

Alcatel's 7300 ASAM: The Universal DSLAM



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Executive Summary

Up until now, DSL penetration has been mainly driven by the rapid deployment of residential high-speed Internet access services. In making the significant investments to support the rollout of these services, many operators are now achieving local exchange coverage figures pointing towards ubiquitous central office presence of DSLAMs in the course of the next two years.

This makes the DSLAM footprint a very attractive platform for both picking up new revenue-generating services, while simultaneously reducing operational costs by converging existing services onto one unified access platform.

Both new services and legacy services like voice and business access can be easily accommodated over DSL, making it an obvious winner in this access convergence opportunity. In this scenario, DSL becomes the default technology for copper wireline access, next to fixed and mobile access platforms.

A few years from now, we will find ourselves with the whole wireline access segment having converged from a multitude of dedicated service legacy networks (voice, leased lines, data, etc.) to a universal access infrastructure, based on “Universal” DSLAMs, enabling the operator to resell copper infrastructure over and over again.

The key success factor in seizing this opportunity, of both easy service creation and operational cost cutting, revolves around a strictly evolutionary approach that leverages the basic infrastructure deployed to address the initial residential packages. This is accomplished by seamlessly evolving the existing DSLAM footprint to gradually accommodate the additional service components as they are rolled out in the respective segments and channels. All incremental investments are highly revenue-coupled and will therefore enjoy an attractive payback period.

Alcatel’s proposition in this space is the Universal DSLAM based on a seamless evolution of its world-leading ASAM (Advanced Services Access Manager) solution to enable progressive introduction of new service enablers with variable or semi-variable investments. New highlights address business access in its broadest sense, derived voice applications, and support of advanced services like video.

TABLE OF CONTENTS

Introduction	1
The Need for a Universal DSLAM Platform	1
Service Velocity	1
Creative Service Bundling and Vertical Homogenization: From Killer Applications to Killer Packages and Killer Channels	2
Access Convergence	3
Different Approaches to Address the Trend Toward Convergence	3
CAPEX	3
OPEX	4
Revenue	6
How the Alcatel Portfolio Addresses the Opportunities	7
Conclusion	9

Introduction

Today, most investment cycles in DSL technology are fueled by market share objectives in the residential broadband access segment for delivery of high-speed Internet access services. This is enabling a rapid service uptake reaching high service penetration rates (two percent in the U.S., one percent in the rest of the world, and even 10 percent in South Korea). This is only the beginning. Annual growth rates of 100 percent are very achievable and likely to be on the conservative side.

As the service market takes off, large equipment footprints are being established to accommodate demand for initial residential service packages. Many operators are now achieving local exchange coverage figures of over 75 percent, some even having attained the landmark of having a DSLAM in every single CO. This makes their DSLAM footprint a more than interesting platform to make the access convergence happen, with minimal additional investments since the fixed investments have already been made.

Having evolved from its basic functionality of aggregating subscriber lines onto a WAN interface, its strategic position in the network and its intrinsic modular and future-proof design are enabling the DSLAM to evolve into a more universal access platform, transforming it into a truly Universal DSLAM.

The Universal DSLAM platform addresses a much broader service scope than performing basic aggregation functions. It enables a whole range of new value-added services without the need for a hardware swap-out or truck roll. This platform empowers service-providers to tailor their service offerings to specific market segments: residential subscribers, telecommuters, SOHOs, small and mid-size businesses and corporate, adding new revenue streams while reducing the cost of ownership. The Universal DSLAM is the catalyst for convergence at the access end of the network. It provides a single platform onto which the whole copper wireline access segment can gradually be merged.

This paper explores the drivers behind this access evolution and how they can be optimally addressed from an infrastructure point of view.

The Need for a Universal DSLAM Platform

The whole access network architecture is going through changes leading to fewer access platforms. Several factors are being identified as key drivers for a single platform: convergence taking place at the access level, higher frequency in the number of newly introduced services, the need to bundle services, and the significant investment already being made in DSLAM equipment.

Service Velocity

Service providers are watching their profit margins and market shares erode, triggering the need to define new strategies to remain profitable and retain customers. Identifying ways to differentiate commodity-type services, and optimizing the full revenue potential of their existing network assets, are two issues that service providers need to address to ensure their long-term viability.

Clearly, to be successful in this evolving market, service providers need to start rethinking their ability to deploy new services. Flexible deployment of new services, with tight control of the costs related to the deployment of those new services, are key.

One strategy for addressing these issues involves the continuous offering of additional multiple services, such as VPNs, additional derived voice services and video services to customers over the existing twisted-pair network infrastructure. Another example for the residential segment is video services, which are gradually gaining in strategic importance for the service provider. A full service package will significantly reduce churn for operators in a competitive environment.

The frequency with which service providers will offer these new services will undoubtedly increase both incremental complexity and cost of deploying a new service in absence of a non-scalable access platform that can gradually evolve along with market trends.

Creative Service Bundling and Vertical Homogenization: From Killer Applications to Killer Packages and Killer Channels

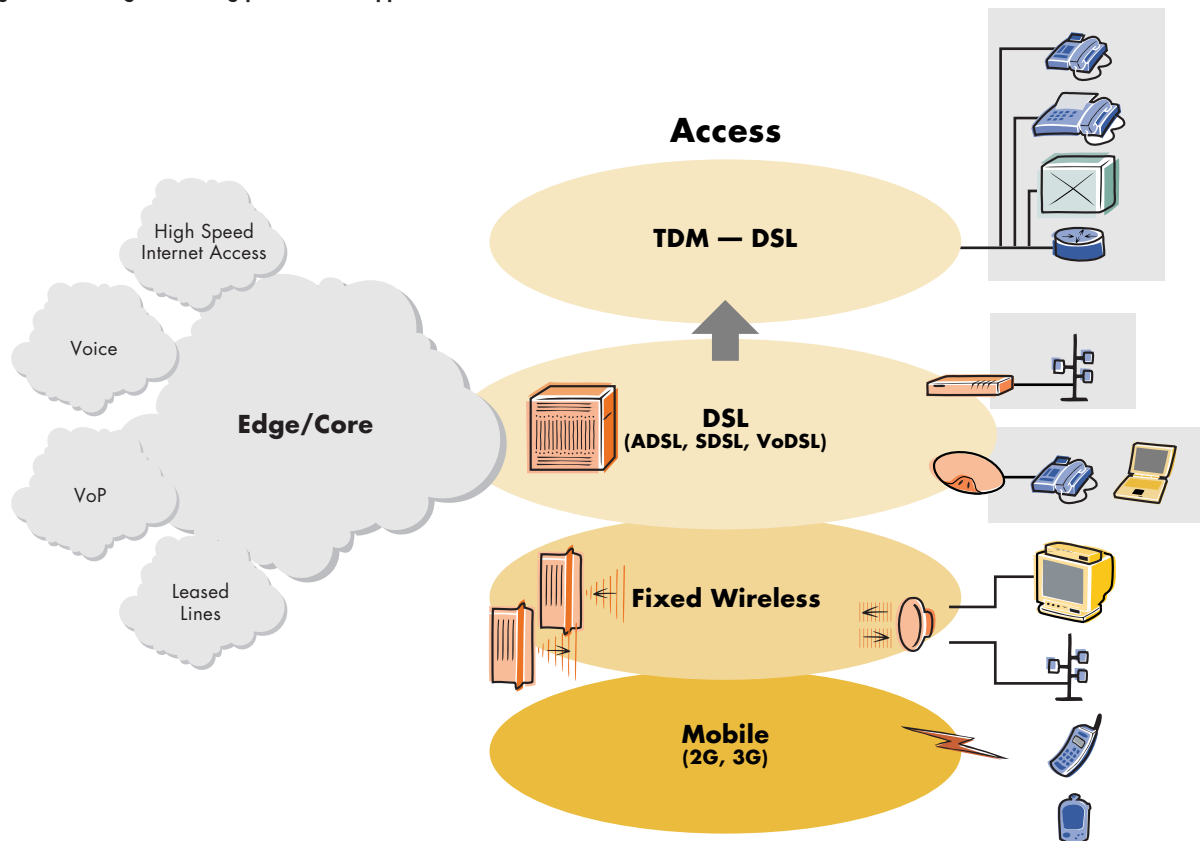
The trend of acceleration in the number and frequency of newly deployed services equally promotes creative service bundling. This becomes a critical competitive advantage when targeting specific market segments. Service providers need to develop a better understanding of the profile of the end user, with the aim of becoming a “one-stop communication billing shop” that, in addition to high-speed Internet access, can offer video services, VPNs, voice, and still more.

The small and mid-size enterprise (SME) market is a good illustration of a currently underserved segment with typical needs that have never been adequately addressed. The issue typically encountered here is identification of market segments that are sufficiently homogeneous to be approached with a common service package. The competitive dynamics induced by deregulation have typically spurred operators to tune their offering towards the high-end corporate and residential segments. The former is approached in an

extremely personalized way, whereas the latter is offered purely cost-optimized, uniform services. While generating over 50 percent of Europe's GDP, the SME segment falls in the middle, being too numerous for personalization and having needs too specific to be effectively served by standard packages.

This issue becomes appealing when approaching the segment from the vertical perspective. Indeed, the SME segment typically consists of large groups or associations such as doctors, pharmacists, architects, insurance brokers, travel agencies, etc. that have obvious common ICT requirements within their vertical segment (e.g., intranet, extranet, easy and flexible delivery of new voice services, etc.). Even more interesting, many of these vertical segments are already being served by their own organizations, some of them even dealing with ICT-related solutions. The resemblance of these vertical associations to corporate or carrier accounts presents an important opportunity to indirectly address a significant portion of this difficult-to-approach segment.

▼ Figure 1: Convergence taking place in the copper wireline access network



As a result, providers have an opportunity to create and market interesting service packages in new segments and hence move away from the pitfall of becoming an undifferentiated commodity in a low-margin business.

Access Convergence

Networks are converging at several stages. Soon data, voice and video services will all be connected over the same data network. This trend will require the development of a common networking infrastructure for all services. Although this convergence trend could ultimately extend to encompass all legacy service delivery platforms (including voice), the most obvious immediate benefit of infrastructure convergence resides in access. A few years from now, the whole wireline access segment will have converged from a multitude of dedicated service legacy networks (voice, leased lines and data) to a universal access infrastructure, based on the Universal DSLAM.

The rationale behind the collapse of multiple service infrastructures — while enabling service providers to reduce costs by taking advantage of this flexibility — is the convergence of all services onto a single multi-purpose DSL platform, the Universal DSLAM. While the platform will provide different flavors of DSL, the complexity of generating legacy interfaces will transfer to the CPE.

Both service and network deployment increasingly suffer from the fact that provisioning and repair activities are being scattered across a diversity of networks, restricting a service provider's responsiveness to changing market needs.

By collapsing the access network onto a single infrastructure, significant economies of scale can be achieved across the whole operational chain, ranging from provisioning over moves, adds and changes, up to repair. In addition, every subsequent investment an operator makes in service management platforms — to add capabilities such as advanced proactive reporting and active SLA management — will benefit the whole wireline service delivery platform.

Different Approaches to Address the Trend Toward Convergence

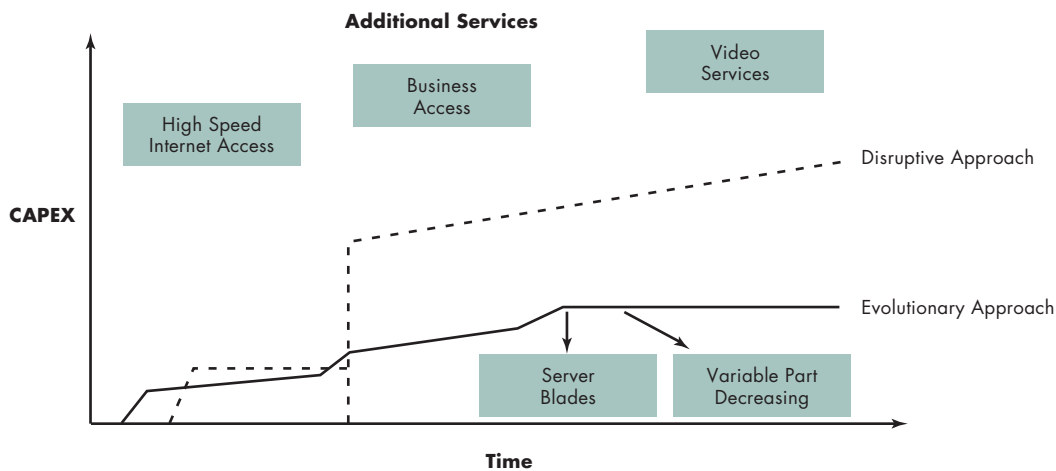
In building out the network gear to enable evolution of their service portfolio offering, service providers have two choices: a strictly evolutionary advancement, or a disruptive approach. In the first approach, a service provider capitalizes on its installed base of DSLAMs; in the second one, it builds up an overlay network to deliver the new range of services, basically losing an opportunity to achieve access convergence.

The business case impact of both strategies is obvious and will be illustrated here based on timing for the introduction of new advanced services such as business access, teleworking VPN, video services, in addition to the current existing high-speed Internet access delivery.

CAPEX

The fixed CAPEX for a new overlay network build is obviously orders of magnitude higher when compared to the mere insertion of service enablers in the existing footprint. For most services, no fixed CAPEX is required

▼ **Figure 2: Service provider CAPEX structure in evolutionary and disruptive approach**



at all (e.g., SHDSL business access). For other services, such as derived voice, a VoDSL server blade is required, translating into a semi-variable CAPEX component.

Typically, a disruptive strategy will fragment an operator's investment resources, thereby capping up-front the opportunities to leverage the investments already made. A parallel can be drawn here with the continuous investments that are being made in the mobile access network. The 1G-2G-3G generation shifts are disruptive by nature, with huge fixed CAPEX components (partly for immaterial assets like licenses).

The variable CAPEX is, in many cases, also affected, since the multi-purpose nature of utterly generic line cards typically tends to be more expensive in addressing the specific service packages.

OPEX

The most significant benefit from a step-by-step approach resides in the operating expenses (OPEX).

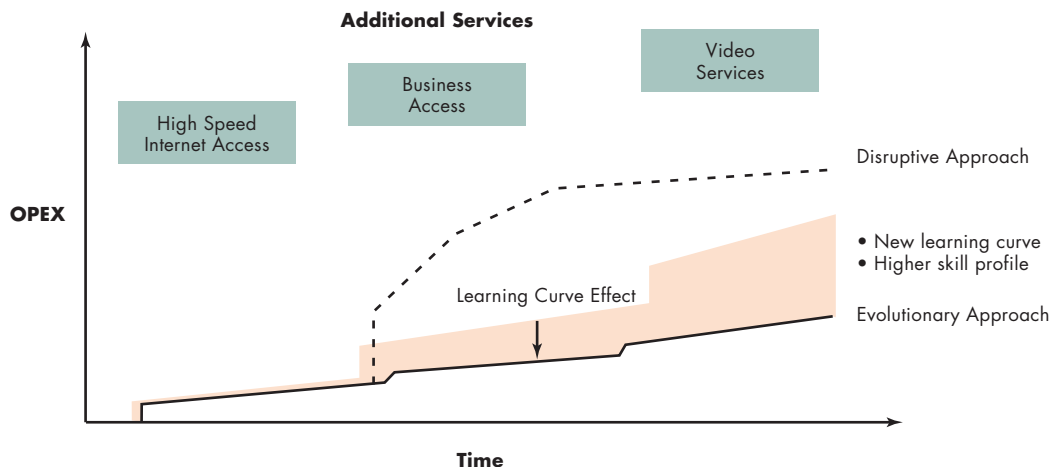
For each network build-out, a significant non-recurrent OPEX is involved that can be almost completely avoided by a gradual evolution.

The only effect typically seen when introducing a new service component in this way is the effect on help desk, repair and training at the time of introduction.

The recurrent OPEX will ride the same curve as before, even continuously improving as the knowledge of the service and equipment grows. This is quite different from a disruptive approach, where several effects play into the recurrent OPEX.

New learning curves will be observed, and higher skill profiles are likely to be required in the operational back-end to accommodate the more complex equipment typically put forward in disruptive approaches.

▼ Figure 3: Service provider OPEX curve in disruptive and evolutionary approach, the latter benefiting from the learning effect



The increasing relevance of both technical and operating challenges involved with the new service introduction and the ever-increasing issue of employing operating personnel and evolving their skill levels, are illustrated in the two graphs below.

Deployment of a service encompasses several steps: network creation, service creation, service activation and service assurance.

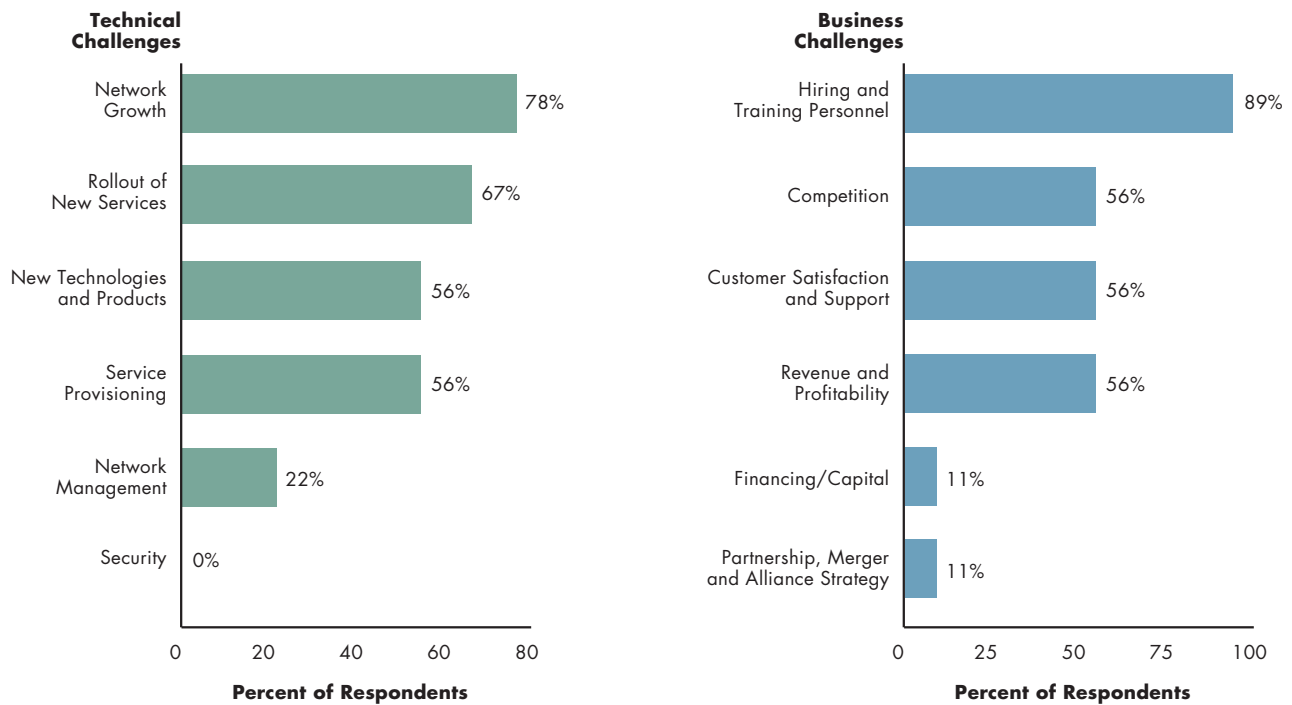
In the case of DSL deployment, all these different steps also need to be handled.

At network creation, the access provider is physically placing the DSLAMs in the central offices. This part of the deployment is highly labor-intensive and cannot be automated. It is, however, only needed during network rollout and when upgrading or expanding a network.

In service creation, the access provider has to predefine traffic parameters on the DSLAMs, establish connectivity between the DSLAMs and the B-RAS, and enable connections to the service providers. Once the service creation is completed, the network is operational and service providers can start offering services to their customers.

Service activation, the step following service creation, is certainly the most labor-intensive step in DSL deployment. The service provider needs to activate a new user in the system: introduce user details in some administrative systems, update the user database, activate the copper lines for the new subscriber, and more. As there can be tens of thousands of end users for all connected service providers, user activation requires substantial effort from the access provider. Furthermore, service activation is an ongoing process that is not only costly and time-consuming (due to the necessary truck rolls and operator interventions), but also prone to error. Automating a part of the service activation phase will not only decrease time-to-market for a service/access provider, but it will also increase the overall profitability and customer satisfaction.

▼ Figure 4: The service provider opportunity in the U.S. 2000: IXC, RBOCs, and Tier 1 CLECs (Infonetics)



The last step in DSL deployment is service assurance. To ensure customer satisfaction, service downtime should be minimized. Due to a network's complexity, it is not easy to trace a problem back to its source. A highly advanced and uniform umbrella management system is needed to prevent most of the problems from happening or otherwise to localize and solve the error conditions as accurately as possible.

Clearly, all these different steps require a lot of effort and expose the service provider to huge operational costs. An integrated, uniform management platform is one of the most important elements for ensuring fast, error-free, low-cost DSL deployment. Reducing the number of management platforms will not only enhance end-to-end visibility of the complete network, but it also will reduce the required office space, the number of training hours and the need to support multiple hardware and software products. The umbrella management system should, however, have an open application interface in order to connect easily to the service provider's OSS. Due to tight integration of all network components, the umbrella management platform is also a perfect tool for detecting and solving network problems in a fast and reliable way. The access provider can then offer assured high quality service to service providers and, indirectly, to end users. The universal access platform greatly facilitates the integration of the umbrella management.

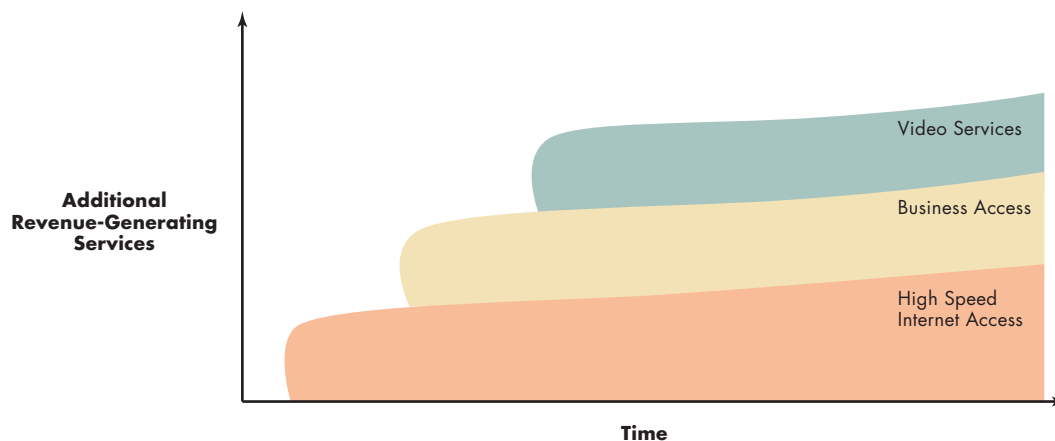
By respecting this requirement, the service provider ensures network-wide integration of the installed universal DSLAMs that will progressively support all the services. In this case, the service provider no longer needs to “superimpose” network management systems, each one dedicated to the delivery of one service.

Revenue

From the revenue side, effects will also likely be observed in time-to-market performance. By continuously shifting from platform to platform, operational attention gets overly focused on infrastructure, whereas this energy could have been invested in service creation. Furthermore, the infrastructure learning curve mentioned in the OPEX section will also have an impact here on the timeliness of new service introduction.

Hence, a gradually converged access network focusing on optimizing the support of service components along the way will allow new services to be deployed with lower incremental complexity and costs. A Universal DSLAM and its modular approach greatly contribute to reductions in the CAPEX and OPEX of the service provider. Moreover, its capability to provide a very broad range of service allows the service provider to resell the infrastructure over and over again with a very competitive time-to-market.

▼ Figure 5: Service provider improved revenue blankets with an evolutionary approach



How the Alcatel Portfolio Addresses the Opportunities

To ride the broadband wave in an economically viable way, service providers must compress the evolutionary steps, speed up broadband deployment and eliminate barriers to rapid adoption. They require a DSLAM that incorporates all the capabilities required to address the different service creation phases on a single platform.

Alcatel's 7300 ASAM — the platform that has built a market share of over 50 percent — easily copes with these challenges. It is a cost-effective answer that provides for today's services and non-disruptive evolution to new services. The core capability of Alcatel's DSL portfolio is to evolve beyond the "more-of-the-basics" performance criteria (e.g., continuous improvements in the reliability and performance of the products/solutions offered to customers) to provide a platform from which incremental revenue can be generated while minimizing the total cost of ownership.

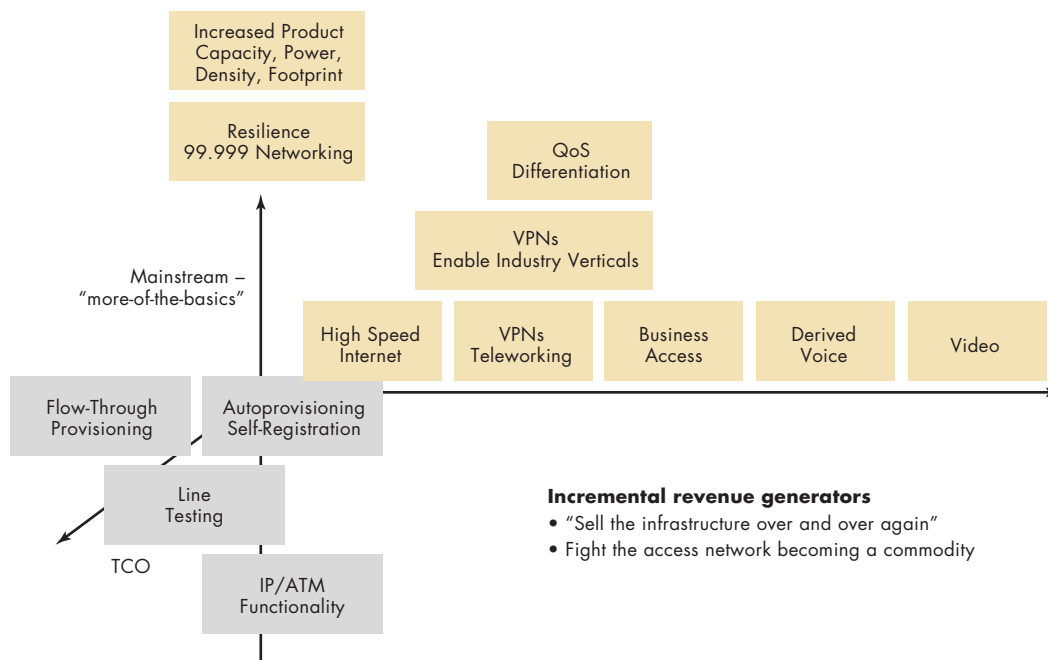
Offering additional services on the Alcatel DSL access network is a highly flexible and revenue-financed investment based on the same platform.

Initially, the 7300 ASAM allows high-speed Internet access service delivery at a low entry cost for both the service provider and the end user. The residential market is synonymous with mass deployment and consequently reduced or even non-existent product customization. The operator can focus on deployment issues, unencumbered by problems concerning service elaboration. Payback periods of two to three years on average are easily achievable.

Once the service provider has built up basic know-how about residential market dynamics, DSL technology and operating flows, and after having received a first payback on investment, it can move forward to more sophisticated services and market segments.

One such example is delivery of VPNs for teleworking applications. Interesting side effects of this service type are the different margin structures, involvement of the corporate IT help desk in the support process, and the fact that a whole new customer base is approached through a limited number of corporate channels. Even more interesting, no investment whatsoever is required to tap this opportunity. One just needs to leverage the DSLAM installed base to deliver VPN teleworking services. The same approach can be taken towards intranet and extranet VPNs that are

▼ Figure 6: Mainstream — "more-of-the-basics"



required to enable the industry verticals mentioned earlier. Depending on the specific segment addressed, the access part of the equation can rely on ADSL or G.shdsl.

Another important enabler of incremental high-value service is the QoS differentiation that can be provided to the end user. QoS differentiation is essential because it is synonymous with differentiated pricing strategies, driven by the service offered. One of the key competitive strengths of the Alcatel ASAM is its ability to concentrate an ever-increasing number of users onto a single WAN interface while still guaranteeing individual QoS differentiation.

The next step in the value chain is, then, the business access, in the broadest sense of the concept.

The availability of G.shdsl technology and the large installed base of DSLAMs make it easy to pick up traffic from business customers on the same platform. The business segment is particularly attractive due to high margins, and investment and service customization are high as well. This buildup of value-added services can serve two purposes at the same time: delivery of new services like video and delivery of "lower-cost" substitute services such as voice over DSL.

For example, with the 7300 ASAM, the service provider can offer value-added services to SMEs in a very flexible, highly economical way. The business benefit to the service provider includes additional revenue generation through the multiple voice connections offered simultaneously with data. From a business user's perspective, a bundled voice and data service provides increased flexibility to meet changing communication needs of the business, and it allows for one interface to a single service provider for all communication service needs. For a competitive access provider, this allows leveraging the local loop to the maximum possible extent, while creating an interesting one-stop competitive package. For an incumbent operator, the angle is slightly different: the delivery of voice services across a single platform is not necessarily innovative since it already exists and has been delivered for decades. With the emergence of the Universal DSLAM, the way that cost-optimization is implemented makes it very attractive. Once the access has been provisioned, the service provider can "soft-provide" remaining lines very easily, without the need of investing in new PSTN or TDM access equipment.

Alcatel's ASAM delivers key business benefits to service providers by consolidating and extending the generic design of the 7300 ASAM as a universal access platform, making it the default copper wireline access node, next to fixed and mobile access platforms. More specifically, in the business access segment, the critical enablers are covered in one consistent portfolio. This ranges from feature-rich service interworking equipment in the edge, over the ability to capture business CPE legacy in a non-intrusive way, through to integrated end-to-end network management.

The key proposition, however, resides in the fact that the service portfolio can be extended with small incremental investments. For new DSL "flavors" like G.shdsl, the investment is fully variable and boils down to the simple installation of additional line interfaces. If new service components are added, such as for VoDSL or IGMP-based video zapping, the additional investment entails the insertion of fully redundant server blades onto the same platform. A consistent trait throughout Alcatel's track record in DSL has been protection of the operator's investment. This is demonstrated here again as the addition of hardware or software components that enable additional service capabilities blend seamlessly into the operational system.

Along the same lines, the Alcatel ASAM product strategy embraces a model of IP-friendliness, rather than being IP-centric. This enables it to be cost-effective and reliable, reaching carrier class standards in terms of provisioning and operations for the current mainstream business. Yet it allows for gradual introduction of IP-awareness in the access network. The way this is achieved is by modular addition of IP service gateway (IP-GW) functionality to the ASAM. The IP-GW functionality can range from basic session aggregation functions and VPN support (L2TP, MPLS) up to more advanced BRAS functions, if desired. This modular approach ensures a very gradual evolution, also enabling different control plane models (e.g., ATM and MPLS) to co-exist temporarily rather than imposing an abrupt cutover that would affect service.

Conclusion

The broadband access value chain is progressively evolving as both residential and business users demand new applications and services, such as video, VPN services, voice, and more. To keep abreast of this evolutionary process, service providers require a broadband access platform that enables them to offer compelling services to their diverse base of business and residential customers. The 7300 ASAM has been designed to scale with the operator's changing needs by offering a diverse portfolio of services in a nondisruptive way, while squeezing a maximum of services (and revenues) through the thin copper pairs.

A few years from now, the whole copper wireline access segment will have converged from a multitude of dedicated legacy networks (voice, leased lines and data) to a universal access infrastructure, based on Universal DSLAMs.

A consistent trait throughout Alcatel's product strategy is the protection of existing investments by seamlessly evolving the installed base.

Alcatel is committed to being a strategic partner that supports the service provider along the whole investment and operational cycle required for successful deployment of broadband services. This commitment extends far beyond sustaining leadership in the basic performance parameters and the benchmarks commonly applied to DSL technology (power, reach, density, etc.). It puts top priority on those parameters that drive the total cost of ownership, and on enablers of incremental revenue generation.

For more information: www.alcatel.com/dsl

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