

Cisco Videoscape Multiscreen Cloud DVR: Take the Next Step in Personalized TV

What You Will Learn

Consumers want more personalized TV experiences. They want to be able to watch whatever they want, wherever and however they choose, without the limitations of a hardware-based digital video recorder (DVR). Service providers can give them this freedom and flexibility with multiscreen cloud DVR and time-shift TV services, powered by the evolution of the Cisco Videoscape™ platform, Cisco® Videoscape Unity. This document describes:

- The market forces driving the need for personalized TV experiences
- The business and technical challenges that service providers must overcome to deliver them
- The capabilities of Cisco Multiscreen Cloud DVR as a platform for cloud-based DVR and time-shift TV services, and the benefits it delivers to both service providers and their customers

The Rise of Personalized TV

Reports of the decline of TV have been greatly exaggerated. Despite the proliferation of new video-capable devices and new video services, consumer appetite for TV is growing. DVR and time-shift TV - services that free consumers from arranging their viewing around the broadcast schedule and allow them to watch programs whenever they choose - are a big reason why.

In fact, time-shifted TV viewing is growing faster than all other kinds of TV viewing, even more than “over-the-top” (OTT) video services like Netflix and Hulu. Nielsen reports that 144 million viewers watched nearly 12 hours of time-shifted TV per month in 2011 - up 12.3 percent from the previous year. Contrast that with online video viewing, which captured about the same number of viewers (147 million) but a lot less attention span (about four and a half hours per month) and grew at about a third the rate. Nielsen also reports that DVR usage now accounts for 8 percent of viewers' TV time - up from just 1.6 percent in 2006 - and that U.S. viewers watch, on average, 24 minutes of DVR-recorded programs each day. Among all U.S. homes, viewers watch about 12 hours of time-shifted TV each month, and more than double that in homes with DVRs.

Clearly, consumers' demand for TV is increasing. However, their consumption pattern is changing; they want it wherever, whenever, and however they choose. And they want to be able to schedule recordings and play back content from any device, inside or outside the home, without worrying about scheduling conflicts or lack of storage space. Service providers that can give consumers these types of capabilities will not only stand up well against new and traditional video competitors, they will be among the first to capitalize on the growing wave of personalized TV experiences that allow for a more profitable video offering, and happier subscribers.

Cisco Videoscape Multiscreen Cloud DVR

Cisco Videoscape Multiscreen Cloud DVR, part of the Cisco Videoscape Unity portfolio of prepackaged, end-to-end solutions for next-generation video services, provides all of these capabilities for your subscribers. As a result, it can help you build unique and compelling experiences around your premium content to increase subscriber loyalty, and monetize those experiences in innovative ways.

Cisco Videoscape Multiscreen Cloud DVR lets subscribers restart live shows; catch up on past programs; and schedule, manage, and play back DVR recordings from any device, inside or outside the home. The offer combines the best of both set-top-box (STB) and cloud-based time-shift capabilities, with the ability to extend network-based time-shift TV services to customer STBs, and cloud-based recording scheduling and playback on any connected consumer device.

With Multiscreen Cloud DVR, your subscribers can:

- Catch up on their favorite shows on any device, anytime, anywhere
- Capture and manage recordings in the cloud, and play back on any device
- Pause and resume content from a companion device for total viewing control
- Search for content across all sources - live, on-demand, online, and on their local device or hardware DVR - from a single interface
- Watch a program on one screen (for example, a tablet), and “fling” that experience to another screen (for example, the living-room TV) and resume exactly where they left off
- Avoid having to skip recordings due to a limited number of tuners and limited DVR space
- Avoid having to choose what to record (and what to skip) due to a limited number of simultaneous recordings and limited DVR space
- Browse and watch time-shift TV content (restart a live program from the beginning, navigate backward on the program guide to discover and watch content, pause live TV without a DVR, etc.) on the STB or any connected device
- Add storage capacity without needing to purchase new hardware
- Combine the benefits of their previously installed hardware DVR and cloud DVR services with the ability to add cloud storage when hardware storage is full, decide whether to record content in the home network or the cloud in real time, and transparently switch between content stored locally and in the cloud

You can also offer your customers much more personalized and flexible TV options with new time-shift TV capabilities such as:

- **Catch-up TV:** Watch TV programs after they air by browsing through a video on demand (VoD) catalog folder.
- **Restart TV:** Tune in to selected content in the middle of a broadcast and restart the program from the beginning.
- **Reverse Electronic Programming Guide (EPG):** Navigate backwards on the EPG to discover and watch content, for example, selecting a program that aired earlier in the week.
- **Pause live TV:** Pause, rewind, and fast-forward a currently airing program, without a hardware-based DVR.

At the same time, Multiscreen Cloud DVR helps you deploy these new services faster with reduced operational complexity. It provides highly scalable and flexible content recording, packaging, and delivery to a variety of devices. And it provides a modular architecture, intelligent business logic, and automated workflow management to deliver all types of video services.

With Multiscreen Cloud DVR, you can:

- Increase your subscriber base and keep loyal customers happy with new capabilities and a better experience
- Remotely extend DVR services to existing customers without a costly truck roll, reducing operational expenses (OpEx)
- Augment home DVRs with additional storage capacity in the cloud
- Up-sell higher service tiers with more storage capacity and more simultaneous recordings, without upgrading customer hardware
- Build a modular and open foundational infrastructure for advanced applications and services
- Reuse the same video and metadata stream for multiple streams and delivery methods, with support for both adaptive bit rate (ABR) and MPEG transport stream (MPEG TS) streaming technologies, and a completely automated process for capturing broadcast content and repurposing it for time-shifted and cloud DVR services
- Capture a broad range of content across MPEG, ABR, and other popular formats
- Protect content end-to-end with powerful Cisco policy and session management capabilities
- Extend content security across STBs and unmanaged devices with integrated digital rights management (DRM) and conditional access (CA) management
- Unify workflows and data center infrastructures for linear TV, video on demand, time-shift TV and DVR, simplifying operations and lowering OpEx

DVR and Time-Shift TV Trends, and Service Provider Requirements

Where are DVR and time-shift TV trends leading? What do consumers actually want, and what will you need to do to give it to them? To deliver the flexible, personalized TV experiences that your customers crave, you will need to do the following.

- **Improve DVR flexibility:** Customers love their DVRs, but they are becoming increasingly impatient with the limitations of a hardware-based solution, tied to one or two TVs. They want to be able to schedule a recording, manage existing recordings, and play back recorded content anywhere, on any device. They don't want to have to choose which shows to watch (and which to miss) because their DVR can only record so many programs at once. And they don't want to miss their favorite programs because their DVR ran out of space or lost power in the middle of a recording. To provide and capitalize on the personalized DVR experiences your customers want, you will need to evolve your DVR offering from a service based on costly and inflexible hardware to one delivered through the cloud.
- **Increase channels and programming available for time-shifting:** According to findings based on the Emerging Video Services study conducted by Leichtman Research Group, the main reason consumers watch TV shows online is because they missed them when they aired on TV. Ideally, service providers will make **all** TV programming available for consumers to watch whenever they choose. Even if this goal is not immediately attainable, you can work with content providers to expand the catalog of programs available on a time-shift TV service.

-
- **Accelerate service velocity for delivering time-shift TV services and other new offerings:** Consumers love their TV content, but service providers are still searching for ways to counter competition from OTT video services. Netflix streamed more than 1 billion hours of video in June 2012, with 60 percent of streams being TV shows. Online TV provider Hulu now has more than 2 million subscribers. One way you can counter this competitive threat is by making broadcast content available for time-shifted consumption more quickly.
 - **Reach more screens:** The [Cisco Visual Networking Index \(VNI\) forecasts](#) there will be three IP-connected devices for every man, woman, and child on the planet by 2016, many of which will be video-capable. This proliferation of devices is fueling growing consumer demand for the ability to watch TV content on any device, anywhere, and leading to an expected four-fold increase in consumer IP traffic by 2016. To meet this expectation, you need to be able to scale video delivery to multiple devices.
 - **Deliver personalized, compelling, and differentiated experiences:** To increase loyalty and reduce subscriber churn (customers switching to another service provider or abandoning pay TV services altogether), you need to offer a unique TV experience that enhances the value of the TV services you provide.
 - **Reduce costs and complexity, while preserving quality:** To build a profitable and sustainable video service, you need to find ways to reduce the cost of delivering online video as you scale video services to new devices, while maintaining the high-quality TV experience your customers expect.

Overcoming Time-Shift TV Challenges

While service providers may want to deliver the kind of personalized, flexible, time-shift TV capabilities consumers desire, many are hampered by the limitations of the video infrastructures they have in place.

Today's video infrastructures were typically designed to deliver one or two types of services (live or on-demand), to one type of device (the STB). Even for service providers that offer VoD and other network-based time-shifting capabilities, adapting existing infrastructures to support next-generation personalization, time-shifting, and cloud-based DVR recording and playback can be a complex and expensive proposition. Conventional video infrastructures are hampered by the following.

- **Reliance on antiquated DVR hardware:** Service providers have offered the ability to schedule recordings and watch programs when customers choose for many years, but these capabilities are provided almost exclusively through DVR hardware in the customers' homes. This hardware-based approach limits customers' TV watching flexibility, as it has fixed limitations on simultaneous recordings and storage space, and can often function only with a single connected TV. In addition, hardware-based DVRs represent a significant capital expense (CapEx), hindering many service providers from expanding DVR services as quickly as they would like. Maintaining, replacing, and upgrading hardware DVRs also usually requires a service call - representing significant ongoing OpEx.
- **Lack of infrastructure for multiscreen recording and playback:** Many service providers now offer TV Everywhere services that extend live TV and VoD services to new devices. But because scheduling and playback of personal recordings has long been provided by hardware-based DVRs, conventional video infrastructures offer no means to give subscribers that degree of personal control over their video experiences beyond the TV.

-
- **Inefficient video delivery systems for time-shift TV:** Traditional video infrastructures are optimized for delivery of broadcast TV and VoD storage and streaming. But most VoD services rely on file-based ingestion of content, typically performed through a manual or semi-automated process that is slow and prone to error. To support a massively expanded catalog of time-shift TV content (theoretically, every program that airs on TV), you need a highly scalable “live-capture” ingestion mechanism that can automatically record TV programs as they air, in real time.
 - **Duplicate media workflows and lost revenues:** Conventional content management systems treat live and VoD content as entirely separate assets with entirely separate workflows. As a result, an episode of a TV program proceeds through one distinct workflow when it airs live, and an entirely separate workflow to be made available on demand. Processing these separate workflows is a time-consuming and error-prone manual effort, typically resulting in a delay of several hours or even days from the time content airs until it becomes available on demand. This means that service providers are not fully monetizing content during the extremely valuable first few hours and days after it airs, even though their licenses may allow them to do this. Additionally, conventional content management systems offer no means at all to incorporate a subscriber’s personal DVR recordings.
 - **Limited control-plane functionality:** In most conventional video systems, the control plane is tied to the existing infrastructure, which in turn is built to deliver just one or two types of content to the STB. As a result, it is difficult and expensive to modify policy and business rules to support new types of content, access networks, and devices. Consider the challenges in modifying such systems to implement policy-based limitations for content viewing windows, to enforce usage limitations on content recorded and stored in the cloud, or to enable services on new consumer electronic devices.
 - **High costs and complexity when delivering video to new devices:** HTTP adaptive bit rate (ABR) streaming is becoming the prevailing method for ensuring quality of experience when delivering video content to IP-connected consumer devices across networks where bandwidth is variable (for example, over an unmanaged Internet connection or cellular network). But implementing ABR streaming in existing video infrastructures, which requires encoding and storing content in multiple bit rates and formats, is an expensive, complex, and inefficient process.

Cisco Videoscape Multiscreen Cloud DVR: Powering a New TV Experience

Service providers know they must evolve to deliver the personalized TV services their subscribers want, but many are struggling to overcome the limitations of a video delivery model designed for a simpler environment. Cisco can help you build the capabilities you need to unlock the next generation of TV experiences with Multiscreen Cloud DVR.

Cisco Videoscape Multiscreen Cloud DVR provides a cloud-based infrastructure to scale the ingestion, recording, management, and delivery of any type of content, over any network, to any device. And it provides a framework to allow subscribers to schedule and manage personal video recordings in the cloud, and play back their recorded content on any device. As a result, you can support full-featured DVR capabilities, as well as all types of content (linear, VoD, and time-shifted TV), to both managed STBs and unmanaged consumer devices (tablets, smartphones, and game consoles), whether delivered on-net or off-net, from a single infrastructure.

Contrast this capability with time-shift TV services available today. Even when such services incorporate some cloud-based capabilities (for example, the ability to program a hardware DVR from another device through the cloud), they do not provide the total flexibility in recording scheduling and multiscreen playback that customers want. Additionally, they do not fully capitalize on cloud capabilities to scale and optimize video ingestion, recording, management, and multiscreen delivery. Multiscreen Cloud DVR provides the ideal platform for delivering a more personalized and differentiated TV experience. It delivers the following advantages.

- **Provides an open and flexible platform:** Multiscreen Cloud DVR is based on modular building blocks with open APIs among all components. This lets you upgrade each component individually as your needs change and gives you total flexibility in how you deploy next-generation video services. Whatever capabilities you need and whatever elements of your existing system you want to preserve, Cisco Videoscape Unity components will integrate with your platform's existing architecture, as well as with third-party components.
- **Supports cloud-based scheduling and multiscreen playback of recorded content:** Multiscreen Cloud DVR evolves your DVR offering from a hardware-based service to one managed in the cloud. It provides a complete service framework to allow subscribers to store content in multiple locations (on a local device, on a conventional DVR, and in the service provider's hosted cloud storage), and play back recorded content on any device they choose.
- **Offers a more profitable personalized TV service:** With the ability to deliver DVR recording, scheduling, management, and storage through the cloud, you can reduce or eliminate the high CapEx and OpEx costs associated with traditional hardware DVRs. You can also more easily and inexpensively scale DVR services to your existing customers, giving them a full-featured DVR service using their existing STBs, without having to deploy new hardware. Additionally, you can increase revenues by up-selling additional cloud storage or higher service tiers that support more devices and more simultaneous video recordings.
- **Consolidates previously separate and redundant workflows and infrastructures:** Cisco Videoscape Multiscreen Cloud DVR unifies workflows and data center infrastructures for linear TV, VoD, time-shift TV and DVR services. It eliminates duplicate efforts and streamlines service operations. Ultimately, this consolidated infrastructure improves efficiency, lowers operating costs, and allows you to scale time-shifted content and services to your customers more quickly.
- **Supports cloud-based content management:** Multiscreen Cloud DVR allows you to centrally configure content recording, playback, and management with a platform designed for multiscreen services. As a result, you can:
 - Unify content management for live, VoD, DVR, and time-shift services
 - Enable common search, recommendation, and discovery of content across multiple services and screens
 - Implement flexible policy controls to manage license windows, trick plays (pause, rewind, fast forward, etc.), and blackouts
 - Employ a single, universal cloud-based entitlement system to allow consumers to transparently access entitled content across all services and screens
- **Extends content distribution networks (CDNs) to scale cloud-based delivery:** Many of today's service providers use separate distribution networks for each type of service (for example, using entirely separate CDNs for VoD and online video services). Cisco Videoscape Multiscreen Cloud DVR bridges the gap between separate CDNs and allows you to:

- Scale content ingestion and storage for real-time recording of live content
- Deliver time-shifted and DVR-recorded content to managed devices (that is, IP or quadrature amplitude modulation [QAM] STBs)
- Simplify and consolidate ABR origin and management, and support for on-demand content encapsulation (transformation and packaging for multiscreen delivery)
- Support multiscreen and multi-protocol content streaming to multiple devices, over multiple networks
- **Allows flexible management of both operator- and subscriber-initiated scheduling and recording:** Cisco Videoscape Multiscreen Cloud DVR provides unprecedented policy-based control, allowing you to specify granular business rules associated with service policies, licensing windows, entitlements, billing tiers, devices, etc. It lets you easily scale scheduling and recording of TV content, and optimize resource allocation for cloud DVR and time-shift TV recording and sessions. You can:
 - Use policy-based rules to determine storage location (local, in-home, or cloud) and quality and resolution of stored cloud DVR content
 - Intelligently manage recorded content (for example, automatically deleting all shared references of stored content once the last reference is removed)
 - Encrypt all recordings and protect all content with digital rights management

Cisco Videoscape Unity - Powering Multiscreen Cloud DVR

All of these Multiscreen Cloud DVR capabilities are based on Cisco Videoscape Unity, the platform for delivering and monetizing a new generation of compelling, differentiated video experiences. Cisco Videoscape Unity answers the next-generation demand for video experiences on multiple screens, empowering service providers and media companies to create and connect new synchronized, personalized, and intuitive multiscreen experiences - at the speed of now.

Evolving from the Cisco Videoscape platform, Cisco Videoscape Unity is now strengthened and enhanced with solutions and expertise from NDS that bring powerful new capabilities across the platform:

- An enhanced cloud to increase capabilities aligned to business needs
- An intelligent network to optimize CapEx and OpEx
- An immersive client approach to bring the new Cisco Videoscape Unity experiences anytime, anywhere, on any device

For more details on the Cisco Videoscape Unity platform, visit <http://www.cisco.com/go/videoscape>.

Protecting Your Investments

You may view cloud DVR and time-shift TV services as important business requirements, but you likely also view them as significant new investments, as well as risks. Cisco Videoscape Multiscreen Cloud DVR helps you minimize both by providing a preintegrated, end-to-end cloud DVR and time-shift TV solution, including both products and integration.

Multiscreen Cloud DVR can support next-generation time-shift TV and cloud-based recording services, new business policies and revenue models, and various content licensing models, without requiring you to abandon your existing video infrastructure and STB investments. In fact, Cisco Videoscape Unity is designed to allow service providers to migrate to next-generation TV services in a phased, incremental approach that builds on existing infrastructure every step of the way. (For more details, visit <http://www.cisco.com/go/videoscape>).

Cisco Videoscape can help you:

- Intelligently scale infrastructure to support expanding content, ingestion, and delivery requirements
- Manage the transition from QAM to hybrid QAM/IP to all-IP video delivery
- Support new IP devices and consumer electronics
- Maintain flexibility in implementing policies for licenses, time-shifting capabilities, devices, billing tiers, and more
- Transition from hardware-based DVR recording to a more flexible cloud-based framework
- Evolve from a cloud-based recording model based on unique copies for each subscriber to common copies for multiple subscribers, as content licenses evolve

Reinvent the TV Experience

New personalized TV capabilities hold the key to delivering a more compelling and profitable TV experience. With Cisco Videoscape Multiscreen Cloud DVR, you can take advantage of a preintegrated, end-to-end DVR and time-shift TV solution that can:

- **Unify** and centrally manage all services: live, VoD, DVR, and time-shift TV
- **Scale** ingestion, storage, and content delivery resources to support more content and screens and unlock new efficiencies
- **Accelerate** the introduction of new, differentiated subscriber services with a cloud-based model that promotes flexibility and innovation
- **Evolve** to next-generation TV experiences without having to abandon existing infrastructure investments or start over from the beginning when expanding cloud services in the future

Multiscreen Cloud DVR also addresses all sides of the personalized TV economic equation:

- It lowers CapEx by optimizing content caching, storage, and streaming bandwidth, and eliminating the need to invest in expensive hardware DVRs.
- It reduces OpEx by simplifying content management workflows, lowering integration costs, and reducing ongoing DVR maintenance and upgrade requirements.
- It increases revenues by allowing you to up-sell cloud storage and higher service tiers, support lucrative multiscreen advertising, and more fully monetize content during the period immediately after it airs.
- It scales higher-revenue services by allowing you to offer high-value DVR and time-shift TV services to your existing customers, without requiring them to upgrade to a hardware DVR.

For More Information

To find out more about Cisco Videoscape Multiscreen Cloud DVR, contact your local Cisco representative or visit <http://www.cisco.com/go/videoscape>.



Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

 Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: www.cisco.com/go/trademarks. Third party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)