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Generating video on demand (VOD) using network digital video recording (NDVR)

Abstract

Disclosed herein are embodiments generating video on demand (VOD) using network digital video recording (NDVR). A method includes receiving a video on demand (VOD) request for generating a VOD package of a video broadcast prior to a broadcast. The method further includes retrieving electronic program guide (EPG) metadata related to the video broadcast. The method further includes sending a digital video recording (DVR) request to a network digital video recording (NDVR) system to record the video broadcast. The method further includes obtaining a video recording of the video broadcast generated by the NDVR system. The method further includes generating a VOD package of the video broadcast, the VOD package including the video recording, and VOD metadata of the video recording. The method further includes sending the VOD package of the video broadcast toward a VOD system to distribute the VOD package.

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References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
2004/0255335	12/2003	Fickle et al.	N/A	N/A
2011/0157463	12/2010	Shin	348/E7.018	H04N 21/4316
2016/0066009	12/2015	Rothschild	725/88	H04N 21/2347
2017/0034571	12/2016	Natarajan	N/A	H04N 21/4335
2017/0155948	12/2016	Harper et al.	N/A	N/A
2017/0245015	12/2016	Rose et al.	N/A	N/A
2018/0014050	12/2017	Phillips	N/A	H04N 21/2402
2018/0025233	12/2017	Iwai	348/143	G06V 40/161
2018/0192079	12/2017	Riedl	N/A	H04N 21/812
2022/0201351	12/2021	Chung et al.	N/A	N/A

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
101196916	12/2007	CN	N/A

OTHER PUBLICATIONS

Office Action for U.S. Appl. No. 17/386,673, mailed May 26, 2022, 14 pages. cited by applicant
Final Office Action for U.S. Appl. No. 17/386,673, mailed Oct. 6, 2022, 14 pages. cited by applicant
Office Action for U.S. Appl. No. 17/386,673, mailed Mar. 3, 2023, 13 pages. cited by applicant
Notice of Allowance and Notice of Allowability for U.S. Appl. No. 17/386,673, mailed Jul. 11, 2023, 11 pages. cited by applicant

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Background/Summary

RELATED APPLICATION (1) This application is a continuation of co-pending U.S. patent application Ser. No. 17/386,673, filed on Jul. 28, 2021, entitled “GENERATING VIDEO ON DEMAND (VOD) USING NETWORK DIGITAL VIDEO RECORDING (NDVR),” which is hereby incorporated herein by reference in its entirety.

BACKGROUND
(1) After initial airing of a video broadcast, such as a TV episode or a movie, the video broadcast is prepared for video on demand. This may require the programmer, such as NBC, CBS, ABC, or the like, to transmit the program to a third party to prepare a video on demand (VOD) package. The VOD package is then transmitted to a VOD system. This process may be time-consuming and result in delays in making the VOD package available to end users.
SUMMARY
(2) The embodiments disclosed herein provide generating video on demand (VOD) using network digital video recording (NDVR). In particular, the embodiments provide a computing system that receives a VOD request for generating a VOD package of a video broadcast prior to a broadcast. The computing system retrieves electronic program guide (EPG) metadata and then sends a digital video recording (DVR) request to an NDVR system to record the video broadcast. After the broadcast, the computing system obtains a video recording of the video broadcast generated by the NDVR system. The computing system generates a VOD package based on the video record and sends the VOD package toward a VOD system for distribution to users. In this way, the VOD system reduces delays in providing the VOD package to users.
(3) In one embodiment, a method is provided. The method includes receiving, by a computing system comprising one or more processor devices, a video on demand (VOD) request for generating a VOD package of a video broadcast prior to a broadcast. The method further includes retrieving, by the computing system, electronic program guide (EPG) metadata related to the video broadcast. The method further includes sending, by the computing system, a digital video recording (DVR) request to a network digital video recording (NDVR) system to record the video broadcast. The method further includes obtaining, by the computing system, a video recording of the video broadcast generated by the NDVR system after the broadcast. The method further includes generating, by the computing system, a VOD package of the video broadcast, the VOD package including the video recording, and VOD metadata of the video recording. The method further includes sending, by the computing system, the VOD package of the video broadcast toward a VOD system to distribute the VOD package.
(4) In another embodiment, a computer system is provided. The computer system includes one or more processor devices of one or more computing devices. The one or more processor devices are configured to receive a video on demand (VOD) request for generating a VOD package of a video broadcast prior to a broadcast. The one or more processor devices are further configured to retrieve electronic program guide (EPG) metadata related to the video broadcast. The one or more processor devices are further configured to send a digital video recording (DVR) request to a network digital video recording (NDVR) system to record the video broadcast. The one or more processor devices are further configured to obtain a video recording of the video broadcast generated by the NDVR system after the broadcast. The one or more processor devices are further configured to generate a VOD package of the video broadcast, the VOD package including the video recording and VOD metadata of the video recording. The one or more processor devices are further configured to send the VOD package of the video broadcast toward a VOD system to

distribute the VOD package.
(5) In another embodiment, a computer program product includes a non-transitory computer-readable storage medium and includes instructions to cause one or more processor devices to receive a video on demand (VOD) request for generating a VOD package of a video broadcast prior to a broadcast. The one or more processor devices are further configured to retrieve electronic program guide (EPG) metadata related to the video broadcast. The one or more processor devices are further configured to send a digital video recording (DVR) request to a network digital video recording (NDVR) system to record the video broadcast. The one or more processor devices are further configured to obtain a video recording of the video broadcast generated by the NDVR system after the broadcast. The one or more processor devices are further configured to generate a VOD package of the video broadcast, the VOD package including the video recording and VOD metadata of the video recording. The one or more processor devices are further configured to send the VOD package of the video broadcast toward a VOD system to distribute the VOD package.
(6) Those skilled in the art will appreciate the scope of the disclosure and realize additional aspects thereof after reading the following detailed description of the embodiments in association with the accompanying drawing figures.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) The accompanying drawing figures incorporated in and forming a part of this specification illustrate several aspects of the disclosure and, together with the description, serve to explain the principles of the disclosure.
(2) FIG. **1** is a block diagram of a system for generating video on demand (VOD) using network digital video recording (NDVR), illustrating certain aspects of various embodiments disclosed herein;
(3) FIG. **2** is a flowchart illustrating processing steps for generating VOD using NDVR;
(4) FIG. **3** is a message sequence diagram illustrating example messages communicated between and actions taken by several of the elements illustrated in FIG. **1**, according to one embodiment; and
(5) FIG. **4** is a block diagram of a computing device suitable for implementing one or more of the processing devices disclosed herein, according to one embodiment.
DETAILED DESCRIPTION
(6) The embodiments set forth below represent the information to enable those skilled in the art to practice the embodiments and illustrate the best mode of practicing the embodiments. Upon reading the following description in light of the accompanying drawing figures, those skilled in the art will understand the concepts of the disclosure and will recognize applications of these concepts not particularly addressed herein. It should be understood that these concepts and applications fall within the scope of the disclosure and the accompanying claims.
(7) Any flowcharts discussed herein are necessarily discussed in some sequence for purposes of illustration, but unless otherwise explicitly indicated, the embodiments are not limited to any particular sequence of steps. The use herein of ordinals in conjunction with an element is solely for distinguishing what might otherwise be similar or identical labels, such as “first message” and “second message,” and does not imply a priority, a type, an importance, or other attribute, unless otherwise stated herein. The term “about” used herein in conjunction with a numeric value means any value that is within a range of ten percent greater than or ten percent less than the numeric value.
(8) As used herein and in the claims, the articles “a” and “an” in reference to an element refers to “one or more” of the element unless otherwise explicitly specified. The word “or” as used herein

and in the claims is inclusive unless contextually impossible. As an example, the recitation of A or B means A, or B, or both A and B.

(9) After initial airing of a video broadcast, such as a TV episode or a movie, the video broadcast is prepared for video on demand (VOD). This may require the programmer, such as NBC, CBS, ABC, or the like, to transmit the program to a third party to prepare a video on demand (VOD) package. The VOD package is then transmitted to a VOD system. This process may be time-consuming and result in delays in making the VOD package available to end users.

(10) The examples disclosed herein provide generating video on demand (VOD) using network digital video recording (NDVR). In particular, the embodiments provide a computing system that receives a VOD request for generating a VOD package of a video broadcast prior to a broadcast. The computing system retrieves electronic program guide (EPG) metadata and then sends a digital video recording (DVR) request to an NDVR system to record the video broadcast. After broadcast, the computing system receives from the NDVR system a DVR video recording, which may be a plurality of video segments. The computing system generates a VOD package based on the plurality of video segments and sends the VOD package toward a VOD system for distribution. In this way, the VOD system reduces delays in providing the VOD package to users.

(11) FIG. **1** is a block diagram of a system for generating VOD using NDVR, illustrating certain aspects of various embodiments disclosed herein. The system **10** includes a computing device **12**, including a VOD generator **14**, a processor device **16**, and a memory **18** coupled to the processor device **16**. Although only the VOD generator **14** is illustrated with a processor device **16** and a memory **18**, any component may include a processor device **16** (or processor device set) and/or a memory **18** (or memory set).

(12) Because the VOD generator **14** is a component of the computing device **12**, functionality implemented by the VOD generator **14** may be attributed to the computing device **12** generally. Moreover, in examples where the VOD generator **14** comprises software instructions that program the processor device **16** to carry out functionality discussed herein, functionality implemented by the VOD generator **14** may be attributed herein to the processor device **16**.

(13) It is further noted that while the VOD generator **14** is shown as a single component, in other implementations, the VOD generator **14** may be implemented in a plurality of components. Finally, it is noted that while, for purposes of illustration and simplicity, the embodiments are illustrated as being implemented by a single processor device on a single computing device, in other environments, such as a distributed and/or clustered environment, and where the VOD generator **14** is implemented in multiple components, the VOD generator **14** may be implemented on a computer system that includes a plurality of processor devices of a plurality of different computing devices. Thus, irrespective of the implementation, the embodiments may be implemented on a computer system that includes one or more processor devices of one or more computing devices.

(14) The computing system **10** includes one or more content provider(s) **20**, which provide video content to a broadcaster system **22**. The broadcaster system **22** is configured to transmit the video content as a video broadcast **24** to one or more end user devices **26** of one or more end users. For example, the broadcaster system **22** may include over the air transmission, cable transmission, IPTV (Internet Protocol Television), DTH (direct to home), DTT (digital terrestrial television), OTT (over the top) streaming, MVPD (multichannel video programming distributor), or the like. The video broadcast **24** may be an episode of a television series, an episode of a mini-series, a movie, or the like.

(15) The broadcaster system **22** may transmit EPG metadata **28** or other broadcast information to an entertainment programming system **30** (may also be referred to as an Electronic Programming Guide (EPG)), such as Gracenote. The entertainment programming system **30** provides entertainment metadata, which may be directed to music, video, and sports, or the like. Entertainment metadata may include EPG metadata **28**, which may also be referred to as an interactive programming guide (IPG) metadata. EPG metadata **28** provides users of television,

radio, and other media applications with continuously updated menus providing scheduling information for current and upcoming broadcast programming. EPG metadata **28** is directed to the video broadcast **24** and provides information and data relevant thereto. For example, EPG metadata **28** may include content information **32**, an image file **34**, and/or a broadcast instant **36** (may also be referred to as a broadcast instance). The content information **32** may include the title, description, cast list, or the like. For example, content information **32** for a movie may include the title, logline, lead actors, genre, or the like. The image file **34** provides a visual image associated with the video broadcast **24**. For example, for a movie, the image file **34** may include a movie poster. The broadcast instant **36** provides the date and/or time that the video broadcast **24** will initially broadcast.

(16) An origin computing device **38** sends a VOD request **40** with a program ID **42** that uniquely identifies a video broadcast **24** that has not yet been previously broadcast and is not yet available through video on demand (VOD). In certain embodiments, the program ID **42** includes a TMS ID, which may also be referred to as Gracenote IDs. TMS IDs are standard identification for cross-platform linking and advanced search and discovery across video content. TMS IDs facilitate video discovery platforms and on-screen guides, enabling linking to schedule data and on-demand catalogs.

(17) The VOD generator **14** receives the VOD request **40** and retrieves the EPG metadata **28** from the entertainment programming system **30**. In certain embodiments, the VOD generator **14** determines whether the VOD request **40** is for a future, current, or past broadcast. If the VOD request **40** is for a past broadcast or a current broadcast, the VOD generator **14** rejects the VOD request **40**. In certain embodiments, if the VOD request **40** is for a current broadcast, the VOD generator **14** informs the origin computing device **38** that the VOD request may only be partially fulfilled.

(18) If the VOD request **40** is for a future broadcast, the VOD generator **14** proceeds to generate VOD metadata **43** based on the EPG metadata **28** received from the entertainment programming system **30**. The VOD metadata **43** may include, for example, the title, index of scenes, and/or business rules as to display, copy, or sale of the video broadcast **24** or the like. The VOD metadata **43** may include an Asset Distribution Interface (ADI) file and/or Extensible Markup Language (XML) file. An asset is a combination of content, which is a physical media file combined with the necessary metadata required to use the content for a given application. A package is a bundle of assets delivered, tracked, and managed as a unit for distribution and hand-off. ADI is used to define distribution of assets over a network interface, where assets are contained in a package that is moved from an Asset Distribution System (ADS) to an Asset Management System (AMS). Further, ADI is used to provide block updates to previously distributed assets. For example, block updates may include metadata replacement, content replacement, adding a new child asset, and/or deleting an asset, or the like. XML may be used so that parsing routines may be as simple as possible. This also allows for easy extensions with respect to new metadata tag-value pairs. XML is a markup language that defines a set of rules for encoding documents in a format that is human-readable and machine-readable.

(19) The VOD generator **14** sends a DVR request **44** to a network digital video recording (NDVR) system **46**. In certain embodiments, the NDVR system **46** includes a Cisco Virtual Media Recorder. The DVR request **44** requests that the NDVR system **46** records the video broadcast **24**. In certain embodiments, the DVR request **44** includes an Application Programming Interface (API) call. The NDVR system **46** may be a cloud-based system that services recording requests from a plurality of users. In particular, the NDVR system **46** saves video broadcasts **24** to a service provider's data center rather than on a local computing device of the user, such as a personal DVR, set-top box, or the like. Local DVRs typically have a simultaneous recording limit with a local storage limit. The NDVR system **46** has a much larger simultaneous recording limit with a much larger storage limit. Accordingly, the NDVR system **46** is in communication with and receives recording requests from

a plurality of users. The NDVR system **46** processes the DVR request **44** and uses a scheduler **48** to schedule recording of the video broadcast **24** at the time of the broadcast. In certain embodiments, the NDVR system **46** is unable to differentiate the DVR request **44** of the VOD generator **14** from any other user. In other embodiments, the NDVR system **46** is able to differentiate the DVR request **44** of the VOD generator **14** and prioritizes the DVR request **44** of the VOD generator **14** over that of other users.

(20) In certain embodiments, at least some of the EPG metadata **28** may be obtained from the NDVR system **46** instead of from the entertainment programming system **30**. In particular, the VOD generator **14** may receive the VOD request **40** with the program ID **42** and forward the VOD request **40** with the program ID **42** to the NDVR system **46**. The NDVR system **46** can then retrieve EPG metadata **28** from the entertainment programming system **30** and forward at least a portion of the EPG metadata **28** to the VOD generator **14**.

(21) When the video broadcast **24** is broadcast, the NDVR system **46** generates a DVR video recording **50** based on the video broadcast **24**; thus, the NDVR system **46** records the video broadcast **24**. In certain embodiments, the DVR video recording **50** may be recorded in a plurality of video segments **52**-**1**-**52**-N (may be referred to in general as video segments **52**). For example, each video segment **52** may be less than 2 MB, less than 1 MB, or the like. In certain embodiments, the DVR video recording **50** may include at least 500 video segments **52**, at least 1,000 video segments **52**, or the like.

(22) In certain embodiments, the DVR video recording **50** and/or the video segments **52** are recorded as a Video Transport Stream (TS) file, such as an H.264 Dynamic Adaptive Streaming over HTTP (DASH) Video Transport Stream (TS) file. A TS file is a video stream file used to store streamed or broadcast video. TS files are often saved as multiple files. DASH may also be referred to as MPEG-DASH and is an adaptive bitrate streaming technique enabling high-quality streaming of media content over the Internet delivered from conventional HTTP web servers. DASH breaks content into a sequence of small segments, which are served over HTTP, where each segment contains a short interval of playback time of content that is potentially hours in duration. H.264 is a video compression standard based on block-oriented, motion-compensated integer-DCT coding. H.264 is commonly used for recording, compression, and distribution of video content, supporting resolutions up to and including 8K UHD.

(23) After or during the broadcast, the DVR video recording **50** is transmitted to the VOD generator **14**. In certain embodiments, the VOD generator **14** pulls the DVR video recording **50** from the NDVR system **46**. In other embodiments, the NDVR system **46** pushes the DVR video recording **50** to the VOD generator **14**. In certain embodiments, the NDVR system **46** notifies the VOD generator **14** as to completion of the DVR video recording **50** and identification as to the location where the DVR video recording **50** is stored. For example, in certain embodiments, the NDVR system **46** sends an internal Uniform Resource Identifier (URI) for the VOD generator **14** to locate the DVR video recording **50**. In this way, the VOD generator **14** can obtain the DVR video recording **50** without encryption. In particular, in certain embodiments, the DVR video recording **50** is obtained by obtaining a plurality of video segments **52**.

(24) Upon receiving the DVR video recording **50**, the VOD generator **14** matches the DVR video recording **50** with VOD metadata **43**, which may be previously prepared. As noted above, the VOD metadata **43** may be based on EPG metadata **28** received from the entertainment programming system **30**.

(25) The VOD generator **14** processes the DVR video recording **50** to generate a VOD video recording **50′**. Further, the VOD generator **14** generates a VOD package **54**, including the VOD video recording **50′**. As noted above, an asset is a combination of content, which is a physical media file combined with the necessary metadata required to use the content for a given application. A package is a bundle of assets delivered, tracked, and managed as a unit for distribution and hand-off. In certain embodiments, the VOD generator **14** may remove commercial

breaks within the DVR video recording **50**. Further, the VOD generator **14** may transcode or encode the DVR video recording **50**. In particular, the VOD generator **14** may translate the file format, the video, and/or the audio of the DVR video recording **50** to convert the DVR video recording **50** from one digital encoding to another.

(26) In certain embodiments, if the DVR video recording **50** includes a plurality of video segments **52**, the VOD generator **14** obtains the plurality of video segments **52** and then catenates the video segments **52** into a single video file forming the VOD video recording **50′**. In particular, the VOD generator **14** may catenate the plurality of video segments **52** of the video broadcast **24** to generate a VOD video recording **50′**. In certain embodiments, the VOD video recording **50′** may include catenated TS files forming a single video file. In particular, in certain embodiments, the VOD generator **14** receives H.264 DASH-TS files for the video segments **52** of the DVR video recording **50**. The VOD generator **14** then processes the H.264 DASH-TS files to generate a single H.264 Constant Bit Rate (CBR) file for the VOD video recording **50′**. Further, the VOD video recording **50′** may include a manifest file **61**, such as a Manifest.xml file. The manifest file **61** contains metadata for a group of accompanying files that are part of a set or coherent unit. In this case, the manifest file **61** contains metadata for the video segments **52**.

(27) In certain embodiments, the VOD video recording **50′** and/or manifest file **61** form a Tape Archive (TAR) file or the like. A TAR file is used to package files together for backup or distribution purposes. A TAR file contains multiple files stored in an uncompressed format along with metadata about the archive. In certain embodiments, the VOD package **54** includes an H.264 CBR file. CBR files are video files encoded at a constant bit rate and can use various compression algorithms.

(28) In certain embodiments, the VOD generator **14** generates a plurality of VOD packages **54**. For example, the VOD generator **14** may generate a first VOD package **54**, including a MPEG-2 file, and a second VOD package **54**, including a MPEG-4 file.

(29) The VOD generator **14** then transmits the VOD package **54** to a VOD distribution system **62** for distribution to a one or more end user devices **26** of one or more users. For example, the VOD distribution system **62** may include a content delivery network (CDN) using at least one of a ConvergeMedia Manager (CMM) or Multiscreen Delivery Management System (MDMS). CMM is an open platform for deploying VOD and other on-demand services. MDMS is a virtualized software platform that may provide video-on-demand workflow. In particular, MDMS may provide additional benefits such as offline transcoding, content management, VOD storage, or the like. The VOD distribution system **62** may include a Video Storage and Processing Platform (VSPP), which allows for the storage and stream out of VOD video files.

(30) In certain embodiments, the VOD distribution system **62** includes Mystro Back Office (MBO) to support MPEG-4 video and other end-user devices. The VOD distribution system **62** may include Spectrum TV App (STVA). Further, the VOD distribution system **62** may include vault storage, among other services.

(31) The above features and configurations reduce delays between the broadcast and the availability of a VOD package **54** by a VOD distribution system **62**.

(32) FIG. **2** is a flowchart illustrating processing steps using the system of FIG. **1**. The computing system **10** comprising one or more processor devices **16** receives a video on demand (VOD) request **40** for generating a VOD package **54** of a video broadcast **24** prior to a broadcast (**1000**). The computing system **10** retrieves EPG metadata **28** related to the video broadcast **24**, the EPG metadata **28** including a broadcast instant **36** (**1002**). The computing system **10** sends a digital video recording (DVR) request **44** to a network digital video recording (NDVR) system **46** to record the video broadcast **24** (**1004**). The computing system **10** obtains a video recording of the video broadcast **24** generated by the NDVR system **46** after the broadcast (**1006**). The computing system **10** generates a VOD package **54** of the video broadcast **24**, the VOD package **54** including the video recording and VOD metadata **43** of the video recording (**1008**). The computing system **10**

sends the VOD package **54** of the video broadcast **24** toward a VOD system to distribute the VOD package **54** (**1010**).

(33) FIG. **3** is a message sequence diagram illustrating example messages communicated between and actions taken by several of the elements illustrated in FIG. **1**, according to one embodiment. The origin computing device **38** sends a VOD request **40** to a VOD generator **14** (**2000**). The VOD generator **14** retrieves EPG metadata **28** from the entertainment programming system **30** (**2002**). The VOD generator **14** generates a DVR request **44** based on the EPG metadata **28** (**2004**). The VOD generator **14** sends the DVR request **44** to record the video broadcast **24** to an NDVR system **46** (**2006**). The NDVR system **46** generates a DVR video recording **50** of the video broadcast **24** (**2008**). The VOD generator **14** obtains the DVR video recording **50** from the NDVR system **46** (**2010**). The VOD generator **14** generates a VOD package **54** of the video broadcast **24** including the VOD video recording **50**′ and VOD metadata **43** of the VOD video recording **50**′ (**2012**). The VOD generator **14** sends the VOD package **54** to the VOD distribution system **62** (**2014**).

(34) FIG. **4** is a block diagram of a computing device **80** containing components suitable for implementing any of the processing devices disclosed herein. The computing device **80** includes a processor device **82**, a system memory **84**, and a system bus **86**. The system bus **86** provides an interface for system components including, but not limited to, the system memory **84** and the processor device **82**. The processor device **82** can be any commercially available or proprietary processor.

(35) The system bus **86** may be any of several types of bus structures that may further interconnect to a memory bus (with or without a memory controller), a peripheral bus, and/or a local bus using any of a variety of commercially available bus architectures. The system memory **84** may include non-volatile memory **88** (e.g., read-only memory (ROM), erasable programmable read-only memory (EPROM), electrically erasable programmable read-only memory (EEPROM), etc.), and volatile memory **90** (e.g., random-access memory (RAM)). A basic input/output system (BIOS) **92** may be stored in the non-volatile memory **88** and can include the basic routines that help transfer information between elements within the computing device **80**. The volatile memory **90** may also include a high-speed RAM, such as static RAM, for caching data.

(36) The computing device **80** may further include or be coupled to a non-transitory computer-readable storage medium such as a storage device **94**, which may comprise, for example, an internal or external hard disk drive (HDD) (e.g., enhanced integrated drive electronics (EIDE) or serial advanced technology attachment (SATA)), HDD (e.g., EIDE or SATA) for storage, flash memory, or the like. The storage device **94** and other drives associated with computer-readable media and computer-usable media may provide non-volatile storage of data, data structures, computer-executable instructions, and the like.

(37) A number of modules can be stored in the storage device **94** and in the volatile memory **90**, including an operating system **96** and one or more program modules, which may implement the functionality described herein in whole or in part. All or a portion of the examples may be implemented as a computer program product **98** stored on a transitory or non-transitory computer-usable or computer-readable storage medium, such as the storage device **94**, which includes complex programming instructions, such as complex computer-readable program code, to cause the processor device **82** to carry out the steps described herein. Thus, the computer-readable program code can comprise software instructions for implementing the functionality of the examples described herein when executed on the processor device **82**. The processor device **82**, in conjunction with the network manager in the volatile memory **90**, may serve as a controller or control system for the computing device **80** that is to implement the functionality described herein.

(38) The computing device **80** may also include one or more communication interfaces **100**, depending on the particular functionality of the computing device **80**. The communication interfaces **100** may comprise one or more wired Ethernet transceivers, wireless transceivers, fiber, satellite, and/or coaxial interfaces by way of non-limiting examples.

(39) Those skilled in the art will recognize improvements and modifications to the preferred embodiments of the disclosure. All such improvements and modifications are considered within the scope of the concepts disclosed herein and the claims that follow.

Claims

1. A method, comprising: receiving, by a network digital video recording (NDVR) system, from a video on demand (VOD) generation computing system, a digital video recording (DVR) request to record a video broadcast at a future point in time; scheduling, by the NDVR system, a recording of the video broadcast at the future point in time; generating, by the NDVR system, a video recording based on the video broadcast, the video recording comprising a plurality of video segments; sending, by the NDVR system to the VOD generation computing system, a notification indicating that the video recording is complete; and sending, by the NDVR system, the video recording to the VOD generation computing system to generate a VOD package of the video broadcast based on the plurality of video segments.
2. The method of claim 1, further comprising: receiving, by the NDVR system, a plurality of DVR requests from a plurality of users; differentiating, by the NDVR system, a DVR request of the plurality of DVR requests from the plurality of DVR requests; and prioritizing, by the NDVR system, the DVR request over the plurality of DVR requests.
3. The method of claim 1, wherein the notification comprises an internal Uniform Resource Identifier (URI) of a storage location of the video recording.
4. The method of claim 1, further comprising: retrieving, by the NDVR system, EPG metadata related to the video broadcast from an entertainment programing system.
5. The method of claim 4, further comprising: sending, by the NDVR system, at least a portion of the EPG metadata to the VOD generation computing system.
6. The method of claim 5, wherein the EPG metadata includes an image file associated with the video broadcast.
7. The method of claim 1, wherein the DVR request comprises an Application Programming Interface (API) call from the VOD generation computing system to the NDVR system.
8. The method of claim 1, wherein the DVR request comprises a program identification (ID) uniquely identifying the video broadcast.
9. The method of claim 1, wherein the video broadcast has not been previously broadcast and is not available through video on demand (VOD).
10. The method of claim 1, wherein the video broadcast comprises a television episode or a movie.
11. The method of claim 1, wherein each of the plurality of video segments is less than 2 megabytes.
12. The method of claim 1, wherein the plurality of video segments comprises at least 500 video segments.
13. The method of claim 1, wherein the plurality of video segments comprises a Video Transport Stream (TS) file.
14. The method of claim 1, wherein the plurality of video segments comprises an H.264 Dynamic Adaptive Streaming over HTTP (DASH) Video Transport Stream (TS) file.
15. The method of claim 1, wherein the VOD package of the video broadcast comprises a single video file comprising a catenation of the plurality of video segments.
16. The method of claim 1, wherein the NDVR system is operable to receive recoridng requests from the VOD generation computing system and is operable to receive recording requests from a plurality of end user devices.
17. A computing system comprising: one or more processor devices of one or more computing devices, the one or more processor devices configured to: receive, from a video on demand (VOD) generation computing system, a digital video recording (DVR) request to record a video broadcast

at a future point in time; schedule a recording of the video broadcast at the future point in time; generate a video recording based on the video broadcast, the video recording comprising a plurality of video segments; send, to the VOD generation computing system, a notification indicating that the video recording is compete; and send the video recording to the VOD generation computing system to generate a VOD package of the video broadcast based on the plurality of video segments.

18. The computing system of claim 17, wherein the one or more processor devices are further configured to: receive a plurality of DVR requests from a plurality of users; differentiate a DVR request of the plurality of DVR requests from the plurality of DVR requests; and prioritize the DVR request over the plurality of DVR requests.

19. A computer program product comprising a non-transitory computer-readable storage medium and including instructions to cause one or more processor devices of a network digital video recoridng (NDVR) system to: receive, from a video on demand (VOD) generation computing system, a digital video recording (DVR) request to record a video broadcast at a future point in time; schedule a recording of the video broadcast at the future point in time; generate a video recording based on the video broadcast, the video recording comprising a plurality of video segments; send, to the VOD generation computing system, a notification indicating that the video recording is complete, and send the video recording to the VOD generation computing system to generate a VOD package of the video broadcast based on the plurality of video segments.