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Successfully Deploying Switched Digital Video Systems

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Introduction

Although successfully deploying Switched Digital Video (SDV) systems can happen in a relatively seamless and rapid manner, it does involve a multifaceted approach that includes planning, installation, provisioning and testing prior to launch.

This paper assumes the reader is familiar with the technology behind SDV and does not attempt to provide an in-depth tutorial on the actual workings of the SDV system itself. Rather, we will look at some of the physical space requirements, heating, ventilating and air conditioning (HVAC) and power requirements, RF splitting and combining networks and node splits and service group segmentation, which must all be evaluated in addition to upgrades that must be performed prior to the equipment being installed. Network planning, including switch and router upgrades/additions, IP addressing and virtual local area networks (VLANs) also need to be evaluated and upgraded as required. Set-top box clients, channel masks and conditional access need to be addressed. Additionally, freeing up frequency spectrum for the SDV QAMs, determining the channel lineup, CableCARD™ and TiVo users also need to be considered. Success involves investigating a myriad of elements in your network and developing a comprehensive plan of attack prior to rolling out your SDV service.

Additionally, this paper will delve into installation considerations including equipment delivery; rack and stack, Ethernet and RF wiring and labeling. Effective SDV testing, which includes wiring validation and Service Group testing to ensure proper operation will also be explored.

SDV System Overview

A typical switched digital video architecture is shown in **Figure 1**. This diagram depicts the management server physically located at the hub site; however, many customers choose to centrally locate their servers. Both scenarios provide an inherent physical set of advantages and disadvantages that work based on the customer's needs; however, the logical flow of the SDV system remains the same regardless of the configuration chosen.

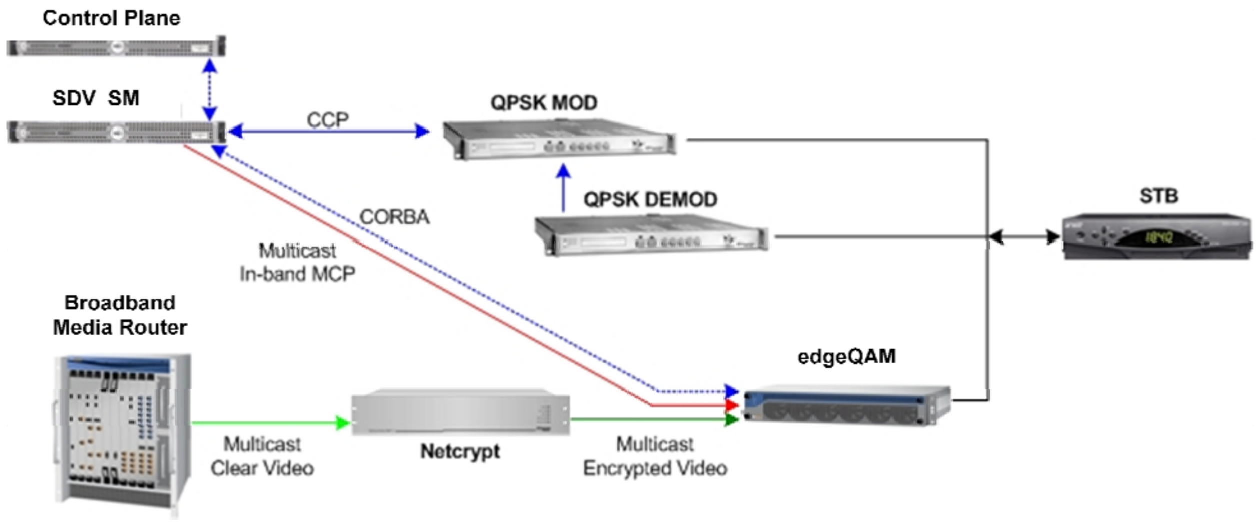

Figure 1: Major Components of Switched Digital Video Systems

The major components of a switched digital video network include:

- Acquisition/Clamping sub-system: receives programming destined for the switched tier and converts it from VBR (variable bit rate) multiple program transport streams to CBR (constant bit rate) single program transport streams. The acquisition subsystem typically consists of broadband multimedia signal processing router/switch. It connects to all sources of switched channels and outputs converted switched channels to the encryption sub-system.
- Encryption sub-system: performs bulk encryption of switched channels before distribution to hubs. The encryption sub-system typically consists of a bulk encryptor with GigE inputs and outputs.
- Transport sub-system: performs transport protocol conversion and headend-to-hub transport of clamped, encrypted SDV channels.
- Edge sub-system: replicates program streams and directs them to the appropriate edge QAM, in response to directions from the SDV manager.
- Client sub-system: resides on a subscriber's set-top box (STB). When a program is selected, the client conveys the channel request upstream along with information that uniquely identifies the node-group location of the STB. The client functionality can be easily integrated into the tuning firmware of future STBs.
- Management sub-system: uses the received channel number to identify the requested program and, consequently, the input port on the switch where the program is being received. Similarly, the SDV manager uses the STB ID and associates the node group information to determine the downstream path that connects to the subscriber.

Initial Planning

Developing a comprehensive statement of work (SoW) prior to beginning the deployment helps ensure that everyone understands exactly what their responsibilities are for a given task. When the deployment involves multiple competitive QAM vendors working together with a single SDV server vendor, seamless integration requires that everyone understand exactly what their responsibilities are. A typical example of defining requirements in a SoW is shown in **Table 1**.

Major Subsystems	Primary Component Supplier	Primary Subsystem Integrator
Racks: Physical placement of racks (excluding power & wiring trays)	SDV Vendor	CUSTOMER
Third Party Equipment: e.g., QAM combiners, aggregation switches, router cards, router card SFPs & associated mounting hardware	CUSTOMER/SDV Vendor	SDV Vendor
Manhattan Hub Rack & Stack: Offsite rack & stack of SDV Vendor & associated 3rd party equipment	SDV Vendor	SDV Vendor
Manhattan Hub Cables: Supply & install off site intra rack coax, optical & Ethernet Cable (including proper terminations)	SDV Vendor	SDV Vendor
Headend Rack & Stack: Rack, stack, wiring & labeling of SDV Vendor equipment	SDV Vendor	SDV Vendor
Headend Cables: Supply intra rack Ethernet Cable (including proper terminations)	CUSTOMER	SDV Vendor
Hub Coax Cabling: Intra rack from QAMoutput to input of QAM combiners	SDV Vendor	SDV Vendor
Hub Ethernet Cabling: Intra rack from QAM port to input port of aggregation switch	SDV Vendor	SDV Vendor
Headend Ethernet Cabling: From server port to input port of aggregation switch	SDV Vendor	SDV Vendor
Third Party QAM (TPQ) Hubs: SDV Vendor has **NO** responsibility for rack, stack, wiring, labeling, configuration or provisioning of TPQ hub sites	TPQ Vendor	TPQ Vendor
Third Party QAMs (TPQ) **Turn-up, functional validation of the TPQs and TPQ interface**	CUSTOMER/TPQ Vendor	CUSTOMER/TPQ Vendor
HEADEND MANAGEMENT SYSTEM: Upgraded to allow Bulk Encryptor System & switched operation	CUSTOMER	CUSTOMER
Channel Line-up: Provide proposed Switched Digital Video channel line-up	CUSTOMER	CUSTOMER

Table 1: Statement of Work Responsibility Matrix Defines Project Requirements

Additionally, the SoW should include a matrix of responsibilities for each of the major subsystems that pertain to the SDV deployment that the customer will need to address. An example of such a matrix is shown in **Table 2**.

Perform all RF wiring from outputs of QAM combiners to system input points
Perform all Ethernet wiring from outputs of aggregation switches to system input points
Perform any wiring required from receivers, IRTs, etc. to inputs of Manhattan & Flushing HE clamping devices
Perform all work relative to Third Party QAM hub sites including rack, stack, wire, provisioning, configuration, functional validation & validation of TPQ interface compliance.
Configure routers
Provide IP, service group and Switched Digital Video channel line-up information at least three weeks prior to SDV Vendor equipment arrival on site
Provide empowered IP/network engineer(s) to facilitate & resolve any issues in a timely manner that may arise during the deployment
Provide empowered operator(s) & configure Subscriber Authorization & Control system as required in a timely manner
Supply to SDV Vendor the necessary aggregation switches for the offsite rack, stack & wiring. In the event the aggregation switches are not supplied prior to SDV Vendor shipping of the completed rack(s), it shall become the responsibility of CUSTOMER to rack & stack the switches & to connect the existing wiring to the switches.
Connect power & make the necessary RF & Ethernet connections to existing infrastructure to all racks in each hub
Configure bulk encryptor as required
Procure all Ethernet cabling, terminations and jumpers for the servers to be placed in the Manhattan data center prior to SDV Vendor equipment arrival on site
Distribute SDV Vendor equipment from the central receiving site to the appropriate locations upon arrival
Provide sufficient dedicated, empowered personnel to allow SDV Vendor to work the hours & days necessary (up to 7x24) to successfully meet the agreed to schedule in the Terms & Conditions document
Provide dedicated, empowered personnel as required to assist with installation so they will be operationally aware of how to configure and operate the system after installation

Table 2: Matrix of Responsibility for SDV Deployment of Major Subsystems

Project Plan

In conjunction with the SoW, a detailed project plan should be developed. The form factor could be as simple as an Excel spreadsheet, but it is important to capture each of the steps necessary to successfully rollout an SDV deployment. Because of the complexities and interdependencies it is recommended that a detailed plan utilizing Microsoft Project be created. **Figure 2** is a screen shot that illustrates how Project allows the inclusion of dependencies and immediately shows the impact if a specific task slips. Executive and other high-level scheduling updates can be created as needed from this plan. Once this plan is developed, keeping it current is important to allow project stakeholders to see exactly where they are in the deployment process and if they are still on track to hit their target launch date.

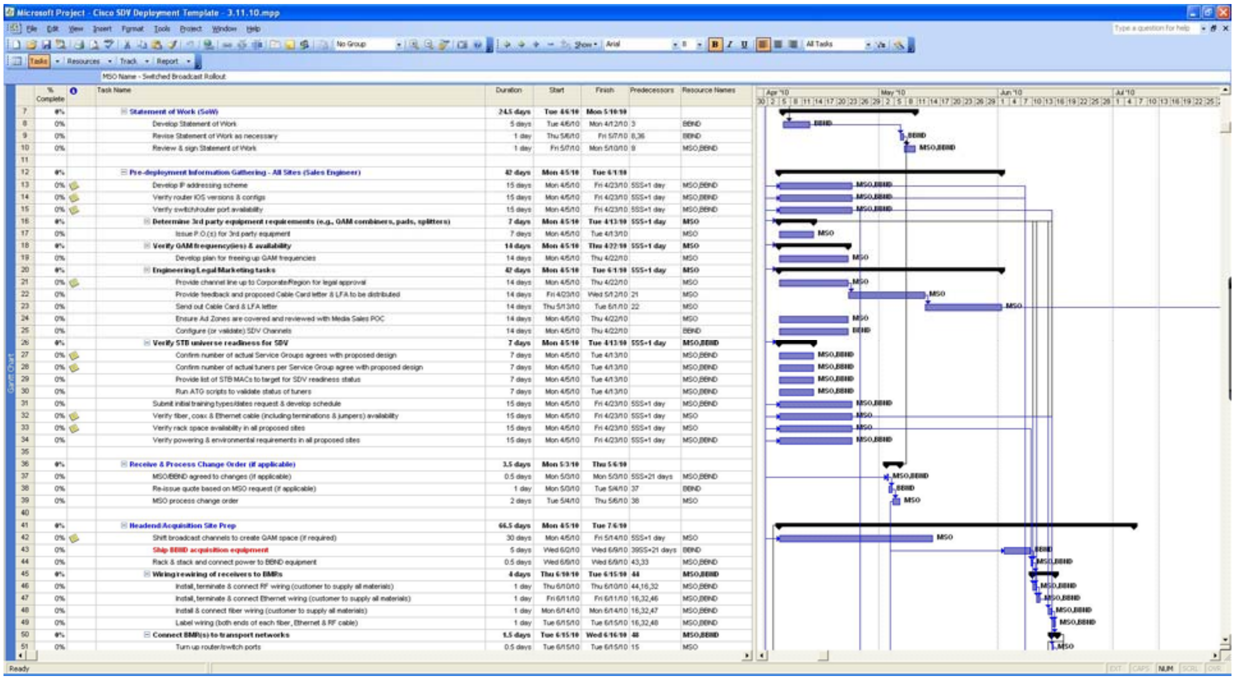

Figure 2: Detailed MS Project SDV Plan Example

Clearing RF Spectrum for SDV

Channels for SDV must be in contiguous blocks. This usually involves some rearranging of existing services in order to accommodate this requirement. Rearranging the lineup itself is not difficult technically, but there are non-engineering considerations that can greatly impact and extend the rollout schedule. Notifications to local franchise authorities (LFA) typically run 30 days, but there are instances that require 90 days of notification. Scheduling the work and internal notifications can also add to this delay. The key to keeping the project on schedule is to determine early in the project where the changes will occur and to get the notifications out with plenty of advance notice.

Determining the SDV Channel Lineup

Determining the switched channel lineup is typically not an engineering function, but just like rearranging the RF spectrum to accommodate SDV, it can negatively impact the rollout of the deployment. Notifications to LFAs are typically required. Additional communications to TiVo® and CableCARD™ customers explaining the impact of the SDV service to these customers will be required as well as ordering and making a sufficient number of tuning adaptors available prior to the launch of SDV. The lead times in ordering and receiving these devices can also have a significant impact on the SDV launch schedule.

Powering and HVAC

Headend and hub power, HVAC, and even the addition of uninterruptable power supply (UPS) considerations need to be thought out early in the process. The addition of the SDV equipment has the potential of overloading and taking down a circuit or even an entire hub site. Although the SDV equipment isn't live to customers yet, once it is powered up it can affect other equipment that is already operational. Therefore, it is imperative to verify the existing current load on a circuit then calculate the added draw of the SDV equipment prior to powering it up to avoid this problem. Once the equipment is powered on, it will also be adding to the existing heat load of the headend or hub even though it’s not on line. Like the power load, confirmation that the existing HVAC system can accommodate the extra load needs to be calculated prior to powering on the SDV equipment to prevent creating issues for equipment that is already in service.

Operating close to the capacity limit for both powering and cooling infrastructures can be troublesome and cause service interruptions to the SDV system and others as intermittent failures become a troubleshooting issue until the overloading problem is identified and corrected. The power and HVAC specifications needed to make these calculations and decisions are available from the SDV equipment vendor.

Off-Site Rack, Stack, Wiring and Delivery Concerns and Considerations

Performing the rack, stack, wiring and labeling of the SDV equipment remotely prior to shipping the completed racks to the hub sites offers several major advantages over onsite installation. First, there may already be other projects taking place on site such as infrastructure upgrades, node splits and moving existing equipment to accommodate the incoming SDV equipment. This puts usable work at a premium since many times the different projects require working in the same rack or area. The second consideration is the availability and cost of labor in the marketplace. If the technicians installing the SDV gear have to be accompanied to each site, the cost of having an employee “babysit” can become a factor. This is especially true if the deployment schedule is tight and requires working extended hours and having installations occurring concurrently at multiple sites. In addition to more useable work space, offsite building of the SDV racks allows more flexibility for the scheduling of wiring technicians. **Figure 3** depicts this process.

Figure 3: Performing the Rack, Stack, Wiring and Labeling of the SDV Equipment Remotely Offers Advantages Over Onsite Installation

Prior to ordering materials and beginning to assemble the racks, a comprehensive survey of each hub site must be performed. Detailed measurements and notes of doorways, ceiling heights, number of stairs, availability and dimensions of ramps and freight elevators need to be taken. This is a critical component since a seven foot rack of edge QAMs along with their associated wiring, splitter/combining chassis, modules and switches and crating can easily weigh in excess of 800 pounds. A digital camera is an invaluable tool in gathering this information. Some hub site locations may have restrictions that only allow deliveries on certain days and within certain time blocks. An expediter familiar with the area who specializes in moving large, delicate electronic assemblies should be contracted to handle the delivery and final placement of the completed racks to their respective hub sites. In addition to having the tools and manpower to undertake the task, they should also be familiar with the day-part restrictions unique to the sites.

The SoW should spell out whether the vendor or the customer will provide the racks, power strips, splitter/combiners, RF and Ethernet cable, terminations and the management and content aggregation switches to be used in the deployment. If the customer is supplying some or all of these materials, the SoW should capture exactly which materials are being supplied by whom and spell out the arrangements to have them drop shipped to the staging facility.

Physical equipment placement in the racks should be done with sufficient space to allow for future QAM expansion. Both RF and Ethernet wire routing should be done in such a manner that it will facilitate ease of repair and troubleshooting when necessary. **Figure 4** shows an example of equipment positioning within the rack. An alternate method of racking is placing the splitter/combiner chassis and the aggregation switches in the center of the racks. This method offers the added advantage of keeping the wiring bundles to a consistent, manageable size along the entire vertical run of the rack. While it may not be necessary to certify the wiring, at a minimum each Ethernet cable should be tested for miswires and each RF cable should checked for continuity prior to crating.

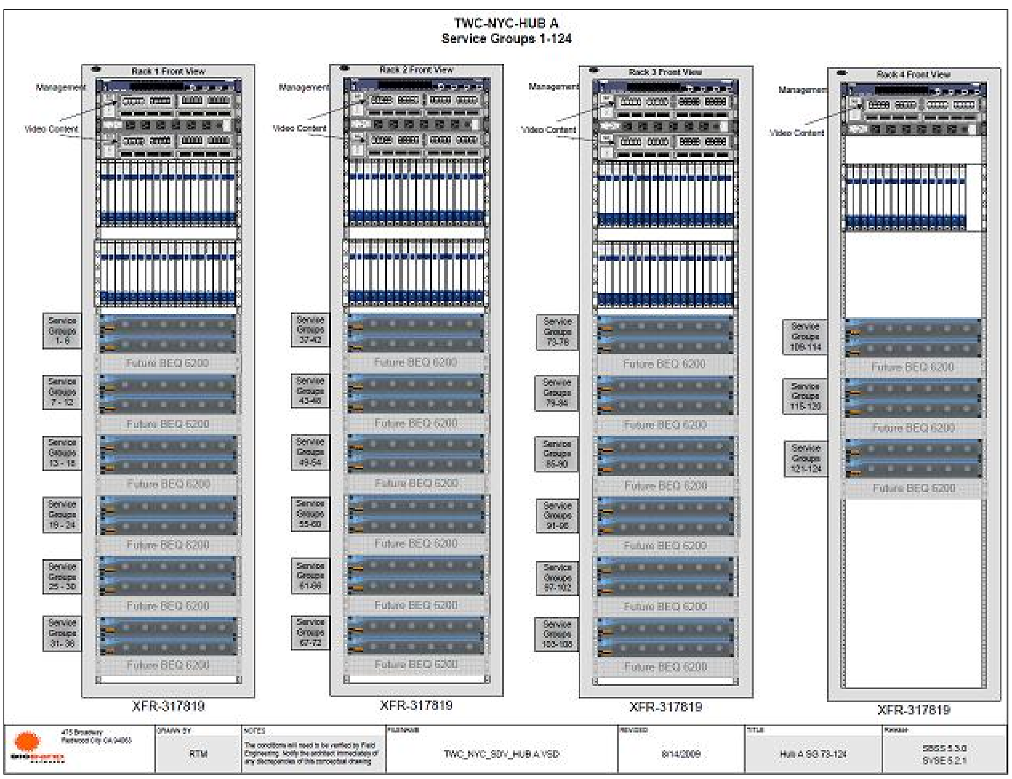

Figure 4: Equipment Positioning within the Racks

Labeling can be done in a variety of formats and each rack should have an accompanying spreadsheet similar to the one shown in **Table 2** which gives the termination points for each wire within the rack.

FROM			TO		
RACK	UNIT	PORT	RACK	SWITCH	PORT
1	QAM-1A	13	2	1	1
1	QAM-1A	14	2	2	1
1	QAM-1A	15	2	1	13
1	QAM-1A	16	2	2	13
1	QAM-1B	13	2	1	2
1	QAM-1B	14	2	2	2
1	QAM-1B	15	2	1	14
1	QAM-1B	16	2	2	14
1	QAM-2A	13	1	1	1
1	QAM-2A	14	1	1	13
1	QAM-2A	15	1	1	2
1	QAM-2A	16	1	1	14
1	QAM-2B	13	1	1	3
1	QAM-2B	14	1	1	15
1	QAM-2B	15	1	1	4
1	QAM-2B	16	1	1	16

Table2: Wire Routing Matrix

Naming and Numbering Considerations

Naming and numbering conventions should be established for the hubs and service groups (SGs) before the deployment begins. It is recommended that the conventions used for the SDV QAM SGs match the existing SGs as this will assist in future troubleshooting. Valuable time can be lost troubleshooting when an entirely new convention is used. In addition to future troubleshooting, having these conventions decided upon and laid out prior to the actual installation allows for configuration of the equipment to take place before shipping which will ensure a more accurate and efficient installation.

Switch and Router Considerations

Prior to the installation it needs to be determined how many Ethernet ports will be needed to accommodate the SDV system in each of the hub sites. Regardless of whether aggregation switches are used within the SDV racks or the cables are pulled directly to the router, care must be taken to ensure there are sufficient ports available. Depending on the size of the hub site, the number of ports required can be significant. As an example, an edge QAM configured for redundant content feeds will require four Ethernet ports for content and one Ethernet port for management. This means each of the full racks will require 48 ports for content and 12 ports for management. The partial rack on the right will require 12 and six ports for content and management respectively. Therefore, we will need a total of 168 ports for content and 42 for management. Because of the number of ports required in a typical hub site, most customers choose to use aggregation switches within the SDV racks. In addition to making wire management easier within the hub site, significant cost savings can be realized by purchasing the aggregation switches as opposed to additional router cards and, in some cases, additional routers.

Additional Network for Content Delivery
While the impact of the SDV management traffic is minimal, the same cannot be said of the content network. The impact of this additional traffic potentially overloading an existing network or the desire to consolidate standalone systems prior to deploying SDV may necessitate adding new network capacity. **Figure 5** is an example of how the various signals flow and are routed throughout the SDV network. The ordering, installation, turn up and testing of this network can directly impact the rollout schedule of the SDV deployment. Therefore, this decision needs to be made early in the planning process to avoid causing schedule delays. If this new network will be used to combine two or more existing systems, network engineers familiar with all the affected systems should work closely with each other to ensure that IP conflicts don't arise.

IP Networking
One of the key underlying concepts of SDV is matching each of the program stream source IDs with distinct Internet protocol/user datagram protocol (IP/UDP) multicast addresses and utilizing this mapping in the edge platform to forward the stream to the appropriate STB. Inherent in the implementation is the assignment of appropriate unicast and multicast IP addresses for video streams and edge platforms, and configuration of the requisite network routers, switches and processors.

Each of the key SDV components requires a control IP unicast address. This IP address must be assigned by the customer and must be able to communicate with the digital STB network control system, quadrature phase shift keying (QPSK) and STBs from each respective device preferably with a minimal hop count. It is recommended, though not mandatory, that all unicast IP addresses be in the same subnet. If it is decided the unicast management addresses will span multiple subnets, the customer must ensure all the subnets can route to each other. Proper planning and coordination of sub-netting and IP address allocation is recommended to avoid future time consuming and service affecting reprogramming of device IP addresses. Additionally, each service needs a unique multicast IP address.

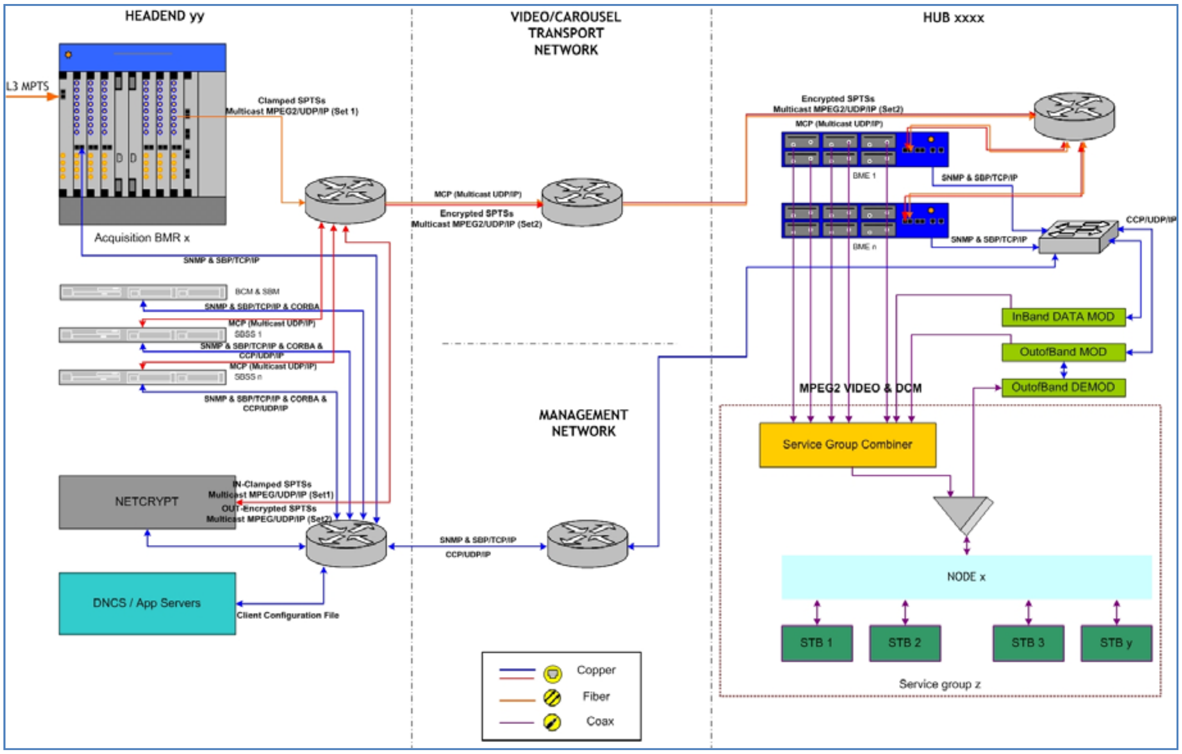

Figure 5: Interconnection of Hardware Components Including Routers and Switches within Service Groups

Variable bit rate (VBR) sources are converted to CBR with one IP multicast address per program stream in the acquisition stage. CBR sources are encrypted to ensure conditional access of services with another IP multicast address per encrypted program stream in the encryption stage. Encrypted sources are sent out as single program transport streams (SPTSs) from the headend to hubs with this unique IP multicast address per service.

It is important to note that utilizing PIM with IGMPv2 necessitates assignment of one multicast address in the clear and a new multicast address after encryption for each program. However, the advent of PIM-SSM [source specific multicast] in conjunction with IGMPv3 has eliminated the need for multiple multicast address use for each stream. Using these newer features allows the customer to efficiently reuse multicast addresses.

For ad insertion, a unique multicast IP address is necessary for each ad zone. Two sets of multicast addresses are required, one set for output from the broadband media switcher to the encryption device and the other for the outputs of the encryption devices. For example, eighty program streams will require one hundred and sixty (160 = 80 x 2) individual multicast IP addresses to be allocated. If forty of these programs are on two separate ad zones, then two hundred and forty (240 = ((40 + (40 x 2)) x 2) individual multicast IP addresses need to be allocated, 80 for the non-ad zone programs and 160 for the ad zone programs.

Proper planning and coordination is needed to avoid significant time consuming IP address re-configuration as future needs arise.

Another distinct multicast IP address is required for each service group in the hub to facilitate transmission of dynamic channel map (DCM) information. The DCM is carried in the carousel multicast data stream out to the associated Edge QAM device then carried in-band on the QAMs out to the particular service group STBs. The carousel server creates a DCM for each service group using unique IP multicast addresses that incorporate the service group ID numbers. A STB receives a DCM that is created for its specific service group and the DCM supplies the channel tuning carousel data to the STBs.

Two distinct IP addresses are associated with the switched broadcast session server (SBSS) carousel server port – the carousel data port unicast IP address and the carousel data multicast IP addresses. The carousel data port also known as the data IP port is required to direct the carousel data multicasts out the correct port and requires a unicast IP address. The data port unicast IP should be in a separate subnet from the management IP subnet.

The DCM multicast IP address is created based on service group IDs. The carousel data multicast addresses could be on the same physical port as the carousel data port IP unicast address though in a separate subnet or VLA. A unique carousel data multicast IP address is required for each service group. Carousel data multicast IPs are created from a base multicast IP address and a unique service group ID number. For example, multicast IP address of 239.5.0.101 uses the multicast address 239.5.0.0 (the base) and .101 corresponds to service group ID# 101, in hub 1. A range of IP addresses from the base up to 239.5.40.0 would allow for more than 10,000 IDs. Thus the hub service groups needs to be assigned unique ID numbers and a range of multicast IP addresses needs to be allocated for each hub.

The base multicast IP address and range for the carousel DCM traffic for each hub must be set by the customer and configured by the SBM (SDV manager). For a hub comprising one SBSS, four edge switchers, and twelve service groups, ten unicast IP addresses are needed, two for SBSS (one carousel, one management), and eight for edge switchers. Each edge switcher needs an IP address for management and one additional IP address for IGMP operation. Twelve multicast IP addresses are needed for the carousel DCM.

The unicast and base multicast IP addresses must be assigned by the customer. This may be done at the "system" level or IP addresses may be assigned by corporate network engineering. Regardless of where the IP assignments are determined, the process is usually time consuming and resource intensive. Therefore, it should begin very early on in the planning process to avoid becoming a gating factor in meeting the rollout schedule. Taking the time to properly plan and coordinate the overall IP address range allocation can help to avoid significant time consuming IP address re-configuration as future needs arise. Experience has shown that IP/networking issues are the major gating factor in SDV deployment schedule delays.

Digital Set-Top Box Network Control System Reconfiguration

A STB knows that a channel is available for switching because of the SDV client residing in the STB. The client identifies switched channels based on the string inserted in the uniform resource locator (URL) field of the service application manager (SAM) service for a given channel. When channels on a system are selected as switched channels, duplicate SAM services are added on the digital STB network control system with SAM services for switched channels containing an SDV flag in the URL of the service. The STB reads the SAM services off of the broadcast file system (BFS) carrier (originating from the digital STB network control system), presented to the STB at boot-up or whenever SAM updates occur. The new SAM services are added to the channel maps for hubs that are migrating to switched services. Once the channel map update occurs on the digital STB network control system, the STBs are notified of the update and switching will occur since the new SAM services contain the SDV flag. Non-switched hubs will use existing SAM services while hubs selected for switching channels would use the new SAM services. Consequently, digital STB network control system reconfiguration work is required to activate SDV on a system. Digital STB network control system reconfiguration entails the following key steps:

- Provisioning program stream sources with encryption, digital session and a segment;
- Provisioning packages by adding segments and sub-packages – packages are groups of services which have the same conditional access number;
- Provisioning services on bulk encryptors – these must be provisioned in the digital STB network control system to receive the video multicast SPTSs, encrypt them and output them on a different set of multicast IP and UDP port numbers;
- Uploading the SDV client application to the digital STB network control system;
- Creating the BFS for downloading from the digital STB network control system of the SDV client to the STB;
- Creating SAMs on digital STB network control system – one SAM service to load the SDV client to the STB and one SAM service for each switched program/channel planned for the system;
- Updating Channel Maps – each channel maps associates the SDV programs with the corresponding SAM services created on the switched network; and
- Authorization of STBs.

SDV STB clients can vary depending on the customer and the headend architecture employed, but the principals described here will be similar.

Multiple ad zones lead to multiple copies of channels and channel SAM service definitions on the switched network. Overloading the storage capacity of the individual STBs memory with multiple SDV / ad zone channel line-up information can become an issue if not properly managed. In systems where additional source IDs are created for duplicate channels with different ad content (for different ad zones), increased channel map data is downloaded to the STB. For instance, this occurs when a STB is required to feed more than one ad zone.

For systems where individual service groups in a hub feed only a single ad zone, one switched broadcast manager (SBM) per ad zone allows for the use of one source ID that may have different ad content depending on the number of ad zones created with it. Consequently, multiple source IDs for the same channel do not need to be created for multiple ad zones. Channel map data downloaded to STB is not increased due to additional source IDs created for the additional ad zones. One SBM per ad zone facilitates download of a channel line-up without duplicate channels with different ads and the STB overload problem is mitigated. Interactive program guide (IPG) data and digital STB network control system SAM service definitions downloaded to STBs will be for the ad zone designated for the selected service group only.

Proper planning for multiple ad zones and allocation of maintenance window activity time for the digital STB network control system reconfiguration is recommended to avoid unplanned delays, future downtime and additional reconfiguration of the digital STB network control system.

Service Group Testing
Service group testing performs two very important functions. First, it checks and validates all wiring. Testing each and every service group in every hub site will uncover any problems associated with connectors as well as any SG that may have been miswired or mislabeled. Secondly, and equally as important, it validates, end to end, that the newly installed SDV system is functioning properly. The following procedure details how SG testing is performed:

- Create the test wiring set:
    - Plug one end of a cable into a forward laser test point of a node in the SG and the other end into a two-way splitter output;
    - Plug one end of a cable into the return combining of the node above and the other end into a two-way splitter output;
    - Add any necessary attenuation so that RF levels at two-input are optimal for normal STB operations;
    - Plug one end of cable into the two-way splitter input and then the other end into a SDV provisioned STB; and
    - Connect the STB video output to a TV or USB tuner.

- For each SG, test the SDV functions:
    - Connect the wiring set to the desired SG;
    - Boot the SDV-provisioned STB then go into the MDN diagnostic to observe that the MCP is being read and the right SG is discovered;
    - While simultaneously monitoring edge device and TV screen, use the remote control to begin SDV channel acquisition;
    - Verify that the edge device starts the stream and the TV displays good quality video and audio;
    - Continue SDV channel acquisition and verification until all QAM channels in the SG are filled with content; and
    - Move laser and return cables to a new SG and repeat the procedure.

While it is possible to do SG testing utilizing a QAM analyzer, experience has shown that the best way to test and validate a SDV system is utilizing a STB, test TV or properly configured laptop and a trained set of eyes.

Communication During the Deployment
Timely, concise communications and reporting is a critical key in keeping the SDV deployment under control. The deployment began with weekly calls being held to ensure that the vendors and cable operator, in this case, Time Warner Cable, were kept abreast of the infrastructure progress. When the actual configuration, turn up and test of the servers and edge devices began, these calls became daily in frequency. In addition to the calls daily e-mail updates were sent out to the key stakeholders giving them a quick snapshot of deployment progress, potential blockers and pending issues. An example of one of these emails is shown below in **Figure 6.**

There is/are 4 Critical Issue(s) pending

Status Highlights:

- TWC – SI RMS can now reach the service center (RMS can now be configured)
- Imported Hub J XML files for Arris QAMs
- Assisted Arris in resolving BioHD issue (channel 6)
- Assisted Arris in resolving Service Group testing issues in Hub R
- Hub D BEQ 14B was replaced, re-upgraded, and reconfigured

Critical Issues:

- TWC – NY-SBSS23A eth1 interface issue needs to be resolved (Awaiting word from Des regarding ownership of the MCP switches in the datacenter)
- TWC/BBND – Complete Service Group narrowcast wiring for Hub F (Service Group testing cannot begin until this is resolved)
- Resolve no MCP issue in Hub F (Service Group testing cannot begin until this is resolved)
- Receive, install & provision NetCrypts

Pending Issues:

- BBND/TWC – Replace Hub D BEQ 14B due to a faulty port 15 gigabit interface
- Resolve no connectivity issues to D5 QAMs in Brooklyn & Queens from the SBSSs (ongoing)
- TWC – Distribute spares to hub sites
- TWC – Configure 4900s in Hubs F
- TWC – Receive narrowcast Service Group combining info for Hubs F
- BBND/TWC – Begin Service Group testing in Hubs F
- TWC – Verify all 4900M switches in Manhattan, Mount Vernon & Bergen are configured for full duplex & 1000 speed
- TWC – Finalize launch channel lineup
- BBND – Reconfigure Hubs E, F & G Service Groups with port 1 quad upconversion & ports 2 – 4 mute in preparation for launch
- BBND – Add Brooklyn & Queens TPQs to SBM topologies when management & transport network is activated

Figure 6: Example of a Typical SDV Deployment Daily Update

Summary

Switched Digital Video systems are an excellent and cost-effective mechanism for optimizing utilization of cable plant bandwidth. By considering all aspects, from facilities, physical plant, networking, encryption, training, optimization, SDV content planning and frequent, concise communication before and during the installation, a successful and uneventful deployment may be achieved. Experience has shown that, while SDV is perceived to be complex, once launched, it is considered a much more flexible and easier to maintain system, capable of keeping pace with today’s constantly changing content needs.

Acronym List

Broadcast file system (BFS)
Constant bit rate (CBR)
Dynamic channel map (DCM)
Heating, ventilating and air conditioning (HVAC)
Internet group management protocol (IGMP)
Internet protocol/user datagram protocol (IP/UDP)
Interactive program guide (IPG)
Local franchise authorities (LFA)
Protocol independent multicast (PIM)
Quadrature phase shift keying (QPSK)
Service application manager (SAM)
Switched broadcast session server (SBSS)
Switched Digital Video (SDV)
Service group (SG)
Statement of Work (SoW)
Single program transport stream (SPTS)
Set-top box (STB)
Switched broadcast manager (SBM)
Uninterruptable power supply (UPS)
Uniform resource locator (URL)
Variable bit rate (VBR)
Virtual local area networks (VLANs)