

# BigBand Switched Digital Video

BigBand SDV (Switched Digital Video) enables dramatic savings in bandwidth consumption, allowing cable operators to increase revenues via expanded program offerings and the delivery of personalized, high-margin services. BigBand SDV transmits programs to subscriber service groups when subscribers in a service group request to view them, instead of broadcasting all programs to all subscribers all the time.

BigBand Networks pioneered SDV and has commercial installations passing millions of households. Unlike legacy environments, network capacity in a BigBand SDV environment seamlessly scales with the number of active viewers in each service group. This demand-side paradigm means that, with the amount of long-tail content increasing exponentially and advances in transcoding technology, there is virtually no limit to the programming and personalization that can be made available to subscribers.

There is no need to alter viewers behaviors since there is no noticeable delay or change during channel surfing and tuning, and programs appear the same in EPG lineups. Integration with all popular brands of STB (set-top box), including DVRs, is seamless.

Although a sophisticated technology, BigBand SDV is not difficult to deploy when done so by experts familiar with the technology. Benefiting from a wealth of experience accumulated over multiple deployments, BigBand Networks' professional services team can install a switched video system in as little as 90 days. Over time any deployment can be incrementally expanded to allow delivery of a virtually unlimited number of services, including high definition programming choices.

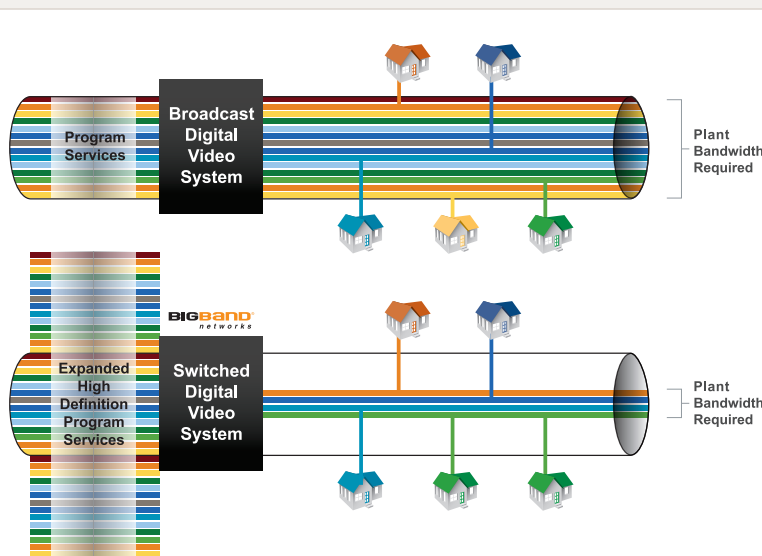
A key component to the BigBand SDV solution is the BEQ™ (Broadband Edge QAM), a uniquely modular platform for edge processing of switched video services. Awareness of which programs are being watched in real-time enables the BEQ to replicate program streams for transmission to only those service groups where the program is being viewed, requiring much less network bandwidth than any other digital programming transmission method.

Designed to provide massive scalability, the highest levels of reliability and the most open platform for third party interoperability, BigBand SDV provides operators tools to increase competitive service differentiation, improve subscriber satisfaction and maximize profitability.

## Summary

- Achieves dramatic savings in network bandwidth by sending programs to subscribers only when subscribers are watching them in real-time
- Allows monetization of reclaimed network capacity by enabling substantial increases in SD and HD program offerings and delivery of new highly personalized services
- Supports the broadest suite of SDV ecosystem patterns, including QAM, middleware and STBs vendors
- Leverages the versatile BigBand BEQ platform, which supports applications such as SDV, VOD, network-based time-shifting and more
- Deploys seamlessly in a matter of weeks, leverages embedded assets, and provides best-in-class ROI
- Does not affect subscribers viewing experiences, requires no change to subscribers' viewing habits, and maintains EPG lineups
- Integrates seamlessly with all popular set-top boxes including DVRs

### Dramatic bandwidth savings for expanded HD programming with BigBand SDV



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## Cost-effective Bandwidth and Service Expansion

BigBand SDV switches programs dynamically to subscriber service groups. Software embedded in a client device sends a request to the BigBand BEQ when a subscriber tunes to a new program, and tuning requests are handled without any perceptible delay. Subscribers requesting programs that are already available in their service group join existing switched program streams, maximizing the utilization of bandwidth resources. If the program is not yet available in a service group, it is switched to an available QAM that addresses the requesting STB.

BigBand SDV is architected to ensure that all program tuning requests can be satisfied at all times. At the service provider's discretion, different degrees of quality of service can be implemented in order to maximize resource efficiency in all but the most extreme peak demand situations.

Depending on design parameters, BigBand SDV frees up between 50% and 80% of digital spectrum. In addition to the ability to add new high definition program choices for customers, a cable operator can choose to use the reclaimed bandwidth to expand programming to include a broader assortment of niche content since switched digital video provides, for the first time, the ability to add content without a proportional increase in bandwidth consumption and network cost. Programming addressing specific professions, hobbies and lifestyles can be provided economically, along with an increased amount of international and ethnic programming.

## Rapid Switched Digital Video Deployments

Before a switched video installation begins BigBand Networks' professional services team has already provided its customer with a detailed system design and reviewed it with them in depth. Many issues are considered during this pre-deployment phase, including the following:

- What are the cable operator's switched digital video business goals?
- How much spectrum is available?
- How many programs can, or should, be switched?
- What types of programs can, or should, be put on the switched tier?
- How many QAMs per service group can, or should, be supported?
- How many tuners per service group can, or should, be supported?

Once the switched digital video system design has been finalized and a purchase order accepted, deployment begins. Being the switched digital video leader has allowed BigBand Networks to define a deployment process that allows its professional services team to install a custom-designed switched solution in the shortest period of time.

## Viewership and Performance Analysis

The BigBand SVA (Switched Video Analysis) platform is a comprehensive viewership and performance analysis tool for switched digital video and broadcast video applications. BigBand SVA provides operators with the tools needed to significantly reduce cost, enhance performance and explore new revenue opportunities during all stages of switched digital video deployments.

### Insights into Traffic Patterns:

Prior to installation, operators must assess which programs in their broadcast lineup are the best candidates for SDV. BigBand SVA allows the operator to collect viewership statistics for available programming and identify niche programming, also called 'long tail content'.

### Optimizing Program Lineups:

Once the deployment begins, an operator can use SVA to monitor both switched and broadcast programming in near-real-time to measure channel popularity, and identify additional long-tail content best suited to be placed onto the switched tier.

### Managing Infrastructure Performance:

Once the installation has been completed, BigBand SVA monitoring can be extended to a broad range of performance and reliability metrics to optimize network utilization, and for service assurance purposes. SVA is designed to identify trends to detect unanticipated viewership changes, that can impact system performance and content delivery before they impact subscribers.

## Third-party Interoperability

BigBand Networks offers the most open SDV solution on the market. It has been integrated with a wide variety of third-party vendors, including STB, EPG, middleware, transport, and conditional access systems partners. Not only is BigBand Networks working with others to bring standards to the marketplace but is also fulfilling the promise of open standards by delivering a true open systems:

- First to deliver a software release that enables interoperability with compliant third-party QAMs and servers;
- Only SDV solution provider meeting all published protocols.

## Best-In-Class Solution and Components

### Acquisition, Clamping and Transport:

At the core of the BigBand SDV solution is the BigBand BMR® (Broadband Multimedia-Service Router) the recognized benchmark platform for network delivery of video services. It is a versatile platform for a broad range of solutions, built on the most powerful media processing and routing engines available in the industry.

Flexible and scalable, the BigBand BMR1200 is fully interoperable with sources of a broad range of content and services in headend and hub facilities, enabling a service provider to achieve significantly higher utilization of network capacity and assets. The BMR features programmable hardware for easy upgrading and reconfiguration, maximizing return on capital investments. The modular, high density design of the BMR facilitates a "pay as you grow" capex model.

### Robust, Intelligent, Edge Switching:

At the edge of the BigBand Networks SDV solutions is the BigBand BEQ6000 supporting the widest range of digital services including switched digital video, broadcast video and VOD services. It is the ideal UEQ (Universal Edge QAM) platform for operators looking to significantly improve total cost of ownership via lower service costs, better power consumption and superior RF performance.

Best-of-breed RF performance allows the BigBand BEQ6000 to provide a high quality signal at levels that are higher than industry standards and are far superior to other QAM devices. This simplifies combining and reduces the number of amplifiers required in the headend; both leading to improved network availability. Additionally, the higher signal quality (as measured by modulation error ratio or MER) increases the probability that subscribers will enjoy high quality video even in last-mile environments where the network

may be impaired. Consequently, cable operators can expect fewer enquiries from subscribers concerned about picture quality and experience a reduction in field service calls. The BigBand BEQ features a superior processing power to power consumption ratio and is characterized by industry-leading low HVAC requirements.

A single BigBand BEQ6000 chassis is designed to universally support switched digital video, broadcast video and VOD services. Use of an advanced ERM (Edge Resource Manager) allows independent configuration of each narrowcast service group, eliminating the need to factor in overhead for each service's "worst case" service group utilization planning bandwidth assignments.

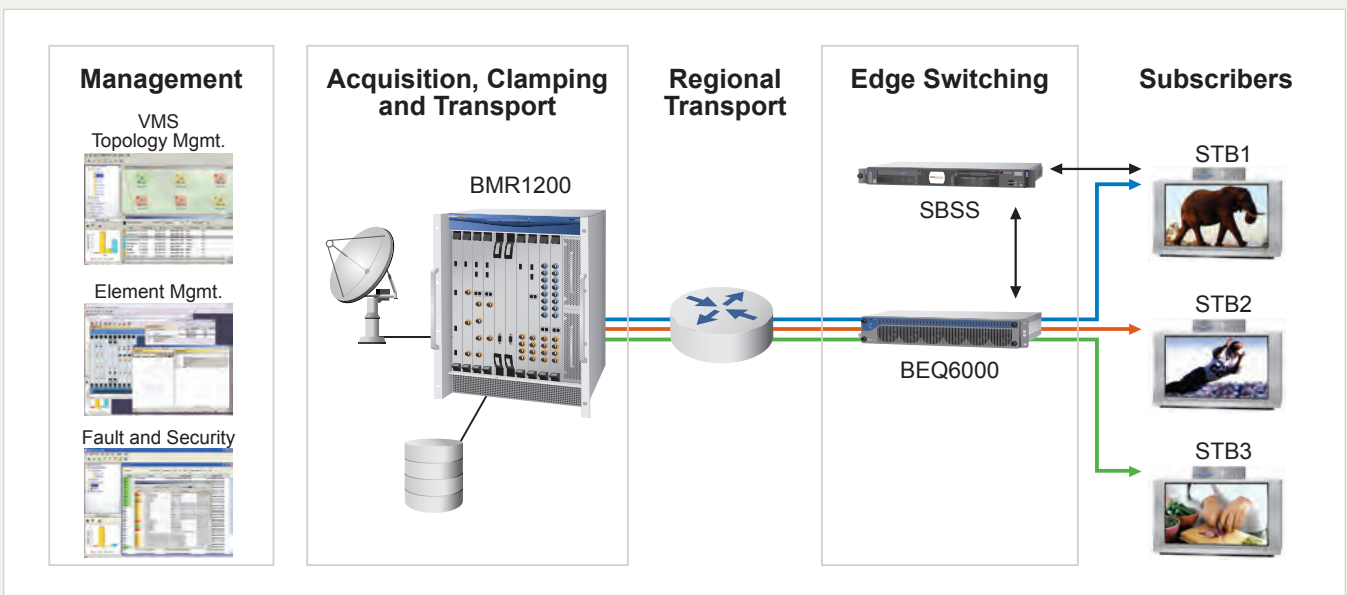
In addition to the BEQ on the edge is the BigBand SBSS (SDV Session Server) providing the session and resource management support, receiving channel change request from set top boxes over the two-way network (DOCSIS® and SA DAVIC are both supported), and then interacting with local edge QAM devices to set up and tear down mappings. The SBSS is the network element that captures the subscriber activity data sets that are so critical for advanced addressable advertising.

### Video Systems Management:

The BigBand VMS (Video Management System) simplifies the operation and deployment of video services. Its innovative capabilities improve operational costs by enabling integrated management of video processing functions. VMS also accelerates service turn-up, and enhances network troubleshooting and maintenance.

BigBand VMS provides comprehensive end-to-end management of BigBand video platforms and solutions across a variety of network topologies, and supports multicast and narrowcast video, addressable advertising and other applications.

## | The market-leading BigBand SDV solution is built around best-in-class components



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## Exploring New Revenue Opportunities

BigBand SDV offers cable operators much more than just bandwidth savings. It provides benefits spanning addressable advertising that more closely matches promotional messages to the interests of viewers, greater personalization of content and the ability to obtain precise viewership data without the use of audience polls by third parties.

### Content Personalization:

Collection of viewership data allows content and subscriber interests to be accurately correlated, new content can then be created and delivered to subscribers that better meets their interests. This could be offered as a premium service, or at no additional charge to increase customer loyalty results.

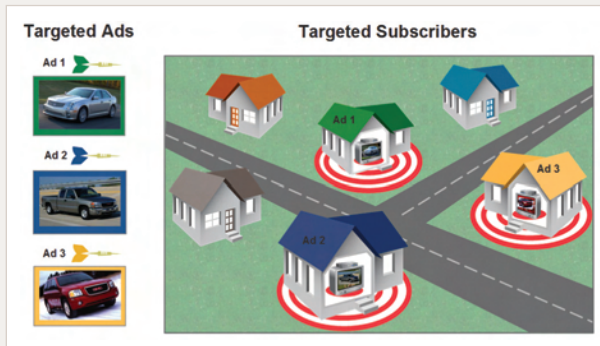
### Addressable Advertising:

Addressable advertising is the most frequently cited example of content personalization and one that promises to drive revenue growth. An ability to match ads more closely to subscriber interests will incentivize marketers to pay more to the cable operators that support this capability, combined with enhanced TV interactivity that will further enrich these experiences.

Switched unicast is a form of SDV in which each subscriber receives a unique program stream. The technology employs a similar tuning process to switched multicast except that a subscriber is allocated new dedicated bandwidth whenever SDV programming is requested. Switched unicast consumes significantly less bandwidth than traditional broadcast methods while allowing operators to offer highly customized programming. Switched unicast provides the ability to deliver promotional messages that map to an individual viewer's interests, ultimately resulting in higher advertising revenues for cable operators.

Advanced advertising, however, is far from being the only opportunity for personalization. Other examples include customized mosaics, new bulletins and personal searches. Channel change

## Viewers see the same programs but are delivered different ads



times can become more rapid because each subscriber's individual stream can be delivered with the right MPEG frame first for immediate resolution, and no incremental set-top box tuning is required. Additionally, switched unicast opens up choices of any device type or conditional access methodology even within nodes, since each subscriber receives a unique stream which can be encoded and encrypted per the subscriber's compatibility.

### Viewership Market Research:

BigBand SDV can be configured to store information about subscribers' viewing patterns. This allows cable operators to get precise viewership statistics without relying on third parties such as TV audience research firms. The value of this information is high because it provides insights into the viewing patterns of all subscribers on the switched tier, not just the subset of viewers that have been enlisted by audience rating firms, whose viewing habits may not necessarily represent those of the majority. Moreover, unlike viewers who track their viewing habits using diaries, switched unicast systems provide precise records without human biases.

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