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Take the bite out of capacity crunch

Future-proof your investment by insisting on a fiber diet in a bandwidth-hungry world

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1. Executive Summary

By 2017, there will be a predicted seven trillion networked devices. To support this connected world, where bandwidth-hungry devices and applications are connected anytime and anywhere, service providers will have no choice but to upgrade their networks to overcome the looming capacity crunch.

One of the most suitable technologies for providing broadband access in the connected world is fiber, which can easily deliver more than 1Gbps, compared to the lower than 50Mbps provided by copper-to-VDSL technology. Service providers currently using copper-to-xDSL technology are already facing competition from cable operators, who today can offer approximately 100Mbps by using DOCSIS3 technology, and from mobile operators who are moving towards LTE.

Service providers also face regulatory pressures to switch from copper to fiber, as governments seek to promote national broadband network projects in order to use fiber's superior capacity to increase competition and drive economic dynamism.

But rolling out a fiber deployment (FTTx) is expensive, complicated and has a relatively long payback time. To help overcome these obstacles, service providers need the aid of operational support systems (OSS) solutions that can reduce risks and cut costs through automated planning, fulfillment, activation and assurance processes.

By creating deployment plans, providing automated fulfillment processes and migrating brownfield networks from copper to fiber, OSS solutions enable service providers both to maximize their investment and offer their customers a top-quality service that will answer the demands of today's – and tomorrow's – bandwidth-hungry world.

2. Introduction: The Demands of the Connected World

In the connected world, with its trillions of connected devices, every aspect of a consumer's life, such as health, education, transportation and more, utilizes the network, with which they will engage wherever they are. To enable this, service providers have to ensure they have the necessary network capacity – according to Cisco, the monthly IP Internet traffic in three years' time will reach 40 exabytes!

To put this into perspective, only 10 years ago you probably had a dial-up connection to the Internet from your home PC. Then service providers started offering ADSL with approximately 512Kbps, which at the time was thought to be more than a person needed.

The 1Gbps connectivity that fiber can provide might seem more than we could ever want, but in the connected world, where you will want to watch one VOD movie on 3D at home while your children are watching another on HD TV, the demand for bandwidth will be ever-increasing. And to match this inexhaustible demand, service providers will need a systematic approach to capacity management that will enable them not just to expand capacity today, but to be able to use it and manage it optimally over time.

Capacity demands are not the only driver behind an FTTx deployment, with regulation playing an ever-increasing role. Historically, service providers have often been reluctant to invest in FTTx because of regulatory demands that they provide open access to their network to wholesale players, leaving operators uncertain about the potential profitability of their investment. To combat this, several countries – Australia, New Zealand, and Singapore for example – have launched ambitious public investments in broadband to encourage service providers to roll out fiber. In Europe, where incumbent operators have been hesitant in deploying FTTx, there have been examples of the regulator announcing the opening of the market for fiber rollout. This has had the effect of spurring the incumbents into FTTx deployment, out of the fear that someone else would roll out before them and gain the competitive advantage.

The introduction of wholesale offerings creates its own demands, such as for a high degree of visibility of network and services available by region and by retail service provider. It also requires support for B2B transactions with a high degree of automation and retailer self-sufficiency; fulfillment and assurance processes conducted according to regulated procedures and timeframes; and jeopardy management and, in cases where the deployment followed regulatory measures, reporting of compliance with regulatory targets.

Admittedly, upgrading from copper to a fiber deployment (FTTx) demands a significant investment, which is difficult to make at a time of declining revenues and pressures on cash flow, particularly given the relatively long payback time for this type of investment.

Aside from the heavy civil engineering costs, changes will also need to be made to the service provider's business processes and operational supporting systems because the introduction of FTTx involves new network technology, new service offerings, and new business models (involving retailers and subscribers). And all this is taking place in a brown-field environment. These changes also typically involve a multi-year transition period during which there is a complex migration from legacy systems to the new one.

As a result, as service providers introduce fiber, they will also want to consolidate management of, and leverage, their entire set of assets and networks which will include multiple different technologies – copper, FTTx, Hybrid Fiber-Coaxial and even wireless networks. And so, when provisioning customer services, service providers will need to determine the optimal choice of available network technologies to deliver the service.

3. Removing Risk with a Five-step OSS Approach

An FTTx project is expensive and not free of risk. But with the right OSS approach, service providers can reduce these risks and cut costs through the ongoing lifecycle of FTTx management, planning, rollout, fulfillment and assurance.

3.1 Create the Optimal Deployment Plan

Planning is the key to a successful deployment. Smart decisions as to which FTTx flavor should be used and in

which areas the network should be deployed are crucial. At this stage, service providers have to take into account both geo-economic conditions and current infrastructure in order to maximize revenues and utilize existing resources. In addition, the deployment plan should also include a secured migration path from the old broadband connectivity to fiber so as not to cause service downtime for the end-user.

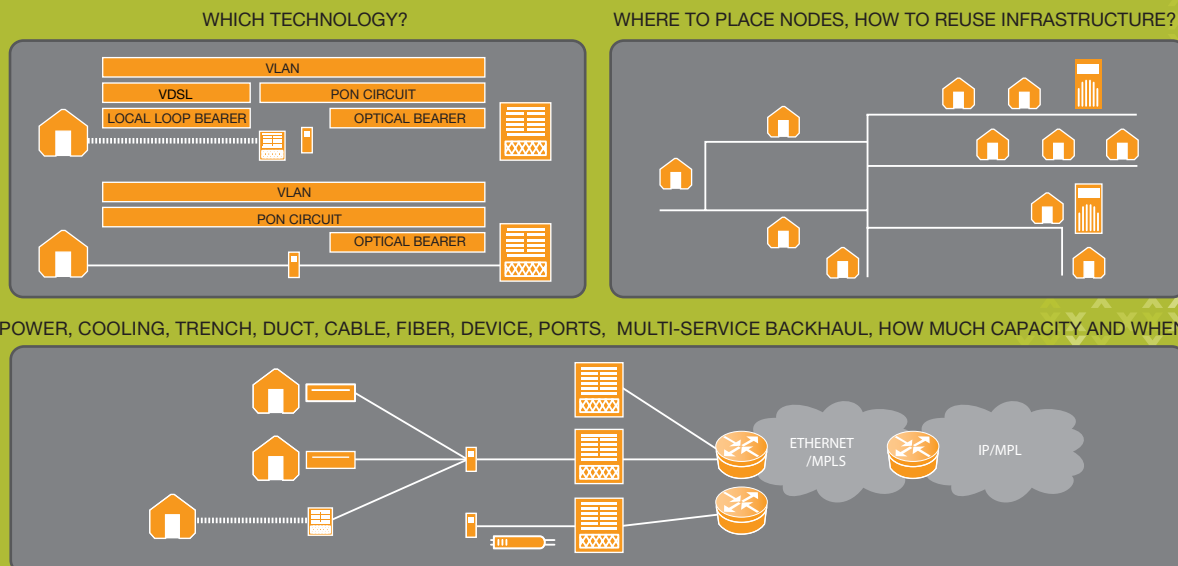
These many decisions have to be made repeatedly as the service provider rolls out its FTTx service in neighborhood after neighborhood, and subsequently through its entire lifecycle. It is here, through their ability to automate high-volume, repetitive decisions, that OSS solutions help service providers maximize their investment.

Creating a deployment plan that optimizes so many variables is a hard (mathematical) problem that demands complex algorithmic support. And so, to calculate optimum device placement at design time, optimization tools are needed to ensure correct decision making, quickly and cost-efficiently.

3.2 Automate the Rollout

Many providers have opted to roll out FTTN (fiber to the node), FTTC (fiber to the curb) or FTTB (fiber to the basement) as a first step on the road to FTTH (fiber to the home). Decisions need to be made as to which existing infrastructure can be reused in the deployment so as to reduce costs and where new infrastructure, such as street cabinets, is needed. It should be remembered that an FTTx rollout means working mainly in a brown-field environment.

FIGURE 1: PLANNING AND AUTOMATED ROLLOUT PERSPECTIVE



Rules determining policy must also be factored in, and these complex evaluations must be made repeatedly as the network is rolled out, bearing in mind that the cost of bad decisions is high.

In this environment, capturing multiple offline plans by reserving resources from the live network is extremely useful; migrating from the old technology to the new one has more than a single rollout option and can affect other parts of the network. Choosing the optimal scenario increases efficiency, eliminates bottlenecks, and reduces capital expenditure.

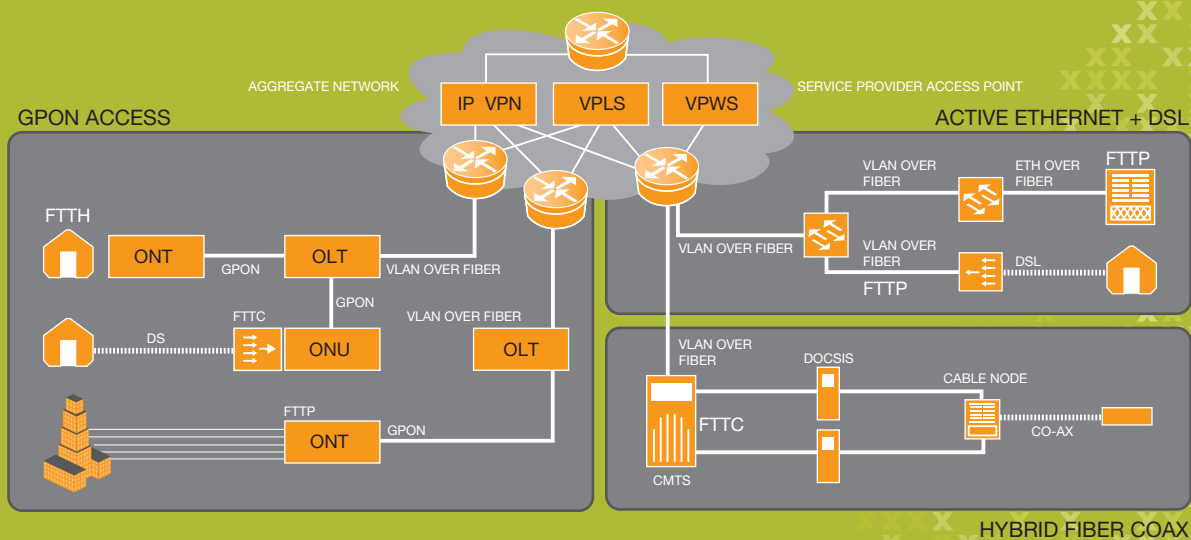
The amount of repetitive design work involved here is high. Therefore, automation can significantly reduce costs and fallout while reducing time to deploy.

3.3 Fulfillment – Time to Pick up the Revenues

The financial pressure on FTTx projects is high, so the next stage after rolling out the fiber network is to connect customers as quickly as possible. Minimizing the time a newly deployed network sits unused, and proactively targeting customers with new service offerings are vital to improving the service provider's ROI. The competitive landscape also adds pressure on the service provider to provide a fast and accurate fulfillment process to the end-user.

An OSS strategy for FTTx strategy should include high volume, multi-service fulfillment capabilities. These capabilities will need to integrate and orchestrate a number of related entities, including resource design to perform FTTx access fulfillment, workforce management, third-party content providers and service delivery platforms as well as legacy OSS systems to support seamless service migration. Providing out-of-the-box automation processes speeds up the fulfillment time and, as such, reduces time to market. This is most valuable for mass provisioning, when a service provider connects hundreds of thousands of subscribers a day to the fiber network.

FIGURE 2: AUTOMATED FULFILLMENT FOR FIBER FLAVORS
(FTTC: Fiber To The Cabinet, FTTP: Fiber To The Premises, FTTH: Fiber To The Home)



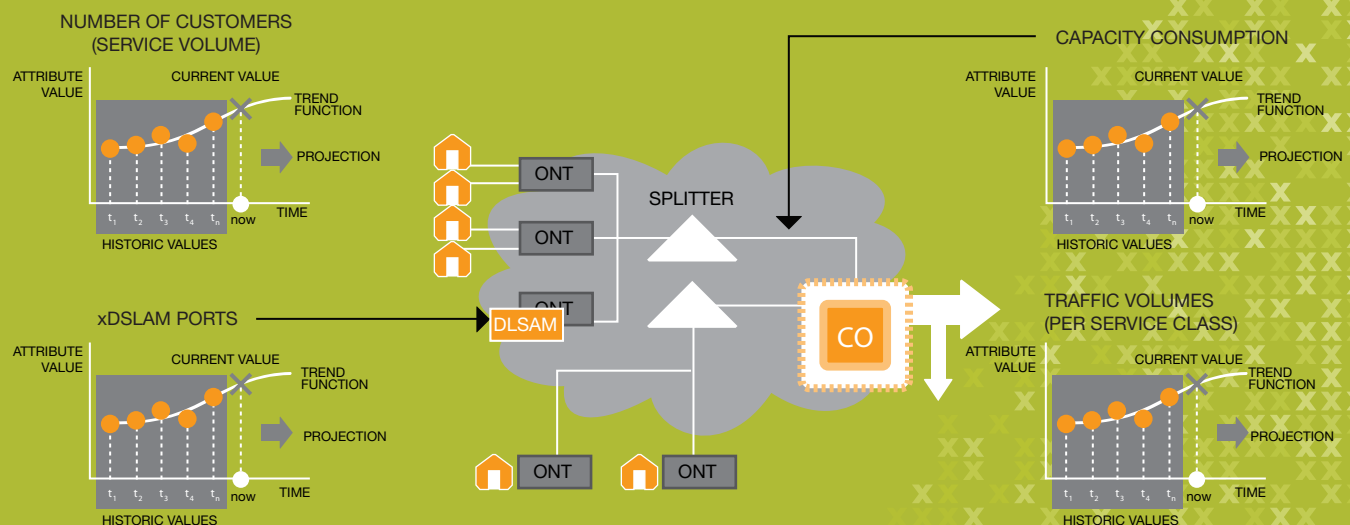
3.4 Resource Consumption Trending – Just-in-time Capacity

Planning and fulfillment processes rely on the same data and there is a cyclical relationship between planning and fulfillment functions in the inventory. The initial network builds define the capacity upon which the fulfillment processes base their allocation decisions. As more services are added to the network, resource consumption trending is then responsible for anticipating any capacity threshold breach. There is, therefore, a strong case for consolidating inventory management and design automation capabilities of both the fulfillment and planning processes.

A major factor in deferring capital spend in an FTTx deployment is just-in-time planning, where more resources are deployed only when and where needed. OSS enables this by managing trends through aggregation, projection and by providing visibility of the dependencies between network layers, factoring in lead times to facilitate just-in-time capacity expansion.

The most comprehensive way to perform just-in-time planning is via ongoing time-lined capacity management, where periodic snapshots of different capacity consumption trends are taken from multiple inventory and performance systems, spanning different technologies and equipment types. This data can then be aggregated and presented at different levels. With this historical trend analysis, operators can easily identify a bottleneck or over-utilization trends and act proactively. Additionally, they can also use this data as a baseline for future trending.

FIGURE 3: RESOURCE CONSUMPTION TRENDING – JUST-IN-TIME CAPACITY



3.5 Assure Your Customer Experience

Planning, rollout and fulfillment probably constitute a one-time process for each service a customer uses. But maintaining network resources in such a way as to enable a smooth customer experience is an ongoing cycle. Identifying faults that may affect the customer's service, e.g., cable cuts, demands a consolidated network view that can represent the relationship between the FTTx resources and other resources related to the connected subscribers.

This proactive service assurance approach enables service providers to handle a problem sometimes even before the customer calls the help desk, and equally once a problem is known, to ensure problems are resolved on time. Managing and maintaining the correlation between resources, services and customers is an important factor in meeting service-level agreements, reducing churn, and reducing the operation effort associated with incident resolution, all of which are essential to ensuring the network's profitability.

4. Conclusion

FTTx networks offer service providers the opportunity to deploy high-speed, high-bandwidth broadband access, which will enable them to deliver converged next-generation services with differentiated levels of quality. But because such deployments are expensive and not free of risk, service providers need to adopt an OSS approach that will enable them to minimize risk and, at the same time, maintain customer satisfaction.

This path consists of a five-step FTTx technology lifecycle management approach:

- Plan the optimal route and area in which to roll out resources in the most efficient manner and in locales where there will be a positive ROI.
- Automate complex but repetitive rollout tasks to minimize rollout times and ensure maximum control over quality and visibility.
- Automate fulfillment of both FTTx access and the overlay services it enables to maximize returns, reduce time to revenue, reduce cost, improve accuracy of delivery and eliminate fallout.
- Employ ongoing resource consumption trending to know when it's time to add more capacity and where to apply that capacity to maximum effect to support customer orders.
- Assure a superior customer experience by advanced alerts to the customer when a problem occurs and by having the ability to know a problem exists – and even fix it – before the customer calls to complain.

And finally, this approach should also combine flexibility and configurability with out-of-box functionality, processes and configurations. With such a solution, service providers will be able to rapidly deploy a next-generation OSS in support of nextgeneration networks and services.





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Amdocs has a 30-year track record of ensuring service providers' success by embracing their biggest challenges. Uniquely, the company combines business and operational support systems, service delivery platforms and proven services with deep industry expertise. In today's connected world, Amdocs helps service providers simplify the customer experience, harness the data explosion and stay ahead, while improving operational efficiency. A global company with revenue of \$3.2 billion in fiscal 2011, Amdocs has over 19,000 employees and serves customers in more than 60 countries worldwide. Amdocs: Embrace Challenge, Experience Success. For more information, visit Amdocs at www.amdocs.com.

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