Bright House Networks® and Cisco®: A Successful Approach to tru2way™ Implementation for Cable MSOs

Introduction

Bright House Networks® is a US-based cable operation with multiple systems located across the country. It has been quick to embrace advanced technologies, successfully positioning itself as a frontrunner in the development and deployment of services such as CallerID-on-TV, video-on-demand (VoD), and enhanced television services such as Start Over™.

Bright House Networks shares Cisco's vision of the Connected Life as a guiding principle in developing the next generation of video services. The Connected Life describes a consumer experience in which multiple media services work seamlessly across a wide variety of devices—TV, computer, handheld, etc—through a tightly integrated and flexible video network platform that allows consumers to enjoy more personal and more social applications.

The OpenCable™ Application Platform (OCAP™) specifications developed by CableLabs® are meant to establish an open, standardized platform for creating and deploying advanced, interactive applications through cable networks. Tru2way™ is the consumer-focused trade name for OCAP technologies and products. While tru2way is often referred to as a "successor" to OCAP, the terms are essentially interchangeable.

Since 2005, Cisco™ has partnered with Bright House Networks and Time Warner Cable in transitioning to a tru2way-enabled network infrastructure. In July 2007, Bright House Networks deployed its first tru2way set-tops with separable security, and shortly thereafter launched its first tru2way application offering—the tru2way electronic programming guide, or OCAP Digital Navigator™ (ODN). Bright House Networks initially deployed ODN in its Orlando, Florida site. Cisco was particularly involved in solution development, trials, roll-out plans, and beta-testing phases of the deployment.

Bright House Networks, with Time Warner Cable, are the first multiple service operators (MSO) to successfully convert their systems to a tru2way-enabled infrastructure. The lessons learned by all parties—Bright House Networks, Time Warner, and Cisco—in the course of the project (which remains ongoing) will be important for other cable operators to consider as they plan and launch their own tru2way initiatives.

Challenge and Change in the Cable Industry

As consumers become accustomed to the interactive and personalized applications and services commonly delivered over the Internet, they are increasingly demanding the same level of customizability and interactivity in the services they receive from their cable operators. At the same time, of course, they are continually demanding the very same high quality and reliability of what cable has given them over the years.

As a result, cable operators face a number of significant challenges. Existing cable infrastructures represent a major capital investment, yet they are not typically designed or configured to accommodate a high level of interactivity. To implement video-on-demand, whole-home viewing, and other advanced services, operators must invest a great deal of resources and time to development and deployment efforts.

The multiplicity of set-top box (STB) designs that may be used even in a single service area requires that application development, testing, and installation must be laboriously reproduced for every possible end-user configuration. The fact that each application or service may exist in a large number of hardware-specific "flavors" creates a daunting level of complexity for customer- and technical-service personnel.

In addition, high-definition (HD) video is growing very quickly as a proportion of the total volume of content delivered to consumers. This, along with the deployment of new, interactive features and capabilities, is placing unprecedented demands on fixed bandwidth resources, which in many cases may be overwhelmed unless advanced strategies for bandwidth optimization and intelligent content routing are developed and implemented.

The promise of tru2way is that it can eliminate some of these challenges and make the development and delivery of advanced, interactive services over cable much faster and less costly.

The implementation of tru2way for a given infrastructure can be a complex and demanding project, involving the adoption of new processes and technologies, and requiring a significant commitment to change at all levels of the company. Nonetheless, there is a consensus throughout the cable industry that tru2way will soon be the de facto standard platform for next-generation cable services and applications. MSOs that are among the first to adopt the tru2way standard can expect to achieve a significant competitive advantage, based on several factors, including:

- Advanced service offerings that can differentiate cable service providers from competitors and build subscriber interest and loyalty
- Faster time-to-market for new applications, along with reduced costs for application development, testing, and deployment
- Cost reductions resulting from greater competition and selection among hardware and software applications, since the long-term goal of tru2way is to enable broader vendor and partner choice.

Bright House Networks and tru2way

Bright House Networks made the forward-thinking business decision to transition to a tru2way-enabled network, beginning with deployments at their Orlando site.

Speaking of the reasons behind the decision, Jeff Chen, Bright House Networks senior vice president of advanced technologies, said, "we look at tru2way as the future of our industry. You have to do it. And if you look at the benefits that the tru2way platform is expected to bring to us... It's justified to invest the time and money to go forward with it."

Several other considerations contributed to the decision to go ahead with the tru2way initiative:

- Bright House Networks, with Time Warner Cable, was already positioned as a national leader in providing next-generation, interactive, two-way video services to consumers, and recognized that early tru2way implementation would contribute to maintaining that industry position.
- Both organizations had committed to developing and deploying an advanced, digital programming guide application. This would have been far more costly to accomplish in the legacy environment. Since tru2way implementation was understood to be inevitable in the long run, it was clear from a cost perspective that the best course of action was to undertake the tru2way transition and develop the program guide—OCAP Digital Navigator, or ODN—as a tru2way application.

- The Federal Communications Commission (FCC) had mandated a deadline of July 1, 2007, for cable operators to adopt separable security as a standard for STBs and televisions. For Bright House Networks, it made good business sense to couple the separable-security mandate with tru2way implementation, since each of those initiatives on its own would require that Bright House Networks install a new generation of STBs to its subscriber base.

Project Challenges

The primary challenges faced by Bright House Networks were related to the sheer size and complexity of the project. The Orlando site has a very large subscriber base, and it supports equipment from multiple vendors.

In addition, it was understood that the migration to a tru2way-enabled infrastructure would require every part of the company to re-evaluate and adjust long-established processes, and possibly to rebuild from scratch a large number of tools that had long been effective in helping to ensure security, service reliability, and efficiency.

These challenges were made more acute by the July 2007 ("7/07") deadline for conversion to set-top boxes with separable security. Because Bright House Networks and Time Warner Cable had combined that project to the tru2way implementation, they had a hard deadline set for them before even launching the project planning. Although it posed a challenge at the time, in retrospect it is clear that the "7/07" deadline helped contribute to the eventual success of the project. As Dale Lang, director of program management at Cisco, said later,

"One thing I think we had working in our favor (though at the time it felt like it was working against us) was the July 1, 2007 deadline because Bright House Networks and Time Warner Cable had decided they were going to launch new set-tops with separable security and our tru2way solution at the same time. We had an outside force making us do what we had to do to get across that goal line. I think that did help us be successful together."

Another challenge arose from the fact that the deployment of new platform and new applications puts further demand for system capacity. It would therefore be necessary to enact advanced strategies for bandwidth optimization, including intelligent stream management and content-storage virtualization. Glenn McGilvray, video headend product manager at Cisco, said of the challenge, "from a bandwidth management standpoint, being able to free up spectrum to support new applications driven by tru2way is a critical component to success."

Before beginning the execution phase of the project, Bright House Networks undertook an extremely thorough planning process, and this proved to be another key factor in the eventual success of the project. Rather than conducting the planning solely from an engineering and operational perspective, and then informing other divisions of the tasks they would need to accomplish, Bright House Networks used an open planning process that involved all company divisions from the outset. This decision had a number of beneficial results.

First, it served to minimize the number of unplanned-for issues that arose during project execution, leading to a faster, more efficient process. For example, the customer-service department was able to foresee the need for a very thorough training process for its personnel, and for a top-to-bottom re-structuring of its processes and scripts for issue escalation and resolution. Had the planning been done purely from an engineering perspective, the time and resources needed for this might have been significantly underestimated. This may have caused project delays and hindered inter-departmental communication.

The inclusive and collaborative planning process ensured that each division of the company fully understood the importance of its role in the process, and was able to take ownership and

responsibility for accomplishing its share of project tasks. In addition, the process served to create established lines of communication and a shared vocabulary to ensure effective collaboration and information-sharing. This turned out to be immensely valuable during the deployment process, as it ensured that emerging challenges and unexpected complications could be communicated and addressed in a timely, effective manner.

Choosing a Technology Partner

Cisco was considered an integral partner in the project from Day 1. Cisco was chosen over other vendors for a variety of reasons:

- Because of the pre-existing, long-term relationship among Bright House Networks, Time Warner Cable, and Cisco, lines of communication and personal relationships were well established. As a result, Bright House Networks and Time Warner were confident that Cisco would be highly responsive and fully involved.
- Cisco had been very closely involved in creating the tru2way standards as a CableLabs partner, and was clearly committed to delivering comprehensive services and technologies to support the industry's transition to the new platform. Indeed, portions of Cisco's end-to-end tru2way solution had been chosen by CableLabs as their certification testing platform.
- Unlike other vendors offering only specific, focused products or services, Cisco offered end-to-end video services and technologies—from set-top boxes and head-end appliances, to network-architecture and ongoing maintenance services, to large-scale testing facilities and implementation know-how.
- Cisco is the recognized leader in crafting and pursuing the vision of the Connected Life—advanced, integrated, next-generation video and IP services delivered over media-aware networks using advanced bandwidth-optimization and content-virtualization strategies—of which tru2way technologies are key components.
- Cisco's testing labs and procedures are capable of massive-scale pre-deployment testing to minimize service disruptions and unexpected problems during actual deployment.
- Cisco has unmatched experience and expertise in large-scale digital-video network architecture, integration, and deployment.

Cisco tru2way Solution Elements

Cisco has been intimately involved in creating the tru2way specifications in collaboration with CableLabs, and has developed a complete, end-to-end tru2way solution for MSOs. Cisco's solution includes headend software, end-user set-top boxes, application middleware and more:

1. Cisco tru2way software release for its video headend Digital Network Control System (DNCS)
2. Next-generation Cisco set-top boxes with tru2way capabilities
3. Cisco tru2way Axiom™ middleware that functions at the video headend and STB levels

Cisco collaborated with Bright House Networks and Time Warner Cable on the remaining steps necessary for a successful tru2way implementation:

4. OCAP Digital Navigator (ODN) integration
5. Integration and testing of the Cisco tru2way solution across the entire end-to-end video network

Tru2way Digital Network Control System

Cisco Digital Network Control System (DNCS version 4.x or higher) headend software integrates with existing headend software to deliver tru2way enhancements:

- Capable of delivering tru2way applications to the set-top device, enabling enhanced subscriber experience
- Facilitates seamless addition of tru2way applications and network components, saving development time and money
- Has been tested extensively within Cisco network architecture, and is fully compatible with both native and tru2way interactive program guides and set-tops boxes
- Optimized to perform within the Cisco end-to-end video solution

Cisco tru2way Set-Top Boxes

Cisco now has available a series of next-generation, high-definition set-top devices, consisting of the Explorer 8642HDC, Explorer 4640HDC, and Explorer 1640HDC. Each is tru2way- and ADSG-capable, while providing a 300% improvement in processing power over the previous generation of hardware. Moreover, these Cisco models are designed for connectivity within the home, as supported by the following:

- IP-enabled video distribution through optional Multimedia over Coax Alliance (MoCA) and Ethernet configurations
- Digital Transmission Content Protection over Internet Protocol (DTCP-IP), offering secure content distribution while maximizing content portability
- Digital Living Network Alliance (DLNA) 1.5 within the home allowing devices to connect, discover each other and communicate on the home network

Because they also feature a built-in interface for the Multi-stream CableCARD™ (M-Card) module, these STBs are also fully compliant with the FCC's separable-security mandate, while Axiom middleware support makes them fully tru2way-enabled. The availability of these features in Cisco's tru2way solution offerings was critical to the success of Bright House Networks' goal of pairing their ODN deployment with their separable-security compliance efforts, completing both in time for the July 2007 deadline.

- Axiom Middleware—Supports tru2way applications such as service navigators and games

- M-Card™ Interface—The ability to accept the M-Card, a CableCARD capable of supporting up to six simultaneous video streams
- Advanced DOCSIS Set-Top Gateway (ADSG)—Enables a larger variety of 2-way media-server applications, and effectively lays the foundation for the integration of IP and traditional media services

Cisco Axiom Middleware

Cisco's tru2way middleware, Axiom™, is the foundation of its tru2way technology solution. Axiom abstracts differences in hardware platforms and operating systems to provide a common execution environment for tru2way technology applications. And with its built-in DVR, HD, SATA drive, and home networking product support, Axiom lets operators save considerable time and money in development and testing. By eliminating the differences in multiple hardware platforms, Cisco's tru2way middleware platform establishes a common environment for tru2way solutions, including:

- Support for advanced set-top capabilities for delivery of new services that increase revenue
- A means for cable sites to support tru2way standards
- Integration with Cisco's current architecture and service applications
- Reliability and stability based on extensive experience in middleware application development and rigorous testing, to reduce the likelihood of maintenance and service issues

Time Warner/Bright House Networks tru2way Programming Guide/OCAP Digital Navigator (ODN)

Cisco and Bright House Networks/Time Warner began collaborating on the development of an advanced digital programming guide in 2005. It was at this point that the decision was made to make the guide a tru2way application.

ODN is at the heart of tru2way's benefits to consumers. It gives viewers new ways of customizing how they navigate the ever-growing selection and types of content available to them.

As the most visible element of the tru2way solution, it was critical for ODN to be deployed with as few disruptions as possible—from the subscriber's point of view. Extensive consumer research was conducted leading to the design of ODN.

Key to the success of the ODN deployment was the fact that Bright House Networks customer- and technical-service personnel, along with the field technicians performing the actual installations, received extensive training beforehand. They were not only trained in the technical aspects of the ODN, but also in the appropriate ways to communicate with customers, who were bound to experience at least some anxiety about the changeover.

While Cisco did not provide this training directly, they did contribute a great deal of information—technical specifications, customer service scripts, and more—to support the training.

End-to-End Testing and Integration of the Solution

Cisco, Time Warner Cable, and Bright House Networks all conducted very extensive pre-deployment testing of the tru2way solution prior to final deployment. Testing was conducted at a large number of sites and labs, which kept in close communication at all times to ensure that as issues were identified, information was shared promptly to avoid redundant efforts and accelerate resolution. Cisco's vast experience and deep expertise in testing large-scale video-network solutions contributed significantly to the ultimate success of the deployment. Although there were some issues that only arose once the solution was deployed to large numbers of subscribers, the extensive testing that took place beforehand ensured that those issues were kept at a minimum.

The testing that was conducted fell into several categories, each of which was critical to ensuring that the ultimate deployment went smoothly and successfully:

- Automation testing—This unattended, batch processing of scripts was conducted overnight. Numerous functional IR commands such as channel guide updates were tested this way, along with features and functions such as electronic programming guides and exit screens.
- Functional testing—This verified that the features and functionality of the set-top box—from Pause and Play commands to Emergency Alert Service (EAS) and Closed Captioning—were all working as intended. Network testing for common downloads—images that are loaded onto the set-top box itself via object carousel—and application testing (including application download via Extended Application Information Table, or XAIT) also fell under the category of functional testing.
- Performance testing—Here Cisco and Bright House Networks ensured that channel change times, set-top box boot-up times, and other performance metrics fell within acceptable parameters. Under this testing regime, channel change times and boot-up times —very important to the Central Florida Division of Bright House Networks because of frequent severe weather events, particularly during hurricane season—were significantly reduced.
- Robustness/Stability testing—These are conducted through automation scripts and involves "torture testing" of the set-top and the solution beyond normal use and limits to determine overall robustness and to establish failure points. With that information, Cisco worked with Bright House Networks to develop "corner cases," as well as procedures to address these them if should they arise when the solution went live.
- Scale testing—This was conducted at the network (or DNCS) level and with back-office algorithms. Scale testing is used to evaluate for network overload and management. This tests the effectiveness and limits of load balancing to ensure all set-tops placed in the consumer home can operate on command. Because the Cisco tru2way solution uses the field-proven Cisco PowerTV set-top operating system—a stable and robust platform with a large core of features already deployed to more than forty million set-tops worldwide—the system was found to be effective and reliable in very large-scale deployment. The Cisco PowerTV™ core features are now enhanced with Cisco Axiom middleware.

Results

Thanks to the commitment by all parties—including both internal departments and project partners such as Cisco—to devote all necessary resources to the project, the new tru2way infrastructure was successfully deployed in its first iteration.

Perhaps most important is that fact that Bright House Networks, with Time Warner Cable, made the strategic decision to time the deployment of the tru2way solution to coincide with the FCC-mandated deadline for the separable-security initiative.

This decision meant that everyone involved had a hard deadline for completion of the necessary elements of the solution. While Time Warner Cable and Bright House Networks worked to develop the ODN, Cisco worked just as hard to make sure that its next-generation set-top boxes would be ready for deployment in time to meet the deadline. Had any single element of the solution not been completed on time, the entire project would have been severely compromised.

Bright House Networks, with Time Warner Cable, was successful in getting the entire company committed to the project, with a full understanding of the level of investment required for success. And when Cisco came on as partner, its personnel were quick to adopt the same level of commitment, responsiveness, and transparency that both organizations had achieved internally.

John Walsh, Bright House Networks vice president of engineering in Orlando, emphasized the importance of communication and training:

"Another part of the challenge that is just as important as the actual solution development is training and educating our people before the deployment. During the first six months, there was a lot of communications required among the engineering teams, field operations, call centers, and across the greater Central Florida division with Tampa. As we learned new things, we made sure that our people were able to address issues as they arose."

A great deal of pre-deployment testing was undertaken by Bright House Networks, Time Warner Cable and Cisco—and thanks to the commitment to collaboration on both sides, this was done with minimal duplication of effort, as the different testing labs shared information and findings at all levels.

Despite extensive pre-deployment testing, the very large scale of the project meant that there were issues that only became evident during and after deployment to the customer base. Cisco's expertise and deep experience with large-scale video-delivery networks, along with constant efforts to communicate early and effectively about emerging problems, it was possible to rapidly identify and resolve these issues as they arose, minimizing service disruptions and schedule delays.

Bright House Networks is actively developing a number of next-generation video services for deployment to their Orlando subscribers. Because of the success of Bright House Networks' tru2way implementation, these new services will be brought to market much more quickly and cost-effectively than would have been possible before tru2way. This will serve to rapidly put in place new revenue streams, while dramatically differentiating Bright House Networks offerings from competing services.

Cisco continues to contribute to the project, and remains a full and active partner in providing ongoing maintenance services, training, and support. Together, Bright House Networks and Cisco continue to refine the system for even greater efficiency and bandwidth optimization while developing and delivering new applications.

Lessons Learned and Looking Ahead

The primary lesson learned by all parties to the project is that tru2way implementation for MSOs requires a significant investment of time, money, and resources, and—arguably more important—a willingness on the part of all parties to make sacrifices and to commit themselves to the project's success. Operators who undertake tru2way implementation with this understanding, and with full buy-in from all stakeholders both internal and external, will avoid frustrations and delays, minimize budget overruns, and retain customer satisfaction with service reliability.

In addition, success requires the contributions of a technology partner—such as Cisco—that is fully conversant with the tru2way standards and has experience with all aspects of large, complex video-delivery network design and deployment. Furthermore, the relationship between the operator and the partner must be open and actively communicative to ensure effective collaboration and problem-solving on the fly.

Finally, Bright House Networks and Cisco both learned that MSO tru2way implementation is challenging and costly, requiring significant internal coordination, effort and commitment to success.

Bright House Networks is now moving forward with plans to roll out tru2way to other sites in its footprint. It also prepares to deploy more applications on the tru2way platform, such as My Account on Demand and diagnostic services. These are examples of unbound tru2way applications in that they are not directly tied to the programming content.

Tru2way also paves the way for cable MSOs like Bright House Networks to deploy applications written in Enhanced Binary Exchange Format (EBIF) for future enhanced and interactive video services. EBIF is a CableLabs® specified messaging and signaling engine designed for interactive video application development. In looking to the future, Jeff Chen of Bright House Networks notes, "EBIF is a standard that we are firmly behind, and one of the great things about tru2way is that it supports EBIF seamlessly."

Other MSOs who wish to position themselves to deliver the next generation of applications and services should consider that tru2way is only one part of the process. Success requires significant planning and preparation within the MSO at the corporate and site levels. It also requires having the right technology partner—a partner like Cisco, with the technological excellence and expertise to deliver innovative and cutting-edge video solutions to the cable industry.

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