unexpected charges, and you don't want customers to think a slowdown in service is due to your network rather than enforcement of a usage policy. Make sure your system supports real-time notifications to the end-user through email and text messaging.

Give your customers fair warning. Take advantage of available products that will track demand and automatically notify customers when they are nearing or have exceeded their usage limits.

SEMIOLOGY



START SLOWLY

Give customers a chance to get used to the idea of usage limits by easing them into the new system. Start by turning on usage monitoring one or two months in advance, before enforcing usage tiers. Let customers know when they have approached or reached their bandwidth quota and include in your notifications the date when enforcement will begin and what the consequences will be. Once again, there are bandwidth management products available that will monitor usage and automatically message customers as usage thresholds are reached.

If you set up your tiers as previously suggested, a percentage of users will reach a daily or monthly usage quota. Higher-use customers will then have a chance to consider changing their usage habits before any consequences actually take effect. This also is a good time to begin upselling customers to higher bandwidth plans if the customer determines that they will need the additional bandwidth. You can do this effortlessly through your automatic messaging. Also, check usage reports and make proactive phone

calls to subscribers who are close to or have reached their usage limits to make sure they are aware of the new usage policies and to see if they want to upgrade their package.

IMPLEMENT YOUR POLICIES

If you have carefully planned, communicated and tested your system, you should be able to turn on enforcement with minimal impact to the majority of your customer base. There also should be no surprise for those customers who regularly come close to or reach your bandwidth thresholds. In addition to having a positive impact on bandwidth usage throughout the month, you will have an opportunity to increase the average revenue received from customers as they use more of the bandwidth on your network. ■■■■



Rick Yuzzi is the Vice President of Marketing for ZCorum. He has over 25 years experience in sales, marketing and management. Hired in 1995 to establish the sales department for a fledgling Internet Service Provider that later became ZCorum, he is now a key member of the executive team, overseeing the company's marketing efforts. An earlier version of this article and other great information can be found at ZCorum.com



MELINDA SUE GORDON FOR NETFLIX

Oscar-winner Kevin Spacey leads an all-star cast on Netflix's original series *House of Cards*

Wading into the Stream

Streaming Video Changes Everything About How We Consume TV

Levy Jones

LIKE MOST AMERICANS, I love television. After a long day at work, a hard workout, or while lazing about on a Sunday afternoon, television gives and gives. Sometime in the last 15-20 years – probably beginning with HBO's original broadcast of the epic *Band of Brothers* – television got really good. It also got really bad in some ways, too, but this isn't about MTV.

Television studios are now producing what are essentially novellas for serious escapists, available at 45-minute increments. I can sit down, relax, and disappear into a story that is engrossing, enchanting, or just playful and exciting. The only downfall to this approach is that many times I am left hanging at the end of a 45-minute block wanting more, left with such a cliffhanger I can barely contain myself for an entire week.

Luckily with the availability of streaming services I don't have to wait from one week to the next to check out what happens next; I can just watch the entire season in one or two marathon sittings.

The technologies associated with shooting, editing, and delivering streaming content have also opened up opportunities for independent studios to sell their shows. When Google's YouTube launched its channels feature, we assumed it would be glutted with millions of videos of kittens and unfortunate skateboarding accidents. It is, actually, now that I think about it. But, YouTube also has become home to some very good, independent television series – in some cases featuring very high-profile actors – all produced by independent talent.

There are other players breaking on to the scene now, too. For example, back in 1993, comedian Byron Allen launched his own production company, Entertainment Studios. Today, it produces 29 syndicated television series – the largest of any independent producer – and operates SmartTV.com.

ENTERTAINMENT STUDIOS



HULU



SOPHIE GIRAUD FOR NETFLIX

Top Left: Entertainment Studios' original series *Mr. Box Office*.

Bottom Left: Cartoon superheroes from Hulu's *The Awesomes*.

Above: Famke Janssen and Bill Skarsgård from Netflix's *Hemlock Grove*.

GAME CHANGER

I recently was perusing my weekly entertainment magazine (yes, I get a weekly entertainment magazine), and was happy to find that the show in which I was currently engrossed – *Friday Night Lights* – posted 48th on their list of the best TV shows ever. *FNL* was great, but with yearly cancellation threats over its 5-year run, a lot of the public skipped over it.

For fans, that usually means syndication limbo, a spendy Blu-ray collection, or what may be worst of all: the inability to share the show with others.

Streaming video changes all of that. It allows fans to sit down and watch an entire season or series – say, 76 episodes – in a couple of weeks. (I admit, I did this.) It's digital environment makes shows easy to share. Shows that might get lost in syndication are at your fingertips, and easily searchable and share-able.

There *is* something at work here, though. Without the broadband that allows me to connect to streaming services, I wouldn't have had the opportunity to binge on *Friday Night Lights* the way I did. I might not have seen it at all.

With this in mind, the streaming services that are now available are changing the way urban and suburban Americans watch television. Along the dirt roads, however, where broadband service is not always ubiquitous, or as powerful, viewers can be stuck with only the scheduling and availability of their normal cable TV or over-the-air broadcasts.

THE BEAUTY OF STREAMING TELEVISION

Streaming allows viewers to sample in a way that channel surfing can't hope to compare. Consider this anecdote: some time ago I heard good things about a BBC show called *Torchwood*. So, I jumped in and watched a season on Netflix. Little did I know that *Torchwood* is an offshoot of the perennial sci-fi series *Doctor Who*, which was canceled in 1989 and successfully revived in 2005. (In fact, "Torchwood" is an anagram of "Doctor Who.") In 2006, a reincarnation of the Doctor – who's way cooler than the one from my childhood – meets one of the characters from *Torchwood*.

So, after cramming my way through every available *Torchwood* episode, I turned my attention to *Doctor Who*, which, as I mentioned has been back on the air for a number of years.

In a way, the effects of streaming video are to broadcast television what iTunes was to the record industry. The choices that we have as viewers today don't just amount to quantitative changes, they impose qualitative changes. Years ago, to watch a show or season that was not actively broadcast, we would have to buy it — series were rarely at the video store. Now we can take our pick of the litter whenever we want, without having to wait, spend too much money... or even own a cable box.

THE NEXT WAVE OF ORIGINAL CONTENT

I mentioned Entertainment Studios. They're sort of a hybrid in the content space, creating first-run series and shows like other studios. They also have deals with a number of broadband providers to distribute their proprietary HD networks. They inked a deal this year to offer up their networks to NCTC's more than 25 million affiliated viewers. Entertainment Studios also runs SmartTV.com, where viewers can access their theme-based library of original content.

YouTube, the ultimate crowdsourcing platform, opened the floodgates when it allowed users to develop their own channels. Since then, YouTube has been a launching platform to stardom, or a way for actors to

take on projects they otherwise can't. Viewers should give the drama channel Wigs a serious look. Aimed at sophisticated female audiences, Wigs features actors like Julia Stiles, Jennifer Beals and Anna Paquin in critically-acclaimed original series. Contrary to popular belief, many YouTube videos are available in HD.

Netflix – the current king of online streaming – is well on its way to becoming the next HBO. Beginning with *Lilly Hammer* – a show about a former mobster trying to get a fresh start in Norway – Netflix has been rolling out one critically acclaimed show after another – with big stars, to boot. Its American adaptation of a BBC miniseries, *House of Cards*, starring Kevin Spacey, Robin Wright, and Kate Mara just picked up three Emmy nominations.

Netflix also scored a huge cult win when it revived *Arrested Development*, a much-beloved comedy that aired on Fox from 2003-2006.

Hulu – a joint venture between NBCUniversal, Fox Networks and Disney/ABC – also is getting into the original content game with series like *The Awesomes*, *The Wrong Mans* and *Behind the Mask* debuting this year.

Amazon may turn out to be the 800 lb. gorilla of streaming content. Their Instant feature lets you stream movies on a pay-per-view basis. Only, Amazon's pay-per-view library is positively enormous. Amazon's free-shipping membership service, Prime, lets members stream an online library that's not quite comparable to what you'll find on Netflix.

Distributors like Hulu and Netflix also stream hard-to-find or just plain exclusive content from other studios. Sony Pictures' ad-supported Crackle Network, which distributes movies out of Sony's library, is syndicated through Hulu and YouTube.

YOU'RE NOT OFF THE HOOK

For producers and distributors, original content is a way to attract and retain viewers. If you can only see *Hemlock Grove* on Netflix – and you really like it – it might push you into the Netflix camp. For cable systems, though, it means fewer cable TV viewers (and subs) and more strain on your broadband network.

Regardless of how many viewers preference their Internet connection in the near future, cable TV providers are still going to be paying programming fees. They might be able to negotiate those down based on viewership, but that's a whole can of worms — and one that smaller, independent systems may not be able to bait. Indy systems also will still be fighting off pressure from the satellite giants, and encroachment from the goliaths of the industry.

Streaming content is often free for users —the digital world makes sampling an attractive marketing tactic. But, for broadband providers, that's as much of a bane as it is a boon. Free content means consumed bandwidth.

While technologists like to say that the marginal cost of digital content is zero, the cost of delivering it is decidedly not so cost-free, as we all know. ■■■■

Levy Jones has been writing for over 20 years. He holds a degree in English Education from Fort Lewis College and a Master's degree from Regis University. Levy is a pop culture aficionado, and makes it his mission to keep people connected to what's hip.



Viewers might bolt from their cable TV services for streaming video, but that only means you have that much more reason to get that broadband system upgraded. Oh, and you're still going to pay for programming fees and CATV upgrades.



Netflix Revived *Arrested Development*, a comedy with a cult following. Good for them: *Arrested Development* picked up three Emmy nominations.

FOR RURAL COMMUNITIES, STREAMING VIDEO DEMOCRATIZES CONTENT

In smaller, rural communities the need for streaming is greater than one would think. The cost is low, and the enjoyment is technically endless, depending on the viewer's preferences and tolerance for television. Consider this: it costs around \$10.50 for an adult ticket to a movie, half that for a kids ticket. Take a family of four, in a rural community and they want to see the latest family friendly movie. This will run them around \$30.00 to just get into the theatre, not counting treats, and other refreshments. Tag onto that the fact that most smaller, rural communities get maybe one or two movies at a time, for several weeks.

If a company is providing streaming services, the bandwidth is solid, and the services are clean, a family of four can enjoy a wider range of programming than they could before. Movies that don't show up at the only theatre in town can be sampled and shared.

Streaming from Netflix and Hulu costs \$8 a month. An Amazon Prime membership (providing the same basic services as Netflix and Hulu), costs \$75 yearly. To purchase original television shows off of an entire network from Entertainment Studios is going to set a family back \$2 per network, and they are very specific and specialized with what they have on their site. It makes sense then, for a family to spend the extra \$8 a month to purchase a streaming plan. They can lower their monthly costs for entertainment, and open a door to a whole new world of entertainment.



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Frankfort Plant Board: Managing Growth, Competition and Development In America’s Fourth Smallest Capital City

GRAYSON HILL, EDITOR, *RURAL COMMUNICATIONS*
JOHN HIGGINBOTHAM, SUPERINTENDENT CABLE/TELECOMMUNICATIONS, FPB, *Contributor*

STATUS: FPB operates in a geographically difficult and demographically constrained area. While Frankfort boasts a lower unemployment rate than the national average, it also has household income slightly above 80 percent of the national average. While Frankfort holds steady, it is faced, like all other independent cable and broadband providers, with the costs required to stay in front of the large, institutional corporations. FPB has managed its situation admirably.

The Kentucky Revised Statute of 1942 established the Electric and Water Plant Board of the City of Frankfort, Kentucky (FPB). The statute provides that the mayor nominates and, along with four commissioners, approves FPB’s directors. This represents the only connection between the city of Frankfort and FPB concerning the operations or revenues generated or allocated by either party. FPB began operations early in 1943, the following year to provide reliable and affordable electricity and water to local residents and businesses.

Frankfort’s location deep in the Kentucky River Valley prevented local television set owners from getting adequate reception out of stations in Louisville, KY and Cincinnati, OH — the dominant metropolitan areas in the region. At the time, it was common for hardware stores to retail the new consumer electronics that were being created and sold after the war. About ten years after FPB was

established, several local hardware store owners approached the board with the idea of putting an antenna on top of the water tower located on a bluff above the state capitol, to supply the area with **CATV**, and increase sales (as well as contact with the world outside of the Kentucky River Valley).

FPB approved of the idea, and set up a separate management team, Community Service Inc., to provide customers the CATV service, while keeping it separated from the water and power businesses in which FPB specialized. By 1988, the arrangement no longer proved efficient, and FPB absorbed Community Service Inc.

Between 1940 and 1970, Frankfort’s population doubled from less than 12,000 to just over 21,000 people, with much of the growth actually coming from annexing surrounding towns. Still, within ten years after FPB started CATV operations, it had 4,000 customers.

“We upgraded the [DOCSIS 3.0] cards to achieve more up and down ports, which in turn allows the higher speeds. The investments were needed more for technical improvements. . . than to generate new revenues. But we’ve been pleasantly surprised with growth.”

~ John Higginbotham

NASA



Because of that adoption rate, it was no surprise that a privately owned cable company – Consolidated Cable – began operations in East Frankfort in the early 1960s. Consolidated had a run of about 30 years before FPB bought them out in 1990.

These days, FPB’s cable business includes telephony, security and broadband, and accounts for about 40 percent of the total managerial staff. Additionally, FPB employs about 85 positions in HR, IT, Accounting, Legal, Customer Service and so on. This arrangement allows FPB’s various businesses to share costs on a single billing system (which is advantageous for customers), an IT department and other operational functions and expenses. But the opportunities of scope are not perfect. Only 70 percent of FPB’s cable lines piggy-back on FPB’s power infrastructure. The rest of the cable TV runs atop and along other rural electric co-ops. From the outset, FPB’s cable

business has been separate from the electric and water. So, while the latter two can share resources, there’s no cross-subsidy with the cable side. A surprising outcome of this arrangement is that the traditional utilities are completely shielded from any private financing set up for the cable business.

ACQUISITION AND UPGRADES

By 1990, FPB needed to make some upgrades. But when it acquired its cross-town competitor, it also got its dilapidated infrastructure. Some neighborhoods were still operating on a 300 MHz plant while others were at 450 MHz. As studies were completed, it became clear that FPB was in a pickle. Apart from selling off the system, the only solution to its infrastructure woes was to build it for the future. New services and expanded cable TV offerings would have to supply the income needed to pay off the buildout.

**Figure 1:
It’s In The Middle Of That.**

Frankfort is not, as one would expect, named after a fort. Rather it memorializes British-American pioneer, Stephen Frank, who was killed by local American Indians when his party was attacked while crossing a ford in the Kentucky River (the large, north-south running river above that bisects the city). The spot came to be known as “Frank’s Ford.”

Frankfort is surrounded by hills; it’s growth is therefore highly constrained.



Working In The Shadow Of The Capitol

Often, the worst place to run any business – let alone a utility – is where other people make laws. While FPB is subject to most of the same regulations – leased access, must carry, and so on – that take a disproportionate chunk out of other independent providers' bandwidth and raise costs for the providers and customers alike, credit is due to a system that can operate in its and its customers' own best interests, even when it's so close to regulatory interests.

FPB brought in two teams of consultants: one for the infrastructure design work and another team focused on the legal aspects of the borrowing needed to fund the infrastructure upgrades. Based on their recommendations and FPB's own expertise, FPB's board set up a municipal corporation – with the same board members as those sitting on FPB's board – to borrow the funds for the rebuild. The municipal corporation would own the cable assets, and lease them back to FPB.

In 1997, FPB's board of directors approved the borrowing of \$29 million to upgrade the cable infrastructure to a 750 MHz HFC system. The new system would include digital cable, high speed cable modem access, facility-based CLEC services, long distance, and home

security. Soon after, the municipal corporation put out an RFP to local and regional lenders, eschewing all federal and state monies.

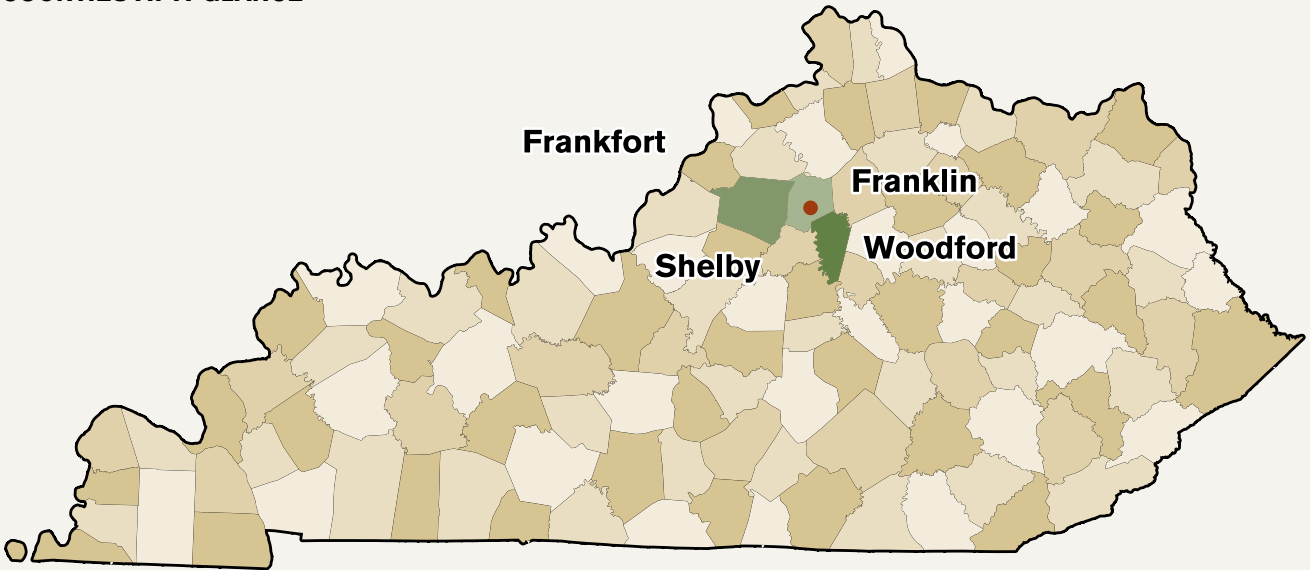
The lending came in the form of a succession of six bond anticipation notes (BANs), each for about \$5 million, spread out from 1998-2003. The municipal corporation drew down funds as needed. When it expended about \$5 million, it started on a new BAN. At the conclusion of the rollout, all of the lending essentially was rolled into one note, worth about \$29 million.

The principal was untouched until the project was completed but the municipal corporation paid interest on all funding as the project continued. Because the complete rollout would take some time – about 3.5 years

FRANKFORT PLANT BOARD

SEMIOLOGY

FPB OPERATING AREA:
FRANKFORT & SURROUNDING
COUNTIES AT-A-GLANCE



	Population	Households	Families	Population Density	Housing Density	Median HHI	Per Capita Income
Frankfort	25,527	11,140	6,653	1,746 / m ²	885 / m ²	\$40,009	\$22,299
Franklin County	47,687	19,9078	12,840	227	102	40,011	21,229
Shelby County	33,337	12,104	9,126	87	34	45,534	20,195
Woodford County	23,208	8,893	6,643	122	49	49,491	22,839
United States						52,762	27,915

– FPB worked with the lending bank to ramp up sales of new services as the rollout moved along. After each node was upgraded, it was turned on and services were offered. Receipts from services and other revenues were used by FPB to pay the lease on the equipment, which the municipal corporation then used to pay off the interest. After the whole rollout was completed, the municipal corporation went to work on the principal.

The local bank that provided the funds subrogated the total loan amount to other banks in their holding company, so that, technically, five regional banks own a piece of the whole \$29 million loan. Initial loan terms stretched from 2001-2017, but the consolidated note was refinanced in 2005, extending the

payback term to 2022. FPB and the municipal corporation had more time to sell new subscriber services to service the whole loan, and also received better rates through its term.

RESULTS

In December 2000, FPB launched digital cable to portions of Franklin County with high-speed Internet access via cable modem coming online two months later. The following month, FPB launched security services for homes and business everywhere in Franklin County. About a year later, in February 2002, FPB launched high capacity data services starting at 2 megabit via Ethernet connection. Customers everywhere in the 502 area code could use FPB for their long distance by early

Because the complete rollout would take about 3.5 years, FPB worked with the lending bank to ramp up sales of new services concurrent with the rollout. After each node was upgraded, it was activated and services were offered to connected households.

JARGON

ARPU
Average return per user.

CATV
Originally for community access or community antenna television, from the early days when cable lines were run from large antennas to provide service in areas isolated by terrain or distance. Now, generically for cable tv.

CLEC
Competitive local exchange carrier. Local telephone competing with an already established, ILEC or incumbent local exchange carrier.

FTTH
Fiber to the x (FTTx); generic term for any broadband network where fiber replaces metallic cables within the last mile. FTTH designates an implementation that travels from the central distribution point all the way to the boundary of a living space.

HFC
Hybrid fiber-coaxial; for a network that combines fiber optic and coaxial cable. Often as an intermediate step to FTTH where fiber starts at the headend and eventually builds out into the last mile.

IPTV
Delivery of video services via Internet Protocol. Includes time-shifted viewing and many live broadcasts are also delivered via IPTV.

Subrogate
Legal doctrine where a third party takes over the claims a second party has against a first. For the purposes of this paper, regional banks that each took a portion of FPB's \$29 million note are the third parties.

VOD
Video on demand; generically services that allow customers to choose programs a la carte. Usually delivered via IPTV.



fall of 2002, with local telephone service opening a year after that.

Previously, in the early 1990s, AT&T began offering DSL in FPB's back yard, having leveraged the telephony infrastructure it held in the region since the 1890s as South Central Bell. FPB's upgrades meant it was now able to go head-to-head and service-to-service with the telecom giant.

July 2010 saw the elimination of analog cable TV on FPB's system, and the conversion to all-digital. The transition freed up nearly 300 MHz of spectrum — enough reclaimed space to launch 50 new HD channels, bringing FPB's total to more than 80. The reclaimed bandwidth also allowed for the launch of a VOD service in January 2012.

Using only working capital, FPB has been migrating to Arris' CMTS (the network presently operates three C-4 setups), and upgraded the cards to DOCSIS 3.0 this spring. These upgrades rocketed FPB's bandwidth from the 2 megabits of the 1997 rebuild to 30 megabits available today.

Says FPB Superintendent John Higginbotham, "We upgraded the cards to achieve more up and down ports, which in turn allows the higher speeds. The investments were needed more for technical improvements of the broadband service than to generate new revenues. But," he says, "we've been pleasantly surprised with grown, because it's better than expected with new broadband customers.

"Plus, we're on track with incremental upgrades to faster speeds, giving us higher ARPU with existing customers."

VOD is progressing nicely, too. Launched in January 2012, FPB is recording 3,600 buys per month, with about 50,000 total streams per month (free and paid), in spite of the learning curve that's universally associated with VOD adoption.

But while it's on track for a 36-42 month return, the real positive impact of VOD on the business is harder to measure. Higginbotham notes, "Keeping customers was and is part of our decision-making process. Launching VOD helps us better compete with satellite,

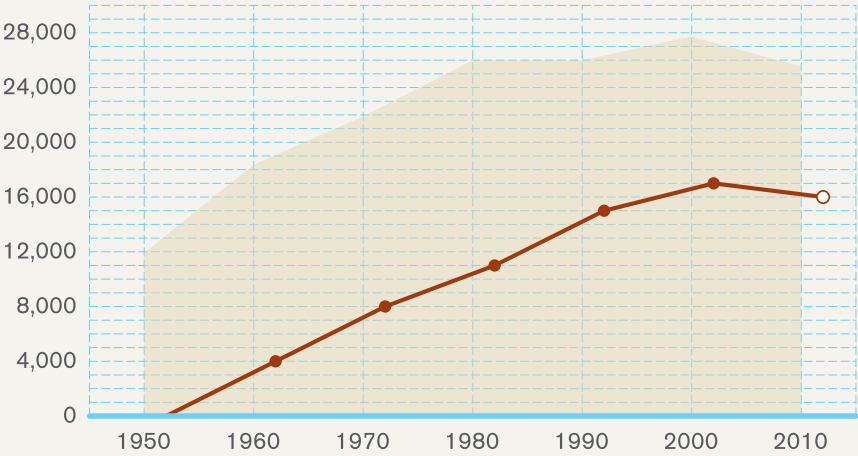
FRANKFORT PLANT BOARD

SEMIOLOGY

FPB BY THE NUMBERS:
STATISTICAL OVERVIEW

VIDEO SUBSCRIBERS

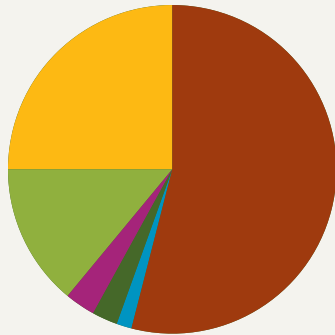
Historic approximation of 10-year periods from 1952 - 2012; number of subscribers compared to Frankfort population, according to US Census data



REVENUE

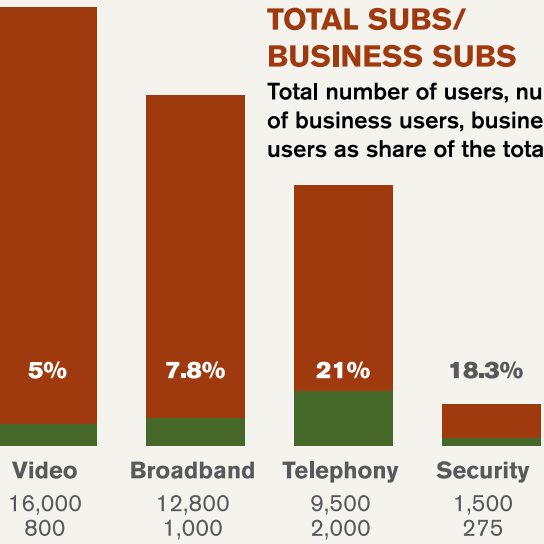
Share of revenue by offering

- Video: 54%
- Broadband: 25%
- Telephony: 14%
- Dark Fiber: 3%
- Ad Sales: 2.5%
- Security: 1.5%



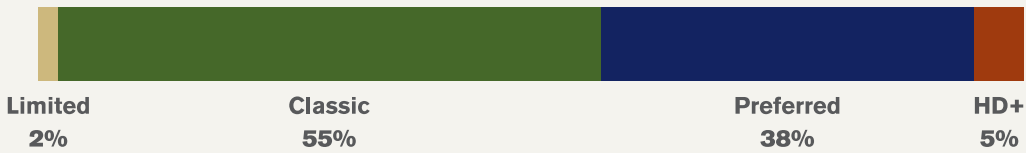
TOTAL SUBS/
BUSINESS SUBS

Total number of users, number of business users, business users as share of the total



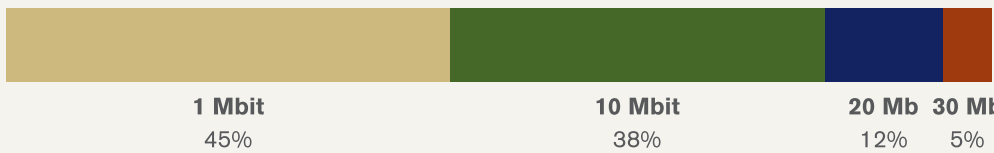
VIDEO

Share of total users by level of service



BROADBAND

Share of total users by level of service



NOTE: Dark Fiber revenue comes from leased bandwidth on fiber that is not connected to the headend. Often used for point-to-point communication.



**CONNECTING, AND
CONNECTED TO,
THE COMMUNITY.**

Since 1968, FPB has operated a local origination channel, Cable 10, which airs nearly 70 hours of informational, educational and government programming each week. FPB also operates a leased-access channel available to all customers, a real estate classified channel, and a photo classified channel.

Beginning in the early 1980s, FPB, in conjunction with Kentucky Educational Television (KET) and the Kentucky Legislative Research Commission (LRC), has been offering legislative feeds of the Kentucky General Assembly's House and Senate general sessions and committee meetings.

FPB continues to be the only provider of this service in the Commonwealth of Kentucky.

FPB's established a cable advertising department for the community in 1999. Currently, 32 channels are available for digital insertion via Seachange equipment. Full production facilities also are available and are utilized by FPB for external marketing, PSAs and community outreach.

**A CLEVER, LOCAL
TWIST ON VOD**

Additionally, FPB has more than 12,000 programs in its archive of local origination programming. To date, putting old high school sports, Christmas plays and county fair pageants has been a great way of driving usage of free VOD – with a side benefit of new DVD sales of this classic programming.



and shores up basic and premium retention numbers. Early indicators show high premium channel VOD usage, enhancing that offering to the premium customer.”

THE FUTURE

While a stubbornly and stagnant economy is troubling for almost every business, even capital-intensive ones can show improvement if managed well.

Like everyone else in the business, FPB has been losing phone lines — mostly to mobile devices. Phone accounts peaked in 2008; residential accounts have fallen by about 25 percent since then. And, video subs have fallen off by about six percent in as many years as consumer tastes and the economy drive passive content online.

For FPB, it appears that security offerings, and broadband are where present and future gains are going to be made.

But, only if they play it right.

At the moment FPB has little reason to move completely away from HFC to newer

FTTH. They used Commscope's Brightpath product to test a limited area, and were pleased with the results, but the return isn't there right now. For example, in 2009, FPB conducted an internal study and determined that there were 1,600 unserved homes in the county, about 8 per mile. By their calculations, the cost to reach those homes via FTTH was approximately \$8 million.

But between recession worries and more pressing infrastructure improvements – such as FPB's planned \$9-10 million relocation of their headend – building out the entire system in FTTH isn't worth the expenditure and risk at this time.

Higginbotham: “There is such a costly investment in the existing HFC plant, which is well-maintained and not very old... But when we have development starting again – sometime beyond the next three years – I expect service extensions going forward to be FTTH.”

Today, FPB's cable system supports more than 16,000 customers in Franklin, Shelby and Woodford counties. ■■■■

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One-time setup fee will be charged at the time of sale. Minimum 24-month service term. Monthly service fees and taxes apply. Equipment lease fee is \$9.99 per month or if prepaid, \$199.00 for 24 months. Equipment must be returned upon cancellation of service, otherwise an unreturned equipment fee will apply. Non-standard installations may result in additional charges. Speeds are "up to", are not guaranteed, and will vary. Service is subject to data transmissions limits measured on a monthly basis. For full details, see the Data Allowance Policy here. Service is not available in all areas and requires a clear view of the southern sky. Live interactive online multiplayer games over the Internet have very poor performance with Exede. Some multiplayer games may not work at all. Use of the Exede Internet service on multiple devices requires a wireless router. Virtual Private Networks (VPNs) and Remote Computer access may be very slow with Exede. Some VPNs may not work at all. All offers may be changed or withdrawn at any time. Exede is a registered service mark of ViaSat, Inc.



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