

Superando los retos de escalar los servicios de fibra óptica de siguiente generación

Patrocinado por:



La fibra es un activo estratégico para los operadores latinoamericanos, especialmente en el largo plazo e independientemente de las realidades de cada mercado. Por un lado, porque la competencia fuerza a los operadores a diferenciarse y, por otro, porque la fibra ofrece unas prestaciones que incrementan de forma significativa la calidad de la experiencia del usuario. Este último parámetro se considera fundamental en el sector de las telecomunicaciones, pero sobre todo se cree que es un factor clave de competitividad para el futuro —cada operador mide el futuro según las presiones competitivas de su mercado—.

Los proyectos de fibra óptica en Latinoamérica van desde la puesta en marcha de redes troncales por parte de varios gobiernos, operadores de cable mejorando su infraestructura HFC y operadores de telecomunicaciones lanzando FTTH/B. En general, los operadores que más avanzan en el despliegue de fibra al hogar son los operadores de telefonía fija cuyas redes de cobre con ADSL no son suficientes para soportar la demanda que se espera para los próximos años, especialmente en las grandes ciudades. Los operadores de cable prefieren mantener la red HFC —cuyas actualizaciones con Docsis 3.1 o superior le permitirían estar mejor preparados para cubrir la demanda— aunque, al mismo tiempo, tiran fibra cada vez más cerca del cliente.

Los datos cercanos a la mitad de 2018 con respecto al despliegue de fibra por parte de los operadores (HFC y FTTx) eran alentadores en la región, a pesar de que la relación inversiones y ARPU no es tan favorable como lo puede ser en Estados Unidos, Europa o Asia Pacífico.

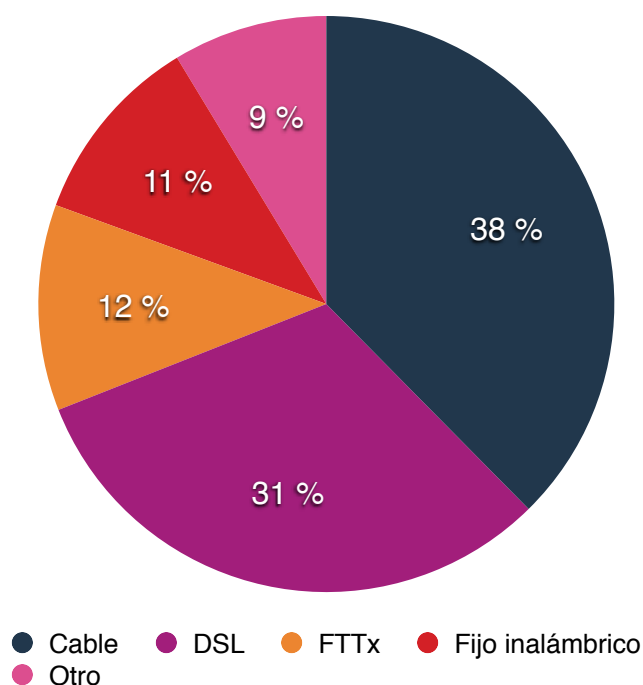
Aún así, la región crece, y lo hace relativamente rápido porque, en parte, tiene mucho terreno aún por recorrer. Durante el segundo trimestre de 2018 la Fiber Broadband Association decía que el

número de hogares conectados con FTTH había crecido en un 43 por ciento de un año a otro, lo que suponía pasar de unos cinco millones de hogares conectados en la región a 7,8 millones.

El crecimiento no sólo se produce en el número de hogares que contratan el servicio sino en aquellos que podrían hacerlo porque alguno de los operadores cuenta con la infraestructura disponible. Este parámetro indicaría el avance en las inversiones en FTTH por parte de los operadores y, en este caso, el incremento para el mismo periodo fue del 21 por ciento, elevando la cifra por encima de los 29 millones de hogares. La tasa de conexión en la región se situaba en el 27,7 por ciento en promedio sobre hogares pasados, si bien países como México ya estaban al 50 por ciento en el momento de divulgarse las cifras.

Si bien los datos indican que la fibra sigue creciendo, también queda claro que el promedio latinoamericano está compuesto de una gran

Usuarios de banda ancha en Latinoamérica por tecnología a diciembre de 2017



Fuente: Telegeography

dispersión. Dicha dispersión podría categorizar a los diferentes países en tres niveles. En el primer nivel estarían los países con mayor penetración y avance de la fibra: México, Brasil y Uruguay —este caso es muy particular— lideran la región. En un segundo nivel estarían Argentina, Colombia, Ecuador o Chile, para acabar en los países del tercer nivel donde encontraríamos a Bolivia, Paraguay Perú o Costa Rica con cifras algo menos alentadoras, pero con planes interesantes dentro de la relatividad de su escala.

Incluso dentro de los mercados con mayor actividad en el despliegue de fibra, como serían México y Brasil, encontramos una polarización interesante en cuanto a los despliegues. En Brasil, Telefónica tiene una participación del 50 por ciento en FTTH, y tanto Vivo, su filial en ese país, y Oi han anunciado paquetes de inversiones destinados principalmente a 4G y fibra. Los dos operadores se parecen, ya que comenzaron ofreciendo servicios de telefonía fija en Brasil.

Telefónica se ha comprometido a hacer inversiones en el orden de 8.000 millones de reales (2.154

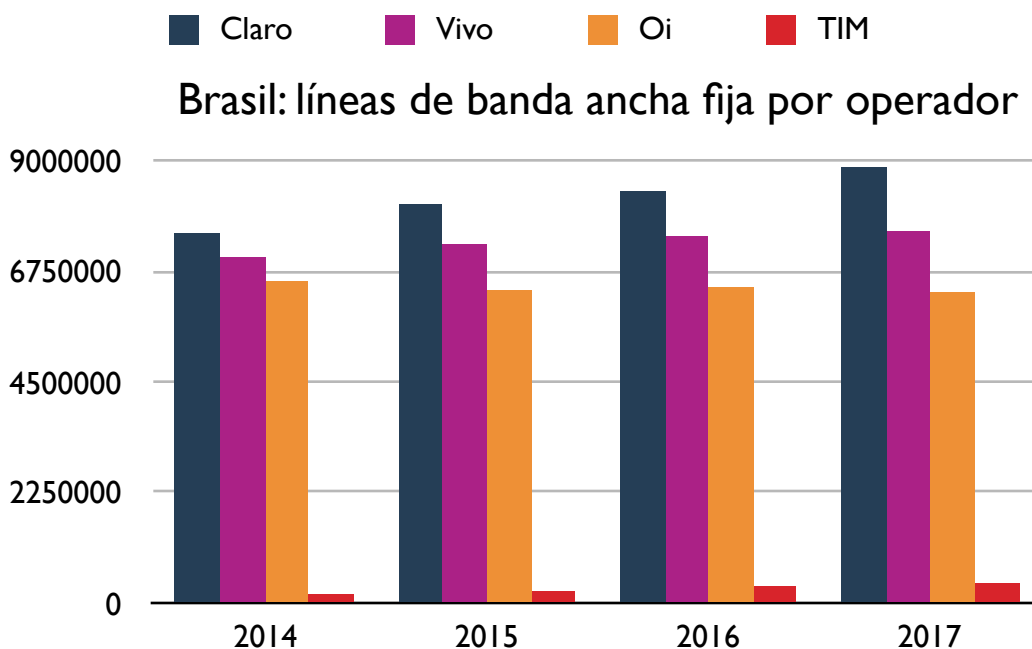
millones de dólares) en Brasil entre 2018 y 2020 y destinará 2.500 millones de reales (673 millones de dólares) adicionales a la fibra óptica. En la presentación de resultados al tercer trimestre de 2018, la empresa anunció que espera cerrar el año con nueve millones de hogares pasados con FTTH y terminar 2020 con 15 millones, casi el doble de los que existen hasta el momento.

En cuanto a Oi, su objetivo era alcanzar el millón de hogares con FTTH para cuando terminase 2018 —veremos si lo ha conseguido en su próximo reporte financiero—. La firma rubricó en julio un acuerdo con Huawei con foco en fibra óptica y la modernización de su red móvil. El acuerdo tiene una vigencia de cinco años.

La filial de América Móvil, Claro, es curiosamente líder del mercado de banda ancha en Brasil, con más del 30 por ciento del mercado. En su caso, no tiene grandes planes en fibra porque ya cuenta con una buena penetración de su red HFC. En cambio, apunta más a prepararse para el lanzamiento de la 5G.

Por último, TIM anunció a mitad de año que sus

esfuerzos en fibra estaban concentrados en el sudeste del país y su próximo paso era avanzar al noreste con énfasis en áreas con poca cantidad de competidores. La empresa tiene 423.000 clientes que contratan el servicio TIM Live y entiende que la tecnología es una oportunidad de mejorar sus números: “Con FTTH tenemos un ARPU mayor. El ingreso promedio por usuario creció 12 por ciento



en el último año”, dijo la empresa en un comunicado. Eso sí, en hogares desconectados y de difícil acceso a fibra, apuesta a cubrir la demanda con banda ancha fija 4G.

En México es Telmex —¡sorpresa!— quien tira del carro para que se acelere la adopción de su red de fibra antes de tener que compartirla con sus competidores. El operador había realizado un esfuerzo de despliegue de infraestructura con el objetivo de tener su red preparada para cuando se lo autorice a ofrecer servicios de televisión paga. México es el país con mayor cantidad de FTTH y ya contaba con más del 40 por ciento de los hogares pasados con fibra a finales de 2017, según datos de IDATE.

Además de Telmex, México tiene redes enteramente de fibra óptica al hogar desplegadas por parte de pequeños operadores como Total Play (Azteca) y Axtel —que recientemente vendió parte de su infraestructura residencial a Televisa—.

En el caso de Uruguay, el despliegue de fibra óptica de la estatal Administración Nacional de Telecomunicaciones (Antel) cubre el 70 por ciento de la población con 580.000 kilómetros de fibra. A mediados de 2017 contabilizaba 610.000 servicios.

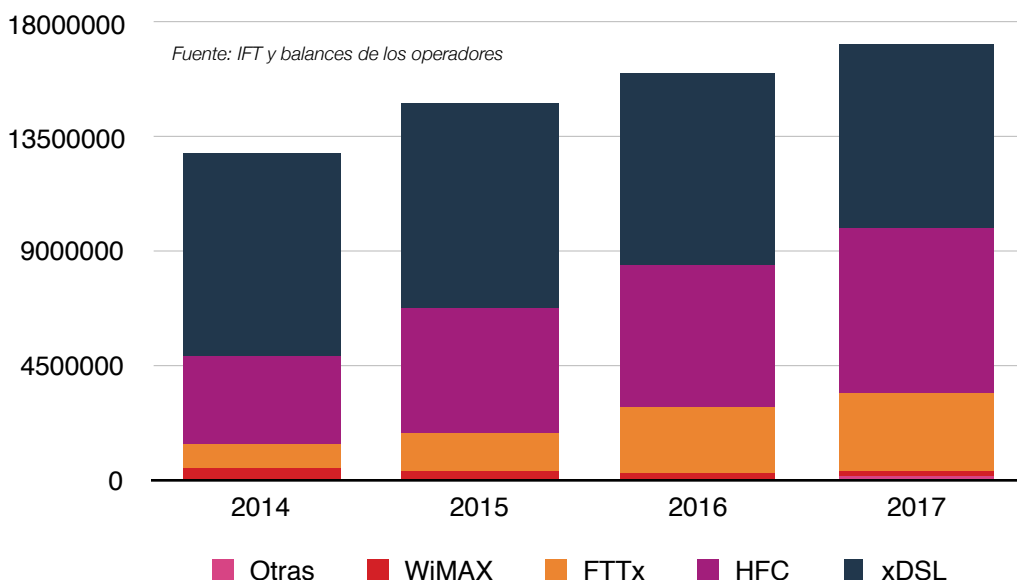
Subiendo a los países de nivel dos, encontramos que en Argentina son varios los jugadores que están trabajando en sus esfuerzos para lanzar o modernizar sus activos de fibra. Allí los grandes operadores están avanzando con sus

despliegues de fibra, liderados en este caso por los cableoperadores con sus redes HFC, además de Telefónica y Claro, que están apostando por FTTH para competir contra sus rivales cableros.

Adicionalmente, las cooperativas y operadores pymes del interior del país, la mayoría de servicios de TV paga, también están modernizando su infraestructura y buscan la forma de poder bloquear su área de influencia con despliegues de fibra. Argentina no está sola en esta tendencia, y también en México y Brasil los operadores de menor tamaño están contribuyendo a los despliegues de fibra.

Siguiendo en países del segundo nivel, como sería el caso de Chile en referencia a FTTH, encontramos que desde el gobierno se están enviando señales para que los operadores avancen con los despliegues de fibra. Para ello están desarrollando algunos planes de redes troncales y conexiones internacionales que podrían crear un incentivo para el avance y modernización de las redes de banda ancha fija de los operadores. Las iniciativas son múltiples e incluyen nuevas conexiones de fibra por la cordillera de los Andes con Argentina, una red

Líneas de banda ancha fija por tecnología en México



troncal en la zona más austral del país y un acuerdo para conectar al país con Japón a través de un cable submarino. Según datos del regulador, Chile contaba con 501.153 conexiones vía fibra óptica, lo que equivalía al 15,9 por ciento de los 3,1 millones de accesos registrados en octubre de 2018.

Incluso los países que entrarían a formar parte del tercer nivel, como por ejemplo, Perú, Bolivia o Costa Rica están mostrando sus avances en el despliegue de fibra y sobre todo en el despliegue de FTTH/B.

Así pues, el avance de la fibra en sus diferentes variantes parece mostrar registros de crecimiento a pesar de las dificultades que tienen los operadores para desplegar este tipo de infraestructura. La expansión de la fibra generará nuevos retos para los operadores a medida que avanzan en la oferta de nuevos servicios como consecuencia de la nueva infraestructura, impactando especialmente sus sistemas OSS/BSS, un aspecto que en muchos casos queda desatendido cuando se trata de este tipo de redes.

La firma de investigación independiente Heavy Reading recientemente se asoció con Incognito Software, un proveedor de software independiente

que se especializa en servicios de banda ancha y administración de dispositivos, para encuestar a proveedores globales de servicios de telecomunicaciones sobre los desafíos que enfrentan al escalar servicios basados en fibra. Los resultados de la encuesta, respondida por 150 ejecutivos principalmente en funciones de ingeniería de red, planificación de red y operaciones de red, se describen en el documento que sigue a continuación titulado “Superar los desafíos de escalar los servicios de fibra de próxima generación”.

Este documento profundiza en los resultados de la primera investigación de la industria que describe el desarrollo de la fibra, la activación del servicio, las estrategias de gestión y migración de los operadores de telecomunicaciones globales. El informe también explora el impacto que tendrán los nuevos servicios basados en fibra en los sistemas BSS/OSS heredados, y los desafíos que enfrentan los operadores al implementar, escalar y migrar a la fibra.



Rafael A. Junquera, Co-Fundador y Director Editorial de TeleSemana.com, cuenta con más de 18 años de experiencia cubriendo el sector de las telecomunicaciones para América Latina. El Sr. Junquera ha viajado constantemente alrededor del mundo cubriendo los eventos de mayor relevancia para la industria en América, Europa y Asia. Además ha sido invitado por varias organizaciones y empresas para realizar presentaciones estratégicas sobre el futuro del sector a operadores de varios países de Latinoamérica. Su experiencia académica incluye un BA en periodismo escrito por la Universidad de Suffolk en Boston, MA, y un Master en Economía Internacional en la misma institución.

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**HEAVY
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Overcoming the Challenges of Scaling Next-Generation Fiber Services

A Heavy Reading white paper produced for Incognito Software



AUTHOR: ALAN BREZNICK, CONTRIBUTING ANALYST, HEAVY READING

INTRODUCTION: WHY WE DID THIS STUDY

More than ever before, cable operators and other service providers are scrambling to install fiber in their hybrid fiber-coax (HFC) access networks to meet the growing customer demand for next-generation all-IP services. Whether they're racing to go all-fiber like Altice, embracing Fiber Deep like Comcast, Cox Communications and Liberty Global, or simply splitting more fiber-optical nodes like many other cable companies, providers are investing heavily in fiber for a plethora of reasons these days.

Besides soaring customer demand for new IP services, the list of reasons includes providing more basic bandwidth to subscribers, delivering new and/or advanced video services such as UHD/4K TV and streaming video, and eliminating amplifiers and other active electronic devices from their networks. The list also includes taking advantage of various PON technologies, supporting new wireless services and devices such as CBRs, 5G and small cells, and reducing operational expenses, among other things.

All these factors certainly seem well established now. In fact, fresh industry research conducted for Incognito by Light Reading's research arm, Heavy Reading, indicates that 90 percent of global service providers are now investing in fiber as a top business priority to boost network performance and offer new gigabit services to customers, among other reasons.

But what's not readily evident is the impact that this growing fiber diet is having, and will continue to have, on the network upgrades, equipment strategies and BSS/OSS system upgrade strategies of service providers, as well as how all these factors are impacting their ability to scale new gigabit, video and other advanced services.

In particular, it is not well known how providers intend to integrate their new fiber-based services into their OSS platforms, what kinds of challenges they are facing in installing, integrating and managing the fiber links, and how they are moving to meet those challenges. Yet, whether it means carrying out an OSS retrofit or adopting an entirely new stack approach for fiber, ensuring the seamless integration of new fiber network infrastructure and business process flows with legacy operational support systems is critical to the success of an operator's fiber journey.

Seeking answers to these and other critical questions, Heavy Reading partnered with Incognito in an industry-first project to survey and interview cable operators and other fixed-line broadband providers around the world about their fiber buildout, service activation, management and maintenance strategies. This white paper delves into the findings from the comprehensive online survey of 154 cable and fixed-line executives – complemented by one-on-one interviews of service providers in North America, Europe and Asia conducted by Heavy Reading – to dissect the challenges that providers face in scaling fiber-based services and examine the impact that deploying IP-based services over fiber will have on back-office systems.

ABOUT THE RESEARCH

The industry fiber survey, which was conducted online in early fall 2018, generated 154 qualified responses from cable, fixed-line telecom and converged (fixed and mobile) operators.

The survey responses were distributed broadly across the planet. North America contributed about 58 percent of the responses (with most of those coming from the U.S.) while Europe

came in second, generating about 22 percent. Latin America produced 10 percent of the responses, and the Asia/Pacific region contributed another 8 percent. The Middle East and Africa accounted for the remaining 1 percent.

Respondents hailed from service providers of all sizes, resulting in a quite diverse range. About a quarter (26 percent) of the survey replies came from executives at very large providers that produce more than \$10 billion in annual revenue, while another 9 percent came from staffers at big companies generating \$5 billion to \$10 billion in revenue. At the other end of the scale, 10 percent of the responses came from executives at small providers producing less than \$50 million in annual revenue, and another 15 percent came from staffers at companies generating \$50 million to \$200 million. Right about in the middle, 12 percent of the responses came from staffers at providers generating \$500 million to \$1 billion each year.

Not too surprisingly, most of the survey participants work for service providers that already deliver fiber-based service or plan to do so shortly. Nearly two thirds (62 percent) said their companies have offered fiber-based services for more than a year, while 18 percent said their company started offering such services in the past 12 months. Another 10 percent said their company intends to launch fiber-based services by next fall.

The survey participants were mainly technology experts very familiar with fiber and the services and equipment it enables and supports. More than two thirds (68 percent) are involved in technology evaluation of their company's fiber-based services. More than half (54 percent) are engaged in the introduction of new services. Exactly half (50 percent) work on rolling out fiber infrastructure, and more than a quarter (25 percent) work on CPE selection.

Respondents largely work in the network engineering, network planning and network operations units of their companies. Network engineering led the way with 38 percent, followed by network planning and network operations, both at 20 percent.

The one-on-one interviews were conducted by phone or email with four service provider technology executives, including one from North America, two from Europe and one from Asia. Heavy Reading agreed to keep the identities of the executives confidential to foster the frankness of their replies.

SUMMARY OF KEY STUDY FINDINGS

The study conducted for Incognito offers numerous insights about the fiber deployment, activation, migration and scaling plans of fixed-line providers, as well as the challenges they face in doing so. What follows is a brief summary of those findings:

- Fiber is central to the business and operational goals of the overwhelming majority of CSPs.
- New services, better network performance and improved customer experience are the key reasons why operators are installing more fiber.
- Gigabit, IP video streaming and 5G backhaul are the three top new services driving fiber deployments.
- CSPs generally favor retrofitting their existing OSS stack over replacing it with a totally new stack.

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- More providers plan to stick with DOCSIS for device management and diagnostics rather than switch to TR-069.
 - CSPs are generally split between using EPON and GPON for device provisioning over fiber lines.
 - Providers are aiming to automate a number of key network functions and processes, especially diagnostics, service fulfillment, device discovery and self-healing.
 - CSPs view network upgrades and integration with legacy OSS as the top two challenges for fiber service delivery.
 - Service configuration, billing and order management top the list of BSS/OSS systems impacted by introducing fiber-based services.
 - Providers see fiber customer integration, OSS systems and billing process changes as the biggest activation/management hurdles to overcome with fiber-based services.
 - Switching customers to fiber networks is the chief migration challenge from both a technical and business perspective.

CABLE NETWORK UPGRADE PLANS

Fiber Rollout Plans

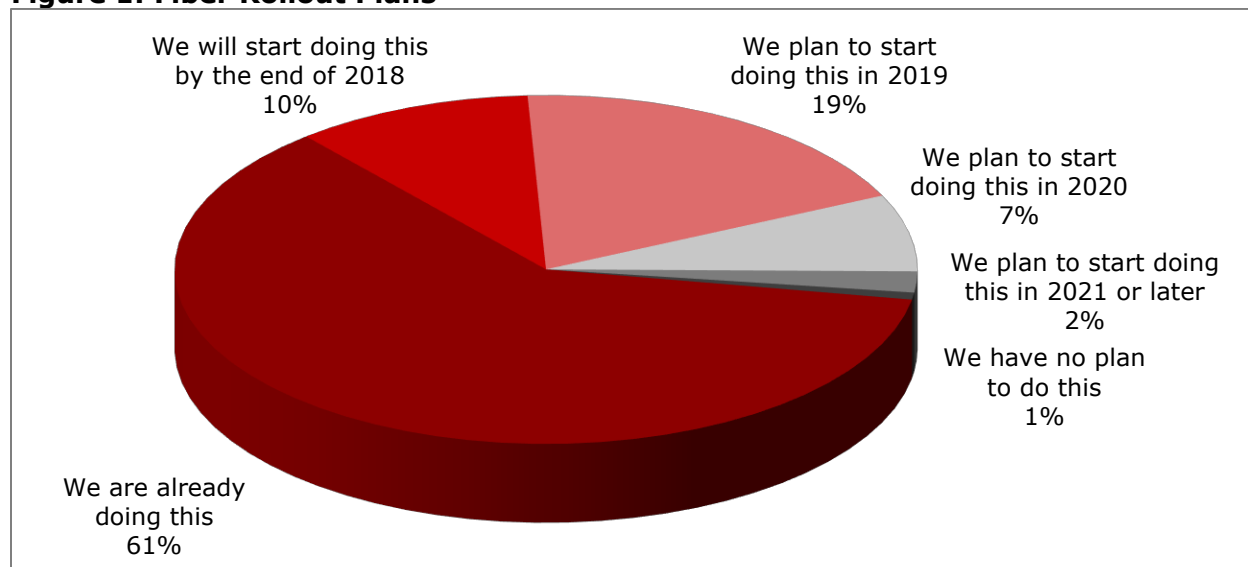
It's no secret that cable and other wireline providers are extremely committed to boosting their fiber diets, with most already doing it. But, just in case there were any doubts about it, the Heavy Reading study for Incognito should eliminate them. In the online survey of 154 qualified providers globally, more than three fifths of the participants (61 percent) said their company has already begun to extend fiber deeper into its access network. Another 10 percent said their company will start extending fiber deeper by the end of this year, while nearly 19 percent intend to start doing so in 2019.

The regional breakdowns of the results show that service providers have not been uniformly aggressive with their fiber deployments. In Asia, for instance, more than three quarters of respondents (nearly 77 percent) said their company has already begun to deploy fiber deeper while slightly less than half of European providers (nearly 48 percent) and less than two thirds of providers in North and South America (nearly 64 percent) said the same. That largely reflects the hyper-intense competitive environment in Asia, as well as the commitment by such leading Asian nations and territories as South Korea, Hong Kong and Singapore to blanket their countries with gigabit speeds.

But Asian service providers may not maintain their fiber lead for long. The survey also indicates that providers in Europe and the Americas intend to catch up quickly with their Asian counterparts, with at least 89 percent of the providers from each region slated to have started laying more fiber by 2020.

For instance, an executive at a large Western European service provider interviewed for this paper said his company has maintained an unflinching fiber installation pace for the past decade and doesn't intend to stop now. "We are doing it very, very fast," he said, noting that his company has now rolled out fiber lines to tens of millions of homes in its footprint but still has millions more to go.

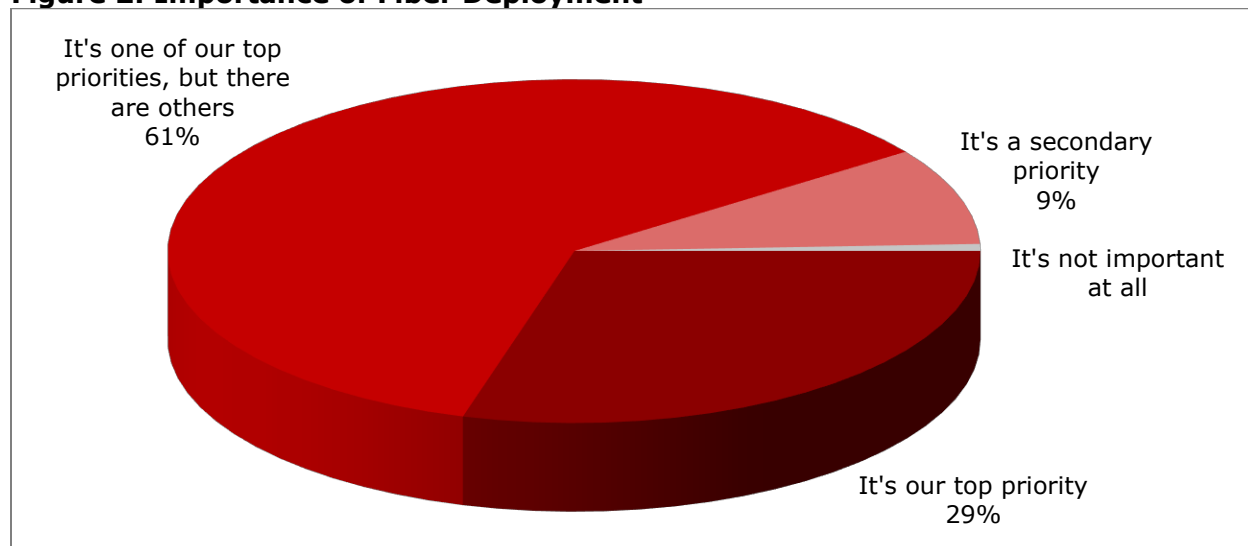
Figure 1: Fiber Rollout Plans



Importance of Fiber

Not surprisingly, then, deploying more fiber is a critical priority for most cable providers. Notably, nearly one third of survey participants (29 percent) labelled fiber deployment as their company's top priority right now. Moreover, three fifths of respondents (an impressive 61 percent) affirmed that installing more fiber is one of their company's top priorities. Thus, in total, 90 percent of respondents see deploying more fiber as a prime goal for their company.

Figure 2: Importance of Fiber Deployment



Looking at the regional breakdowns, rolling out more fiber appears to be most urgent in the Western Hemisphere right now. More than one third of North and South American respondents (nearly 36 percent) named fiber deployment as their company's top priority right now, as opposed to slightly under one quarter of Asian respondents (23 percent) and just more than a tenth of European respondents (11 percent). Further, nearly 93 percent of respondents

from the Americas termed fiber deployment a top or main priority for their company now, once again beating their counterparts in Asia (92 percent) and Europe (76 percent).

"We're embracing IP all the way," said an executive at one major North American MSO. If that means putting more fiber in the network, the executive said, then so be it. "The goal is not to be service-based but to provide service over all [platforms]."



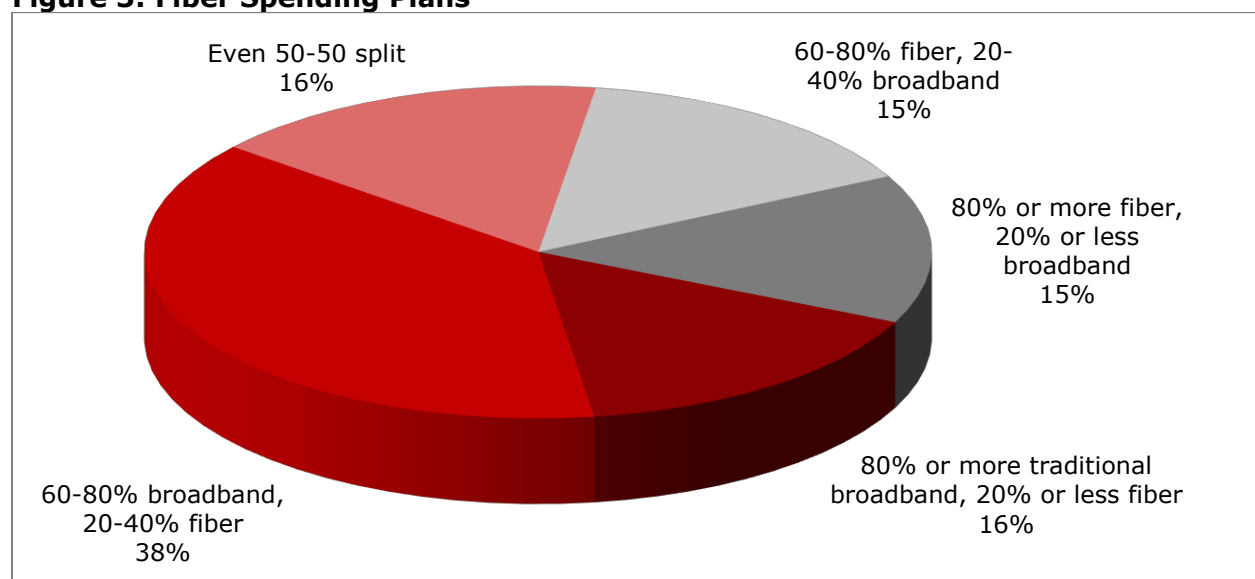
Most European and Asian providers still view further fiber deployment as critical to their future as well. In the follow-up one-on-one interviews, for instance, the executive at the large Western European service provider explained that his company views fiber as so vital that it's pouring nearly all its capital resources into it. "Our real target is FTTH," he said.

Even in parts of Asia, where fiber is already deployed more than in other regions, many service providers are still scrambling to install far more. For instance, in the follow-up interviews, an executive at a mid-sized Western Asian provider said his company continues to prioritize FTTH builds.

Spending on Fiber Service Teams

With the deployment of more fiber clearly a high priority for the vast majority of providers around the world, operator spending patterns are notably shifting in fiber's favor. When asked about their company's current budgetary allocation between traditional broadband service teams and fiber service teams, slightly more than half of survey participants (or about 54 percent) said their company is still spending more on traditional broadband teams than fiber service teams. But nearly a third (about 30 percent) said their companies are now spending more heavily on fiber, and 16 percent said their company now spends about the same on both fiber and broadband.

Figure 3: Fiber Spending Plans



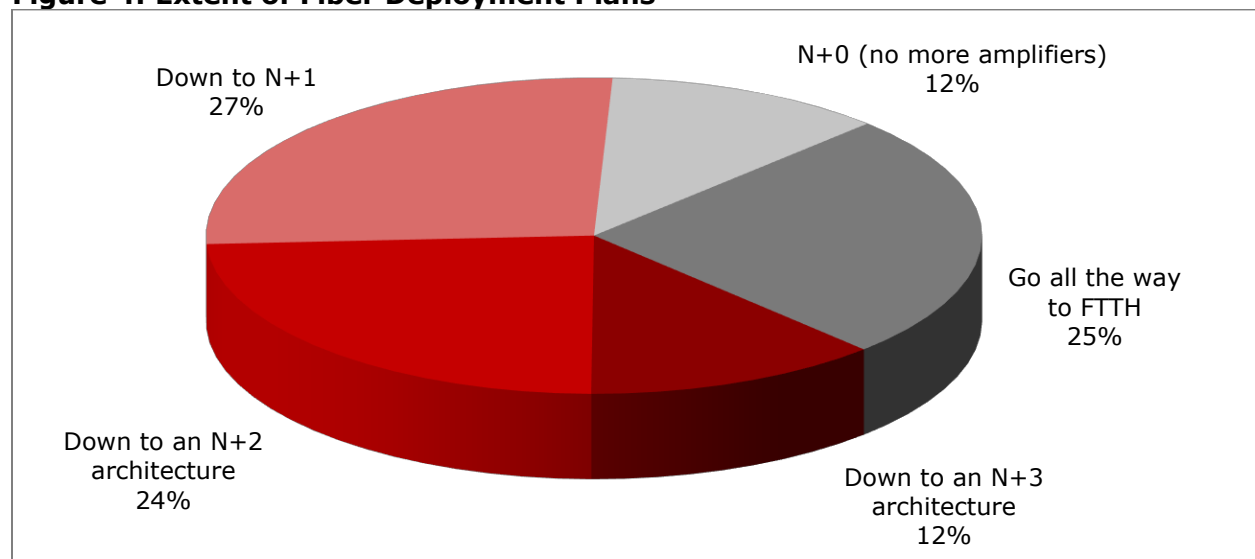
There are some stark regional differences here, too. Not surprisingly given the earlier results, Asian service providers are spending the heaviest on fiber teams now, with close to half of

respondents (46 percent) saying their companies are spending at least 80 percent of their budget on fiber. In contrast, just 17 percent of European respondents say their company is spending that much of its budget on fiber service teams and a mere 10 percent of respondents from the Americas say the same thing.

Depth of Fiber Rollouts

Just how deep do cable and other fixed-line providers plan to extend fiber lines into their access networks? Pretty deep, judging by the survey results. A quarter of all survey participants (25 percent) said their company aims to go all the way to a full FTTH network eventually. About one seventh of overall respondents (12 percent) said their company plans to extend its fiber lines to an N+0 architecture (fiber-optic node plus zero amplifiers, which is the very definition of the cable industry's Fiber Deep strategy), down from the N+4 and N+5 architectures that are typically still found among cable operators today. Nearly 27 percent said their company aims to go almost as far to a node-plus-one-amplifier (N+1) architecture, while 24 percent selected an N+2 architecture and the remaining 12 percent picked N+3.

Figure 4: Extent of Fiber Deployment Plans



While the study didn't break down the results by type of provider, the N+0 percentage would undoubtedly be higher for pure cable operators because that architecture is unique to the cable industry. In another recent study conducted by Heavy Reading, more than a third of respondents (nearly 36 percent) said their company plans to go FTTH in at least some regions while 29 percent said their company will extend fiber to an N+0 architecture.

Asian service providers stand out in the Incognito survey again. More than half of the respondents (nearly 54 percent) from Asian providers said their company plans to go fiber all the way to the home, more than twice the overall survey average. In contrast, slightly less than one quarter of respondents in the Americas (almost 24 percent) and only about one sixth of European respondents (nearly 17 percent) intend to follow the FTTH path.

Instead, service providers in Europe and the Americas are more likely to extend fiber deep enough in their access networks that they can eliminate at least some, if not all, of the network amplifiers. The biggest portion of providers in the Americas (27 percent) aim to get to

"We can do fiber to the buildings but its [still] not economical to wire inside buildings that already have coax."

— A Mid-Sized Eastern European Operator

an N+2 architecture while the biggest portion of European providers (47 percent) are shooting for an N+1 architecture.

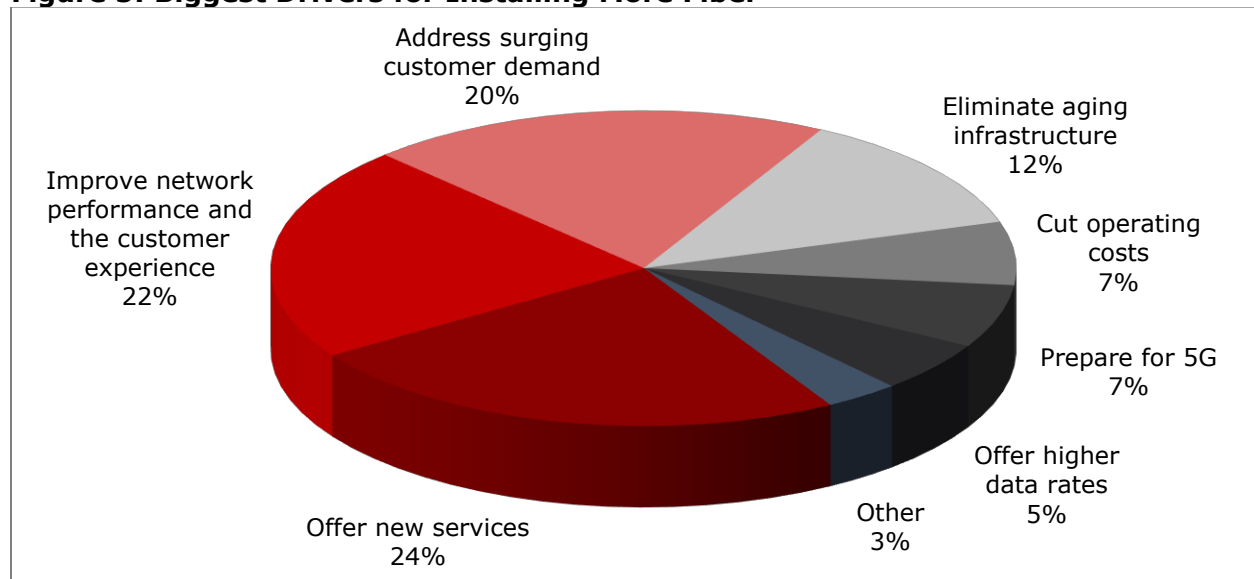
To cite one typical example, a mid-sized Eastern European operator is increasingly laying fiber all the way to apartment buildings in its footprint, but not all the way to the individual apartment units yet. "We can do fiber to the buildings but its [still] not economical to wire inside buildings that already have coax," an executive at that operator said. But even in Europe, some providers are embracing FTTH. Besides the

Western European service provider quoted in this paper, Altice Europe is a classic example, now going all-fiber in both France and Portugal.

Biggest Drivers for Fiber

As we have noted already, cable operators have numerous reasons for putting more fiber in their networks. But, as the survey shows, several reasons do stand out as the biggest ones. Nearly one quarter of survey respondents (24 percent) cited offering new services. Improving network performance and the customer experience came in a close second, with support from 22 percent of respondents. Addressing surging customer demand placed third with 20 percent, followed by eliminating aging infrastructure at 12 percent.

Figure 5: Biggest Drivers for Installing More Fiber



The regional differences are notable here, too. While offering new services easily emerges as the biggest motivation for installing more fiber in both Asia and Europe, it does not in the Americas. More than one third of European respondents (36 percent) and nearly one third of Asian provider execs (31 percent) cited offering new services as the biggest motivation, while only 19 percent of respondents did so in the Americas.

Indeed, offering new services came in as only the third leading reason for deploying more fiber in the Americas. Unlike in the other two regions, both improving network performance and the customer experience (26 percent) and addressing surging customer demand (21 percent) topped the list of reasons instead.

New Fiber Services

Given such strong interest in offering new and advanced services over their fiber lines, fixed-line providers are clearly chomping at the bit to roll out a slew of services, if they haven't started doing so already. Gigabit broadband leads the way, with nearly three quarters of respondents (almost 72 percent) citing that as a service their company either now offers or plans to offer over its fiber network. No other service comes close.

But other next-gen services still rank highly as well. Nearly three fifths of survey participants (58 percent) said their company now offers or intends to offer IP video streaming over fiber. 5G mobile backhaul (56 percent), business services (53 percent) and 4K/8K video (51 percent) all drew support from a definite majority of respondents as well.

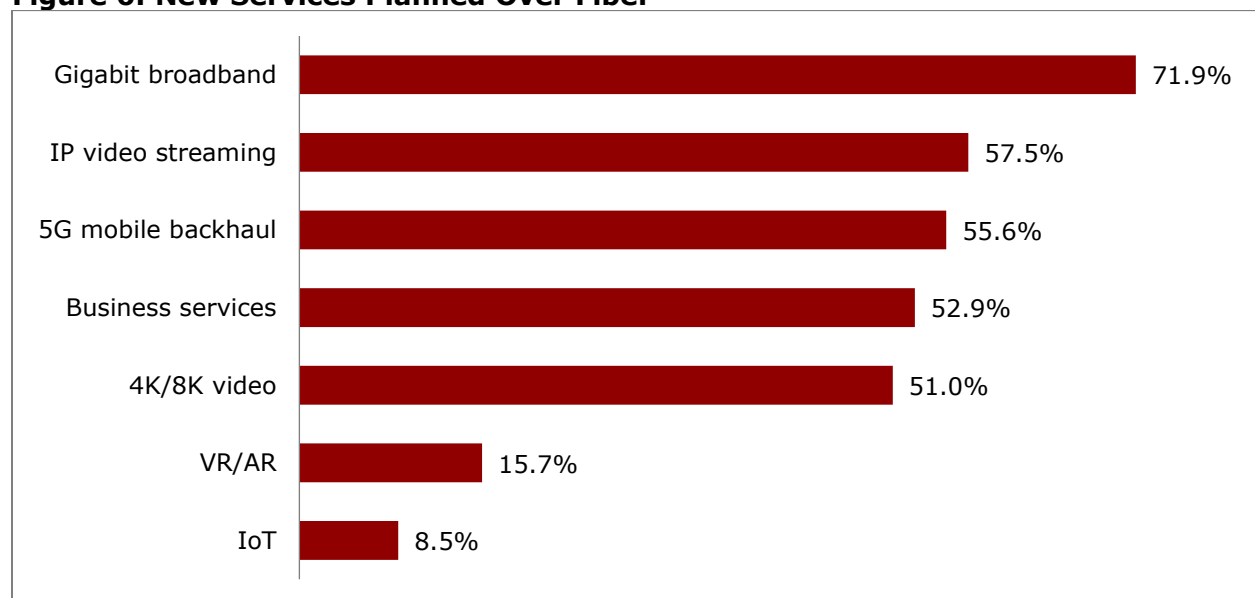
Looking at the regional breakdowns, some interesting differences proved notable. While gigabit broadband topped the scales in most regions of the world, it did not do so in Europe, where it actually finished a close second in the rankings to 4K/8K video.

Furthermore, the other most popular services traded positions in the various regions. In the Americas, for instance, 5G mobile backhaul and IP video streaming took second and third place, respectively. But in Europe, gigabit broadband and business services came in second and third. Lastly in Asia, business services tied gigabit broadband for first, while IP video streaming finished third.

In one example of the diversity of new services planned, the mid-sized Eastern European operator has plans to use its fiber lines to deliver 5G backhaul services to mobile carriers, at least its more densely populated regions. In addition, it's looking at using fiber to offer more advanced video services.

Somewhat similarly, the mid-sized Western Asian provider is now leveraging its fiber networks to offer business services, especially to enterprises. It's also relying on fiber to support mobile services, such as LTE and transport of RF services.

Figure 6: New Services Planned Over Fiber



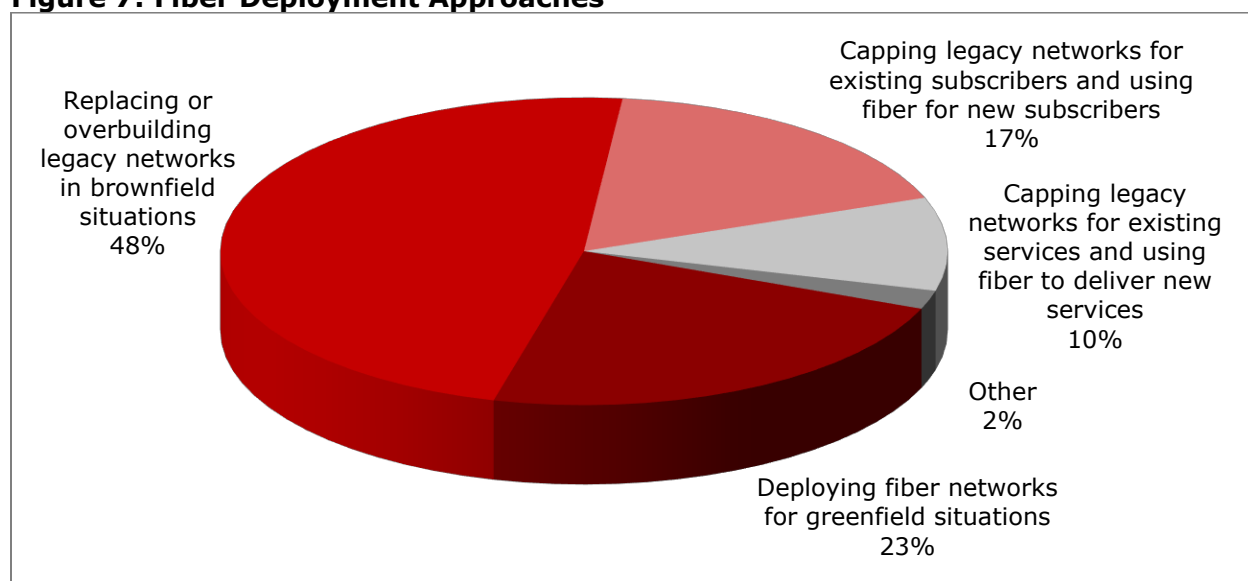
CABLE FIBER ROLLOUT STRATEGIES

As we have seen, cable operators and other wireline service providers clearly have ambitious plans for rolling out more fiber and leveraging that fiber to deliver next-gen IP services, boost network performance, improve the customer experience and meet surging subscriber demand for more bandwidth and more advanced services. Now the big question is: How will service providers carry out these fiber deployments? How will the fiber rollouts impact their network buildout, equipment uses and back-office system upgrade strategies?

Greenfield vs. Brownfield Approach

What the survey results reveal is that service providers are pursuing a variety of strategies for deploying new fiber in their territories. Surprisingly, nearly half of respondents (48 percent) said their company is replacing or overbuilding legacy networks in "brownfield" situations at least some of the time. That's far more than was expected going into the survey, indicating that many providers are more than willing to junk their legacy coax and copper networks in favor of fiber if they sense the need for it.

Figure 7: Fiber Deployment Approaches



For once, no real regional differences surfaced here. In all areas of the world, significantly more respondents said their companies are replacing or overbuilding legacy networks in "brownfield" situations than said they are deploying fiber networks for new-builds in "greenfield" situations. Brownfield particularly trumped greenfield in Europe but also scored highly in Asia and the Americas, likely reflecting the increasingly high demand for fiber by many customers.

"We do fiber if the building owner wants it," explained the major North American MSO executive, who mainly focuses on serving commercial customers. "It's not just for greenfields... We will do fiber in brownfields too."

More predictably, nearly one quarter of survey participants (23 percent) said their company is mainly deploying fiber networks for new builds in "greenfield" situations where providers

are seeking to serve new, unwired homes, multiple dwelling units (MDUs) or commercial buildings. Another 17 percent said their company is capping its legacy networks for existing services and using fiber to serve new subscribers, while 10 percent said their company is capping its legacy networks for existing services and using fiber to deliver new services.

But even in some greenfield situations, FTTH is not necessarily the automatic choice, service provider executives say. "Even greenfields are not always so easy now," said the executive at the mid-sized Eastern European operator, citing the relatively high costs of fiber and labor in that company's region. "They do not always turn out economically well."

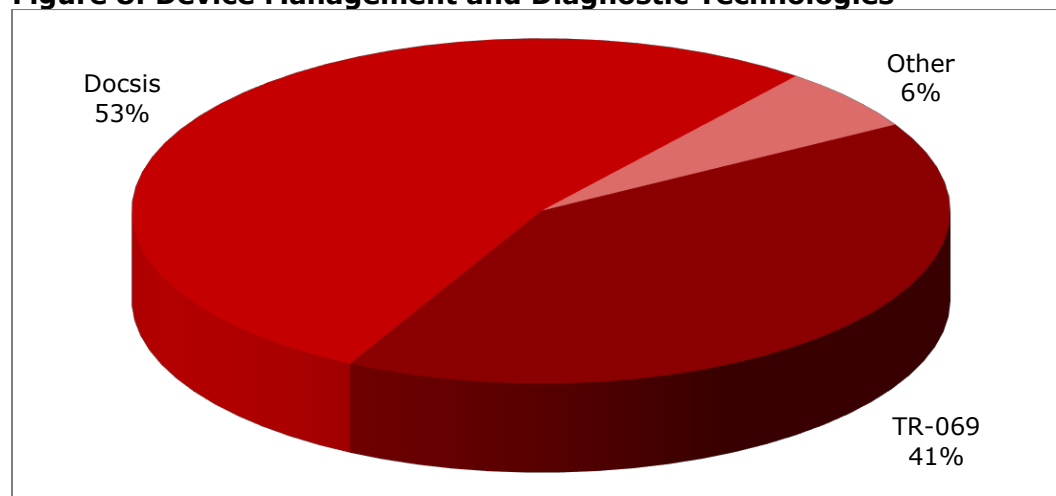
DOCSIS vs. TR-069

As cable operators introduce more fiber and related new customer premises equipment (CPE) in their networks, they face the choice of switching to new device management and diagnostic technology or sticking with their legacy systems. That raises the question of whether they will stick with DOCSIS technology or change to a new system.

The survey results indicate that while a slight majority of providers will stick with DOCSIS, a sizable minority may turn elsewhere. Specifically, 53 percent of respondents said their company will keep leveraging DOCSIS for device management and diagnostics while 41 percent said their company will turn to TR-069 technology, indicating that service providers may be looking at supporting new types of devices such as various IoT gadgets.

The TR-069 option is proving particularly popular in Asia, where it's favored by almost three fifths of respondents (nearly 59 percent), as opposed to 39 percent for DOCSIS. But DOCSIS still holds reign in Europe and the Americas, where it commands 53 percent and 57 percent support, respectively.

Figure 8: Device Management and Diagnostic Technologies

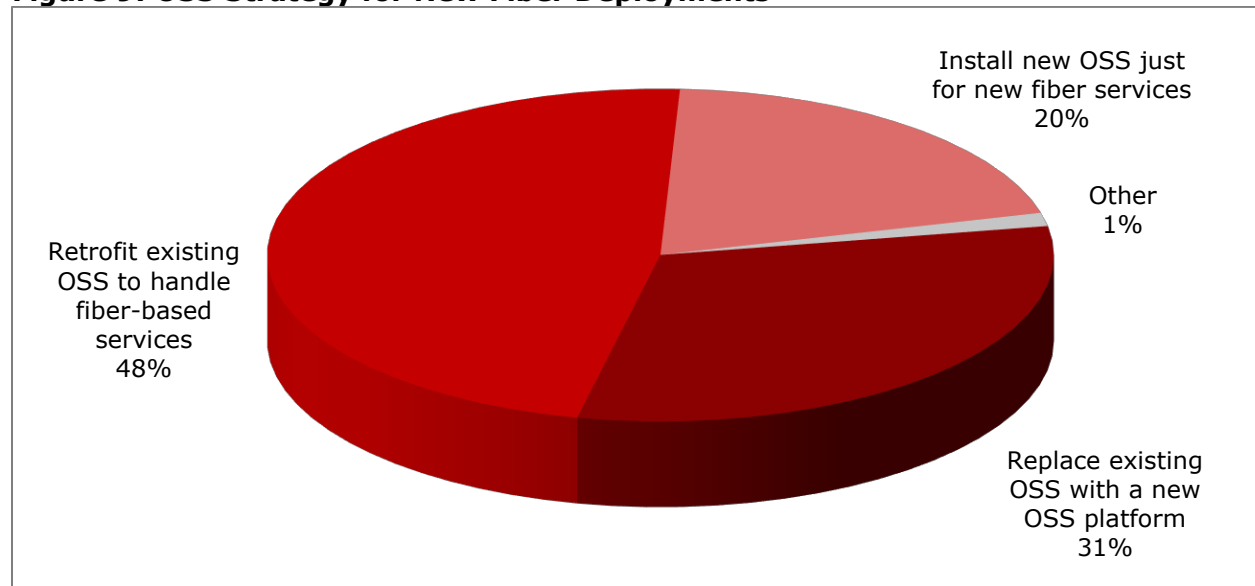


Retrofitting vs. Replacing OSS

One critical component of the cable industry's aggressive fiber rollout is its strategy for upgrading or replacing key back-office systems such as operations support systems (OSS). Will the increased reliance on fiber prompt operators to put in new OSS stacks, retrofit their existing stacks or adopt some type of hybrid approach?

The survey results indicate that, while all approaches draw support, a plurality of providers are leaning toward retrofitting their existing OSS stack right now. Specifically, nearly half of survey participants (48 percent) said their company's approach is to retrofit its existing OSS stack to handle fiber-based services. Slightly less than one third (31 percent) said their company's strategy is to replace its existing OSS with a totally new OSS platform. The remaining 20 percent said their company is installing or will install a new OSS stack just for new fiber-based services. The remaining 20 percent said their company is installing or will install a new OSS stack just for new fiber-based services.

Figure 9: OSS Strategy for New Fiber Deployments



Homing in on the regional breakdowns, however, a more nuanced view emerges. While most European services providers and a plurality of wireline operators in the Americas favor retrofitting their existing OSS stack, an overwhelming majority of Asian providers are looking at replacing their existing OSS stack. Specifically, slightly more than three fifths of executives at Asian providers (61.5 percent) said that their companies are replacing their OSS platforms, rather than retrofitting them. In contrast, European respondents said their companies favor retrofitting over replacing by an overwhelming 60 percent to 20 percent margin, and respondents in the Americas gave the nod to retrofitting by a 47 percent to 29 percent margin.

These disparate results were reflected in the follow-up one-on-one interviews. "We're much more inclined to retrofit systems," said the executive at the mid-sized Eastern European provider who described his company's approach as "very conservative."

But several officials noted that the market momentum is moving in the direction of installing new OSS stacks for fiber-based services as more fiber gets installed and more services are distributed over it. "It's kind of both [right now]," said the executive at the major North American MSO. "[But] our new systems will take off more next year."

Anticipating the need for improved OSS platforms for fiber services, some providers have already replaced or upgraded their legacy stacks. Take the large Western European provider, which began the upgrade process as far back as a decade ago. "That's [retrofitting is] not really a big deal for us now," said the executive there. "We already did it years ago."

Technologies for Retrofitting OSS

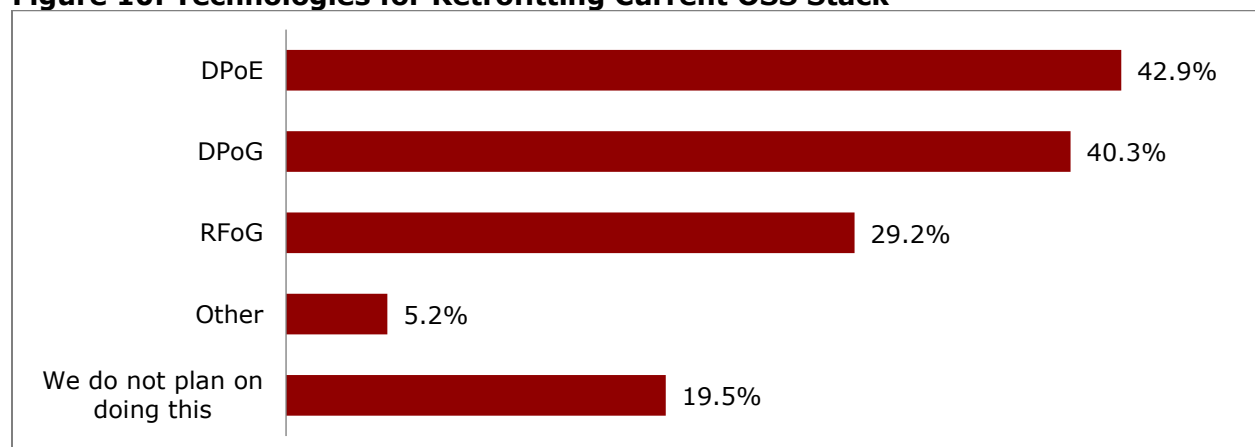
With retrofitting the existing OSS stack carrying the day, we then asked survey participants which technologies their company intends to use to do that. DOCSIS Provisioning over EPON (DPoE) was the narrow winner here, with a bit over two fifths of respondents (43 percent) choosing it. But DOCSIS Provisioning over GPON (DPoG) came in a very close second, with two fifths of respondents (40 percent) selecting that option. This reflects the fact that both EPON and GPON appear to be popular options as operators increasingly shift more to fiber.

"We do envision a future where PON will be available quite a bit across the board," said the executive at the major North American MSO, which is mainly deploying EPON right now. "Our OSS system needs to support an OLT and manage that as a core network device."

While DPoE carries the day overall, it fares much better in the Americas than other parts of the world. Whereas survey participants from service providers in the Americas picked DPoE over DPoG by a 45 percent to 39 percent margin, respondents from Asian providers were evenly split at 23 percent apiece and respondents from European providers cast their lot with DPoG by a 49 percent to 43 percent margin.

Radio Frequency over Glass (RFoG) also received notable support, with 29 percent of respondents picking it. This indicates that at least some providers are planning to use more than one technology for retrofitting their legacy OSS stacks. For instance, the mid-sized Eastern European operator is now leveraging both GPON and RFoG for its fiber deployments, deciding which one to use on a case-by-case basis.

Figure 10: Technologies for Retrofitting Current OSS Stack



DAA Plans

As they push fiber deeper in their access networks, fixed-line operators are also deploying other new technologies and platforms at the same time. One of those prime new technologies is Distributed Access Architecture (DAA), which involves shifting key headend components and intelligence to the access network and is dependent on greater fiber links.

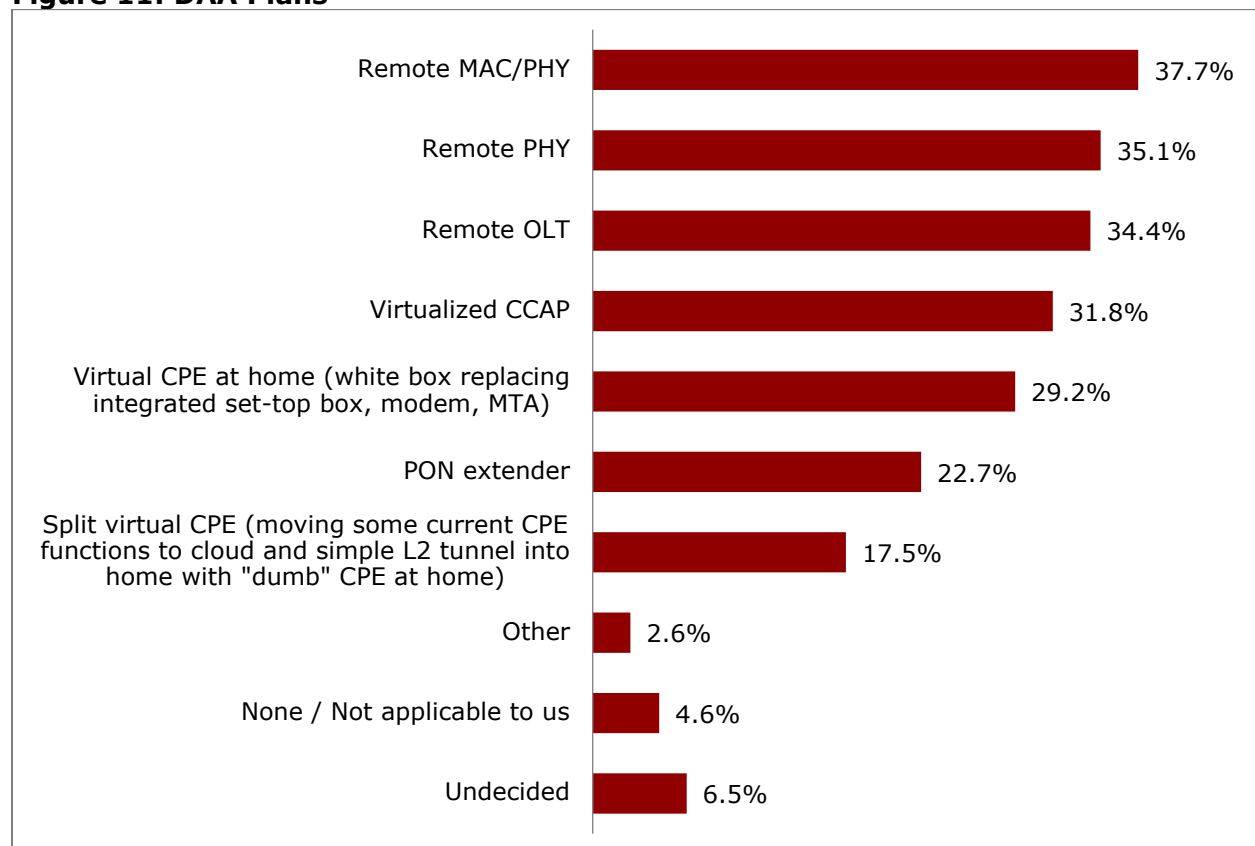
Queried about which DAA solutions their company is now pursuing, survey participants were all over the map. Nearly two fifths of respondents (almost 38 percent) said their company is now pursuing a Remote MAC/PHY solution, making that the lead choice. But nearly as many, 35 percent, said their company is pursuing Remote PHY, while 34 percent are pursuing

Remote OLT. Plus, just about all the other options garnered significant support as well, with 32 percent choosing Virtualized CCAP, 29 percent picking Virtual CPE in the home, 23 percent picking PON extenders, and 18 percent selecting Split Virtual CPE.

Once again, the regional differences are notable here. While Remote PHY is the narrow favorite over Remote MAC/PHY and Remote OLT in the Americas, it fares much worse in other parts of the world. Respondents from Asian service providers heavily favored Virtual CPE and PON extenders as their company's DAA choices, while more European respondents said their companies were betting on Remote MAC/PHY technology than any other distributed access option.

What these results indicate is that the religious wars over the different DAA options may well be coming to an end after years of strife. While some MSOs, like the large North American operator profiled here, still strongly favor Remote PHY technology, most cable operators intend to leverage a variety of DAA options in their footprints, rather than take a one-technology-fits-all-systems approach, at least for the time being. It will be interesting to see if, and how, that strategy changes over time as they increase their fiber penetration.

Figure 11: DAA Plans



Automation Plans

Along with deploying the various DAA solutions, cable operators are seeking to automate their systems and processes as they install more fiber and start virtualizing their networks, functions and services. When asked which specific processes their company expects to automate over the next two years, more than half of survey participants (about 56 percent) chose

service fulfillment, making that the narrow lead choice. Slightly fewer (54 percent) selected system diagnostics, making that the second favorite. Close to half of participants (47 percent) named device discovery, while 46 percent picked self-healing, 39 percent chose trouble ticketing, and 31 percent picked report generation.

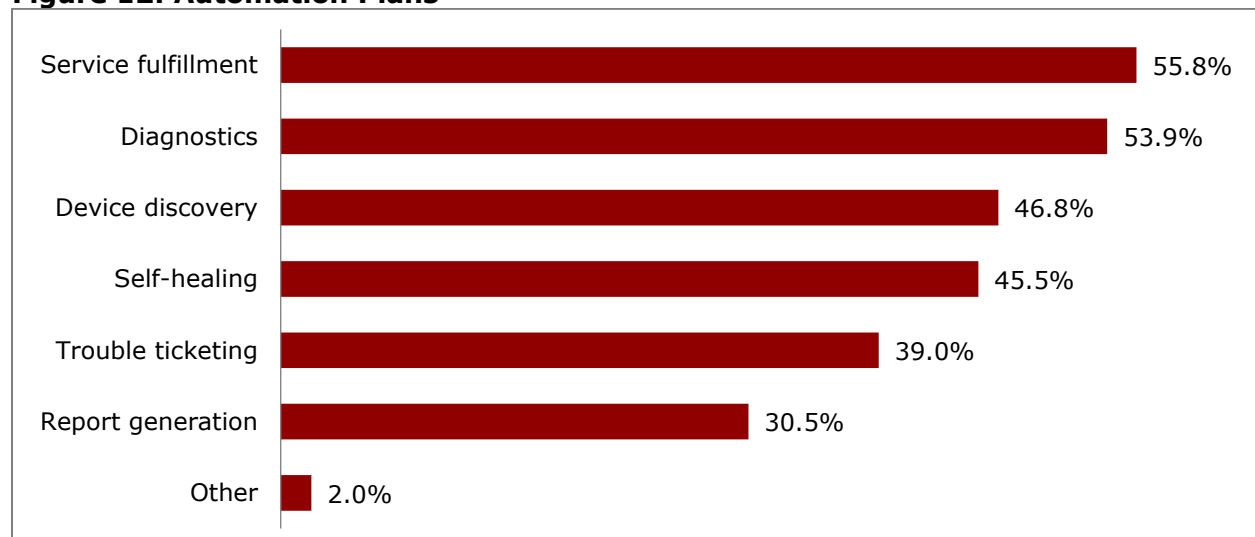
While service fulfillment was the top choice among all survey participants, it did decidedly better in some parts of the world than others. In the Americas, for instance, it led the way with support from 56 percent of respondents, easily outdistancing self-healing, which claimed second with 47 percent. But self-healing edged out service fulfillment by a 54 percent to 49 percent margin in Europe, and service fulfillment ended in a four-way tie for first with trouble ticketing, diagnostics, and report generation in Asia. Thus, the automation priorities clearly vary somewhat from one region to the next.

Despite such regional differences, these results show that service providers intend to automate a number of critical systems and processes over the next couple of years, especially concerning service fulfillment, system diagnostics and self-healing. The goals seem to be to improve early detection and correction of network problems and improve the delivery of both new and existing services.

"We need increased automation," said the Western European service provider executive. But to achieve that, he noted, "We need to have very good inventory, good data in our systems. That's very important... We need pretty complex algorithms to make the right decisions."

"We need increased automation... [so] we need to have very good inventory, good data in our systems... We need pretty complex algorithms to make the right decisions."
— A Western European Service Provider

Figure 12: Automation Plans



CABLE FIBER DEPLOYMENT CHALLENGES

Of course, as alluded to earlier, cable operators face numerous challenges, both major and minor, as they move to install more fiber in their plant. These challenges range from upgrading their network platforms to support the new fiber connections to integrating fiber

customers into their legacy OSS systems to maintaining service to customers who haven't been upgraded to fiber yet. And that's just for starters.

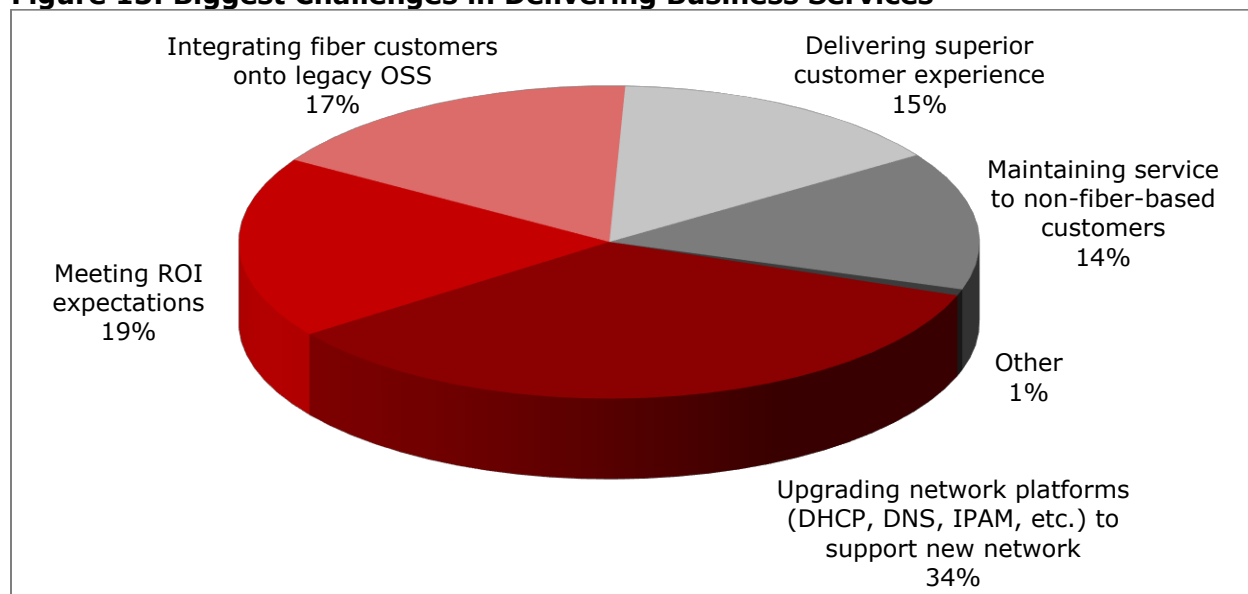
Focusing on these issues, the Heavy Reading survey for Incognito asked a series of questions about the challenges that cable operators face in installing more fiber in their plant. The answers proved quite illuminating.

Chief Challenges in Delivering Business-Grade Services

First, the survey asked participants to select the biggest challenge for their company in delivering business-grade data, voice, video and other services to enterprise customers over fiber. About one third of respondents (34 percent) cited upgrading network platforms (DHCP, DNS, IPAM, etc.) to support the new fiber network, making that handily the number one choice. Nearly a fifth (19 percent) picked meeting ROI expectations, while slightly fewer (17 percent) chose integrating fiber customers onto their company's legacy OSS stack. About 15 percent selected maintaining service to non-fiber-based customers, and 14 percent opted for delivering a superior customer experience.

Once again, though, the responses significantly varied by region. While upgrading network platforms was the lead choice among all survey participants, it was notably more popular in the Americas and Europe than in Asia. Some 39 percent of European survey participants and nearly 36 percent of respondents in the Americas picked it as their company's biggest challenge in delivering business-grade services, as opposed to a mere 8 percent of Asian respondents. Instead, Asian respondents overwhelmingly chose delivering a superior customer experience and meeting ROI expectations as their companies' greatest challenges in delivering business-grade services.

Figure 13: Biggest Challenges in Delivering Business Services



Existing OSS a Big Barrier?

Given that it's a big deal for cable operators to retrofit or replace their OSS stack for any reason, the survey looked at just how much of a barrier their existing OSS system can be

for deploying new fiber-based services. As it turns out, it is a major stumbling block. Nearly half of survey participants (47 percent) said their company's existing OSS stack is "a significant barrier but not the biggest one," while another 4 percent said it's the biggest one. In other words, slightly more than half of respondents (51 percent) view the legacy OSS stack as a major obstacle in rolling out new fiber-based services.

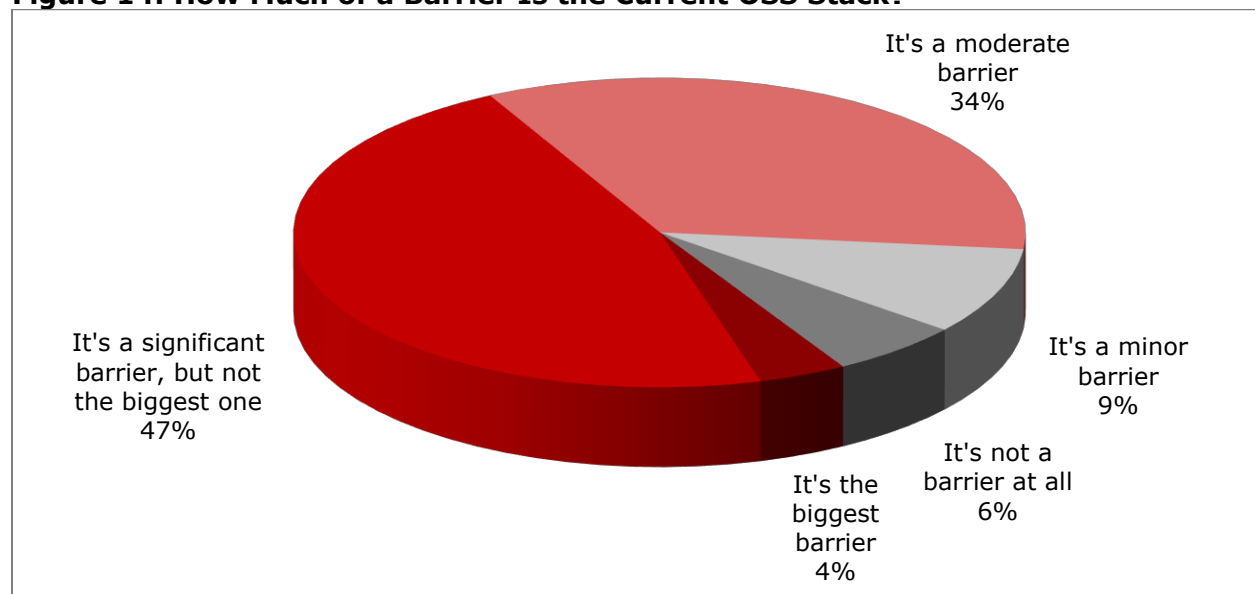
Slightly more than one third of respondents (34 percent) characterized their existing OSS stack as "a moderate barrier." Another 9 percent shrugged it off as a minor barrier, while 6 percent dismissed it as "not a barrier at all."

For a change, service providers in all three regions pretty much agreed on the thrust of the results here. But there were still some noticeable differences among them. In particular, European respondents view their company's existing OSS platform as a significant barrier, with more than three fifths of them (nearly 63 percent) checking that box. That compares with 54 percent of Asian respondents, and 41 percent of executives from the Americas.

The Western European provider interviewed for this paper would appear to be an exception to the rule here, because it generally does not view its existing OSS stack as a major barrier to more fiber deployments. But that's largely because it already started moving to retrofit or replace its stack years ago. "We mostly modified our existing ones," the executive there said.

Thus, it is clear once again that dealing with their existing OSS stack is a crucial issue for service providers as they increase their reliance on fiber. Overcoming this hurdle will go a long way toward making the deployment and delivery of services over fiber-rich networks more effective and efficient.

Figure 14: How Much of a Barrier Is the Current OSS Stack?



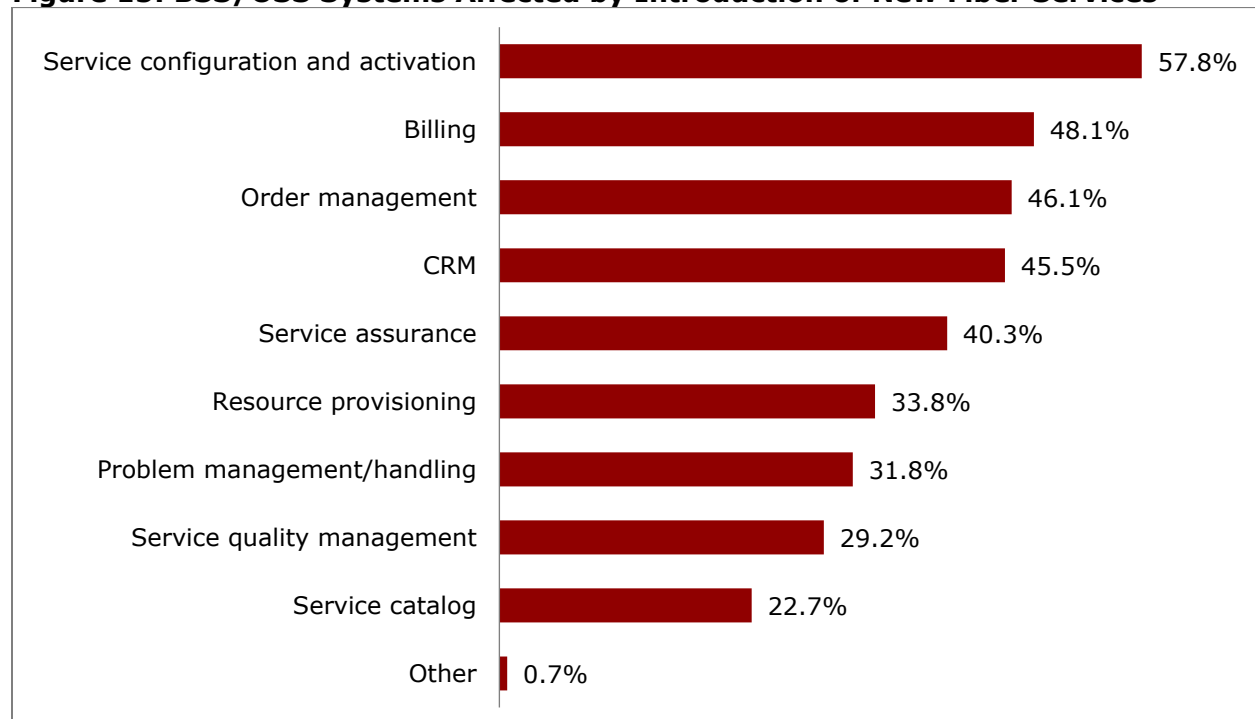
BSS/OSS Systems Most Impacted

Given such a dramatic impact on the back office, which BSS/OSS systems will be most impacted by the introduction of new fiber-based services? Nearly three-fifths of survey

participants (almost 58 percent) said service configuration and activation will be affected, making that the lead choice. Billing came in second, earning votes from 48 percent of respondents. Order management was in third place with 46 percent, followed by CRM at 46 percent and service assurance with 40 percent.

A few regional differences emerged here, with service configuration and activation topping the charts in the America and Asia, while coming in a much weaker third in Europe. But respondents in all three regions basically chose the same four BSS/OSS systems – service configuration and activation, billing, CRM and order management – as the ones that will be most impacted by the launch of new fiber-based services. In one notable exception, service assurance and problem management/handling ranked high as a challenge in Asia.

Figure 15: BSS/OSS Systems Affected by Introduction of New Fiber Services

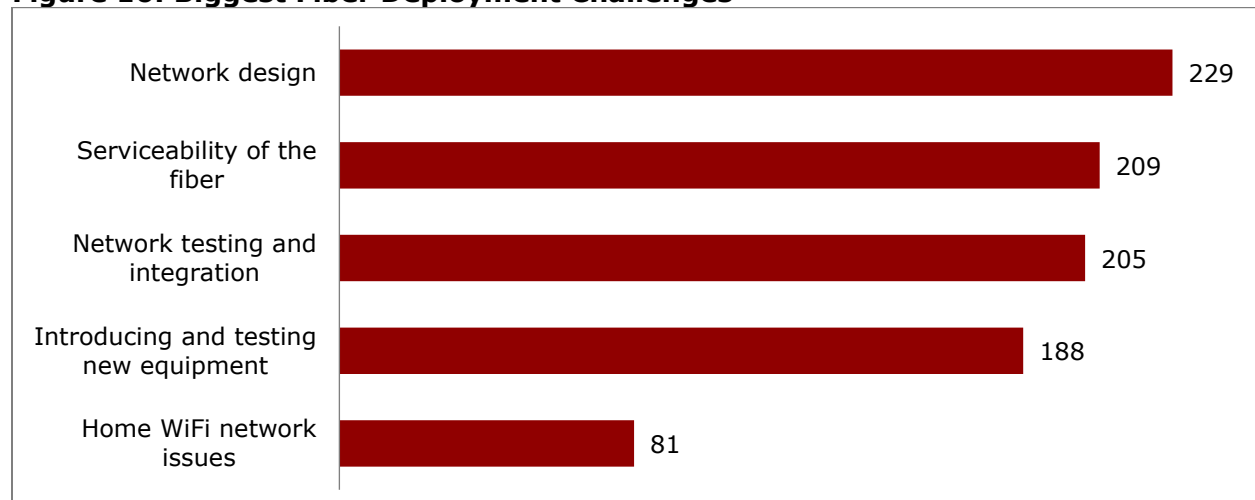


Biggest Fiber Deployment Challenges

Moving beyond the OSS issues to broader concerns, the survey explored the three biggest fiber deployment challenges facing fixed-line operators today. Network design rated as the greatest challenge among survey participants with an index score of 229, beating out four other choices. Respondents ranked fiber serviceability (index score of 209) as the second biggest fiber deployment challenge with network testing and integration (index score of 205) coming in a close third.

Network-related issues predominated in all three regions studied, especially in the Americas, although less so in Asia. In fact, respondents in both Europe and the Americas rated network design as the leading fiber deployment challenge and ranked network testing among the top three challenges. Survey participants in all three regions also ranked network design and fiber serviceability as top challenges. In the only real deviation from the norm, Asian respondents identified introducing and testing new equipment as a leading challenge.

Figure 16: Biggest Fiber Deployment Challenges



Although it did not draw much attention in the online survey, permitting issues for public rights-of-way emerged as a critical concern in some of the follow-up interviews. In parts of Asia, for example, gaining government permits to dig up the streets and install more fiber can be a lengthy. In fact, in our follow-up one-on-one interviews, the executive at the large Asian service provider named that and civil work as two of the top three fiber deployment challenges for his company, along with fiber quality and installation issues.

Similarly, in North America, officials complained that building owners can take as long as 90 days to let cable construction crews in, while some large cities take up to 150 days to issue construction permits. "Fiber is just difficult to build because of the paperwork needed with the cities and buildings," said the executive at the major North American MSO. "Downtown areas are just incredibly hard to build anywhere."

Other executives explained that the sheer, unrelenting "pace" of installing so much fiber in their networks is a critical deployment challenge. "It's a challenge really of scale," said the executive at the large Western European provider. "It's been a very fast deployment, especially compared to copper." Among other things, he noted that the fast pace has put a strain on his company's ability to acquire enough fiber and train its technicians and subcontractors properly to install it.

Biggest Fiber Migration Challenges

Next, the survey tackled the thorny issue for service providers of moving customers and services to fiber, asking participants to pick the three biggest migration challenges that cable companies face with their fiber deployments. Switching customers from a legacy network to a new fiber network from a business perspective narrowly topped the list of hurdles among respondents, generating an index score of 220. Switching customers from a legacy network to a new fiber network from a technical business perspective came in a very close second with an index score of 219. Retrofitting legacy OSS platforms for new services rounded out the group of three with an index score of 129.

These results were nearly uniform across the different regions. In all three, the migration of customers from a legacy network to a fiber network ranked as the top challenges from both a business and technical perspective. OSS platform transition issues also stood out as a

Migration challenges include matching up the design database with the actual install database, updating the database after upgrading the fiber network and covering the costs of frequent site surveys.

— A Mid-Sized Western Asian Operator

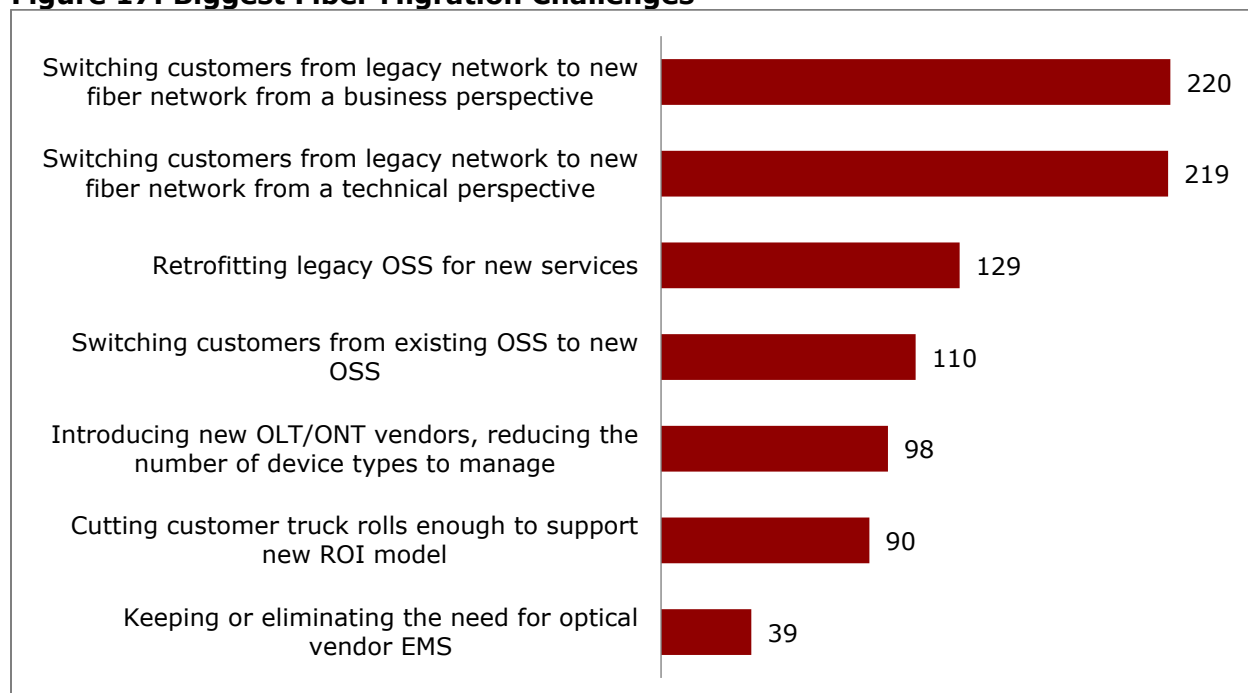
of view, it's no big deal," he said. "It's much more of a migration issue on the customer's IT than the network IT."

main issue in the Americas and Europe, while Asian respondents are concerned about cutting customer truck rolls.

In the follow-up one-on-one interviews, a few other key issues emerged as well. At the mid-sized Western Asian provider, for instance, the executive ticked off such customer migration challenges as matching up the design database with the actual install database, updating the database after upgrading the fiber network and covering the costs of frequent site surveys.

The large Western European provider is running into other fiber migration issues, primarily in the customer's home because of the need for equipment upgrade there. "From a network point

Figure 17: Biggest Fiber Migration Challenges



Biggest Fiber Scaling Challenges

The survey then looked at the three biggest scaling challenges that fixed-line operators face with fiber. Not surprisingly, fiber availability and cost easily topped the charts here, beating out the other five choices with an index score of 204. Introducing new services ranked second highest with a score of 163, followed closely by installation issues with a score of 160.

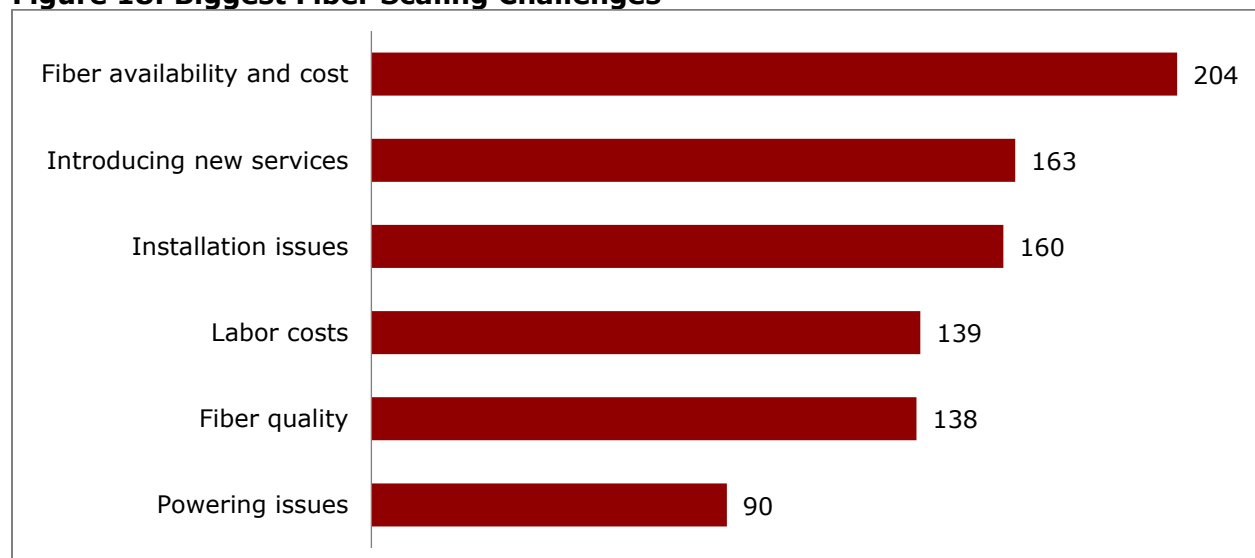
Fiber availability and cost ranked as one of the chief challenges across all the regions, including the biggest challenge in the Americas. Installation issues scored at or near the top in the Americas and Asia, while introducing new services ranked highly in Europe and Asia. Labor costs were also a great concern in the Americas, while fiber quality was a major hurdle in Europe.

In one typical interview response, the executive at the mid-sized Eastern European operator said the high cost of both fiber and labor in that provider's region is a significant constraint. He particularly noted that "the equipment is always a big part of the money spent here."

Fiber availability and cost are not necessarily huge concerns for all service providers, though, especially the largest ones. At the major North American MSO, for instance, high capex spending on new fiber is just one of many factors that the company considers when weighing fiber builds. And it may be all but cancelled out by the significant operational savings of switching from coax to fiber lines. "The issue is not the expense," the North American cable executive said. "We couldn't spend the money fast enough."

Besides fiber and labor costs, other issues came out in the one-on-one interviews. For instance, the executive at the mid-sized Western Asian operator expressed concerns about the quality of fiber deployments and the lack of skills and experience among its fiber installation subcontractors. He said company executives also worry about fiber dispersion issues.

Figure 18: Biggest Fiber Scaling Challenges



Biggest Fiber Activation & Management Challenges

Finally, survey participants were asked to name the three biggest activation and management challenges their company is facing with its fiber-based services. Upgrading cable customers to fiber rose to the top of the list here, posting an index score of 161. OSS systems emerged as a prime concern again, with respondents picking the integration of fiber customers onto legacy OSS systems as the second biggest challenge with an index score of 159. Making ordering and billing changes to integrate new network with IT rounded out the triumvirate with a score of 134.

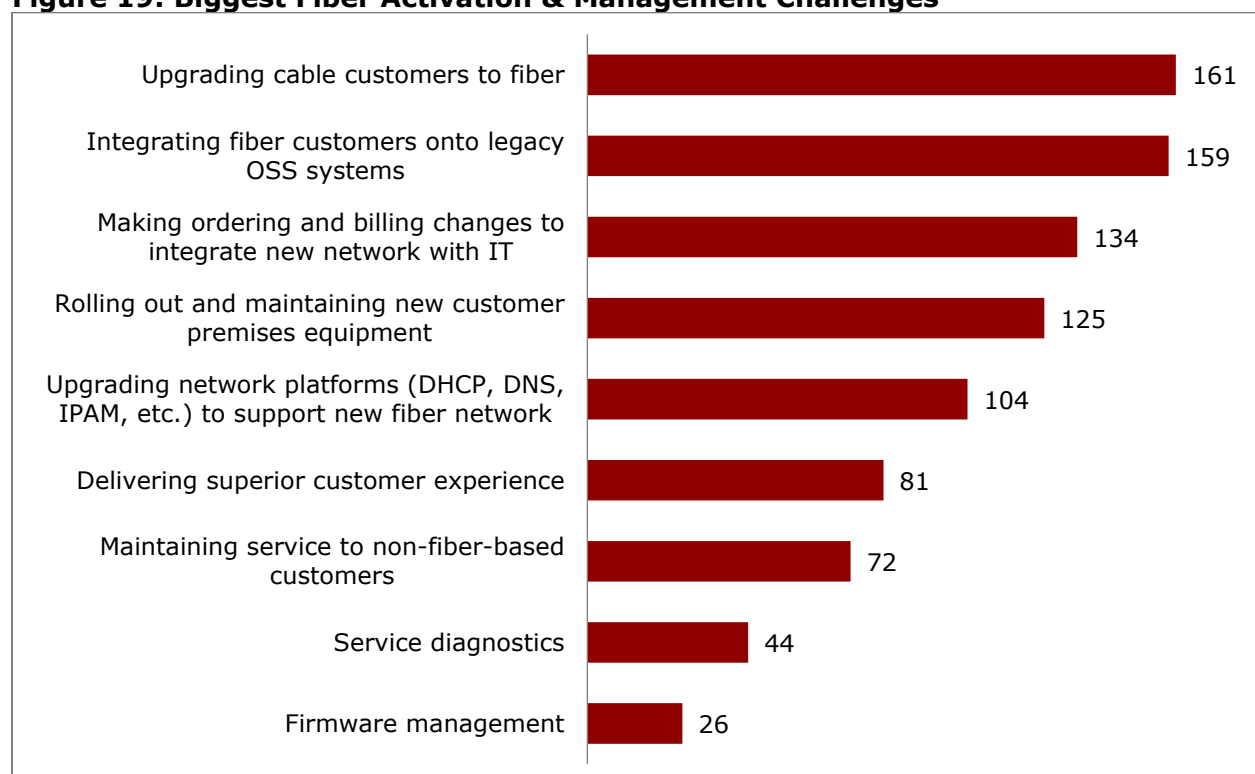
Although it finished in second place overall, the integration of fiber customers onto legacy OSS systems ranked as a leading challenge in all three global regions and tied for the top of the list in the Americas. Respondents in the Americas and Asia rated upgrading cable customers to fiber as a prime hurdle to overcome but European respondents ranked it lower. Similarly, respondents in Europe and the Americas rated making ordering and billing changes as a major concern but their Asian counterparts seemed less worried about that.

Unlike their colleagues around in the world, European survey participants view rolling out and maintaining new CPE as a key challenge. And, more so than their counterparts in Europe and the Americas, Asian respondents strongly worry about delivering superior customer service.

In addition to all the challenges of upgrading customers and systems for fiber service, preparing and training employees and subcontractors for the fiber transition stood out as a sizable management challenge for some MSOs in the follow-up interviews. They cited the difficulty of both upgrading employee skills and changing their organizational mindset to focus on the fiber future. "It's a multifaceted situation," said the major North American MSO executive. "It has to do with culture and training. That in [and of] itself is a bit of a challenge."

Thus, the embrace of fiber poses significant people challenges for service providers, in addition to the significant equipment and system challenges already spelled out. How they cope with those challenges will go a long way toward determining how successful they are with their fiber rollouts.

Figure 19: Biggest Fiber Activation & Management Challenges



CONCLUSION

As we have seen, deploying fiber is a top, if not the top, priority for the vast majority of wireline service providers for a wide variety of reasons. Most notably, service providers are embracing fiber to deliver new, more advanced services, improve network performance, boost the customer experience, address surging customer demand for more bandwidth and eliminate aging infrastructure. As a result, more than 90 percent of providers are either installing more fiber now or plan to start doing so by the end of next year, according to our survey.

In particular, the survey shows that service providers are ambitiously looking to leverage fiber to roll out a slew of new, more advanced video, data, wireless and other services, if they haven't started doing so already. Gigabit broadband easily leads the way, but other next-gen services rank highly as well, including IP video streaming. 5G mobile backhaul, business services and 4K/8K video.

But, as they seek to bulk up on fiber, providers are running into numerous thorny hurdles, chief among them are the difficulty of upgrading their network platforms to handle fiber-based services and retrofitting or replacing their existing OSS stacks for fiber deployments. In fact, over half of our survey respondents cited their company's legacy OSS stack as a major obstacle in rolling out new fiber-based services.

Beyond the pure OSS issues, service providers highlight such other key obstacles to deploying, scaling and migrating to fiber as: network design, testing and integration; fiber cost, availability, installation and serviceability; upgrading customers from legacy networks to fiber networks; and integrating new fiber customers and networks with legacy OSS, billing and IT systems. In addition, providers say they are battling lengthy permitting approval processes by public authorities and building owners for laying new fiber, as well as major cultural and organizational issues within their own companies as they try to shift gears for the digital age.

Thus, scaling next-generation fiber services is clearly not a simple, clean task for cable operators and other wireline providers despite their strong motivations for carrying out the transition. It will take a well-planned, carefully coordinated, multi-faceted approach for providers to overcome the hurdles in front of them and reap the rich rewards promised by the fiber future.

What's Needed

Specifically, then, what's needed are platforms that can support both OSS retrofitting and replacement models. That's become a key imperative, given that wireline network operators are actively pursuing different strategies. These new platforms should be able to:

- Configure new services
- Support multiple provisioning architectures – TR069, SNMP, and DOCSIS
- Integrate with existing OSS, BSS and CRM systems
- Integrate with new network elements and service platforms
- Automate diagnostics and fulfillment processes
- Feature scalable network platforms such as DDI

Each piece is an important step toward deploying, scaling, activating and managing fiber-based services. Thus, CSPs can accelerate their delivery of IP-based services as they push fiber further into their access networks, as long as they have a vendor who offers a fiber orchestration solution and experience in network transformation, especially experience in solving regional differences in OSS retrofitting, replacement and integration.

ABOUT INCOGNITO SOFTWARE SYSTEMS

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