"An OSS Case Study: Autoprovisioning and Autofulfillment of HSD in Ninety Days"

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1 Common Issues Facing Today's Service Provider OSS Environments

OSS environments for service providers have undergone a lot of change and expansion in the last decade, driven by the following areas:

- Need to automate common provisioning tasks for specific high-volume subscriber services in order to reduce costs, improve operational scalability, and reduce order intervals.
- Need for OSS systems to support new services.
- Need to support new network platforms/vendors.
- Expectation and benefits of subscriber managing their own services
- Increasing service complexity.
- Ad-hoc point solutions to address specific operational problems.

As much of this change and evolution has happened in an ad-hoc incremental fashion, many service providers now are facing some significant issues in their OSS operational environment such as:

- Homegrown OSS systems that were not built with the appropriate architecture to accommodate the massive service growth.
- Homegrown OSS systems are difficult to support and extend due to their proprietary nature and closed interfaces.
- Complex Customer Service Representative(CSR) / Technical Service Representative(TSR) interface environment as the CSR/TSR has to access many different systems (each with a different interface) to execute a service order or to troubleshoot a problem. This results in high training costs, and a higher risk of human error.
- OSS silos - Many OSS solutions/systems that can only support a single service, resulting in high costs to support and evolve multiple OSS systems.
- OSS solutions that are intricately tied to a particular network vendor, platform or technology, that make it too costly and disruptive for the Service Provider to utilize better or lower cost network platforms in their network.
- Limited automation - Many services still have many manual steps resulting in high operational costs, excessive data reentry, and error-prone manual processes.
- Complex, costly integration environments, due to the need to support multiple interfaces (from each OSS silo) to each shared business support system or database repository, and due to a lack of integration interfaces.

- Serious data integrity issues, due to re-keying errors, or errors in the manual processes required to synchronize the data between the many non-integrated databases, that are used in the different OSS systems. This can result in:
  - Lost revenue (where provisioned services are not being billed correctly, or at all).
  - High order fallout due to data inconsistencies.
  - Expensive manual interventions to research and resolve data integrity issues on a per customer service basis.
  - Stranded capital or resource investment, as there is no accurate information on how much equipment/resource capacity is actually in use.
- Difficulty in diagnosing service problems across multiple services due to inaccurate and unavailable information and storage of vital information in OSS silos.

As Service Providers face increasing competitive pressures, they are recognizing that they urgently need to evolve their OSS environment to a service management based architecture and solution infrastructure that addresses the issues discussed above, and positions them to:

- Respond quickly (and at a much lower cost) to new service opportunities and new competitive threats, in order to significantly grow their service revenues
- Substantially lower their operational costs to increase their service margins

The following sections explain the basic concepts of OSS service management that are used to provide **auto-provisioning and auto-fulfillment** of telecommunications services, and the key evaluation criteria you should consider in assessing service management solutions in the marketplace.

2 What is OSS Service Management?

2.1 Definition of Service Management

The term *service management* for OSS generally refers to the system (or systems) that enables the definition of services, performs order management, service network topology management, provisioning and activation, and service assurance functions (e.g. service fault diagnostics and performance/health monitoring) for communications service providers and their networks. Other supplemental service management functions can include network inventory management, IP address space management, CPE firmware management, and order capture via CSR, or self-service interfaces. Essentially, these systems are designed to provide an operator with a single OSS infrastructure that can support the automation of provisioning/activation of the services, management of the services to customize the services to the subscriber's needs and operator efficiencies and service assurance processes to ensure that the services continue to be delivered at levels of acceptance to both the operator and subscriber. The goal of service management is to dramatically simplify and lower the operational costs for the delivery of services.

2.2 Introduction to Service Management

An OSS service management system with an underlying workflow management engine incorporates industry knowledge and expertise, and is the required neural center to support the automation of business logic, operational processes along with intra-system and inter-application communication. An OSS system will interact with external OSS (operations support systems), BSS (business support systems), EMS (element management systems), and NMS (network management systems), among others, to rapidly deliver broadband services and provide diagnosis when problems arise. A summary of the primary functional areas of OSS service management is outlined below.

Service definitions describe the distinct capability of the service delivery network and rules over how it can be configured. Services define the content and behavior of these capabilities. Services can be composed in order to present an appropriate level of interface abstraction to external order management systems. Relationships and rules can also be established between services to describe concepts such as dependencies, exclusivity in a subscriber's profile, and etcetera.

Order capture involves the capture of the desired service or service change and the related service parameters for a specific subscriber account. With the order capture process, an OSS system will typically receive requests from a higher-order customer care and billing system, or from a self-care portal such as a web site or IVR, and translate this request into a format that can be processed by the order management function. Order capture has a tight coupling with a product and/or service catalog to define the product offers and capture rules presented to the user.

Order management provides the capability to breakdown, track, fulfill, and maintain service orders for the life of the customer's account inclusive of all business and operational service actions required to fulfill broadband services. Flow-through provisioning involves verifying serviceability, checking for physical/logical network capacity, identifying the network entry point for a service and then activating the subscribed services at the end customer's device. This provisioning of services is done in the context of the OSS system determining the service actions required to fulfill an order with a direct correlation to understanding the service delivery network, the network's capabilities, and what services can actually be delivered to a subscriber. The result of this functional process is a set of dynamically generated workflow processes that are carried out by a workflow engine that guarantees data and transactional integrity, order status tracking and detailed processing of success, failure, cancellation, rollback and jeopardy scenarios.

Service topology management and maintenance understands the service delivery network (e.g. HFC, DOCSIS and IP networks for cable, PSAP, etc), commissioned network elements, and available service resources and the rules for managing subscriber services on these networks. This managed information is typically used by an OSS system to identify which network resources are to be used in fulfilling the service order, including support for different technologies and vendors in the service delivery network. This critical function for OSS also manages the service network view that is needed for service assurance activities to enable network fault to customer service correlation for service diagnostics. Finally, service topology management can be used to execute network maintenance activities (e.g. node split) when subscribers must be automatically re-provisioned on a new segment within the commissioned network.Service assurance provides the necessary proactive and reactive diagnostic and troubleshooting tools to analyze customer service problems, isolate the service problem, and provide the appropriate information and notification to service representative to track and resolve the subscriber's service issue. Proactive service assurance attempts to help identify resolve problems before they occur and reactive service assurance provides tools to ensure when the problems do occur they are identified and resolved expediently. Service diagnostics simplifies the customer/technical service representatives' (CSR/TSR) interaction with the network in diagnosing service related issues. Instead of facing dozens of different diagnostic tools and screens, service representatives can perform integrated user-friendly service diagnostic triage by launching diagnostic test suites that home in on, and clearly describe to the user, any and all problems and situations encountered.

Inventory Management involves tracking and managing the physical assets associated with the service delivery network and customer CPE equipment. This may include, but is not limited to chassis, cards, ports, hardware revisions, serial numbers, manufacturer/vendor, circuits and etcetera.

IP Address Management involves reservation, assignment, utilization tracking, renumbering, reporting and replenishment functions associated with managing IP sub-networks on broadband access systems (e.g. CMTS, Device Provisioning System (DHCP), ISP routers).

Firmware Management includes auto-discovery of broadband CPE equipment (e.g. cable modem) and the ability to manage and upgrade the CPE firmware revisions via an automated download process.

In summary, service management systems can help to accommodate changing business needs in a service provider's operational environment. OSS systems provide the flexibility to add new services, accommodate changing business process models, and inter-operate with various legacy support systems to preserve your capital investments. With a robust and proven service management system, you will be able to improve time to revenue through premium service offerings, reduce costs through process automation, and improve overall customer satisfaction with detailed service assurance applications.

3 Why is OSS Service Management Required for Automated Provisioning and Fulfillment?

3.1 The Evolving Complexity of Broadband Services

As service providers gain market success in offering new broadband services such as high- speed internet, telephony, home networking, mobile data and messaging, and advanced digital video services, they quickly face the challenge of order rates and order fulfillment complexity overwhelming their manual processes, and capabilities of their current OSS applications. The likely result may include an unacceptable increase in order intervals, high order fall-out rates, high operational costs and data integrity issues.

Due to the ever-growing complexity of broadband services, manual order management and provisioning of these broadband services on an end-to-end basis can typically be very time consuming, labor intensive, and extremely cost prohibitive. Manually creating multiple service instances across disparate network elements and legacy support systems can easily result in hundreds to thousands of service instantiation and change requests that could result in time-to-service delays, provisioning errors and a dissatisfied customer base.

Without automated service creation, order management, provisioning and activation, you have a minimal chance of capitalizing on the ever-growing demand for advanced broadband service offerings. Automated service fulfillment, with the ability to efficiently manage bundled service offerings is the key to building long-standing customer relationships, enhancing growth and market share, and improving profitability with greatly reduced costs.

3.2 Operational Shortfalls Without OSS Service Management

Managing broadband service offerings in separate business units, organizations and operations support systems only facilitates a very inefficient and expensive business environment. The complexity of managing bundled service offerings requires scalable, integrated and flow-through service fulfillment processes that are supported by a common OSS infrastructure. Without an OSS service management system to provide a common, managed view of all subscriber services, there are set of operational hurdles and resultant shortfalls that are likely to exist in your business.

A summary of some other more visible hurdles your operations may face without a service management include:

- Limited central customer visibility – little or no centralized service catalog management, order management, order tracking and subsequent reporting.

- Complex manual business processes with little automation – limiting scalability and inhibiting time-to-revenue.

- Inability to reduce “swivel chair” provisioning and activation – your operational costs are much too high.

- Inability to diagnose service problems across multiple services due to inaccurate information and storage of vital information in OSS silos.

- Complex troubleshooting as important information such as subscriber and network topologies that are necessary information to resolve issues is stored across these multiple systems not readily available to the decision makers in the field.

When customer and technical service representatives have to use multiple systems, tools and applications to order and manage subscribed services the following issues will likely result:

- Inability to effectively bundle service offerings because a common view to the subscriber’s profile is non-existent or the system is not architected to handle bundles.

- Significant total cost of ownership as the training, maintenance and upgrade costs for multiple systems will become inordinate.

- Data integrity issues are very likely to emerge that require extensive manual involvement to attempt to resolve operational issues. Data integrity can result in order fallout that ultimately ends with lost customer revenue. Manual intervention such as re-provisioning subscribers would only compound data integrity problems and result in higher revenue recovery costs.

Many OSS solutions/systems are developed, integrated and managed in a “silo” in that it can only support a single service. The result is high costs to support and evolve multiple OSS systems. Other underlying business and operational shortfalls associated with OSS silos are as follows:

- Fragmented or inaccessible customer/network information which makes it very difficult to provide a consolidated view of the customer, or the network the delivers a customer’s service.

- Limited ability to offer and provision multi-service bundles.

- Slow, costly introduction of new services resulting in competitive losses and poor time to revenue. This is due to the fact that in many cases, the existing OSS systems cannot be readily extended to support a new service, resulting in need to develop another costly OSS silo solution.

Homegrown OSS systems that were not built with the appropriate architecture to accommodate the massive service growth are also difficult to support, enhance and upgrade. These types of systems may typically lack architectural definition, open interfaces, sufficient documentation and in-house knowledge to keep things running smoothly. The result that many service providers may experience includes experiencing serious stability issues (outages), or encountering hard limits in their ability to support additional services

4 What are the Key Requirements for Selecting an OSS Service Management System?

4.1 Service Provider Requirements for an OSS System

The following is a list of the most prominent operational requirements that a service provider should assess for an OSS service management system:

- Proven scale, performance, and reliability.
- Multi-service deployment experience showing depth in installation and implementation capabilities.
- Ability to integrate with existing business, operational and network management systems; protecting your existing front and back office investments
- An information model for subscriber, service and network-based information that can be easily accessed by other systems for essential OSS operations
- Detailed understanding of the underlying network and the associated inventory of physical and logical resources so that accurate provisioning can occur.
- Ability to abstract services from network so that offered services are not dependent on a particular vendor platform or technology, and the service management system automatically translates the service action into the required provisioning/activations processes required by the applicable vendor platform (i.e. support a consistent service across a multi-vendor network environment).
- Automated provisioning and activation for complex service offerings with transactional integrity to avoid lost orders.
- Workflow engine that supports the unique requirements of service management
- The ability to diagnose the service delivery network when problems are reported along with visibility into network performance and health.
- Open APIs that allow rapid integration to other systems.

5 What is the Justification for an OSS Service Management System?

5.1 An OSS System Addresses Your Critical Business Needs

OSS service management systems can help to accommodate changing business needs. OSS systems provide the flexibility to add new services, accommodate changing business models, and inter-operate with various legacy support systems to preserve your capital investments. An OSS Service Management portfolio can address at least these five critical business needs for a broadband service provider:

- Increased revenue streams via the timely delivery of new and enhanced service offerings.
- Significantly reduced operational costs associated with delivering and managing broadband services through system integration, configurable business logic and reliable workflow management.
- Consolidated and rationalized service delivery processes across disparate broadband regions and systems to reduce operational silos and improve overall operating margins. Providing your service center/s with the tools to rapidly diagnose service problems being experienced by your subscribers, thus significantly reducing call-handling time for customer and technical service representatives.
- Simplifying and automated service re-provisioning activities associated with network configuration and maintenance activities that reduce operational costs expended by network engineering and deployment teams.

5.2 An OSS System Addresses These Critical Operational Tasks

- An OSS system based upon an open architectural platform that can be configured to support any service, or bundled service offerings.
- The OSS system derives the controlling business logic for complex multi-service bundles from its management information model and service topology model, instead of requiring the hard-coding of a complex workflow processes that have to address all the possible permutations and combinations

- The OSS system provides the capabilities to easily provision services across a heterogeneous multi-vendor service network.

    - Ability to install new service platforms and technologies without impacting your existing services, and without requiring a large effort to define and manage the network dependencies for each new vendor or product release.

    - Ability to use different vendors and service topologies in different parts of your network.

- The OSS system includes a rich service management information model and data structure that can be leveraged by other OSS/BSS/NMS systems through defined application programming interfaces (APIs).

- Data integrity issues should be non-existent as the OSS system captures and manages the service-subscriber-service topology relationships (avoiding "back-door" operational activities).

- Proven scalability to support millions of subscribers with carrier-class system availability

- Investment protection through ability to integrate with and leverage your existing OSS and BSS investments.

5.3 Impact of Selecting the Wrong OSS Service Management System

Making the wrong decision regarding an OSS service management system can be a costly mistake if you do not proceed with due diligence in your selection process per the functional requirements stated in this paper. A summary of some of these major business and operational impacts are noted below:

- Inability to support subscriber growth as the service management system is not appropriately architected to scale without prohibitive hardware costs, system stability/availability issues and the like.

- Technical complex, difficult and costly integration into your existing network and management systems due to poorly designed interfaces and APIs.

- Subscriber, service, network and operational intelligence are not effectively modeled such that automation of service management processes for OSS is sub-optimal and does not meet your desired business objectives.

- Inability to respond quickly to new service opportunities and new competitive threats, in order to significantly grow your service revenues.

- Inability to lower your operational costs to increase service margins.

5.4 Wrap-Up for Service Management

Service providers must be able to obtain “near” turnkey service management systems that have been highly integrated and configured from an established OSS vendor. The appropriate tools and applications must be made available so that service providers can gain a level of ownership and autonomy in enhancing and maintaining their OSS system. A service provider in this generation can no longer afford to wait for many months and sometimes years for a proven, scalable and reliable operation support system…the prosperity of these providers and the satisfaction of their customer base can no longer support a slow response to the demands of the marketplace.

6 Adelphia Power Tools – OSS in 90 Days

6.1 Power Tools Background

There were numerous challenges Adelphia Communications faced in 2003. One of their most important business initiatives was to drive new revenues via rapid subscriber growth for high-speed Internet services as well as improve overall quality of service.

Functional Requirements

In the summer of 2003, Matt Bell was tasked with creating the Adelphia Power Tools OSS infrastructure to provide a configurable and adaptable solution to support the company's predicted subscriber growth. . Equally important was to increase revenues per existing subscriber for Adelphia's Power Link high-speed Internet service. This OSS infrastructure was critical in Adelphia achieving a critical milestone in being able to deliver nationwide auto-provisioning for their high-speed Internet service. Second, it had to be able to easily and seamlessly scale with Adelphia's accelerated growth plans for HSD subscriber acquisition. The underlying OSS solution in the Power Tools infrastructure had to enable Adelphia to quickly react to new market demands with agility and the ability to drive new products/ services rapidly to market. Finally it had to support a dynamic service delivery infrastructure with a wide array of DOCSIS manufacturers and equipment.

6.2 Power Tools Network Environment and System Implementation

6.2.1 Introduction

The OSS infrastructure solution deployed at Adelphia to manage high-speed Internet service was code-named Power Tools.

The key roles and requirements for Power Tools included:

- Manage the services offered to Adelphia's subscribers and the rules for managing these services.
- An understanding of the network topology to perform different provisioning rules in different regions of the plant.
- Manage the relationship of subscriber to network elements providing services and ensuring necessary elements are correctly configured to deliver and manage these services.
- Auto detection of network serving the subscriber including integrated inventory management for these elements, thereby improving data accuracy and reducing operational tasks.
- Readily enable extensions supporting future requirements as well as additional service plans including additional tiers of HSD services, ISP services, VoIP and new delivery technologies.
- Provide capabilities to collect data from various data sources.

- Provide tools to ensure accuracy of new data and to improve the accuracy of existing data.
- Need to customize the customer's PC with Adelphia branding, select an email address and configure the email client all without a CD.
- Empower the subscriber to manage their service profile experience with effective self-care portals that can easily guide the user through installation and other service management functions
- Quickly and easily adapt to provide new services with new service providers on the existing infrastructure.
- Provide reporting on network and subscriber order activity and user activity.
- Scale to multi-million subscribers and flexibility to manage new services.

6.2.2 Broadband Services Managed

The Power Tools OSS solution manages the Adelphia Power Link High Speed Internet service over Adelphia's DOCSIS™ network. Adelphia offers ISP services to these subscribers including email management and web-space hosting. For these services, activating and deactivating Internet service was automated along with managing non-pay and temporary service suspension scenarios.

6.2.3 OSS Vision

This section identifies some of the unique functions provided within the Power Tools implementation.

"**Walled Garden" Activation and Subscriber Management Flows**

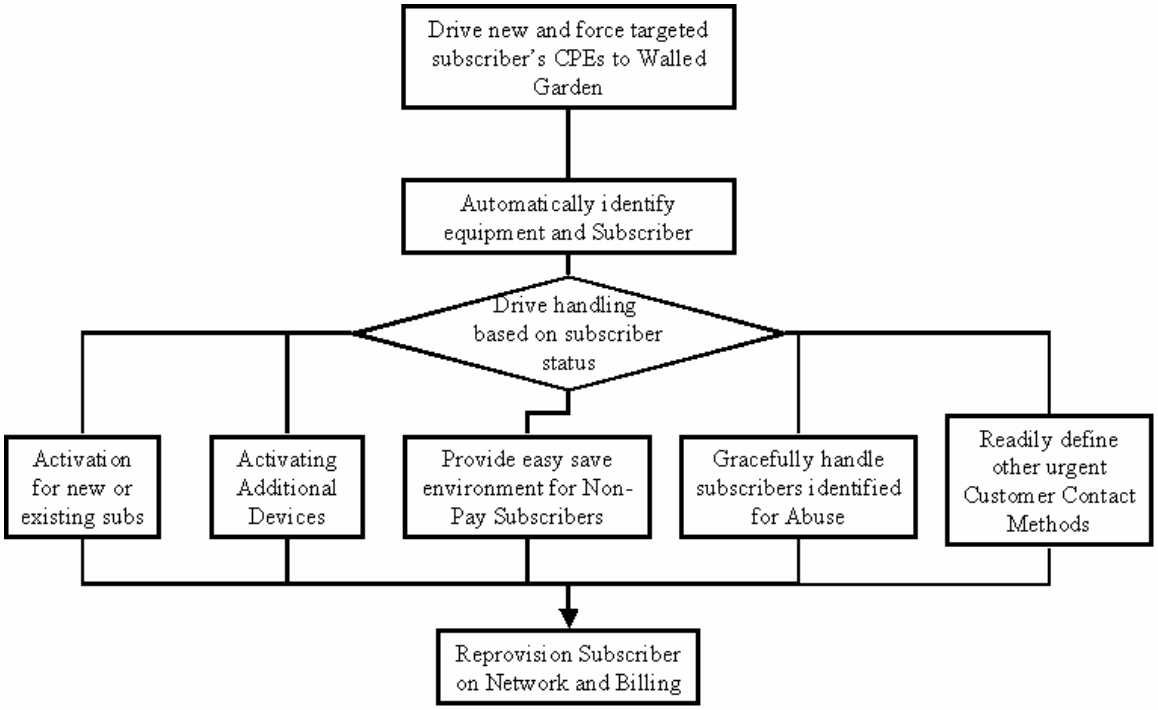
The Power Tools OSS solution provides a unique and effective method for interacting with subscribers in an effective, friendly method that is used for urgent interactions. When interaction with the subscriber is urgently required, historically operators have attempted contacting the subscriber but when this fails the service is disconnected until the subscriber calls. With the walled garden flow, service is interrupted and the subscriber is put into a state describing the scenario as to why they have been put into this state and detailed automated instructions to recover from this state. Support staff is readily available through on-line chat functions.

Some of the scenarios that are driven through this environment include:

- New activation – in this flow the subscriber selects his primary email, configures his client and his modem is automatically detected and updated in the provider's subscriber and inventory data stores.
- Flow for non-pay – When a subscriber goes into a delinquency state he is informed of this state through the walled garden and encouraged to electronically settle past dues at which time his service is immediately activated.
- Subscribers performing Illegal activities – subscribers who have been identified by law enforcement agencies as downloaded illegal content or other activities will be placed in the walled garden with a message to the nature of their offense.
- Contaminated CPE devices – subscribers with viruses that are found to be detrimental to the provider's network can be forced into the walled garden with

filters applied as to the nature of the contamination and necessary support to clean their system.

- Activation of additional equipment – As subscribers activate additional 'billable' devices on the network they may be handled in a friendly manner to enable the easy addition of incremental equipment.



Adding Forethought to the Service Support Spectrum

With limited OSS capabilities, operators have historically been unable to take effective, and proactive steps to reduce service interruptions until the subscriber themselves contacts the operator to inform them of the outage. These interruptions often take significant resources and time to resolve the issue and the subscriber experiences additional grief and aggravation in addition to their service interruption.

With an advanced OSS system, such as Adelphia's PowerTools solution, much more forethought has been applied to service support - to prevent outages from occurring and dealing with them effectively and rapidly when they do occur. Tools are included in this advanced OSS environment quickly identify an outage, identify the severity, escalate accordingly and empower the subscriber or TSR to remedy the problem expediently when the subscriber does make a call.

These advanced tools required a comprehensive network management system to monitor network equipment, a service management solution to correlate network elements to the subscribers and the services utilizing the network and tools to empower the TSR and the subscriber to investigate and resolve the outage. Of course the outages that the subscriber can resolve are limited, however, one solved by the Power Tools solution is maintaining a snapshot of the CPE configuration so that when it is

changed and connectivity to a service is lost, a wizard in the subscriber's self care web portal enables the subscriber to restore their configuration settings.

Common View of Subscriber, Services and Network to all users
Another common problem faced by service providers is ensuring that employees performing operational roles including troubleshooting, maintenance and customer support have relevant, accurate and consistent data to enable them to perform their job. Too often important information is available only to key individuals, and not available to all relevant users.

When this information is unavailable to all the users, the support infrastructure often breaks down with rivalries building among support teams, which distracts the team from the end result – resolving the subscriber's problems. A common problem area is when the network operations team has data regarding network performance that is unavailable to the front line support team that handles customer calls. When a problem occurs, and the front line team receives a call from the subscriber, without the data available to them, they assume the problem is attributed to the network and escalate to the network team. The network team cannot find a network problem and point the issue back to the subscriber and the front line support team who has to call the customer back to resolve the issue. The end result is an unhappy customer and wasted time and resources on behalf of the operator.

The Power Tools solution ensures that network information is available for all employees in an easy to use utility that enables point based investigations as well as performance trending across areas. This data enables the network team to receive immediate feedback for actions that they are performing on the network and also receive immediate gratification that their actions are benefiting subscribers. These changes within the Power Tools solution has resulted in an improved performance of the network, reduced call center load and improved customer satisfaction.

6.3 Power Tools Project Challenges

Aggressive Timelines

The OSS Team was challenged to deploy the in an extremely tight timeframe, under 90 days. This timeline was driven by the need to drive new subscriber acquisition and revenue targets.

Subscriber Data Migration

The Power Tools OSS solution enabled Adelphia to store and manage the state of Adelphia's 850,000 high-speed Internet subscribers and migrate these subscribers to the new system. Data was sourced and correlated from over 200 different data sources including billing applications, troubleshooting databases and legacy provisioning systems. With this subscriber data and automated processing by the team, the migration occurred seamlessly without any service loss.

National Footprint

Adelphia serves a wide geographic region covering areas across continental U.S and Puerto Rico. The project and deployment teams worked with users and systems in all of these regions covering four time zones.

Technology Mix

Although Adelphia's HSI services are deployed on all-DOCSIS networks there is a mix of 5 different CMTS vendors and 13 different CMTS models, and 40 different CM vendors and models on the network and an even larger number of different customer configuration files. The project supported this multi-vendor environment with automated provisioning and service fulfillment as a result.

6.4 Power Tools Project Results

The Power Tools OSS solution empowers Adelphia to cost-effectively create, manage and automatically provision and fulfill high-speed Internet services on their DOCSIS™ enabled, IP digital network. The solution provided significant deployment risk reduction for Adelphia as the industry-leading vendors had proven high-speed Internet deployments prior to integrating together at Adelphia. This integrated OSS solution optimizes self-installation, order entry, order management, device provisioning and service activation processes for high-speed Internet access, e-mail and self-installation while providing rich APIs for third party system integration and reporting.

The Power Tools OSS solution and necessary customizations were configured and delivered to Adelphia in 30 calendar days. The interval from Beta deployment and testing to a complete national rollout occurred in only two short weeks. At the completion of the Adelphia Power Tools OSS project, nearly 1 million subscribers were completely migrated and managed by our OSS solution in total project duration of only 73 days! This very aggressive milestone was achieved without a third-party system integrator and only via the direct cooperation between Adelphia Program Management and diligent Project Teams from premium industry vendors. By choosing these premier industry vendors, Adelphia is now currently on track with OSS automation to meet their subscriber growth initiatives.

6.5 Secrets of Success

Post project reviews between Adelphia and the vendor community discussed some of the key elements that made this initiative successful. The most important element was a common vision for the project among all participants, both employees and vendors, as well as an urgent priority across all facets of the organization. This priority was maintained and encouraged by each member of the management team and carried through each of the many talented, dedicated and empowered team members. Communication was made a high priority throughout the entire project team.

The project was implemented using a 'fast-follower' approach. Innovation was rewarded but a consistent message was to employ similar solutions to similar problems from the experiences of other large-scale operators. This approach required experienced employees and vendors with deployment expertise from other implementations.

The project management team maintained a very tight control of requirements ensuring that there was minimal scope creep where each change was carefully controlled and communicated. There was a long-term strategy in place with well-defined, iterative goals defined with each release of the solution. Interfaces were accurately defined and communicated between each of the elements ensuring clear development handoffs and testing strategies.

The project continues following consistent rules. Iterative development continues with additional service and operational functionalities in each release of the solution. Management commitment, communication, and control of requirement scope creep remain key criteria to the success of this ongoing initiative.

The Adelphia Power Tools Project is a testament to the cable industry on how a focused and motivated team with a specific set of business and operational objectives could very rapidly automate and scale the operational environment of a major broadband operator. This same type of focus, leadership and cooperation should serve as key lessons learned by the cable industry on how to quickly deploy broadband services and establish a viable self-service, network management and support infrastructure for operational cost reduction and highly scaleable automation..