Clearing VoDSL Deployment Hurdles

Paul Arceneaux
Siemens, ICN

DSL is an excellent speed and performance value for residential and business customers alike. By expanding the capabilities of an ordinary copper pair, DSL provides residential subscribers with high-speed service for only incremental cost over dial-up access; business users find DSL a very attractive alternative to conventional and far more expensive data service options. Despite market slowdowns, the overall demand for DSL and related broadband services continues to grow.

But while DSL maximizes the utility of the local loop for data, it adds nothing to the telephony side of the business. The underlying DSL transport infrastructure is in fact ideal for significant expansion of voice services, with substantial benefits for both service providers and customers. Enter Voice over DSL (VoDSL). Using the same, single copper pair that delivers standard DSL, VoDSL effectively adds up to 24 business-class voice lines—with quality and feature sets intact.

All of that sounds great—and there are many benefits, including reuse of infrastructure and tremendous potential for additional provider revenue—but VoDSL has been comparatively slow to take off. For one thing, VoDSL and customer base expansion dramatically increase service delivery, management, and support complexity. This is a significant hurdle for any provider; clearing it requires careful course mapping and the right tools. Another potential obstacle comes from incorporating several new hardware and software elements into a network infrastructure already burdened with varied and disparate elements. Even when components are standards-based, timely and cohesive network management can be a significant challenge.

As the VoDSL subscriber base grows and demand increases, existing order entry, inventory, provisioning, and element and trouble management tasks can quickly overwhelm provider capacity and expose inefficiencies. The problem is that conventional provisioning processes cannot scale appropriately to meet advanced service needs. Bottlenecks can also surface in delivery and support mechanisms, particularly when dealing with a proliferation of multi-vendor operations support systems (OSSs).

The good news is that VoDSL deployment need not be a monumental challenge. The hurdles can be easily—and profitably—traversed. The needed level of support can come only from non-disruptive, end-to-end systems designed to leverage existing infrastructure and business rules—with flexible and cost-effective support for new applications.
The key is to incorporate a comprehensive flow-through software tool capable of service creation, activation, monitoring, and process automation work in real time, incorporating direct knowledge of network status and capabilities.

**Good Form: Flow-through Network Management**

Advanced flow-through service delivery and management offers the principal method for containing and lowering costs across all segments of a provider’s operation. Instead of adding employees or re-training existing staff, for example, providers can employ flow-through provisioning to effectively automate the many complex and time-consuming tasks associated with advanced services. This keeps staffing and training costs under control while virtually eliminating errors and delays in provisioning and service operations.

A properly designed flow-through system offers many other key provider success components, including vastly improved network performance and problem resolution. In a sense operating as an umbrella application, the system continually monitors the network, delivering a coherent end-to-end view of an entire multi-vendor, multi-protocol network. And due to its ability to communicate with many disparate elements, an advanced flow-through system typically identifies existing and potential problems before customers are affected.

Flow-through provisioning has a positive impact on key areas within a service provider organization. The following examples highlight how a system offers support to specific functional groups:

- **Planning and engineering** departments forecast service needs and develop the network structure to support them. Functions include network inventory creation, network utilization monitoring, and recovery of stranded resources. Done manually, these are protracted and error prone processes. With a carrier-class flow-through system, a real-time inventory of network components and their operational status is always available, enabling accurate planning and capability assessment.

- **Customer care and service negotiation** groups handle service requests, generate orders for provisioning and billing, and typically also form call center hubs for customer and service information. The fault and problem isolation components of an automated system quickly identify and address issues—generally in time to avert network problems or outages—and keep customer and network data readily available.

- **Service creation and activation** departments assign network resources to match customer needs and activate services within the network. An end-to-end automation system easily addresses the disparate but critical network elements that must be configured for
this function, all the way down to the customer-located network device. Service deployment delays are thus minimized while customer satisfaction is maximized.

- **Service assurance** troubleshoots and resolves a variety of network-based customer service issues. Automation software tools enable teams to more quickly identify sources of trouble or delay, accounting for quality of service (QoS) and bandwidth issues, and enabling customer service level agreements (SLAs).

With better and automatic control of the network domain, providers can more effectively respond to service needs. Subscribers also benefit from lower costs, and the ready availability of varied services increases the provider’s perceived value. Overall customer satisfaction increases as a result, helping to drive up provider revenue and control customer churn.

![Diagram of network components](image)

**Figure [x].** The components of a next generation OSS architecture that makes VoDSL possible, showing the flow-through provisioning, management, and fault isolation framework at the top.
**Carrier-class Flow-through Framework Criteria**

Without the right provisioning and support framework to back it, any new service rollout also carries very high risk. Burgeoning market growth, technological change, and competition can leave an unprepared provider in a perpetual catch-up mode.

Before rolling out new services, providers must be ready to deliver needed VoDSL services faster than the competition and at the right price, while simultaneously managing rising network and staffing costs. That’s a series of very tall hurdles. To clear the course for VoDSL, providers must look to a carrier-class flow-through framework that supports the needed service mix while also setting the stage for additional and future value-added services. The framework should include:

- **Incorporation of existing business rules and processes.** Time- and field-tested rules are the backbone of the provider’s system. A flow-through framework must begin by incorporating these rules and building on them to support of new and future services.

- **End-to-end flow-through provisioning for all services.** All aspects of deployment, performance, management, and monitoring should be handled automatically, with direct control of all network elements in the service path. This is the key to quick and error-free service activation.

- **Seamless interworking with diverse systems, network elements, and layers.** An extensive and expandable data base of CPE, gateways, servers, and associated network and functional elements is the key to immediate results with minimal configuration. Automated network inventory creation must be employed to assure quick identification of stranded resources and to assure data base accuracy.

- **Future-proof integration of elements and next generation services.** The same network and functional element data base also provides a building block for other OSS tools, allowing providers to select third-party modules as needed to further extend capabilities or incorporate new features as they become available.

- **Proactive network trouble identification and problem resolution.** System tools must extend network operations personnel access to a complete network topology map for fault and capacity alerts. It must also allow configurable thresholds and alerts for specific events.

- **Automated service fulfillment and configuration.** With the network clearly mapped out, a flow-through framework can automate and streamline service turn-up, configuration, and termination. This effectively removes the need for manual provider intervention and sets the stage for customer-driven service purchases.

- **Customer-initiated, value-added services activation and changes.** A self-service interface is a critical component. The service should
provide access to real-time account information and service selection and configuration—without manual provider involvement.

To provide carrier-class reliability and functionality, the ideal flow-through framework must function at the software layer, integrating service provider management systems, network equipment, and business rules. It must also combine with existing provider OSSs—order entry, provisioning, and billing systems—and provider networks to enable powerful new business solutions.

At the network level, the flow-through system should integrate OSI management functions with Web-enabled user interfaces, legacy, and next-generation OSS interfaces, and key network adapters to enable smooth and seamless systems integration. The system should also be modularized such that providers can deploy functional components as needed to offer the desired level of value-added services.

Layered software components additionally facilitate interworking between networks and external OSSs, enabling providers to model the network end-to-end, covering CPE, access, and core network equipment. The result is a build-to-suit solution that supports not only VoDSL, but also a wide variety of profitable integrated voice and data applications, including digital video and virtual private networking (VPN). Layering also facilitates service delivery over varied access technologies, including TDM, frame relay, DSL, and ATM.

**VoDSL Provisioning Steps**

A significant advantage of VoDSL is reuse of infrastructure already deployed to support data-only DSL. The copper plant, existing central office DSLAMs and voice switches, and data networking and telephony equipment at the customer premises—all are leveraged, and no equipment is rendered obsolete.

Only two new devices need to be installed to support multi-line VoDSL service: a customer-located integrated access device (IAD) and a CO-located voice gateway. Add flow-through provisioning, and VoDSL delivery and maintenance is streamlined end-to-end, with consistent network availability, significant improvements in customer service, and correspondingly improved service provider margins.

Seamless integration across global broadband data elements assures scalable, future-prepared operational and service delivery flexibility. An advanced flow-through framework can integrate with business and management systems, including billing, workflow, customer care, and order management.
The following list enumerates the VoDSL provisioning and service path, including the IAD and voice gateway, and highlights the flow-through system’s role.

Figure [X]. VoDSL greatly expands the range of services available to subscribers, using the infrastructure already in place to support DSL. Only an IAD at the customer premises and a voice gateway at the CO need to be added to support VoDSL.

1. **The Integrated Access Device (IAD):** The IAD terminates the subscriber end of the DSL access network. It resides at the customer premises and splits the data and voice portions of the signal. Similar to a DSL modem, the typical IAD has one or more standard Ethernet ports for connection to the customer’s LAN. Multiple standard telephone line jacks on the IAD connect to the subscriber’s telephony equipment—telephones, fax machines, key systems, or PBXs, with all features intact. Up to 24 simultaneous, business-quality voice lines can be carried in addition to the high-speed data provided by standard DSL service.

2. **The DSL Transport Network:** This is the link between the IAD at the customer premises and equipment at the service carrier’s CO. The protocol foundation of the transport network varies but is most often supplied by asynchronous transfer mode (ATM). An ATM-based transport network has substantial advantages as the protocol is designed specifically to meet the stringent demands of concurrent voice and data traffic, and ATM is already widely deployed in other carrier network segments.

3. **The DSL Access Multiplexer (DSLAM):** At the CO, the DSLAM terminates the DSL protocol and converts ATM-based data to traditional formats. Data traffic is directed to its destination (usually through a broadband remote access server to the Internet), just as in current DSL service. Voice traffic is offloaded to the voice gateway, below.

4. **The Voice Gateway:** Also located at the CO, the voice gateway receives encapsulated voice traffic from the DSLAM. The gateway converts the stream to the traditional formats used in
existing voice networks and then forwards the traffic to a Class 5 voice switch where it goes out to the public switched telephone network (PSTN).

Crossing the VoDSL Finish Line—First

Healthy demand for expanded services over the local loop is great news for providers, but it also creates a fiercely competitive environment. With flat-rate pricing the norm for basic access, providers need significant service differentiators to attract new customers and keep existing ones happy. The main differentiators providers can offer are timely service activation, reliability, and value-added services such as VoDSL.

An automation-capable flow-through framework is essential; it’s the key to rapid service expansion, revenue realization, and provider survival. For VoDSL support, seamless workflow must combine with real-time access to resource and process visibility and utilization. The system must also incorporate end-to-end order and service delivery management across heterogeneous networks and network elements.

The right framework is key to more than VoDSL—it also enables new and future offerings providers need to meet the growing demands of service-hungry subscribers. Many new value-added services are on the horizon: bandwidth on demand, multi-service delivery, and prioritized bandwidth. Only those providers armed with advanced flow-through provisioning will be in a position to capitalize on them.

Finally, a flow-through framework also sets the stage for a successful transition to the next-generation network. Fast paced, continuous network evolution combined with the need to roll services out fast and accurately means advanced flow-through provisioning is a necessary way of life for providers, not an option.

###

Based in Dallas, Texas, Paul Arceneaux is VP and General Manager of Siemens ICN’s Service Management Business Unit.