



Motorola Digital Equipment and Services

Much of Motorola's success in the deployment of digital cable systems has been its sole ability to address every market segment served by its world class access control solutions and headend products. These markets have been served with two distinct access control products - the DAC6000 and the National Authorization Service (NAS) Access Controller. Motorola's National Authorization Service solution provides customers with the capability to receive, process, control, and distribute digital video, audio, interactive and data services. The flexible and scalable equipment solutions listed in this brochure are available to systems with various bandwidth capacities and conditional access platforms.

Many Motorola customers are also taking advantage of HITS Services. HITS Quantum was introduced and is revolutionizing distribution, offering the most efficient and cost-effective way to seamlessly migrate to an all-digital or digital simulcast platform. It provides a solution that gives you more channels, higher quality, more capacity, with fewer headaches and lower costs.

This product information guide presents customers with the necessary information on a majority of the equipment and services required for deploying an NAS all-digital headend system using a combination of Motorola's headend products and HITS Quantum services as part of a digital conversion strategy.

Digital Headend

The digital headend consists of a variety of components. The system's topology and the number of applications that will be deployed will determine which component and how many of each component would be required. Given the modular design of the Motorola

digital system, it is easy to start off with a simple, broadcast digital network requiring only a handful of components and later transition to a fully interactive network by gradually adding components. The digital headend uses an Ethernet Network (LAN) running

TCP/IP protocol to interconnect equipment for operations, administration and maintenance. Ethernet offers a standard interface (10 Mbps, 10/100Base-T) for all digital equipment, simplifying expansion and the addition of new features and functions. A network hub is the cen-

tral point of termination for the interconnecting cables and provides a means for expanding the network as well as isolating each device connected to it. The digital headend consists of the following:

DSR4410MD



The Motorola DSR4410MD is a powerful digital headend product, capable of simultaneous decryption of up to 64 services. With advanced modulation support, the DSR4410MD can output a full transport multiplex with both MPEG-2 and/or MPEG-4 services at an information rate of up to 160 Mbps.

The Motorola DSR4410MD comes equipped with industry standard interfaces such as dual ASI outputs that enable seamless connection to head-end equipment. The DSR4410MD also accommodates the current trend for distributing MPEG-2 transport streams over Gigabit Ethernet interfaces throughout digital headends.

Packaged in a 1RU chassis, the DSR4410MD offers local monitoring of a single service and the ability to step through the authorization and encryption state of each service. In the event of a transport stream fault, or loss of authorization for any of the provided services, the DSR4410MD will trigger an alarm indication for the user.

SEM



The SmartStream Encryptor Modulator (SEM), Motorola's High Density Encryptor/Modulator/Upconverter product family provides cable operators with a cost and space efficient means to perform encryption, modulation and upconversion functions within the digital headend. Providing for up to 8 multiplexes of processing functionality in a single RU package, the SEM significantly lowers the barrier to entry in an on-demand environment. Providing high speed interfaces to servers and content aggregation systems, the SEM performs multiplex creation, encryption, 64/256QAM modulation and Upconversion across the full HFC band. The SEM provides system operators with the necessary tools to launch narrowcast services as the HFC infrastructure evolves to allow subscribers to watch what they want, when they want.

The SEM is ideal for:

- :: Secure Session Based VOD Applications
- :: Cost Effective 256QAM Upgrades
- :: Lower Cost Digital Headend Deployments

Product configurations include:

- :: Edge Configuration (On Demand applications)
 - Digital Baseband Input, encryption, modulation/upconversion
- :: Uplink/Central Encryptor
 - Digital Baseband Input, encryption, high-speed output (no RF)
- :: Dense Modulation/Upconversion
 - Digital Baseband Input, modulation/upconversion



Digital Headend



HMS

The Headend Management Station (HMS) is a component supplied to NAS affiliate cable systems that supports headend configuration/monitoring and Impulse Pay Per View (IPPV) purchase collection. As a configuration tool, the HMS registers, configures and monitors the headend devices. The HMS flags problem areas via its local GUI, and in some cases informs the NAS about any problems in the proper functioning of the headend. The HMS also provides easy, user friendly access to local (or remotely connected) technicians to view the status or reconfigure headend devices. As a part of IPPV processing, the HMS collects reportback messages from the subscriber's settop and routes the messages to the Data Collection System Interface (DCSI) or the Data Collection Application (DCA) in the NAS system. The settops respond to requests issued by NAS or the HMS itself to transmit diagnostic reports and IPPV data to an HMS.



VPN

An Internet-based virtual private network (VPN) uses the open, distributed infrastructure of the Internet to transmit data between networked devices. Rather than depend on dedicated leased lines or frame relay's permanent virtual circuits, an Internet-based VPN uses the open, distributed infrastructure of the Internet to transmit data. The NetScreen 5GT Virtual Private Network router and firewall provides the security and two-way connectivity required for the NAS-RAC Architecture. The NetScreen 5GT provides five 10/100 Ethernet connections with up to ten VPN tunnels.



ARPD2000

The Advanced RPD (ARPD) is a next-generation headend product that offers greater demodulator density in a more compact chassis than the currently fielded RPD2000 product. The ARPD is a modular 1RU product that supports the inclusion of up to six removable (hot-swappable) demodulator modules (ADM4000 modules). The ARPD performs the same functions as the RPD2000 product, but offers a larger number of upstream demodulators in a smaller physical package. In addition to saving rack space, the ARPD easily and efficiently allows multiple upstream demodulators to be placed in each upstream path. This increases the bandwidth capacity of each upstream return path, allowing the system to support increased VOD penetration and the introduction of new interactive features such as switched digital video.



OM2000

The Motorola OM2000 Out-of-Band Multiplexer/Modulator generates an out-of-band (OOB) data stream from the headend to digital cable set-top devices, either individually or on a broadcast basis. The OM2000 can be configured to receive data over Ethernet using UDP/IP, or as serial data over RS-530 or RS-232 communications links. The OOB data stream is used primarily as a signaling channel, but is also used to transmit electronic program guide (EPG) information and code download data. The out-of-band data stream is also the downstream path in an interactive system.

A Quadrature Phase Shift Key Modulator (QPSK) modulates the data on a 1.8 MHz-wide carrier. The center frequency is agile across the 71 to 129 MHz band. The OM 2000 uses null packets as necessary to perform rate aggregation between its inputs and the 2.048 Mbps output. Forward Error Correction (FEC) encoding and interleaving protects data integrity.





Scalable Equipment Solutions for Going All Digital

Solution price ranges vary between \$50,000 and \$120,000+ depending on individual system requirements. See your Motorola representative for pricing and configuration information customized for your system needs.

All Analog System (no digital)

Classic Digital System Current Head End

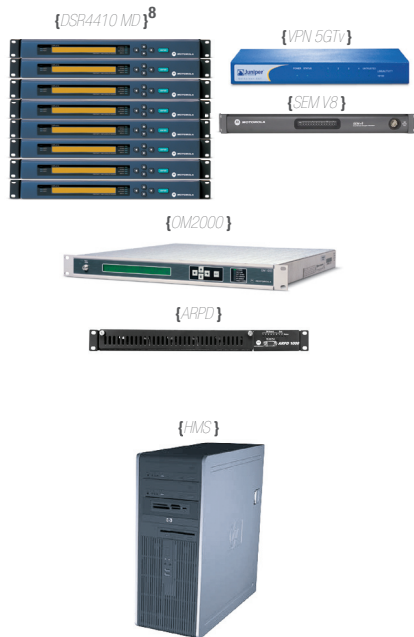
Upgraded Digital System

Current Head End with added components to include the new HITS Quantum All-Digital and HD Line up



New Replacement System Replacement for the current Head End

New Expansion System Replacement for the current Head End and additions for new All Digital and HD



For More Information:

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