WHITE PAPER

Securing the Future With Motorola Mobility Multi-Room DVR

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Introduction

With consumer demand for multi-room digital video recording (MR-DVR) services on the rise, cable operators have an opportunity to differentiate themselves from their competition by offering a cost-effective MR-DVR solution today while building in the opportunity to provide more advanced interactive services in the future. With MR-DVR services, subscribers can distribute digital video throughout the home over the existing coaxial cable home network.

Motorola Mobility has crafted this visionary approach to growing subscriber average revenue per user (ARPU) and improving subscriber retention to precisely meet the cable operator's demands for a compelling, easy-to-manage and simple-to-deploy solution that goes beyond the MR-DVR services being offered by telco and satellite competitors.

Motorola Mobility's MR-DVR solution is based on the DCX set-top portfolio, which supports multiple simultaneous recording and viewing sessions throughout the home. This solution allows cable operators to integrate advanced DVR functions with easy-touse options via a subscriber's electronic programming guides (EPG). This whitepaper discusses the business value of offering MR-DVR services, presents compelling use cases for deploying MR-DVR offerings and explains the architectural advantages of Motorola Mobility's MR-DVR solutions.

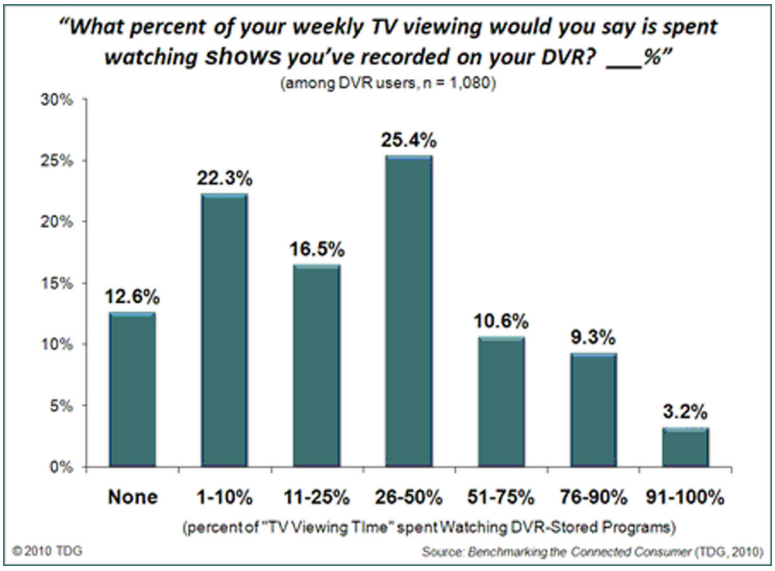
The Business Value of Deploying MR-DVR Services

Consumers are demanding high-value services from cable operators, and MR-DVR services allow multiple system operators (MSOs) to build longer-lasting and highervalue subscriber relationships.

Capitalizing on DVR Usage Trends

Consumers' embrace of the DVR is now firmly established. The consumer adoption rate for extending DVR capabilities is high where they are offered by competitive video providers, and subscribers are willing to pay incrementally more for these services. Sticky applications such as DVR and MR-DVR are helping service providers to attract and retain subscribers. Not surprisingly, the growth rate of networked set-tops is increasing. Parks Associates estimates the market base for networked set-tops will rise to 18 million homes by 2012.

The Diffusion Group states the use of DVRs has skyrocketed, especially among broadband households. According to their latest data, more than 50% of households that subscribe to a residential broadband service currently use at least one DVR in their home. Diffusion's research shows ownership of a DVR in these households has a profound impact on the viewing of appointment-based TV. Consumers value DVR services, and those service providers that deliver high-value DVR services can gain a competitive advantage in the marketplace.



Combatting Over-the-Top (OTT) Competition

Cable operator support for time-shifted viewing via DVRs – and especially via MR-DVR – provides important protection against the loss of viewers to OTT competitors. According to research conducted by The Nielsen Company, usage patterns associated with long-form online video suggest that this type of viewing is largely done for timeshifting purposes as an alternative to DVR use. When viewers were asked for reasons why they watch TV shows on the Internet, 54% of respondents cited forgetting to watch an episode when it aired on TV and another 32% said they forgot to record a show with their DVR.

There likely would be greater use of the DVR if people could utilize the DVR experience on any TV in the home. Many studies have shown the first thing that happens when people become accustomed to using their DVRs is they want to extend the ability to record and view recorded content on all the TVs in the house without incurring the expense of connecting a DVR to every TV set. This is why so many major telcos and satellite operators have launched MR-DVR services. For competing service providers who haven't yet made this move, the good news is that these deployments so far are fairly limited in market reach, leaving plenty of opportunity to gain ascendancy in this space with the launch of a superior service.

Increasing ARPU and Retention Rates

In an increasingly competitive market – where DVR services are becoming ever more commonplace – providing MR-DVR service becomes key to customer retention. But MR-DVR is also a revenue-generating opportunity, with the potential to significantly increase ARPU. In the near term, cable operators can derive new revenues directly from MR-DVR in a number of ways, depending on how they market the service.

- Some may promote MR-DVR as a new tier of service in-and-of itself
- Others may bundle MR-DVR in a new tier that includes several other features as well

Either way, MR-DVR-based revenue increments promise to be long-lived, given the fact that once consumers become accustomed to using DVRs they don't want to give up the convenience of time-shifted viewing. If that convenience is enhanced by an operatorprovided MR-DVR service, consumers are more likely to stick with the service rather than purchase alternative equipment.

Upselling New Services

Deploying MR-DVR service in a subscriber's household provides a foundation for upselling new home networking services in the future. Converged Media Experiences, video distribution to PCs, tablets, smart phones and other consumer devices, and service assurance for the connected home are just a few of the additional services possible. The software foundation underlying MR-DVR is designed to support ongoing service enhancements both within the deployed DCX set-top array and across other devices that become linked via the home network to the cable operator's service.

Gain a Competitive Advantage by Delivering a More Complete Consumer Experience

Telcos and satellite operators that provide MR-DVR services are restricted by the types of networks, software architectures and customer premise equipment (CPE) they have in place. These limitations open an opportunity for cable operators to uniquely market a truly complete MR-DVR experience that leverages the unique advantages of Motorola Mobility's MR-DVR architecture.

Motorola Mobility's MR-DVR solutions utilize MoCA® (Multimedia over Coax Alliance) technology, which creates a common standard for distributing IP digital video and other content over the existing coaxial cables in the home. MoCA is embedded in each DCX set-top to link all the set-tops into a unified client-server architecture. By automating the discovery and provisioning of the DCX set-tops over the home's existing coaxial wiring, Motorola Mobility provides cable operators complete flexibility to easily activate MRDVR services.

The benefits of MoCA include:

- No new wires
- No installation or truck roll
- No interference with existing networks
- Operation within any coaxial environment
- Complements any wireless network

Motorola Mobility provides cable operators with various software options. Cable operators can choose between OCAP®-based or legacy-based software environments when deploying MR-DVR. And if cable operators choose to launch MR-DVR with a legacy software option, they can migrate over to an OCAP platform when they are ready to implement OCAP technology.

Motorola Mobility's MR-DVR solutions assure cable operators a software migration path to many other applications, including access to music, photos and other personal media, as well as place-shifting of DVR content to any IP-based devices in the home (i.e. PCs, laptops and tablets). Ultimately, Motorola Mobility will employ this architecture to enable on-the-go transfer of stored TV content to mobile devices and other portable IP-based devices in and outside the home.

Convenience and Ease of Use

Motorola Mobility's MR-DVR solution allows cable operators to bring advanced DVR functionality to every connected television in the house in one simple solution. This allows viewers to access DVR content from non-DVR set-tops. These solutions also support existing set-top functionality – such as Video on Demand (VOD) – and enable integration with existing EPGs.

Cable subscribers can navigate, view, rewind, pause or fast-forward content from DCX servers to DCX clients located throughout their homes. Even though all content is coming from the DCX server's hard drive, each TV displays its own independent session. A program being watched on one TV can "follow" a viewer to another TV in the house with a simple press of a button on the remote control.

For example, imagine a family is in the living room watching a broadcast program on television, but one viewer is getting tired and wants to finish watching the program in the bedroom. With the entire home connected with MoCA-enabled DCX set-tops, the viewer just needs to press "stop" on the remote control and the system will let the viewer "bookmark" the show to continue to view it at a later time, at any location in the home. Remaining family members in the living room can still continue to watch the program.

With Motorola Mobility MR-DVR solutions, all recordings are presented in an aggregated view to the subscriber – there is no need for the subscriber to worry about which DVR recorded a particular program or which DCX client scheduled the recording. In addition, in-progress recordings are available for viewing at any DCX client. Each DCX3400-M can support up to four simultaneous viewings of four different recorded HDTV programs along with as many as two simultaneous recording sessions, adding up to as many as six simultaneous sessions activated over different set-top locations in the home.

For users, the experience is the same no matter where they are. All recording and viewing options are accessed through the EPG with the same options to which users are accustomed – sort by date, title or channel, scheduling of recordings and more. Ease of use is a primary selling point with MR-DVR. As subscribers discover how simple it is to greatly enhance their viewing and recording options, the idea of serving all TVs from one DVR is a major benefit.

Maximum Control and Functionality

Motorola Mobility's MR-DVR solutions support the most advanced range of MR-DVR features throughout the home. Subscribers will be able to view recorded programs stored on the DCX server from any connected TV, while being able to perform numerous trick-play options. Trick-play options include program pause, playback, multispeed rewind and fast-forward choices from any connected DCX set-top.

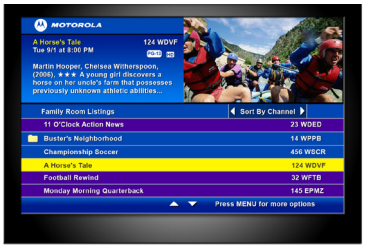
Subscribers also have the ability to schedule, cancel and delete recordings from any connected DCX set-top, through an easy-to-use and very intuitive user interface. Recordings of single programs or a given series of programs covering a given timeframe can be set from any DCX client set-top. This provides users with the ability to control their viewing habits and manage their personal program choices.

Subscribers have the flexibility to exercise parental controls over the viewing of certain recorded programming for controlling what they want their children to watch. This means parents can set the controls over individual DCX set-tops based on where their children typically access programming, while avoiding controls on DCX set-tops where their children don't watch TV.

Compelling Use Cases

The following scenarios represents use cases available with Motorola Mobility's legacy software option. Other software environments may offer different features.

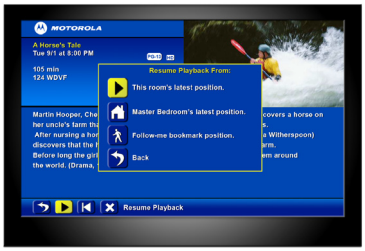
The My Recordings screen provides the subscriber a list of all their existing recorded programs and "in-progress" recordings. The program series recordings are automatically placed in folders which allow subscribers to quickly find their favorite shows. They select the folder to view one or more series recordings on their DVR.



The Playback Details screen gives subscribers a description of their recorded program and offers easy to follow icons for quick identification of the playback options, including:

- Watch a recording from where it was left off
- Watch a recording from the beginning
- Delete a recording

Subscribers also have control over where they want to view and playback their content. The Resume Playback menu offers subscribers the various playback options.



Motorola Mobility's MR-DVR solutions provide maximum flexibility for Place-Shifting and Bookmarking of content from one DCX set-top to another, and for individual DCX settop bookmarking to support access to view different pieces of content at different locations throughout the home.

Setting the Follow-Me Bookmark option allows a user to set a bookmark for playback of a recording, and resume that recording from that same bookmark at another location. When it comes to place-shifting, the user relies on the bookmarking associated with the DVR set-top, so when content is paused in one room, it can be picked up where left off, on any other connected DCX set-top. MR-DVR supports transfer of bookmarks from one DCX set-top to another, so that a user who wants to access the same program being viewed by someone in one room can bookmark it for accessing it elsewhere without interrupting the other person's viewing experience.

Motorola Mobility's MR-DVR Solution Architecture

Motorola Mobility's Multi-Room DVR solutions offer cable operators a variety of costeffective hardware and software solutions. It is scalable and extensible, so cable operators can deploy a basic multi-room DVR solution utilizing MoCA-enabled DCX settops, user interfaces and current EPGs. This architecture also provides an easy path for growth to advanced services and capabilities using downloadable software technology.

DCX Hardware

Motorola Mobility's MR-DVR solutions are delivered through a combination of MoCAenabled DCX set-tops, in conjunction with various software options. Motorola Mobility offers a number of DVR servers and non-DVR client set-top options to meet cable operators MR-DVR deployment strategies.

DVR set-tops include all-digital, high-definition and dual-tuner capabilities, while supporting trick-play options such as pause, playback, multi-speed rewind and fast forward choices. The DVRs also schedule and delete recordings, while storing content for access by the DCX client set-tops. Additional features, such as a "bring your own hard drive" DVR-capable set-top to increase hard drive capacity via connection of an external eSATA hard drive are available.

Non-DVR set-tops serve as media clients for accessing content from other compatible devices in the home. These client set-tops access recorded content from the DCX server for remote viewing, scheduling and trick-play options. They also support recording set-up, DVR management and pausing live TV broadcasts. As Motorola Mobility develops and releases future set-top offerings, these new products will also support MR-DVR solutions.

Multimedia over Coaxial Alliance (MoCA)

The communications link that makes MR-DVR possible is the MoCA technology embedded in all the DCX set-tops. MoCA is an open, international technology standard body that promotes the networking of multiple streams of high definition video around the home using the existing coaxial cables. By tapping into the vast amount of unused bandwidth available on coaxial cables installed in more than 90% of American homes, MoCA easily and reliably shares digital video content (including multiple streams of high definition TV) through a managed and trusted home network, invisible to the homeowner. MoCA offers a plug and play set-top solution – no professional installation is required.

MoCA, now widely embraced by much of the U.S. cable industry, provides sufficient bandwidth to accommodate multiple content streams, including high definition as well as the IP device management communications across all devices. MoCA meets all of the stringent consumer requirements for whole-home networking of digital entertainment, including no new wires, high data rate, reliability, ease of installation, full quality of service and security.

ABI Research projects in 2014, as many as 15 million set-tops will be supported with MoCA. According to the NCTA, an estimated 90% of U.S. households are wired for coaxial cable. Most homes have multiple cable outlets. Coax is already connected to more than 300 million television sets and is the preferred in-home video distribution medium for more than 100 million cable and satellite homes in the U.S. today.

Point of Entry (PoE) Filter

Most MR-DVR installations will require a PoE filter, which prevents interference between neighboring homes that are using MoCA-enabled products. It stops the MoCA signal from leaving the subscriber's home network and being accessed by neighbors, and it also improves MoCA network performance and requires professional installation. In instances where cable operators are installing new customers on the DCX set-top platform or, because of set-top upgrades, installers should be instructed to place a POE filter in all homes, even if the subscriber has declined to take MR-DVR service.

This will ensure that if the subscriber later wants to subscribe to MR-DVR service, the cable operator can activate it remotely without requiring another truck roll. Establishing a base of households where MR-DVR service can be activated remotely also has important implications for marketing strategies. Once DCX households are equipped for software provisioning of MR-DVR, cable operators can create free-trial offers for subscribers who have not purchased the service. Offering a free trial could become an important mechanism for upselling the service.

Software Options

Motorola's Mobility MR-DVR solutions offer support for both legacy and OCAP set-top environments. The following discussion of these options reflects feature sets as they are constituted at the time of this writing. Be sure to contact Motorola Mobility sales personnel for updates on latest developments.

Motorola Mobility MR-DVR (i-Guide™ based)

For cable operators who currently utilize Rovi Corporation's i-Guide EPG, Motorola Mobility has developed a MR-DVR application that seamlessly integrates into this guide. When combined with MoCA-enabled DCX set-tops, this downloadable software enables the DVR experience to be extended to all the network-connected set-tops in the home.

All DCX set-tops support this MR-DVR solution. Architecturally, the DVRs (DCX-3501-M, DCX3400-M, DCX3300-M) are considered servers, whereas non-DVRs (DCX3200-M, DCX700-M) are considered to be clients. These set-tops all communicate via an IP network that is automatically discovered and provisioned via Motorola Mobility's MoCA software, which is already an integral part of the set-top.

The MR-DVR application software can be selectively downloaded and activated to all the DCX set-tops within a household or to an entire system – it's all up to the cable operator. This remote service activation is controlled through the cable operator's provisioning system, as opposed to a process that involves a costly truck roll. This Motorola Mobility MR-DVR application works in conjunction with either Rovi's i-Guide A25 or A28 version. This MR-DVR application also integrates seamlessly with current and future set-top applications, such as VOD and EBIF user agents.

OCAP based MR-DVR

Another option for deploying MR-DVR on the DCX platform is OCAP (also known as tru2way®). This is CableLabs' next-generation platform for interactive television applications and services. Motorola Mobility's OCAP middleware complies with the latest version of the CableLabs specifications, including OCAP-HN, the Home Networking Extension. OCAP-HN is designed to provide OCAP home networking applications access to digital entertainment content available on devices connected to a cable service subscriber's home network.

Motorola Mobility's OCAP solution is an interoperable solution with MR-DVR built in. It supports up to 16 DCX set-tops in a home, any number of which can be DVRs for cable operators who want to provide their customers scalable solutions with more available hard drive space and more simultaneous recordings. Customers can also use an eSATA external hard drive to extend the DVR's hard drive space.

Motorola Mobility's OCAP solution is built on Digital Living Network Alliance (DLNA®), so the cable operator can deploy applications that transparently deliver MR-DVR and other services that take advantage of networked set-tops and other home devices – like PCs, video game consoles, network storage, smartphones and tablets. As more and more consumer electronic devices become networkable, the opportunities are endless.

Cable operators have a choice of EPGs. Many cable operators who have chosen to deploy OCAP have decided to write their own EPGs, which allows them control over the interactive services they can offer their particular subscribers. This OCAP approach also creates a marketplace for software developers to write attractive, competitive applications that make for a sticky, ever-expanding offering.

MR-DVR and an IP-Based Migration Path

By employing IP communications to manage devices across the home network, Motorola Mobility's MR-DVR solution provides cable operators a means to interconnect any IP-enabled device to their cable services. The platform supports connectivity via standard Ethernet and 802.11 Wi-Fi® wireless technology as well as through the MoCA coax links.

MR-DVR, used in conjunction with open standards, will provide cable operators an especially powerful platform for enhancing user experiences while maintaining the service edge over competitors. In contrast, satellite and telco providers, even those who provide TV in an IP mode, remain tied to proprietary middleware systems, greatly impeding their ability to bring best-of-breed applications to market.

Future iterations of MR-DVR will support an OCAP/DLNA connected-device architecture to support transfer of personal media from the DCX platform for access on TVs and other connected devices. DLNA interoperates with other vendor solutions and other devices that are not traditional set-tops. Cable operators will be able to introduce other DLNA-compliant devices to be used as media servers and clients in the home. The ability to extend protected IP-based premium content to subscribers across all devices promises

to enhance the value of emerging TV Everywhere services to cable subscribers. Not only will DLNA support users' access from multiple devices, but it will also allow them to store content in the IP-enabled DCX DVR set-top for later access from the IP devices.

This architecture opens a plethora of use cases that will keep cable operators in the forefront of delivering consumers the convenience they're looking for, as even more devices enter the marketplace. Users will be able to connect third-party storage platforms to allow access to stored content from any room in the house. By giving consumers the ability to share content from digital cameras, camcorders, MP3 players, computers and mobile devices throughout the home via a simple user interface, cable operators will be able to offer personal media management services that greatly simplifies customers' efforts to organize and access their photos, videos and music.

Motorola Mobility, as a leading global supplier of mobile devices and network systems, is well positioned to take MR-DVR to the wireless arena. Cable subscribers can program their DVRs from their mobile devices today, and they'll be able to download personal as well as IP-based cable content from their DVRs to their DLNA-enabled mobile devices wherever they are. And, eventually, customers of cable operators that offer mobile services will be able to seamlessly transfer in-progress programs for viewing on their smartphones and mobile devices.

Summary

Cable operators have made it clear they want to provide market-leading, cost effective MR-DVR solutions. At the same time, they want to ensure the technology they're using supports a forward-looking migration path to next generation services and applications across a wide variety of devices. Motorola Mobility offers an established MR-DVR solution that is:

- **Flexible** – Motorola Mobility offers MR-DVR deployable solutions today, for cable operators running legacy software or OCAP/tru2way. The common element in both of these is the DCX line of set-tops.
- **Cost effective** – Motorola Mobility has a full portfolio of DCX set-tops with integrated MoCA available today. No additional hardware to buy, install and manage beyond the MoCA enabled DCX set-tops.
- **Future-proof** – Motorola Mobility's MR-DVR solution operates over the existing home coax network via MoCA, allowing cable operators to leverage existing coax infrastructure for future home networking services.
- **Proven** – Motorola Mobility has pioneered the introduction of MR-DVR and has successfully launched scalable MR-DVR deployments with major North America service providers.
- **Innovative** – Motorola Mobility delivers an extensive portfolio of MR-DVR products that offer cable operators the best MR-DVR solution for their business

Motorola Mobility's MR-DVR solutions meet these requirements. It not only provides a DCX set-top portfolio which will support next generation services and applications, but also provides cable operators the flexibility to choose a robust software environment to fit their deployment needs.

MR-DVR solutions create major business opportunities for cable operators. Consumers want the flexibility of MR-DVR on all televisions throughout the home, and many will pay a premium for the flexibility to watch programming and other content on their own schedule. Subscribers gain access to digital content, allowing cable operators to build lasting relationships with them.

Market conditions now dictate that cable operators must offer MR-DVR solutions to stay competitive. Fortunately, the most compelling, cost-effective approach to doing so implements a state-of-the-art DCX set-top infrastructure that will continue to support the service enhancements essential to discouraging customers from considering alternative services, no matter what new options might come along to peak their interest.

For more information on Motorola Mobility MR-DVR, related products and converged media experiences, visit **www.motorola.com/videosolutions**.

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